PROGRAMME DESIGN DOCUMENT FORM FOR CDM PROGRAMMES OF ACTIVITIES (F-CDM-PoA-DD)
Version 02.0

PROGRAMME OF ACTIVITIES DESIGN DOCUMENT (PoA-DD)

PART I. Programme of activities (PoA)

SECTION A. General description of PoA
A.1. Title of the PoA

Grid Connected Photovoltaic (PV) Renewable Electricity Generating Facilities PoA

Version 1.5
Date PoA-DD Completed: 01/12/2012

A.2. Purpose and general description of the PoA

The stated objective of this PoA is to support the development and implementation of grid-connected PV renewable electricity generation facilities in South Africa. These facilities will, through increasing the amount of renewable energy supplied to the grid and reducing its reliance on fossil fuel based electricity generation, support its decarbonisation.

The PoA makes a positive contribution to sustainable development. This is based on the South African Designated National Authority's (DNA) framework of three key criteria i.e.

- Economic (Does the project contribute to national economic development?);
- Social (Does the project contribute to social development in South Africa?); and,
- Environmental (Does the project conform to the National Environmental Management Act's principles of sustainable development?).

A view on each of these criteria is given below:

Economic

In terms of the question "Does the project contribute to national economic development?", the South African DNA considers the project in terms of its economic impacts as well as its appropriate technology transfer.

Having an adequate and secure electricity supply to satisfy internal demand is a prerequisite for economic growth and development in South Africa. The negative economic impact of not having enough electricity was seen in 2008 when a series of blackouts was experienced in South Africa as a result of the mismatch between supply and demand. Projects supplying electricity into the grid support this through there being additional generation capacity in the country, as well as there being further diversification in the country's energy mix which supports the country's energy security. The PoA therefore supports South Africa's national economic development objectives.

Social

In terms of the question "Does the project contribute to social development in South Africa?", the South African DNA considers this with respect to its alignment with national, provincial and local development priorities, as well as its impact on social equity and poverty alleviation.

The South African Government's economic policy is defined in the New Growth Path, with unemployment recognised as key problem in the country that needs to be addressed. This document indicates that the key social development deliverable the policy is aiming to support is the creation of new jobs in South Africa. The projects that fall under this PoA will create jobs during the construction and operational phases supporting the Government's policy objectives.

Environmental

In terms of the question "Does the project conform to the National Environmental Management Act's principles of sustainable development?", the South African DNA considers this in terms of impacts on local environmental quality, changes in usage of natural resources and impacts on biodiversity and ecosystems.

The National Environmental Management Act, NEMA (No. 107 of 1998) is the primary piece of environmental legislation in South Africa. Its aim is to ensure that the environmental right in the South African Constitution is supported. The environmental right states that everyone has the right to an environment that is not harmful to his or her health or well-being. In terms of actually operationalising this right, activities are guided by the principles as defined in the act. These include a number of principles for sustainable development.

This PoA will support the principle "that pollution and degradation of the environment are avoided, or, where they cannot be altogether avoided, are minimised and remedied". This is because the project activity will displace fossil-fuel generated electricity with its associated negative environmental impacts (e.g. air pollution and water pollution from ash waste). By supporting the development of renewable energy the PoA will reduce the pressure on South Africa's natural resources.

In terms of the framework for implementation of the PoA, this PoA involves the installation and operation of large-scale and small-scale grid connected PV renewable electricity generation facilities. The PoA is located in the Republic of South Africa.

The PoA is written for South Africa, but it is envisaged that other countries may be added to the programme in terms of the provisions of EB 60 Annex 26 Paragraph 6.

The Carbon Protocol of SA (from here in the document referred to as the CPSA) is the CME for this PoA. As background, the CPSA is hosting a platform for Programme of Activities (PoA) under the Kyoto Protocol. Each PoA under the platform will be managed separately to ensure that the interests of the both the underlying projects and project owners are protected.

The CPSA, as the CME, confirms that this PoA is a voluntary action. There are no regulatory requirements in South Africa for the CME to develop and register this PoA, and further there are no regulatory requirements for Solar PV CPA implementers in South Africa to develop such projects, and\or register them as CPAs with this or any other PoA.

A.3. CMEs and participants of PoA

The Carbon Protocol of SA (CPSA) as the CME for this PoA is the entity that will communicate with the Board. The CPSA is the only project participant.

A.4. Party(ies)

Name of Party involved (host) indicates a host Party	Private and/or public entity(ies) project participants (as applicable)	Indicate if the Party involved wishes to be considered as project participant (Yes/No)
Republic of South Africa (Host)	Carbon Protocol of SA (private entity).	No

A.5. Physical/ Geographical boundary of the PoA

The geographical boundaries of this PoA are the internationally recognised borders of the Republic of South Africa. In implementing the PoA, the CME will take due cognisance of the requirements of all applicable South African national and\or sectoral policies and regulations.

A.6. Technologies/measures

The CPA would involve the generation of electrical power through photovoltaic panels. These panels will be erected on support structures and will convert the energy of solar radiation into direct electrical current. The direct current will be fed into inverters to convert it into alternating current, and from there the electricity will be fed into the South African national grid via a substation.

All equipment installed, including the PV panels, will be compliant with all applicable South African standards and regulations.

ACM 0002 (Version 13.0.0) requires that the CME shall describe in the POA-DD the types of CPA that fall under the umbrella of this PoA. Currently there is only one type of CPA that falls under the umbrella of this PoA. This is:

Type 1: Grid-Connected Solar Power Plant/Unit (Photovoltaic) – Greenfield

A.7. Public funding of PoA

The PoA has not and is not receiving public funding from Annex 1 Parties as confirmed by the CME and attached in Appendix 2.

SECTION B. Demonstration of additionality and development of eligibility criteria
B.1. Demonstration of additionality for PoA

In the absence of the CDM the proposed voluntary measure would not be implemented as there are no mandatory requirements for PoA development in South Africa.

B.2. Eligibility criteria for inclusion of a CPA in the PoA

The criteria developed are based on the requirements in the "*Standard for the development of eligibility criteria for the inclusion of a project activity as a CPA under the PoA*" (Version 01.0, EB65 Annex 3).

Demonstration of additionality as per "*Standard for the development of eligibility criteria for the inclusion of a project activity as a CPA under the PoA*", Version 01.0, EB65 Annex 3		Demonstration of how PoA complies or imposes additional criteria
7	*Additionality shall be demonstrated by establishing that in the absence of CDM, none of the implemented CPAs would occur.*	Additionality will be demonstrated at the CPA level.
10	*PoAs that consist of one or more large scale projects as CPAs shall include eligibility criteria derived from all the relevant requirements contained in the additionality section of the large scale methodologies.*	ACM0002 (Version 13.0.0) directs that the additionality of the project activity (in this case a CPA) shall be demonstrated and assessed using the "*Tool for the demonstration and assessment of additionality*" (Version 06.1.0).
11	*The CME shall demonstrate that compliance with the additionality-related eligibility criteria set in the PoA design document will ensure that all the relevant additionality-related guidelines, tools or any requirements embedded in the methodologies are met.*	This is done in section B.2 of Part I of the PoA-DD.
12	*For PoAs involving combinations of technologies/measures and/or methodologies, the eligibility criteria relative to each of them shall be proposed to demonstrate additionality.*	There is only one technology involved in this PoA i.e. Solar PV. There is also only one type of project that falls under the umbrella of the PoA i.e. a greenfields project.

According to *ACM0002: Consolidated baseline methodology for grid-connected electricity generation from renewable sources* (Version 13.0.0), the eligibility criteria for CPA inclusion must be described for each type of CPA.

The table below details the eligibility criteria that would apply for Type 1 – Greenfield Plants (the only type of CPA eligible under this PoA).

Minimum Requirements for Eligibility Criteria as per "*Standard for the development of eligibility criteria for the inclusion of a project activity as a CPA under the PoA*" (Version 01.0, EB65 Annex 3) and additional criteria to be as per the direction of ACM 0002 (Version 13.0.0)	CPA Eligibility Criterion Developed to Address Minimum Requirements
(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 and be grid-connected.
(b) Conditions that avoid double-counting of emission reductions like unique identifications of product and end-user locations (e.g. programme logo).	2. Each CPA must be linked to specific geographical co-ordinates supported by a description of its location (the description should include a reference to a land registry system, if such a system exists).
(c) The specification of technology/measure including the type of service, performance specifications including testing/certifications.	3. Each CPA will use PV renewable energy generation technology only. The technology will have to satisfy all relevant national testing and certification requirements,

	including the requirements specified in any Power Purchase Agreement (PPA).
(d) Conditions to check the start date of the CPA through documentary evidence.	4. Each CPA will show that the first 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 (01/05/2012).
(e) Conditions that ensure compliance with applicability and other requirements of single or multiple methodologies applied by CPAs (in this case ACM 0002 Consolidated Baseline Methodology for Grid-Connected Electricity Generation from Renewable Sources – at the time of the PoA's development this was version 12.2.0 EB 65, Annex 16, 25th November 2011).	5. Each CPA will be a solar PV grid-connected renewable power generation project that is an installation of a new power plant at a site where no renewable power plant was operated prior to the implementation of the project activity (greenfield plant).
(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".	6. If the CPA is using an Investment Analysis approach to demonstrate additionality then it must be shown that: (i) the CPA has a lower after-tax equity IRR than the benchmark for expected return on equity for Group 1 projects in South Africa; and, (ii) The Common Practise Analysis sub-steps are satisfied.
	7. If the CPA is using an Investment Barrier Analysis to demonstrate additionality then it must be shown that: (i) The CPA is unable to secure either debt finance and\or an equity investment without the CDM and that the CDM has enabled the project to secure financing for it to be able to move into implementation; and, (ii) The Common Practise Analysis sub-steps are satisfied.
	8. If a "First of its Kind" Analysis is being used to demonstrate additionality then it must be shown that the CPA has been identified as a "First of its Kind" project activity.
(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.
	10. CPAs will have undertaken an analysis of their environmental impacts, which will have been formally recorded.
(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 will need to choose one of the following two options with regard to showing that no diversion of official development assistance occurred: (i) For CPAs that have not received any public

	funding from Annex 1 parties, the CPA will need to confirm this in writing; or, (ii) For CPAs that have received public funding from Annex 1 parties, the Annex 1 country funding source will confirm in writing that it has not resulted in a diversion of official development assistance.
(j) Where applicable, target group (e.g. domestic/commercial/industrial, rural/urban, grid-connected/off-grid) and distribution mechanisms (e.g. direct installation).	Not applicable to this PoA due to the nature of the projects.
(k) 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 to this PoA, as all CPAs falling under the umbrella of the PoA will be monitored and verified.
(l) 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.	Not applicable to the CPAs in this PoA as a large-scale methodology is being used. The CPAs are therefore not subject to its this requirements.
(m) Where applicable, the requirements for the debundling check, in case CPAs belong to small-scale (SSC) or microscale project categories.	Not applicable as all CPAs will be using the large-scale methodology.
From ACM 0002, Version 13.0.0 When defining eligibility criteria for CPA inclusion for a distinct type of CPAs, the CME shall consider relevant technical and economic parameters, such as: (a) Technical and economic parameters that are technology specific (e.g. ranges of load factors, sizes of installation, wind speed) (b) Parameters reflecting the investment climate: (i) Subsidies or other financial flows; (ii) Tariffs; (iii) Depreciation; (iv) Power purchase agreements; (v) Other parameters determining market circumstances; (c) Ranges of costs (capital investment, operating and maintenance costs, etc) and revenues (income from electricity sale, subsidies/fiscal incentives, ODA)	12. The CPA should be grid-connected (Economic Parameter). 13. The CPA should be of a scale that it can fund the following: • Separate Meters; • A formal environmental analysis; and, • Formal public consultation. (Economic Parameter) 14. Each CPA should be in the process of negotiating or applying for a power purchase agreement with an off-taker that includes content addressing at least one of the following issues: • Tariff; • Metering; • Record keeping; and, • Generation Forecasts. (Investment Parameter)

With regard to the eligibility criteria related to specific requirements of ACM 0002, it should be noted that these criteria shall be updated every two years in order to correctly reflect the technical and market circumstances of the CPA implementation.

B.3. Application of methodologies

The technology chosen for this PoA is Solar Power Photovoltaic (PV) based generation technology

The methodology chosen is ACM 0002 "Consolidated baseline methodology for grid-connected electricity generation from renewable sources" (the latest version at the time of drafting the PoA documentation was Version 13.0.0 as per EB 67, Annex 13, 11th May 2012). ACM 0002 is the only methodology that will be applied to CPAs falling under this umbrella of this PoA.

Use of this methodology by the PoA will also use the following tools:

- "Tool for the demonstration and assessment of additionality" (the latest version at the time of drafting the PoA documentation was Version 06.1.0, EB 69, Annex 20, 13th September 2012); and,
- "Tool to calculate the emission factor for an electricity system" (the latest version at the time of drafting the PoA documentation was Version 02.2.1. EB 63, Annex 19, 29th September 2011).

In terms of justification of the choice of methodology, the table below lists the applicability criteria detailed in ACM 0002 and for each criteria details why it is applicable to CPAs envisaged falling under the umbrella of this CPA. ACM 0002 also requires that applicability conditions included in the tools should also be included in this analysis.

ACM 0002 Applicability Criteria	CPA Applicability?
The methodology is applicable to grid-connected renewable power generation project activities that (a) install a new power plant at a site where no renewable power plant was operated prior to the implementation of the project activity (greenfield plant); (b) involve a capacity addition; (c) involve a retrofit of (an) existing plant(s); or (d) involve a replacement of (an) existing plant(s).	**Applicable** The CPAs under this PoA will be grid-connected renewable electricity power generation projects that involve the installation of PV technology at sites that had no renewable energy plant operated previously. All CPAs will fall under this large-scale methodology, even if they are small-scale or micro-scale.
The methodology is applicable under the following conditions: The project activity is the installation, capacity addition, retrofit or replacement of a power plant/unit of one of the following types: hydro power plant/unit (either with a run-of-river reservoir or an accumulation reservoir), wind power plant/unit, geothermal power plant/unit, solar power plant/unit, wave power plant/unit or tidal power plant/unit;	**Applicable** The CPAs will use solar power plant/units based on PV technology.

The methodology is applicable under the following conditions: In the case of capacity additions, retrofits or replacements (except for wind, solar, wave or tidal power capacity addition projects which use Option 2: on page 10 to calculate the parameter *EGPJ,y*): the existing plant started commercial operation prior to the start of a minimum historical reference period of five years, used for the calculation of baseline emissions and defined in the baseline emission section, and no capacity expansion or retrofit of the plant has been undertaken between the start of this minimum historical reference period and the implementation of the project activity;	**Criterion Not Relevant** PoA does not involve capacity additions.
The methodology is applicable under the following conditions: In case of hydro power plants: - one of the following conditions must apply:	**Criterion Not Relevant** CPAs under this PoA will not be hydro projects.
The methodology is not applicable to the following: • Project activities that involve switching from fossil fuels to renewable energy sources at the site of the project activity, since in this case the baseline may be the continued use of fossil fuels at the site.	**Criterion Not Relevant** CPAs under this PoA do not involve the switching from fossil fuels to renewable energy sources.
The methodology is not applicable to the following: • Biomass fired plants.	**Criterion Not Relevant** CPAs under this PoA do not involve biomass fired power plants.
The methodology is not applicable to the following: • A hydro power plant[1] that results in the creation of a new single reservoir or in the increase in an existing single reservoir where the power density of the power plant is less than 4 W/m^2.	**Criterion Not Relevant** CPAs under this PoA are not hydro power plants.
In the case of retrofits, replacements, or capacity additions, this methodology is only applicable if the most plausible baseline scenario, as a result of the identification of baseline scenario, is "the continuation of the current situation, i.e. to use the power generation	**Criterion Not Relevant** PoA does not involve capacity additions.

equipment that was already in use prior to the implementation of the project activity and undertaking business as usual maintenance".	
Applicability condition from the "Tool for the demonstration and assessment of additionality": Once the additionality tool is included in an approved methodology, its application by project participants is mandatory. This is the case for ACM 0002 (Version 13.0.0)	**Applicable** All CPAs will apply the "Tool for the demonstration and assessment of additionality" (Version 06.1.0).
Applicability condition from the "Tool to calculate the emission factor for an electricity system": This tool may be applied to estimate the OM, BM and/or CM when calculating baseline emissions for a project activity that substitutes grid electricity, i.e. where a project activity supplies electricity to a grid or a project activity that results in savings of electricity that would have been provided by the grid (e.g. demand-side energy efficiency projects).	**Applicable** All the CPAs will involve the supply of electricity to the grid. Please note that each CPA will calculate the emission factor at the time of its inclusion in the PoA and use this value throughout the life of the CPA.

SECTION C. Management system

In line with the requirements of the "Standard for demonstration of additionality, development of eligibility criteria and application of multiple methodologies for programme of activities" (Paragraph 17 of Version 01.0, EB 65, Annex 3, 25th November 2011), CME's shall develop and implement a management system will several key requirements. Each of these requirements is specified below with an associated description as to how they are being addressed by the CME in the manual it has developed to support the management system.

These are:

(a) Clear definition of roles and responsibilities of personnel involved in the process of inclusions of CPAs, including a review of their competencies.

CPAs applying for inclusion to the PoA will be evaluated on two levels:

Technical Inclusion: The eligibility of the proposed new CPA will be assessed by the carbon specialist, with specific reference to the project, the latest requirements of Executive Board of the CDM, latest version of the approved methodology and the eligibility criteria. The carbon specialist will prepare a report demonstrating compliance of the CPA with all applicable requirements for the PoA Management Committee, for them to make a decision as to whether to include the CPA or not.

Commercial Inclusion: Once it has been verified that the new CPA is technically eligible for inclusion, the commercial conditions of inclusion will be negotiated between the CPA owner and the PoA Management Committee. The PoA legal advisor will be responsible for this.

(b) Records of arrangements for training and capacity development for personnel.

Training and capacity development for personnel is a key element in the CME's PoA operating manual. The section "Resources Management – Training and Competence" details how competence requirements will be drafted, and supported by an annual review. Records will be kept of all training undertaken, and by whom, including attendance registers and the associated material of such training.

(c) Procedures for technical review of inclusion of CPAs.

See the detail in (a) above for the process to be used in the technical review of inclusion of CPAs.

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

Prior to the inclusion of a new CPA within the PoA, the carbon specialist will check the CPA project database to establish whether a CDM project activity or CPA of another PoA has already been registered. This search will cover registered project activities, project activities requesting registration, project activities under review and project activities for which either a review or corrections have been requested within the geographical boundary of the PoA.

Each CPA will also not overlap the geographical boundary of another CPA registered under the same PoA.

Unique identification code(s) for the site and the CPA meter(s) that record the amount of electricity exported to the South African national grid will also be provided, as well as GPS reference points for the site and meter(s).

(e) Record and documentation control process for each CPA under the PoA.

The CME will operate a PoA monitoring database including all 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 a CPAs inclusion in the PoA:

Basic CPA related data for inclusion in PoA Monitoring Database	
1.	Name of the CPA
2.	Name of the CPA developer
3.	Contact details of the CPA developer including contact person, address, landline, cellphone 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 CPA developer will record the required monitoring data (CPA monitoring records) and will ensure that the CPA monitoring records are made available to the CME. The CME will be responsible for the management of the PoA monitoring database, consisting of the basic data for inclusion and of all CPA monitoring records. All records will be stored for a period of two years after the end of the relevant crediting period. Relevant data capture, verification and storage procedures will be followed in maintaining the data to ensure its accuracy, validity and completeness.

(f) Measures for the continuous improvements of the PoA Management system.

The management review as detailed in the CME Manual for the PoA is the key measure that will support the continuous improvement of the management system. This will be done on an annual basis and the results formally recorded.

(g) Any other relevant elements.

There are no other relevant elements.

SECTION D. Duration of PoA
D.1. Start date of PoA

The start date of this PoA was determined by the earliest date at which real action of a PoA began. Real action was defined as the uploading of the PoA for GSC on 01/05/2012.

The start date of the PoA is therefore 01/05/2012.

D.2. Length of the PoA

28 Years 0 Months

SECTION E. Environmental impacts

E.1. Level at which environmental analysis is undertaken

Environmental analysis will be done at CPA level.

In terms of South African law, with regard to Environmental Impact Assessments (the Environmental Impact Assessment Regulations in terms of the National Environmental Management Act, NEMA, No. 107 of 1998), CPAs that fall under this PoA will require formal environmental analysis to be done on them. This and the fact that local conditions in which the CPAs are located will vary, requiring site specific environmental analysis and mitigation measures, are the reasons why environmental analysis is to be done at the CPA level.

E.2. Analysis of the environmental impacts

No analysis was done at PoA level as environmental analysis will be done at CPA level.

E.3. Environmental impact assessment

No Environmental Impact Assessment was required at PoA level.

SECTION F. Local stakeholder comments

F.1. Solicitation of comments from local stakeholders

Local stakeholder consultation will be done at CPA level.

As detailed in section C.1 above in terms of South African law with regard to Environmental Impact Assessments (the Environmental Impact Assessment Regulations in terms of the National Environmental Management Act, NEMA, No. 107 of 1998), CPAs that fall under this PoA will require formal environmental analysis to be done on them. Part of the environmental assessment process involves formal consultation with stakeholders. This, and the fact there will be different sets of stakeholders as a result of the different geographical locations within South Africa that the PoAs CPAs will be located, provide the rationale for stakeholder comments being invited at this level.

F.2. Summary of comments received

No stakeholder comments were solicited at PoA level. This will be done at CPA level.

F.3. Report on consideration of comments received

No stakeholder comments were solicited at PoA level. This will be done at CPA level.

SECTION G. Approval and authorization

Host country approval was received from the South African Government’s Designated National Authority on the 20/09/2012.

PART II. Generic component project activity (CPA)

SECTION A. General description of a generic CPA
A.1. Purpose and general description of generic CPAs

One generic CPA type will be considered in terms of this PoA. This is:

Type 1: Grid-Connected Solar Power Plant/Unit (Photovoltaic) – Greenfield

New grid-connected renewable electricity generating facilities of any capacity that use photovoltaic technology.

SECTION B. Application of a baseline and monitoring methodology
B.1. Reference of the approved baseline and monitoring methodology(ies) selected

The reference of the approved baseline and monitoring methodology selected is as follows:

ACM 0002 "Consolidated Baseline Methodology for Grid-Connected Electricity Generation from Renewable Sources" (Version 13.0.0)

The references for the associated tools are:

"Tool for the demonstration and assessment of additionality" (Version 06.1.0)

"Tool to calculate the emission factor for an electricity system" (Version 02.2.1)

B.2. Application of methodology(ies)

The one type of CPA will meet the applicability conditions of ACM 0002 as follows:

ACM 0002 Applicability Criteria	CPA Applicability?
The methodology is applicable to grid-connected renewable power generation project activities that (a) install a new power plant at a site where no renewable power plant was operated prior to the implementation of the project activity (greenfield plant); (b) involve a capacity addition; (c) involve a retrofit of (an) existing plant(s); or (d) involve a replacement of (an) existing plant(s).	**Applicable** The CPAs under this PoA will be grid-connected renewable electricity power generation projects that involve the installation of PV technology at sites that had no renewable energy plant operated previously. All CPAs will fall under this large-scale methodology, even if they are small-scale or micro-scale.
The methodology is applicable under the following conditions: The project activity is the installation, capacity addition, retrofit or replacement of a power plant/unit of one of the following types: hydro power plant/unit (either with a run-of-river reservoir or an accumulation reservoir), wind power plant/unit, geothermal power plant/unit,	**Applicable** The CPAs will use solar power plant/units based on PV technology.

solar power plant/unit, wave power plant/unit or tidal power plant/unit;	
The methodology is applicable under the following conditions: In the case of capacity additions, retrofits or replacements (except for wind, solar, wave or tidal power capacity addition projects which use Option 2: on page 10 to calculate the parameter *EGPJ,y*): the existing plant started commercial operation prior to the start of a minimum historical reference period of five years, used for the calculation of baseline emissions and defined in the baseline emission section, and no capacity expansion or retrofit of the plant has been undertaken between the start of this minimum historical reference period and the implementation of the project activity;	**Criterion Not Relevant** Capacity additions are not part of this PoA.
The methodology is applicable under the following conditions: In case of hydro power plants: - one of the following conditions must apply:	**Criterion Not Relevant** CPAs under this PoA will not be hydro projects.
The methodology is not applicable to the following: • Project activities that involve switching from fossil fuels to renewable energy sources at the site of the project activity, since in this case the baseline may be the continued use of fossil fuels at the site.	**Criterion Not Relevant** CPAs under this PoA do not involve the switching from fossil fuels to renewable energy sources.
The methodology is not applicable to the following: • Biomass fired plants.	**Criterion Not Relevant** CPAs under this PoA do not involve biomass fired power plants.
The methodology is not applicable to the following: • A hydro power plant[2] that results in the creation of a new single reservoir or in the increase in an existing single reservoir where the power density of the power plant is less than 4 W/m^2.	**Criterion Not Relevant** CPAs under this PoA are not hydro power plants.
In the case of retrofits, replacements, or capacity additions, this methodology is only applicable if the most plausible baseline scenario, as a result of the	**Criterion Not Relevant** Capacity additions are not part of this PoA.

identification of baseline scenario, is "the continuation of the current situation, i.e. to use the power generation equipment that was already in use prior to the implementation of the project activity and undertaking business as usual maintenance".	
Applicability condition from the "Tool for the demonstration and assessment of additionality": Applicable geographical area covers the entire host country as a default; if the technology applied in the project is not country specific, then the applicable geographical area should be extended to other countries. Project participants may provide justification that the applicable geographical area is smaller than the host country for technologies that vary considerably from location to location depending on local conditions.	**Applicable** The CPAs will all be located in the host country of South Africa.
Applicability condition from the "Tool to calculate the emission factor for an electricity system": This tool may be applied to estimate the OM, BM and/or CM when calculating baseline emissions for a project activity that substitutes grid electricity, i.e. where a project activity supplies electricity to a grid or a project activity that results in savings of electricity that would have been provided by the grid (e.g. demand-side energy efficiency projects).	**Applicable** All the CPAs will involve the supply of electricity to the grid.

B.3. Sources and GHGs

The sources and GHGs included in the CPA boundary are reflected in the table below:

Source		GHGs	Included?	Justification/Explanation
Baseline scenario	CO_2 emissions from electricity generation in fossil fuel fired power plants that are displaced due to the project activity	CO_2	Yes	Main emission source
		CH_4	No	Minor emission source
		N_2O	No	Minor emission source
Project scenario	GHG Emissions associated with the CPA	CO_2	No	No GHG emissions associated with the CPA.
		CH_4	No	No GHG emissions associated with the CPA.
		N_2O	No	No GHG emissions associated with the CPA.

B.4. Description of baseline scenario

The baseline scenario for the one type of generic CPA, as detailed in ACM 0002 (Version 13.0.0), is as follows:

Type 1: Greenfield

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, as reflected in the combined margin (CM) calculations described in the "Tool to calculate the emission factor for an electricity system".

B.5. Demonstration of eligibility for a generic CPA

For a Generic CPA eligibility would be shown as follows:

CPA Eligibility Criterion	Description How Eligibility Criterion will be Satisfied
1. Any CPA must be located within the internationally recognised boundaries of the Republic of South Africa and be grid-connected.	The specific geographical co-ordinates for the CPA are shown to be within the internationally recognised boundaries of the Republic of South Africa. Technical studies will be used to show that the CPA is intending to be grid connected.
2. Each CPA must be linked to specific geographical co-ordinates supported by a description of its location (the description should include a reference to a national land registry system, if such a system exists).	A description of location with its associated specific geographical co-ordinates is provided. These will then be used to confirm the following: • The CPA is not part of another PoA; and,

	• The CPA is not a stand-alone project activity;
3. Each CPA will use PV renewable energy generation technology only. The technology will satisfy all relevant national testing and certification requirements.	The technical studies for the CPA clearly indicate that the technology used is PV based technology for renewable energy generation and that the technology used will satisfy all relevant national testing and certification requirements.
4. Each CPA will show that the first 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 CPA will clearly define its first real action and the date associated with it. This will then be compared to the date on which the PoA-DD was published for GSC. The date of first real action must be after that when the PoA-DD was published for GSC i.e. 01/05/2012.
5. Each CPA will be a solar PV grid-connected renewable power generation project that is an installation of a new power plant at a site where no renewable power plant was operated prior to the implementation of the project activity (greenfield plant).	The technical studies for the CPA will show that it is a greenfield plant.
6. If the CPA is using an Investment Analysis approach to demonstrate additionality then it must be shown that: (i) the CPA has a lower after-tax equity IRR than the benchmark for expected return on equity for Group 1 projects in South Africa; and, (ii) The Common Practise Analysis sub-steps are satisfied.	If the CPA is using an Investment Analysis a financial model would be developed clearly indicating what the after-tax IRR is. This must be lower than the identified benchmark. The Common Practise Analysis sub-steps would also need to be shown to be satisfied.
7. If the CPA is using an Investment Barrier Analysis to demonstrate additionality then it must be shown that: (i) The CPA is unable to secure either debt finance and\or an equity investment without the CDM and that the CDM has enabled the project to secure financing for it to be able to move into implementation; and, (ii) The Common Practise Analysis sub-steps are satisfied.	Documentary evidence will be shown
8. If a “First of its Kind” Analysis is being used to demonstrate additionality then it must be shown that the CPA has been identified as a “First of its Kind” project activity.	The CPA-DD would clearly show that the additionality argument for the CPA satisfied the requirements of the “Tool for the demonstration and assessment of additionality” as directed in Section B.1 of the PoA-DD.
9. CPAs will have undertaken stakeholder consultations, which will have been formally	There would be documentary evidence of how the stakeholder consultations were

recorded.	undertaken. The results of consultations would be formally recorded and reported on.
10. CPAs will have undertaken an analysis of their environmental impacts, which will have been formally recorded.	In the event that an EIA was required, the reports required by the regulatory authority in question would be submitted as documentary evidence. The document recording the regulatory approval of the CPA will also be provided.
11. CPAs will need to choose one of the following two options with regard to showing that no diversion of official development assistance occurred: (i) For CPAs that have not received any public funding from Annex 1 parties, the CPA will need to confirm this in writing; or, (ii) For CPAs that have received public funding from Annex 1 parties, the Annex 1 country funding source will confirm in writing that it has not resulted in a diversion of official development assistance.	CPAs will need to clearly indicate which of the two options applies and what documentary evidence (and from whom) has been provided.
12. The CPA should be grid-connected.	This shall be shown through technical feasibility related documentation.
13. The CPA should be of a scale that it can fund the following: • Separate Meters; • A formal environmental analysis; and, • Formal public consultation.	Shown through documentary evidence
14. Each CPA should be in the process of negotiating or applying for a power purchase agreement with an off-taker that includes content addressing at least one of the following issues: • Tariff; • Metering; • Record keeping; and, • Generation Forecasts.	Shown through documentary evidence.

ACM0002 (Version 13.0.0) directs that the additionality of the project activity (in this case a CPA) shall be demonstrated and assessed using the "*Tool for the demonstration and assessment of additionality*" (Version 06.1.0). Additionality for this CPA shall be demonstrated at a CPA level and will be done using a step-wise approach:

The step-wise approach is detailed in the text below.

Step 1: Identification of alternatives in the project activity consistent with the current laws and regulations

Realistic and credible alternatives to the CPA will be defined through the Sub-steps detailed below.

Sub-step 1a: Define alternatives to the project activity

According to the Validation and Verification Standard (version 01.2, EB 65 Annex 4): "*113. Where the baseline scenario is not prescribed in the approved methodology, the DOE shall assess the list of identified credible alternatives to the project activity in the PDD selected to determine the most realistic baseline scenario. "*.

The following baseline scenario is prescribed according to ACM0002 (Version 13.0.0) for the one Generic CPA type:

Scenario	Baseline	CPA Specific Applicability
If the project activity is the **installation of a new grid-connected renewable power plant/unit (Type 1 – Greenfields)**	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, as reflected in the combined margin (CM) calculations described in the "*Tool to calculate the emission factor for an electricity system*".	*[Insert CPA specific text: "Yes" or "No"]*

As such, there is no need to further analyse alternatives to the proposed project activity to assess and demonstrate the **baseline scenario**, since the methodology ACM0002, Version 13.0.0 prescribes the baseline scenario for the proposed project activity.

The tool indicates that when using ACM0002, a CPA will only need to identify that there is at least one credible and feasible alternative that would be more attractive than the proposed CPA.

Therefore, the following are realistic alternatives available to the project developer:

(a) The project is undertaken without registration as a CDM project (*Alternative 1*); or
(b) No project activity is undertaken, i.e. the continuation of the business as usual (baseline scenario as defined above) (*Alternative 2*).

Although the baseline scenario is prescribed by ACM0002, the following steps needs to be completed in order to assess the additionality of the project.

Outcome of Step 1a	CPA Specific Applicability
Identified realistic and credible alternative scenario(s) to the project activity	Yes

Sub-step 1b: Consistency with mandatory laws and regulations.

The alternatives shall be assessed in terms of their compliance with applicable mandatory legal and regulatory requirements.

Outcome of Step 1b	CPA Specific Applicability
Identified realistic and credible alternative scenario(s) to the CPA that are in compliance with mandatory legislation and regulations taking into account the enforcement in the region or country and EB decisions on national and/or sectoral policies and regulations can proceed.	*[Insert CPA specific text: "Yes" or "No"]*

"Proceed to Step 2 (Investment Analysis) or Step 3 (Barrier Analysis). (Project Participants may also select to complete Steps 2 and 3)"

Step 2: Investment Analysis

It is not a prerequisite that an investment analysis be performed as the CPA may use any of the analyses provided for in the "Tool for the demonstration and assessment of additionality" (Version 06.1.0, EB 69 Annex 20).

This step shall determine whether the CPA is not:

(a) The most economically or financially attractive; or
(b) Economically of financially feasible, without the revenue from the sale of certified emission reductions (CERs).

The step shall take into account the latest version of the *"Guidelines on the assessment of investment analysis"*. (Version 05, EB 62 Annex 5)

To conduct the investment analysis, the following sub-steps will be followed:

Sub-step 2a: Determine Appropriate Analysis Method

The 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" (Version 05).* The CPA fall under the Group 1 project category in accordance with the *"Guidelines on the Assessment of Investment Analysis" (Version 05).*

Sub-step 2b: Option III. Apply Benchmark Analysis

The CPA will use an equity IRR approach as the basis for applying the investment comparison 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.

Sub-step 2c: Calculation and comparison of financial indicators

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. 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)	*Net Annual Electricity Generation will be calculated using a plant load factor obtained from the sources listed in the "Guidelines for the reporting and validation of plant load factors" (Version 01). According to the guidelines, the plant load factor shall be defined ex-ante according to one of the following three options:* *(a) The plant load factor provided to banks and/or equity financiers while applying the project activity for project financing, or to the government while applying the project activity for implementation approval;* *(b) The plant load factor determined by a third party contracted by the project participants (e.g. an engineering company);* *The CPA implementer must clearly document which option was chosen and how the Annual Electricity Generation was calculated.*
Electricity Tariff (Rand per MWh)	*The latest available information on the average price of grid electricity using one of the following three sources of information, using the hierarchy (i) the energy regulator (ii) grid operator and\or utility, or (iii) government departments at the start date of the CPA*
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 the following three sources of information using the hierarchy (i) energy regulator (ii) grid operator or (iii) the utility. If no such information for part of the period, then the rate of inflation shall be used.*
Inflation Rate (% per year)	*The latest available information on the mid-point of the inflation target, using one of the following three sources of information using the hierarchy (i) the South African Reserve Bank (SARB), (ii) national treasury or (iii)government sources at the start date of the CPA*
Capital Cost (Rands)	*Based on information from the following three sources, using the hierarchy (i) feasibility related studies (ii) third party opinions or (iii) supplier quotes.*
Operation and Maintenance Cost (Rands)	*Based on information from the following three sources, using the hierarchy (i) feasibility related studies (ii) third party opinions or (iii) supplier quotes.*
Period of Investment Analysis (Years)	*Technical lifetime based on information from the following three sources, using the hierarchy (i) feasibility related studies (ii) third party opinions or (iii) equipment suppliers*
Fair Value of Assets at end of Investment Analysis (Rand)	*Based on information from the following two sources, using the hierarchy (i) feasibility related studies or (ii) third party opinion.*
Depreciation (% per year)	*Based on information from the following three sources using the hierarchy (i) tax legislation (ii) South African Revenue Services or (iii) third party opinion.*
Corporate Tax Rate (%)	*Based on information from the following three sources using the hierarchy (i) tax legislation (ii) South African Revenue Services or (iii) third party opinion.*
Cost of Debt (Rands)	*Taken as the prime interest rate as published by a bank registered as a licensed financial services provider in South Africa.*
Financing from Debt (%)	*Based on information from potential debt providers and the CPA implementer.*

Parameter (Unit)	Sources for supporting documentation
Financing from Equity (%)	*Based on information from potential equity investors and CPA implementer.*
Investment Decision Date (Date)	*Based on the following four sources of information using the hierarchy (i) board decisions, (ii) submission of tender documents, (iii) PPA conclusion, or (iv) signing of debt agreements.*
Construction Start Date (Date)	*Based on information from the following three sources using the hierarchy (i) a project plan, (ii) feasibility studies, or (iii) contracts.*
Date Project Starts Producing (Date)	*Based on information from the following three sources using the hierarchy (i) a project plan, (ii) feasibility studies, or (iii) contracts.*

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.

Sub-Step 2d: Sensitivity Analysis

Include 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 Benchmark Value]*	*[Insert Benchmark Value]*	*[Insert Benchmark Value]*	*[Insert Benchmark Value]*	*[Insert Benchmark Value]*

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.

In addition project participants should also show to what extent key parameters would need to be varied in order for the benchmark to be exceeded. The results of this analysis would be reported in the CPA-DD as follows:

Parameter	% Change in Parameter Required to Exceed Benchmark	Likelihood of Benchmark Being Exceeded	Rationale Behind Likelihood Assessment.
[Insert title of Parameter]	*[Figure in %]*	*[Indicate using the following two terms only – **High** or **Low**]*	*[Text clearly indicating reasoning behind likelihood assessment being **High** or **Low**]*

If there are clear arguments confirming for all parameters, that there is a low likelihood the % change required to exceed the benchmark would occur, then the project analysis can continue.

Outcome of Step 2	CPA Specific Applicability
If after the sensitivity analysis is concluded that: the proposed CDM project activity is unlikely to be financially/economically attractive then proceed to Step 4 (Common practise analysis).	*[Insert CPA specific text: "Yes" or "No"]*

Otherwise, unless barrier analysis below is undertaken and indicates that the proposed project activity faces barriers that do not prevent at least one alternative from occurring, the project activity is considered not additional.

Step 3: Barrier Analysis

Any CPA that falls under the scope of the PoA will be able to utilize a barrier analysis as an alternative to an investment analysis.

This Step will use the "*Guidelines for Objective Demonstration and Assessment of Barriers*" (Version 01, EB 50, Annex 13, 16th October 2009) to undertake the analysis, in conjunction with the "*Tool for the demonstration and assessment of additionality*" (Version 6.1.0, EB 69, Annex 20, 13th September 2012)

The barrier analysis will determine if the CPA faces barriers that:

(a) Prevent the implementation of this type of CPA; and.
(b) Do not prevent the implementation of at least one of the alternatives, if the project is not "first of its kind".

For the purposes of this PoA the barrier analysis options have been limited to the following two options:

- An investment barrier; and,
- Barriers due to prevailing practise, as reflected by the project being "first-of-its kind".

In undertaking the barrier analysis the following sub-steps will be followed:

Sub-step 3a: Identify barriers that would prevent the implementation of the proposed CPA

The approach to identifying and detailing the barrier analysis for each of the two options is described in the sections below:

Investment Barrier:

With regard to a CPA that is using the investment barrier option the results of the barrier identification process will be captured as per the specified content and guidance given in the table below:

Barrier Type	Description of the Barrier	Evidence Sources Confirming the Existence of the Barrier	How does the CDM alleviate the barrier?
Investment Barrier	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.

Barrier due to prevailing practice:
"*Prevailing practice or existing regulatory or policy requirements would have led to implementation of a technology with higher emissions;*"

According to EB 69 Annex 20 for the measure as defined, a proposed project activity is the First-of-its-kind in the applicable geographical area if:

a) *The project is the first in the applicable geographical area that applies a technology that is different from any other technologies able to deliver the same output and that have started commercial operation in the applicable geographical area before the start date of the project; and;*
b) *The project implements one or more of the measures;*
c) *Project participants selected a crediting period for the project activity that is "a maximum of 10 years with no option of renewal".*

The CPA implementer will be required to provide the following:

Definitions	Identification	Justification and supporting documents as to how the CPA conforms to the identified definitions.
Applicable geographical area	South Africa	This is in accordance with the guidelines of EB 69 Annex 20, where it is stated that the "*applicable geographical area should be the entire host country*". *[Insert CPA specific text: CPA implementer to provide the provisional GPS coordinates for site/equipment]*.
Measure	Option B. Switch of technology with change of energy source.	The switch of technology is from the production of current grid electricity, which is largely based on the combustion of fossil fuels, to *[Insert CPA specific text: type of renewable energy project, e.g. "concentrated solar power" or "wind power"]*.
Output	Grid Electricity	*[Provide CPA specific supporting documentation: Contractual or regulatory documents, e.g. application for grid connection or draft PPA]*
Different technologies	*[Insert CPA specific text: specify differentiating aspect of the technology: energy source/fuel, or size of installation.]*	At the *[Insert CPA specific text: "start date of the proposed project activity"]* no power plant that utilises solar energy as source/fuel and delivers grid electricity ("output") at a *[Insert CPA specific text: "small" or "large"]* scale, has started commercial operation in South Africa, therefore this project activity is a different technology to any other technology in South Africa. *[Provide CPA specific supporting documentation: Written documentation of independent expert judgments from industry, educational institutions (e.g. universities, technical schools, training centres), industry associations and others to substantiate the abovementioned]*.

The Project is considered a First-of-its-kind because:

1. No other power plant that utilises solar energy as source/fuel and delivers grid electricity ("output") has reached commercial operation within the borders of South Africa ("applicable geographical area") at the start date of the proposed project activity which is on *[Insert CPA specific text: project starting date]*.

2. The project implements a switch of technology with change of energy source measure.

3. The Project participant selected a crediting period for the project activity that is a maximum of 10 years with no option of renewal.

A proposed project activity that has been identified as a first-of-its-kind project activity is additional.

Outcome of Step 3a	CPA Specific Applicability
Identified barriers that may prevent one or more alternative scenarios to occur. This would apply to the investment barrier option only and would mean that the analysis would proceed to Sub-step 3b.	*[Insert CPA specific text: "Yes" or "Not satisfied"]*
Conclusion that the project is additional (Only applicable in the case of CPAs that have been identified as being "first-of-its kind" and therefore additional. These CPAs do not have to apply Step 4: Common practise analysis). A CPA showing this would not need to proceed to Sub-step 3b (it would be taken that Sub-step 3b has been satisfied).	*[Insert CPA specific text: "Yes, proposed CPA is additional" or "No"]*

Sub-step 3b: Show that the identified barriers would not prevent the implementation of at least one of the alternatives (except the proposed project activity)

For a CPA that uses the investment barrier analysis it will need to demonstrate that the investment barrier does not prevent the implementation of at least one of the alternatives.

The analysis of the alternatives would be done and presented using the table below:

Identified Barrier	Alternative to Project Activity	Indicate if the alternative is or is not prevented from moving into implementation	Detail Rationale Behind Conclusion and Supporting Evidence
Investment Barrier	*[Insert CPA specific text: Indicate which alternative is being considered]*	*[Insert CPA specific text : "Yes" or "No"]*	*[Insert CPA specific text : Insert rationale behind conclusion]* *[Insert CPA specific supporting documentation: Clearly indicate the evidence used to support the conclusion and how it has been used]*

Outcome of Step 3b	CPA Specific Applicability
If an alternative is not prevented from being implemented by one of the identified barriers then this step is satisfied.	Alternative not prevented: *[Insert CPA specific text: Indicate which alternative is being considered, or "step not satisfied"]*

In terms of outcomes:

"If both Sub-steps 3a – 3b are satisfied, proceed to Step 4 (Common practise analysis)".

"If one of the sub-steps 3a – 3b is not satisfied, the project activity is not additional".

Step 4: Common Practise Analysis

For this section the *Guidelines on Common Practice (Version 02.0)* will be used to demonstrate is a CPA is common practice.

This test is a credibility check to complement the investment analysis (Step 2) or barrier analysis (Step 3).

Stepwise Approach for Common Practice:

Step 1	Calculate applicable capacity range as +/-50% of total design capacity of proposed CPA	*[Enter CPA specific calculated capacity range]*
Step 2	Identify PV projects in South Africa that are grid connected and fall within the range calculated in Step 1. This information will be obtained from the South African Department of Energy (DoE) and\or the National Energy Regulator of South Africa (NERSA).	*[Enter CPA specific text: Number of identified projects]*
Step 3	Within the projects identified in Step 2, identify those that are neither registered CDM project activities, project activities submitted for registration, nor project activities undergoing validation. Note their number N_{all}.	*[Enter CPA specific text: Number of identified projects]*
Step 4	Within the similar projects identified in Step 3, identify those that are different technologies to that of the technology applied in the proposed project activity. Technologies will be deemed different if the installed capacity are different in terms of the following scales: (i) Micro (as defined in paragraph 24 of decision 2/CMP.5 and paragraph 39 of decision 3/CMP.6); (ii) Small (as defined in paragraph 28 of decision 1/CMP.2); (iii) Large Technologies will also be deemed different if the investment climate on the date of the investment decision were different in terms of the projects having accessed: (i) PPA's providing a subsidised tariff for renewable electricity production; or (ii) Promotional policies supporting renewable energy project development, such as the Renewable Energy Independent Power Producer program. Note their number N_{diff}.	*[Enter CPA specific text: Number of identified projects]*
Step 5	Calculate $F=1-N_{diff}/N_{all}$	*[Enter CPA specific calculated value]*

Outcomes of the Stepwise approach for common practice	**CPA Specific Applicability**
The factor F is greater than 0.2	*[Insert CPA specific text: "Yes" or "Not satisfied"]*
N_{all}-N_{diff} is greater than 3	*[Insert CPA specific text: "Yes" or "Not satisfied"]*

If both the above conditions are fulfilled, then the proposed CPA is a "common practice" in South Africa.

Outcome of Step 4	CPA Specific Applicability
The proposed CPA is not common practice in South Africa	*[Insert CPA specific text: "Yes, proposed CPA is additional" or "Not satisfied, the proposed CPA is not additional"]*

B.6. Estimation of emission reductions of a generic CPA
B.6.1. Explanation of methodological choices

Baseline Emissions

Baseline emissions include only CO_2 emissions from electricity generation in fossil fuel fired power plants that are displaced due to the project activity. The methodology assumes that all project electricity generation above baseline levels would have been generated by existing grid-connected power plants and the addition of new grid-connected power plants. The baseline emissions are to be calculated as follows:

$BE_y = EG_{PJ,y} * EF_{grid, CM, y}$

Where:

BE_y = Baseline emissions in year *y* (tCO_2/yr)
$EG_{PJ,y}$ = 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* (MWh/yr)
$EF_{grid, CM, y}$ = Combined margin CO_2 emission factor for grid connected power generation in year *y* calculated using the latest version of the "Tool to calculate the emission factor for an electricity system" (tCO_2/MWh).

For Type 1 - Greenfield Renewable Energy Power Plants the calculation of $EG_{PJ,y}$ is undertaken as follows.

If the project activity is the installation of a new grid-connected renewable power plant/unit at a site where no renewable power plant was operated prior to the implementation of the project activity, then:

$EG_{PJ,y} = EG_{facility, y}$

Where:
$EG_{PJ,y}$ = Quantity of net electricity generation that is produced and fed into the grid as a result of the implementation of the CDM project activity in year *y* (MWh/yr)
$EG_{facility, y}$ = Quantity of net electricity generation supplied by the project plant/unit to the grid in year *y* (MWh/yr)

$EF_{grid, CM, y}$ the Combined Margin CO_2 emission factor for grid connected power generation in year *y* will be calculated by the CME using the latest version of the "Tool to calculate the emission factor for an electricity system". The latest version of this calculation clearly indicating the approach taken using the tool is provided in Annex 3 of this document for reference.

Emission Reductions

The Emission Reductions for a CPA would be calculated as follows:

$ER_y = BE_y - PE_y$

Where:
ER_y = Emission Reductions in year *y* (tCO_2e/yr)
BE_y = Baseline Emissions in year *y* (tCO_2e/yr)
PE_y = Project Emissions in year y (tCO_2e/yr)

As the project emissions associated with the generic CPA type are zero then:

$ER_y = BE_y$

B.6.2. Data and parameters that are to be reported ex-ante
(Copy this table for each data and parameter.)

Data / Parameter	$EF_{grid, CM, y}$
Unit	tCO_2/MWh
Description	The Combined margin CO_2 emission factor for grid connected power generation in year *y1*
Source of data	Calculation by Promethium Carbon (Pty) Ltd using the latest version of the "Tool to calculate the emission factor of an electricity system" (UNFCCC Tool Version 02.2.1)
Value(s) applied	0.91
Choice of data or Measurement methods and procedures	Please see Appendix 4 for complete description how $EF_{grid, CM, y}$ has been calculated using the latest version of the "Tool to calculate the emission factor of an electricity system" by Promethium Carbon
Purpose of data	This parameter will be used as an input into the calculation of the emission reductions for the 10 year crediting period.
Additional comment	

B.6.3. Ex-ante calculations of emission reductions

For Type One – Greenfield the calculation of emissions reductions would for a year y would be as follows:

Assuming that the CPA has delivered 20 000 MWh of net electricity generation supplied to the grid in year *y* ($EG_{facility,y}$) and that the Combined margin CO_2 emission factor for grid connected power generation in year *y* ($EF_{grid, CM, y)}$ is 0.91 (see B.6.2 above) . In this case $EG_{PJ,y}$ is equal to $EG_{facility,y}$.

Using the figures above the following equation would be used to calculate the baseline emissions, BE_y:

$BE_y = EG_{PJ,y} * EF_{grid, CM, y}$
$BE_y = 20\ 000 * 0.91 = 18\ 200\ tCO_2e/yr$

For these types of CPA the emission reductions are equal to the baseline emissions i.e. $ER_y = BE_y$

Therefore the emissions reductions in year y for this CPA would be 18 200 tCO_2e/yr.

B.7. Application of the monitoring methodology and description of the monitoring plan
B.7.1. Data and parameters to be monitored by each generic CPA

Data / Parameter	$EG_{facility,y}$
Unit	MWh/yr
Description	Quantity of net electricity generation supplied by the CPA to the grid in year *y*
Source of data	Electricity meters
Value(s) applied	Actual values will depend on the results of the metering.
Measurement methods and procedures	The following parameters shall be measured: (i) The quantity of electricity supplied by the CPA to the grid; and (ii) The quantity of electricity delivered to the CPA by the grid.
Monitoring frequency	Continuous measurement and at least monthly recording. The data will be aggregated monthly for monitoring purposes.
QA/QC procedures	Cross check measurements with records for sold electricity. Any differences to be discussed in the monitoring report.
Purpose of data	To calculate emission reductions.
Additional comments	

B.7.2. Description of the monitoring plan for a generic CPA

The monitoring plan has been developed using the approved consolidated baseline and monitoring methodology ACM 0002 “Consolidated baseline methodology for grid connected electricity generation from renewable sources” (version 13.0.0)

All CPAs falling under this PoA will be monitored separately and the requirements described below apply to both types.

1. **Monitoring Period**

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

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 meter readings will be cross-checked with records for sold electricity.

3. **Monitoring Plan Management**

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

4. Storage of Data

All data collected will be archived electronically in two places for security purposes. All data will be kept for at least two years after the end of the crediting period.

5. Meter Calibration

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

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Appendix 1: Contact information on entity/individual responsible for the PoA

Organization	Carbon Protocol of SA
Street/P.O. Box	150 West Street Sandton c/o Lloyd Christie
Building	
City	Johannesburg
State/Region	Gauteng Province
Postcode	2196
Country	South Africa
Telephone	
Fax	
E-mail	info@carbonprotocol.org
Website	www.carbonprotocol.org
Contact person	Hildegard Niehaus
Title	General manager
Salutation	Ms
Last name	Niehaus
Middle name	
First name	Hildegard
Department	
Mobile	+27 72 348 1505
Direct fax	
Direct tel.	
Personal e-mail	hildegard@carbonprotocol.org

Appendix 2: Affirmation regarding public funding

www.carbonprotocol.org
info@carbonprotocal.org

16 August 2012

Subject: Undertaking by the Carbon Protocol of SA on the Grid Connected Photovoltaic (PV) Renewable Electricity Generating Facilities PoA

To Whom It May Concern,

We hereby confirm that the Grid Connected Photovoltaic (PV) Renewable Electricity Generating Facilities PoA:

- Has not received Official Development Assistance (ODA).
- This programme is a voluntary coordinated action that would not be implemented in the absence of the Clean Development Mechanism (CDM).
- The Carbon Protocol of SA has been appointed as the Coordinating/Managing Entity (CME) for this programme.

Yours sincerely,

Hildegard Niehaus

General Manager: Carbon Protocol of SA

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Appendix 3: Application of methodology(ies)

Not Applicable

Appendix 4: Further background information on ex ante calculation of emission reductions

APPLICATION OF THE UNFCCC METHODOLOGICAL TOOL: "TOOL TO CALCULATE THE EMISSION FACTOR FOR AN ELECTRICITY SYSTEM" (UNFCCC TOOL VERSION 02.2.1)

Step 1: Identify the relevant electricity systems

This tool will serve project activities that will displace grid electricity in South Africa.
The **project electricity system** is defined by the spatial extent of the power plants that are physically connected through transmission and distribution lines to the project activity and that can be displaced without significant transmission constraints.

Similarly, a **connected electricity system**, e.g. national or international, is defined as an electricity system that is connected by transmission lines to the project electricity system. Power plants within the connected electricity system can be dispatched without significant transmission constraints, but transmission to the project electricity system has significant transmission constraints.

The DNA of South Africa has not published a delineation of the project electricity system and connected electricity systems. Also, the application of the criteria with regards to determining significant transmission constraints does not result in a clear grid boundary due to a lack of sufficient data. For these reasons the following was chosen for the reference system of this project:

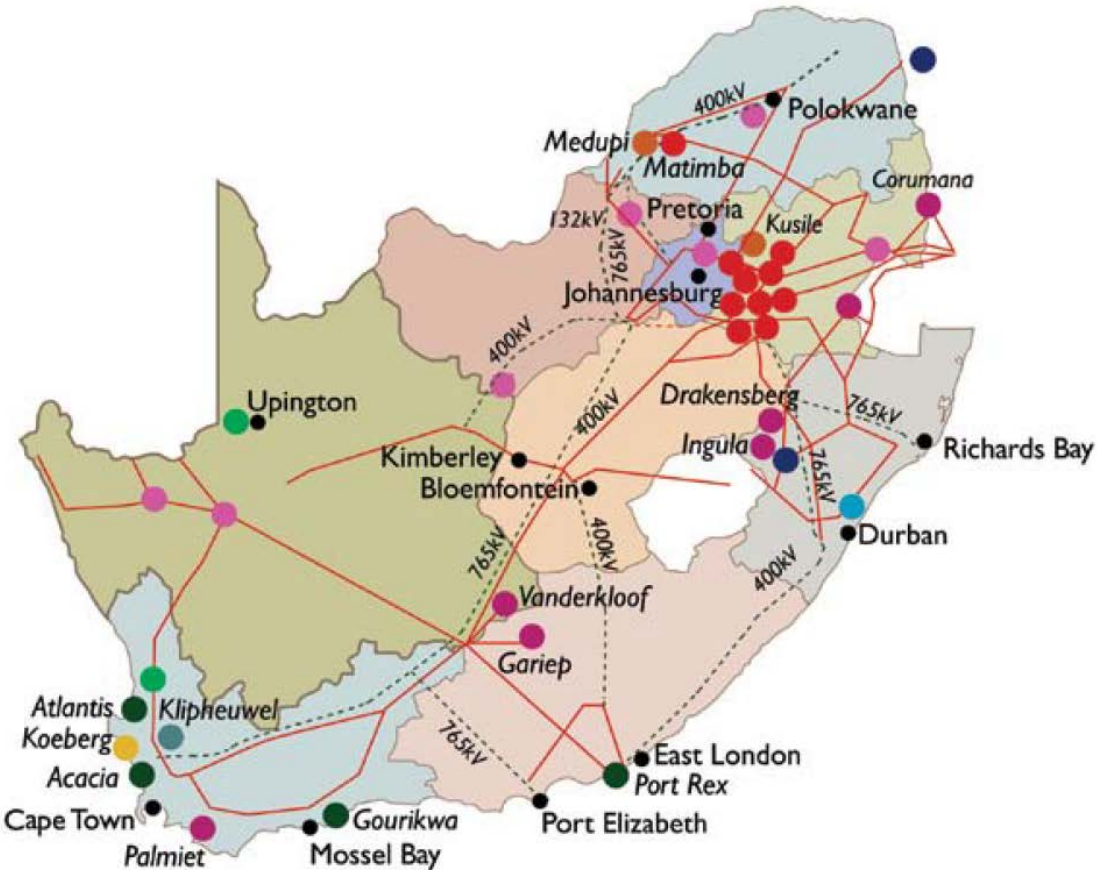
- The **project electricity system** entails all the Eskom power plants in the South African electricity grid.
- Due to a lack of data available in the public domain (in order to evaluate significant transmission constraints), all other power stations (non-Eskom) and countries with power grids connected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

All electricity generated by the Eskom power stations is taken into consideration when calculating the grid emission factor; exports are not subtracted.

All the data for the Eskom power stations are obtained from the Eskom website, where they have a specific webpage dedicated to CDM grid emission factor related data[3]. This data includes commissioning dates, electricity generated, and fuel consumed.

Data for the imported electricity were obtained from the Eskom annual report[4].

[3] Eskom Holdings SOC Limited. (2012). *CDM Calculations.* Retrieved October 04, 2012, from Eskom: http://www.eskom.co.za/c/article/236/cdm-calculations/
[4] Eskom Holdings SOC Limited. (2012). *Annual Report 2012.*



Step 2: Chose whether to include off-grid power plants in the project electricity system

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

Step 3: Select a method to determine the operating margin (OM)

The OM is calculated using the **simple OM method (Option a)**. The simple OM method can be used provided that the low-cost/must-run resources constitute less than 50% of the total grid generation in average of the five most recent years.

The average percentage of low-cost/must-run resources amount to 0.00% of the total grid generation for this project electricity system. Therefore, Option (a) is applicable.

In terms of data vintages, the *ex ante* option were chosen to calculate the simple OM. In this option a 3 year generation-weighted average are used for the grid power plants. Using this option also means that the emission factor is determined only once at the validation stage, thus no monitoring and recalculation is required during the crediting period.

The data used in OM calculations are for the 3 year period of 1 April 2008 – 31 March 2011 (Eskom financial year runs from 1 April – 31 March). This is the latest available data.

Step 4: Calculate the operating margin emission factor according to the selected method

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

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

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

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

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

Where:

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

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

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

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

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 appear in Table 1.

Table 1: Parameters used in calculations

Parameters[5]		
$NCV_{other\ bituminous\ coal,\ 2009}$[6]	19.10	GJ/T
$NCV_{other\ bituminous\ coal,\ 2010}$[7]	19.22	GJ/T
$NCV_{other\ bituminous\ coal,\ 2011}$[8]	19.45	GJ/T
$NCV_{jet\ kerosene}$	42	GJ/T
$NCV_{gas/diesel\ oil}$	41.4	GJ/T
$EF_{CO2,other\ bituminous\ coal}$	0.0895	tCO_2/GJ
$EF_{CO2,jet\ kerosene}$	0.0697	tCO_2/GJ
$EF_{CO2,gas/diesel\ oil}$	0.0726	tCO_2/GJ
Other Kerosene Density[9]	817.15	kg/m^3
Gas/Diesel Oil Density[10]	820	kg/m^3

The fuel used for coal power stations is other bituminous coal. In *"Eskom Fact Sheet – Formation of Coal"*[11] it is stated that coal in South Africa is "mostly classified as 'bituminous' coals". The article *"What is the carbon emission factor for the South African electricity grid? (Spalding-Fecher, 2011)"*[12] also specifies the use of "other bituminous coal" as the fuel used in the Eskom power stations.

The fuel used for Acacia and Port Rex power stations is kerosene. This is stated in *"Eskom Fact Sheet – Port Rex and Acacia Power Stations"*[13]. Also, in the source data for electricity generation and fuel consumption the fuel consumption for these two power stations are specified in units of "liters kerosene/year"[14]. In a similar fashion the source data specify the fuel consumption for Ankerlig and Gourikwa to be "liters diesel/year", and therefore diesel is used as fuel in these power stations. The latter fact is also supported in the Eskom document *"Eskom Fact Sheet – Ankerlig and Gourikwa Gas Turbine Power Stations"*[15].

Using equation 6, the OM is calculated as **0.92** tCO_2e/MWh.

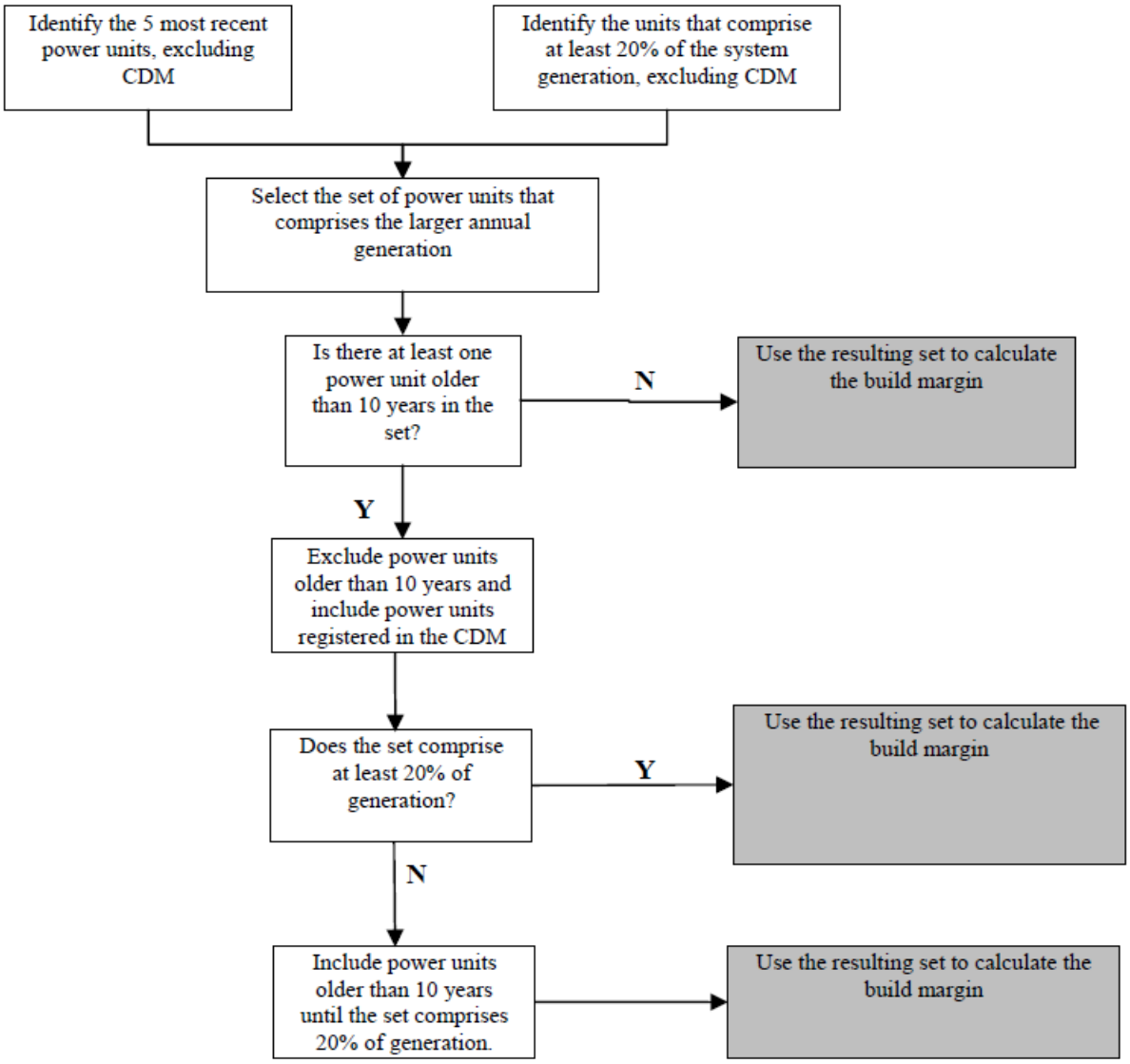
[5] All the parameters are from 2006 IPCC Guidelines for National Greenhouse Gas Inventories, except if independently referenced otherwise.
[6] Eskom Holdings SOC Limited. (2011). *Annual Report 2011*.
[7] Eskom Holdings SOC Limited. (2011). *Annual Report 2011*.
[8] Eskom Holdings SOC Limited. (2011). *Annual Report 2011*.
[9] Website: http://www.simetric.co.uk/si_liquids.htm, accessed 04 October 2012, published 8 September 2007
[10] Website: http://www.simetric.co.uk/si_liquids.htm, accessed 04 October 2012, published 8 September 2007
[11] Document available from website: http://recruitment.eskom.co/live/content.php?Category_ID=60
[12] Document available at: http://www.erc.uct.ac.za/jesa/volume22/22-4jesa-spaldingfecher.pdf
[13] Document available at: http://www.eskom.co.za/content/GS_0001GasTurbAcaciaPortRexRev6~1~1.pdf
[14] Eskom Holdings SOC Limited . (2011). *CDM Calculations*. Retrieved October 04, 2012, from Eskom: http://www.eskom.co.za/c/article/236/cdm-calculations/
[15] Document available at: http://recruitment.eskom.co.za/content/GS_0003AnkerlGouriTechBrochRev1~1.pdf

Step 5: Calculate the build margin (BM) Emission Factor

In terms of vintage of data, one **Option 1** was selected: For the first crediting period, calculate the build margin emission factor *ex ante* based on the most recent information available on units already built for sample group *m* at the time of CDM-PDD submission to the DOE for validation.

The sample group of power units *m* used to calculate the build margin were determined as per the procedure delineated in the tool, consistent with the data vintages selected.

The following diagram summarizes the procedure of identifying the sample group:



After following the above diagram, four power stations were included in the build margin: Ankerlig (2007), Gourikwa (2007), Majuba (1996) and Kendal (1988). There is no power generation data available for power units registered in the CDM, therefore these could not be included.

The sample group of power units *m* used to calculate the build margin is the resulting set **SETsample-CDM->10yrs**.

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.

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 the coal power stations (Majuba (1996) and Kendal (1988)) in the BM were obtained from Annex 1 of the tool. The value used is 37%.

Using equation 13, the BM is calculated as **0.87** tCO_2e/MWh.

Step 6: Calculate the combined margin (CM) emission factor

The combined margin factor is calculated as follows:

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

Where:

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

The emission factors for the final combined margin appear in Table 1.

Table 1: CM emission factor

	w_{OM}	w_{BM}	**Combined Margin Emission Factor**
Wind and solar power generation project activities for the first crediting period and for subsequent crediting periods.	0.75	0.25	**0.91**

APPENDIX 5: Further background information on the monitoring plan

Not Applicable

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History of the document

Version	Date	Nature of revision(s)
02.0	EB 66 13 March 2012	Revision required to ensure consistency with the "Guidelines for completing the programme design document form for CDM programmes of activities" (EB 66, Annex 12).
01	EB33, Annex 41 27 July 2007	Initial adoption.
Decision Class: Regulatory **Document Type:** Form **Business Function:** Registration		