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):

NuPlanet Small Scale Hydropower PoA
Version: 02
Date: 17/12/2012

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

1. The General operating and implementing framework of the PoA.

The objective of this programme is to support the development of hydroelectricity renewable energy generation units in South Africa.

The coordinating/managing entity (CME) is NuPlanet Project Development (Pty) Ltd (referred to from now on in the document as NuPlanet), a private company registered in South Africa.

2. Policy/measure or stated goal of the PoA.

The PoA will support the reduction of greenhouse gas emissions by displacing electricity from the South African national grid, which is produced mainly by fossil-fuel based generation.

The PoA will increase the proportion of renewable energy being supplied into the South African grid and in so doing the grid will rely less on fossil fuel based electricity generation, resulting in grid electricity becoming less carbon intensive.

The PoA will assist in the development of hydropower projects in South Africa. The PoA will support the three components of sustainable development as follows:

Environmental Component

As well as reducing GHG emissions, the development of hydroelectricity renewable energy generation units will reduce other environmental impacts associated with fossil-fuel based electricity generation. These impacts include air pollution and the production of significant quantities of solid waste.

Social Component

The projects that fall under the auspices of this PoA will create opportunities for temporary and permanent employment in both the construction and operational phases of each project.

Economic Component

The projects will support economic development by improving access to, and the quality of, electricity supply in South Africa, which will support enterprise development and operation.

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

NuPlanet, as the CME, confirms that this is a voluntary action. There are no mandatory regulations/ policies in South Africa which mandate the CME to conceptualise the PoA, or to implement the underlying CPAs. This is elaborated below.

South Africa's energy policy is clearly set out in the 1998 "White Paper on Energy Policy of the Republic of South Africa"[1]. This White Paper clearly indicated that Renewable Energy would play a significant role in the country's energy planning. This was formalised in 2003 with the publication of the "White Paper on the Renewable Energy Policy of the Republic of South Africa"[2]. In this document Government indicated that it wanted to implement a range of measures to bring about the integration of renewable energies into the mainstream energy economy. To achieve this, the Government set itself a target of 10 000 GWh renewable energy contribution to final energy consumption by 2013, to be produced mainly from biomass, wind, solar and small-scale hydro. In South Africa, the key policy and planning document for the electricity sector is the Integrated Resource Plan (IRP). The latest version, titled "Integrated Resource Plan for Electricity 2010 – 2030"[3] identified renewable technologies as a key part of the new build that the country needs in the electricity sector to satisfy demand. To support this, the Minister of Energy subsequently determined that 3 725 MW would be required from renewable energy sources to ensure the continued uninterrupted supply of electricity[4]. The achievement of this objective is being supported through the implementation of a Renewable Energy Independent Power Producer Procurement Programme (REIPPP)[5], with hydro projects has been allocated 75 MW of the 3 725 MW to be contracted through this programme. Participation in REIPPP is voluntary and there are no mandatory requirements for the development of renewable energy facilities in South Africa.

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

1. **Coordinating or managing entity of the PoA as the entity which communicates with the Board**.

NuPlanet, as the coordinating/managing entity, will communicate with the Board.

[1] White Paper on the Energy Policy of the Republic of South Africa. Department of Minerals and Energy. December 1998.
[2] White Paper on the Renewable Energy Policy of the Republic of South Africa. Department of Minerals and Energy. November 2003.
[3] Integrated Resource Plan for Electricity 2010 – 2030. Department of Energy. Version 2. Final Report. 25 March 2011.
[4] Website for the Department of Energy's Renewable Energy Independent Power Producer Procurement Programme (REIPPPP). www.ipprenewables.co.za. Accessed on 9th October 2012.
[5] Website for the Department of Energy's Renewable Energy Independent Power Producer Procurement Programme (REIPPPP). www.ipprenewables.co.za. Accessed on 9th October 2012.

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.

Name of the Party involved ((host) indicates a host Party)	Private and/or public entity(ies) project participants (as applicable)	Kindly indicate if the Party involved wished to be considered as a project participant (Yes/No)
Republic of South Africa (host)	NuPlanet Project Development (Pty) Ltd (private entity)	No

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

A.4.1. Location of the programme of activities:

The PoA will initially support the development of CPAs in the Republic of South Africa. The range of coordinates for projects located in the Republic of South Africa is as follows:

Latitude: -22 to -35 (South)[6]
Longitude: +16 to +33 (East)

[6] http://en.wikipedia.org/wiki/South_africa#Geography

A.4.1.1. Host Party(ies):

Republic of South Africa

A.4.1.2. Physical/ Geographical boundary:

The PoA's boundary is the internationally recognised borders of the Republic of South Africa.

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

A typical CPA that would fall under the auspices of this PoA would be:

- A hydroelectricity plant that has an installed capacity below 15MW.
- A Greenfield plant new installation.
- A capacity addition.
- A retrofit.
- A replacement.
- The CPAs can either be run of river and/or use existing infrastructure such as reservoirs and/or involve the construction of new infrastructure such as reservoirs.

Any CPA falling under this PoA would need to satisfy all the applicable content of version 17 of the small-scale methodology AMS I.D. 'Grid Connected Renewable Electricity Generation'.

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

The PoA will use commonly available hydroelectricity related technology that transforms the kinetic energy in water flows into electricity. The technology will either use diverted river flows or water flowing from dams to drive turbines. The turbines will drive generators that feed electricity into the grid via substation and transmission lines.

Hydro power plants with reservoirs (as per AMS I.D. version 17, a reservoir is defined as a water body created in valleys to store water generally made by the construction of a dam) are eligible to be considered as CPAs, under the umbrella of this PoA.

In terms of AMS I.D. version 17, such CPAs need to satisfy at least of the following conditions:

- The project activity is implemented in an existing reservoir with no change in the volume of the reservoir (as per AMS I.D. version 17, a reservoir is considered to be an existing reservoir if it has been in operation for at least three years before the implementation of the project activity);
- The project activity is implemented in an existing reservoir, where the volume of the reservoir is increased and the power density of the project activity is greater than 4 W/m^2; and,
- The project activity results in new reservoirs and the power density of the power plant is greater than 4 W/m^2.

Therefore CPAs may involve the following options: the use of existing reservoirs to provide water flows to the facility; the use of an existing reservoir whose volume has been increased; or, a new reservoir has been built as part of the hydro power project.

In the case of the latter two options, calculations as directed by ACM0002 version 13.0.0 will need to be done to account for CH_4 and CO_2 emissions from the reservoirs.

The power density of a CPA is calculated using the installed capacity of the CPA's hydro power plant and the reservoir(s) surface area when full.

The electricity produced through this technology has no greenhouse gas emissions associated with it, as it does not use fossil-fuels. Therefore its production assists in reducing the emissions associated with electricity grids that are based on fossil-fuel use.

The PoA type and category is as follows: Scope Number 1 and Sectoral Scope - Energy Industries (renewable - / non-renewable sources).

For hydro projects in South Africa technology transfer does occur in several elements of the projects, in particular with regard to the turbine and generator technology which will be imported.

The types of CPA's envisaged under this PoA do not require extensive initial training and maintenance efforts in order for the projects to be carried out as per their schedules. The technology elements of such projects are mature and relatively simple. The training needs associated with such projects for equipment (e.g. metering and data management) are not extensive and in several cases can be given by the equipment suppliers themselves. CPA implementers would also have engineers on their teams with the required expertise and experience to absorb such training effectively and apply it in an operational context. The maintenance demands for small-scale hydro facilities are low over their useful life. Generally one part-time operator is able to handle the routine maintenance associated with such facilities. The periodic maintenance of the larger components of the plant (e.g. turbines) will generally be outsourced to companies specialising in such services.

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

The eligibility criteria used for assessing whether or not a SSC-CPA may be enrolled into this PoA have been developed using the guidance contained in version 01 of the 'Standard for Demonstration of Additionality, Development of Eligibility Criteria and Application of Multiple Methodologies for Programme of Activities'.

The table below indicates how this has been done:

Minimum Requirements for Eligibility Criteria	CPA Eligibility Criterion Developed to Address Minimum Requirements	How the CPA\CME Will Demonstrate that it Satisfies the Eligibility Criteria
(a) The geographical boundary of the CPA including any time-induced boundary consistent with the geographical boundary set in the PoA;	1. Any CPA must be located within the internationally recognised boundaries of the Republic of South Africa.	The GPS co-ordinates for the CPA will be checked and confirmed by the CME that these fall within the boundaries of the Republic of South Africa.
(b) Conditions that avoid double-counting of emission reductions like unique	2. Each CPA must be linked to specific geographical co-ordinates supported by	The CPA implementer must provide the GPS co-ordinates of the proposed CPA site to the

Minimum Requirements for Eligibility Criteria	CPA Eligibility Criterion Developed to Address Minimum Requirements	How the CPA\CME Will Demonstrate that it Satisfies the Eligibility Criteria
identifications of product and end-user locations (e.g. programme logo).	a description of its location (the description should include a reference to a national land registry system, if such a system exists)	CME. The CME will confirm, through a search of the UNFCCC website, that the CPA is not part of another PoA or is a standalone CDM project activity.
(c) The specification of technology/measure including the level and type of service, performance specifications including compliance with testing/certifications.	3. Each CPA will use hydroelectricity renewable energy generation technology only. The technology will satisfy all relevant national testing and certification requirements. This will be shown through a review of the feasibility study related reports that describe the technology to be used.	The CME will confirm through a review of technical and/or feasibility related documentation for the project that it is a hydroelectricity renewable energy generation project and that it is or will be in compliance with applicable (if any) national testing and certification requirements. All CPAs will be required to provide the CME with relevant technical and feasibility related documentation.
(d) Conditions to check the start date of the CPA through documentary evidence.	4. Each CPA should show that the earliest date of its first real action or implementation or construction was after the date on which the CDM-PoA-DD was published for Global Stakeholder Consultation.	The start date of the CPA must be shown to be after the date of the PoA's GSC i.e. 04/04/2012. The CPA implementer will define what is being used to define the start date (as per the CDM definition) and provide documentary evidence to the CME to confirm the start date.
(e) Conditions that ensure compliance with applicability and other requirements of single or multiple methodologies applied by CPAs (in this case Small – Scale Methodology I.D. Grid Connected Renewable Electricity Generation).	5. The CPA must have a capacity of less than 15MW.	The CPA must provide the CME with relevant technical and/or feasibility related documentation confirming that the CPA has a capacity less than 15MW.
	6. The CPA must involve either the (a) installation of either a new power plant at a site where there was no renewable energy power plant operating prior to the implementation of the project activity (Greenfield Plant) or (b) involve a capacity	The CPA must provide the CME with relevant technical and/or feasibility related documentation confirming what the CPA involves in terms of the nature of the project activity and whether it falls under the four options defined.

Minimum Requirements for Eligibility Criteria	CPA Eligibility Criterion Developed to Address Minimum Requirements	How the CPA\CME Will Demonstrate that it Satisfies the Eligibility Criteria
	addition or (c) involve a retrofit of an existing plant or (d) a replacement.	
	7. CPAs with reservoirs must satisfy at least one of the following conditions: • The CPA is implemented in an existing reservoir with no change in the volume of reservoir. • The CPA is implemented in an existing reservoir, where the volume of reservoir is increased and the power density of the project activity, as per definitions given in the project emissions section, is greater than 4 W/m^2. • The project activity results in new reservoirs and the power density of the power plant, as per definitions given in the project emissions section, is greater than 4 W/m^2.	The CPA must provide documentary evidence to the CME to show whether it has a reservoir or not (as per CDM definitions). If the CPA does have a reservoir then the documentary evidence must show that it satisfies one of the three conditions as defined in the eligibility criteria.
(f) The conditions that ensure that CPAs meet the requirements pertaining to the demonstration of additionality as specified in section III. A of the "Standard for Demonstration of Additionality, Development of Eligibility Criteria and Application of Multiple Methodologies for Programme of Activities".	8. CPAs will demonstrate additionality using the Guidelines on the Demonstration of Additionality of Small-Scale Projects (formerly known as Attachment A of Appendix B of the "Simplified modalities and procedures for small-scale CDM project activities") as detailed in Section E.5.1 of the PoA-DD.	Any CPA will have to choose one of two options to show additionality. These are: 1. Using an Investment Analysis approach, it will be shown that the CPA has a lower after-tax equity IRR than the expected return on equity for Group 1 projects in South Africa; or, 2. If the CPA is using an investment barrier to demonstrate additionality (as outlined in version 09 of the 'Guidelines on the demonstration of additionality of small scale project activities'), then it will shown that the CPA is unable to secure either debt finance

Minimum Requirements for Eligibility Criteria	CPA Eligibility Criterion Developed to Address Minimum Requirements	How the CPA\CME Will Demonstrate that it Satisfies the Eligibility Criteria
		and/or equity investment without the CDM for it to be able to move into implementation. This is an access to finance barrier, in accordance with version 01 of the 'Guidelines for objective demonstration and assessment of barriers'.
(g) The PoA-specific requirements stipulated by the CME including any conditions related to undertaking local stakeholder consultations and environmental impact analysis.	9. CPAs will have undertaken stakeholder consultations, which will have been formally recorded.	The CPA will provide documentary evidence to the CME that shows that stakeholder consultations have been undertaken.
	10. CPAs will have undertaken an analysis of their environmental impacts, which will have been formally recorded.	The CPA will provide documentary evidence to the CME that an analysis of its environmental impacts has been undertaken.
(h) Conditions to provide an affirmation that funding from Annex 1 parties, if any, does not result in a diversion of official development assistance.	11. CPAs that have received development assistance will submit written confirmation from the assistance provider that this has not resulted in a diversion of official development assistance.	The CPA will provide written confirmation that it has either received or not received development assistance from an Annex 1 party. In the case that it has received development assistance, the source of the development assistance should provide a written statement that this has not resulted in a diversion of official development assistance.
(i) Where applicable, target group (e.g. domestic/commercial/industrial, rural/urban, grid-connected/off-grid) and distribution mechanisms (e.g. direct installation).	12. CPAs will show clearly that the target group is grid-connected. This will be shown clearly through a review of the feasibility related documentation, clearly indicating that hydroelectricity will be delivered into the grid's electricity transmission system. As CPAs will be feeding into the grid via the transmission system, an eligibility criterion related to distribution	The CPA will provide documentary evidence (e.g. feasibility and/or technical studies) that the CPA is grid-connected.

Minimum Requirements for Eligibility Criteria	CPA Eligibility Criterion Developed to Address Minimum Requirements	How the CPA\CME Will Demonstrate that it Satisfies the Eligibility Criteria
	mechanisms is not required.	
(j) Where applicable, the conditions related to the sampling requirements for a PoA in accordance with the approved guidelines/standard from the Board pertaining to sampling and surveys.	Not applicable as all CPAs under this PoA will be subject to verification.	
(k) Where applicable, the conditions that ensure that every CPA in aggregate meets the small-scale or microscale threshold criteria and remains within those thresholds throughout the crediting period of the CPA.	13. The CPA implementer will provide a declaration that the CPA in aggregate meets the small-scale or microscale threshold criteria and will remain within these thresholds throughout the crediting period of the CPA.	The CPA will provide the CME with a declaration.
(l) Where applicable, the requirements for the debundling check, in case CPAs belong to small-scale (SSC) or microscale project categories.	14. CPAs shall show that they are not debundled projects through the application of the latest applicable and approved version of the "Guidelines on assessment of debundling for SCC project activities".	The CPA will provide documentary evidence that it is not a debundled project.

Depending on the specific characteristics of the PoA, the validating DoE and/or the Board may specify additional eligibility criteria.

All the eligibility criteria detailed in the table above are verifiable.

Once a project developer has expressed interest in joining the PoA, the CME will undertake the following formally documented process to assess whether the proposed CPA is eligible to be included under the PoA or not:

1. Initial Assessment – This is done by the CME's Reporting and Admin Manager to ensure that the project meets all the eligibility criteria as stipulated in the PoA-DD.
2. Records Check – The purpose of this step, carried out by the Reporting and Admin Manager, is to ensure that the project is a new CDM project and is not registered elsewhere avoiding double counting.
3. Technical Assessment – The CME's Technical Advisor will conduct a further check on the technical aspects of the project, ensuring that the project meets all the eligible criteria e.g. with regard to technology choice and capacity.

4. Additionality and Financial Assessment – The CME's General Manager will assess the financial models of the proposed CPA and ensure that it meets all the financial criteria, including that of additionality.
5. Quality Assurance – The CME's Reporting and Admin Manager will check the assessments done under steps 1 to 4 above and ensure that all the criteria are met before issuing a letter confirming that the proposed CPA qualifies to be included under the PoA. If the project is rejected for inclusion then reasons for the rejection will be given to the applicant.

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):

(i) The proposed PoA is a voluntary co-ordinated action

NuPlanet as the CME confirms that this is a voluntary coordinated action. There are no regulations requiring the mandatory development of hydropower projects, the use of CDM funding to develop such projects, the development of PoAs or for hydropower projects to join the PoA. This was discussed in section A.2 of the PoA.

(ii) If the PoA is implementing a voluntary co-ordinated action, it would not be implemented in the absence of the PoA.

The additionality of a SSC-CPA that falls under the umbrella of the PoA will be demonstrated in accordance with version 09 of the 'Guidelines on the Demonstration of Additionality of Small-Scale Project Activities'.

CPAs will show that the project activity would not have occurred in the absence of the PoA as a result of at least one of the following barriers:

(a) **Investment barrier:** a financially more viable alternative to the project activity would have led to higher emissions;
(b) **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;
(c) **Barrier due to prevailing practise:** prevailing practise or existing regulatory or policy requirements would have led to implementation of a technology with higher emissions;
(d) **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 be higher.

For CPAs using an investment barrier argument, version 05 of the 'Guidelines on the assessment of investment analysis' will be applied.

In the absence of the proposed PoA, the voluntary coordinated actions envisaged under this PoA would not be implemented.

There are no mandatory policies or regulations in South Africa that require the implementation of the PoA.

Additionality will be proven at CPA level.

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

There is no mandatory policy/regulation that would drive the development of the CPAs that fall under the umbrella of this PoA.

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

There is no mandatory policy/regulation that would drive the development of the CPAs that fall under the umbrella of this PoA.

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

A.4.4.1. Operational and management plan:

(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 CPA related data for inclusion in PoA Monitoring Database	
1.	Name of the CPA
2.	Name of the CPA implementer
3.	Contact details of the CPA implementer including contact person, address, landline, cell phone and email address
4.	Installed capacity and other relevant technical specifications of each CPA
5.	Location of the CPA (Description and GPS coordinates)
6.	Project start date of the CPA
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 implementer prior to inclusion. The CPA implementer 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 PoA monitoring database will report and contain the physical location of each CPA.

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 hydroelectricity renewable energy generation units 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.

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

As part of the eligibility assessment process, CPAs also have to show that there are not debundled projects by applying the latest debundling guidance.

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

NuPlanet, as the CME, will be involved in the implementation phase of the PoA and in the monitoring, however CPA implementers will be in charge of monitoring the parameters for the CPA and providing monitoring reports to CME. The CME will interact with the regulatory bodies (e.g. UNFCCC, DOEs and DNAs) and provide CDM services and necessary documentation to the CPA implementer. The CME will agree with the CPA implementer on a commercial/inclusion agreement. The commercial agreement will, inter alia, define the ownership of CERs.

A.4.4.2. Monitoring plan:

(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.

There will be no sampling and all CPAs to be included in proposed PoA will be 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 implementer. For each CPA, all parameters included in E.7.1 will be monitored and recorded in the CPA monitoring records by the CPA implementer 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. The CPA implementer shall also monitor the on-site consumption of fossil fuels due to the project activity for emergency or backup generators. The CME will store all the data submitted by the CPA implementer in an electronic database (the 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 implementers 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 implementer will monitor and record all parameters included in section E.7.1 (CPA monitoring record).
- The CME will provide guidance to the CPA implementer on how the monitoring should be conducted and how data should be collected with regards to emission reduction calculations.
- The CPA implementer 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 implementer in a central electronic database (PoA monitoring database), while primary data will be stored by each CPA implementer. The data for each CPA will be kept for at least two years after the end of the relevant 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):

No public funding has been used in the development of this PoA.

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

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

The starting date of the PoA is the 04/04/2012 (date of Global Stakeholder Consultation in accordance with CDM glossary, version 07).

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

28 Years 0 Months

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:

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

As typical CPAs will likely require an Environmental Impact Assessment (EIA), the environmental analysis at CPA level will assist in ensuring the environmental integrity of the PoA. This is particularly important as local conditions and potential impacts will vary according to the specific geographical location of the CPA.

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

This will be done at CPA level.

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 South Africa, Greenfield plants will require an EIA as per the requirement of host country guidelines:

No. R. 385 21 April 2006 REGULATIONS IN TERMS OF CHAPTER 5 OF THE NATIONAL ENVIRONMENTAL MANAGEMENT ACT, 1998, and sub-regulations R387 and R386.

For the other three types of CPA envisaged falling under the auspices of this PoA i.e. capacity addition, retrofit and replacement, there is no guidelines so far by host country. This is a product of increasing concerns in South Africa with regard to water resources management, including access and quality related

issues. The requirement would be dependent on the location and context of the proposed CPA. In the event that no EIA process is required a formal environmental analysis will be done by an independent environmental consultant using a risk based approach at the time of CPA inclusion. The environmental analysis will use suitable internationally guidance as available at the time of CPA inclusion.

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 X

As CPAs under this PoA will be located in different locations with varying local conditions it is appropriate that comments are invited at CPA level. This will ensure that the PoA supports sustainable development appropriately in the CPA locality.

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

Not done at PoA level.

D.3. Summary of the comments received:

Not done at PoA level.

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

Not done at PoA level.

SECTION E. Application of a baseline and monitoring methodology

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

AMS I.D 'Grid Connected Renewable Energy Generation' (version 17).

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

The table below provides the justification of the choice of AMS I.D. for the CPAs that fall under this PoA.

Paragraph	AMS I.D Applicability Criteria	Justification of Applicability
1.	This methodology comprises renewable energy generation units, such as photovoltaic, hydro, tidal/wave, wind, geothermal and renewable biomass: (a) Supplying electricity to a national or a regional grid; or (b) Supplying electricity to an identified consumer facility via	All the CPAs that fall under the ambit of this PoA will be renewable energy generation units that use hydro technology. They will be either supplying electricity directly to a national or regional grid or to an identified consumer

Paragraph	AMS I.D Applicability Criteria	Justification of Applicability
	national/regional grid through a contractual arrangement such as wheeling.	facility via a national/regional grid through a contractual arrangement such as wheeling.
3.	This methodology is applicable to project activities that: (a) Install a new power plant at a site where there was no renewable energy power plant operating prior to the implementation of the project activity (Greenfield plant); (b) Involve a capacity addition;[7] (c) Involve a retrofit[8] of (an) existing plant(s); or (d) Involve a replacement[9] of (an) existing plant(s).	All the CPAs that fall under the ambit of this PoA will; either, involve the installation of new power plant at a site where there was no renewable energy power plant operating prior to the implementation of the project activity (Greenfield plant); involve a capacity addition; a retrofit; or, a replacement.
4.	Hydro power plants with reservoirs[10] that satisfy at least one of the following conditions are eligible to apply this methodology: • The project activity is implemented in an existing reservoir with no change in the volume of reservoir; • The project activity is implemented in an existing reservoir,[11] where the volume of reservoir is increased and the power density of the project activity, as per definitions given in the project emissions section, is greater than 4 W/m2; • The project activity results in new reservoirs and the power density of the power plant, as per definitions given in the project emissions section, is greater than 4 W/m2.	The CPAs falling under the ambit of this PoA will involve hydro power plants and may have reservoirs. In which case they will need to satisfy one of the three conditions specified.

[7] A capacity addition is an increase in the installed power generation capacity of an existing power plant through: (i) The installation of a new power plant besides the existing power plant/units; or (ii) The installation of new power units, additional to the existing power plant/units. The existing power plant/units continue to operate after the implementation of the project activity.

[8] Retrofit (or rehabilitation or refurbishment). It involves an investment to repair or modify an existing power plant/unit, with the purpose to increase the efficiency, performance or power generation capacity of the plant, without adding new power plants or units, or to resume the operation of closed (mothballed) power plants. A retrofit restores the installed power generation capacity to or above its original level. Retrofits shall only include measures that involve capital investments and not regular maintenance or housekeeping measures.

[9] Replacement. It involves investment in a new power plant or unit that replaces one or several existing unit(s) at the existing power plant. The installed capacity of the new plant or unit is equal to or higher than the plant or unit that was replaced.

[10] A reservoir is a water body created in valleys to store water generally made by the construction of a dam.

[11] A reservoir is to be considered as an "existing reservoir" if it has been in operation for at least three years before the implementation of the project activity.

Paragraph	AMS I.D Applicability Criteria	Justification of Applicability
5.	If the new unit has both renewable and non-renewable components (e.g. a wind/diesel unit), the eligibility limit of 15 MW for a small-scale CDM project activity applies only to the renewable component. If the new unit co-fires fossil fuel,[12] the capacity of the entire unit shall not exceed the limit of 15 MW.	All the CPAs that fall under the ambit of this PoA will have renewable components only and will be less than 15 MW (in terms of installed capacity).
6.	Combined heat and power (co-generation) systems are not eligible under this category.	None of the CPAs that fall under the ambit of this PoA will be combined heat and power (co-generation) systems.
7.	In the case of project activities that involve the addition of renewable energy generation units at an existing renewable power generation facility, the added capacity of the units added by the project should be lower than 15 MW and should be physically distinct[13] from the existing units.	For all that CPAs that fall under the ambit of this PoA, that involve the addition of renewable energy generation units at an existing renewable power generation facility, the added capacity of the units added by the project will be lower than 15 MW and will be physically distinct from the existing units.
8.	In the case of retrofit or replacement, to qualify as a small-scale project, the total output of the retrofitted or replacement unit shall not exceed the limit of 15MW.	In the case of CPAs that fall under the ambit of this PoA that involve retrofits or replacements, the total output of the retrofitted or replacement unit shall not exceed 15 MW.
25.	In the specific case of biomass project activities the applicability of the methodology is limited to either project activities that use biomass residues only or biomass from dedicated plantations complying with the applicability conditions of AM0042.	None of the CPAs that fall under the ambit of this PoA involve biomass.
26.	In the specific case of biomass project activities the determination of leakage shall be done following the general guidance for leakage in small-scale biomass project activities (attachment C of Appendix B of simplified modalities and procedures for small-scale clean development mechanism project activities;	None of the CPAs that fall under the ambit of this PoA involve biomass.

[12] A co-fired system uses both fossil and renewable fuels, for example the simultaneous combustion of both biomass residues and fossil fuels in a single boiler. Fossil fuel may be used during a period of time when the biomass is not available and due justifications are provided.

[13] Physically distinct units are those that are capable of generating electricity without the operation of existing units, and that do not directly affect the mechanical, thermal, or electrical characteristics of the existing facility. For example, the addition of a steam turbine to an existing combustion turbine to create a combined cycle unit would not be considered "physically distinct".

Paragraph	AMS I.D Applicability Criteria	Justification of Applicability
	decision 4/CMP.1) or following the procedures included in the leakage section of AM0042.	
27.	In case the project activity involves the replacement of equipment, and the leakage from the use of the replaced equipment in another activity is neglected because the replaced equipment is scrapped, an independent monitoring of scrapping of replaced equipment needs to be implemented. The monitoring should include a check if the number of project activity equipment distributed by the project and the number of scrapped equipment correspond with each other. For this purpose scrapped equipment should be stored until such correspondence has been checked. The scrapping of replaced equipment should be documented and independently verified.	For CPAs that involve the replacement of equipment, and the leakage from the use of the replaced equipment in another activity is neglected because the replaced equipment is scrapped, the CPA implementer shall ensure that there is independent monitoring of the scrapped or replaced equipment.

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

The spatial extent of the project boundary includes the project power plant and all power plants physically connected to the electricity system that the CDM power plant is connected to.

Table E.3: Emissions sources included in or excluded from the CPA boundary

Source		Gas	Included?	Justification / Explanation
Baseline	Electricity generated for the grid.	CO_2	Yes	According to AMS I.D. only CO_2 emissions from electricity generation need be accounted for.
		CH_4	No	According to AMS I.D.
		N_2O	No	According to AMS I.D.
CPA	For hydro power activities with no reservoirs or existing reservoirs (with no increase in size).	CO_2	No	According to AMS I.D. and version 13 of ACM 0002.
		CH_4	No	
		N_2O	No	
	For hydro power activities that result in new single or multiple reservoirs and hydro power activities that result in the increase of single or multiple existing reservoirs.	CO_2	No	According to AMS I.D.
		CH_4	Yes/No	According to AMS-I.D. which referred to in the most recent version of ACM0002, for hydro power project activities that result in new reservoirs and hydro power project activities that result in the increase of existing reservoirs, project proponents shall account for CH_4 and CO_2 emissions from the reservoir, estimated as follows: Included if the power density of the project activity (PD) is greater than 4 W/m^2 and less than or equal to 10 W/m^2. Excluded if the power density of the project activity (PD) is greater than 10 W/m^2.
		N_2O	No	According to AMS I.D.

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

The baseline is identified through the guidance given in AMS I.D and is the electricity delivered to the grid by the project activity that would have otherwise been generated by the operation of grid-connected power plants and by addition of new generation sources into the grid.

The PoA has identified the following four types of project activities that would fall under its umbrella i.e. Greenfield, capacity addition, retrofit and replacement. The descriptions of the baseline scenarios for the different project types are given below:

Baseline for a Greenfields Site

The baseline emissions are the product of electrical energy baseline $EG_{BL,y}$ expressed in MWh of electricity produced by the renewable generating unit multiplied by the grid emission factor.

$$BE_y = EG_{BL,y} * EF_{CO_2,grid,y} \quad \textbf{(1)}$$

Where:

BE_y	Baseline Emissions in year *y* (t $CO_{2)}$
$EG_{BL,y}$	Quantity of net electricity supplied to the grid as a result of the implementation of the CDM project activity in year *y* (MWh)
$EF_{CO2,grid,y}$	CO_2 emission factor of the grid in year *y* (t CO_2/MWh)

The emission factor used in the baseline calculations $EF_{CO2,grid,y}$ will be calculated using the latest version of the *"Tool to Calculate the Emission Factor for an Electricity System"*.

Baseline for Retrofits, Capacity Additions and Replacements

For project activities that involve retrofits or replacements of an existing facility the baseline scenario is the continuing operation of the existing plant. The methodology uses historical electricity generation data to determine the electricity generation of the existing plant in the baseline scenario, assuming that the historical situation observed prior to the implementation of the project activity would continue. In the absence of the CDM project activity, the existing facility would continue to provide electricity to the grid $EG_{BL,retrofit,y}$ at historical average levels $EG_{historical}$ until the time at which the electrical generation facility would be likely to be replaced or retrofitted in the absence of the CDM project activity ($DATE_{BaselineRretrofit}$). From that point of time onwards, the baseline scenario is assumed to correspond to the project activity, and baseline electricity supply is assumed to equal the project's net electricity supply and no emission reductions are assumed to occur.

For capacity additions and retrofits in hydro projects where power generation can vary significantly from year to year, due to natural variations in the availability of the renewable source i.e. varying rainfall, the use of few historical years to establish the baseline electricity generation can therefore involve a significant uncertainty. The methodology addresses this uncertainty by adjusting the historical electricity generation by its standard deviation. This ensures that the baseline electricity generation is established in a conservative manner and that the calculated emission reductions are attributable to the project activity. Without this adjustment, the calculated emission reductions could mainly depend on the natural variability observed during the historical period rather than the effects of the project activity. The baseline emissions ($BE_{retrofit,CO_2,y}$) are thus calculated as follows:

$$BE_{retrofit,CO2,y} = [EG_{BL,retrofit,y}] * \mathrm{EF_{CO2}} \quad \textbf{(2)}$$

Where:

$$EG_{BL,retrofit,y} = \mathrm{EG_{PJ,\,facility,y}} - (\mathrm{EG_{historical}} + \sigma_{\mathrm{historical}}) \quad \textbf{(3)}$$

$$EG_{BL,retrofit,y} = 0 \; on/after \; DATE_{BaselineRretrofit} \quad \textbf{(4)}$$

Where:

$EG_{BL,retrofit,y}$	Quantity of net electricity supplied to the grid as a result of the implementation of the CDM project activity in year *y* (MWh)
$EG_{PJ,facility,y}$	Quantity of net electricity supplied to the grid by the project plant/unit in year *y* (MWh)
$EG_{historical}$	Annual average historical net electricity generation by the existing renewable energy hydro plant that was operated at the project site prior to the implementation of the project activity (MWh) Average of historical net electrical energy levels delivered by the existing facility, spanning all data from the most recent available year (or month, week or other time period) to the time at which the facility was constructed, retrofit, or modified in a manner that significantly affected output (i.e. by 5% or more), shall be used. To determine $EG_{historical}$, project participants may choose between the following two historical periods (This allows some flexibility; the use of the longer time period may result in a lower standard deviation and the use of the shorter period may allow a better reflection of the (technical) circumstances observed during the more recent years): (a)The three last calendar years (five calendar years for hydro project) prior to t (b) The time period from the calendar year following *DATEhist*, up to the last calendar year prior to the implementation of the project, as long as this time span includes at least three calendar years (five calendar years for hydro project), where *DATEhist* is latest point in time between: (i) The commercial commissioning of the plant/unit; (ii) If applicable: the last capacity addition to the plant/unit; or (iii) If applicable: the last retrofit of the plant/unit
$\sigma_{historical}$	Standard deviation of the annual average historical net electricity supplied to the grid by the existing renewable energy plant that was operated at the project site prior to the implementation of the project activity (MWh)
$DATE_{BaselineRretrofit}$	Point in time when the existing equipment would need to be replaced in the absence of the project activity (date)

Project activities for capacity addition in hydro shall use equation (3) replacing 'retrofit' with 'capacity addition'.

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:

To assess and demonstrate additionality CPAs will use version 01 "Standard for Demonstration of Additionality, Development of Eligibility Criteria and Application of Multiple Methodologies for Programme of Activities".

The standard indicates that additionality shall be demonstrated by establishing that in the absence of the CDM, none of the implemented CPAs shall occur.

As per the standard this guidance has been incorporated into the eligibility assessment.

The additionality of a SSC-CPA that falls under the umbrella of the PoA will be demonstrated in accordance with version 09 of the "Guidelines on the Demonstration of Additionality of Small-Scale Project Activities".

These guidelines indicate that CPAs will show that the project activity would not have occurred in the absence of the PoA as a result of at least one of the following barriers:

(a) **Investment barrier:** a financially more viable alternative to the project activity would have led to higher emissions;
(b) **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;
(c) **Barrier due to prevailing practise:** prevailing practise or existing regulatory or policy requirements would have led to implementation of a technology with higher emissions;
(d) **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 be higher.

For the purposes of this PoA, CPAs will only use an investment barrier argument to show that they would not have occurred. CPAs are given two options in how they may show this. These are:

Option 1 – Investment Analysis: For this option a CPA must show that it has a lower after-tax equity IRR than the benchmark for expected return on equity for Group 1 projects in South Africa, as defined in the "Guidelines on the assessment of investment analysis"

Option 2 – Other Barrier (Access to finance): For this option a CPA must show that it is unable to secure debt finance and/or an equity investment without the CDM for it to be able to move into implementation. This is an access to finance barrier, in accordance with version 01 of the 'Guidelines for objective demonstration and assessment of barriers'.

A CPA implementer must indicate clearly which option it is taking.

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

The required approach to prove additionality for each of the options provided in section E.5.1 is shown below.

Option 1: Investment Analysis

In terms of version 09 of paragraph 1(a) of the "Guidelines for the Demonstration of Additionality of Small-Scale Project Activities", an investment barrier exists when "a financially more viable alternative to the project activity would have led to higher emissions". If an investment analysis shows that the CPA is not financially feasible (without the revenue from the sale of certified, then it can be assumed that the baseline scenario would take place and higher emissions would result.

To show whether a CPA is financially feasible or not will be undertaken as follows: This process has taken into account the requirements of version 05 of the "Guidelines on the Assessment of Investment Analysis."

Each CPA will use the benchmark analysis (Option III), and apply the default values for the expected return on equity for the host country as defined in the latest version of the *"Guidelines on the Assessment of Investment Analysis"*. CPAs fall under the Group 1 project category in accordance with these guidelines.

The CPA will use an after-tax equity IRR approach as the basis for applying the benchmark analysis.

The benchmark to be used will be the after-tax expected return on equity for the host country for the Group 1 project category.

The CPA shall calculate the after-tax equity IRR financial indicator chosen for the proposed CPA.

The CPA shall present the investment analysis in a transparent matter and provide all the relevant assumptions, so that a reader can reproduce the analysis and obtain the same results.

The financial model will use the following list of parameters as the basis for what should be included in it. The required sources of supporting documentation that need to be supplied by the CPA implementer are also specified.

Parameter (Unit)	Sources for supporting documentation
Net Annual Electricity Generation (MWh/year)	*Based on information from feasibility study related information and\or a generation forecast.*
Electricity Tariff (Rand per MWh)	*Average price of grid electricity as published by either the energy regulator, grid operator and/or utility, or government departments.*
Revenue from Electricity Sales (Rands per year)	*Result of combining information with regard to net annual electricity generation and electricity tariffs.*
Anticipated increase in electricity tariff over anticipated lifetime of the project (% per year)	*Based on information from official documents from either the energy regulator, grid operator and\or utility. If no such information is available for part of the period, then the rate of inflation shall be used*
South African Inflation Rate (% per year)	*The mid-point of the inflation target, based on information from Government sources.*
Capital Cost (Rands)	*From either feasibility related studies, third party opinions and\or supplier quotes.*
Operation and Maintenance Cost (Rands)	*From either feasibility related studies, third party opinions and\or supplier quotes.*

Parameter (Unit)	Sources for supporting documentation
Period of Investment Analysis (Years)	*Technical lifetime based on information from either feasibility study related work, third party opinion and\or equipment suppliers.*
Tax Allowance (% per year)	*From either tax legislation, South African Revenue Services and\or third party opinion.*
Corporate Tax Rate (%)	*From either tax legislation, South African Revenue Services and\or third party expert.*
Salvage Value (Rands)	*To be determined as per national or international best practise.*
Expected Date of Commissioning (Date)	*Based on information from either a project plan, feasibility studies and\or contracts.*

As per paragraph 7 of EB62 Annex 5, in the case of CPAs for which implementation ceases after the commencement and where implementation is recommenced due to consideration of the CDM, the capital costs incurred prior to the revised CPA start date will be included as the recoverable value of the assets, which are limited to the potential re-use or re-sale of the tangible assets.

As per paragraph 8 of EB 62 Annex 5, CPAs should supply spreadsheet versions of all investment analysis. All parameters and formulas used in the analysis shall be readable and all relevant cells shall be viewable and unprotected. In instances where CPAs do not wish to make a spreadsheet available to the public an exact read-only or PDF copy shall be provided for general publication. In the case of a CPA wishing to black-out elements of the publically available version, a clear justification for this shall be provided.

The CPA shall present a clear comparison of the financial indicator for the proposed CDM activity and the financial benchmark. If the CPA has a lower after-tax equity IRR than the benchmark, then the CDM project activity cannot be considered as financially attractive and is therefore additional.

Each CPA will also undertake a sensitivity analysis that shows whether the conclusion regarding the financial\economic attractiveness is robust to reasonable variations in the critical assumptions. The sensitivity analysis will be conducted by altering parameters that are more than 20% of either total project costs or total project revenues. These parameters shall be altered by a range of +10% and -10% to be conservative.

The results of the sensitivity analysis would be reported in the CPA-DD as follows:

Parameter	Impact on Benchmark as a Result of Change in Parameter Value				
	-10%	-5%	0	+5%	+10%
[Insert title of Parameter]	*[Insert the revised after-tax equity IRR value as a result of the sensitivity analysis, from the financial model]*	*[Insert the revised after-tax equity IRR value as a result of the sensitivity analysis, from the financial model]*	*[Insert the revised after-tax equity IRR value as a result of the sensitivity analysis, from the financial model]*	*[Insert the revised after-tax equity IRR value as a result of the sensitivity analysis, from the financial model]*	*[] Insert the revised after-tax equity IRR value as a result of the sensitivity analysis from the financial model*

If in any scenario the benchmark is exceeded then the CPA-DD should provide evidence that as to the likelihood of this occurring. If evidence is provided that shows that the scenario(s) where the benchmark has been exceeded is unlikely to have occurred then the project analysis can continue

Option 2: Other Barrier (Access to finance)

In this case the CPA must show that it is unable to secure debt finance and/or an equity investment without the CDM for it to be able to move into implementation. This is an access to finance barrier, in accordance with version 01 of the 'Guidelines for objective demonstration and assessment of barriers'.

This will be done as per the guidance in the following table:

Barrier Type	Description of the Barrier	Evidence Sources Confirming the Existence of the Barrier	How does the CDM alleviate the barrier?
Other Barrier (Access to finance)	The CPA is unable to secure either debt finance and\or an equity investment without the CDM.	*[Insert CPA specific supporting documentation: Documentary evidence clearly showing the investments in or financing for the project are dependent on the project securing CDM project registration and benefitting from the CDM. This documentary evidence could include, but is not limited to, loan agreements.]*	By enabling the project to secure financing for it to be able to move into implementation.

If the investment barrier is shown to exist then the CPA would be considered additional.

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:

The CPAs will fall under the following four project-activity types, as defined in terms of AMS I.D: Greenfield projects; capacity addition; retrofit; and, replacement.

These project types guide the methodological choices in AMS I.D. as to how the emission reductions will be estimated.

Emission factor of the grid

In terms of the emission factor derivation the following methodological choices were made:

- Ex-ante approach used;
- Simple OM emission factor is calculated; and,
- Weightings of 50% and 50% were used for the operating margin emissions factor and the build margin emissions factor (as directed for hydro projects).

Power density

According to AMS-I.D. which referred to in the most recent version of ACM0002, for hydro power project activities that result in new reservoirs and hydro power project activities that result in the increase of existing reservoirs, project proponents shall account for CH_4 and CO_2 emissions from the reservoir, estimated as follows:

- Included if the power density of the project activity (PD) is greater than 4 W/m^2 and less than or equal to 10 W/m^2.
- Excluded if the power density of the project activity (PD) is greater than 10 W/m^2.

The power density calculations are provided in section E.6.2 below.

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

The baseline scenario is that the electricity delivered to the grid by the project activity would have otherwise been generated by the operation of grid-connected power plants and by the addition of new generation sources into the grid.

Baseline for a Greenfields Site

The baseline emissions are the product of electrical energy baseline $EG_{BL,y}$ expressed in MWh of electricity produced by the renewable generating unit multiplied by the grid emission factor.

$$BE_y = EG_{BL,y} * EF_{CO_2,grid,y} \quad \textbf{(5)}$$

Where:

BE_y Baseline Emissions in year y (t CO_2)

$EG_{BL,y}$	Quantity of net electricity supplied to the grid as a result of the implementation of the CDM project activity in year *y* (MWh)
$EF_{CO2,grid,y}$	CO_2 emission factor of the grid in year *y* (t CO_2/MWh)

The emission factor used in the baseline calculations $EF_{CO2,grid,y}$ will be calculated at CPA level using the latest version of the *"Tool to Calculate the Emission Factor for an Electricity System"*.

Baseline for a Retrofit/Capacity Addition

For capacity additions and retrofits in hydro projects where power generation can vary significantly from year to year, due to natural variations in the availability of the renewable source i.e. varying rainfall, the use of few historical years to establish the baseline electricity generation can therefore involve a significant uncertainty. The methodology addresses this uncertainty by adjusting the historical electricity generation by its standard deviation. This ensures that the baseline electricity generation is established in a conservative manner and that the calculated emission reductions are attributable to the project activity. Without this adjustment, the calculated emission reductions could mainly depend on the natural variability observed during the historical period rather than the effects of the project activity. The baseline emissions ($BE_{retrofit,CO_2,y}$) are thus calculated as follows:

$$BE_{retrofit,CO2,y} = [EG_{BL,retrofit,y}] * \mathrm{EF}_{\mathrm{CO2}} \quad \textbf{(6)}$$

Where:

$$EG_{BL,retrofit,y} = \mathrm{EG}_{\mathrm{PJ,\,facility,y}} - (\mathrm{EG}_{\mathrm{historical}} + \sigma_{\mathrm{historical}}) \quad \textbf{(7)}$$

$$EG_{BL,retrofit,y} = 0 \; on / after \; DATE_{BaselineRretrofit} \quad \textbf{(8)}$$

Where:

$EG_{BL,retrofit,y}$	Quantity of net electricity supplied to the grid as a result of the implementation of the CDM project activity in year *y* (MWh)
$\mathrm{EG}_{\mathrm{PJ,\,facility,y}}$	Quantity of net electricity supplied to the grid by the project plant/unit in year *y* (MWh)

$EG_{historical}$	Annual average historical net electricity generation by the existing renewable energy hydro plant that was operated at the project site prior to the implementation of the project activity (MWh) Average of historical net electrical energy levels delivered by the existing facility, spanning all data from the most recent available year (or month, week or other time period) to the time at which the facility was constructed, retrofit, or modified in a manner that significantly affected output (i.e. by 5% or more), shall be used. To determine $EG_{historical}$, project participants may choose between the following two historical periods (This allows some flexibility; the use of the longer time period may result in a lower standard deviation and the use of the shorter period may allow a better reflection of the (technical) circumstances observed during the more recent years): (a)The three last calendar years (five calendar years for hydro project) prior to the in (b) The time period from the calendar year following *DATEhist*, up to the last calendar year prior to the implementation of the project, as long as this time span includes at least three calendar years (five calendar years for hydro project), where *DATEhist* is latest point in time between: (i) The commercial commissioning of the plant/unit; (ii) If applicable: the last capacity addition to the plant/unit; or (iii) If applicable: the last retrofit of the plant/unit
$\sigma_{historical}$	Standard deviation of the annual average historical net electricity supplied to the grid by the existing renewable energy plant that was operated at the project site prior to the implementation of the project activity (MWh)
$DATE_{BaselineRretrofit}$	Point in time when the existing equipment would need to be replaced in the absence of the project activity (date)

Calculation of Project Emissions

Emissions from water reservoirs of hydro power plants

For CPAs that are either run of river projects or use existing reservoirs:

$PE_y = 0$

However, for hydro power CPAs that result in new single or multiple reservoirs and hydro power project activities that result in the increase of single or multiple existing reservoirs, CPA implementers shall account for CH_4 and CO_2 emissions from the reservoirs, estimated as follows:

(a) If the power density of the single or multiple reservoirs (PD) is greater than 4 W/m^2 and less than or equal to 10 W/m^2

$$PE_{HP,y} = \frac{EF_{Res} \times TEG_y}{1000}$$

Where:

$PE_{HP,y}$	Project emissions from water reservoirs (tCO_2e/yr)
EF_{Res}	Default emission factor for emissions from reservoirs of hydro power plants in year y ($kgCO_2e/MWh$)
TEG_y	Total electricity produced by the project activity, including the electricity supplied to the grid and the electricity supplied to internal loads, in year y (MWh)

(b) If the power density of the project activity (PD) is greater than 10 W/m^2

$$PE_{HP,y} = 0$$

The power density of the CPA (PD) is calculated as follows:

$$PD = \frac{Cap_{PJ} - Cap_{BL}}{A_{PJ} - A_{BL}}$$

Where:

PD	Power density of the project activity (W/m^2)
Cap_{PJ}	Installed capacity of the hydro power plant after the implementation of the project activity (W)
Cap_{BL}	Installed capacity of the hydro power plant before the implementation of the project activity (W). For new hydro power plants, this value is zero.
A_{PJ}	Area of the single or multiple reservoirs measured in the surface of the water, after the implementation of the project activity, when the reservoir is full (m^2)
A_{BL}	Area of the single or multiple reservoirs measured in the surface of the water, before the implementation of the project activity, when the reservoir is full (m^2). For new reservoirs, this value is zero.

Emissions from on-site consumption of fossil fuels

CO_2 emissions from on-site consumption of fossil fuels due to the CPA shall be calculated using the version 02 of the 'Tool to calculate project or leakage CO_2 emissions from fossil fuel combustion'. The consumption of fossil fuels is likely to be for onsite emergency/backup generators.

The project emissions from the consumption of fossil fuels are calculated with equation 1 from the Tool; where the emissions are based on the quantity of fuel combusted and the CO_2 emission coefficient of the fuel; as follows:

$$PE_{FC,y} = FC_y \times COEF_{i,y}$$

Where:

$PE_{FC,y}$	Project emissions from the consumption of fossil fuels in year *y* (tCO_2e/yr)
$FC_{j,y}$	Quantity of fuel consumed by the project activity in year *y* (l/yr)
$COEF_{i,y}$	CO_2 emission coefficient of fossil fuel in year *y* (tCO_2e/l)

The applied tool states that the CO_2 emission coefficient ($COEF_{i,y}$) can be calculated using one of two options, depending on the availability of data of the fossil fuel. Although Option A is the preferred approach, it is unlikely that the CPA implementer will measure the weighted average mass fraction of

carbon in the fossil fuels ($w_{c,j,y}$), nor is this type of information conventionally supplied on South African fuel supply invoices. Therefore, Option A will not be applied.

The CO_2 emission coefficient of fossil fuels will, therefore, be calculated using Option B from the Tool, where the coefficient, $COEF_{i,y}$, is based on net calorific value and the CO_2 emission factor of the fossil fuel; as follows:

$$COEF_{i,y} = NCV_{i,y} \times EF_{CO_2,i,y}$$

Where:

$COEF_{i,y}$ CO_2 emission coefficient of fossil fuel in year *y* (tCO_2e/l)
$NCV_{i,y}$ Net calorific value of fossil fuel in year *y* (MJ/l)
$EF_{CO_2,i,y}$ Emission factor of fossil fuel in year *y* (tCO_2e/MJ)

Leakage

If the energy generating equipment is transferred from another activity, leakage is to be considered.

Estimated Project Emissions

Finally the estimated project emissions are calculated as follows:

$$ER_y = BE_y - PE_y - LE_y \quad (9)$$

Where:

ER_y Emission reductions in year *y* ($t\ CO_2/y$)
BE_y Baseline Emissions in year *y* ($t\ CO_2/y$)
PE_y Project emissions in year *y* ($t\ CO_2/y$)
LE_y Leakage emissions in year *y* ($t\ CO_2/y$)

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

Data / Parameter:	$EF_{grid, CM, y}$
Data unit:	tCO_2/MWh
Description:	The Combined margin CO_2 emission factor for grid connected power generation in year *y*
Source of data used:	Calculation by Promethium Carbon (Pty) Ltd using the latest version of the "Tool to calculate the emission factor for an electricity system" (See Annex 3).
Value applied:	-
Justification of the choice of data or description of measurement methods and procedures actually applied :	In terms of the emission factor derivation the following methodological choices were made: • Ex-ante approach used; • Simple OM emission factor is calculated; and, • Weightings of 50% and 50% were used for the operating margin emissions factor and the build margin emissions factor (as directed for hydro projects).
Any comment:	The ex-ante value would remain fixed for the crediting period of the CPA in

	question.

Data / Parameter:	Cap_{BL}
Data unit:	W
Description:	Installed capacity of the hydro power plant before the implementation of the project activity. For new hydro power plants, this value is zero
Source of data used:	Project site
Value applied:	-
Justification of the choice of data or description of measurement methods and procedures actually applied :	Determine the installed capacity based on recognised standards
Any comment:	For CPAs that are either run of river projects or use existing reservoirs, this parameter can be neglected as $PE_{HP,y} = 0$.

Data / Parameter:	A_{BL}
Data unit:	m^2
Description:	Area of the single or multiple reservoirs measured in the surface of the water, before the implementation of the project activity, when the reservoir is full. For new reservoirs, this value is zero.
Source of data used:	Project site
Value applied:	-
Justification of the choice of data or description of measurement methods and procedures actually applied :	Measured from topographical surveys, maps, satellite pictures, etc.
Any comment:	For CPAs that are either run of river projects or use existing reservoirs, this parameter can be neglected as $PE_{HP,y} = 0$.

Data / Parameter:	EF_{RES}
Data unit:	$kgCO_2e/MWh$
Description:	Default emission factor for emissions from reservoirs.
Source of data used:	Decision by EB23
Value applied:	90
Justification of the choice of data or description of measurement methods and procedures actually applied :	-
Any comment:	-

Data / Parameter:	$EG_{historical}$
Data unit:	MWh/yr

Description:	Annual average historical net electricity generation delivered to the grid by the existing renewable energy plant that was operated at the project site prior to the implementation of the project activity.
Source of data used:	Project activity site.
Measurement procedures (if any):	Electricity meters.
Any comment:	-

Data / Parameter:	$\sigma_{historical}$
Data unit:	MWh/yr
Description:	Standard deviation of the annual average historical net electricity generation delivered to the grid by the existing renewable energy plant that was operated at the project site prior to the implementation of the project activity.
Source of data used:	Calculated from data used to establish $EG_{historical}$.
Measurement procedures (if any):	Parameter to be calculated as the standard deviation of the annual generation data used to calculate $EG_{historical}$ for retrofit or replacement project activities.
Any comment:	-

Data / Parameter:	$Date_{BaselineRetrofit}$
Data unit:	Date.
Description:	Point in time when the existing equipment would need to be replaced in the absence of the project activity.
Source of data used:	Project activity site.
Measurement procedures (if any):	As per the methodology ACM0002 version 13.
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:	$EG_{PJ,y}$
Data unit:	MWh/yr
Description:	Quantity of net electricity generation that is produced and fed into the grid as a result of the implementation of the CPA in year *y*
Source of data to be used:	Meters at project activity site.
Value of data applied for the purpose of calculating expected emission reductions in section B.5	Not applicable
Description of measurement methods and procedures to be applied:	Electricity meters separately measure each CPA, at the boundary between the CPA and the electricity grid. The parameter will be monitored continuously and the data aggregated monthly for monitoring purposes. These meters will be bidirectional to measure the amount of electricity imported from the grid and the amount of electricity exported to the grid. The quantity of net electricity

	generated will be calculated by subtracting the imported electricity from the exported electricity. The meter accuracy will be determined when installed through an assessment of the appropriate national standards for the meter type to be used.
QA/QC procedures to be applied:	Cross check measurement results with records for sold electricity. Any differences to be discussed in monitoring report. Calibration schedule for electricity meters to be developed and implemented. This will be done in accordance with the manufacturer's specifications and if required by an accredited organisation.
Any comment:	-

Data / Parameter:	$FC_{i,y}$
Data unit:	l/yr
Description:	Quantity of fossil fuel consumed by the project activity in year *y*
Source of data to be used:	Measured at project site.
Value of data	Not applicable
Description of measurement methods and procedures to be applied:	The quantity of fossil fuel consumed by the backup/diesel generators will be measured with meters.
QA/QC procedures to be applied:	Purchase invoices will be checked monthly against meter readings.
Any comment:	The reason for the measurement of this parameter is to ensure that diesel is used for emergency and back-up purposes only and is therefore not a material emission source in the project.

Data / Parameter:	$NCV_{i,y}$
Data unit:	MJ/l
Description:	Net calorific value of fossil in year *y*
Source of data to be used:	IPCC default value at the upper limit of uncertainty at a 95% confidence interval.
Value of data	Not applicable
Description of measurement methods and procedures to be applied:	The IPCC default value at the upper limit of uncertainty at a 95% confidence interval for the emission factor of the fossil fuel, according to the 2006 guidelines.
QA/QC procedures to be applied:	Any future revisions of the IPCC guidelines will be taken into account.
Any comment:	-

Data / Parameter:	$EF_{CO2,i,y}$
Data unit:	tCO_2e/MJ
Description:	Emission factor of fossil fuel in year *y*
Source of data to be used:	IPCC default value at the upper limit of uncertainty at a 95% confidence interval.
Value of data	Not applicable

Description of measurement methods and procedures to be applied:	The IPCC default value at the upper limit of uncertainty at a 95% confidence interval for the emission factor of the fossil fuel, according to the 2006 guidelines.
QA/QC procedures to be applied:	Any future revisions of the IPCC guidelines will be taken into account.
Any comment:	-

Data / Parameter:	Cap_{PJ}
Data unit:	W
Description:	Installed capacity of the hydro power plant before the implementation of the project activity. For new hydro power plants, this value is zero
Source of data to be used:	Project site
Value of data applied for the purpose of calculating expected emission reductions in section B.5	Not applicable
Description of measurement methods and procedures to be applied:	Checking nameplate capacity
QA/QC procedures to be applied:	-
Any comment:	For CPAs that are either run of river projects or use existing reservoirs, this parameter can be neglected as $PE_{HP,y} = 0$.

Data / Parameter:	A_{PJ}
Data unit:	m^2
Description:	Area of the reservoir measured in the surface of the water, after the implementation of the CPA project activity, when the reservoir is full.
Source of data to be used:	Project site
Value of data applied for the purpose of calculating expected emission reductions in section B.5	Not applicable
Description of measurement methods and procedures to be applied:	Measured from topographical surveys, maps, satellite pictures
QA/QC procedures to be applied:	
Any comment:	For CPAs that are either run of river projects or use existing reservoirs, this parameter can be neglected as $PE_{HP,y} = 0$.

Data / Parameter:	TEG_y

Data unit:	MWh/yr
Description:	Total electricity produced by the project activity, including the electricity supplied to the grid and the electricity supplied to internal loads, in year one.
Source of data to be used:	Project activity site.
Measurement procedures (if any):	Electricity meters.
Monitoring frequency:	Continuous measurement and at least monthly recording.
QA/QC procedures to be applied:	-
Any comment:	Applicable to hydro power project activities with a power density of the project activity (PD) greater than $4W/m^2$ and less than or equal to 10 W/m^2.

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

The monitoring plans for the SSC-CPAs that fall under the umbrella of this PoA would be guided by the CME. This guidance would be formalised through Monitoring Procedures that support the CME Management System. The person with management responsibility at CME level for monitoring is the Reporting and Admin Manager.

Specifically, the CME's monitoring related responsibilities are as follows:

- Providing guidance to the CPAs as to how monitoring should be conducted and how data should be collected with regards to the emission reduction calculations.
- Documenting and storing all data related to the required monitoring parameters provided by the CPA implementer in the central PoA Monitoring Database. Data will be kept by the CME for each CPA at least two years after the end of the relevant crediting period for the CPA.
- The CME will also be responsible for reviewing all relevant CPA monitoring records, prepare the monitoring reports and providing monitoring reports to DOEs when required.
- Responsible for managing and monitoring the data set that generates the grid emission factor.

All CPA s falling under the umbrella of this PoA will be monitored separately.

1. Monitoring Period

The monitoring period will start from the date of commissioning of the CPA. An annual monitoring report will be produced for full calendar years (or part thereof for the first year depending on the commissioning date).

2. Data Monitored and Sources

The quantity of net electricity generation that is produced and fed into the grid by the CPA in year *y* shall be determined on the basis of the measurements taken by the electricity meters. As an accuracy check the meters will be cross-checked with records for sold electricity. If there is a material difference (defined as being more than 1%), this would be investigated, explained and discussed in the monitoring report.

Each CPA will have two bi-directional meters recording net electricity production. The first is the Main Meter which is the primary source for all data readings. The second is a check meter, which is a back-up

meter which records data concurrently with the main meter. It is used if the Main meter is considered faulty or inaccurate. Data gathering is done remotely or if the remote system is down the data is recorded manually at the facility.

The fossil-fuel use associated with the backup/emergency generators is only for back-up or emergency purposes, but will still be monitored in the project activity.

3. Monitoring Plan Management

Monitoring plan management is the responsibility of the CPAs. Any CPA that falls under this PoA will have a designated Operations Manager who will be responsible for the monitoring plan's management, including the collection the data. The Operations Manager of a specific CPA reports to the CME's Reporting and Admin Manager via the CPA's Managing Director.

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.

4. Storage of Data

All data collected will be archived electronically in multiple locations (at least two) to ensure no data is lost. All data will be kept for at least two years after the end of the relevant crediting period.

5. Meter Calibration

Meters will be calibrated in accordance with the manufacturer's requirements. The results of each calibration will be recorded in a formal report and the report archived.

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: 24/03/2012

Promethium Carbon (Pty) Ltd
Ballyoaks Office Park
35 Ballyclare Drive
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This entity is not a project participant.

Annex 1

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

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Annex 2

INFORMATION REGARDING PUBLIC FUNDING

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Annex 3

BASELINE INFORMATION

Calculation of Grid emission factor:

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 dispatched without significant transmission constraints.

Latest publicly available data at the time of CPA inclusion should be used to calculate the grid emission factor.

STEP 1: IDENTIFY THE RELEVANT ELECTRICITY SYSTEMS

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 project electricity system and any connected electricity systems must be clearly defined for each CPA.

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 must be calculated for each CPA to show that it is below 50% of the total grid generation for this project electricity system, and subsequently, that Option (a) is applicable.

In terms of data vintages, the *ex ante* option should be 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.

Each CPA should state the vintages of data that was used.

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 was 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.

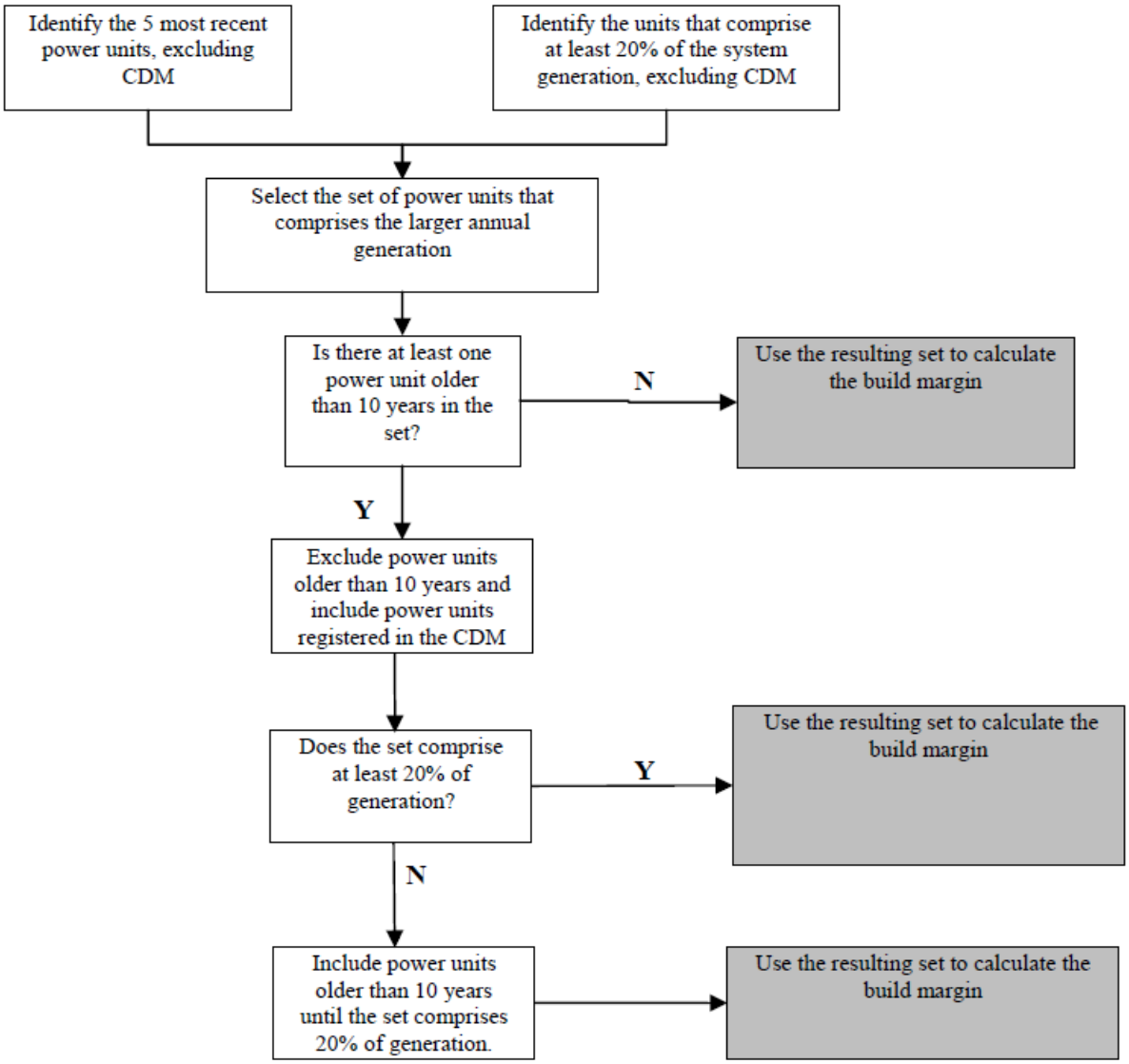
The parameters used in calculations should be clearly shown and referenced.

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

In terms of vintage of data, **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:



Clearly state which power stations are included in the sample selected for the build margin.

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.

In the case that the sample group of power units m used to calculate the build margin is the resulting set **SETsample-CDM->10yrs** according to the tool: *If the power units included in the build margin m correspond to the sample group **SETsample-CDM->10yrs**, then, as a conservative approach, only option A2 from guidance in Step 4 (a) can be used and the default values provided in Annex 1 shall be used to determine the parameter $\eta_{m,y}$.*

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 A2**:

$$EF_{EL,m,y} = \frac{EF_{CO2,m,i,y} \times 3.6}{\eta_{m,y}} \quad \textbf{(3)}$$

Where:

$EF_{EL,m,y}$	= CO_2 emission factor of power unit *m* in year *y* (tCO_2/MWh)
$EF_{CO2,m,i,y}$	= Average CO2 emission factor of fuel type *i* used in power unit *m* in year *y* (tCO_2/GJ)
$\eta_{m,y}$	= Average net energy conversion efficiency of power unit *m* in year *y* (ratio)
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.

The default value for $\eta_{m,y}$ for power stations in the BM can be obtained from Annex 1 of the tool.

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 (%)

Annex 4

MONITORING INFORMATION

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