



**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

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Title: Solar Energy Programme for South Africa

Version: 09

Date: 22/11/2012

A.2. Purpose and general description of the PoA

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(a) Policy/measure or stated goal that the PoA seeks to promote

The goal of this PoA is to develop grid connected CSP power generation facilities in South Africa. The electricity will be sold to the organ of state designated by the Minister of Energy, which is likely to be Eskom, the national electricity utility in order to decrease power shortage, diversify the local grid and reduce greenhouse gas emissions.

The installation of solar power systems delivering electricity to the South African grid will aid in increasing the currently very low grid electricity reserve margin, as well as increase the renewable energy generation fraction to help achieve the country's renewable energy targets and carbon emission reduction targets.

Based on an estimation that in total 6 CPAs will be registered under this PoA (each CPA reducing 3 500 000 tCO₂e over its 10 year lifetime), the total emission reductions of all CPAs expected to be included to the PoA are estimated to be 21 000 000 tCO₂e (in the 28 years of the PoA) or 750 000 tCO₂e on average per year.

In 2005, the South African Department of Energy set a renewable energy target of 4% for 2013. As for carbon emissions, at the climate change conference in Copenhagen in 2010, South Africa committed to reducing its carbon footprint by 34% by 2020 and by 42% by 2025. Coal accounts for more than 92% of the fuel used in South Africa's electricity generation and is therefore heavily carbon-intensive (Department of Water and Environmental Affairs, 2010).

The historically low cost of electricity also means that carbon intensive electricity is cheaper than any other source of power. This has made it difficult for renewable energy projects to compete with coal based power (Department of Water and Environmental Affairs, 2010).

This PoA will provide commercial entities with a framework on which to overcome these barriers.

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

The PoA makes a positive contribution to sustainable development. The South African Designated National Authority (DNA) evaluates sustainability in three categories: economic, environmental, and



social. The contribution of the programme towards sustainable development is discussed below in terms of these three categories:

Environmental

The project will have a positive environmental impact by displacing electricity from the South African grid. These positive impacts relate to a reduction in the generation of coal-based electricity and its associated environmental impacts. These impacts include: the impact of coal mining, the utilisation of scarce water resources, SO₂ emissions, particulate emissions, the environmental impacts associated with the mining and transportation of coal and the impacts associated with the disposal of coal ash.

The operation of solar energy farms requires very small quantities of water to operate. This contrasts with conventional coal fired plants, which are a major consumer of water during their requisite cooling processes. As an already water stressed nation, it is critical that South Africa engages in a variety of water conservation measures, particularly as the detrimental effects of climate change on water availability will be experienced in the future.

Economic

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

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

Social

This project will create jobs during the construction and operational phases supporting the Government's economic policy objectives.

(b) Framework for the implementation of the proposed PoA

This programme of activities (PoA) aims to overcome the barriers for commercial concentrated solar power (CSP) in South Africa. These projects will generate electricity to be supplied to the South African electricity grid. Each CDM programme activity (CPA) will either cover a single generation site of varying generation capacity or a tranche thereof (i.e. a capacity expansion). Due to the barriers relating to availability of capital and longer term resource certainty solar power projects are to be implemented in stages. Each capacity expansion will be treated as a new distinct CPA under the PoA.

The PoA involves any greenfields grid connected CSP project. As there are a number of technology suppliers worldwide, the PoA is written in a way so as to not limit the choice of technology on condition that the technology is in accordance with the eligibility criteria of the PoA.

The Coordinating Managing Entity (CME) for this PoA is the Carbon Protocol of SA

(c) Confirmation that the proposed PoA is a voluntary action by the coordinating/managing entity

The Coordinating Managing Entity (CME) for this PoA is the Carbon Protocol of SA. The management of this PoA is a voluntary action by the Carbon Protocol of SA.

South Africa also has no mandatory requirements to implement grid connected CSP electricity generation sites. The CPA implementer(s) will voluntarily install the new renewable technology and also voluntarily register under this PoA.

A.3. CMEs and participants of PoA

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The Carbon Protocol of SA will form the managing entity of the PoA. The contact details are provided in Annex 1.

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

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



A.6. Technologies/measures

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This programme is specifically for CSP plants that are grid connected. Various types and designs of CSP systems exist, and these are all valid under this programme.

CSP systems use lenses or mirrors and tracking systems to focus a large area of sunlight into a small beam and onto a collection tube filled with a heat transfer fluid. Electrical power is produced when the concentrated light is converted to heat, which drives a heat engine (usually a steam turbine) connected to an electrical power generator, which will be connected to the electricity grid.

A detailed description of the equipment and systems that will be installed within the project activity will be provided in the CPA-DD.

A typical CPA consists of a newly-built (greenfields), grid-connected CSP plant.

A.7. Public funding of PoA

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

SECTION B. Demonstration of additionality and development of eligibility criteria

B.1. Demonstration of additionality for PoA

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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

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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 “ <i>Standard for the development of eligibility criteria for the inclusion of a project activity as a CPA under the PoA</i> ”, Version 01.0, EB65 Annex 3		Demonstration of how PoA complies or imposes additional criteria
7	<i>Additionality shall be demonstrated by establishing that in the absence of CDM, none of the implemented CPAs would occur.</i>	Additionality will be demonstrated at the CPA level.
10	<i>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.</i>	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 “ <i>Tool for the demonstration and assessment of additionality</i> ” (Version 06.1.0).
11	<i>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.</i>	This is done in section B.2 of Part I of the PoA-DD.
12	<i>For PoAs involving combinations of technologies/measures and/or methodologies, the eligibility criteria relative to each of them shall be proposed to demonstrate additionality.</i>	This is addressed in the assessment of additionality at the CPA level.

In accordance with *ACM0002: Consolidated baseline methodology for grid-connected electricity generation from renewable sources* (Version 13.0.0), relevant technical and economic parameters were also considered when defining eligibility criteria for the CPA inclusion. The parameters deemed relevant were included in the table for this specific type of CPA.

Criteria as per “ <i>Standard for the development of eligibility criteria for the inclusion of a project activity as a CPA under the PoA</i> ”, Version 01.0, EB65 Annex 3 plus additional criteria to be imposed by the CME	Demonstration of how PoA complies or imposes eligibility criteria
(a) <i>The geographical boundary of the CPA including any time-induced boundary consistent with the geographical boundary set in the PoA;</i>	The CPA must be grid connected to the South African national electricity grid and fall within the boundaries of the Republic of South Africa as they may exist at the time of CPA inclusion. This will be demonstrated with a power purchase agreement and GPS co-ordinates of the outline of the project.
(b) <i>Conditions that avoid double counting of emission reductions like unique identifications of product and end-user locations (e.g. programme logo);</i>	Each CPA will follow the procedures established by the CME and described in Section C of the PoA to avoid double accounting and comply therewith. Each CPA shall be uniquely identified and defined in an unambiguous manner, by amongst other aspects providing geographic information (GPS coordinates of the project outline), metering the installed capacity of the plant and the exact start date/ end date of the crediting period. 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.
(c) <i>The specifications of technology/measure including the level and type of service, performance specifications including compliance with testing/certifications;</i>	The technology must be CSP plants that are grid connected. Various types and designs of CSP systems exist, and these are all valid under this programme. Each CPA will demonstrate that the solar equipment complies with the relevant quality standards for grid connectivity to the national grid, by submitting relevant documentation from the technology suppliers as proof to the CME, who will check this against the national grid quality standards. The CME will record and store the information for validation purposes.
(d) <i>Conditions to check the start date of the CPA through documentary evidence;</i>	For the purpose of this PoA, the start date of the CPA will be the date on which a contract has been signed for equipment or construction/operation services required for the project activity. The CPA operator will provide documentary proof of this contract to the CME and the CME will record the start date of the CPA and confirm that a document check has been done. The start date must be after the date of GSC.
(e) <i>Conditions that ensure compliance with applicability and other requirements of single or multiple methodology/ies applied by CPAs;</i>	The CPA will be a CSP 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)	<i>The conditions that ensure that CPAs meet the requirements pertaining to the demonstration of additionality;</i>	<p>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 “<i>Tool for the demonstration and assessment of additionality</i>” (Version 06.1.0). Additionality will be demonstrated at the CPA level in the CPA-DD and checked by the CME. A demonstration of the additionality of a generic CPA is described in PART II Section B.5 of this PoA.</p> <ol style="list-style-type: none"> 1. If the CPA is using an Investment Analysis approach to demonstrate additionality then it must be shown that: <ol style="list-style-type: none"> (i) The CPA has a lower equity IRR than the benchmark for expected return on equity for Group 1 projects in South Africa; and, (ii) The CPA is not common practice. 2. If the CPA is using an Investment Barrier Analysis to demonstrate additionality then it must be shown that: <ol style="list-style-type: none"> (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 CPA is not common practice. 3. 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)	<i>The PoA-specific requirements stipulated by the CMEs including any conditions related to undertaking local stakeholder consultations and environmental impact analysis;</i>	<p>CPAs will have undertaken stakeholder consultations, which will have been formally recorded.</p> <p>CPA s will have undertaken an analysis of their environmental impacts which will have been formally recorded.</p>
(h)	<i>Where applicable, target group (e.g. domestic/commercial/industrial, rural/urban, grid-connected/off-grid) and distribution mechanisms (e.g. direct installation);</i>	<p>The target group is prospective grid connected CSP project developers in South Africa.</p> <p>There are no specific distribution mechanisms.</p>
(i)	<i>Where applicable, the conditions related to sampling requirements for a PoA in accordance with the approved guidelines/standard from the Board pertaining to</i>	No sampling will be done within any specific CPA.



	<i>sampling and surveys;</i>	
(j)	<i>Where applicable, the conditions that ensure that CPA in aggregate meets the small-scale or micro-scale threshold criteria (please refer to the latest approved version of the “Guidelines for demonstrating additionality of microscale project activities” and the latest approved version of the “General Guidelines to SSC CDM methodologies” and remain within those thresholds throughout the crediting period of the CPA;</i>	Given that ACM0002 will be used for all projects this requirement does not apply.
(k)	<i>Where applicable, the requirements for the debundling check, in case CPAs belong to small-scale (SSC) or microscale project categories (please refer to the latest approved version of the “Guidelines on assessment of debundling for SSC project activities”);</i>	Given that ACM0002 will be used for all projects this requirement does not apply.
(l)	<i>Conditions to provide an affirmation that funding from Annex I Parties, if any, does not result in a diversion of official development assistance.</i>	CPAs will need choose one of the following two options: <ul style="list-style-type: none"> i.) For CPAs that have not received any public funding from Annex I parties, the CPA will need to confirm this in writing; or, ii.) For CPAs that have received public funding from Annex I parties, the Annex I country funding source will confirm in writing that it has not resulted in a diversion of official development assistance
<p><i>From ACM 0002, Version 13.0.0</i></p> <p><i>When defining eligibility criteria for CPA inclusion for a distinct type of CPAs, the CME shall consider relevant technical and economic parameters.</i></p>		Technical parameter: the CPA should be grid-connected, as described and covered in eligibility criteria (a).
		<p>Economic parameter: The CPA should be of a scale that it can fund the following:</p> <ul style="list-style-type: none"> • Separate Meters; • A formal environmental analysis; and, • Formal public consultation.
		<p>Investment parameter: Each CPA should be in the process of negotiating or applying for a power purchase agreement (PPA) with an off-taker that includes content addressing:</p> <ul style="list-style-type: none"> • Tariff; • Metering; • Record keeping; and,



	<ul style="list-style-type: none"> • Generation Forecasts.
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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

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Each CPA must comply with the applicability criteria as set out in the selected methodology (*ACM0002: Consolidated baseline methodology for grid-connected electricity generation from renewable sources* (Version 13.0.0)).

Each CPA must also meet the applicability criteria for the following tools:

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)

Tool to calculate project or leakage CO₂ emissions from fossil fuel combustion (Version 02)

The applicability conditions are described below.

Applicability conditions as per ACM0002	Applicability to the CPA
<i>This 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).</i>	Applicable Each CPA project activity will be a grid-connected greenfield CSP project. The CPA is the construction of a solar facility at a site where no renewable power plant was operated prior to the implementation of the project activity.
<i>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.</i>	Applicable The CPA project activity is the installation of a CSP plant.
<i>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.</i>	Criterion Not Relevant Criteria not applicable to solar capacity addition projects. The CPA project activity is a greenfield CSP plant. Option 2 in the methodology will be used.
<i>In case of hydro power plants, one of the following conditions must apply:</i>	Criterion Not Relevant CPAs under this PoA will not be hydro projects.



<ul style="list-style-type: none"> • The project activity is implemented in an existing reservoir, with no change in the volume of reservoir; or • The project activity 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/m²; or • 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. 	
<p>The methodology is not applicable to the following:</p> <ul style="list-style-type: none"> • 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; • Biomass fired power plants; • Hydro power plants that result in new reservoirs or in the increase in existing reservoirs where the power density of the power plant is less than 4 W/m². 	<p>Criterion Not Relevant</p> <p>CPAa under this PoA do not involve the switching from fossil fuels to renewable energy sources. CPAs under this PoA do not involve biomass fired power plants. CPAs under this PoA are not hydro power plants.</p>
<p>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 equipment that was already in use prior to the implementation of the project activity and undertaking business as usual maintenance”.</p>	<p>Criterion Not Relevant</p> <p>All CPAs are greenfield plants.</p>
<p>Applicability conditions as per Tool for the demonstration and assessment of additionality.</p>	<p>Applicability to the CPA</p>
<p>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.</p>	<p>Applicable</p> <p>Additionality will be demonstrated at the CPA level in the CPA-DD and checked by the CME. Each CPA will therefore justify its own applicable geographical area.</p>
<p>Applicability conditions as per Tool to calculate the emission factor for an electricity system.</p>	<p>Applicability to the CPA</p>
<p>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</p>	<p>Applicable</p> <p>The CPA must be grid connected to the South African national electricity grid and fall within the boundaries of the Republic of South Africa as they may exist at the time of CPA inclusion.</p>



<i>electricity that would have been provided by the grid (e.g. demand-side energy efficiency projects).</i>	
Applicability conditions as per Tool to calculate project or leakage CO₂ emissions from fossil fuel combustion.	Applicability to the CPA
<i>This tool provides procedures to calculate project and/or leakage CO₂ emissions from the combustion of fossil fuels. It can be used in cases where CO₂ emissions from fossil fuel combustion are calculated based on the quantity of fuel combusted and its properties.</i>	Applicable If a specific CPA combusts fossil fuel, this tool will be used.

SECTION C. Management system

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All the details regarding a management system are contained in the CME contract that will be signed by each CPA. The contract includes:

- A clear definition of roles and responsibilities of personnel involved in the process of inclusion of CPAs, including a review of their competencies;
- Records of arrangements for training and capacity development for personnel;
- Procedures for technical review of inclusion of CPAs; and
- Measures for continuous improvements of the PoA management system.

Procedure to avoid double counting

The database ensures that each CPA is uniquely defined and is included in one PoA only, thereby avoiding double counting of emissions reductions generated by the CPA. However, prior to the registration of each CPA under the PoA, the managing entity will confirm that the proposed CPA is not registered, or in the process of being registered, as a CDM project activity.

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 co-ordinates as reference points for the delineation of the boundary of the CPA site. The meter(s) must be situated within the site boundary. The installed capacity of the plant and the exact start date/ end date of the crediting period will also be defined for the CPA.

According to the applicable methodology (ACM0002), capacity additions may occur at the same site, as might be the case with subsequent tranches for solar installations. Each capacity addition will however be handled as a separate CPA to avoid double counting. Capacity additions will have to have separate meters with a unique identification code, which will fall within the specific capacity addition CPA boundary. This boundary will also require GPS co-ordinates as reference points for the delineation of the boundary of the CPA site.

Record keeping system for each CPA under the PoA

A database will be set up by the managing entity of the PoA. It will include the following information for each CPA:

- 1) The name of the CPA implementer(s);
- 2) The name of the site where the solar facility is implemented;

- 3) The CPA site details, including street address (if available), meter numbers, and GPS co-ordinates as reference points for the delineation of the boundary of the CPA site;
- 4) The start date of the project and the start date of the crediting period; and
- 5) The monitoring period for each CPA.

The signed contract between with the managing entity and the CPA implementers will be recorded and stored by the CME.

The database capturing points 1 to 5 above will be setup in a way that allows the user to easily extract information for the purposes of emission reduction monitoring and reporting. Data will be archived for a minimum of two years after the 28 year crediting period of the programme has lapsed. Relevant data capture, verification and storage procedures will be followed in maintaining the data to ensure its accuracy, validity and completeness.

SECTION D. Duration of PoA

D.1. Start date of PoA

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The start date of the PoA is 07 June 2012.

D.2. Length of the PoA

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28 years 0 months

SECTION E. Environmental impacts

E.1. Level at which environmental analysis is undertaken

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Environmental Analysis is done at CPA level.

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.

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 if the installed capacity is equal to, or larger than, 20 MW.

E.2. Analysis of the environmental impacts

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

E.3. Environmental impact assessment

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A typical CPA will require an environmental impact assessment in terms of NEMA's EIA regulations if the installed capacity is equal to, or larger than, 20 MW. No analysis was done at PoA level as environmental analysis will be done at the CPA level.

SECTION F. Local stakeholder comments

F.1. Solicitation of comments from local stakeholders

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Local stakeholder consultation is done at CPA level.



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.

As detailed in section E.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 if the installed capacity is equal to, or larger than, 20 MW. Part of the environmental assessment process involves formal consultation with stakeholders.

F.2. Summary of comments received

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Will be done at CPA level.

F.3. Report on consideration of comments received

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Will be done at CPA level.

SECTION G. Approval and authorization

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Letter of approval from the South African DNA not available at the time of validation.

PART II. Generic component project activity (CPA)

SECTION A. General description of a generic CPA

A.1. Purpose and general description of generic CPAs

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The CPA is a greenfields grid-connected renewable electricity generating facility utilising **concentrated solar power (CSP) technology**. The purpose of the CPA is to generate renewable electricity to displace the CO₂ emissions associated with fossil fuel generated electricity that dominates the South African national grid.

SECTION B. Application of a baseline and monitoring methodology

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

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The selected methodology:

ACM0002: Consolidated baseline methodology for grid-connected electricity generation from renewable sources (Version 13.0.0)

Other tools and guidance used:

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)

Tool to calculate project or leakage CO₂ emissions from fossil fuel combustion (Version 02)

B.2. Application of methodology(ies)

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The CPA complies with the applicability criteria as set out in the selected methodology (*ACM0002: Consolidated baseline methodology for grid-connected electricity generation from renewable sources* (Version 13.0.0)). It also meets the applicability criteria for the following tools:

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)

Tool to calculate project or leakage CO₂ emissions from fossil fuel combustion (Version 02)

The applicability conditions are described below.

Applicability conditions as per ACM0002	Applicability to the CPA
<i>This 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).</i>	Applicable This CPA project activity is a grid-connected renewable energy project (CSP plant). This project activity is either a greenfield plant.
<i>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.</i>	Applicable The CPA project activity is the installation of a CSP power plant/unit.
<i>In the case of capacity additions, retrofits or replacements (except for wind, solar, wave or tidal</i>	Criterion Not Relevant Criteria not applicable to solar power plants. This



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.	CPA is a solar power project. Option 2 in the methodology will be used.
In case of hydro power plants, one of the following conditions must apply: <ul style="list-style-type: none"> • The project activity is implemented in an existing reservoir, with no change in the volume of reservoir; or • The project activity 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/m²; or • 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. 	Criterion Not Relevant This CPA is not a hydro power plant.
The methodology is not applicable to the following: <ul style="list-style-type: none"> • 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; • Biomass fired power plants; • Hydro power plants that result in new reservoirs or in the increase in existing reservoirs where the power density of the power plant is less than 4 W/m². 	Criterion Not Relevant This CPA does not involve the switching from fossil fuels to renewable energy sources. This CPA does not involve biomass fired power plants. This CPA is not a hydro power plant.
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 equipment that was already in use prior to the implementation of the project activity and undertaking business as usual maintenance”.	Criterion Not Relevant This is a greenfields plant.
Applicability conditions as per Tool for the demonstration and assessment of additionality.	Applicability to the CPA
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	Applicable The applicable geographical area is the host country (default).

<i>geographical area is smaller than the host country for technologies that vary considerably from location to location depending on local conditions.</i>	
Applicability conditions as per Tool to calculate the emission factor for an electricity system.	Applicability to the CPA
<i>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).</i>	Applicable This CPA is grid connected to the South African national electricity grid and fall within the boundaries of the Republic of South Africa.
Applicability conditions as per Tool to calculate project or leakage CO₂ emissions from fossil fuel combustion.	Applicability to the CPA
<i>This tool provides procedures to calculate project and/or leakage CO₂ emissions from the combustion of fossil fuels. It can be used in cases where CO₂ emissions from fossil fuel combustion are calculated based on the quantity of fuel combusted and its properties.</i>	Applicable Fossil Fuel is combusted as start-up fuel in this CPA.

B.3. Sources and GHGs

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The spatial extent of the CPA boundary includes the CPA power plant and all power plants connected physically to the electricity system that the CPA power plant is connected to. The electricity system is defined by the “Tool to calculate the emission factor for an electricity system”.

Source		Gas	Included?	Justification / Explanation
Baseline	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 ₂ O	No	Minor emission source
CPA	CO ₂ emissions from combustion of fossil fuels for electricity generation in solar thermal power plants.	CO ₂	Yes	Main emission source
		CH ₄	No	Minor emission source
		N ₂ O	No	Minor emission source

B.4. Description of baseline scenario

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According to ACM0002 (Version 13.0.0) the baseline scenario is:

If the project activity is the **installation of a new grid-connected renewable power plant/unit**, the baseline scenario is:

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

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The description of general criteria for enrolling the CPA is described in the table in section A.4.2.2. in the PoA-DD (also shown below). 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, EB63 Annex 3). The list covers the applicability criteria of the methodology ACM0002 (Version 13.0.0).

Criteria as per “ <i>Standard for the development of eligibility criteria for the inclusion of a project activity as a CPA under the PoA</i> ”, Version 01.0, EB65 Annex 3 plus additional criteria to be imposed by the CME		Demonstration of how PoA complies or imposes eligibility criteria	Support documentation /evidence provided by the CPA/CME to demonstrate and confirm that the CPA is eligible to be incorporated in the PoA
(a)	<i>The geographical boundary of the CPA including any time-induced boundary consistent with the geographical boundary set in the PoA;</i>	The CPA must be grid connected to the South African national electricity grid and fall within the boundaries of the Republic of South Africa as they may exist at the time of CPA inclusion. This will be demonstrated with a power purchase agreement and GPS co-ordinates of the outline of the project.	The GPS co-ordinates for the project activity must be checked and confirmed by the CME that it falls within the boundaries of South Africa. It must be confirmed by the CME that the project activity is connected to the South African national electricity grid by means of a power purchase agreement.
(b)	<i>Conditions that avoid double counting of emission reductions like unique identifications of product and end-user locations (e.g. programme logo);</i>	Each CPA will follow the procedures established by the CME and described in Section C of the PoA to avoid double accounting and comply therewith. Each CPA shall be uniquely identified and defined in an unambiguous manner, by amongst other aspects providing geographic information (GPS coordinates of the project outline), metering the installed capacity of the plant and the exact start date/ end date of the crediting period. 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.	<ol style="list-style-type: none"> 1. The CPA operator must provide the GPS co-ordinates of the proposed CPA site to the CME. 2. CME must confirm that the CPA is not part of another PoA or a CDM individual project activity. 3. The CME must record the installed capacity and confirm this with supporting documents. 4. The CME must confirm that there are no other CPAs existing or under development in the same region as this project activity.



(c)	<i>The specifications of technology/ measure including the level and type of service, performance specifications including compliance with testing/ certifications;</i>	The technology must be CSP plants that are grid connected. Various types and designs of CSP systems exist, and these are all valid under this programme. Each CPA will demonstrate that the solar equipment complies with the relevant quality standards for grid connectivity to the national grid, by submitting relevant documentation from the technology suppliers as proof to the CME, who will check this against the national grid quality standards. The CME will record and store the information for validation purposes.	This CPA is for a CSP parabolic trough, grid-connected solar power plant installation. The equipment must conform to international and local quality standards, and this documentation must be provided to the CME.
(d)	<i>Conditions to check the start date of the CPA through documentary evidence;</i>	For the purpose of this PoA, the start date of the CPA will be the date on which a contract has been signed for equipment or construction/operation services required for the project activity. The CPA operator will provide documentary proof of this contract to the CME and the CME will record the start date of the CPA and confirm that a document check has been done. The start date must be after the date of GSC.	The start date must after the date of GSC, and be in accordance with the definition. The CPA operator will supply proof of the signed contract between the CPA implementer and the equipment or construction/operation services provider, to the CME as soon as this becomes available.. CME will record the start date of the CPA and confirm that a document check has been done.
(e)	<i>Conditions that ensure compliance with applicability and other requirements of single or multiple methodology/ies applied by CPAs;</i>	The CPA will be a CSP 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. This must be checked by the CME and the relevant supporting documents stored.
(f)	<i>The conditions that ensure that CPAs meet the requirements pertaining to the demonstration of additionality;</i>	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	Additionality must be assessed by the CME and relevant supporting documents provided by the CPA implementer to the CME.



		<p><i>assessment of additionality”</i> (Version 06.1.0). Additionality will be demonstrated at the CPA level in the CPA-DD and checked by the CME. A demonstration of the additionality of a generic CPA is described in PART II Section B.5 of this PoA.</p> <ol style="list-style-type: none">1. If the CPA is using an Investment Analysis approach to demonstrate additionality then it must be shown that:<ol style="list-style-type: none">(i) The CPA has a lower equity IRR than the benchmark for expected return on equity for Group 1 projects in South Africa; and,(ii) The CPA is not common practice.2. If the CPA is using an Investment Barrier Analysis to demonstrate additionality then it must be shown that:<ol style="list-style-type: none">(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 CPA is not common practice.3. If a “First of its Kind” Analysis is being used to demonstrate	
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		<p>additionality then it must be shown that the CPA has been identified as a “First of its Kind” project activity.</p>	
(g)	<p><i>The PoA-specific requirements stipulated by the CMEs including any conditions related to undertaking local stakeholder consultations and environmental impact analysis;</i></p>	<p>CPAs will have undertaken stakeholder consultations, which will have been formally recorded.</p> <p>CPAs will have undertaken an analysis of their environmental impacts which will have been formally recorded.</p>	<p>The documents related to the environmental analysis must be provided to the CME.</p> <p>Local stakeholder participation process and comments will be documented in the CPA, and proof of the original comments, if any, will be provided to the CME.</p> <p>The CPA must sign an agreement with the CME that indicates that they intend to comply with the code of conduct of the CME.</p>
(l)	<p><i>Conditions to provide an affirmation that funding from Annex I Parties, if any, does not result in a diversion of official development assistance.</i></p>	<p>CPAs will need choose one of the following two options:</p> <ul style="list-style-type: none"> i.) For CPAs that have not received any public funding from Annex I parties, the CPA will need to confirm this in writing; or, ii.) For CPAs that have received public funding from Annex I parties, the Annex 1 country funding source will confirm in writing that it has not resulted in a diversion of official development assistance 	<p>A written declaration must be submitted to the CME, depending on which option was chosen. This will be stored in the CME database.</p>
<p><i>From ACM 0002, Version 13.0.0</i></p> <p><i>When defining eligibility criteria</i></p>		<p>Technical parameter: the CPA should be grid-connected, as described and covered in</p>	<p>No sampling will be done within any specific CPA.</p>



<p><i>for CPA inclusion for a distinct type of CPAs, the CME shall consider relevant technical and economic parameters.</i></p>	<p>eligibility criteria (a).</p> <p>These criteria shall be updated every two years in order to correctly reflect the technical and market circumstances of the CPA implementation.</p>	
	<p>Economic parameter: The CPA should be of a scale that it can fund the following:</p> <ul style="list-style-type: none"> • Separate Meters; • A formal environmental analysis; and, • Formal public consultation. <p>These criteria shall be updated every two years in order to correctly reflect the technical and market circumstances of the CPA implementation.</p>	<p>Given that ACM0002 will be used for all projects this requirement does not apply.</p>
	<p>Investment parameter: Each CPA should be in the process of negotiating or applying for a power purchase agreement (PPA) with an off-taker that includes content addressing:</p> <ul style="list-style-type: none"> • Tariff; • Metering; • Record keeping; and, • Generation Forecasts. <p>These criteria shall be updated every two years in order to correctly reflect the technical and market circumstances of the CPA implementation.</p>	<p>Given that ACM0002 will be used for all projects this requirement does not apply.</p>

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 with the following step-wise approach:

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 scenarios are prescribed according to ACM0002 (Version 13.0.0):

Scenario	Baseline	CPA Specific Applicability
If the project activity is the installation of a new grid-connected renewable power plant/unit	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 “ <i>Tool to calculate the emission factor for an electricity system</i> ”.	Yes

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 need 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” (EB 69 Annex 20).

This step shall determine whether the CPA is not:

- (a) The most economically or financially attractive; or
- (b) Economically or 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*”. (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 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.

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
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Parameter (Unit)	Sources for supporting documentation
Net Annual Electricity Generation (MWh/year)	<i>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.</i>
Electricity Tariff (Rand per MWh)	<i>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.</i>
Revenue from Electricity Sales (Rands per year)	<i>Result of combining information with regard to net annual electricity generation and electricity tariffs.</i>
Anticipated increase in electricity tariff over anticipated lifetime of the project (% per year)	<i>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.</i>
Inflation Rate (% per year)	<i>The latest available information on the mid-point of the inflation target, based on information from the South African Reserve Bank (SARB) and national treasury government sources at the start date of the CPA.</i>
Capital Cost (Rands)	<i>Based on information from the following three sources, using the hierarchy (i) feasibility related studies (ii) third party opinions or (iii) supplier quotes.</i>
Operation and Maintenance Cost (Rands)	<i>Based on information from the following three sources, using the hierarchy (i) feasibility related studies (ii) third party opinions or (iii) supplier quotes.</i>
Period of Investment Analysis (Years)	<i>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.</i>
Fair Value of Assets at end of Investment Analysis (Rand)	<i>Based on information from the following two sources, using the hierarchy (i) feasibility related studies or (ii) third party opinion.</i>
Depreciation (% per year)	<i>Based on information from the following three sources using the hierarchy (i) tax legislation (ii) South African Revenue Services or (iii) third party opinion.</i>
Corporate Tax Rate (%)	<i>Based on information from the following three sources using the hierarchy (i) tax legislation (ii) South African Revenue Services or (iii) third party opinion.</i>
Cost of Debt (Rands)	<i>Taken as the prime interest rate as published by a bank registered as a licensed financial services provider in South Africa.</i>
Financing from Debt (%)	<i>Based on information from potential debt providers and the CPA implementer.</i>

Parameter (Unit)	Sources for supporting documentation
Financing from Equity (%)	<i>Based on information from potential equity investors and CPA implementer.</i>
Investment Decision Date (Date)	<i>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.</i>
Construction Start Date (Date)	<i>Based on information from the following three sources using the hierarchy (i) a project plan, (ii) feasibility studies, or (iii) contracts.</i>
Date Project Starts Producing (Date)	<i>Based on information from the following three sources using the hierarchy (i) a project plan, (ii) feasibility studies, or (iii) contracts.</i>

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%
<i>[Insert title of Parameter]</i>	<i>[Insert Benchmark Value]</i>	<i>[Insert Benchmark Value]</i>	<i>[Insert Benchmark Value]</i>	<i>[Insert Benchmark Value]</i>	<i>[Insert Benchmark Value]</i>

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.
<i>[Insert title of Parameter]</i>	<i>[Figure in %]</i>	<i>[Indicate using the following two terms only – High or Low]</i>	<i>[Text clearly indicating reasoning behind likelihood assessment being High or Low]</i>

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.

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.

Outcome of Step 2	CPA Specific Applicability
If after the sensitivity analysis is concluded that: the proposed CDM	<i>[Insert CPA specific text:]</i>



project activity is unlikely to be financially/economically attractive then proceed to Step 4 (Common practise analysis).	“Yes” or “No”]
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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?
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Barrier Type	Description of the Barrier	Evidence Sources Confirming the Existence of the Barrier	How does the CDM alleviate the barrier?
1. Investment Barrier	The CPA is unable to secure either debt finance and/or an equity investment without the CDM.	<i>[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.]</i>	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:

- The project is the first in the applicable geographical area that applies a technology that is different from technologies that are implemented by any other project, which are able to deliver the same output and that have started commercial operation in the applicable geographical area before the start date of the proposed project activity;*
- The project implements one or more of the measures; and*
- 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 “ <i>Tool for the demonstration and assessment of additionality</i> ” (Version 6.1.0, EB 69, Annex 20, 13 th September 2012), where it is stated that the “ <i>applicable geographical area covers the entire host country as a default</i> ”. <i>[Insert CPA specific text: CPA implementer to provide the provisional GPS coordinates for site/equipment].</i>
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 <i>[Insert CPA specific text: type of renewable energy project, e.g. “concentrated solar power” or “wind power”]</i> .
Output	Grid Electricity	<i>[Provide CPA specific supporting documentation: Contractual or regulatory documents, e.g. application for grid connection]</i>

		<i>or draft PPA]</i>
Different technologies	<i>[Insert CPA specific text: specify differentiating aspect of the technology: energy source/fuel, or size of installation.]</i>	At the start date of the proposed project activity no power plant that utilise solar energy as source/fuel and deliver grid electricity (“output”) at a <i>[Insert CPA specific text: “small” or “large”]</i> scale, has started commercial operation in South Africa, therefore this project activity is a different technology to any other technology in South Africa. <i>[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].</i>

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

1. No other power plant that utilise solar energy as source/fuel and deliver grid electricity (“output”) have reached commercial operation within the borders of South Africa (“applicable geographical area”) at the *[Insert CPA specific text: “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.	<i>[Insert CPA specific text: “Yes” or “Not satisfied”]</i>
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).	<i>[Insert CPA specific text: “Yes, proposed CPA is additional” or “No”]</i>

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	Detail Rationale Behind Conclusion and Supporting Evidence



		implementation	
Investment Barrier	<i>[Insert CPA specific text: Indicate which alternative is being considered]</i>	<i>[Insert CPA specific text : “Yes” or “No”]</i>	<i>[Insert CPA specific text : Insert rationale behind conclusion]</i> <i>[Insert CPA specific supporting documentation: Clearly indicate the evidence used to support the conclusion and how it has been used]</i>

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: <i>[Insert CPA specific text: Indicate which alternative is being considered, or “step not satisfied”]</i>

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	<i>[Enter CPA specific calculated capacity range]</i>
Step 2	Identify CSP in South Africa that are grid connected and fall within the range calculated in Step 1. This must be obtained from either the Department of Energy or the National Energy Regulator of South Africa (NERSA).	<i>[Enter CPA specific text: Number of identified projects]</i>
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} .	<i>[Enter CPA specific text: Number of identified projects]</i>
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);	<i>[Enter CPA specific text: Number of identified projects]</i>

	(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} .	
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

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The approved baseline and monitoring methodology ACM0002 (Version 13.0.0): "Consolidated baseline methodology for grid-connected electricity generation from renewable sources" is applied to CSP solar power projects generating electricity into a grid.

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 (tCO₂e/yr)

BE_y = Baseline Emissions in year y (tCO₂e/yr)

PE_y = Project Emissions in year y (tCO_2e/yr)

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:

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

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).

It will be the responsibility of the CME to provide the CPA with the latest combined margin CO_2 emission factor for grid connected power generation in year y ($EF_{grid, CM, y}$), which will be calculated using the “Tool to calculate the emission factor for an electricity system”.

The methodological choices made regarding the “Tool to calculate the emission factor for an electricity system” (Version 02.2.1, EB 61, Section B.6.4), are:

- 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 is 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 simple operating margin emission factor ($EF_{grid, OMsimple, y}$) is chosen for the calculation method, seeing as low-cost/must-run resources constitute less than 50% of total grid generation in average of the five most recent years.
- For calculation of the combined margin emission factor that involve wind and solar power generation project activities: $w_{OM} = 0.75$ and $w_{BM} = 0.25$ (owing to their intermittent and non-dispatchable nature).

(a) For Greenfield Renewable Energy Power Plants

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)

Project Emissions

Most CSP power plants will utilise fossil fuel as start-up fuel, and therefore there will be project emissions due to fossil fuel consumption. These emissions shall be accounted for by using the following formula:

$$PE = PE_{FF,y}$$

Where :

$PE_{FF,y}$ = Project emission from fossil fuel combustion in year y (tCO₂/yr)

In accordance with ACM0002, $PE_{FF,y}$ are to be calculated as per the "*Tool to calculate project or leakage CO₂ emissions from fossil fuel combustion*" (latest version) as follows (Version 02 is used in this document):

$$PE_{FF,y} = PE_{FC,j,y} = \sum_i FC_{i,j,y} \times COEF_{i,y}$$

Where:

$PE_{FC,j,y}$ = CO₂ emissions from fossil fuel combustion in process j during the year y (tCO₂/yr)

$FC_{i,j,y}$ = Quantity of fuel type i combusted in the process j during the year y (Mass or volume unit/yr)

$COEF_{i,y}$ = CO₂ emission coefficient of fuel type i in year y (tCO₂/mass or volume unit)

i = Fuel types combusted in process j during the year y

According to the tool, $COEF_{i,y}$ can be calculated using one of two options, depending on the availability of data on the fossil fuel type i , as follows:

Option A: The CO₂ emission coefficient $COEF_{i,y}$ is calculated based on the chemical composition of the fossil fuel type i ;

Option B: The CO₂ emission coefficient $COEF_{i,y}$ is calculated based on the net calorific value and CO₂ emission coefficient emission factor of the fuel type i .

The exact chemical composition of most of the fuels used won't be monitored and available on a continual basis; therefore **Option B** will be used for this type of CPA in the PoA, and shall be calculated as follows:

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

Where:

$COEF_{i,y}$ = CO₂ emission coefficient of fuel type i in year y (tCO₂/mass or volume unit)

$NCV_{i,y}$ = Weighted average net calorific value of fuel type i in year y (GJ/mass or volume unit)

$EF_{CO_2,i,y}$ = Weighted average CO₂ emission factor of fuel type i in year y (tCO₂/GJ)

i = Fuel types combusted in process j during the year y

Leakage

As per methodology ACM0002, no leakage emissions are considered.

B.6.2. Data and parameters that are to be reported ex-ante

(Copy this table for each data and parameter.)

Data / Parameter	NCV _{i,y}	
Unit	GJ/ton	
Description	Net calorific value (energy content) of fossil fuel type <i>i</i> in year <i>y</i>	
Source of data	The following data sources may be used if the relevant conditions apply:	
	Data Source	Conditions for using the data source
	(a) Values provided by fuel suppliers in invoices	This is the preferred source.
	(b) Measurements by the project participants	If (a) is not available
	(c) Regional or national default values	If (a) is not available These sources can only be used for liquid fuels and should be based on well documented reliable sources (such as national energy balances).
	(d) IPCC default values at the upper limit of the uncertainty at a 95% confidence interval.	If (a) is not available
Value(s) applied	42.8	
Choice of data or Measurement methods and procedures	As per the "Tool to calculate project or leakage CO ₂ emissions from fossil fuel combustion".	
Purpose of data	Calculation of project emissions.	
Additional comment	For data sources (a) and (b): Measurements should be undertaken in line with national or international fuel standards.	

Data / Parameter	EF _{CO₂,i,y}										
Unit	tCO ₂ /GJ										
Description	CO ₂ emission factor of fossil fuel type <i>i</i> in year <i>y</i>										
Source of data	<p>The following data sources may be used if the relevant conditions apply:</p> <table border="1"> <thead> <tr> <th>Data Source</th><th>Conditions for using the data source</th></tr> </thead> <tbody> <tr> <td>(a) Values provided by fuel suppliers in invoices</td><td>This is the preferred source.</td></tr> <tr> <td>(b) Measurements by the project participants</td><td>If (a) is not available</td></tr> <tr> <td>(c) Regional or national default values</td><td>If (a) is not available These sources can only be used for liquid fuels and should be based on well documented reliable sources (such as national energy balances).</td></tr> <tr> <td>(d) IPCC default values at the upper limit of the uncertainty at a 95% confidence interval.</td><td>If (a) is not available</td></tr> </tbody> </table>	Data Source	Conditions for using the data source	(a) Values provided by fuel suppliers in invoices	This is the preferred source.	(b) Measurements by the project participants	If (a) is not available	(c) Regional or national default values	If (a) is not available These sources can only be used for liquid fuels and should be based on well documented reliable sources (such as national energy balances).	(d) IPCC default values at the upper limit of the uncertainty at a 95% confidence interval.	If (a) is not available
Data Source	Conditions for using the data source										
(a) Values provided by fuel suppliers in invoices	This is the preferred source.										
(b) Measurements by the project participants	If (a) is not available										
(c) Regional or national default values	If (a) is not available These sources can only be used for liquid fuels and should be based on well documented reliable sources (such as national energy balances).										
(d) IPCC default values at the upper limit of the uncertainty at a 95% confidence interval.	If (a) is not available										
Value(s) applied	0.0748										
Choice of data or Measurement methods and procedures	As per the " <i>Tool to calculate project or leakage CO₂ emissions from fossil fuel combustion</i> ".										
Purpose of data	Calculation of project emissions.										
Additional comment	For data sources (a) and (b): Measurements should be undertaken in line with national or international fuel standards.										

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 <i>y</i>
Source of data	Calculation provided by the CME using the latest version of the "Tool to calculate the emission factor for an electricity system".
Value(s) applied	0.91
Choice of data or Measurement methods and procedures	According to the " <i>Tool to calculate the emission factor for an electricity system</i> ".
Purpose of data	Calculation of baseline emissions.
Additional comment	-

B.6.3. Ex-ante calculations of emission reductions

>>

Baseline Emissions

$$\begin{aligned}
 BE_y &= EG_{PJ,y} \times EF_{\text{grid, CM, } y} \\
 &= 100\,000 \times 0.91 \\
 &= 91\,000
 \end{aligned}$$

Where:

- BE_y = Baseline emissions in year y (tCO₂/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 CO₂ emission factor for grid connected power generation in year y calculated using the “*Tool to calculate the emission factor for an electricity system*” (tCO₂/MWh).

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:

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

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)

Project Emissions

The CSP power plant utilise fossil fuel as start-up fuel, and therefore there will be project emissions due to fossil fuel consumption. These emissions shall be accounted for by using the following formula:

$$PE = PE_{FF,y}$$

Where :

- $PE_{FF,y}$ = Project emission from fossil fuel combustion in year y (tCO₂/yr)

In accordance with ACM0002, $PE_{FF,y}$ are to be calculated as per the “*Tool to calculate project or leakage CO₂ emissions from fossil fuel combustion*” (latest version) as follows (Version 02 is used in this document):

$$\begin{aligned} PE_{FF,y} = PE_{FC,j,y} &= \sum_i FC_{i,j,y} \times COEF_{i,y} \\ &= 10\,000 \times 3.2014 \text{ (see calculation of this value below)} \\ &= 32\,014 \end{aligned}$$

Where:

- $PE_{FC,j,y}$ = CO₂ emissions from fossil fuel combustion in process j during the year y (tCO₂/yr)
 $FC_{i,j,y}$ = Quantity of fuel type i combusted in the process j during the year y (Mass or volume unit/yr)
 $COEF_{i,y}$ = CO₂ emission coefficient of fuel type i in year y (tCO₂/mass or volume unit)
 i = Fuel types combusted in process j during the year y

$$\begin{aligned} COEF_{i,y} &= NCV_{i,y} \times EF_{CO_2,i,y} \\ &= 42.8 \times 0.0748 \\ &= 3.2014 \end{aligned}$$

Where:

$COEF_{i,y}$ = CO₂ emission coefficient of fuel type i in year y (tCO₂/mass or volume unit)
 $NCV_{i,y}$ = Weighted average net calorific value of fuel type i in year y (GJ/mass or volume unit)
 $EF_{CO_2,i,y}$ = Weighted average CO₂ emission factor of fuel type i in year y (tCO₂/GJ)
 i = Fuel types combusted in process j during the year y

Leakage

As per methodology ACM0002, no leakage emissions are considered.

Emission Reductions

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

$$\begin{aligned}
 ER_y &= BE_y - PE_y \\
 &= 91\,000 - 32\,014 \\
 &= 58\,986
 \end{aligned}$$

Where:

ER_y = Emission Reductions in year y (tCO₂e/yr)
 BE_y = Baseline Emissions in year y (tCO₂e/yr)
 PE_y = Project Emissions in year y (tCO₂e/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

(Copy this table for each data and parameter).

Data / Parameter	EG _{facility,y}
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	Data measured and recorded from the electricity meters installed at the project site.
Value(s) applied	100 000
Measurement methods and procedures	Electricity meters separately measure each CPA, at the boundary between the CPA and the South African electricity grid. The equipment (and its associated accuracy) will be in line with the Metering Code of the South African Grid Code.
Monitoring frequency	The parameter will be monitored continuously and the data aggregated monthly for reporting purposes.
QA/QC procedures	Cross check measurement results with records for sold electricity. Calibration will be done according to manufacturer specifications.
Purpose of data	Calculation of baseline emissions.
Additional comments	-



Data / Parameter	$FC_{i,y}$
Unit	Ton
Description	Amount of fossil fuel type i consumed in the project electricity system in year y
Source of data	Fuel meters installed to measure all the fuel usage of the project activity will be used to measure and record all the data required.
Value(s) applied	10 000
Measurement methods and procedures	<p>Meters will be used to measure the net amount of fuel used by the specific CPA.</p> <p>The meters will be calibrated and maintained in-line with manufacturer's specifications. The accuracy of the fuel meters will be according to the meter manufacturer's specifications. If at the time of installation there are National or Industry standards on the accuracy of the specific type of flow meter, this must be met and documented in the CPA.</p>
Monitoring frequency	The parameter will be monitored continuously and the data aggregated monthly for reporting purposes.
QA/QC procedures	<p>Cross check measurement results with records for purchased fuel figures. Discrepancies will be discussed and resolved at internal meetings, and the results reported.</p> <p>The meters will be calibrated and maintained in-line with manufacturer's specifications.</p>
Purpose of data	Calculation of project emissions.
Additional comments	-



Data / Parameter	NCV _{i,y}	
Unit	GJ/ton	
Description	Net calorific value (energy content) of fossil fuel type <i>i</i> in year <i>y</i>	
Source of data	The following data sources may be used if the relevant conditions apply:	
	Data Source	Conditions for using the data source
	(a) Values provided by fuel suppliers in invoices	This is the preferred source.
	(b) Measurements by the project participants	If (a) is not available
	(c) Regional or national default values	If (a) is not available These sources can only be used for liquid fuels and should be based on well documented reliable sources (such as national energy balances).
	(d) IPCC default values at the upper limit of the uncertainty at a 95% confidence interval.	If (a) is not available
Value(s) applied	42.8	
Measurement methods and procedures	<p>For data sources (a) and (b): Measurements should be undertaken in line with national or international fuel standards. The NCV should be obtained for each fuel delivery, from which weighted average annual values should be calculated</p> <p>For (c): Review appropriateness of the values annually</p> <p>For (d): Any future revision of the IPCC Guidelines should be taken into account</p>	
Monitoring frequency	Depend on measurement method chosen.	
QA/QC procedures	Verify if the values under (a), (b) and (c) are within the uncertainty range of the IPCC default values as provided in Table 1.2, Vol. 2 of the 2006 IPCC Guidelines. If the values fall below this range collect additional information from the testing laboratory to justify the outcome or conduct additional measurements. The laboratories in (a), (b) or (c) should have ISO17025 accreditation or justify that they can comply with similar quality standards.	
Purpose of data	Calculation of project emissions.	
Additional comments	-	

Data / Parameter	$EF_{CO_2,i,y}$	
Unit	tCO ₂ /GJ	
Description	CO ₂ emission factor of fossil fuel type <i>i</i> in year <i>y</i>	
Source of data	The following data sources may be used if the relevant conditions apply:	
	Data Source	Conditions for using the data source
	(a) Values provided by fuel suppliers in invoices	This is the preferred source.
	(b) Measurements by the project participants	If (a) is not available
	(c) Regional or national default values	If (a) is not available These sources can only be used for liquid fuels and should be based on well documented reliable sources (such as national energy balances).
	(d) IPCC default values at the upper limit of the uncertainty at a 95% confidence interval.	If (a) is not available
Value(s) applied	0.0748	
Measurement methods and procedures	<p>For data sources (a) and (b): Measurements should be undertaken in line with national or international fuel standards. The CO₂ emission factor should be obtained for each fuel delivery, from which weighted average annual values should be calculated</p> <p>For (c): Review appropriateness of the values annually</p> <p>For (d): Any future revision of the IPCC Guidelines should be taken into account</p>	
Monitoring frequency	Depend on measurement method chosen.	
QA/QC procedures	For (a): If the fuel supplier does provide the NCV value and the CO ₂ emission factor on the invoice and these two values are based on measurements for this specific fuel, this CO ₂ factor should be used. If another source for the CO ₂ emission factor is used or no CO ₂ emission factor is provided, Options (b), (c) or (d) should be used.	
Purpose of data	Calculation of project emissions.	
Additional comments	-	

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

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1. Monitoring Period

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

2. Monitoring Plan Management

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

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



3. Data Monitored and Sources

All parameters depicted above in Section B.7.1 will be monitored by the implementing entity of the CPA and recorded electronically. The CPA owners will provide data on monitored parameters included in the above tables to the CME. The CME will document and store all data related to parameters provided by CPA implementing entities in an electronic database, while primary data will be stored by each CPA implementing entity.

4. Storage of Data

All data collected will be archived electronically in two places for security purposes. Data will be consolidated and submitted to the CME database on a monthly basis. All data will be kept by the CPA and the CME 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.

- - - - -

**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-Edward Nathan Sonenberg
Building:	
City:	Johannesburg
State/Region:	Gauteng Province
Postfix/ZIP:	2196
Country:	Republic of South Africa
Telephone:	
FAX:	
E-Mail:	info@carbonprotocol.org
URL:	
Represented by:	
Title:	General Manager
Salutation:	Ms
Last Name:	Niehaus
Middle Name:	
First Name:	Hildegard
Department:	
Mobile:	+27 (0) 723481505
Direct FAX:	
Direct tel:	
Personal E-Mail:	



Appendix 2: Affirmation regarding public funding

Not Applicable.



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 tCO₂/MWh.

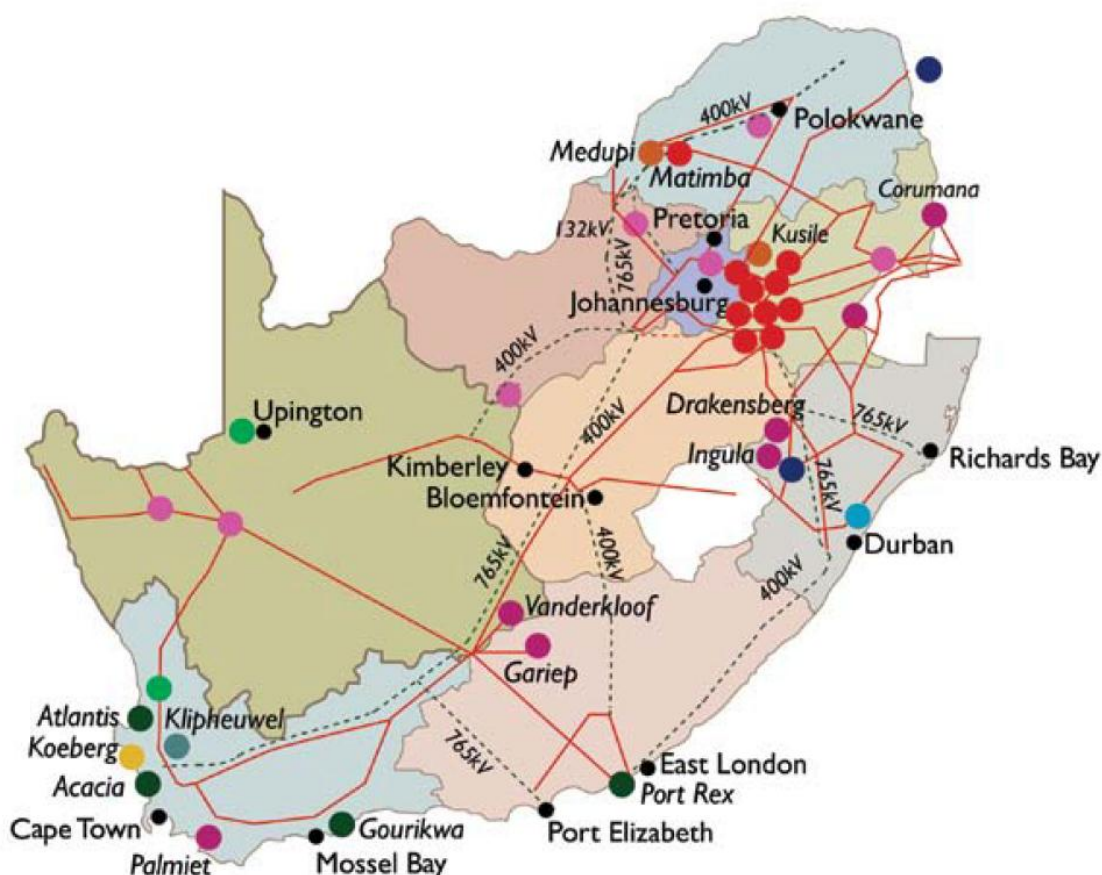
All electricity generated by the Eskom power stations is taken into consideration when calculating the grid emission factor; exports are not subtracted.

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 data¹. This data includes commissioning dates, electricity generated, and fuel consumed.

Data for the imported electricity were obtained from the Eskom annual report².

¹ Eskom Holdings SOC Limited. (2012). *CDM Calculations*. Retrieved October 04, 2012, from Eskom: <http://www.eskom.co.za/c/article/236/cdm-calculations/>

² 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 CO₂ emissions per unit net electricity generation (tCO₂/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**):

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

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 ³		
NCV _{other bituminous coal, 2009} ⁴	19.10	GJ/T
NCV _{other bituminous coal, 2010} ⁵	19.22	GJ/T
NCV _{other bituminous coal, 2011} ⁶	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 ⁷	817.15	kg/m ³
Gas/Diesel Oil Density ⁸	820	kg/m ³

The fuel used for coal power stations is other bituminous coal. In “*Eskom Fact Sheet – Formation of Coal*”⁹ 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)*”¹⁰ 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*”¹¹. 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”¹². 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*”¹³.

Using equation 6, the OM is calculated as **0.92 tCO₂e/MWh**.

³ All the parameters are from 2006 IPCC Guidelines for National Greenhouse Gas Inventories, except if independently referenced otherwise.

⁴ Eskom Holdings SOC Limited. (2011). *Annual Report 2011*.

⁵ Eskom Holdings SOC Limited. (2011). *Annual Report 2011*.

⁶ Eskom Holdings SOC Limited. (2011). *Annual Report 2011*.

⁷ Website: http://www.simetric.co.uk/si_liquids.htm, accessed 04 October 2012, published 8 September 2007

⁸ Website: http://www.simetric.co.uk/si_liquids.htm, accessed 04 October 2012, published 8 September 2007

⁹ Document available from website: http://recruitment.eskom.co/live/content.php?Category_ID=60

¹⁰ Document available at: <http://www.erc.uct.ac.za/jesa/volume22/22-4jesa-spaldingfecher.pdf>

¹¹ Document available at: http://www.eskom.co.za/content/GS_0001GasTurbAcaciaPortRexRev6~1~1.pdf

¹² Eskom Holdings SOC Limited. (2011). *CDM Calculations*. Retrieved October 04, 2012, from Eskom:

<http://www.eskom.co.za/c/article/236/cdm-calculations/>

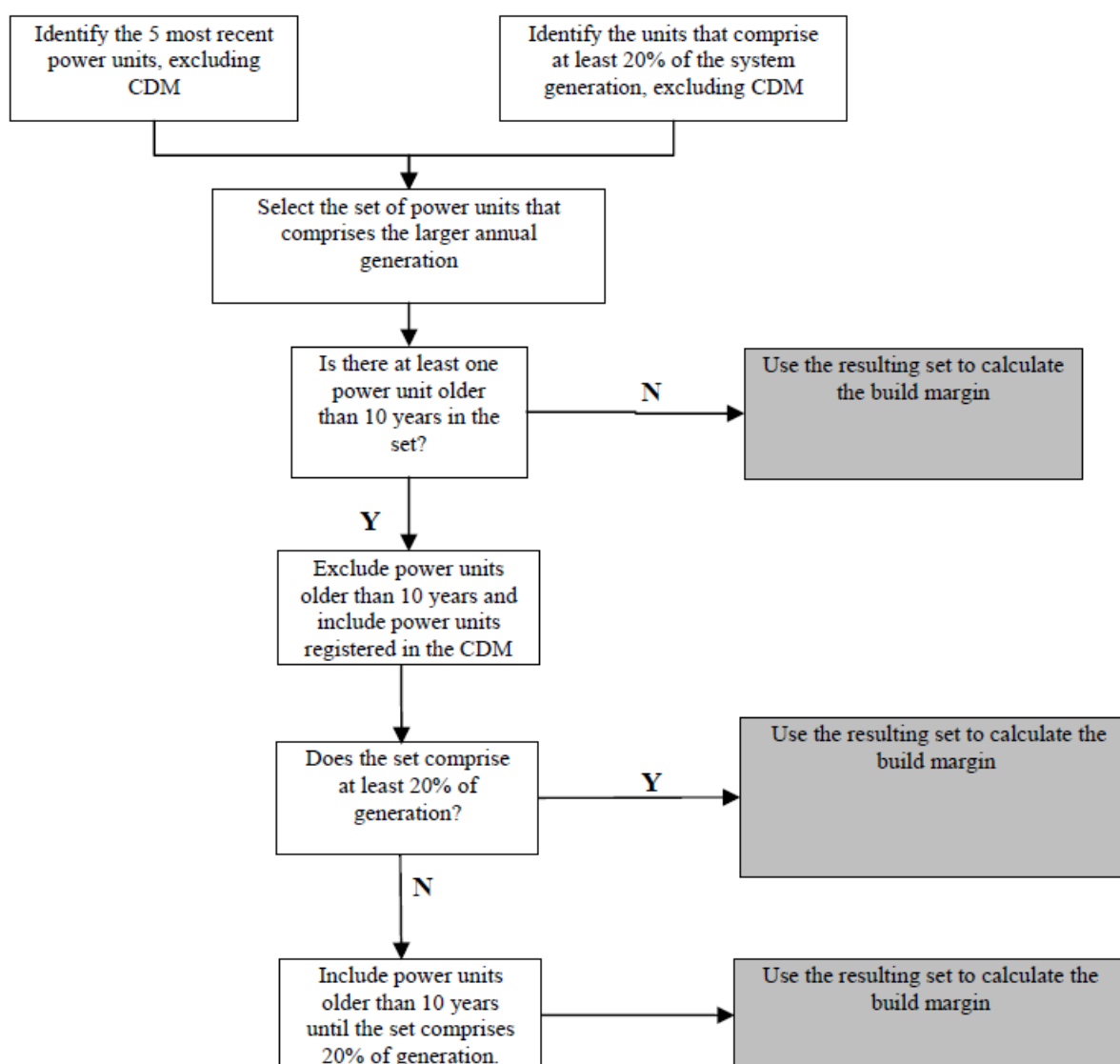
¹³ Document available at: http://recruitment.eskom.co.za/content/GS_0003AnkerlGouriTechBrochRev1~1.pdf

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 (tCO₂/MWh) of all power units m during the most recent year y for which power generation data is available, calculated as follows:

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

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 CO₂ emission factor of each power unit m ($EF_{EL,m,y}$) should be determined as per the guidance in Step 4 (a) for the simple OM, using **Option A2**:*

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

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 CO ₂ 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 tCO₂e/MWh**.

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

The combined margin factor is calculated as follows:

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

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



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		