CLEAN DEVELOPMENT MECHANISM
SMALL-SCALE PROGRAMME OF ACTIVITIES DESIGN DOCUMENT FORM
(CDM-SSC-PoA-DD) Version 01

CONTENTS

Annexes

NOTE:

(i) This form is for the submission of a CDM PoA whose CPAs apply a small scale approved methodology.

(ii) At the time of requesting registration this form must be accompanied by a CDM-SSC-CPA-DD form that has been specified for the proposed PoA, as well as by one completed CDM-SSC-CPA-DD (using a real case).

SECTION A. General description of small-scale programme of activities (PoA)

A.1 Title of the small-scale programme of activities (PoA):

>>
Title: Compressed Air Energy Efficiency PoA
Version: 01
Date: 26/04/2012

A.2. Description of the small-scale programme of activities (PoA):

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1. General operating and implementing framework of PoA

This programme of activities (PoA) aims to overcome the barriers for compressed air energy efficiency power projects across South Africa. Compressed air is used extensively in underground mines. The main applications are pneumatic drilling, pneumatic operation of loaders, instrumentation, refuge bay ventilation and air agitation. A significant portion of mine electricity consumption is used for compressed air generation.

The proposed project system will improve the efficiency of the compressed air system by monitoring, integrating, optimising and controlling elements of the supply and demand of compressed air. The project will also access the compressed air SCADA (supervisory control and data acquisition) system to retrieve compressor statuses, pressures, flows, valves statuses, etc. and this data will be used to optimise and control the system.

Nedbank Ltd will act as the managing entity of the PoA. The installation of the compressed air energy efficiency systems will typically be managed by the owner(s) of each generation site, hence forth referred to as the CPA implementer(s).

2. Policy/measure or stated goal of the PoA

The purpose of the PoA is to reduce greenhouse gas emissions through the implementation of energy efficiency measures in the compressed air system.

In 2005, the South African Department of Energy set a renewable energy target of 4% for 2013. As for carbon emissions, at the climate change conference in Copenhagen in 2010, South Africa committed to reducing its carbon footprint by 34% by 2020 and by 42% by 2025.

The historically low cost of electricity also means that energy efficiency projects face significant barriers to implementation.

Energy efficiency is traditionally low on the priority list for mining companies as other challenges such as mine safety and commodity price volatility dominate management agenda's and therefore get allocated the bulk of the resources available to operational improvements.

This PoA will provide mining companies with a framework on which to overcome these barriers.

The PoA makes a positive contribution to sustainable development. The South African Designated National Authority (DNA) evaluates sustainability in three categories: economic, environmental, and social. The contribution of the programme towards sustainable development is discussed below in terms of these three categories:

Environmental

The project will reduce electricity consumption from a predominantly coal-fired grid, which will result in a reduction of greenhouse gas emissions and of the negative impacts associated with coal mining. The negative impacts associated with coal mining include: acid mine drainage, the utilisation of scarce water resources, SO_2 emissions, local smog emissions in the vicinity of the power stations and the impacts associated with the disposal of coal ash.

The project also supports the greenhouse gas emission mitigation actions of South Africa as referred to above.

Economic

South Africa's national electricity provider, Eskom, carried out planned electricity supply interruptions at the beginning of 2008. These interruptions were caused by the demand for electricity exceeding the supply of electricity. During the interruptions, grid electricity was not accessible. Promoting energy efficiency in South Africa will reduce the pressure on the current energy infrastructure, thereby making important contributions the country's economic sustainability.

There will be a transfer of knowledge from the countries supplying the energy efficient technology to South Africa, and the project will contribute to foreign reserve earnings for South Africa via carbon credit sales revenue.

Social

The project will create jobs during the implementation phase. The implementation of the project will improve the working conditions of the people operating the mine.

3. Confirmation that the proposed PoA is a voluntary action by the coordinating/managing entity

South Africa has no mandatory requirements to implement compressed air energy efficiency projects. The CPA implementer(s) will voluntarily install the new renewable technology.

A.3. Coordinating/managing entity and participants of SSC-POA:

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1. The co-ordinating or managing entity of the PoA as the entity which communicates with the Board

Nedbank Ltd as the CME will be the entity that communicates with the board.

2. Project participants being registered in relation to the PoA. Project participants may or may not be involved in one of the CPAs related to the PoA.

The project participants being registered in relation to the PoA are provided in the table below:

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)
Republic of South Africa (host)	Nedbank Ltd (Private)	No

A.4. Technical description of the small-scale programme of activities:

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A.4.1. Location of the programme of activities:

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The PoA will be a multi country PoA. The initial CPA's will be located in the Republic of South Africa. Other countries may be added to the PoA at a later stage in in accordance with EB60, Annex 26, Paragraph 6.

The PoA is initially located within the geographical boundaries of South Africa.

Figure 1: Geographical boundary of the PoA – South Africa[1]

A.4.1.1. Host Party(ies):

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The initial host party to the PoA is the Republic of South Africa.

A.4.1.2. Physical/ Geographical boundary:

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The CPA's can be implemented anywhere in the host party.

A.4.2. Description of a typical small-scale CDM programme activity (CPA):

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The proposed project system will improve the efficiency of the compressed air system by monitoring, integrating, optimising and controlling elements of the supply and demand of compressed air.

[1] Retrieved from http://www.nationsonline.org/oneworld/map/south_africa_map.htm

A.4.2.1. Technology or measures to be employed by the SSC-CPA:

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The CPA's will be installed in operations that use compressed air as an energy carrier. One example of such an installation is an underground mine where compressed air is used for services such as (for example) pneumatic drilling, pneumatic operation of loaders, instrumentation, refuge bay ventilation and air agitation. The PoA is however not linked to mining systems alone and other compressed air systems may also be included. The CPA will increase energy efficiency in such systems by monitoring, integrating, simulating, optimising and controlling elements of the supply and demand of compressed air. The project will also access the compressed air SCADA system to retrieve compressor statuses, pressures, flows, valves statuses, etc.

A typical CPA will implement a control system that will perform one or more of the following tasks:

i. Connect to the control and data acquisition system of the relevant compressed air network.
ii. Monitor compressor status and record their power consumption data.
iii. Monitor and record, guide vane position, blow-off position and discharge pressure of the compressors.
iv. Signal pressure set points to the compressors that will be approved and adjusted by the relevant mine authority on the existing compressor control system.
v. Send signals to the compressor control system to switch compressors on or off.
vi. Change pressure set points of level control valves.
vii. Open or close valves supplying one or more of the sections of the compressed air system.
viii. Control the compressed air system and all its components to achieve optimum energy efficiency.
ix. Implement maximum peak clipping.

A.4.2.2. Eligibility criteria for inclusion of a SSC-CPA in the PoA:

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The eligibility criteria for including each CPA in this PoA are given below:

General eligibility criteria for inclusion of a CPA in the PoA	
1.	The CPA must be located in the boundaries of the host country(ies) of the PoA as defined in this document;
2.	The following data must be provided to the CME prior to inclusion in the PoA in order to allow the avoidance of double counting of emission reductions: • Name of the CPA; • Name of the CPA developer; • Name of the operation/installation of the CPA developer where the CPA is being implemented • Contact details of the CPA developer including contact person, address, telephone email address ; • Installed capacity and other relevant technical specifications of each CPA; • Location of the CPA (e.g. GPS coordinates);

3.	The technology applied in the CPA must conform to the description as set out in this document;
4.	The project start date of the CPA must be after 1 February 2012;
5.	The CPA must comply with all the applicability conditions of AMS-II.D.: Energy efficiency and fuel switching measures for industrial facilities - Version 12.0 ;
6.	The conditions that ensure that CPAs meet the requirements pertaining to the demonstration of additionality as specified in Section A above;
7.	The PoA-specific requirements stipulated by the CME including any conditions related to undertaking local stakeholder consultations and environmental impact analysis;
8.	Conditions to provide an affirmation that funding from Annex I parties, if any, does not result in a diversion of official development assistance;
9.	The CPA must meet the requirements for the debundling check for the small-scale (SSC) project category.
10.	Each CPA shall not be registered, or be in the process of registration, as an individual CDM project activity.
11.	Each CPA shall not be included in another registered PoA.
12.	Each CPA must be approved by the CME prior to its incorporation into the PoA. Each CPA shall sign an agreement with the managing entity to participate in the programme. This commercial arrangement will dictate the sale and/or distribution of the credits.

A.4.3. Description of how the anthropogenic emissions of GHG by sources are reduced by a SSC-CPA below those that would have occurred in the absence of the registered PoA (assessment and demonstration of additionality):

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(i) The proposed PoA is a voluntary coordinated action

The proposed PoA is a voluntary action by the CME. The CME as the key project participant with the implementation of the PoA intends to facilitate the access to CDM revenues to compressed air energy efficiency projects and to build an easier entrance for carbon financing for compressed air energy efficiency projects. When providing such a platform for potential CPAs the CME is taking care of the development of the CDM cycle related tasks of the project activity and will receive a certain return in accordance with the agreement between the CME and CPAs.

(ii) If the PoA is implementing a voluntary coordinated action, it would not be implemented in the absence of the PoA;:

Additionality has to be proven on the CPA level for each CPA separately following the CDM baseline and monitoring methodology "*AMS-II.D.: Energy efficiency and fuel switching measures for industrial facilities --- Version 12.0"* together with the relevant corresponding tools.

For most CPA cases additionality will be proven based on the UNFCCC *"Tool for the demonstration and assessment of additionality" (Version 6.0.0)* and *"Tool to calculate the emission factor for an electricity system" (Version 2.2.1).* The aspects are discussed in sections E.5.1 and E.5.2 of this document.

(iii) If the PoA is implementing a mandatory policy/regulation, this would/is not enforced;

Not applicable since there is no mandatory policy/regulation in connection with this PoA.

(iv) If mandatory a policy/regulation is enforced, the PoA will lead to a greater level of enforcement of the existing mandatory policy/regulation.

Not applicable since there is no mandatory policy/regulation in connection with this PoA.

A.4.4. Operational, management and monitoring plan for the programme of activities (PoA):

A.4.4.1. Operational and management plan:

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Description of the operational and management arrangements established by the coordinating/managing entity for the implementation of the PoA, including:

(i) A record keeping system for each CPA under the PoA,

The CME will operate a PoA monitoring database including the CPAs for the PoA. Each CPA will be uniquely identified within the PoA monitoring database of all CPAs. According to the eligibility criteria the following data must be provided to the CME prior to inclusion in the PoA:

Basic data for inclusion	
1.	Name of the CPA
2.	Name of the CPA developer
3.	Contact details of the CPA developer including contact person, address, telephone and/or email address
4.	Installed capacity and other relevant technical specifications of each CPA
5.	Location of the CPA (e.g. GPS coordinates)
6.	Project start date of the CPA as defined in EB41, para67

7.	The commissioning date of the equipment
8.	The crediting period for each CPA;
9.	The signed agreement with the CME to participate in the programme
Data during crediting period	
10.	Verification status, CPA monitoring records and monitoring reports of each CPA.

The basic data for inclusion listed above will be provided by each CPA developer prior to inclusion. The
CPA developer will record the required monitoring data (CPA monitoring records) and will ensure that the CPA monitoring records are made available to the CME. The CME will be responsible for the management of the PoA monitoring database, consisting of the basic data for inclusion and of all CPA monitoring records. All records will be stored for a period of two years after the end of the relevant crediting period. Relevant data capture, verification and storage procedures will be followed in maintaining the data to ensure its accuracy, validity and completeness.

(ii) A system/procedure to avoid double accounting e.g. to avoid the case of including a new CPA that has been already registered either as a CDM project activity or as a CPA of another PoA,

Each CPA shall be uniquely identified within the PoA monitoring database described in (i) above.
The geographical boundary for the PoA is limited by the borders of the host country eligibly under this PoA.
The PoA monitoring database will report and contain the physical location of each CPA.
Each CPA implementer will sign a declaration stating that the CPA has not been already registered either as a CDM project activity or as a CPA of another PoA.

(iii) The SSC-CPA included in the PoA is not a de-bundled component of another CDM programme activity (CPA) or CDM project activity.

Prior to inclusion of a new CPA within the proposed PoA, the CME will check the UNFCCC CDM project database to verify whether a CDM project activity or CPA of another PoA for compressed air energy efficiency has already been registered within the host country. In an instance where a CPA of another PoA or CDM project activity is already registered, the CME will ensure through crosschecking the PoA monitoring database of the other CPA or CDM project that there is no double counting of the individual CPA for this PoA.

(iv) The provisions to ensure that the CPA implementer is aware of, and has agreed that the activity is being subscribed to the PoA;

Nedbank Limited, as the CME, will sign a contract with each CPA owner.

A.4.4.2. Monitoring plan:

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(i) Description of the proposed statistically sound sampling method/procedure to be used by DOEs for verification of the amount of reductions of anthropogenic emissions by sources or removals by sinks of greenhouse gases achieved by CPAs under the PoA.

The PoA implementing compressed air energy efficiency projects is applying the monitoring methodology AMS-11.D. that does not use statistical sampling. All CPAs will be monitored and verified.

(ii) In case the coordinating/managing entity opts for a verification method that does not use sampling but verifies each CPA (whether in groups or not, with different or identical verification periods) a transparent system is to be defined and described that ensures that no double accounting occurs and that the status of verification can be determined anytime for each CPA;

The CME will implement a monitoring protocol that allows the DOE to verify all CPAs in the PoA. As described previously a PoA Monitoring database will be established that contains all the CPA specific data required to identify and locate each CPA. Each CPA will comprise a single project activity, and hence the data will be monitored directly and submitted to the CME.

Monitoring will be carried out by each CPA developer. For each CPA, all parameters included in E.7.1 will be monitored and recorded in the CPA monitoring records by the CPA developer according to the procedures established in E.7.2. Each CPA is responsible to appropriately measure the net electricity supplied to the grid and assuring the correct operation and maintenance of the measuring equipment. This will be done by respecting the calibration frequency as per methodology AMS 11.D. , e.g. the manufacturer’ s requirements. The CME will store all the data submitted by the CPA developer in an electronic database (PoA monitoring database). Primary data will be stored by the CPA as back-up.

Verification initiated by the CME will occur either separately for each CPA or for several CPAs at the same time. The CME will typically be responsible for the preparation of the monitoring reports, based on the CPA monitoring records using the monitoring report form, and communication with the DOE during verification activities. However CPA developers can opt to develop the Monitoring Reports based on the nature of the commercial agreement with the CME. The monitoring reports will aggregate all required monitoring information, i.e. CPA monitoring records, in order to allow the DOE to verify the emission reductions for each monitoring period of each CPA. Each monitoring report will unambiguously set out the data on emission reductions generation by each CPA during the monitoring period consistent with the requirements of this PoA-DD and the corresponding CPA-DD. The use of the PoA monitoring database of CPA information and QA/QC procedures will ensure that double counting is not possible.

The start and end date of each monitoring period for each individual CPA, together with the CPA monitoring records attributable to that monitoring period will be recorded in the PoA monitoring database. Record keeping procedures undertaken by the CME will ensure that the CPA monitoring records attributed to a monitoring period can be clearly attributed to an individual CPA and will furthermore prevent double counting of emission reduction data.

The monitoring plan for parameters included in section E.7.1 will be implemented for each CPA with assistance from the CME as follows:

- CPA developer will implement each CPA individually and monitor and record all parameters included in section E.7.1 (CPA monitoring record).
- The CME will provide guidance to the CPA developer on how the monitoring should be conducted and data should be collected with regards to emission reduction calculations.
- The CPA developer will provide data on monitored parameters included in section E.7.1, required calculations, if any, and any documentary evidence to the CME.
- The CME will document and store all data related to parameters included in section E.7.1 provided by CPA developer in a central electronic database (PoA monitoring database), while primary data will be stored by each CPA developer. The data for each CPA will be kept for at least two years after the end of the last crediting period for the CPA.
- The CME will review relevant CPA monitoring records, prepare the monitoring report, and provide the monitoring report to the DOE.

A.4.5. Public funding of the programme of activities (PoA):

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No public funding will be used in the development or implementation of this PoA

SECTION B. Duration of the programme of activities (PoA)

B.1. Starting date of the programme of activities (PoA):

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The starting date of the PoA is the date of Global Stakeholder Participation (GSP): 30 April 2012.

B.2. Length of the programme of activities (PoA):

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As per the "Guidance on the registration of Project activities under a Programme of Activities as a single CDM Project activity" (Version 04) EB 55, Annex 38 the length of the PoA will be 28 years.

SECTION C. Environmental Analysis

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

1. Environmental Analysis is done at PoA level ☐
2. Environmental Analysis is done at SSC-CPA level ✕

Local and focalised impacts of each CPA project (depending on location, capacity, construction, etc.) justify separate environmental assessments at a CPA level.

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

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The programme mainly has a positive impact on the environment. It will reduce the electricity consumed from coal-based power from the Southern African national grid. This will lead to reduction of all the negative impacts associated with coal mining such as: the impact of the actual (coal) mining process, the utilisation of scarce water resources, SO_2 emissions and the impacts associated with the disposal of coal ash.

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),:

>>

The environmental impacts of the programme will be considered on a CPA level in terms of a CPA not involving any activity that is listed in terms of the National Environmental Management Act, 1998 (Act No. 107 of 1998. Each CPA will have to comply with this Act.

The national regulations are however subject to change and updated relevant regulations should be followed for each CPA.

SECTION D. Stakeholders' comments

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

1. Local stakeholder consultation is done at PoA level ☐
2. Local stakeholder consultation is done at SSC-CPA level ✕

Note: If local stakeholder comments are invited at the PoA level, include information on how comments by local stakeholders were invited, a summary of the comments received and how due account was taken of any comments received, as applicable.

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

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Not applicable. This section has been intentionally left blank.

D.3. Summary of the comments received:

>>

Not applicable. This section has been intentionally left blank.

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

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Not applicable. This section has been intentionally left blank.

SECTION E. Application of a baseline and monitoring methodology

This section shall demonstrate the application of the baseline and monitoring methodology to a typical SSC-CPA. The information defines the PoA specific elements that shall be included in preparing the PoA specific form used to define and include a SSC-CPA in this PoA (PoA specific CDM-SSC-CPA-DD).

E.1. Title and reference of the approved SSC baseline and monitoring methodology applied to a SSC-CPA included in the PoA:

>>

The development of the baseline is carried out as per the guidelines laid down in the approved methodology AMS II D; Version 12

The additionality of the project activity shall be demonstrated and assessed using the *"Tool for the demonstration and assessment of additionality"* (Version 06.0.0)

Other tools used in this methodology: "*Tool to calculate the emission factor for an electricity system"* (Version 02.2.1)

E.2. Justification of the choice of the methodology and why it is applicable to a SSC-CPA:

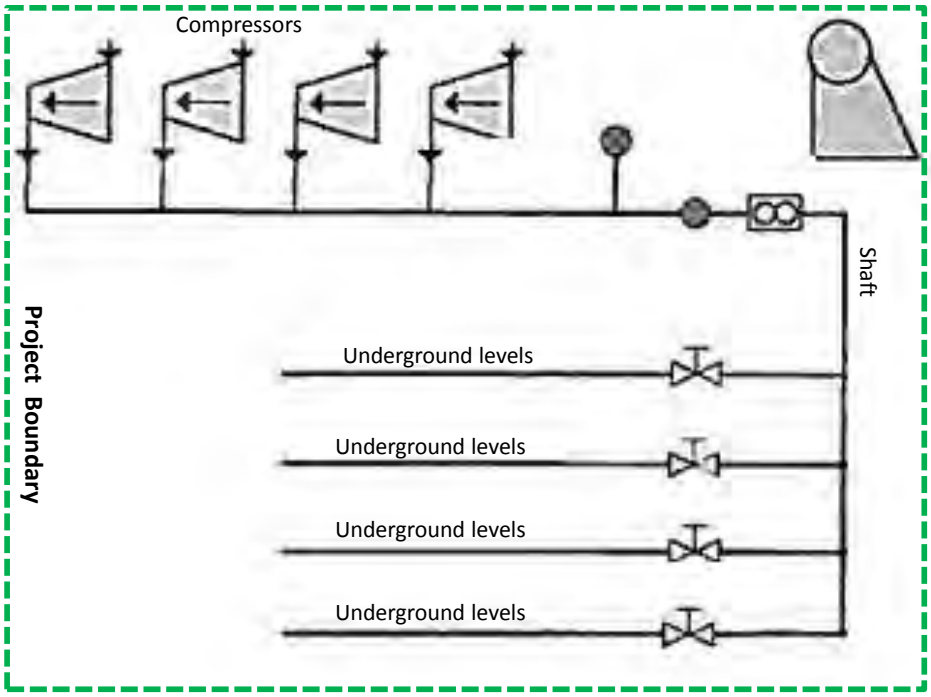
>>

Applicability Criteria as enlisted in Approved Methodology AMS II D, Version 12	Project Activity.
This category comprises any energy efficiency and fuel switching measures implemented at a single or several industrial or mining and mineral production facility(ies). This category covers project activities aimed primarily at energy efficiency; a project activity that involves primarily fuel switching falls into category III.B.1 Examples include energy efficiency measures (such as efficient motors), fuel switching measures (such as switching from steam or compressed air to electricity) and efficiency measures for specific industrial or mining and mineral production processes (such as steel furnaces, paper drying, tobacco curing, etc.).	This PoA consists of energy efficiency CPA's and no fuel switching takes place.
The measures may replace, modify or retrofit existing facilities or be installed in a new facility.	The CPA's in this PoA are implemented by modifying existing installations in order to improve the energy efficiency of the systems
This category is applicable to project activities where it is possible to directly measure and record the energy use within the project boundary (e.g., electricity and/or fossil fuel consumption).	The electricity consumption of the compressed air systems is measured directly
This category is applicable to project activities where the impact of the measures implemented (improvements in energy efficiency) by the project activity can be clearly distinguished from changes in energy use due to other variables not influenced by the project activity (signal to noise ratio).	The energy consumption of the compressed air systems are reduced sufficiently to clearly distinguish the saving from changes in energy use due to other variables not influenced by the project activity
The aggregate energy savings of a single project (inclusive of a single facility or several facilities) may not exceed the equivalent of 60 GWhe per year. A total saving of 60 GWhe per year is equivalent to a maximal saving of 180 GWhth per year in fuel input.	The individual CPA's in this PoA will not have an energy saving of more than 60 GW_e per year

E.3. Description of the sources and gases included in the SSC-CPA boundary

>> In accordance with the project category - II.D. , "the project boundary is the physical, geographical site of the industrial or mining and mineral production facility(ies), processes or equipment that are affected by the project activity."

The site (CPA project activity) has distinctive physical demarcated boundaries.



GHG emission sources taken into account in the project activity are shown in the table B.3.

For both "Baseline Scenario" and "Project Scenario", CO_2 should be included in the project and calculated, because CO_2 is a main GHG emission related to electricity consumption and should be affected (reduced) by the project activity. However CH_4 and N_2O are also GHG emissions related to electricity consumption and also reduced once the project is carried out, the amount of those gases is much smaller than CO_2. Therefore CH_4 and N_2O are excluded from the project as a conservative manner.

Table B.3. GHG emission sources related to the project activity

	Source Gas	Included?	Justification / Explanation
Baseline Scenario	CO_2 emissions from electricity consumption of existing facilities	Included in the project	Main emission source.
	CH_4 and N_2O emissions from electricity consumption of existing facilities	Excluded from the project	Excluded for simplification. This is conservative.
Project Scenario	CO_2 emissions from electricity consumption of facilities after applying energy-efficiency improvement measures	Included in the project	Main emission source.

	Source Gas	Included?	Justification / Explanation
	CH_4 and N_2O emissions from electricity consumption of facilities after applying energy efficiency improvement measures	Excluded from the project	Excluded for simplification. This is conservative.

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

>>

The development of the baseline is carried out as per the guidelines laid down in the approved methodology AMS II D;

Baseline Criteria as enlisted in Approved Methodology AMS II D, Version 12	Baseline as applicable to the Project Activity.
In the 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. In the case of project activities involving several facilities, the baseline needs to be established separately for each site. In the case of project activities involving multiple energy efficiency measures at individual facilities, the interaction between the measures should be taken into consideration when establishing the baseline.	The baseline of each of the sites on which the project is implemented is equal to the historic average electricity consumption for that specific site
For new facilities and project activities involving capacity additions, the energy baseline consists of the facility that would otherwise be built; the most plausible baseline scenario for the project activity shall be evaluated based on the related and relevant requirements in the General Guidance for SSC methodologies.	No capacity additions are done in this project

Baseline Criteria as enlisted in Approved Methodology AMS II D, Version 12	Baseline as applicable to the Project Activity.
In the absence of the CDM project activity, the existing facility(ies) would continue to consume energy (EC_{BL} in GWh/year) at historical average levels (ECHY in GWh/year), until the time at which the industrial or mining and mineral production facility(ies) would be likely to be replaced, modified or retrofitted in the absence of the CDM project activity ($DATE_{BaselineRetrofit}$). From that point of time onwards, the baseline scenario is assumed to correspond to the project activity, and baseline energy consumption (ECBL) is assumed to equal project energy consumption ($EC_{PJ,y}$ in GWh/year), and no emission reductions are assumed to occur. *EC_{BL}= EC_{HY} until $DATE_{BaselineRetrofit}$* *EC_{BL}= $EC_{PJ,y}$ on/after $DATE_{BaselineRetrofit}$* *The requirements concerning demonstration of the remaining lifetime of the replaced equipment shall be met as described in the 'General Guidance to SSC CDM methodologies'. If the remaining lifetime of the affected systems increases due to the project activity, the crediting period shall be limited to the estimated remaining lifetime, i.e., the time when the affected systems would have been replaced in the absence of the project activity* *In order to estimate the point in time when the existing equipment would need to be replaced in the absence of the project activity (), project participants may follow the procedures described in the general guidance.*	The $DATE_{BaselineRetrofit}$ of the compressors and compressed air systems are indicated in the table below
Each energy form in the emission baseline is multiplied by an emission coefficient (in kg CO2e/kWh). For the electricity displaced, the emission coefficient is calculated in accordance with provisions under category I.D. For fossil fuels, the IPCC default values for emission coefficients may be used.	The emission factor for electricity is calculated on an ex-ante basis. It is equal to 1.04 ton CO_2e/MWhr. The calculation and supporting data is presented in Annex 3.

E.5. Description of how the anthropogenic emissions of GHG by sources are reduced below those that would have occurred in the absence of the SSC-CPA being included as registered PoA (assessment and demonstration of additionality of SSC-CPA): >>

E.5.1. Assessment and demonstration of additionality for a typical SSC-CPA:

>> Additionality of the CPA needs to be demonstrated to show that in the absence of the CDM, the CPA would not occur. According to version 01 of the 'Standard for demonstration of additionality, development of eligibility criteria and application of multiple methodologies for programme of activities', PoAs that consist of one or more small-scale projects as CPAs shall demonstrate additionality according to the requirements of attachment A to Appendix B of the 'Simplified modalities and procedures for small-scale CDM project activities'.

E.5.2. Key criteria and data for assessing additionality of a SSC-CPA:

>> As per section E.5.1 of this document, the CPA shall demonstrate additionality using attachment A to Appendix B of the 'Simplified modalities and procedures for small-scale CDM project activities'. Additionality will be demonstrated on a CPA level, for each individual CPA.

The CPA implementer shall provide an explanation to show that the project activity would not have occurred anyway due to at least one of the following barriers:

Investment barrier: a financially more viable alternative to the project activity would have led to higher emissions.

Technological barrier: a less technologically advanced alternative to the project activity involves lower risks due to the performance uncertainty or low market share of the new technology adopted for the project activity and so would have led to higher emissions.

Barrier due to prevailing practice: prevailing practice or existing regulatory or policy requirements would have led to implementation of a technology with higher emissions. It is standard practice in South Africa for facilities to use conventional non-energy-efficient ventilation fans. There are no policies or schemes which support the installation of energy efficient ventilation fans in South Africa.

Other barriers: without the project activity, for another specific reason identified by the project participant, such as institutional barriers or limited information, managerial resources, organizational capacity, financial resources, or capacity to absorb new technologies, emissions would have been higher.

At the time of drafting the PoA, automatic additionality in the case of microscale project activities was not applicable to the CPA's in this PoA (*Annex 23, Guidelines for demonstrating additionality of microscale project activities. Version 03. Paragraph 3*). This is because in the case of automatic additionality, the end users are households/ communities/ small and medium enterprises, and not facilities that will be targeted in this PoA.

E.6. Estimation of Emission reductions of a CPA:

E.6.1. Explanation of methodological choices, provided in the approved baseline and monitoring methodology applied, selected for a typical SSC-CPA:

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1. Ex-ante calculation of emission reductions
2. An equal split of the operating and built margin in calculation of the emission factor
3. Emission reductions are determined by methodology AMS II.D. (Version 12) The equations used for calculating the emission reductions are found in section E.6.2.

E.6.2. Equations, including fixed parametric values, to be used for calculation of emission reductions of a SSC-CPA:

>> The procedure followed for estimating the emissions reductions from this project activity during the
crediting period are as per the following steps which corresponds with AMS II.D / version 12.

Steps	Description	Parameter	Equation Used	Methodological Choices
1	Procedure for calculation of Baseline Emissions	$EC_{BL,y}$	$EC_{BL} = EC_{HY}$	The electricity consumption prior to the project activity
2	Procedure for calculation of Project Emissions	$EC_{PJ,y}$		The electricity consumption after project implementation
3	Procedure for calculation the Emission reductions	ER_y	$ER_y = BE_y - PE_y - LE_y$	

E.6.3. Data and parameters that are to be reported in CDM-SSC-CPA-DD form:

(Copy this table for each data and parameter)

Data / Parameter:	EC_{HY}
Data unit:	Electricity consumption in year y
Description:	MWh/year
Source of data used:	Plant records
Value applied:	
Justification of the choice of data or description of measurement methods and procedures actually applied :	Electricity consumption figures as reflected on monthly plant records.
Any comment:	Parameter will be measured continuously and aggregated monthly for the monitoring report.

Data / Parameter:	EF_{grid}
Data unit:	Ton CO_2e/MWh
Description:	Emission Factor for grid electricity
Source of data used:	Eskom annual reports and dedicated CDM data
Value applied:	1.021
Justification of the choice of data or description of measurement methods and procedures actually applied :	As calculated with the CDM tool. (See Annex 3)
Any comment:	

E.7. Application of the monitoring methodology and description of the monitoring plan:

E.7.1. Data and parameters to be monitored by each SSC-CPA:

Data / Parameter:	$EC_{PJ,y}$
Data unit:	GWh/year
Description:	Energy consumption of the project
Source of data to be used:	Plant Records
Value of data applied for the purpose of calculating expected emission reductions in section B.5	
Description of measurement methods and procedures to be applied:	In this section the project participants shall provide description of equipment used for measurement, if applicable, and its accuracy class.
QA/QC procedures to be applied:	
Any comment:	Parameter will be measured continuously and aggregated monthly for the monitoring report.

E.7.2. Description of the monitoring plan for a SSC-CPA:

>> The monitoring plan has been developed using the approved consolidated baseline and monitoring methodology AMS-II.D. The purpose of the monitoring plan will be to measure and record the energy savings of each CPA. Details of the CPA monitoring plan will be described in each CPA, whilst considering the following elements:

1. Monitoring Period

The monitoring period will start from the date of commissioning of the CPA. An annual monitoring report will be produced.

2. Monitoring Plan Management

The CPA facility manager is responsible for the effective implementation of the monitoring management plan. All elements of the monitoring plan will be supported by formal procedures and regular training of delegated personnel, as appropriate.

The CME is responsible for managing and monitoring the data set that generates the grid emission factor.

3. Data Monitored and Sources

For each CPA, all parameters included in E.7.1 will be monitored by the CPA implementer(s) and recorded electronically. The CPA implementer(s) will provide data on monitored parameters included in section E.7.1 to the CME. The CME will document and store all data related to parameters included in section E.7.1 provided by CPA implementing entities in an electronic database, while primary data will be stored by each CPA implementing entity.

Equipment for monitoring the electricity consumption of the mine shafts is installed at the existing facility. Calibrated electricity meters will be installed.

4. Storage of Data

All data collected will be archived electronically in two places for security purposes. Data will be consolidated and submitted to the CME database on a regular basis. All data will be kept by the CPA and the CME for at least two years after the end of the crediting period.

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

>>

Date of completion of application: 11/04/2012

Contact information for the entity responsible for the application of the baseline and monitoring information:
Promethium Carbon (Pty) Ltd
Coral House
20 Peter Place
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Telephone: +27 11 706 8185

Annex 1

CONTACT INFORMATION ON COORDINATING/MANAGING ENTITY and PARTICIPANTS IN THE PROGRAMME of ACTIVITIES

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Represented by:	Head: African Treasuries, Carbon and Financial Products Unit
Title:	Mr
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Annex 2

INFORMATION REGARDING PUBLIC FUNDING

No public funding will be used in the development or implementation of this programme.

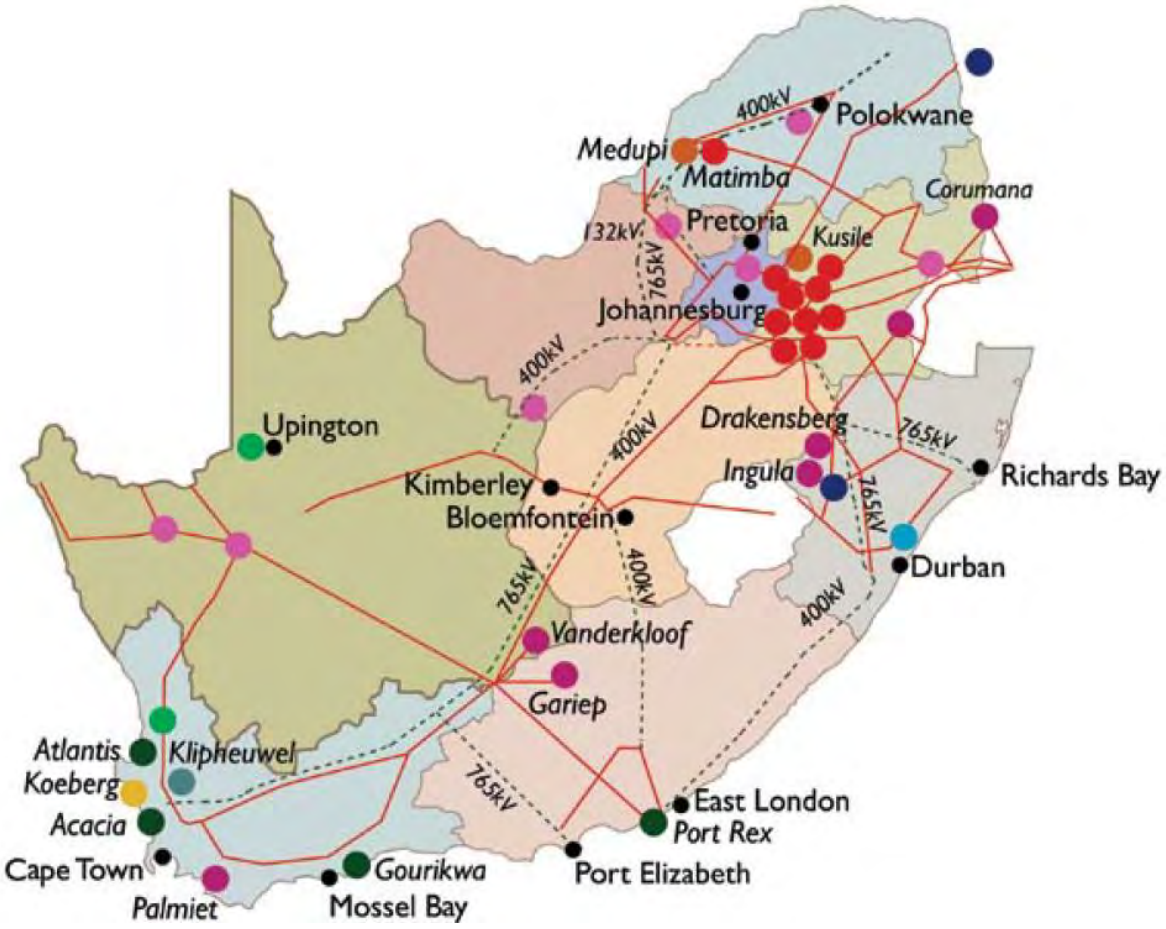
Annex 3

STEP 1: IDENTIFY THE RELEVANT ELECTRICITY SYSTEMS

This tool will serve project activities that prospect to displace grid electricity in South Africa.
The **project electricity system** is defined by the spatial extent of the power plants that are physically connected through transmission and distribution lines to the project activity and that can be displaced without significant transmission constraints.
Similarly, a **connected electricity system**, e.g. national or international, is defined as an electricity system that is connected by transmission lines to the project electricity system. Power plants within the connected electricity system can be dispatched without significant transmission constraints, but transmission to the project electricity system has significant transmission constraints.
The DNA of South Africa has not published a delineation of the project electricity system and connected electricity systems. Also, the application of the criteria with regards to determining significant transmission constraints does not result in a clear grid boundary due to a lack of sufficient data. For these reasons the following was chosen for the reference system of this project:

- The **project electricity system** entails all the Eskom power plants in the South African electricity grid.
- Due to a lack of data available in the public domain (in order to evaluate significant transmission constraints), all other power stations (non-Eskom) and countries with power grids connected to South Africa, are treated as **connected electricity systems**, and emission factors for imports from these systems are conservatively assumed to be 0 tCO_2/MWh.

All electricity generated by the Eskom power stations is taken into consideration when calculating the grid emission factor; exports are not subtracted.
All the data for the Eskom power stations are obtained from the Eskom website, where they have a specific webpage dedicated to CDM grid emission factor related data (Eskom Holdings SOC Limited , 2011). This data includes commissioning dates, electricity generated, and fuel consumed.
Data for the imported electricity are obtained from the Eskom annual report, where "*Total purchased for the Eskom system (GWh)*" is shown in the "*Statistical overview*" table on pg. 324 of the report(Eskom Holdings SOC Limited, 2011).



STEP 2: CHOSE WHETHER TO INCLUDE OFF-GRID POWER PLANTS IN THE PROJECT ELECTRICITY SYSTEM

This step is optional according to the tool. The grid emission factor is calculated from only grid power plants (**Option I**). Off-grid power plants are not included in the calculations.

STEP 3: SELECT A METHOD TO DETERMINE THE OPERATING MARGIN (OM)

The OM is calculated using the **simple OM method (Option a)**. The simple OM method can be used provided that the low-cost/must-run resources constitute less than 50% of the total grid generation in average of the five most recent years.
The average percentage of low-cost/must-run resources amount to 0.00% of the total grid generation for this project electricity system. Therefore, Option (a) is applicable.
In terms of data vintages, the *ex ante* option were chosen to calculate the simple OM. In this option a 3 year generation-weighted average are used for the grid power plants. Using this option also means that the emission factor is determined only once at the validation stage, thus no monitoring and recalculation is required during the crediting period.
The data used in OM calculations are for the 3 year period of 1 April 2008 – 31 March 2011 (Eskom financial year runs from 1 April – 31 March). This is the latest available data.

STEP 4: CALCULATE THE OPERATING MARGIN EMISSION FACTOR ACCORDING TO THE SELECTED METHOD

The simple OM emission factor ($EF_{grid,OMsimple,y}$) is calculated as the generation-weighted average CO_2 emissions per unit net electricity generation (tCO_2/MWh) of all generating power plants serving the system, not including low-cost/must-run power plants/units. Hence, the hydro and nuclear power plants are excluded from the calculation of the OM.

Option A is used for calculating the simple OM. The calculations in this option are based on the total net electricity generation and a CO2 emission factor of each power plant.

Option A – Calculation based on average efficiency and electricity generation of each plant

Under this option, the simple OM emission factor is calculated based on the net electricity generation of each power plant and an emission factor of each power plant, as follows:

$$EF_{grid,OMsimple,y} = \frac{\sum_m EG_{m,y} \times EF_{EL,m,y}}{\sum_m EG_{m,y}}$$

Where:

$EF_{grid,OMsimple,y}$ = Simple operating margin CO_2 emission factor in year y (tCO_2/MWh)
$EG_{m,y}$ = Net quantity of electricity generated and delivered to the grid by power unit m in the year y (MWh)
$EF_{EL,m,y}$ = CO_2 emission factor of power unit m in year y (tCO_2/MWh)
m = All power units serving the grid in year y except low-cost/must-run power units
y = The relevant year as per data vintage chosen in Step 3

Determination of $EF_{EL,m,y}$

The emission factor for each power plant m were determined as follows (**Option A1**):

$$EF_{grid,OMsimple,y} = \frac{\sum_i \left(FC_{i,y} \times NCV_{i,y} \times EF_{CO2,i,y} \right)}{EG_y} \quad \textbf{(6)}$$

Where:

$EF_{grid,OMsimple,y}$ = Simple operating margin CO_2 emission factor in year y (tCO_2/MWh)
$FC_{i,y}$ = Amount of fossil fuel type i consumed in the project electricity system in year y (mass or volume unit)
$NCV_{i,y}$ = Net calorific value (energy content) fossil fuel type i in year y (GJ/mass or volume unit)
$EF_{CO2,i,y}$ = CO_2 emission factor of fossil fuel type i in year y (tCO_2/GJ)
EG_y = Net electricity generated and delivered to the grid by all power sources serving the system, not including low-cost/must-run power plants/units, in year y (MWh)
i = All fossil fuel types combusted in power sources in the project electricity system in year y
y = The relevant year as per data vintage chosen in Step 3.

Electricity imports are treated as one power plant, as per the tool guidance.

The constants used in calculations appear in Table 1.

Table 1: Constants used in calculations

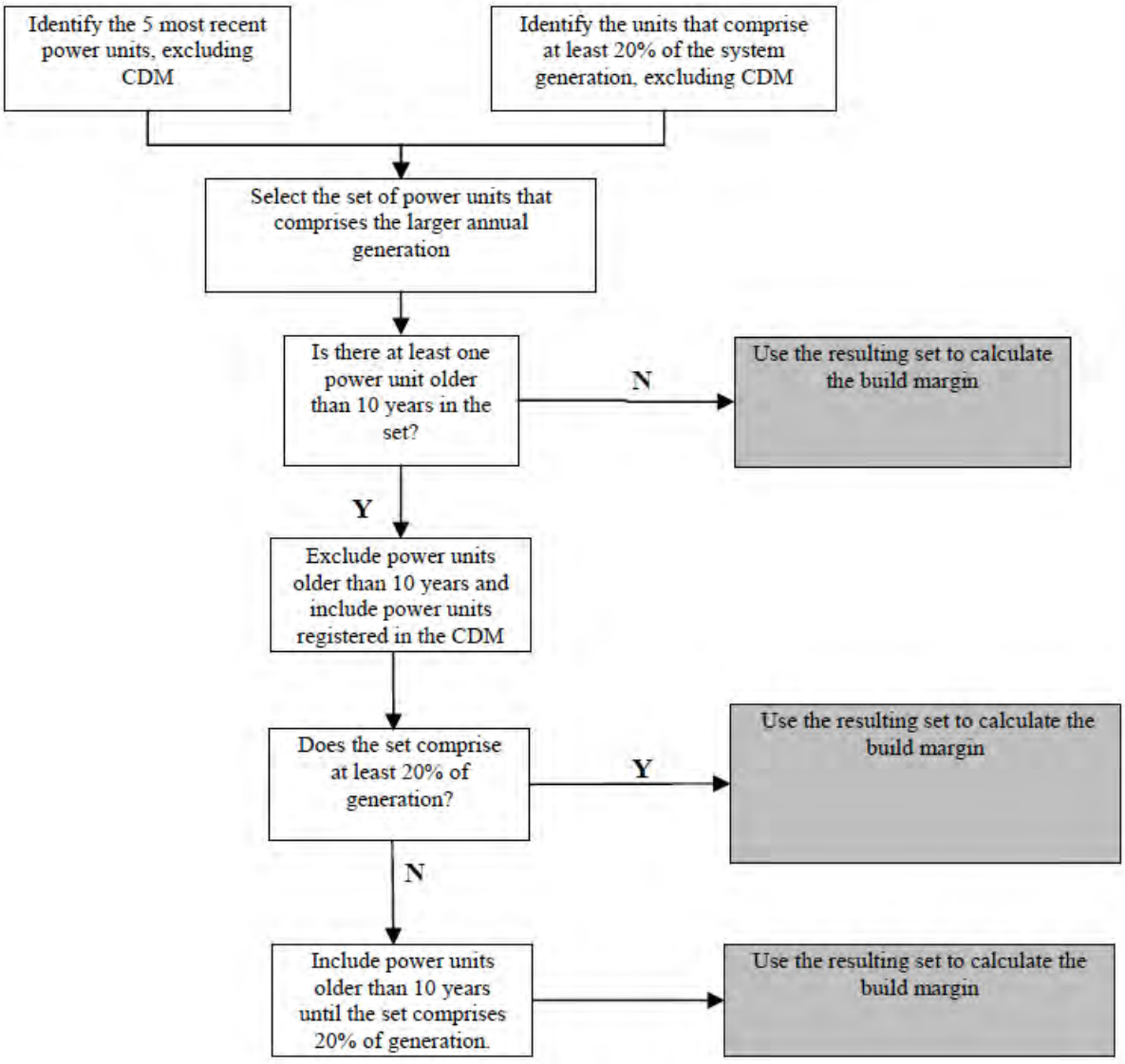
Constants		
$NCV_{other\ bituminous\ coal}$	19.9	GJ/T
$NCV_{other\ kerosene}$	42.9	GJ/T
$EF_{CO2other\ bituminous\ coal}$	0.0895	tCO_2/GJ

$EF_{CO2,other\ kerosene}$	0.0708	tCO_2/GJ

Using equation 6, the OM is calculated as **1.018** tCO_2e/MWh.

STEP 5: CALCULATE THE BUILD MARGIN (BM) EMISSION FACTOR

In terms of vintage of data, one **Option 1** was selected: For the first crediting period, calculate the build margin emission factor *ex ante* based on the most recent information available on units already built for sample group *m* at the time of CDM-PDD submission to the DOE for validation.
The sample group of power units *m* used to calculate the build margin were determined as per the procedure delineated in the tool, consistent with the data vintages selected.
The following diagram summarizes the procedure of identifying the sample group:



The build margin emissions factor is the generation-weighted average emission factor (tCO_2/MWh) of all power units *m* during the most recent year *y* for which power generation data is available, calculated as follows:

$$EF_{grid,BM,y} = \frac{\sum_m EG_{m,y} \times EF_{EL,m,y}}{\sum_m EG_{m,y}} \quad \textbf{(13)}$$

Where:

$EF_{grid,BM,y}$ = Build margin CO_2 emission factor in year y (tCO_2/MWh)
$EG_{m,y}$ = Net quantity of electricity generated and delivered to the grid by power unit *m* in year *y* (MWh)
$EF_{EL,m,y}$ = CO_2 emission factor of power unit *m* in year *y* (tCO_2/GJ)
m = Power units included in the build margin
y = Most recent historical year for which power generation data is available.

The CO_2 emission factor of each power unit m ($EL_{EL,m,y}$) should be determined as per the guidance in Step 4 (a) for the simple OM, using **Option A1** using for *y* the most recent historical year for which power generation data is available, and using for *m* the power units included in the build margin.
If for a power unit *m* data on fuel consumption and electricity generation is available the emission factor ($EF_{EL,m,y}$) should be determined as follows:

$$EF_{EL,m,y} = \frac{\sum_i FC_{i,m,y} \times NCV_{i,y} \times EF_{CO2,i,y}}{\sum_m EG_{m,y}} \quad \textbf{(2)}$$

Where:

$EF_{EL,m,y}$ = CO_2 emission factor of power unit *m* in year *y* (tCO_2/MWh)
$FC_{i,m,y}$ = Amount of fossil fuel type *i* consumed by power unit *m* in year *y* (mass or volume unit)
$NCV_{i,y}$ = Net calorific value (energy content) fossil fuel type *i* in year y (GJ/mass or volume)
$EF_{CO2,i,y}$ = CO_2 emission factor of fossil fuel type *i* in year y (tCO_2/GJ)
$EG_{m,y}$ = Net electricity generated and delivered to the grid by power unit *m* in year *y* (MWh)
m = All power plants/units serving the grid in year y except low-cost/must-run power plants/units
i = All fossil fuel types combusted in power plant/unit m in year y
y = The relevant year as per data vintage chosen in Step 3.

Using equation 13, the BM is calculated as **1.024** tCO_2e/MWh.

STEP 6: CALCULATE THE COMBINED MARGIN (CM) EMISSION FACTOR

The combined margin factor is calculated as follows:

$$EF_{grid,CM,y} = EF_{grid,OM,y} \times w_{OM} + EF_{grid,BM,y} \times w_{BM} \quad \textbf{(14)}$$

Where:

$EF_{grid,BM,y}$ = Build Margin CO_2 emission factor in year y (tCO_2/MWh)
$EF_{grid,OM,y}$ = Operating margin CO_2 emission factor in year y (tCO_2/MWh)
w_{OM} = Weighting of operating margin emissions factor (%)
w_{BM} = Weighting of build margin emissions factor (%)

The emission factors for the operating margin, the build margin, and the final combined margin appear in Table 8.

Table 1: CM emission factor

$EF_{grid,OM,y}$	1.018

$EF_{grid,BM,y}$	1.024
w_{OM}	0.5
w_{BM}	0.5
$EF_{grid,CM,y}$	**1.021**

Annex 4

MONITORING INFORMATION

- - - - -

Not applicable.