CLEAN DEVELOPMENT MECHANISM
PROGRAM ACTIVITY DESIGN DOCUMENT FORM (CDM-CPA-DD)
Version 01

CONTENTS

Annexes

NOTE:

(i) This form is for the submission of CPAs that apply a large scale methodology using provisions of the proposed PoA.

(ii) The coordinating/managing entity shall prepare a CDM Programme Activity Design Document (CDM-CPA-DD)[1,2] that is specified to the proposed PoA by using the provisions stated in the PoA DD. At the time of requesting registration the PoA DD must be accompanied by a CDM-CPA-DD form that has been specified for the proposed PoA, as well as by one completed CDM-CPA-DD (using a real case). After the first CPA, every CPA that is added over time to the PoA must submit a completed CDM-CPA-DD.

[1] The latest version of the template form CDM-CPA-DD is available on the UNFCCC CDM web site in the reference/document section.

[2] At the time of requesting validation/registration, the coordinating managing entity is required to submit a completed CDM-POA-DD, the PoA specific CDM-CPA-DD, as well as one of such CDM-CPA-DD completed (using a real case).

SECTION A. General description of CDM programme activity (CPA)

A.1. Title of the CPA:

Name of the CPA
- Version: 01.01
- Date: 24/4/2012

A.2. Description of the CPA:

XXX CPA (hereafter as the CPA) is implemented by XX Company at XX Coal Mine.

XX Coal Mine has an annual production capacity of XX Mt. In XX Coal Mine ventilation is/is not enough to dilute the methane concentration of the airflow in the underground work area to levels below 0.75% as stipulated in the Safety Regulations. Therefore, coal mine methane is not/also drained from the underground employing gas drainage system.

XXX CPA (the CPA) will involve the following options:

(i) Capture and flaring of the methane
(ii) Capture of the methane for use in electricity generation for the grid
(iii) Capture of the methane for compression and use in motivate power
(iv) Capture of the methane for transfer into a gas pipeline for off site use
(v) Continued venting of ventilation air methane
(vi) Combination of (i)-(v)

Methane captured as VAM will remain vented to the atmosphere (BAU) but CMM and CBM in either underground or opencast or a combination thereof shall be captured and destroyed by one of the methods (i)-(vi) above.

There are no legal requirements for capture of methane in the mine. Methane is released in the atmosphere in the business as usual (BAU) activity, which is also the identified baseline scenario.

The CPA will reduce greenhouse gas emissions by destroying methane through a number of methods generating heat and electricity for the grid.

Current and prospective situation of recovered gas emission is presented in Annex-3 Table-A-1.
Information on volume and methane concentration of recovered gas is presented in Annex-3 Table-A-2.
Composition of recovered gas is presented in Annex-3 Table-A-3.

When the CPA is fully operated, xxx kg of methane will be destroyed per day

Above description is changed according to options included in the CPA.

The CPA will reduce greenhouse gas emission by destroying methane, 25[3] times more potent a greenhouse gas than CO2, by oxidation and replacement of electricity from the GRID (only with power generation option). XXX,XXX tCO2e/y of emission reductions are achieved every year, thus resulting in X,XXX,XXX tCO2e of emission reductions during the each 7 year crediting period.

A.3. Entity/individual responsible for CPA:

The CPA implementer/operator is XXXXXXX

A.4. Technical description of the CPA:

A.4.1. Identification of the CPA:

>>CPA00XX

A.4.1.1. Host Party:

>>
Republic of South Africa

A.4.1.2. Geographic reference of other means of identification allowing the unique identification of the CPA (maximum one page):

XX Coal Mine is located near XX City, XX Province, South Africa. The plant will be built at XX Coal Mine, at latitude XX°XX′XX" north and longitude XX°XX′XX" east.

Figure-1 Location of the project site

The contact details of the CPA implementer/operator are as follows:

Name of the CPA Implementer/operator	
Address	
Email	
TEL	
FAX	

>> Geographic reference or other means of identification[4], Name/contact details of the entity/individual responsible for the CPA , e.g. in case of stationary CPA geographic reference, in case of mobile CPAs means such as registration number, GPS devices.

[3] IPCC 2007 value applicable in 2013

A.4.2. Duration of the CPA:

A.4.2.1. Starting date of the CPA:

dd/mm/yyyy

The starting date of the CPA is the earliest of the date(s) on which the implementation or construction or real action of the CPA begins.

A.4.2.2. Expected operational lifetime of the CPA:

21 years

A.4.3. Choice of the crediting period and related information

Renewable crediting period

A.4.3.1. Starting date of the crediting period:

>>
dd/mm/yyyy or the date of inclusion of the CPA to the PoA, whichever is later.

A.4.3.2. Length of the crediting period, first crediting period if the choice is renewable CP:>

7 years

NOTE: Please note that the duration of crediting period of any *CPA* shall be limited to the end date of the *PoA* regardless of when the CPA was added..

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

The annual estimation of emission reductions are XXX,XXX tCO2e. Over the chosen crediting period of 7 years, the total emission reductions are therefore expected to amount to X,XXX,XXX tCO2e.

Estimated annual emission reductions are given in Table-1.

Table-1 Estimated annual emission reductions from the CPA>>

Year	Annual estimation of Emission reductions (tCO2e)
20XX	XXX,XXX

20XX	XXX,XXX
20XX	XXX,XXX
20XX	XXX,XXX
20XX	XXX,XXX
20XX	XXX,XXX
20XX	XXX,XXX
Total emission reductions (tCO2e)	X,XXX,XXX
Total number of crediting years	7
Annual average over the crediting period of estimated reductions (tCO2e)	XXX,XXX

A.4.5. Public funding of the CPA:

No public funding from Parties included in Annex I countries is involved.

A.4.6. Confirmation that CPA is neither registered as an individual CDM project activity nor is part of another Registered PoA:

In order to avoid double accounting and to ensure that those operating the CPA are aware of and have agreed that their activity is being subscribed to the PoA, the implementing entity of a CPA has, in accordance with the eligibility criteria stipulated in section A.4.2.2 of the CDM-PoA-DD, confirmed with a written statement that:

(i) The CPA and all the equipment to be installed under the CPA have not been and will not be registered as a single CDM project activity nor as a CPA under another PoA.

(ii) The implementing entity is aware that the CPA will be subscribed to the present PoA.

It can ensure that the CPA have not been and will not be registered as a single CDM project activity nor as a CPA under another PoA. CME will check the CPA against the eligibility criteria and other information such as the DNA website and UNFCCC website to confirm no double accounting will occur.

SECTION B. Eligibility of CPA and Estimation of emissions reductions

B.1. Title and reference of the Registered PoA to which CPA is added:

Capture and combustion of Methane in coal mines (Ref. No.:XXXX)

B.2. Justification of the why the CPA is eligible to be included in the Registered PoA :

The proposed CPA complies with all of the eligibility criteria that are described in A.4.2.2. of CDM-PoADD. The justifications are given as follows:

1) The geographic boundary of a CPA lies within Republic of South Africa;

The geographic boundary of the CPA includes XX Airshaft and extraction station in XX Coal Mine, CMM and CBM wells, pipelines, flaring units, electricity plant and related equipments, and the Power Grid (XXXX Grid). As all components of the boundary are located in XX Province, hence, the geographical boundary of the CPA lies within the geographical boundary of the proposed PoA.

2) A CPA will be checked by CME through dedicated management system to avoid double counting of emission reductions;

The CME, Environmental Intermediaries & Trading Group Limited, has checked the CPA through dedicated management system to avoid double counting of emission reductions.

3) A CPA reduces GHG emission by destroying methane from underground and open cast coal mines using a range of technologies which otherwise have been released in the atmosphere. And a CPA adopts one of following options or combination of them for use of recovered heat energy:
- *(i) Flaring of the methane;*
- *(ii) Combustion to generate electricity for the mine*
- *(iii) Combustion to generate electricity for the grid*
- *(iv) Residual heat from combustion used to displace heating power*
- *(v) Compression for use in generating motive power*
- *(vi) Pipelining to another location for use;*

The CPA introduces flaring units and engines to destroy methane which otherwise have been released in the atmosphere. The CPA adopts option (X) or combination of option (select the options).

4) The start date (defined in the Glossary of CDM terms) of the CPA is not prior to the commencement of validation of the PoA;

The start date of the CPA is not prior to the commencement of validation of PoA.

5) Local stakeholder consultations and environmental impact analysis will be carried out for each CPA.

The CPA has carried out the local stakeholder consultations and environmental impact analysis.

6) A CPA does not involve any official development assistance or does not result in a diversion of official development assistance.

The CPA does not involve any official development assistant or dose not result in a diversion of official development assistance.

7) A CPA should meet the applicability criteria of the consolidated methodology ACM0008 V7;

ACM0008 V7 defines the applicability of this methodology. The following Table-2 and Table-3 explain the reason why the methodology applies to the CPA:

Table-2 Comparison of extraction components of the CPA with applicability of ACM0008 V7

ACM0008 V7 Applicability	Extraction Components of a CPA
Surface drainage boreholes to capture CBM associated with mining activities	The proposed CPA involves the extraction of CBM.
Underground boreholes in the mine to capture pre mining CMM	Included
Surface goaf wells, underground boreholes, gas drainage galleries or other goaf gas capture techniques, including gas from sealed areas, to capture post mining CMM	Underground boreholes, gas drainage galleries and some other goaf gas capture techniques are adopted to capture the post mining CMM.
Ventilation air methane that would normally vented	Excluded remaining vented to the atmosphere as BAU

Table-3 Comparison of the utilization components of the CPA with applicability of ACM0008 V7

ACM0008 V7 Applicability	Utilization Components of a CPA
The methane is captured and destroyed through flaring	flaring is involved in the project
The methane is captured and destroyed through flameless oxidation with or without utilization of the thermal energy	No flameless oxidizers will be used in this project
The methane is captured and destroyed through utilization to produce electricity, motive power and/or thermal energy; emission reductions may or may not be claimed for displacing or avoiding energy from other sources	The methane is captured and destroyed through utilization to produce electricity and/or thermal energy and/or motive power and/or piped for external use; emission reduction for displacing electricity from the Grid is claimed as its displacement of fossil fuels for motive power as is the displacement of gas used in the pipeline grid.
The remaining share of the methane, to be diluted for safety reason, may still be vented	Part of CMM/VAM is still vented in the project.
All the CBM or CMM captured by the project should either be used or destroyed, and cannot be	All of the VAM captured by the project will be vented.

vented	

Table-4 Comparison of the utilization components of each CPA with applicability of ACM0008 V7 for open cast mines

ACM0008 V7 Applicability	Utilization Components of a CP
The mine should have been a working concession for 3 years	Only mines that have been a concession for 3 years will be included
The methane is captured and destroyed through use of flameless oxidizers	Excluded. CPA will not use flameless oxidizers to destroy methane
Only pre mine drainage from wells placed within the area to be mined are considered as eligible for crediting	Included
Such pre mine drainage well life may be credited up to but no more than ten years prior to actual mining or the date of issuance of mining concession whichever is later	Included
Avoided emission from methane extracted should only be credited in the year in which the seam is mined through the zone of influence or the de stressing zone	Included

ACM0008 V7 also define the types of activities that could not be applied to this methodology. The CPA does not apply to any of those activities as indicated in Table-5.

Table-5 Comparison of the CPA with incompatibility of ACM0008 V7

ACM0008 V7 Inapplicability	CPA
Capture methane from abandoned/decommissioned coal mines	The project is implemented in a working coal mine
Capture/use of virgin coal-bed methane, e.g. methane of high quality extracted from coal seams independently of any mining activities	All of methane captured/used in the project is dependent with mining activity, CBM captured outside the zone of influence of the mine is excluded for CER but emissions from the methane are included in the project emissions
Use CO_2 or any other fluid/gas to enhance CBM drainage before mining takes place	No enhancement of CBM extraction is employed

It can be concluded from the above analysis that the Approved CDM Methodology ACM0008 V7 is applicable to the CPA.

8) A CPA implementer/operator confirms in a written statement that:

(i) All systems are to be newly installed under a CPA is not and will not be part of another CDM project or PoA;

(ii) They are aware and agree with the inclusion of a CPA to the proposed PoA.

The CPA implementer has already submitted the written statement for above confirmation.

9 A CPA is/is not constructed at an opencast mine. CBM option for methane gas extraction through surface wells is/is not included;

The CPA is/is not constructed at an opencast mine. CBM option is/is not included in the CPA.

10) For the purpose of determining project emissions, a CPA should meet following requirements:

(i) A CPA does not include the combustion of methane in a flameless oxidiser;

The CPA does not include the combustion of methane in a flameless oxidiser;

11) For the purpose of determining baseline emissions, a CPA should meet following requirements:

(i) In the baseline scenario, all of the methane is released into the atmosphere without destruction and utilization;

All methane is released into the atmosphere without destruction and utilization in the baseline.

12) A CPA meets following criteria for assessing additionality:

(i) The IRR of the CPA is calculated based on updated input parameters and assumptions and the method provided in section E.5.1 of CDM-PoA-DD;

The IRR of the CPA is calculated according to E.5.1 of CDM-PoA-DD, based on updated input parameters and assumptions as shown in the Table-5.

Table-5 Key parameters and assumptions of investment analysis for the CPA

Item	Value	Source
Total Investment	Million Rand	FS Report
O & M Cost	Million Rand/year	FS Report
Power Saved Amount	GWh/year	FS Report
Power Unit Price (including VAT)	Rand/kWh	FS Report
Coal Saved Amount	t/year	FS Report
Coal Unit Price (including VAT)	Rand/t	FS Report
Project Lifetime	years	FS Report
Depreciable Period	years	FS Report
Residual Value Rate	%	FS Report
Income Tax Rate	%	FS Report
VAT (for power)	%	FS Report

VAT (for heat)	%	FS Report
City Maintenance and Construction tax rate	%	FS Report
Education additive charge rate	%	FS Report

The result of the IRR calculation is presented in Table-6.

Table-6 Results of investment analysis

Project IRR without CER revenues	XX.XX %
Project IRR with CER revenues	XX.XX %

(ii) According to the Guidelines on the Assessment of Investment Analysis EB62 Report Annex 5 version 5.0 15/7/2011 the threshold IRR after taxes in South Africa is 11.9% for Group 2 subclass 8 mining/mineral production. Benchmark IRR chosen by the PDDs for CMM power generation projects uploaded on the UNFCCC website varies from 8% to over 15%. In order to be conservative, 11.9% benchmark (Project IRR after tax) is applied.*;*

As indicated in the above table, the IRR without CER revenues is XX.XX %, falling much less than the 11.9% benchmark. Thus the proposed project activity is considered to be not financially attractive at all without CER revenues.

Flaring is not required and provides not financial return to the mine. There is no compulsion from a safety or other perspective for pre draining CBM in an open cast mine.

(iii) The financial additionality is demonstrated by showing that the calculated IRR (excluding CDM) below the applied investment benchmark after carrying out sensitivity analysis.

A sensitivity analysis was carried out according to E.5.1 of the CDM-PoA-DD. The result shows that IRR is still below the applied investment benchmark as indicated in Table-7. It can therefore be concluded that the proposed project activity is not financially attractive at all in the absence of the CDM.

Table-7 Result of sensitivity analysis

Parameters	10%	0	-10%
Fixed Assets Cost			
O&M Costs			
Power Saved Amount and Power Unit Price			
Heat Saved Amount and Heat Unit Price			

B.3. Assessment and demonstration of additionality of the CPA, as per eligibility criteria listed in the Registered PoA:

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Key criteria listed in E.5.2. of the CDM-PoA-DD for assessing additionality of a CPA are as follows:

Criteria related to the investment analysis

To demonstrate that a CPA under the proposed PoA is financially not attractive, the following three steps should be checked upon inclusion the CPA to the proposed PoA as per the Eligibility Criteria 13):

(i) The IRR of the CPA is calculated based on updated input parameters and assumptions and the method provided in section E.5.1 of CDM-PoA-DD;

(ii) According to the Guidelines on the Assessment of Investment Analysis EB62 Report Annex 5 version 5.0 15/7/2011 the threshold IRR after taxes in South Africa is 11.9% for Group 2 subclass 8 mining/mineral production. Benchmark IRR chosen by the PDDs for CMM power generation projects uploaded on the UNFCCC website varies from 8% to over 15%. In order to be conservative, 11.9% benchmark (Project IRR after tax) is applied.;

(iii) The financial additionality is demonstrated by showing that the calculated IRR (excluding CDM) is below the applied investment benchmark after carrying out sensitivity analysis.

These criteria are satisfied during the justification of why the CPA is eligible to be included in the Registered PoA, for 13th eligibility criterion, in Section B.2. The CPA is therefore regarded as not financially attractive.

Criteria related to the common practice analysis

There is only one criteria related the common practice analysis. That is, "A CPA reduces GHG emission by destroying methane from coal mines which otherwise have been released in the atmosphere." The CPA under the proposed PoA destroys methane using either flaring and/or electricity generation and/or compression for use in motive power and/or pipeline to off site use, which is included in the Eligibility Criteria 3) for inclusion of a CPA in the proposed PoA.

If the CPA satisfied this criterion, it would be concluded that similar activity cannot be observed in South Africa without CDM support, as described in Step-4, E.5.1. of the CDM-PoA-DD.

Based on the above analysis, it is demonstrated that the CPA under the proposed PoA is additional.

B.4. Description of the sources and gases included in the project boundary and proof that the CPA is located within the geographical boundary of the registered PoA.

>>

The boundary of the CPA includes the XX Coal Mine, CBM wells, flaring units, pipelines and related equipments, and the Power Grid (XXXX Grid). The project boundary for this project activity is presented

in Figure-2, and the overview on emissions sources including in or excluded from the project boundary is presented in Table-8.

Figure-2 Project boundary of the CPA

Table-8 Overview on emissions sources included in or excluded from the project boundary

Overview on emissions sources included in or excluded from the project boundary

	Source	**Gas**		**Justification / Explanation**
Baseline Emissions	Emissions of methane as a result of venting	CH_4	Included	. Main emission source. However, certain sources of methane may not be included, as noted in the applicability conditions; . Recovery of methane from coal seams will be taken into account only when the particular seams are mined through or disturbed by the mining activity; . Recovery of methane from abandoned coalmines will not be included; . The amount of methane to be released depends on the amount used (for local consumption, gas sales, etc) in the baseline
	Emissions from destruction of methane in the baseline	CO_2	Included	. Considers any flaring or use for heat and power in the baseline scenario
		CH_4	Excluded	. Excluded for simplification. This is conservative
		N_2O	Excluded	. Excluded for simplification. This is conservative
	Grid electricity generation (electricity provided to the grid)	CO_2	Included	. Only CO_2 emissions associated to the same quantity of electricity than electricity generated as a result of the use of methane included as baseline emission will be counted; . Use of combined margin method as described in "Tool to calculate the emission factor for an electricity system" should be made
		CH_4	Excluded	. Excluded for simplification. This is conservative
		N_2O	Excluded	. Excluded for simplification. This is conservative
	Captive power and/or heat, and vehicle fuel	CO_2	Included	. Only when the baseline scenario involves such usage

	Source	Gas		Justification / Explanation
	use	CH_4	Excluded	. Excluded for simplification. This is conservative
		N_2O	Excluded	. Excluded for simplification. This is conservative
Project Emissions	Emissions of methane as a result of continued venting	CH_4	Excluded	. Only the change in CMM/CBM/VAM emissions release will be taken into account, by monitoring the methane used or destroyed by the project activity
	On-site fuel consumption due to the project activity, including transport of the gas	CO_2	Included	. If additional equipment such as compressors or fans are required on top of what is required for purely drainage, energy consumption from such equipment should be accounted for
		CH_4	Excluded	. Excluded for simplification. This emission source is assumed to be very small
		N_2O	Excluded	. Excluded for simplification. This emission source is assumed to be very small
	Emissions from methane destruction	CO_2	Included	. From the combustion of methane in a flare, or heat/power generation
	Emissions from NMHC destruction	CO_2	Included	. From the combustion of NMHC in a flare or flameless oxidizer, or heat/power generation, if NMHC accounts for more than 1% by volume of extracted coal mine gas
	Fugitive emissions of unburned methane	CH_4	Included	. Small amounts of methane will remain unburned in flares, flameless oxidizers or heat/power generation
	Fugitive methane emissions from on-site equipment	CH_4	Excluded	. Excluded for simplification. This emission source is assumed to be very small
	Fugitive methane emissions from gas supply pipeline or in relation to use in vehicles	CH_4	Excluded	. Excluded for simplification. However taken into account among other potential leakage effects (see leakage section)
	Accidental methane release	CH_4	Excluded	. Excluded for simplification. This emission source is assumed to be very small

The geographical boundary of the proposed PoA includes all provinces of South Africa. The geographical site of the CPA is located in XX Province as indicated in Figure-1, A.4.1.2., thus the CPA is located within the geographical boundary of the proposed PoA.

B.5. Emission reductions:

B.5.1. Data and parameters that are available at validation:

Data from the flaring tool

Parameter	SI Unit	Description	Value
MM_{CH4}	kg/kmol	Molecular mass of methane	16.04
MM_{CO}	kg/kmol	Molecular mass of carbon monoxide	28.01
MM_{CO2}	kg/kmol	Molecular mass of carbon dioxide	44.01
MM_{O2}	kg/kmol	Molecular mass of oxygen	32
MM_{H2}	kg/kmol	Molecular mass of hydrogen	2.02
MM_{N2}	kg/kmol	Molecular mass of nitrogen	28.02
AM_c	kg/kmol (g/mol)	Atomic mass of carbon	12
AM_h	kg/kmol (g/mol)	Atomic mass of hydrogen	1.01
AM_o	kg/kmol (g/mol)	Atomic mass of oxygen	16
AM_n	kg/kmol (g/mol)	Atomic mass of nitrogen	14.01
P_n	Pa	Atmospheric pressure at normal conditions	101 325
R_u	$Pa.m^3/kmol.K$	Universal ideal gas constant	8 314.472
T_n	K	Temperature at normal conditions	273.15
MF_{O2}	Dimensionless	O2 volumetric fraction of air	0.21
GWP_{CH4}	t_{CO2}/t_{CH4}	Global warming potential of methane	21
MV_n	$m^3/Kmol$	Volume of one mole of any ideal gas at normal	22.414

Data / Parameter:	GWP_{CH4}
Data unit:	tCO_2e/ tCH_4
Description:	Global warming potential of methane
Source of data:	IPCC 2007
Value of data applied for the purpose of calculating the expected emissions reductions in section B.5	25
Description of measurement methods and procedures to be applied:	*Ex ante*
QA/QC procedures:	
Any comment:	25 tCO_2e/tCH_4

Data / Parameter:	CEF_{CH4}
Data unit:	tCO_2e/tCH_4
Description:	Carbon emission factor for combusted methane
Source of data:	ACM0008 V7 default value
Value of data applied for the purpose of calculating the expected emissions reductions in section B.5	2.75
Description of measurement methods and procedures to be applied:	*Ex ante*
QA/QC procedures:	
Any comment:	44/16 = 2.75 tCO_2e/tCH_4

Data / Parameter:	EF_{ELEC}
Data unit:	tCO_2/MWh
Description:	CO_2 emission factor of the grid
Source of data:	Promethium carbon October 2011 study
Value of data applied for the purpose of calculating the expected emissions reductions in section B.5	1.04
Description of measurement methods and procedures to be applied:	Annually
QA/QC procedures:	
Any comment:	Calculated as per "Tool to calculate the emission factor for an electricity system"

Data / Parameter:	$EF_{OM,y}$
Data unit:	tCO_2/MWh
Description:	CO_2 Operating Margin emission factor of the grid
Source of data:	Promethium carbon October 2011 study
Value of data applied for the purpose of calculating the expected emissions reductions in section B.5	1.01
Description of measurement methods and procedures to be applied:	Annually or *ex ante*
QA/QC procedures:	
Any comment:	Calculated as per "Tool to calculate the emission factor for an electricity system"

Data / Parameter:	$EF_{BM,y}$
Data unit:	tCO_2/MWh
Description:	CO_2 Build Margin emission factor of the grid
Source of data:	Promethium carbon October 2011 study
Value of data applied for the purpose of calculating the expected emissions reductions in section B.5	1.06
Description of measurement methods and procedures to be applied:	Annually or *ex ante*
QA/QC procedures:	
Any comment:	Calculated as per "Tool to calculate the emission factor for an electricity system"

Data / Parameter:	Eff_{GAS}
Data unit:	-
Description:	Overall efficiency of methane destruction/oxidation through gas grid
Source of data:	IPCC
Value of data applied for the purpose of calculating the expected emissions reductions in section B.5	98.5%
Description of measurement methods and procedures to be applied:	*Ex ante*
QA/QC procedures:	
Any comment:	Set at 98.5% (IPCC)

Data / Parameter:	Eff_{ELEC}
Data unit:	%
Description:	Efficiency of methane destruction/oxidation in power plant
Source of data:	IPCC 2006
Value of data applied for the purpose of calculating the expected emissions reductions in section B.5	99.5%
Description of measurement methods and procedures to be applied:	*Ex ante*
QA/QC procedures:	
Any comment:	Set at 99.5%(IPCC)

Data / Parameter:	OXID
Data unit:	%
Description:	Oxidation
Source of data:	IPCC 2006
Value of data applied for the purpose of calculating the expected emissions reductions in section B.5	
Description of measurement methods and procedures to be applied:	Daily/continuous
QA/QC procedures:	
Any comment:	

Data / Parameter:	NCV_{ch4}
Data unit:	GJ
Description:	Net calorific value of methane
Source of data:	IPCC 2006
Value of data applied for the purpose of calculating the expected emissions reductions in section B.5	0.0359 GJ/m3
Description of measurement methods and procedures to be applied:	fixed
QA/QC procedures:	
Any comment:	

Data / Parameter:	NCV_{AF}
Data unit:	GJ
Description:	Net calorific value of alternate fuel
Source of data:	IPCC 2006
Value of data applied for the purpose of calculating the expected emissions reductions in section B.5	
Description of measurement methods and procedures to be applied:	fixed
QA/QC procedures:	
Any comment:	

Data / Parameter:	$TH_{BL,y}$
Data unit:	tCH_4
Description:	Projected annual baseline CMM/CBM demand for thermal energy uses
Source of data:	
Measurement procedures (if any):	
Monitoring frequency:	*Ex ante*
QA/QC procedures:	
Any comment:	Estimated by procedure defined in the corresponding baseline methodology

Data / Parameter:	d_k^{max}
Data unit:	
Description:	Scalar adjustment factor for day k, based on the seasonal load shape ($\Sigma\ d_k^{max} > 365$)
Source of data:	
Measurement procedures (if any):	
Monitoring frequency:	*Ex ante*
QA/QC procedures:	
Any comment:	

Data / Parameter:	$CBM_{BL,i,y}$
Data unit:	tCH_4
Description:	CBM that would have been captured, used and destroyed by use *i* in the baseline scenario in year *y*
Source of data:	
Measurement procedures (if any):	
Monitoring frequency:	Estimated *ex ante* at start of project
QA/QC procedures:	
Any comment:	

Data / Parameter:	$CMM_{BL,i}$
Data unit:	tCH_4
Description:	CMM that would have been captured, used and destroyed by use *i* in the baseline scenario in year *y*
Source of data:	
Measurement procedures (if any):	
Monitoring frequency:	Estimated *ex ante* at start of project
QA/QC procedures:	
Any comment:	

Data / Parameter:	$PMM_{BL,i}$
Data unit:	tCH_4
Description:	PMM that would have been captured, used and destroyed by use *i* in the baseline scenario in year *y*
Source of data:	
Measurement procedures (if any):	
Monitoring frequency:	Estimated *ex ante* at start of project
QA/QC procedures:	
Any comment:	

Data / Parameter:	$VAM_{BLi,y}$
Data unit:	tCH_4
Description:	VAM that would have been captured, used and destroyed by use *i* in the baseline scenario in year *y*
Source of data:	
Measurement procedures (if any):	
Monitoring frequency:	Estimated *ex ante* at start of project
QA/QC procedures:	
Any comment:	

Data / Parameter:	$CBMe_{i,.y}$
Data unit:	tCH_4
Description:	Eligible CBM captured, sent to and destroyed by use *i* in the project for year *y*
Source of data:	
Measurement procedures (if any):	
Monitoring frequency:	Yearly
QA/QC procedures:	
Any comment:	

Data / Parameter:	$CBM_{BL,i,y}$
Data unit:	tCH_4
Description:	CBM that would have been captured , sent to and destroyed by use *i* in the baseline scenario
Source of data:	
Measurement procedures (if any):	
Monitoring frequency:	Estimated *ex ante* at start of project
QA/QC procedures:	
Any comment:	

Data / Parameter:	$CMM_{BL, i,y}$
Data unit:	tCH_4
Description:	Pre-mining CMM that would have been captured , sent to and destroyed by use *i* in the baseline scenario in year *y*
Source of data:	
Measurement procedures (if any):	
Monitoring frequency:	Estimated *ex ante* at start of project
QA/QC procedures:	
Any comment:	

Data / Parameter:	$VAM_{BL, i,y}$
Data unit:	tCH_4
Description:	VAM that would have been captured , sent to and destroyed by use *i* in the baseline scenario in year *y*
Source of data:	
Measurement procedures (if any):	
Monitoring frequency:	Estimated *ex ante* at start of project
QA/QC procedures:	
Any comment:	

Data / Parameter:	$PMM_{BL, i,y}$
Data unit:	tCH_4

Description:	Post-mining CMM that would have been captured, sent to and destroyed by use *i* in the baseline scenario in year *y*
Source of data:	
Measurement procedures (if any):	
Monitoring frequency:	Estimated *ex ante* at start of project
QA/QC procedures:	
Any comment:	

B.5.2. Ex-ante calculation of emission reductions:

[this information is CPA specific and is therefore elaborated on in the specific CPA] refer E.6.2 of the POA

B.5.3. Summary of the ex-ante estimation of emission reductions:

Table-13 Summary table of emissions reductions

Year	Estimation of project activity emissions (tonnes of CO_2 e)	Estimation of baseline emissions (tonnes of CO_2 e	Estimation of leakage (tonnes of CO_2 e)	Estimation of overall emission reductions (tonnes of CO_2 e)
20xx				
20xx				
20xx				
20xx				
20xx				
20xx				
20xx				
Total (tonnes of CO_2 e)				

B.6. Application of the monitoring methodology and description of the monitoring plan:

B.6.1. Description of the monitoring plan:

>>

Data to be monitored

Data and parameters that are to be monitored in the CPA are as follows;

In addition to the parameters listed in the tables below, the provisions on data and parameters not monitored in the tools referred to in this methodology apply.

Data / Parameter:	$CONS_{ELEC,PJ}$
Data unit:	MWh
Description:	Additional electricity consumption for capture and use or destruction of methane, if any
Source of data:	Monitoring Data from CPA Operator
Value of data applied for the purpose of calculating the expected emissions reductions in section B.5	
Description of measurement methods and procedures to be applied:	Continuous via electricity meter
QA/QC procedures:	Meter checked maintained and calibrated to manufacturers standards
Any comment:	

Data / Parameter:	$CONS_{HEAT,PJ}$
Data unit:	GJ
Description:	Additional heat consumption for capture and use or destruction of methane
Source of data:	Monitoring Data from CPA Operator
Value of data applied for the purpose of calculating the expected emissions reductions in section B.5	
Description of measurement methods and procedures to be applied:	Continuous
QA/QC procedures:	
Any comment:	

Data / Parameter:	$CONS_{FossFuel,PJ}$
Data unit:	GJ
Description:	Additional fossil fuel consumption for capture and use or destruction of methane
Source of data:	Project site
Value of data applied for the purpose of calculating the expected emissions reductions in section B.5	
Description of measurement methods and procedures to be applied:	Continuous
QA/QC procedures:	
Any comment:	

Data / Parameter:	CEF_{ELEC}
Data unit:	tCO_2/MWh
Description:	Carbon emissions factor of electricity used by coal mine
Source of data:	
Value of data applied for the purpose of calculating the expected emissions reductions in section B.5	
Description of measurement methods and procedures to be applied:	*Ex ante*
QA/QC procedures:	
Any comment:	

Data / Parameter:	CEF_{HEAT}
Data unit:	tCO_2/GJ
Description:	Carbon emissions factor of heat used by coal mine
Source of data:	
Value of data applied for the purpose of calculating the expected emissions reductions in section B.5	
Description of measurement methods and procedures to be applied:	*Ex ante*
QA/QC procedures:	
Any comment:	

Data / Parameter:	$CEF_{FossFuel}$
Data unit:	tCO_2/GJ
Description:	Carbon emissions factor of fossil fuel used by coal mine
Source of data:	
Value of data applied for the purpose of calculating the expected emissions reductions in section B.5	
Description of measurement methods and procedures to be applied:	*Ex ante*
QA/QC procedures:	
Any comment:	Use of IPCC default or national values would suffice

Data / Parameter:	MM_{FL}
Data unit:	tCH_4
Description:	Methane measured sent to flare
Source of data:	
Value of data applied for the purpose of calculating the expected emissions reductions in section B.5	
Description of measurement methods and procedures to be applied:	Continuous
QA/QC procedures:	
Any comment:	Flow meters will record gas volumes, pressure and temperature. Density of methane under normal conditions of temperature and pressure is 0.67kg/m3 (Revised 1996 IPCC Reference Manual p 1.24 and 1.16)

Data / Parameter:	MM_{ELEC}
Data unit:	tCH_4
Description:	Methane sent to power plant
Source of data:	M
Value of data applied for the purpose of calculating the expected emissions reductions in section B.5	
Description of measurement methods and procedures to be applied:	Continuous
QA/QC procedures:	
Any comment:	Flow meters will record gas volumes, pressure and temperature. Density of methane under normal conditions of temperature and pressure is 0.67kg/m3 (Revised 1996 IPCC Reference Manual p 1.24 and 1.16)

Data / Parameter:	Eff_{ELEC}
Data unit:	%
Description:	Efficiency of methane destruction/oxidation in power plant
Source of data:	IPCC 2006
Value of data applied for the purpose of calculating the expected emissions reductions in section B.5	99.5%
Description of measurement methods and procedures to be applied:	*Ex ante*
QA/QC procedures:	
Any comment:	Set at 99.5%(IPCC)

Data / Parameter:	MM_{HEAT}
Data unit:	tCH_4
Description:	Methane sent to boiler
Source of data:	
Value of data applied for the purpose of calculating the expected emissions reductions in section B.5	
Description of measurement methods and procedures to be applied:	Continuous
QA/QC procedures:	
Any comment:	Flow meters will record gas volumes, pressure and temperature. Density of methane under normal conditions of temperature and pressure is 0.67kg/m3 (Revised 1996 IPCC Reference Manual p 1.24 and 1.16)

Data / Parameter:	Eff_{HEAT}
Data unit:	-
Description:	Efficiency of methane destruction/oxidation in heat plant
Source of data:	E
Value of data applied for the purpose of calculating the expected emissions reductions in section B.5	
Description of measurement methods and procedures to be applied:	*Ex ante*
QA/QC procedures:	
Any comment:	Set at 99.5%(IPCC)

Data / Parameter:	MM_{GAS}
Data unit:	tCH_4
Description:	Methane sent to gas grid for end users
Source of data:	M
Value of data applied for the purpose of calculating the expected emissions reductions in section B.5	
Description of measurement methods and procedures to be applied:	Continuous
QA/QC procedures:	
Any comment:	Flow meters will record gas volumes, pressure and temperature. Density of methane under normal conditions of temperature and pressure is 0.67kg/m3 (Revised 1996 IPCC Reference Manual p 1.24 and 1.16)

Data / Parameter:	Eff_{GAS}
Data unit:	-
Description:	Overall efficiency of methane destruction/oxidation through gas grid
Source of data:	IPCC
Value of data applied for the purpose of calculating the expected emissions reductions in section B.5	98.5%
Description of measurement methods and procedures to be applied:	*Ex ante*
QA/QC procedures:	
Any comment:	Set at 98.5% (IPCC)

Data / Parameter:	CEF_{NMHC}
Data unit:	
Description:	Carbon emission factor for combusted non methane hydrocarbons (various)
Source of data:	
Value of data applied for the purpose of calculating the expected emissions reductions in section B.5	
Description of measurement methods and procedures to be applied:	
QA/QC procedures:	
Any comment:	To be obtained through periodical analysis of the fractional composition of captured

Data / Parameter:	PC_{CH4}
Data unit:	%
Description:	Concentration (in mass) of methane in extracted gas (%), measured on wet basis
Source of data:	Concentration meters, optical and calorific
Value of data applied for the purpose of calculating the expected emissions reductions in section B.5	
Description of measurement methods and procedures to be applied:	Hourly/Daily
QA/QC procedures:	
Any comment:	To be measured on wet basis

Data / Parameter:	PC_{NMHC}
Data unit:	%
Description:	NMHC concentration (in mass) in extracted gas
Source of data:	Concentration meters, optical and calorific
Value of data applied for the purpose of calculating the expected emissions reductions in section B.5	
Description of measurement methods and procedures to be applied:	Annually
QA/QC procedures:	
Any comment:	To be counted if above 1% of gas composition

Data / Parameter:	PE_{MVent}
Data unit:	tCH_4
Description:	Emissions of methane vented to atmosphere during the project activity
Source of data:	
Value of data applied for the purpose of calculating the expected emissions reductions in section B.5	
Description of measurement methods and procedures to be applied:	Continuous
QA/QC procedures:	
Any comment:	This parameter is to include any methane vented to atmosphere through flares, in ventilation air methane as well as direct emissions through vents

Data / Parameter:	GWP_{CH4}
Data unit:	tCO_2e/ tCH_4
Description:	Global warming potential of methane
Source of data:	IPCC 2007
Value of data applied for the purpose of calculating the expected emissions reductions in section B.5	25
Description of measurement methods and procedures to be applied:	*Ex ante*
QA/QC procedures:	
Any comment:	25 tCO_2e/tCH_4

Data / Parameter:	CEF_{CH4}
Data unit:	tCO_2e/tCH_4
Description:	Carbon emission factor for combusted methane
Source of data:	ACM0008 V7 default value
Value of data applied for the purpose of calculating the expected emissions reductions in section B.5	2.75
Description of measurement methods and procedures to be applied:	*Ex ante*
QA/QC procedures:	
Any comment:	44/16 = 2.75 tCO_2e/tCH_4

Data / parameter:	R
Data unit:	m
Description:	Cumulative radius of zone of influence
Source of data:	c
Value of data applied for the purpose of calculating the expected emissions reductions in section B.5	
Description of measurement methods and procedures to be applied:	Annually
QA/QC procedures:	
Any comment:	

Data / Parameter:	V_w
Data unit:	m^3
Description:	Cumulative flow at well
Source of data:	
Value of data applied for the purpose of calculating the expected emissions reductions in section B.5	
Description of measurement methods and procedures to be applied:	
QA/QC procedures:	
Any comment:	Monitoring at each well should record gas flow, methane concentration, pressure, and temperature

Data / Parameter:	T
Data unit:	m coal
Description:	Thickness of all coal accessed by wells
Source of data:	
Value of data applied for the purpose of calculating the expected emissions reductions in section B.5	
Description of measurement methods and procedures to be applied:	Annually
QA/QC procedures:	
Any comment:	Depth of fractures into respective seams and casing used should be recorded at time of drilling

Data / Parameter:	ρ_{coal}
Data unit:	t/m^3
Description:	Density of locally mined coal
Source of data:	
Value of data applied for the purpose of calculating the expected emissions reductions in section B.5	
Description of measurement methods and procedures to be applied:	At start of each crediting period
QA/QC procedures:	
Any comment:	Default value is 1.4

Data / Parameter:	g_{coal}
Data unit:	m^3CH_4/t coal
Description:	Gas content of coal
Source of data:	
Value of data applied for the purpose of calculating the expected emissions reductions in section B.5	
Description of measurement methods and procedures to be applied:	At start of each crediting period
QA/QC procedures:	
Any comment:	

Data / Parameter:	n
Data unit:	Days
Description:	Number of days the selected well is operational
Source of data:	
Value of data applied for the purpose of calculating the expected emissions reductions in section B.5	
Description of measurement methods and procedures to be applied:	
QA/QC procedures:	
Any comment:	

Data / Parameter:	V_a
Data unit:	m^3/day
Description:	Average flow per day
Source of data:	
Value of data applied for the purpose of calculating the expected emissions reductions in section B.5	
Description of measurement methods and procedures to be applied:	
QA/QC procedures:	
Any comment:	

Data / Parameter:	V_c
Data unit:	m^3/day
Description:	Cumulative flow from all wells
Source of data:	
Value of data applied for the purpose of calculating the expected emissions reductions in section B.5	
Description of measurement methods and procedures to be applied:	
QA/QC procedures:	
Any comment:	Total flow from all boreholes measured at collection manifold using automatic remote monitoring of gas flow, methane concentration, pressure and temperature

Data / Parameter:	N
Data unit:	Days
Description:	Sum of days all wells operational
Source of data:	
Value of data applied for the purpose of calculating the expected emissions reductions in section B.5	
Description of measurement methods and procedures to be applied:	
QA/QC procedures:	
Any comment:	

Data / Parameter:	
Data unit:	Coordinates
Description:	Position of wells relative to mining plan
Source of data:	
Value of data applied for the purpose of calculating the expected emissions reductions in section B.5	
Description of measurement methods and procedures to be applied:	Annually
QA/QC procedures:	
Any comment:	Recorded in PDD *ex ante*. New drawing produced each year

Data / Parameter:	
Data unit:	Coordinates
Description:	Well profile
Source of data:	
Value of data applied for the purpose of calculating the expected emissions reductions in section B.5	
Description of measurement methods and procedures to be applied:	Annually
QA/QC procedures:	
Any comment:	Shows each well and zone of influence against latest mining plan

Data / Parameter:	
Data unit:	m
Description:	Well depth
Source of data:	
Value of data applied for the purpose of calculating the expected emissions reductions in section B.5	
Description of measurement methods and procedures to be applied:	At time of drilling
QA/QC procedures:	
Any comment:	Based on actual drilling records

Data / Parameter:	t
Data unit:	m
Description:	Total thickness of coal in emission zone
Source of data:	
Value of data applied for the purpose of calculating the expected emissions reductions in section B.5	
Description of measurement methods and procedures to be applied:	At start of each crediting period
QA/QC procedures:	
Any comment:	From geology report and drilling records

Data / Parameter:	ES_t
Data unit:	%
Description:	Total eligible share of CBM
Source of data:	
Value of data applied for the purpose of calculating the expected emissions reductions in section B.5	
Description of measurement methods and procedures to be applied:	Annually
QA/QC procedures:	
Any comment:	

Data / Parameter:	ES_h
Data unit:	%
Description:	Eligible share of CBM based on the horizontal plane overlap
Source of data:	
Value of data applied for the purpose of calculating the expected emissions reductions in section B.5	
Description of measurement methods and procedures to be applied:	Annually
QA/QC procedures:	
Any comment:	

Data / Parameter:	ES_v
Data unit:	%
Description:	Eligible share of CBM based on the vertical plane overlap
Source of data:	
Value of data applied for the purpose of calculating the expected emissions reductions in section B.5	
Description of measurement methods and procedures to be applied:	
QA/QC procedures:	
Any comment:	

Data / Parameter:	AO_w
Data unit:	m^2
Description:	Area of overlap with are to be mined
Source of data:	
Value of data applied for the purpose of calculating the expected emissions reductions in section B.5	
Description of measurement methods and procedures to be applied:	Annually
QA/QC procedures:	
Any comment:	

Data / Parameter:	AT_w
Data unit:	m^2
Description:	Total zone of influence
Source of data:	
Value of data applied for the purpose of calculating the expected emissions reductions in section B.5	
Description of measurement methods and procedures to be applied:	Annually
QA/QC procedures:	
Any comment:	

Data / Parameter:	w
Data unit:	
Description:	Wells
Source of data:	
Value of data applied for the purpose of calculating the expected emissions reductions in section B.5	
Description of measurement methods and procedures to be applied:	
QA/QC procedures:	
Any comment:	

Data / Parameter:	$CBM_{w,y}$
Data unit:	tCH_4
Description:	CBM captured from well intersected in year *y*
Source of data:	
Value of data applied for the purpose of calculating the expected emissions reductions in section B.5	
Description of measurement methods and procedures to be applied:	Continuous
QA/QC procedures:	
Any comment:	Monitor each well separately

Data / Parameter:	$CBM_{z,y}$
Data unit:	tCH_4
Description:	CBM captured from well intersected before year *y*
Source of data:	
Value of data applied for the purpose of calculating the expected emissions reductions in section B.5	
Description of measurement methods and procedures to be applied:	Continuous
QA/QC procedures:	
Any comment:	Monitor each well separately

Data / Parameter:	$CBM_{x,y}$
Data unit:	tCH_4
Description:	CBM captured from well not yet intersected in year *y*
Source of data:	
Value of data applied for the purpose of calculating the expected emissions reductions in section B.5	
Description of measurement methods and procedures to be applied:	Continuous
QA/QC procedures:	
Any comment:	Monitor each well separately

Data / Parameter:	GEN_y
Data unit:	MWh
Description:	Electricity generation by project
Source of data:	
Value of data applied for the purpose of calculating the expected emissions reductions in section B.5	
Description of measurement methods and procedures to be applied:	Continuous
QA/QC procedures:	
Any comment:	

Data / Parameter:	$HEAT_y$
Data unit:	GJ
Description:	Heat generation by project
Source of data:	
Value of data applied for the purpose of calculating the expected emissions reductions in section B.5	
Description of measurement methods and procedures to be applied:	Continuous
QA/QC procedures:	
Any comment:	

Data / Parameter:	$VFUEL_y$
Data unit:	GJ
Description:	Vehicle power supplied by project
Source of data:	
Value of data applied for the purpose of calculating the expected emissions reductions in section B.5	
Description of measurement methods and procedures to be applied:	Continuous
QA/QC procedures:	
Any comment:	

Data / Parameter:	EF_{ELEC}
Data unit:	tCO_2/MWh
Description:	CO_2 emission factor of the grid
Source of data:	Promethium carbon October 2011 study
Value of data applied for the purpose of calculating the expected emissions reductions in section B.5	1.04
Description of measurement methods and procedures to be applied:	Annually
QA/QC procedures:	
Any comment:	Calculated as per "Tool to calculate the emission factor for an electricity system"

Data / Parameter:	$EF_{OM,y}$
Data unit:	tCO_2/MWh
Description:	CO_2 Operating Margin emission factor of the grid
Source of data:	Promethium carbon October 2011 study
Value of data applied for the purpose of calculating the expected emissions reductions in section B.5	1.01
Description of measurement methods and procedures to be applied:	Annually or *ex ante*
QA/QC procedures:	
Any comment:	Calculated as per "Tool to calculate the emission factor for an electricity system"

Data / Parameter:	$EF_{BM,y}$
Data unit:	tCO_2/MWh
Description:	CO_2 Build Margin emission factor of the grid
Source of data:	Promethium carbon October 2011 study
Value of data applied for the purpose of calculating the expected emissions reductions in section B.5	1.06
Description of measurement methods and procedures to be applied:	Annually or *ex ante*
QA/QC procedures:	
Any comment:	Calculated as per "Tool to calculate the emission factor for an electricity system"

Data / Parameter:	$F_{i,j,y}$
Data unit:	t or m_3/yr
Description:	Amount of each fossil fuel consumed by each power source/plant
Source of data:	
Value of data applied for the purpose of calculating the expected emissions reductions in section B.5	
Description of measurement methods and procedures to be applied:	Annually or *ex ante*
QA/QC procedures:	
Any comment:	Obtained from the power producers, dispatch centers or latest local statistics

Data / Parameter:	$COEF_{i,k}$
Data unit:	tCO_2/t or m^3
Description:	CO_2 emission coefficient of each fuel type and each power source/plant
Source of data:	
Value of data applied for the purpose of calculating the expected emissions reductions in section B.5	
Description of measurement methods and procedures to be applied:	Annually
QA/QC procedures:	
Any comment:	Plant or country-specific values to calculate COEF are preferred to IPCC default values, in case of obtaining EF_{OM} *ex post*

Data / Parameter:	$GEN_{j,y}$
Data unit:	MWh/yr
Description:	Electricity generation of each power source/plant
Source of data:	
Value of data applied for the purpose of calculating the expected emissions reductions in section B.5	
Description of measurement methods and procedures to be applied:	Annually or *ex ante*
QA/QC procedures:	
Any comment:	Obtained from the power producers, dispatch centers or latest local statistics

Data / Parameter:	$EF_{CO2,i}$
Data unit:	tC/TJ
Description:	CO_2 emission factor of fuel used for captive power or heat
Source of data:	
Value of data applied for the purpose of calculating the expected emissions reductions in section B.5	
Description of measurement methods and procedures to be applied:	Annually or *ex ante*
QA/QC procedures:	
Any comment:	National sources or IPCC defaults

Data / Parameter:	$Ef_{captive}$
Data unit:	%
Description:	Energy efficiency of captive power plant
Source of data:	
Value of data applied for the purpose of calculating the expected emissions reductions in section B.5	
Description of measurement methods and procedures to be applied:	Annually
QA/QC procedures:	
Any comment:	Depending on option chosen in baseline, measured before or after project implementation

Data / Parameter:	Ef_{heat}
Data unit:	%
Description:	Energy efficiency of heat plant
Source of data:	
Value of data applied for the purpose of calculating the expected emissions reductions in section B.5	
Description of measurement methods and procedures to be applied:	Annually
QA/QC procedures:	
Any comment:	

Data / Parameter:	Ef_V
Data unit:	%
Description:	Efficiency of vehicle engine
Source of data:	
Value of data applied for the purpose of calculating the expected emissions reductions in section B.5	
Description of measurement methods and procedures to be applied:	Annually
QA/QC procedures:	
Any comment:	

Data / Parameter:	ME_k
Data unit:	tCH_4
Description:	Methane extracted on day *k*
Source of data:	
Value of data applied for the purpose of calculating the expected emissions reductions in section B.5	
Description of measurement methods and procedures to be applied:	Daily/continuous
QA/QC procedures:	
Any comment:	

Data / Parameter:	$MM_{ELEC,k}$
Data unit:	tCH_4
Description:	Methane measured for power generation on day *k*
Source of data:	
Value of data applied for the purpose of calculating the expected emissions reductions in section B.5	
Description of measurement methods and procedures to be applied:	Daily/continuous
QA/QC procedures:	
Any comment:	

Data / Parameter:	$MM_{HEAT,k}$
Data unit:	tCH_4
Description:	Methane measured for new heat generation on day *k*
Source of data:	
Value of data applied for the purpose of calculating the expected emissions reductions in section B.5	
Description of measurement methods and procedures to be applied:	Daily/continuous
QA/QC procedures:	
Any comment:	

Data / Parameter:	$MM_{FL,k}$
Data unit:	tCH_4
Description:	Methane measured sent flare on day *k*
Source of data:	
Value of data applied for the purpose of calculating the expected emissions reductions in section B.5	
Description of measurement methods and procedures to be applied:	Daily/continuous
QA/QC procedures:	
Any comment:	

Data / Parameter:	fv_{ih}
Data unit:	-
Description:	Volumetric fraction of component i in the residual gas in the hour *h* where *i* = CH_4, CO, CO_2, O_2, H_2, N_2
Source of data:	Measurements by project participants using a continuous gas analyser
Value of data applied for the purpose of calculating the expected emissions reductions in section B.5	Ensure that the same basis (dry or wet) is considered for this measurement and the measurement of the volumetric flow rate of the residual gas (FV_{RGh}) when the residual gas temperature exceeds 60 ^{0}C
Description of measurement methods and procedures to be applied:	Continuously. Values to be averaged hourly or at a shorter time interval
QA/QC procedures:	Analysers must be periodically calibrated according to the manufacturer's recommendation. A zero check and a typical value check should be performed by comparison with a standard certified gas.
Any comment:	As a simplified approach, project participants may only measure the methane content of the residual gas and consider the remaining part as N2.

Data / Parameter:	**FV_{RGh}**
Data unit:	m3/h
Description:	Volumetric flow rate of the residual gas in dry basis at normal conditions in the hour *h*
Source of data:	Measurements by project participants using a flow meter
Value of data applied for the purpose of calculating the expected emissions reductions in section B.5	Ensure that the same basis (dry or wet) is considered for this measurement and the measurement of volumetric fraction of all components in the residual gas (fv_{ih}) when the residual gad temperature exceeds 60 oC
Description of measurement methods and procedures to be applied:	Continuously. Values to be averaged hourly or at shorter time interval
QA/QC procedures:	Flow meters are to be periodically calibrated according to the manufacturer's recommendation
Any comment:	

Data / Parameter:	t_{o2h}
Data unit:	-
Description:	Volumetric fraction of O_2 in the exhaust gas of the flare in the hour *h*
Source of data:	Measurements by project participants using a continuous gas analyser
Value of data applied for the purpose of calculating the expected emissions reductions in section B.5	Extractive sampling analysers with water and particulates removal devices or in situ analysers for wet basis determination. The point of measurement (sampling point) shall be in the upper section of the flare (80% of total flare height). Sampling shall be conducted with appropriate sampling probes adequate to high temperatures level (e.g. inconel probes). An excessively high temperature at the sampling point (above 700 ^{o}C) may be an indication that the flare is not being adequately operated or that its capacity is not adequate to the actual flow.
Description of measurement methods and procedures to be applied:	Continuously. Values to be averaged hourly or at a shorter time interval
QA/QC procedures:	Analysers must be periodically calibrated according to the manufacturer's recommendation. A zero check should be performed by comparison with a standard gas.
Any comment:	Monitoring of this parameter is only applicable in case of enclosed flares and continuous monitoring of the flare efficiency.

Data / Parameter:	$fv_{CH4\ FGh}$
Data unit:	mg/m^3
Description:	Concentration of methane in the exhaust gas of the flare in dry basis at normal conditions in the hour *h*
Source of data:	Measurements by project participants using a continuous gas analyser
Value of data applied for the purpose of calculating the expected emissions reductions in section B.5	Extractive sampling analysers with water and particulates removal devices or in situ analyser for wet basis determination. The point of measurement (sampling point) shall be in the upper section of the flare (80% of total flare height). Sampling shall be conducted with appropriate sampling probes adequate to high temperatures level (e.g. inconel probes). An excessively high temperature at the sampling point (above 700 oC) may be an indication that the flare is not being adequately operated or that its capacity is not adequate to the actual flow.
Description of measurement methods and procedures to be applied:	Continuously. Values to be averaged hourly or at a shorter time interval
QA/QC procedures:	Analysers must be periodically calibrated according to manufacturer's recommendation. A zero check and a typical value check should be performed by comparison with a standard gas.
Any comment:	Monitoring of this parameter is only applicable in case of enclosed flares and continuous monitoring of the flare efficiency. Measurement instruments may read ppmv or% values. To convert from ppmv to mg/m^3 simply multiply by 0.716. 1% equals 10 000 ppmv.

Data / Parameter:	T_{flare}
Data unit:	^oC
Description:	Temperature in the exhaust gas of the flare
Source of data:	Measurements by project participants
Value of data applied for the purpose of calculating the expected emissions reductions in section B.5	Measure the temperature of the exhaust gas stream in the flare by a Type N thermocouple. A temperature above 500 oC indicates that a significant amount of gases are still being burnt and that the flare is operating.
Description of measurement methods and procedures to be applied:	Continuously.
QA/QC procedures:	Thermocouples should be replaced or calibrated every year.
Any comment:	An excessively high temperature at the sampling point (above 700 ^oC) may be an indication that the flare is not being adequately operated or that its capacity is not adequate to the actual flow.

Data / Parameter:	NCV_{ch4}
Data unit:	GJ
Description:	Net calorific value of methane
Source of data:	IPCC 2006
Value of data applied for the purpose of calculating the expected emissions reductions in section B.5	0.0359 GJ/m3
Description of measurement methods and procedures to be applied:	fixed
QA/QC procedures:	
Any comment:	

Data / Parameter:	NCV_{AF}
Data unit:	GJ
Description:	Net calorific value of alternate fuel
Source of data:	IPCC 2006
Value of data applied for the purpose of calculating the expected emissions reductions in section B.5	
Description of measurement methods and procedures to be applied:	fixed
QA/QC procedures:	
Any comment:	

Data / Parameter:	OXID
Data unit:	%
Description:	Oxidation
Source of data:	IPCC 2006
Value of data applied for the purpose of calculating the expected emissions reductions in section B.5	
Description of measurement methods and procedures to be applied:	Daily/continuous
QA/QC procedures:	
Any comment:	

Organization and Monitoring Manual

Each proposed CPA involves the development of a monitoring manual, based on which accurate monitoring shall be conducted. The monitoring manual clearly states the monitoring method employed at each monitoring point and makes sure that the monitoring is accurately conducted.

The manual clarifies the management structure for a CPA. Typical monitoring structure is presented in Figure-3. A monitoring team is formed under the CDM Manager, who oversees the entire project, for the management of the monitoring of the project. Monitoring is mainly conducted at each location for the activities in the CPA.

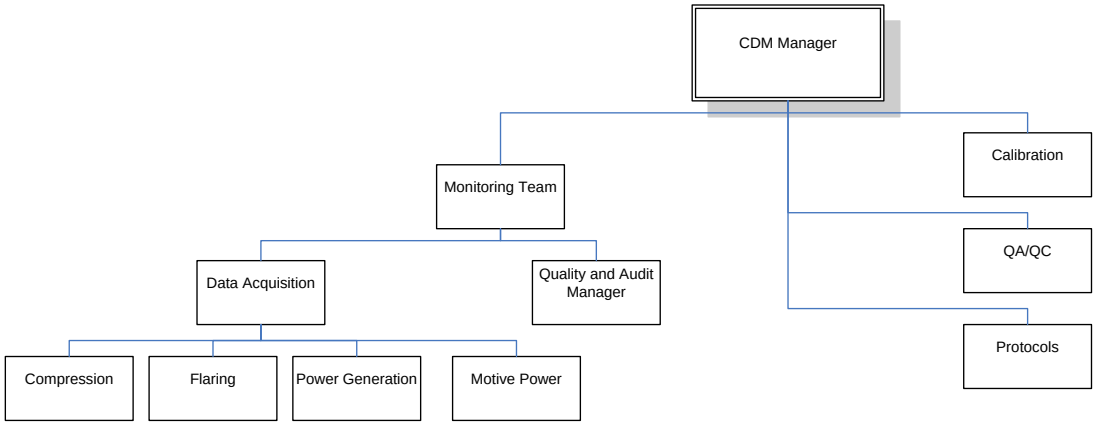

Figure 3 – Monitoring Structure

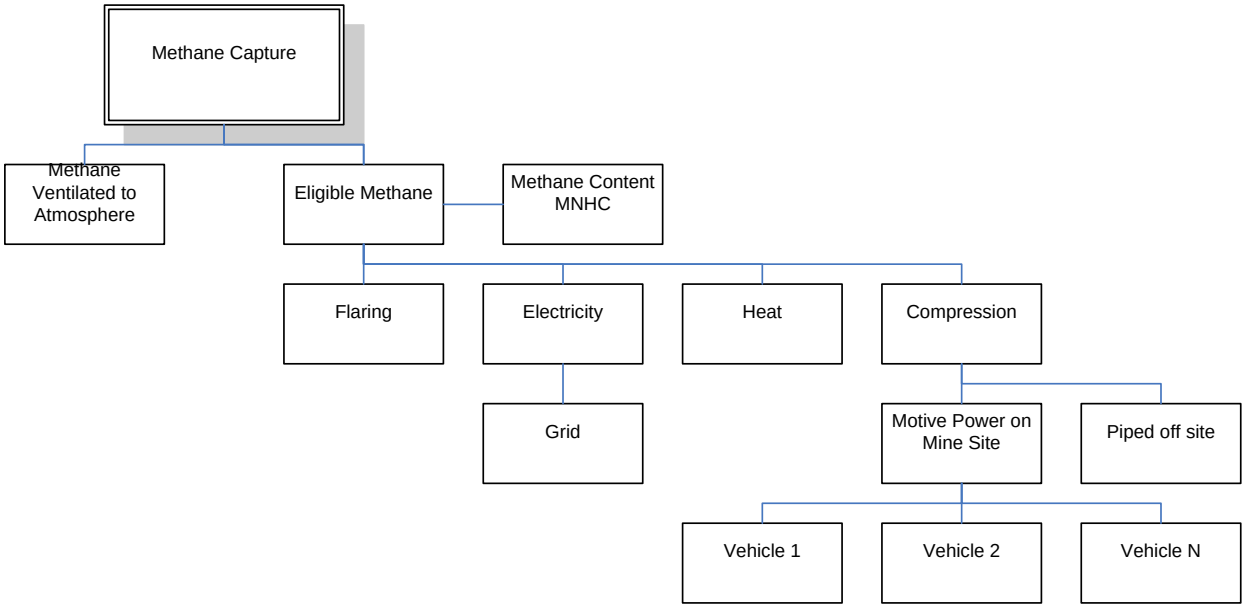

Figure-4 Monitoring & Other Function of Each Section

Monitoring points and data to be monitored

The data that will be monitored are shown in the table of Section E.7.1. Figure-5 indicates the detailed instruments installation for monitoring (depend on each CPA). All equipments will be installed, operated and calibrated corresponding to national or industry standards or manufacture's specifications. Calibration will be checked regularly by outside contractors.

The gas flow measured is corrected by pressure and temperature.

Further, annual analysis will be undertaken by third qualified party to check the NMHC concentration in the methane flow, and if it accounts for more than 1% of methane analysis of the carbon emission factor for combusted NMHC will be undertaken.

Each well will be monitored for Flow, temperature and pressure on a continuous basis. NMHC will be tested from samples of each well annually.

Each well will be classified for eligible CBM by computation equations 23-27

At each point of use the methane flow, that is, flaring, electricity generation, heat generation, compression resulting in motive power and pipelined off site, temperature and pressure shall be monitored on a continuous basis with NMHC being tested annually.

Electricity generated shall be monitored by meter and electricity exported to the grid shall be monitored by meter.

For each vehicle fuel use and hours operated or odometer readings will be recorded.

Type	Name	Parameter	Name
Well	**Eligible CMM**	**F1**	**Flow rate**
		T1	**Temperature**
		P1	**Pressure**
		G1	**Gas Composition**
Well	**Eligible CBM**	**F1**	**Flow rate**
		T1	**Temperature**
		P1	**Pressure**
		G1	**Gas Composition**
		Th1	**Thickness of coal**
Well	**Non Eligible CBM**	**F1**	**Flow rate**
		T1	**Temperature**
		P1	**Pressure**
		G1	**Gas Composition**
		Th1	**Thickness of coal**
Flare		**F1**	**Flow rate**
		T1	**Temperature**
		P1	**Pressure**
		G1	**Gas Composition**
Electricity		**AE**	**Auxiliary output for internal use**
		E1	**Electricity for Grid**
Motive Power	**Vehicle**	**F**	**Gas flow**
		Fd	**Fuel delivered to vehicle**
		M	**Distance or operating hours**
Pipeline	**Gas piped off site**	**F1**	**Flow rate**
		T1	**Temperature**
		P1	**Pressure**
		G1	**Gas Composition**

Figure-5 Monitoring Points for a CPA

Monitoring, recording and management of data

All data continuously measured will be transmitted to the monitoring computer. The records of the time and date will be added to each measurement data stored in the computer. The electronic records and paper copies will be kept for two years after the end of the crediting period as required by approved methodology ACM0008 V7.

The chief of each section will check the data in the measurement tables, sign the datasheets, and report the data of the previous day to the Monitoring Team everyday via email. Furthermore, on the first day of every month, the chief will send the measurement table of the previous month to the monitoring team for storage and management.

The monitoring team will compile the collected data to calculate emission reductions. The team will also be responsible for data storage and for preparing the data for verification.

Quality control and training

The following procedures will be followed to install, maintain and calibrate the equipment used in this project:

1) CDM monitoring team and their staff will have training on every day maintenance check during the test operation by the instrument supplier to ensure that the managing site engineer and his team are familiar with the operation and maintenance of the equipment.
2) The measuring instruments such as for flow rate, methane concentration, pressure and temperature will be calibrated periodically by authorized entities in accordance with relevant national/sectoral or manufacturers' requirements;
3) The electricity meters will be calibrated by authorized entities in accordance with relevant national/sectoral standards or manufacturers' requirements.

Emergency Procedures

In case there are errors found in calibration or during the regular checks of meters, the malfunctioning meter or component will be repaired or replaced immediately in accordance with the manufacturer's instructions.

The CDM responsible person and specialists are informed of the error and ensure that the necessary corrective actions and appropriate steps are taken to resolve the problem.

Corrective Actions

The quality assurance and quality control procedures for recording, maintaining and archiving data shall be improved as part of this CDM project activity according to EB rules and real practice. This is an on-going process which will be ensured through the CDM mechanism in terms of the need for verification of the emission reductions.

SECTION C. Environmental analysis

>>

C.1. Please indicate the level at which environmental analysis as per requirements of the CDM modalities and procedures is undertaken. Justify the choice of level at which the environmental analysis is undertaken:

☐ Please tick if this information is provided at the PoA level. In this case sections C.2. and C.3. need not be completed in this form.

In accordance with requirement in the PoA-DD, Environmental analysis ought to be elaborated on a CPA, and specifics please refer to section of C.2 and C.3.

C.2. Documentation on the analysis of the environmental impacts, including transboundary impacts:

The construction of the plant will be /has been initiated in month yyyy. Before construction, in month yyyy, XXX prepared an Environmental Impact Assessment. XXX is approved by the relevant authorities to issue Environmental Impact Assessments. Such EIA have been lodged with the relevant authorities as part of the process to achieve the appropriate licenses for the Coal Mine to operate.

The Environmental Impact Assessment indicates the following:

Describe the indication by the EIA here.

The relevant authority XXX City/County provided the following instructions for the activity of the methane destruction in its approval letter:

Describe the instruction provided by the authority to be inserted here.

In response, this project will implement the under mentioned measures:

Describe the response from the CPA here.

C.3. Please state whether in accordance with the host Party laws/regulations, an environmental impact assessment is required for a typical CPA, included in the programme of activities (PoA),:

In line with the Mineral and Petroleum Resources Development Act, 2002[5] s39 and s79(4) , an Environmental Impact Assessment (EIA) must be carried out and approved by the environmental agency in charge of environmental protection of City or County before a CPA would start. The EIA should be carried out for the following environmental impact:

[5] The Mineral and Petroleum Resources Development Act, 2002. Available from http://www.info.gov.za/view/DownloadFileAction?id=68062. [Accessed on 13 April 2012]

- Expected Environmental impacts during construction, on such as atmosphere, noise, waste water and solid waste;
- Expected Environmental impacts during operation, on such as atmosphere, noise, waste water and solid waste.

SECTION D. Stakeholders' comments

>>

D.1. Please indicate the level at which local stakeholder comments are invited. Justify the choice:

☐ Please tick if this information is provided at the PoA level. In this case sections D.2. to D.4. need not be completed in this form.

D.2. Brief description how comments by local stakeholders have been invited and compiled:

Mineral and Petroleum Resources Development Act, 2002[6] s79(4)(a)-(b) requires stakeholder consultation as part of the EMPR (environmental impact assessment) This requirement extends to the relevant Authorities as well as local stakeholders.

The implementer of the CPA carried out a questionnaire survey on the coalmine workers and local residents to collect comments if any about the project activity, and the notice had been published for collecting comments from local residents. Comments received from the survey are summarized as follows.

The questionnaire mainly concerns issues as follows:
1) The brief introduction of the project;
2) Basic information of the local people surveyed;
3) Whether supporting of the construction and operation of the project or not.
4) The positive and negative impact caused by the construction and operation of the project.
5) Other suggestions on the project.

D.3. Summary of the comments received:

Totally XX questionnaires returned out of XX with XX% response rate. The basic structure of the respondents is illustrated in Table-14.

INSERT TABLE 14

As shown in above, people surveyed are representative of the public in terms of gender, age and educational background. Therefore their attitudes towards the project can be a comprehensive reflection of the attitudes of the local residents possibly affected by the project.

Among the XX respondents, the statistics is as follows:

[6] The Mineral and Petroleum Resources Development Act, 2002. Available from http://www.info.gov.za/view/DownloadFileAction?id=68062. [Accessed on 13 April 2012]

XX respondents (accounting for XX%) hold a supportive attitude towards the Project, which was considered to alleviate environmental pollution (XX%), increase income (XX%), provide employment opportunity (XX%), improve the residential living condition(XX%), enlarge power supply amount and range (XX%) and decrease electricity purchase price (XX%).

XX respondents (accounting for XX%) considered that there is no negative environment effect and XX respondents (accounting for XX%) supposed it was necessary to take into account XXX of the project.

The survey shows that most of the residents at the project sites consider that construction of the projects will benefit the local economic development, but they still have some concerns about the XXX possibly caused by the projects. The project owners has given adequate consideration to XXX control and taken appropriate measures.

D.4. Report on how due account was taken of any comments received:

>>

Describe how due account was taken of any comments received here

Annex 1

CONTACT INFORMATION ON ENTITY/INDIVIDUAL RESPONSIBLE FOR THE CPA

Organization:	
Street/P.O.Box:	
Building:	
City:	
State/Region:	
Postfix/ZIP:	
Country:	
Telephone:	
FAX:	
E-Mail:	
URL:	
Represented by:	
Title:	
Salutation:	
Last Name:	
Middle Name:	
First Name:	
Department:	
Mobile:	
Direct FAX:	
Direct tel:	
Personal E-Mail:	

Annex 2

INFORMATION REGARDING PUBLIC FUNDING

No public funding is provided for in this CPA

Annex 3

BASELINE INFORMATION

According to section E.4 of the POA Capture and combustion of Methane in Coal Mines there is only one realistic option for the baseline scenario, which is the continuation of venting of the CMM into the atmosphere, heat generation using existing boilers, fossil fuelled vehicles, and electricity imported from the grid. Without income from emission credits the project is not economically feasible and faces prohibitive barriers.

Therefore the baseline scenario for this CPA is the emissions as outlined in Section B.5.3 of this CPA

Annex 4

MONITORING INFORMATION

Contents of the Monitoring Manual

1. Introduction
    a. Purpose of the Operations Monitoring Plan
    b. Use of the Operations Monitoring Plan
2. Project Information
    a. The Monitoring Methodology
    b. Description of the project activity
    c. Estimated amount of emission reductions over the chosen crediting period
    d. Duration of the project activity
    e. The baseline scenario
    f. Description of the sources and gases included in the project boundary
3. Management
    a. Allocation of Responsibilities
    b. Monitoring Organization
    c. Operational Obligations
    d. Job Responsibility
    e. Performance Reports
4. Calculation of emission reductions
    a. Project Emissions
    b. Baseline Emissions
    c. Leakage
    d. Estimation of emission reductions
5. Monitoring System
    a. Data and parameters monitored:
    b. Recording and Archiving of Monitoring Data
    c. Monitoring Point
    d. Monitoring
    e. The Project Workbook – How to use the Workbook
    f. Quality Assurance
    g. Training
6. Auditing and Verification
    a. Project Commissioning
    b. Verification Procedures

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