PROGRAMME DESIGN DOCUMENT FORM FOR SMALL-SCALE CDM PROGRAMMES OF ACTIVITIES (F-CDM-SSC-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

Title: Small Scale Renewable Energy Carbon Programme (SRECP)
Version: Version 01
Date: 06/06/2012

A.2. Purpose and general description of the PoA

Policy/measure or stated goal of the PoA

The purpose of the Small Scale Renewable Energy Carbon Programme - SRECP (hereafter referred as the PoA) is to support the development and implementation of small-scale renewable energy projects in South Africa, and potentially in other countries in the future, in order to displace grid-connected, fossil fuel based electricity generation, thereby reducing greenhouse gas (GHG) emissions.

The first CPA will be a concentrated solar photovoltaic project with a rated capacity of 9.52 MW, which will be located approximately 4 km north-west of Noupoort, Northern Cape Province, South Africa. Renewable energy technologies implemented under the programme will include hydro (either run-of-river reservoir or an accumulated reservoir), wind and solar (photovoltaic and solar thermal).

The establishment of the Programme of Activities will help small-scale renewable energy projects in South Africa in overcoming some of the key barriers faced by projects by enhancing the financial viability of the projects and facilitating access to capital. In addition, the PoA is expected to contribute to sustainable development in South Africa in various ways, including:

- The project is expected to support the national policy goal of achieving 10% penetration for PV technologies as a share of total installed capacity in 2020, and 20% in 2030.[1]
- The project is expected to provide local employment opportunities during the construction and operation phase.
- The project is expected to contribute to South Africa's fiscal revenues through payment of taxes, and attract foreign direct investment.
- The project will have a positive impact on the transfer solar energy technology to South Africa, as well as know-how and skills of local workers. The transfer of technology and know-how will be directly replicable to other future renewable energy projects.
- The project will reduce South Africa's CO2 footprint while increasing the electricity generation capacity of the country.

Framework for the implementation of the proposed PoA

[1] Integrated Resource Plan for Electricity 2010-2030, Department of Energy, Electricity Regulation Act No.4 of 2006, 6 May 2006

Carbon Africa Ltd. will act as the Coordinating/Managing Entity (CME) for the PoA. The CME will be responsible for:

1. Development of the PoA Design Document (CDM-PoA-DD) and CDM Programme Activity (CPA) Design Documents (CDM-CPA-DD) for CPAs that are developed under the Programme of Activities;
2. Obtaining a Letter of Approval for the implementation of the PoA from the host country;
3. Obtaining a Letter of Authorization for the coordination of the PoA from the host country;
4. Liaise with the Designated National Authority (DNA) on matters related to the implementation of the PoA and inclusion of CPAs
5. Carry out a quality check on CPAs to be included in the Programme of Activities ensure that the CPA meets all the eligibility criteria as formulated in the PoA-DD;
6. Collect and compile monitoring records from all the CPA entities;
7. Coordinate monitoring activities and data management during the lifetime of the PoA;
8. Contract a DOE for validation and verification purposes
9. Prepare and submit monitoring reports and facilitate the verification of the same;
10. Act as the focal point with the CDM Executive Board for matters related to the PoA;
11. During the lifetime of the PoA, maintenance of all monitoring reports of all CPAs in accordance with record keeping systems outlined in the CDM-PoA-DD;

CPA entities will be responsible for the implementation of individual CPAs under the PoA and will:

a) Implementation of the described CPA
b) Operate and maintain the CPA for the duration of the project;
c) Keep records of parameters as per the monitoring plan and provide hard and electronic records to the CME on a regular basis and provide the CME and DOE with required documents and access to sites as needed.
d) Make available staff for validation and verification where applicable

The CME will enter into agreements with all CPA entities. The contractual agreements will summarize roles and responsibilities regarding the implementation of the individual project activities as a CDM Programme Activity (CPA). The agreements will ensure that the CME will have control of all records and information related to the implementation of individual CPAs and will be in a position to ensure that each CPA is being implemented according to the provisions as outlined in the PoA-DD. The agreement will also put in place measures, which avoid double counting of the proposed CPA.

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

There are no policies, laws or mandatory requirements in South Africa, the Host Country, stipulating the implementation of renewable energy power plants. The proposed PoA is a voluntary action by the CME.

A.3. CMEs and participants of PoA

Carbon Africa Limited will act as the coordinating/managing entity.

Climate Corporation Emissions Trading GmbH will be a project participant.

A.4. Party(ies)

Name of Party involved (host) indicates a host Party	**Private and/or public entity(ies) project participants (as applicable)**	**Indicate if the Party involved wishes to be considered as project participant (Yes/No)**
South Africa (host)	Carbon Africa Ltd.	No
South Africa (host)	Climate Corporation Emissions Trading GmbH	No

A.5. Physical/ Geographical boundary of the PoA

The geographical area within which small-scale CDM programme activities (SSC-CPAs) included in the PoA will be implemented is defined by the national boundaries of the Host Country, South Africa.

The geographic coordinates of South Africa are provided in the figure and table below.

Figure 1: Map of South Africa

Table 1. Coordinates South Africa

Latitude	**Longitude**
22°25'24.10"S	31°18'26.11"E
28°38'5.99"S	16°27'28.51"E
34°50'3.34"S	19°59'38.61"E
26°51'29.72"S	32°53'28.35"E

In line with EB 60, Annex 26 *Clarification regarding the "Procedures for registration of a Programme of Activities as a single CDM project and issuance of certified emission reductions for a Programme of Activities*, and the *Standard for demonstration of additionality, development of eligibility criteria and* *application of multiple methodologies for programme of activities* (version 01.0, EB 65, Annex 3) the programme boundary might be amended post-registration to include additional Host Parties.

A.6. Technologies/measures

SSC-CPAs under the PoA will use renewable energy technologies to generate electricity. Renewable energy technologies and measures to be employed by a SSC-CPA might include:

- Hydro power plant/unit (either with a run-of-river reservoir or an accumulation reservoir);
- Wind power plant/unit;
- Solar power plant/unit (either photovoltaic or solar thermal).

Project using renewable biomass, geothermal, tidal-wave technologies are excluded from the programme. Installed capacities of individual SSC-CPAs will be below or equal to 15 MW.

Hydro-power:

A hydroelectric power plant harnesses the energy from a flow of water to generate electricity. There are two types of hydro schemes: accumulation reservoir and run-of-river hydro power. In a hydroelectric accumulation reservoir scheme, a watercourse is dammed and a reservoir forms behind the dam. The turbine is located at the base of the dam. When the turbine valve is opened, water flows across the turbine causing it to spin. This in turn drives the generator to generate electricity. In this process the gravitational potential energy of the stored water is converted into kinetic energy as the water flows down the pipe, then into mechanical energy at the turbine, and finally into electrical energy at the generator. In a ‘run-of-river’ scheme, a proportion of the flow in the watercourse is diverted directly into a pipe, which runs down to the turbine. There is no, or minimal, storage of water.

Wind Power:

Wind energy originates from the sun. Solar radiation falls onto the earth and the temperature difference between the equator and the poles drives thermal currents - or winds - which circulate around the globe. The atmosphere is a big thermal machine continuously "producing" wind air mass flows between areas of low and high pressure. Up to now winds in up to about 200 m above ground level can be "harvested" by the wind turbines. Wind turbines can generate electricity at wind speeds of 3 m/s to 35 m/s. Some specially designed wind turbines can work even at lower or higher wind speeds. Quite a wide range of different designs exist for special purposes. Wind turbines are designed with a vertical or horizontal axis, one blade up to about 20 rotor blades, small capacity of some watt up to some megawatt, with or without gear box and with direct current or alternating current generator. A general design does not exist, although the three bladed horizontal upwind turbines are the most successful ones. Generally, the turning rotor spins a generator, producing electricity.

Solar Power:

Solar PV

The solar photovoltaic cells, also known as the solar cells, are used to convert solar energy into electrical energy. The solar cells are the basic elements of a solar module. When semiconductor materials are exposed to sunlight, electrons excite from the valence band to the conduction band creating charged particles called holes. By doping the silicon, i.e. adding tiny amounts of other materials like boron or phosphor to the crystalline structure, p- or n- type semiconductors are formed respectively. By bringing them together, a p-n junction serves for creating an electric field within the semiconductor, which is able to separate electrons and holes and which creates a direct current (DC) coming out from the solar cells through the contacts. Solar modules are composed of solar cells in series and parallel in order to obtain a desired final power, current, and voltage. The amount of solar cells in crystalline modules varies typically between 36 and 72 cells. The output current of a solar cell directly relates to the incoming irradiation: The higher the irradiation, the more electron-hole pairs are produced and therefore the current increases and more electricity is produced.

Solar Thermal
Solar thermal technology is applied for harnessing solar energy for thermal energy (heat). Solar thermal collectors can be classified as low, medium, or high temperature collectors. High-temperature collectors, also known Concentrating Solar Power (CSP) concentrate sunlight using mirrors or lenses and are generally used for electric power production. Concentrating Solar Power (CSP) collectors concentrate large amounts of solar radiation onto a small area in order to achieve high temperatures typically in the range 400-1000°C. This thermal energy is either used directly in process heat applications or converted to electricity via steam or gas turbines.

The renewable energy generation units will either supply electricity to a national or regional grid, or to an identified consumer facility via national/regional grid through a contractual arrangement such as wheeling.

The implementation of CPAs under the PoA will involve the installation of a new power plant at a site where there was no renewable energy power plant operating prior to the implementation of the SSC-CPA (greenfield plant). The renewable energy generation units will be connected and supply electricity to the South African national electricity grid whereby the generated electricity will substitute fossil fuel based generated electricity, therefore reducing greenhouse gas emissions emissions. Capacity additions, retrofits and replacement of existing plants are not included in the PoA.

Project activities could include both renewable and non-renewable components (e.g. a wind/diesel power)

Detailed information about the exact technology and measures applied by the individual SSC-CPAs will be provided in the relevant section of the specific SSC-CPA-DD. The section will also include a description of how environmentally safe and sound technology and know-how is being applied by the specific SSC-CPA *inter alia* technology transfer to the Host Party for application in the SSC-CPA.

A.7. Public funding of PoA

There is no public funding involved in this Programme of Activities.

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

Historically, South Africa has relied heavily on coal-based electricity generation. By 2011 installed capacity of coal power plants amounted to 85%, followed by gas power plants (6%), nuclear (4%) and pumped storage hydro power plants (3%). Currently, there are only two wind power plants connected to the grid. The 3 MW Klipheuwel Wind Farm which is owned by Eskom, and the 5.2 MW Darling Wind Farm which is an IPP owned by private investors. Both wind farms have been developed as demonstration projects and are very small compared to the 47,463 MW of installed capacity in South Africa. Other energy sources like hydro, biogases etc. are negligible. By March 2011, there were no grid connected solar powered systems.

In order to promote the use of renewable energy, the government of South Africa introduced a Feed-in-Tariff policy in 2009. The same year some of the feed-in-tariffs were changed and in 2011, a proposal was tabled which proposed a material decrease in the level of some of renewable energy feed-in-tariffs. The latter proposal never got approved because the government of South Africa abandoned the Feed-in-Tariff policy and adopted the Renewable Energy Independent Power Producer (IPP) Programme. Under the Programme, bidders are required to specify a tariff for the electricity produced. The tariff should not exceed the applicable tariff set out in the procurement documentation.

The first renewable energy projects are currently going through the procurement programme and it is too early to evaluate the success of the programme. However, it is clear that renewable projects in South Africa still face many barriers, including technological, institutional and financial.

In this context, the additionality for the PoA will be demonstrated by establishing that each SSC-CPA is additional through the eligibility criteria on section B.2 using either the *Attachment A to Appendix B* (version 08) or *Guidelines for demonstrating additionality of microscale project activities* (version 03).

As each SSC-CPA will comply with the eligibility criteria on additionality, it can be concluded that in the absence of this PoA and CDM, none of the proposed SSC-CPAs would occur.

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

As per the *Clean Development Mechanism Project Standard* (version 01.0) paragraph 150, the CME has developed eligibility criteria for inclusion of SSC-CPAs under the PoA. The eligibility criteria consist of two sets of criteria: (1) general eligibility criteria as provided in the *Standard for demonstration of additionality, development of eligibility criteria and application of multiple technologies for Programme of Activities* and (2) eligibility criteria for the demonstration of additionality.

The eligibility criteria for the demonstration of additionality for each CPA type were derived from the *Attachment A to Appendix B* (version 08) or *Guidelines for demonstrating additionality of microscale project activities* (version 03).

	Topic	**PoA eligibility criteria**	**Documentary evidence**
1)	Geographical boundary (a)	The geographical boundary of the SSC-CPA including any time-induced boundary is consistent with the geographical boundary set in section A.5 of the PoA-DD.	EIA report or feasibility study
2)	Double counting (b)	The SSC-CPA has not yet been included in another Programme of Activities or has not yet been registered as a single CDM project activity.	a) Contract between CME and CPA
3)	Technology (c)	The SSC-CPA involves the implementation of a grid-connected renewable energy technology including solar PV, solar thermal, wind and hydro. SSC-CPAs involving the use of renewable biomass, geothermal, and tidal/wave technologies for generating electricity are excluded from this Programme of Activities Thereby the proposed SSC-CPA is the installation of a new power plant at a site where no renewable power plant was operated prior to the implementation of the project	Feasibility study or other project documentation

		activity (greenfield plant) If the proposed SSC-CPA is a hydropower plant: • 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.	
4)	Start date (d)	The start of the SSC-CPA occurs after the start date of the validation of the PoA (date of the start of GSP).	Contract with party providing equipment/construction/operation services
5)	Applicability of methodology (e)	The SSC-CPA meets all the applicability criteria of version 17 of AMS I.D *Grid connected renewable electricity generation* as per section B.2, part II of the PoA-DD.	Detailed assessment that the project meets all the applicability criteria of version 17 of AMS-I.D *Grid connected renewable electricity generation*
6)	Additionality (f)	The SSC-CPA meets the eligibility criteria pertaining to the demonstration of additionality as shown below	Additionality check carried out in line with additionality-related eligibility criteria.
7)	Stakeholder consultation and EIA (g)	(a) The SSC-CPA has carried out a local stakeholder consultation. (b) The SSC-CPA has carried out an Environmental Impact Assessment in line with host country laws and regulations	(a) Local stakeholder consultation report. (b) Environmental Impact Assessment report.
8)	ODA (h)	The SSC-CPA has not received funding from Annex I parties that	Confirmation letter from CPA entity or confirmation letter from Annex I party.

		results in a diversion of official development assistance	
9)	Target group (g)	The SSC-CPA supplies electricity to a national or regional grid; or supplies electricity to an identified consumer facility via national/regional grid through a contractual arrangement such as wheeling.	Power Purchase Agreement or any other similar contract agreement.
10)	Installed capacity limits (k)	The installed capacity of the SSC-CPA is smaller than or equal to 15 MW. However, if a project activity is applying the additionality Option A for microscale project activities, the installed capacity of the SSC-CPA will be smaller than or equal to 5 MW.	Feasibility, engineering design or other relevant study reports
11)	Debundling (l)	The SSC-CPA is not a debundled component of a large-scale project activity in accordance with the latest approved version of the *Guidelines on assessment of debundling for SSC project activities* (version 03).	Debundling check carried out in line with the latest approved version of the *Guidelines on assessment of debundling for SSC project activities.*

ADDITIONALITY-RELATED ELIGIBILITY CRITERIA

In case the CPA is a microscale project activity, the following criteria apply:

Option A: Microscale additionality	
Criteria	*Means of verification*
Installed capacity of the SSC-CPA is smaller than or equal to 5MW	Feasibility study or other relevant project documentation.
The geographic location of the project activity is in one of the least developed countries or the small island developing States (LDCs/SIDS) or in a special underdeveloped zone of the host country identified by the government before 28 May 2010; or The project activity employs specific renewable energy technologies/measures recommended by the host country designated national authority (DNA) and approved by the Board to be additional in the host country.	Geographical coordinates of the project activity Public documentation from the host country delineating special underdeveloped zones or Documentation from the CDM Executive Board recognizing the specific renewable energy technology used by the SSC-CPA.
Rationale	
In case the SSC-CPA is a microscale project activity, i.e. project activities up to five megawatts that employ renewable energy technology, additionality will be demonstrated using the *Guidelines for*	

demonstrating additionality of microscale project activities (version 03). SSC-CPAs under the PoA follow the methodology AMS-I.D, therefore eligible SSC-CPAs will have to follow paragraph 2 (a) or paragraph 2 (d) of the guidelines as they are grid-connected renewable energy technologies, in order to demonstrate microscale additionality.

In case the SSC-CPA is not a microscale project activity, additionality will be demonstrated using Attachment A of Appendix B of the *Simplified modalities and procedures for small-scale project activities* (version 08) and the *Non binding best practice examples to demonstrate additionality for SSC project activities* (version 01).

Option B.1 Investment Barrier	
Criteria	*Means of verification*
Without the CDM revenue, the SSC-CPA has a less favourable Project or Equity IRR than the benchmark and,	Investment analysis spreadsheet
Sensitivity analysis shows whether the conclusion regarding the financial/economic attractiveness is robust to reasonable variations in the critical assumptions.	Investment analysis spreadsheet
Rationale	
Investment barrier: a financially more viable alternative to the project activity would have led to higher emissions. The investment barrier shall be demonstrated using benchmark analysis in accordance with the provisions of the *Tool for the demonstration and assessment of additionality* (06.0.0) and *Guidelines on the assessment of investment analysis* (version 05.0).	

Option B.2 Access-to-capital Barrier	
Criteria	*Means of verification*
The SSC-CPA is not implemented by a subsidiary of a multinational group and,	Incorporation documents of the entity implementing the SSC-CPA.
Investment is done by a company that also purchases the CERs	Loan or investment agreement
Rationale	
Access-to-capital barrier: the project activity could not access appropriate capital without consideration of the CDM revenues. The access-to-capital shall be demonstrated by referring to guideline 1 and 6 of the *Guidelines for objective demonstration and assessment of barriers* (version 01.0*)*, as follows: 1. While demonstrating barriers related to the lack of access to capital, information should include nature of company, organization and its ownership and, financial information. A company that is a subsidiary of a multinational group may have different access to capital, technologies or skilled labour than a local SME company. 2. In case the project proponents make the claim for investment barriers, they should demonstrate in the PDD that the financing of the project was assured only due to the benefit of the CDM. Therefore, it should be demonstrated that the loan approval (or other significant financing decision(s)) by the lender takes explicitly the CDM registration into account. For the cases where the investment is done by a company which also purchases the CERs and the loan agreement mentions that, there is an objective demonstration that the CDM facilitated the lending.	

Option B.3 Barrier due to prevailing practice	
Criteria	*Means of verification*
The project is not common practice as demonstrated by the stepwise approach in the *Guidelines on common practice*	Stepwise demonstration of common practice

Rationale
Barrier due to prevailing practice: prevailing practice would have led to implementation of a technology with higher emissions. Best practice examples include but are not limited to, the demonstration that project is among the first of its kind in terms of technology, geography, sector, type of investment and investor, market etc. The stepwise approach as provided in the *Guidelines on common practice* (version 01) will be used to demonstrate that the project is not common practice.

Option C: First-of-its-Kind additionality	
Criteria	*Means of verification*
The project is the first in the applicable geographical area that applies a technology that is different from any other technologies able to deliver the same output and that have started commercial operation in the applicable geographical area before the start date of the project and,	First-of-its-kind assessment in the SSC-CPA-DD as per *Guidelines on additionality of first-of-its-kind project activities* (version 01)
Project participant selected a crediting period for the project activity that is "a maximum of 10 years with no option of renewal"	Crediting period of the SSC-CPA as indicated in section A.4.3.2 of the specific CPA-DD
Rationale	
In case the project activity is a First-of-its-Kind in the applicable geographical area, the project will demonstrate additionality by referring to the *Guidelines on additionality of first-of-its-kind project activities* (version 01).	

Option D: Automatic additionality	
Criteria	*Means of verification*
The project activity uses a technology which is on the positive list of grid-connected renewable electricity generation technologies as specified in the latest version of Attachment A of Appendix B	Project feasibility study or other relevant project documentation
Rationale	
In case the project activity involves a technology, which is on the positive list of grid-connected renewable electricity generation technologies defined in the *Attachment A of Appendix B* the project will be automatically additional.	

B.3. Application of methodologies

This PoA will include grid-connected renewable power generation units of the following technologies types: wind, hydro (run-of-river reservoir and accumulation reservoir) and solar (solar PV and solar thermal). The project activities will consist of the installation of new power plants at sites where no renewable energy power plant was operated prior to the implementation of the project activity (greenfield plants).

All SSC-CPAs implemented under this PoA will apply the approved small-scale baseline and monitoring methodology AMS-I.D*"Grid connected renewable electricity generation"* (version 17)

Since the SSC-CPAs to be included in the PoA will be small-scale renewable energy projects, the CME has opted for a verification method that does not use sampling but verifies each SSC-CPA. An electronic database will be established that contains general information regarding each SSC-CPA as well as data and information, which is monitored on a regular basis and which is used to determine emission reductions achieved by the SSC-CPA. The database will be accessible at any time for verification.

SECTION C. Management system

The following management system will be implemented by the CME for the inclusion of SSC-CPAs.

A programme officer will be appointed by the CME with working experience in CDM and excellent knowledge of CDM modalities and procedures. The programme officer will have the following responsibilities:

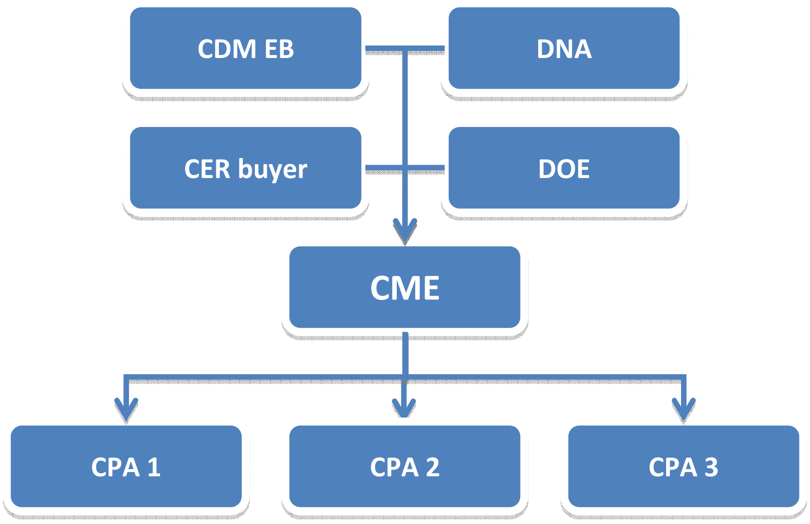
a) Development of the PoA Design Document (CDM-PoA-DD) and CDM Programme Activity (CPA) Design Documents (CDM-CPA-DD) for CPAs that are developed under the Programme of Activities;
b) Carry out a quality check on CPAs to be included in the Programme of Activities ensure that the CPA meets all the eligibility criteria as formulated in the PoA-DD;
c) Collect and compile supporting evidence that are required for the inclusion and validation of the CPA in the PoA
d) Verify that the CPA has not yet been developed as a single CDM project or been included in another PoA. Collect, compile and store data and information regarding each CPA
e) Preparing the monitoring report and implementation of a monitoring database
f) Obtaining a Letter of Approval for the implementation of the PoA from the host country;
g) Obtaining a Letter of Authorization of the coordination of the PoA from the host country;
h) Liaise with the Designated National Authority (DNA) on matters related to the implementation of the PoA and inclusion of CPAs
i) Act as the focal point with the CDM Executive Board for matters related to the PoA;
j) During the lifetime of the PoA, maintenance of all monitoring reports of all CPAs in accordance with record keeping systems outlined in the CDM-PoA-DD;
k) Coordinate monitoring activities and data management during the lifetime of the PoA;
l) Collect and compile monitoring records from all the CPA entities;
m) Prepare and submit monitoring reports and facilitate the verification of the same;
n) Contract a DOE for validation and verification purposes
o) Training the monitoring personnel

CPA entities will be responsible for the implementation of individual CPAs under the PoA and will:

a) Be responsible for the implementation of the described CPA
b) Operate and maintain the CPA for the duration of the project;
c) Keep records of parameters as per the monitoring plan and provide hard and electronic records to the CME on a regular basis and provide the CME and DOE with required documents and access to sites as needed.
d) Make available staff for validation and verification where applicable

Individual CPAs will be developed and implemented by CPA entities. The CPA entities will be responsible for the operation and maintenance of the renewable energy power plant and will enter into a power purchase agreement, wheeling agreement or similar contractual agreement with the electricity off-taker for the supply of electricity. The CPA will also be responsible to provide the CME and DOE with required documents and access to sites as needed.

Figure 2: PoA Management structure



The CME will establish the following operational and management arrangements for the implementation of the PoA:

Record keeping system for each CPA under the PoA

The CME will develop and maintain an electronic database, which will contain essential data and information about each CPA, including:

1. General information about CPA:
    - CPA Name
    - Name and contact details of the entity implementing the CPA
    - Geographical location of the CPA (GPS coordinates)
    - Technology employed by the CPA and installed capacity
    - Commissioning date
    - Start date of the CPA
    - Crediting period
    - Start and end date of crediting period
    - Operational lifetime
    - Verification status (number of verification and associated monitoring period)
    - Emission reductions monitored and issued each monitoring period
2. Supporting evidence for each eligibility criterion to demonstrate that the CPA meets all the eligibility criteria for inclusion into the PoA.
3. Data and information regarding the monitoring of emission reductions achieved by the CPA in line with the monitoring plan as formulated in the PoA-DD

General information regarding the CPA as well as supporting evidence for the inclusion of the CPA will be entered once into the database at the start of the implementation of the CPA. Data and information regarding monitoring of greenhouse gas emissions will be entered on a regular basis as per the requirements of the monitoring plan. All data collected as part of monitoring should be archived electronically and be kept at least for 2 years after the end of the last crediting period.

The programme officer appointed by the CME will be responsible for entering, updating and maintaining data and information regarding CPAs into the electronic database.

Procedure to avoid double accounting

The following procedure will be established to avoid double accounting and avoid the case of including a new CPA that has been already registered either as a CDM project activity or as a CPA of another PoA:

1. Entities implementing a CPA will sign a confirmation, confirming that the project has not yet been included in another Programme of Activities or has not yet been registered as a single CDM project activity or any voluntary carbon offsetting scheme.
2. Before inclusion of a CPA, the CME will check the UNFCCC CDM project database[2] for registered projects applying the same technology and methodology, and implemented in the same location. In case similar projects are found in the same location, the available project documentation will be further scrutinized to confirm that the registered project is different from the proposed CPA.

PoA subscription

Each CPA will enter into a PoA Participation Agreement with the CME. The PoA Participation Agreement will include a confirmation that the entity implementing the CPA is aware and agrees that the CPA is being subscribed to the PoA.

SECTION D. Duration of PoA

D.1. Start date of PoA

In line with the glossary of terms (version 06), the start date of the PoA is 01/01/2013 which is the start date of the first SSC-CPA included to this PoA. The start date of any future SSC-CPA is not, or will not be, prior to the commencement of the validation of the PoA.

D.2. Length of the PoA

28 years

SECTION E. Environmental impacts

E.1. Level at which environmental analysis is undertaken

Environmental Analysis, including an Environmental Impact Assessment if required by the Host Country for that specific type of project activity, will be done at the CPA level because each individual renewable energy project (CPA) is expected to have different local impacts and environmental regulations will be different depending on the location and type of project to be implemented

E.2. Analysis of the environmental impacts

Not applicable. Environmental analysis is carried out at the CPA level.

SECTION F. Local stakeholder comments

F.1. Solicitation of comments from local stakeholders

The stakeholder consultations are held at CPA level, because of the different circumstances and conditions of every social environment in which each SSC-CPA is located.

[2] http://cdm.unfccc.int/Projects/projsearch.html

F.2. Summary of comments received

Not applicable. Stakeholder consultation is done at the CPA level.

F.3. Report on consideration of comments received

Not applicable. Stakeholder consultation is done at the CPA level.

SECTION G. Approval and authorization

At the time of submission of this PoA-DD, the letter of approval from the South African DNA is not yet available.

PART II. Generic component project activity (CPA)

SECTION A. General description of a generic CPA

A.1. Purpose and general description of generic CPAs

The small-scale component project activity (SSC-CPA) which will be implemented under the Small Scale Renewable Energy Carbon Programme - SRECP is a grid-connected renewable energy project as follows (please choose the options apply):

Table 2: Type of CPA

	Type of project activity
Type of renewable energy project	Greenfield activity
Hydro (run-of river reservoir)	☐
Hydro (accumulation reservoir)	☐
Wind	☐
Solar PV	☐
Solar thermal	☐

The generic SSC-CPA compromises the implementation and operation of a hydro (either run-of-river reservoir or accumulation reservoir), wind, solar PV or solar thermal power plant implemented at a site where no renewable power plant was operated prior to the implementation of the project activity. The project activity will generate electricity, which will be feed into to South Africa's national electricity grid or be supplied to an identified consumer facility via national/regional grid through a contractual arrangement such as wheeling. By replacing fossil-fuel based electricity, the project activity will lead to emission reductions.

SECTION B. Application of a baseline and monitoring methodology

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

SSC-CPAs included in the PoA will apply approved baseline and monitoring methodology AMS-I.D (version 17) *Grid connected renewable electricity generation.*

AMS I.D (version 17) also refers to the latest versions of the following methodological tools:

- *Tool to calculate the emission factor for an electricity system (version 2.2.1)*
- *Tool to calculate project or leakage CO2 emissions from fossil fuel combustion (version 2)*

B.2. Application of methodology(ies)

The project activity qualifies as small-scale project activity because the maximum output capacity achieved by individual SSC-CPAs will not exceed 15MW. The project activity falls under category AMS I.D *Grid connected renewable electricity generation* (version 17) because the project activity meets the applicability criteria as follows:

Applicability criteria	**Generic CPA justification**
This methodology comprises renewable energy generation units, such as photovoltaic, hydro, tidal/wave, wind, geothermal and renewable biomass: (a) Supplying electricity to a national or a regional grid; or (b) Supplying electricity to an identified consumer facility via national/regional grid through a contractual arrangement such as wheeling.	The generic SSC-CPA under the Programme will use grid-connected renewable generation units, including hydro, solar PV, solar thermal or wind power generation, that will supply electricity to a national or a regional grid, or to an identified consumer facility via national/regional grid through a contractual arrangement such as wheeling.
This methodology is applicable to project activities that: (a) Install a new power plant at a site where there was no renewable energy power plant operating prior to the implementation of the project activity (Greenfield plant); (b) Involve a capacity addition; (c) Involve a retrofit of (an) existing plant(s); or (d) Involve a replacement of (an) existing plant(s).	The generic SSC-CPA will include activities that: (a) Install a new power plant at a site where there was no renewable energy power plant operating prior to the implementation of the project activity (greenfield plant).
Hydro power plants with reservoirs that satisfy at least one of the following conditions are eligible to apply this methodology: • The project activity is implemented in an existing reservoir with no change in the volume of reservoir; • The project activity is implemented in an existing reservoir, where the volume of reservoir is increased and the power density of the project activity, as per definitions given in the Project Emissions section, is greater than 4 W/m2; • The project activity results in new reservoirs and the power density of the power plant, as per definitions given in the Project Emissions section, is greater than 4 W/m2.	For SSC-CPAs that implement hydropower plants with a reservoir, at least one of the following conditions will be satisfied: • The SSC-CPA is implemented in an existing reservoir with no change in the volume of reservoir; • The SSC-CPA is implemented in an existing reservoir, where the volume of reservoir is increased and the power density of the SCC-CPA, as per definitions given in the Project Emissions section, is greater than 4 W/m2; • The SSC-CPA 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. In the case of SSC-CPA with power projects that are not hydro powered, this condition is not applicable.
If the new unit has both renewable and non-renewable components (e.g. a wind/diesel unit), the eligibility limit of 15 MW for a small-scale CDM project activity applies only to the renewable component. If the new unit	The renewable energy component of generic SSC-CPA with both renewable and non-renewable components will be smaller or equal to 15 MW. In case of SSC-CPAs that co-fire fossil fuel, the capacity of the entire unit will not be bigger than

co-fires fossil fuel, the capacity of the entire unit shall not exceed the limit of 15 MW.	15 MW. If the generic SSC-CPA does not use both renewable and non-renewable components, this condition in not applicable.
Combined heat and power (co-generation) systems are not eligible under this category.	Not applicable. The programme of activities does not include combined heat and power (co-generation) systems.
In the case of project activities that involve the addition of renewable energy generation units at an existing renewable power generation facility, the added capacity of the units added by the project should be lower than 15 MW and should be physically distinct from the existing units.	Not applicable.. The programme of activities does not include capacity additions.
In the case of retrofit or replacement, to qualify as a small-scale project, the total output of the retrofitted or replacement unit shall not exceed the limit of 15 MW.	Not applicable.. The programme of activities does not include retrofits or replacements.

In addition, the project meets the applicability criteria of the *Tool to calculate the emission factor for an electricity system* (version 02.2.1) as follows:

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).	This tool is applicable since the generic project activity involves the generation of electricity from wind, solar and hydro energy and its supply to the South African grid system.
The tool is not applicable if the project electricity system is located partially or totally in an Annex-I country.	The project electricity system is located in South Africa. South Africa is not an annex I country.

B.3. Sources and GHGs

Source		Gas	Included?	Justification/Explanation
Baseline	CO2 emissions from electricity generation in fossil fuel fired power	CO_2	Yes	Main emission source
		CH_4	No	Minor emission source

	plants that are displaced due to project activity	N_2O	No	Minor emission source
Project Activity	CO2 emissions from combustion of fossil fuels for electricity generation in solar thermal power plants	CO_2	[*In case of solar thermal*] Yes [*Other Project*] No	Main emission source
		CH_4	No	Minor emission source
		N_2O	No	Minor emission source
	For hydro power plants, emissions of CH4 from the reservoir	CO_2	No	Minor emission source
		CH_4	[*For hydro projects with reserviors*] Yes [*Other Projects*] No	Main emission source
		N_2O	No	Minor emission source

Flow diagram will be shown for each specific SSC-CPA as the different technologies eligible under methodology AMS-I.D and this PoA may significantly vary on equipment, systems, and flows of mass and energy.

B.4. Description of baseline scenario

In accordance with simplified baseline and monitoring methodology AMS I.D (version 17) *Grid connected renewable electricity generation*, the baseline scenario is "the electricity delivered to the grid by the project activity would have otherwise been generated by the operation of grid-connected power plants and by the addition of new generation sources into the grid".

The South African baseline scenario is described as follows:

Structure of the South African Power Sector

The South African Department of Energy (DoE) is the legislative entity responsible for the South African energy sector. The energy sector is determined by the *National Energy Act of 2008 (No.34 of 2008)*[3].

Specifically for the electricity sector of South Africa, the *Electricity Regulation Act of 2006 (No. 4 of 2006)*[4] determines the framework of the electricity sector. In May 2011, the Department of Energy, acting

[3] Department of Energy (2008), National Energy Act of 2oo8
http://www.info.gov.za/view/DownloadFileAction?id=92826, accessed on 30.12.2011
[4] Department of Energy (2006), Electricity Regulation Act of 2006,
http://www.info.gov.za/view/DownloadFileAction?id=67855, accessed on 30.12.2011

as the legislative entity, put into force the *Electricity Regulations on New Generation Capacity*[5] under the *Electricity Regulation Act of 2006.* According to the new the current regulation, 70% of the new generation capacity must be implemented by the state-owned utility company Eskom, and 30% by Independent Power Producers (IPPs).[6] The Department of Energy has the mandate to decide which planned capacity addition will be implemented by Eskom, and which will be determined by a bidding process between IPPs. However, all IPPs are mandated to sell the generated electricity to Eskom (Single-Buyer-Model) through the signing of long-term Power Purchase Agreements (PPAs) with Eskom.

The Department of Energy determines the needed capacity additions after consultation with the regulator NERSA. The DoE regularly develops an *"Integrated Resource Plan for Electricity"* which is updated every two years, the latest one being the *"Integrated Resource Plan 2010-2030 for Electricity"*[7] under the *Electricity Regulation Act No. 4 of 2006.* In its current version, from the year 2010, the Integrated Resource Plan determines the proposed specific amount of each technology in the electricity generation from 2010 to 2030.

Apart from the Department of Energy (DoE) and the National Energy Regulator of South Africa (NERSA), Eskom is the main player in the South African power sector. From 2002, Eskom became a public, limited liability company wholly owned by the government. Eskom owns and operates the National Electricity Grid and parts of the distribution network, and also owns 93% of the installed generation capacity.

[5] Department of Energy (2010), Electricity Regulations on New Generation Capacity, http://www.info.gov.za/view/DownloadFileAction?id=136320, accessed on 30.12.2011
[6] Department of Energy, http://www.energy.gov.za/files/electricity_frame.html, accessed on 30.12.2011
[7] Department of Energy (2011), Electricity Regulations on the Integrated Resource Plan 2010-2030, http://www.info.gov.za/view/DownloadFileAction?id=146082, accessed on 30.12.2011

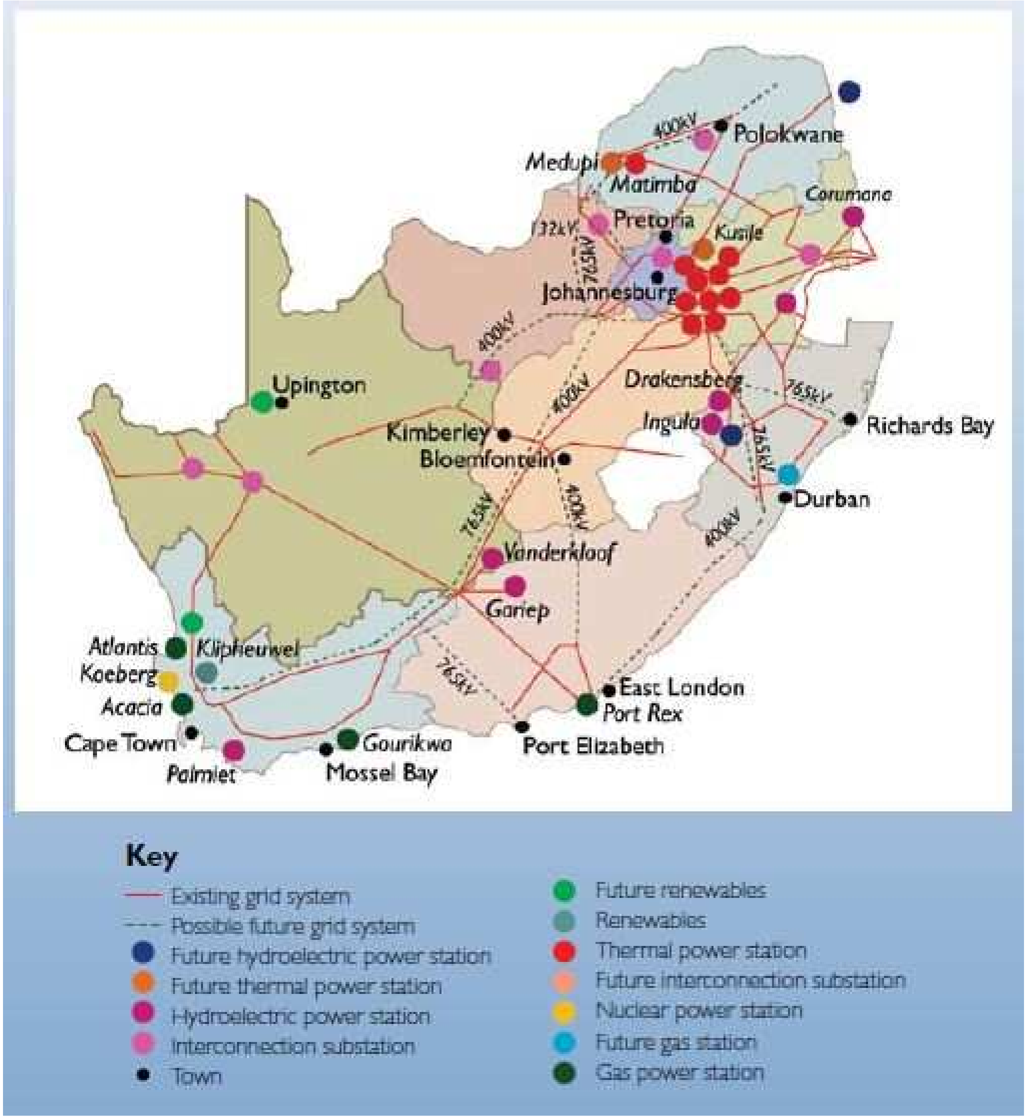


Figure 3. South African Power Sector

<u>Generation</u>

Electricity generation in South Africa is dominated by Eskom, which owns 93% of the installed capacity and supplies about 95% of South Africa's electricity. Municipal owned power plants and IPPs supply the remaining 5% of electricity. Approximately 90% of the total generated electricity is based on coal.[8]

Detailed description of the installed capacity for each technology is presented in the following tables. Data from Eskom's power plants is dated from 2011.[9] The latest published data for IPPs and municipal generation is from 2006[10].

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[8] NERSA (2006), 2006 Electricity Supply Statistics for South Africa, http://www.nersa.org.za/Admin/Document/Editor/file/News%20and%20Publications/Publications/Current%20Issues/Electricity%20Supply%20Statistics/Electricity%20supply%20statistics%202006.pdf , accessed on 30.12.2011

[15] ESKOM (2011), Integrated Report 2011, http://financialresults.co.za/2011/eskom_ar2011/index.php, accessed on 30.12.2011

[10] NERSA (2006), 2006 Electricity Supply Statistics for South Africa, http://www.nersa.org.za/Admin/Document/Editor/file/News%20and%20Publications/Publications/Current%20Issues/Electricity%20Supply%20Statistics/Electricity%20supply%20statistics%202006.pdf accessed on 30.12.2011

Table 3. Eskom Electricity Generation Capacity

Installed Eskom capacity by source 2011	Nominal Capacity [MW]	Net maximum capacity [MW]
Coal	37,745	35,052
Gas	2,426	2,409
Hydro	661	600
Nuclear	1,910	1,830
PSHSP	1,400	1,400
Wind	3	3

Table 4. Municipalities Electricity Generation Capacity

Installed municipal capacity by source 2006	Nominal Capacity [MW]	Net maximum capacity [MW]
Coal	1,323	536
Gas	334	122
Hydro	4	-
PSHSP	189	174

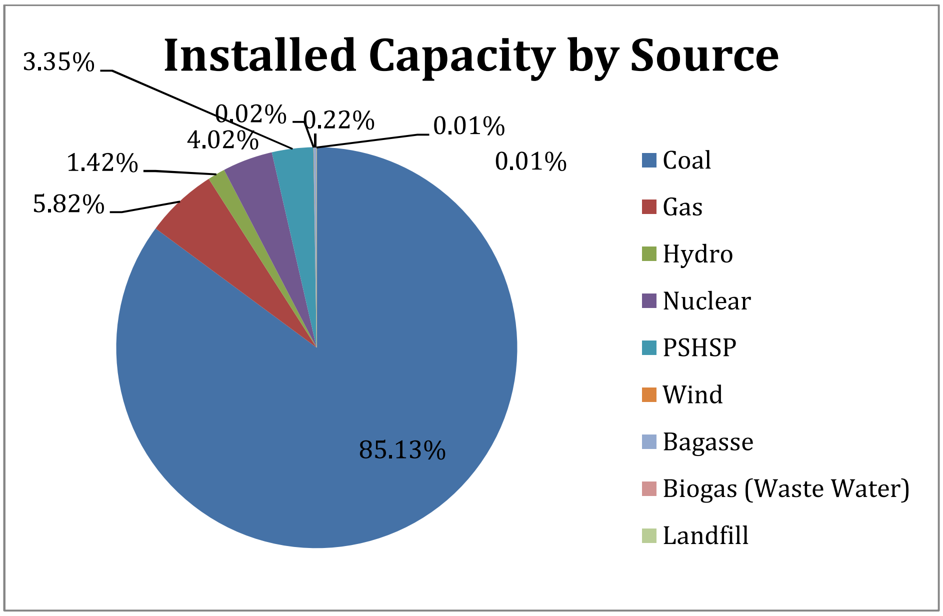
Table 5. IPP Electricity Generation Capacity

Installed private capacity by source 2006	Nominal Capacity [MW]	Net maximum capacity [MW]
Coal	1,339	933
Bagasse / Coal Fired Stations	105	66
Hydro	10	-
Wind	5.2	5.2
Waste Water / Biogas	4.25	4.25
Landfill	5	5

Municipal power plants are mostly coal thermal power plants and gas power plants which generate electricity for the direct supply in their municipal distribution area. Many municipalities own their own distribution networks, and some of them add generation capacity to their distribution lines by adding their own power plants on top of the electricity purchased from the national grid. Power plants operated by IPPs are commonly based on coal/bagasse. Some of the IPP owned power plants generate electricity for on-site consumption (large industrial consumers) and only feed electricity into the grid in the case of excess generation.

Currently, there are only two wind power plants connected to the grid. The 3 MW Klipheuwel Wind Farm which is owned by Eskom, and the 5.2 MW Darling Wind Farm which is an IPP owned by private investors. These plants have been developed as demonstration projects.

In terms of installed capacity, coal power plants' share is about 85% followed by electricity generation based on gas (6%), nuclear (4%) and pumped storage hydro power plants (3%). Pumped storage plants are net consumers of electricity which pump water during off-peak periods to a reservoir so that electricity can be generated during peak periods. Other energy sources like hydro, biogas etc. are negligible.



The *Integrated Resource Plan 2010-2030 for Electricity*, which determines the needed capacity and share of technologies in the future proposes the following capacity additions until 2030: [11]

Table 6. Summary of capacity additions 2010-2030

	Total Capacity		**Capacity added (including committed) from 2010 to 2030**		**New (uncommitted) capacity options from 2010 to 2030**	
	MW	**%**	**MW**	**%**	**MW**	**%**
Coal	41,071	45.9	16,383	29.0	6,250	14.7
OCGT	7,330	8.2	4,930	8.7	3,910	9.2
CCGT	2,370	2.6	2,370	4.2	2,370	5.6
Pumped Storage	2,912	3.3	1,332	2.4	0	0.0
Nuclear	11,400	12.7	9,600	17.0	9,600	22.6
Hydro	4,759	5.3	2,659	4.7	2,609	6.1
Wind	9,200	10.3	9,200	16.3	8,400	19.7
CSP	1,200	1.3	1,200	2.1	1,000	2.4
PV	8,400	9.4	8,400	14.9	8,400	19.7
Other	890	1.0	465	0.8	0	0.0
Total	**89,532**		**56,539**		**42,539**	

The current installed capacity of 47,463 MW is therefore expected to double up to 89,532 MW by the year 2030 in order to meet the estimated rising electricity demand in the country, which is expected to have a peak demand of 80,272 MW by then. Apart from the domestic generation, the Integrated Resource Plan 2010-2030 for Electricity forecasts increasing imports of electricity generated from hydro power plants located in Zambia and Mozambique from 2022 on towards. However, the Integrated Resource Plan for Electricity also mentions that in order to reach this objective cross-border negotiations and an upgrade in transnational transmission infrastructure would be necessary. Additional risks regarding imports are delays from hydro power plants in the construction of the power plants and long-lasting droughts.

The Integrated Resource Plan for Electricity also forecasts the continuation of the current power shortage until the year 2016 when newly installed power plants in line with Integrated Resource Plan 2010-2030

[11] Department of Energy (2011), Electricity Regulations on the Integrated Resource Plan 2010-2030, http://www.info.gov.za/view/DownloadFileAction?id=146082, accessed on 30.12.2011

for Electricity will start operation. By year 2012 a supply shortfall of 9 TWh is estimated meanwhile for the year 2013 the shortfall is expected to be only 3 TWh.

<u>Transmission and Distribution</u>

Eskom operates the integrated national high-voltage transmission system and supplies electricity directly to large consumers such as mines and other large industries, to commercial farmers and also, through the Integrated National Electrification Programme (INEP), to a large number of residential consumers. Eskom provides electricity directly to about 45% of all end-users in South Africa. The other 55% of end-users have their electricity distributed by redistributors (including municipalities).[12] Eskom sells in bulk to certain municipalities, which distribute to the consumers within their boundaries. Those municipalities, own the distribution lines in their areas, and some also own their own generation power plants. There are also a few private entities that have the licence to distribute electricity as shown below: [13]

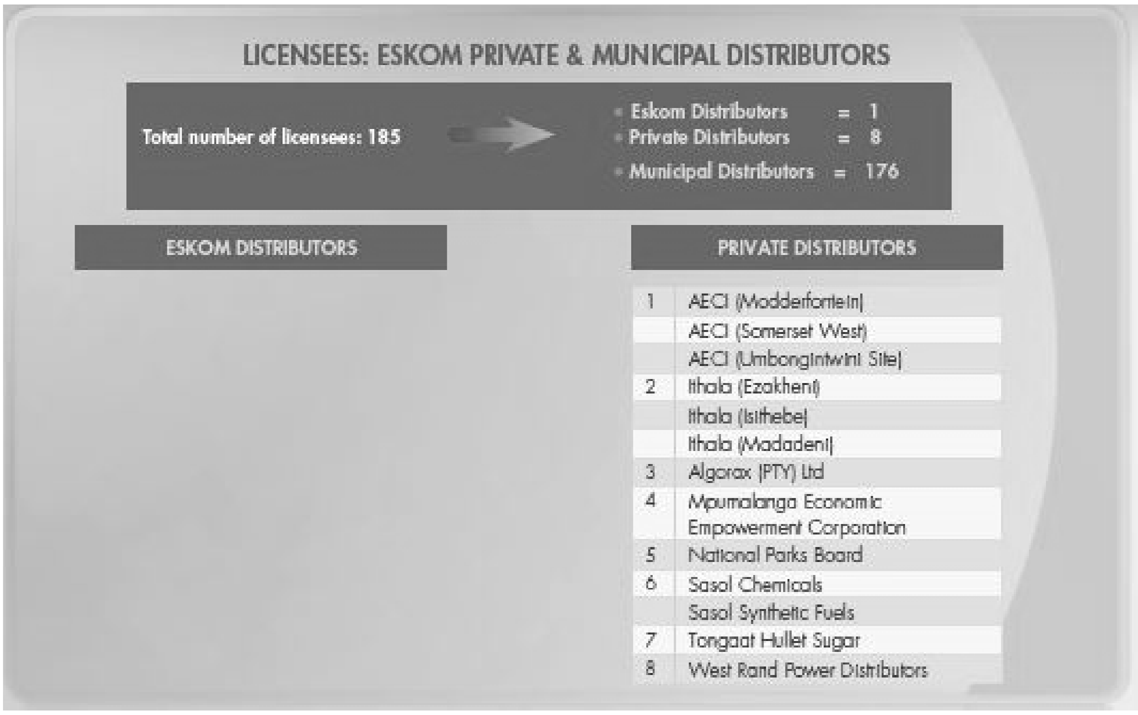


Figure 4. Distribution licenses

The government's policy on the Electricity Distribution Industry (EDI) requires the division to be separated from Eskom and merged with the electricity departments of municipalities to form a number of financially viable regional electricity distributors (REDs)[14]. An interim body, called EDI Holdings Company, was intended to oversee the transition period. This plan would have required Eskom to transfer its distribution assets and business to these entities. The restructuring proposal was formally revoked on 8 December 2010 by the government[15]. Therefore transmission lines are still owned and operated by Eskom.

[12] ESKOM (2011), Integrated Report 2011, http://financialresults.co.za/2011/eskom_ar2011/index.php, accessed on 30.12.2011

[13] NERSA (2006), 2006 Electricity Supply Statistics for South Africa, http://www.nersa.org.za/Admin/Document/Editor/file/News%20and%20Publications/Publications/Current%20Issues/Electricity%20Supply%20Statistics/Electricity%20supply%20statistics%202006.pdf , accessed on 30.12.2011

[14] Department of Energy, http://www.energy.gov.za/files/electricity_frame.html, accessed on 30.12.2011

[15] ESKOM (2011), Integrated Report 2011, http://financialresults.co.za/2011/eskom_ar2011/index.php, accessed on 30.12.2011

As for transmission of the electricity, to meet the forecasted additional generation capacity in the *Integrated Resource Plan*, the *"Transmission Ten-Year Development Plan 2012-2021"*[16] published by the Transmission Division of Eskom determines the required additional transmission capacity as follows:

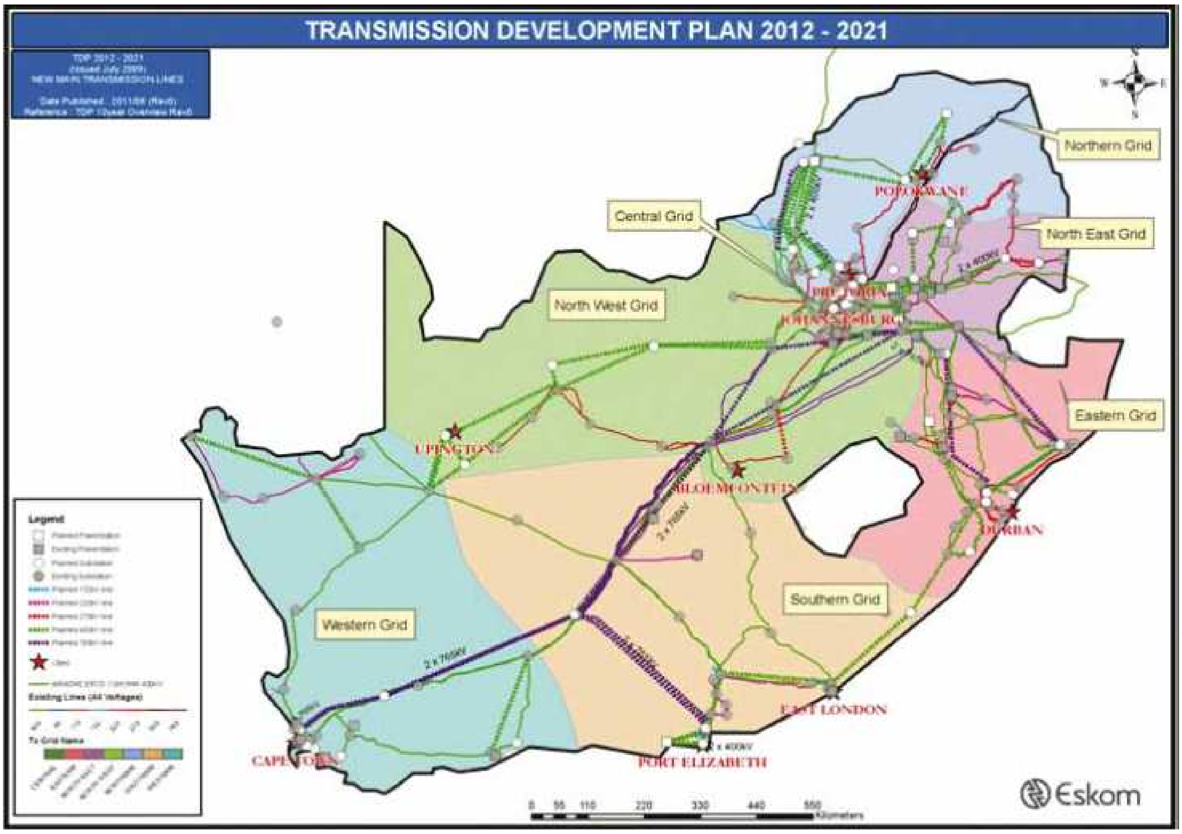


Figure 5. Transmission Development Plan 2012-2021

Significant lengths of new transmission lines are being added to the system: over 4,000 km of 765-kV and over 7,800 km of 400-kV lines have either been approved or proposed over the 10-year *Transmission Development Plan* period. This addition is mainly due to the major network reinforcements required for the supply to the Cape (South and West Grids) and KwaZulu-Natal (East Grid). The integration of the new Medupi Power Station in the developing Limpopo West Power Pool (Medupi is close to Matimba) also requires significant lengths of transmission lines as it is a long distance away from the main load centres. The large length of 400-kV transmission lines is also the result of the development of a more meshed transmission 400-kV network to provide greater reliability and thus improve the levels of network security.

The addition of over 73,000 MVA of transformer capacity to the transmission system is an indication of the increase in load demand and in the capacity requirements of the customers. This figure also includes the transformation capacity required to integrate renewable energy generation. Approximately 2,000 MVars of capacitive support are required to support areas of the network under contingency conditions to ensure that the required voltage levels are maintained. They also improve system efficiency by reducing network losses.

[16] Eskom (2011), Transmission Ten-Year Development Plan 2012-2021, http://www.eskom.co.za/content/TDP%20051011%20lowres.pdf, accessed on 30.12.2011

TDP New Assets	Total
HVDC Lines (km)	0
765kV Lines (km)	4,430
400kV Lines (km)	7,830
275kV Lines (km)	501
Transformers 250MVA+	119
Transformers <250MVA	25
Total installed MVA	73,985
Capacitors	19
Total installed MVAr	2,094
Reactors	55
Total installed MVAr	12,603

Figure 6. New grid assets 2022

B.5. Demonstration of eligibility for a generic CPA

	Topic	PoA eligibility criteria	Justification
1)	Geographical boundary (a)	The geographical boundary of the SSC-CPA including any time-induced boundary is consistent with the geographical boundary set in section A.5 of the PoA-DD.	The SSC-CPA's exact geographical location as shown in the detailed project documentation is within the geographical boundary set in section A.5 of the PoA-DD.
2)	Double counting (b)	The SSC-CPA has not yet been included in another Programme of Activities or has not yet been registered as a single CDM project activity.	A signed confirmation from the entity implementing the SSC-CPA, confirms that the project has not yet been included in another Programme of Activities or has not yet been registered as a single CDM project activity. Each SSC-CPA has a unique name, which at least refers to the location of the SSC-CPA and the installed capacity of the project.
3)	Technology (c)	The SSC-CPA involves the implementation of a grid-connected renewable energy technology including solar PV, solar thermal, wind and hydro. SSC-CPAs involving the use of renewable biomass, geothermal, and tidal/wave technologies for generating electricity are excluded from this Programme of Activities Thereby the proposed SSC-CPA is the installation of a new power	The feasibility study or other project documentation proves that the SSC-CPA involves the implementation of a technology eligible for inclusion in the PoA

		plant at a site where no renewable power plant was operated prior to the implementation of the project activity (greenfield plant) If the proposed SSC-CPA is a hydropower plant: • 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.	
4)	Start date (d)	The start of the SSC-CPA occurs after the start date of the validation of the PoA (date of the start of GSC).	The contract with the party providing equipment/construction/operation services indicates that the start date of the SSC-CPA occurs after the start date of the PoA.
5)	Applicability of methodology (e)	The SSC-CPA meets all the applicability criteria of version 17 of AMS I.D *Grid connected renewable electricity generation* as per section B.2, part II of the PoA-DD.	Detailed assessment that the project meets all the applicability criteria of version 17 of AMS I.D *Grid connected renewable electricity generation*
6)	Additionality (f)	The SSC-CPA meets the eligibility criteria pertaining to the demonstration of additionality as shown below	Additionality check carried out in section D.5 of the SSC-CPA-DD demonstrates that the project is additional.

7)	Stakeholder consultation and EIA (g)	(a) The SSC-CPA has carried out a local stakeholder consultation. (b) The SSC-CPA has carried out an Environmental Impact Assessment in line with host country laws and regulations	(a) The report of the meeting that includes summary of concerns raised and clarification provided thereof, attendance sheet, invitations and photographs shows that a local stakeholder consultation was carried out. (b) Environmental Impact Assessment report and license are provided by the SSC-CPA and show that the SSC-CPA has carried out and EIA.
8)	ODA (h)	The SSC-CPA has not received funding from Annex I parties that results in a diversion of official development assistance	Confirmation letter from SSC-CPA entity that the SSC-CPA has not received funding from Annex I parties or confirmation letter from Annex I party that funding to the SSC-CPA does not result in a diversion of official development assistance
9)	Target group (g)	The SSC-CPA supplies electricity to a national or regional grid; or supplies electricity to an identified consumer facility via national/regional grid through a contractual arrangement such as wheeling.	Power Purchase Agreement, wheeling contract or any other project documentation proving that the SSC-CPA supplies electricity to a national or regional grid; or supplies electricity to an identified consumer facility via national/regional grid through a contractual arrangement such as wheeling.
10)	Installed capacity limits (k)	The installed capacity of the SSC-CPA is smaller than or equal to 15 MW. However, if a project activity is applying the additionality Option A for microscale project activities, the installed capacity of the SSC-CPA will be smaller than or equal to 5 MW.	The feasibility, engineering design or other relevant study reports show that the project meets the small scale or the microscale project threshold.
11)	Debundling (l)	The SSC-CPA is not a debundled component of a large-scale project activity in accordance with the latest approved version of the *Guidelines on assessment of debundling for SSC project activities* (version 03).	Debundling check carried out in line with the latest approved version of the *Guidelines on assessment of debundling for SSC project activities version 03* shows that the project is not a debundled component of a large-scale project activity

ADDITIONALITY-RELATED ELIGIBILITY CRITERIA

Option A: Microscale additionality	
Criteria	*Justification*
Installed capacity of the SSC-CPA is smaller than or equal to 5MW and,	The installed capacity is [insert] MW as evidenced in the feasibility study report/environmental impact

	assessment.
The geographic location of the project activity is in one of the least developed countries or the small island developing States (LDCs/SIDS) or in a special underdeveloped zone of the host country identified by the government before 28 May 2010; or The project activity employs specific renewable energy technologies/measures recommended by the host country designated national authority (DNA) and approved by the Board to be additional in the host country.	The CPA is located in [district] that is a special underdeveloped zone in South Africa. or The CPA employs [technology] which is a recommended technology by the South African DNA.

Option B.1 Investment Barrier	
Criteria	*Justification*
Without the CDM revenue, the SSC-CPA has a less favourable Project or Equity IRR than the benchmark and,	The CPA is not financially without the revenues from the CERs as demonstrated by the benchmark analysis carried out following the guidelines in the *Tool for the demonstration and assessment of additionality* (version 6.0.0)
Sensitivity analysis shows whether the conclusion regarding the financial/economic attractiveness is robust to reasonable variations in the critical assumptions.	The CPA is not financially viable after applying the sensitivity analysis.

Option B.2 Access-to-capital Barrier	
Criteria	*Justification*
The SSC-CPA is not implemented by a subsidiary of a multinational group and,	The CPA is not a subsidiary of a multinational group
Investment is done by a company that also purchases the CERs	Investment in the project activity is done by a company that purchases the CERs

Option B.3 Barrier due to prevailing practice	
Criteria	*Justification*
The project is not common practice as demonstrated by the stepwise approach in the *Guidelines on common practice*	The project is not common practice as demonstrated by the stepwise approach in the *Guidelines on common practice*

Option C: First-of-its-Kind additionality	
Criteria	*Justification*
The project is the first in the applicable geographical area that applies a technology that is different from any other technologies able to deliver the same output and that have started commercial operation in the applicable geographical area before the start date of the project and,	The CPA is categorized as First-of-its-kind as per *Guidelines on additionality of first-of-its-kind project activities* (version 01)
Project participant selected a crediting period for	The crediting period of the SSC-CPA is 10 years

the project activity that is "a maximum of 10 years with no option of renewal"	without option for removal.

Option D: Automatic additionality	
Criteria	*Justification*
The project activity uses a technology which is on the positive list of grid-connected renewable electricity generation technologies as specified in the latest version of Attachment A of Appendix B	The project activity uses [technology] with is a technology on the positive list of grid-connected renewable electricity generation technologies.

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

The PoA will focus on grid-connected renewable electricity generation from solar photovoltaic, solar thermal, hydro or wind. The PoA will include project activities that install a new power plant at a site where there was no renewable energy power plant operating prior to the implementation of the project activity (greenfield plant).

The emission factor of the grid is calculated in a transparent and conservative manner using the combined margin (CM) consisting of the operating margin (OM) and build margin (BM) according to the procedures prescribed in the *Tool to calculate the emission factor for an electricity system* (version 02.2.1).

Baseline Emissions

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

The baseline emissions (BE_y) are calculated using **equation (1)** of AMS I.D version 17:

$$BE_y = EG_{BL,y} * EF_{CO2,grid,y}$$

Where:

BE_y	=	Baseline Emissions in year *y* (tCO2)
$EG_{BL,y}$	=	Quantity of net electricity supplied to the grid as a result of the implementation of the CDM project activity in year *y* (MWh)
$EF_{CO2grid,y}$	=	CO2 emission factor of the grid in year *y* (tCO2/MWh)

Calculation of $EF_{CO2,grid,y}$

The emission factor will be calculated in a transparent and conservative manner using option (a), the combined margin (CM), consisting of the combination of operating margin (OM) and build margin (BM) according to the procedures prescribed in the *Tool to calculate the emission factor for an electricity system*.

The grid emission factor will be calculated for the South African electricity system and will be updated after every seven years of the PoA. Equations and fixed parameter values to calculate the grid emission factor for South Africa are provided below.

Step 1. Identify the relevant electric power system

For calculating the grid emission factor, the project activity has identified the South African national grid as the relevant project electricity system.

The identification of the South African national grid as the relevant project electricity system is based on the following arguments:

- The South African DNA has not published a delineation of the project electricity system and connected electricity system.
- There is no proof of the existence of significant transmission constraints by means of the application criteria, therefore the application criteria does not result in a clear grid boundary.
- Finally, South Africa does not have a layered dispatch system and the country has only one grid system that serves the entire country. Therefore, and in line with version 02.2.1 of the *Tool to calculate the emission factor for an electricity system*, the national grid definition is used by default.

Step 2. Choose whether to include off-grid power plants in the project electricity system (optional)
The project activity has selected Option I, only grid power plants were included in the calculation.

Step 3. Select a method to determine the operating margin (OM)
The *Tool to calculate the emission factor for an electricity system* provides for the following methods to determine the operating margin (OM):

a) Simple OM
b) Simple adjusted OM
c) Dispatch data analysis OM
d) Average OM

In South Africa, low-cost/must-run resources constitute more than 50% of total grid generation. Apart from hydro, wind, and nuclear power plants, most coal-fired power plants have to be considered as low-cost/must-run as:

- Coal used in South African power plants is a cheap resource compared to other technologies e.g. natural gas/kerosene because South Africa is the 6th largest producer of coal in the world with one of the lowest coal prices in the world.[17]
- Coal power plants in South Africa have an average capacity factor higher than 75%. In line with international common practice, power plants with a capacity factor higher than 75% are considered as base-load power plants, which are usually dispatched independently of the daily or seasonal load. Furthermore, Eskom Holdings Annual Report 2011 defines most of the coal power plants as base load plants.

Because low-cost/must-run resources constitute more than 50% of the total grid generation, the simple OM method cannot be used. Therefore, the project activity has selected the average OM method for calculating the operating margin.

In terms of data vintage, the project will use the *ex ante* option, and the emission factor is determined once at the validation stage based on a 3-year generation weighted average based on the most recent data available at the time of submission of the CDM-PoA-DD to the DOE for validation.

Step 4: Calculate the operating margin emission factor according to the selected method
The average OM emission factor ($EF_{grid,OM\text{-}ave,y}$), is calculated as the average emission rate of all power plants serving the grid, using the methodological guidance as described under (a) for the simple OM, but also including the low-cost/must-run power plants in all equations.

[17] The future of South African coal; Market Investment and Policy changes –Anton Eberhard

The average OM emission factor is calculated using equation 1

$$EF_{grid,OM-ave,y} = \frac{\sum_m EG_{m,y} \times EF_{EL,m,y}}{\sum_m EG_{m,y}}$$

Where:

$EF_{grid,OM-ave,y}$ = Average operating margin CO2 emission factor in year y (tCO2/MWh)

$EG_{m,y}$ = Net quantity of electricity generated and delivered to the grid by power unit m in year y (MWh)

$EF_{EL,m,y}$ = CO2 emission factor of power unit m in year y (tCO2/MWh)

m = All grid power units serving the grid in year y

y = The relevant year as per the data vintage chosen in Step 3

Determination of $EG_{m,y}$

For grid power plants, $EG_{m,y}$ is based on published records from Eskom and CDM monitoring reports for the CDM power plants. The grid emission factor calculations are based on the publicly available data in South Africa, i.e. Eskom power plants and CDM projects. This represents 95% of the total electricity generated. Electricity generated from Independent Power Producers and Municipality owned power plants is not available, therefore it could not be included in this calculation. However it only represents less than 5% of the total electricity generated.

		Generation Data (*MWh*)		
Name	**Type**	**2008-2009**	**2009-2010**	**2010-2011**
Amot	Coal	11,987,281	13,227,864	12,194,878
Camden	Coal	6,509,079	7,472,070	7,490,836
Duvha	Coal	21,769,489	22,581,228	20,267,508
Grootvlei	Coal	1,249,556	2,656,230	3,546,952
Hendrina	Coal	12,296,687	12,143,292	11,938,206
Kendal	Coal	23,841,401	23,307,031	25,648,258
Komati	Coal	-	1,016,023	2,060,141
Kriel	Coal	18,156,686	15,906,816	18,204,910
Lethabo	Coal	23,580,232	25,522,698	25,500,366
Majuba	Coal	22,676,924	22,340,081	24,632,585
Matimba	Coal	26,256,068	27,964,141	28,163,040
Matla	Coal	21,863,400	21,954,536	21,504,422
Tutuka	Coal	21,504,122	19,847,894	19,067,501
Acacia	Gas (Jet kerosene)	-	971.00	992.00
Port Rex	Gas (Jet kerosene)	-	322.00	5,507.00
Ankerlig	Gas/Diesel Oil	-	6,303.00	-
Gourikwa	Gas/Diesel Oil	-	5,817.00	-
Gariep	Hydropower	-	-	-

Vanderkloof	Hydropower	-	-	-
Colleywobbles	Hydropower	-	-	-
First Falls	Hydropower	-	-	-
Second Falls	Hydropower	-	-	-
Ncora	Hydropower	-	-	-
Koeberg	Nuclear	13,004,000	12,806,000	12,099,000
Klipheuwel	Wind	2,000	1,000	2,000
PetroSA biogas to energy	CDM	23,286	23,286	23,286
Bethlehem Hydroelectric project	CDM	8,983	8,983	8,983
Durban Landfill-gas-to-electricity project – Mariannhill and La Mercy Landfills	CDM	3,744	3,744	3,744
Durban landfill gas Bisasar Road project	CDM	31,723	31,723	31,723
Total		**224,764,661**	**228,828,053**	**232,394,838**

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

Because data on fuel consumption and electricity generation of the grid-connected units is available, Option A1 is used to determine the emission factors of the grid power units. However, for Acacia, Port Rex, Ankerlig, Gourikwa only data on electricity generation and fuel type is available for the year 2009-2010, thus Option A2 is used instead for those.

Option A1:

$$EF_{EL,m,y} = \frac{\sum_i FC_{i,m,y} \times NCV_{i,y} \times EF_{CO2,i,y}}{EG_{m,y}}$$

Where:

$EF_{EL,m,y}$	=	CO2 emission factor of power unit *m* in year *y* (tCO2/MWh)
$FC_{i,m,y}$	=	Amount of fossil fuel type *i* consumed by power unit *m* in year *y* (Mass or volume unit)
$NCV_{i,y}$	=	Net calorific value (energy content) of fossil fuel type *i* in year *y* (GJ/mass or volume unit)
$EF_{CO2,i,y}$	=	CO2 emission factor of fossil fuel type *i* in year *y* (tCO2/GJ)
$EG_{m,y}$	=	Net quantity of electricity generated and delivered to the grid by power unit *m* in year *y* (MWh)
m	=	All grid power units serving the grid in year *y*
i	=	All fossil fuel types combusted in power unit *m* in year *y*

y = The relevant year as per the data vintage chosen in Step 3

Option A2:

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

Where:

$EF_{EL,m,y}$ = CO2 emission factor of power unit *m* in year *y* (tCO2/MWh)

$EF_{CO2,m,i,y}$ = Average CO2 emission factor of fossil fuel type *i* in power unit *m* in year *y* (tCO2/GJ)

$\eta_{m,y}$ = Average net energy conversion efficiency in power unit *m* in year *y* (ratio)

m = All grid power units serving the grid in year *y*

i = All fossil fuel types combusted in power unit *m* in year *y*

y = The relevant year as per the data vintage chosen in Step 3

The following table summarize the published data on fuel consumption from the power plants:

		$FC_{i,m,y}$ (*kg/year*)		
Name	**Type**	**2008-2009**	**2009-2010**	**2010-2011**
Amot	Coal	6,395,805,000	6,794,134,000	6,525,670,000
Camden	Coal	3,876,211,000	4,732,163,000	4,629,763,000
Duvha	Coal	11,393,553,000	11,744,606,000	10,639,393,000
Grootvlei	Coal	674,538,000	1,637,371,000	2,132,979,000
Hendrina	Coal	7,122,918,000	6,905,917,000	7,139,198,000
Kendal	Coal	15,356,595,000	13,866,514,000	15,174,501,000
Komati	Coal	0	664,497,000	1,271,010,000
Kriel	Coal	9,420,764,000	8,504,715,000	9,527,185,000
Lethabo	Coal	16,715,323,000	18,170,227,000	17,774,699,000
Majuba	Coal	12,554,406,000	12,261,833,000	13,020,512,000
Matimba	Coal	13,991,453,000	14,637,481,000	14,596,842,000
Matla	Coal	12,689,387,000	12,438,391,000	12,155,421,000
Tutuka	Coal	11,231,583,000	10,602,839,000	10,191,709,000
Acacia	Gas (Jet kerosene)	0	0	347,066.46
Port Rex	Gas (Jet kerosene)	0	0	219,913.98
Ankerlig	Gas/Diesel Oil	0	0	0
Gourikwa	Gas/Diesel Oil	0	0	0

For the Acacia and Port Rex, power stations, data on fuel consumption published was in litre units. In order to convert these values to kg/ year, the density of the fuel in kg/l as shown below multiplied the values as indicated below:

Plant Name	Fuel *(litres/year)*			Density *(kg/l)*	Fuel *(kg/year)*		
	2008-2009	***2009-2010***	***2010-2011***		***2008-2009***	***2009-2010***	***2010-2011***
Acacia	0	0	444,957	0.78	0	0	347,066.46
Port Rex	0	0	281,941	0.78	0	0	219,913.98
Ankerlig	0	0	0	0.82	0	0	0
Gourikwa	0	0	0	0.82	0	0	0

For the calculation of the individual power plants emission factors, the following net calorific values and average emission factors for the fuels have been considered:

Type	***NCV (GJ/kg)***	$EF_{co2,i,y}$ ***(tCO2/GJ)***
Coal (Other bituminous coal)	0.0199	0.0895
Gas (Jet kerosene)	0.042	0.0697
Gas/Diesel Oil	0.0414	0.0726

Finally, for Option A2 power plants for year 2009-2010, the following data is used:

	$EF_{CO2,m,i,y}$	$\eta_{m,y}$	$EF_{el,m,y}$
Acacia	0.0697	39.5%	0.64
Port Rex	0.0697	39.5%	0.64
Ankerlig	0.0726	39.5%	0.66
Gourikwa	0.0726	39.5%	0.66

The default value for open cycle gas turbines that began generation after the year 2000 in Annex 1 in the *Tool to calculate the emission factor for an electricity system* has been used for the four power stations.

Step 5: Calculate the build margin (BM) emission factor

For the calculation of the build margin (BM) emission factor, Option 1 data vintage has been chosen. Hence, for the first crediting period, the build margin emission factor will be calculated *ex ante* based on the most recent information available on units already built for sample group *m* at the time of CDM-PoA-DD submission to the DOE for validation. For the second crediting period, the build margin emission factor will be updated based on the most recent information available on units already built at the time of submission of the request for renewal of the crediting period to the DOE. For the third crediting period, the build margin emission factor calculated for the second crediting period will be used.

The build margin emission factor is thus calculated using **equation 12** of the *Tool to calculate the emission factor for an electricity system*, as shown below:

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

Where:

$EF_{,grid,BM,y}$ = Build margin CO2 emission factor in year *y* (tCO2/MWh)

$EG_{m,y}$ = Net quantity of electricity generated and delivered to the grid by power unit *m* in year *y* (MWh)

$EF_{EL,m,y}$ = CO2 emission factor of power unit *m* in year *y* (tCO2/MWh)

m = Power units included in the build margin

y = Most recent historical year for which power generation data is available

The table below provides an overview of the power plants connected to the South African electricity system.

Number	Project Name	Type	Commissioning Date
1	Bethlehem hydroelectric project	Hydro	11/11/09
2	Durban landfill gas Bisasar Road project	Land Fill Project	3/1/08
3	PetroSA biogas to energy	Waste water	1/10/08
4	Gourikwa	Gas fuel	3/30/07
5	Ankerlig	Gas fuel	3/29/07
6	Durban Landfill-gas-to-electricity project – Mariannhill and La Mercy Landfills	Land Fill Project	1/7/06
7	Klipheuwel	Wind	Aug-02
8	Majuba	Coal	4/1/96
9	Kendal	Coal	10/1/88
10	Palmiet	Pumped storage	4/18/88
11	Matimba	Coal	12/4/87
12	Lethabo	Coal	12/22/85
13	Tutuka	Coal	6/1/85
14	Colleywobbles	Hydropower	1/1/85
15	Koeberg	Nuclear	7/21/84
16	Ncora	Hydropower	3/1/83
17	Drakensberg	Pumped storage	6/17/81
18	Duvha	Coal	1/18/80
19	Matla	Coal	9/29/79
20	Second Falls	Hydropower	4/1/79
21	First Falls	Hydropower	2/1/79
22	Vanderkloof	Hydropower	1/1/77
23	Port Rex	Gas fuel	9/30/76
24	Acacia	Gas fuel	5/13/76
25	Kriel	Coal	5/6/76

26	Amot	Coal	9/21/71
27	Gariep	Hydropower	9/8/71
28	Hendrina	Coal	5/12/70
29	Grootvlei	Coal	6/30/69
30	Camden	Coal	12/21/66
31	Komati	Coal	11/6/61

In order to identify the power units *m* included in the build margin and in accordance with the *Tool to calculate the grid emission factor for an electricity system*, $SET_{5\text{-units}}$ and $SET_{\geq 20\%}$ were identified. Both $SET_{5\text{-units}}$ and $SET_{\geq 20\%}$ comprise the same power plants, thus both are SET_{sample}.

	Name	**Technology**	**Year of Commissioning**	**Cumulative %**	***EGm,y (MWh/y)***
1	Gourikwa	Gas fuel	3/30/07	0%	0
2	Ankerlig	Gas fuel	3/29/07	0%	0
3	Klipheuwel	Wind	8/1/02	0%	2,000
4	Majuba	Coal	4/1/96	11%	24,632,585
5	Kendal	Coal	10/1/88	22%	25,648,258
	Total				**50,282,843**

As some of the power plants in the SET_{sample}, Majuba and Kendal, started to supply electricity to the grid more than 10 years ago, step (d) was considered and $SET_{sample\text{-}CDM}$ was calculated.

	Name	**Technology**	**Year of Commissioning**	**Cumulative %**	***EGm,y (MWh/y)***
1	Gourikwa	Gas fuel	3/30/07	0.000%	0.00
2	Ankerlig	Gas fuel	3/29/07	0.000%	0.00
3	Klipheuwel	Wind	8/1/02	0.001%	2,000
CDM	Bethlehem hydroelectric project	Hydro	11/11/09	0.005%	8,983
CDM	Durban landfill gas Bisasar Road project	Land Fill Project	3/1/08	0.018%	31,723
CDM	PetroSA biogas to energy	Waste water	1/10/08	0.028%	23,286
CDM	Durban Landfill-gas-to-electricity project – Mariannhill and La Mercy Landfills	Land Fill Project	1/7/06	0.030%	3,744
	Total	***AEG $SET_{sample\text{-}CDM}$***			***69,736***

AEG $SET_{sample\text{-}CDM}$ was around 0.03%, much lower than 20% required by the *Tool to calculate the emission factor for an electricity system*. Therefore, step (e) was considered and power units that started to supply electricity to the grid more than 10 years ago were added until the electricity generation of the new set comprised 20% of the annual electricity generation. The final set of power plants included in the calculation of the Build Margin ($SET_{sample\text{-}CDM>10years}$) was as follows:

Number	**Name**	**Technology**	**Year of Commissioning**	**Cumulative %**	***EGm,y (MWh/y)***
1	Gourikwa	Gas fuel	3/30/07	0.0%	-
2	Ankerlig	Gas fuel	3/29/07	0.0%	-
3	Klipheuwel	Wind	8/1/02	0.0%	2,000.00
	Bethlehem hydroelectric project	Hydro	11/11/09	0.0%	8,983.13
	Durban landfill gas Bisasar Road project	Land Fill Project	3/1/08	0.0%	31,723.20
	PetroSA biogas to energy	Waste water	1/10/08	0.0%	23,285.54
	Durban Landfill-gas-to-electricity project – Mariannhill and La Mercy Landfills	Land Fill Project	1/7/06	0.0%	3,744.00
4	Majuba	Coal	4/1/96	10.6%	24,632,585
5	Kendal	Coal	10/1/88	21.7%	25,648,258
	Total	***AEG*** $_{SETsample-CDM>10years}$			***50,350,579***

The CO_2 emission factor of each power unit *m* ($EF_{EL,m,y}$) is determined as per the guidance in step 4 (a) for the simple OM, using **equation (2)** under option A1 and using for *y* the most recent historical year for which grid power generation data is available, in this case 2010-2011, and using for *m* the power *units* included in the build margin.

$$EF_{EL,m,y} = \frac{\sum_i FC_{i,m,y} \times NCV_{i,y} \times EF_{CO2,i,y}}{EG_{m,y}}$$

Where:

$EF_{EL,m,y}$	=	CO2 emission factor of power unit *m* in year *y* (tCO2/MWh)
$FC_{i,m,y}$	=	Amount of fossil fuel type *i* consumed by power unit *m* in year *y* (Mass or volume unit)
$NCV_{i,y}$	=	Net calorific value (energy content) of fossil fuel type *i* in year *y* (GJ/mass or volume unit)
$EF_{CO2,i,y}$	=	CO2 emission factor of fossil fuel type *i* in year *y* (tCO2/GJ)
$EG_{m,y}$	=	Net quantity of electricity generated and delivered to the grid by power unit *m* in year *y* (MWh)
m	=	The power *units* included in the build margin
i	=	All fossil fuel types combusted in power unit m in year y
y	=	The relevant year as per the data vintage chosen in Step 3

Name	*Technology*	$EF_{el,m,y}$ *(tCO2/MWh)*	$EG_{m,y}$ *(MWh/y)*
Gourikwa	Gas/Diesel Oil	-	-
Ankerlig	Gas/Diesel Oil	-	-
Klipheuwel	Wind	-	2,000
Bethlehem hydroelectric project	Hydro	0	8,983
Durban landfill gas Bisasar Road project	Land fill	0	31,723
PetroSA biogas to energy	Waste water	0	23,286
Durban Landfill-gas-to-electricity project – Mariannhill and La Mercy Landfills	Land fill	0	3,744
Majuba	Coal	0.94	24,632,585
Kendal	Coal	1.05	25,648,258

Step 6: Calculate the Combined Margin
Option A i.e. the weighted average combined margin is used.

The combined margin emissions factor is calculated as follows:

$$EF_{grid,CM,y} = EF_{grid,OM,y} \times w_{OM} + EF_{grid,BM,y} \times w_{BM}$$

Where:

$EF_{,grid,BM,y}$ = Build margin CO2 emission factor in year *y* (tCO2/MWh)

$EF_{grid,CM,y}$ = Operating margin CO2 emission factor in year (tCO2/MWh)

w_{OM} = Weighting of operating margin emissions factor (%)

w_{BM} = Weighting of build margin emissions factor (%)

The following default values are used for w_{OM} and w_{BM} :

- Wind and solar power generation project activities: w_{OM} = 0.75 and w_{BM} = 0.25 (owing to their intermittent and non-dispatchable nature) for the first crediting period and subsequent crediting periods;
- All hydro projects: w_{OM} = 0.5 and w_{BM} = 0.5 for the first crediting period and w_{OM} = 0.25 and w_{BM} = 0.75 for the second and third crediting period, unless otherwise specified in the approved methodology which refers to this tool.

$$EF_{grid,CM,y} = EF_{CO2,grid,y}$$

Project emissions

For most renewable energy project activities PE_y = 0. However, as per the provisions in AMS I.D (version 17), project emissions will be considered for certain project activities following the procedures described in ACM0002 (version 13.0.0). In those cases, project emissions shall be calculated using **equation (1)** in ACM0002 (version 13.0.0):

$$PE_y = PE_{FF,y} + PE_{GP,y} + PE_{HP,y}$$

Where:

PE_y	=	Project emissions in year *y* (tCO2e/yr)
$PE_{FF,y}$	=	Project emissions from fossil fuel consumption in year *y* (tCO2/yr)
$PE_{GP,y}$	=	Project emissions from the operation of geothermal power plants due to the release of non-condensable gases in year *y* (tCO2e/yr)
$PE_{HP,y}$	=	Project emissions from water reservoirs of hydro power plants in year *y* (tCO2e/yr)

<u>Project Emissions from Fossil Fuel Combustion ($PE_{FF,y}$)</u>

For solar thermal projects that also use fossil fuels for electricity generation, CO_2 emissions from the combustion of fossil fuels shall be accounted for as project emissions ($PE_{FF,y}$). The use of fossil fuels for the back up or emergency purposes (e.g. diesel generator) can be neglected.

$PE_{FF,y}$ shall be calculated as per the latest version of the *Tool to calculate project or leakage CO2 emissions from fossil fuel combustion* (version 02).

CO_2 emissions from fossil fuel combustion in process *j* are calculated based on the quantity of fuels combusted and the CO_2 emission coefficient of those fuels, using **(equation 1)** of the *Tool to calculate project or leakage CO2 emissions from fossil fuel combustion*:

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

Where:

$PE_{FC,j,y}$	=	Are the CO_2 emissions from fossil fuel combustion in process j during the year *y* (tCO_2/yr);
$FC_{i,j,y}$	=	Is the quantity of fuel type *i* combusted in process *j* during he year y (mass or volume unit/yr);
$COEF_{i,j,y}$	=	Is the CO2 emission coefficient of fuel type *i* in process *j* in year *y* (tCO2/mass or volume unit)
i	=	Are the fuel types combusted in process *j* during the year *y*

The CO_2 emission coefficient $COEF_{i,j,y}$ will be calculated using Option B **(equation 4)** in the *Tool to calculate project or leakage CO2 emissions from fossil fuel combustion.* Under Option B, the CO_2 emission coefficient $COEF_{i,j,y}$ is calculated based on the net calorific value and CO_2 emission factor of the fuel type *i*, as follows:

$$COEF_{i,j,y} = NCV_{i,j,y} \times EF_{CO2,i,j,y}$$

Where:

$NCV_{i,j,y}$	=	Is the weighted average net calorific value of the fuel type *i* in process *j* in year *y* (GJ/mass or volume unit)
$EF_{CO2,i,j,y}$	=	Is the weighted average CO_2 emission factor of fuel type *i* in process *j* in year *y*

(tCO_2/GJ)

i = Are the fuel types combusted in process j during the year y

Emissions of non-condensable gases from the operation of geothermal power plants ($PE_{GP,y}$)

This PoA does not involve geothermal power plants SSC-CPAs, therefore there are no emissions of non-condensable gases from the operation of geothermal power plants.

Emissions from water reservoirs of hydro power plants ($PE_{HP,y}$)

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

(a) If the power density of the single or multiple reservoirs (*PD*) is greater than 4 W/m^2 and less than or equal to 10 W/m^2, **equation 3** in ACM0002 (version 13.0.0) will be used to calculate $PE_{HP,y}$:

$$PE_{HP,y} = (EF_{Res} * TEG_y) / 1000$$

Where:

$PE_{HP,y}$	=	Project emissions from reservoirs of hydro power plants in year y (tCO2e/yr)
EF_{Res}	=	Default emission factor for emissions from reservoirs of hydro power plants in year y (kgCO2e/MWh)
TEG_y	=	Total electricity produced by the project activity, including the electricity supplied to the grid and the electricity supplied to internal loads, in year y (MWh)

According to the methodology, the default value for EF_{Res} is used, 90 kgCO_2e/MWh.

b) If the power density of the project activity (*PD*) is greater than 10 W/m^2 **equation 4** will be used:

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

The power density of the project activity (*PD*) will be calculated using **(equation 5)** in ACM0002 version 13.0.0, as follows:

$$PD = (Cap_{PJ} - Cap_{BL}) / (A_{PJ} - A_{BL})$$

Where:

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

implementation of the project activity, when the reservoir is full (m^2). For new reservoirs, this value is zero

Leakage emissions

CPAs included in the PoA will not use energy generating equipment that is transferred from another activity. Therefore, leakage emissions are not considered.

Emission reductions

In line with the used methodology AMS-I.D. (version 17) the emission reduction are calculated using **equation 10** in AMS-I.D (version 17), as follows:

$$ER_y = BE_y - PE_y - LE_y$$

Where:

ER_y	=	Emission reductions in year *y* (tCO2/y)
BE_y	=	Baseline Emissions in year *y* (tCO2/y)
PE_y	=	Project emissions in year *y* (tCO2/y)
LE_y	=	Leakage emission in year *y* (tCO2/y)

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

SPECIFIC PARAMETERS FOR GRID EMISSION FACTOR CALCULATIONS

Data / Parameter	$\mathbf{NCV_{i,y}}$
Unit	GJ/kg
Description	Net calorific value (energy content) of fossil fuel type *i* in year *y*
Source of data	IPCC default values at the lower limit of the uncertainty at a 95% confidence interval as provided in table 1.2 of Chapter 1 of Vol. 2 (Energy) of the 2006 IPCC Guidelines on National GHG Inventories
Value(s) applied	see table below
Choice of data or Measurement methods and procedures	IPCC default values are used as there is no specific data from the fuel suppliers of the power plants and also not regional default values. Average OM: Calculated once for each crediting period during validation stage using the most recent three historical years for which data is available at the time of submission of the CDM-PDD to the DOE for validation (*ex ante* option) BM: For the first crediting period, once *ex ante*. For the second and third crediting period, only once *ex ante* at the start of the second crediting period
Purpose of data	Calculation of baseline emissions
Additional comment	Applicable only to grid emission factor calculations

Fuel Type	NCV (GJ/kg)
Coal (other bituminous coal)	0.0199
Gas/Jet kerosene	0.042
Gas/Diesel Oil	0.0414

Data / Parameter	$EF_{CO2,i,y}$ and $EF_{CO2,m,i,y}$
Unit	tCO2/GJ
Description	CO_2 emission factor of fossil fuel type *i* in year *y*
Source of data	IPCC default values at the lower limit of the uncertainty at a 95% confidence interval as provided in table 1.4 of Chapter 1 of Vol. 2 (Energy) of the 2006 IPCC Guidelines on National GHG Inventories
Value(s) applied	Fuel Type: EFCO2 (tCO2/GJ) Coal (other bituminous coal): 0.0895 Gas/Jet kerosene: 0.0697 Gas/Diesel Oil: 0.0726
Choice of data or Measurement methods and procedures	IPCC default values are used as there is no specific data from the fuel suppliers of the power plants and also not regional default values. Average OM: Calculated once for each crediting period during validation stage using the most recent three historical years for which data is available at the time of submission of the CDM-PDD to the DOE for validation (*ex ante* option) BM: For the first crediting period, once *ex ante* following the guidance included in Step 5. For the second and third crediting period, only once *ex ante* at the start of the second crediting period
Purpose of data	Calculation of baseline emissions
Additional comment	Applicable only to grid emission factor calculations

Fuel Type	EFCO2 (tCO2/GJ)
Coal (other bituminous coal)	0.0895
Gas/Jet kerosene	0.0697
Gas/Diesel Oil	0.0726

Data / Parameter	$\eta_{m,y}$
Unit	-
Description	Average net conversion efficiency of power unit *m* in year *y*
Source of data	Default value for open cycle gas turbines built after 2000 is used as per Annex 1 of the *Tool to calculate the emission factor for an electricity system.*
Value(s) applied	39.5%
Choice of data or Measurement methods and procedures	There is no data published on the efficiency of Eskom's gas power plants, therefore default values as provided in Annex 1 of the *Tool to calculate the emission factor for an electricity system* shall be used.
Purpose of data	Calculation of baseline emissions
Additional comment	-

Data / Parameter	$EG_{m,y}$
Unit	MWh
Description	Net electricity generated by power plant/unit *m*in year *y*
Source of data	Eskom published data and CDM Monitoring Reports for the CDM project activities
Value(s) applied	See appendix 4
Choice of data or Measurement methods and procedures	Data on electricity generation has been obtained from Eskom, the main utility company in South Africa and owner of the power plants. For the CDM power plants, that are not owned by Eskom, generation data had to be calculated from the CDM Monitoring Reports. Average OM: Calculated once for each crediting period using the most recent three historical years for which data is available at the time of submission of the CDM-PDD to the DOE for validation (*ex ante* option) BM: For the first crediting period, once *ex ante* following the guidance included in Step 5 of the *Tool to calculate the emission factor for an electricity system*. For the second and third crediting period, only once *ex ante* at the start of the second crediting period.
Purpose of data	Calculation of baseline emissions
Additional comment	-

Data / Parameter	$FC_{i,m,y}$
Unit	Kg/year
Description	Amount of fossil fuel type *i* consumed by power plant / unit *m* in year *y*
Source of data	Eskom published data, other utility and government records
Value(s) applied	See appendix 4
Choice of data or Measurement methods and procedures	Data on fuel consumption has been obtained from Eskom, the main utility company in South Africa and owner of the power plants. The values provided for the coal plants are in tonnes. These values were converted to kg by multiplying by 1000. The values provided for the gas turbines i.e. Acacia, Port Rex, Ankerling and Gourikwa are in litres. These were converted to kg units by multiplying by the fuel type density given in (kg/l). For jet gasoline, the density value used was 0.78 kg/l while 0.82 kg/l was used for diesel oil. Average OM: Calculated once for each crediting period using the most recent three historical years for which data is available at the time of submission of the CDM-PDD to the DOE for validation (*ex ante* option) BM: For the first crediting period, once *ex ante* For the second and third crediting period, only once *ex ante* at the start of the second crediting period
Purpose of data	Calculation of baseline emissions
Additional comment	-

SPECIFIC PARAMETERS FOR HYDRO PROJECT ACTIVITIES

Data / Parameter	**Cap_{BL}**
Unit	W
Description	Installed capacity of the hydro power plant before the implementation of the project activity (W). For new hydro power plants, this value is zero.
Source of data	Project site
Value(s) applied	To be reported in the specific CPA-DD
Choice of data or Measurement methods and procedures	Determine the installed capacity based on recognized standards
Purpose of data	Calculation of project emissions
Additional comment	Applicable to hydro power project activities with a power density of the project activity (*PD*) greater than 10 W/m2

Data / Parameter	**A_{BL}**
Unit	m^2
Description	Area of the single or multiple reservoirs measured in the surface of the water, before the implementation of the project activity, when the reservoir is full (m2). For new reservoirs, this value is zero
Source of data	Project activity site
Value(s) applied	To be reported in the specific CPA-DD
Choice of data or Measurement methods and procedures	Measured from topographical surveys, maps, satellite pictures, etc.
Purpose of data	Calculation of project emissions
Additional comment	Applicable to hydro power project activities with a power density of the project activity (*PD*) greater than 10 W/m2

B.6.3. Ex-ante calculations of emission reductions

Baseline Emissions

The baseline emissions are to be calculated as follows:

$$BE_y = EG_{BL,y} * EF_{CO2,grid,y}$$

Calculation of $EG_{BL,y}$

Parameter	**Value**	**Unit**	**Source**
$EG_{BL,y}$	[insert value]	[insert unit]	[insert source]

Calculation of $EF_{CO2,grid,y}$

The combined margin emission factor for the grid is calculated using the following equations:

$$EF_{CO2,grid,y} = EF_{grid,CM,y}$$

$$EF_{grid,CM,y} = EF_{grid,OM,y} \times w_{OM} + EF_{grid,BM,y} \times w_{BM}$$

Values to determine $EF_{grid,CM,y}$ for wind and solar SSC-CPAs:

Parameter	Value	Unit	Source
$EF_{grid,BM,y}$	1.00	tCO2/MWh	GEF calculations
W_{BM}	0.25		
$EF_{grid,OM-DD,y}$	0.96	tCO2/MWh	GEF calculations
W_{OM}	0.75		
$EF_{grid,CM,y}$	0.97	tCO2/MWh	

Values to determine $EF_{grid,CM,y}$ for hydro SSC-CPAs:

Parameter	Value	Unit	Source
$EF_{grid,BM,y}$	1.00	tCO2/MWh	GEF calculations
W_{BM}	0.5		
$EF_{grid,OM-DD,y}$	0.96	tCO2/MWh	GEF calculations
W_{OM}	0.5		
$EF_{grid,CM,y}$	0.98	tCO2/MWh	

Therefore:

$EF_{CO2,grid,y}$ = [Insert] tCO2/MWh

BE_y = [Insert] * [Insert] = [Insert] tCO2/year

Project emissions

These emissions shall be accounted for using the following equation from ACM0002 version 13.0.0:

$$PE_y = PE_{FF,y} + PE_{HP,y}$$

[*For CPAs applying solar thermal or hydro, include one of the following sections, if applicable*]

Project Emissions from Fossil Fuel Combustion ($PE_{FF,y}$)

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

The CO_2 emission coefficient $COEF_{i,j,y}$ as follows:

$$COEF_{i,j,y} = NCV_{i,j,y} \times EF_{CO2,i,j,y}$$

The table(s) provide(s) an overview of the parameter values used to calculate the project emissions from fossil fuel combustion:

Parameter	Value	Unit	Source
$NCV_{i,j,y}$	[insert value]	[insert unit]	[insert source]
$EF_{CO2,i,j,y}$	[insert value]	[insert unit]	[insert source]
$FC_{i,j,y}$	[insert value]	[insert unit]	[insert source]
$COEF_{i,j,y}$	[insert value]	[insert unit]	[insert source]

$PE_{FC,j,y}$	[insert value]	[insert unit]	[insert source]

Emissions from water reservoirs of hydro power plants ($PE_{HP,y}$)

For hydro power project activities that result in new single or multiple reservoirs and hydro power project activities that result in the increase of single or multiple existing reservoirs, project proponents shall account for CH_4 and CO_2 emissions from the reservoirs. The project emissions will depend on the power density of the single or multiple reservoirs.

The power density of the single or multiple reservoirs (*PD*) will be calculated using **equation (5)** in ACM0002 version 13.0.0, as follows:

$$PD = (Cap_{PJ} - Cap_{BL}) / (A_{PJ} - A_{BL})$$

The table(s) provide(s) an overview of the parameter values used to calculate the power density of the single or multiple reservoirs:

Parameter	Value	Unit	Source
Cap_{PJ}	[insert value]	[insert unit]	[insert source]
Cap_{BL}	[insert value]	[insert unit]	[insert source]
A_{PJ}	[insert value]	[insert unit]	[insert source]
A_{BL}	[insert value]	[insert unit]	[insert source]

The power density of the single or multiple reservoirs equals [insert value] W/m^2. Therefore, the following formula is used to calculate the project emissions:

[include one of the following two options]

(a) If the power density of the single or multiple reservoirs (*PD*) is greater than 4 W/m^2 and less than or equal to 10 W/m^2, **equation 3** in ACM0002 (version 13.0.0) will be used to calculate $PE_{HP,y}$:

$$PE_{HP,y} = (EF_{Res} * TEG_y) / 1000$$

The table(s) provide(s) an overview of the parameter values used to calculate the emissions from water reservoires of the single or multiple reservoirs:

Parameter	Value	Unit	Source
EF_{Res}	90	kgCO2e/MWh	Default value
TEG_y	[insert value]	[insert unit]	[insert source]
$PE_{HP,y}$	[insert value]	[insert unit]	[insert source]

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

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

Total Project Emission for the project activity equal:

PE_y = [insert value] + [insert value]

PE_y = [insert value]

Leakage emissions

The project activity does not use energy generating equipment that is transferred from another activity. Therefore, leakage emissions are not considered.

Emission reductions

$$ER_y = BE_y - PE_y - LE_y$$

Therefore, emission reductions equal:

[insert value of BE_y] – [insert value of PE_y] - 0 = [insert value of ER_y]

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

GENERAL PARAMETERS

Data / Parameter	$EG_{BL,y}$
Unit	MWh
Description	Quantity of net electricity supplied to the grid as a result of the implementation of the CDM project activity in year *y*
Source of data	Electricity meter(s)
Value(s) applied	To be reported in the specific CPA-DD
Measurement methods and procedures	The electricity supplied to the grid will be measured continuously (hourly measurement and at least monthly recording) by a main and back-up meter owned by ESKOM. The meter is installed at the point of connection with grid as agreed by the grid operator. High-precision equipment will be used to achieve high level of accuracy of the measurements. The equipment will be calibrated and tested according to recognized standards as agreed with the grid operator. If values differ, the values from the meter with a higher precision will be used.
Monitoring frequency	The quantity of electricity supplied to the grid will be measured continuously and recorded monthly. The basic measurement period shall be carried out in line with PPA.
QA/QC procedures	Cross-check measurements results with records of sold electricity.
Purpose of data	Calculation of baseline emissions
Additional comment	-

SPECIFIC PARAMETERS FOR PROJECTS THAT USE FOSSIL FUELS (SOLAR THERMAL)

Data / Parameter	$FC_{i,j,y}$
Unit	Mass or volume unit per year (e.g. ton/yr or m^3/yr)
Description	Quantity of fuel type *i* combusted in process *j* during the year *y*
Source of data	Onsite measurement
Value(s) applied	To be reported in the specific CPA-DD
Measurement methods and procedures	• Use either mass or volume meters. In cases where fuel is supplied from small daily tanks, rulers can be used to determine mass or volume of the fuel consumed, with the following conditions: The ruler gauge must be part of the daily tank and calibrated at least once a year and have a book of control for recording the measurements (on a daily basis or per shift); • Accessories such as transducers, sonar and piezoelectronic devices are accepted if they are properly calibrated with the ruler gauge and receiving a reasonable maintenance; • In case of daily tanks with pre-heaters for heavy oil, the calibration will be made with the system at typical operational conditions.
Monitoring frequency	Measurement must be done continuously
QA/QC procedures	The consistency of metered fuel consumption quantities should be cross-checked by an annual energy balance that is based on purchased quantities and stock changes. Where the purchased fuel invoices can be identified specifically for the CDM project, the metered fuel consumption quantities should also be cross-checked with available purchase invoices from the financial records.
Purpose of data	Calculation of project emissions
Additional comments	Applicable to solar thermal CPAs

<table>
<tr><td>Data / Parameter</td><td>$EF_{CO2,i,j,y}$</td></tr>
<tr><td>Unit</td><td>tCO2/GJ</td></tr>
<tr><td>Description</td><td>Weighted average CO_2 emission factor of fuel type i in process j in year y</td></tr>
<tr><td>Source of data</td><td>The following data sources may be used if the relevant conditions apply:
<table>
<tr><td>Data source</td><td>Conditions for using the data source</td></tr>
<tr><td>a) Values provided by the fuel supplier 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 95% confidence interval as provided in Table 1.2 of Chapter 1 of Vol. 2 (Energy) of the 2006 IPCC Guidelines on National GHG Inventories</td><td>If a) is not available</td></tr>
</table></td></tr>
<tr><td>Value(s) applied</td><td>To be reported in the specific CPA-DD</td></tr>
<tr><td>Measurement methods and procedures</td><td>For a) and b): Measurements should be undertaken in line with national or international fuel standards</td></tr>
<tr><td>Monitoring frequency</td><td>• For a) and b): The CO_2 emission factor should be obtained for each fuel delivery, from which weighted average annual values should be calculated.
• For c): Review appropriateness of the values annually.
• For d): Any future revision of the IPCC Guidelines should be taken into account.</td></tr>
<tr><td>QA/QC procedures</td><td>-</td></tr>
<tr><td>Purpose of data</td><td>Calculation of project emissions</td></tr>
<tr><td>Additional comment</td><td>Applicable where option B is used.
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.

Applicable to solar thermal CPAs</td></tr>
</table>

<table>
<tr><td>Data / Parameter</td><td>NCV$_{i,j,y}$</td></tr>
<tr><td>Unit</td><td>GJ per mass or volume unit (e.g. GJ/m³, GJ/ton)</td></tr>
<tr><td>Description</td><td>Weighted average net calorific value of fuel type i in process j in year y</td></tr>
<tr><td>Source of data</td><td>The following data sources may be used if the relevant conditions apply:
<table>
<tr><th>Data source</th><th>Conditions for using the data source</th></tr>
<tr><td>a) Values provided by the fuel supplier 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 95% confidence interval as provided in Table 1.2 of Chapter 1 of Vol. 2 (Energy) of the 2006 IPCC Guidelines on National GHG Inventories</td><td>If a) is not available</td></tr>
</table></td></tr>
<tr><td>Value(s) applied</td><td>To be reported in the specific CPA-DD</td></tr>
<tr><td>Measurement methods and procedures</td><td>For a) and b): Measurements should be undertaken in line with national or international fuel standards</td></tr>
<tr><td>Monitoring frequency</td><td>• For a) and b): Measurements should be undertaken in line with national or international fuel standards
• For a) and b): The NCV should be obtained for each fuel delivery, from which weighted average annual values should be calculated
• For c): Review appropriateness of the values annually
• For d): Any future revision of the IPCC Guidelines should be taken into account</td></tr>
<tr><td>QA/QC procedures</td><td>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.</td></tr>
<tr><td>Purpose of data</td><td>Calculation of project emissions</td></tr>
<tr><td>Additional comment</td><td>Applicable where option B is used.
Applicable to solar thermal CPAs</td></tr>
</table>

SPECIFIC PARAMETERS FOR HYDRO PROJECTS

Data / Parameter	**TEG_Y**
Unit	MWh/yr
Description	Total electricity produced by the project activity, including the electricity supplied to the grid and the electricity supplied to internal loads, in year *y*
Source of data	Project activity site
Value(s) applied	To be reported in the specific CPA-DD
Measurement methods and procedures	Electricity meters
Monitoring frequency	Continuous measurement and at least monthly recording.
QA/QC procedures	
Purpose of data	Calculation of project emissions
Additional comments	Applicable to hydro power project activities with a power density of the project activity (PD) greater than 4 W/m2 and less than or equal to 10 W/m2

Data / Parameter	**CAP_{PJ}**
Unit	W
Description	Installed capacity of the hydro power plant after the implementation of the project activity.
Source of data	Project site
Value(s) applied	To be reported in the specific CPA-DD
Measurement methods and procedures	Determine the installed capacity based on recognized standards
Monitoring frequency	Monitoring must be done on an annual basis
QA/QC procedures	-
Purpose of data	Calculation of project emissions
Additional comments	Applicable to hydro power project activities with a power density of the project activity (*PD*) greater than 10 W/m2

Data / Parameter	A_{PJ}
Unit	m^2
Description	Area of the single or multiple reservoirs measured in the surface of the water, after the implementation of the project activity, when the reservoir is full.
Source of data	Project activity site
Value(s) applied	To be reported in the specific CPA-DD
Measurement methods and procedures	Measured from topographical surveys, maps, satellite pictures, etc
Monitoring frequency	Monitoring must be done on an annual basis
QA/QC procedures	-
Purpose of data	Calculation of project emissions
Additional comments	Applicable to hydro power project activities with a power density of the project activity (*PD*) greater than 10 W/m2

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

In order to enable verification of emission reductions the project activity must maintain credible, transparent and adequate data measurement, collection, estimation, and tracking systems. The following monitoring procedures and responsibilities will apply:

All data collected as part of monitoring should be archived electronically and be kept at least for 2 years after the end of the last crediting period. All parameters stated in the section 7.1. should be monitored as outlined as indicated.

All measurements should be conducted with the calibrated measurement equipment according to relevant industry standards.

Monitoring period

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

Parameters monitored

Quantity of net electricity generation supplied by the project plant/unit to the grid in year *y*

Metering

Metering for electricity generation will be conducted with calibrated measurement equipment according to relevant industry standards. The South African National Standard has published the *Code of practice of electricity metering* NRS 057:2009. This code of practice specifies the procedures and standards to be adhered to by electricity licensees and their agents in operating and servicing new and existing metering installations which are to be used for billing purposes. The code of practice is applicable to metering installations in their entirety, including all measuring transformers, wiring, cabling, metering panel construction, active and reactive meters, data loggers, and associated test facilities.

ESKOM Distribution as the National Transmission Company will be responsible for:

- Calibration and maintenance of equipment
- Physical reading and day-to-day handling

- Quality Control and Quality assurance measures

ESKOM will provide a Main Metering System and Back-Up Metering System on-site. The metering equipment will be installed at the point of supply which defines the commercial boundary between the licensee and the customer.

ESKOM shall be responsible for managing and collecting metering information. ESKOM shall also transmit the data to the project proponent who is responsible to storage the collected data in line with the monitoring plan.

QA/QC

The meter(s) readings will be crosschecked with actual invoices sent by project owners to the grid company or with the registries provided to the project owners by the grid company of the energy delivered by the project to the interconnection substation, depending on the generation modality under which each CPA is operating.

The meter(s) readings will be readily accessible for the Designated Operational Entity (DOE) carrying out the verification of monitoring data.

Data storage and archiving

Data will be stored electronically by the CME in a centralized database system for at least two years following the end of the last crediting period.

The database contains the following information:

- Name of the CPA
- CPA implementing entity and contacts
- GPS coordinates
- Technical description
- Installed capacity
- Number of verifications and associated monitoring periods
- Monitored parameters and relevant evidence
- Emission reductions monitored

Operational and management structure

Each entity implementing a CPA under the PoA will be responsible for the technical aspects related to on-site monitoring such as:

- Employment and training of personnel responsible for recording monitoring data
- Collecting metering information from ESKOM

ESKOM as the National Transmission Company will be responsible for:

- Calibration and maintenance of metering equipment
- Continuous measurement of electricity generated by the project activity

Each month/quarter, the CPA will submit monthly electricity generation records to the CME accompanied by the respective invoices.

The CME will carry out a quality control on the data received and store them in the electronic database.

Once a year, the CME will prepare a monitoring report for submission to a DOE for verification

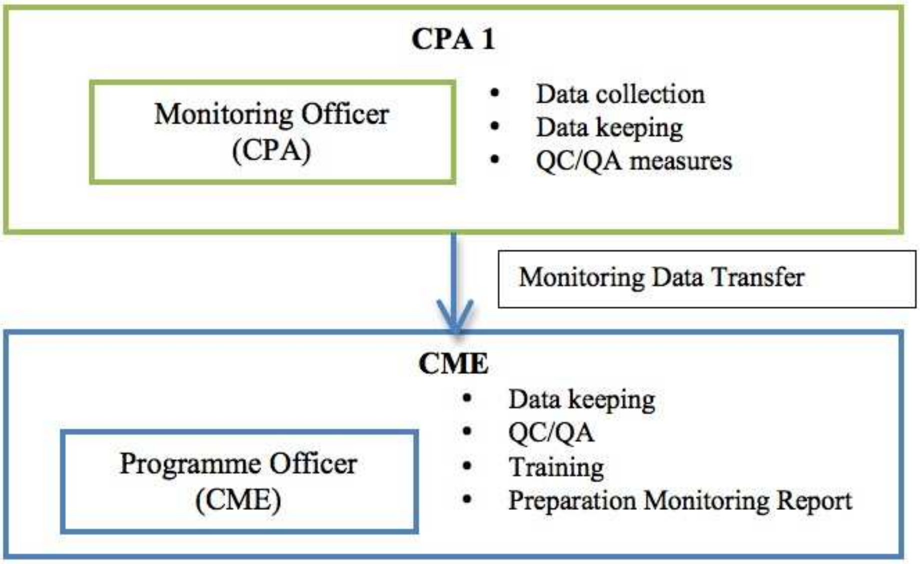


Figure 7. Monitoring organization

Training

Before the implementation of a CPA, the CME will provide training and guidance regarding the implementation of the monitoring plan. The training will include:

- CDM project cycle and the significance of monitoring
- Management structure and work scope
- Components of the monitoring plan
- QA/QC procedures
- Monitoring report template
- Preparation for verification
- Questions and answers

- - - - -

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

Organization	Carbon Africa Ltd.
Street/P.O. Box	P.O. Box 14938
Building	-
City	Nairobi
State/Region	-
Postcode	00800
Country	Kenya
Telephone	+254 731 851 754
Fax	-
E-mail	info@carbonafrica.co.ke
Website	www.carbonafrica.co.ke
Contact person	Adriaan Tas
Title	Director
Salutation	Mr
Last name	Tas
Middle name	-
First name	Adriaan
Department	-
Mobile	-
Direct fax	-
Direct tel.	-
Personal e-mail	adriaan@carbonafrica.co.ke

Appendix 2: Affirmation regarding public funding

No public funding involved in the project activity

Appendix 3: Application of methodology(ies)

No additional information

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

Net electricity generated by power plant/unit *m* in year *y* ($EG_{m,y}$)

		Generation Data (MWh)		
Name	**Type**	**2008-2009**	**2009-2010**	**2010-2011**
Amot	Coal	11,987,281	13,227,864	12,194,878
Camden	Coal	6,509,079	7,472,070	7,490,836
Duvha	Coal	21,769,489	22,581,228	20,267,508
Grootvlei	Coal	1,249,556	2,656,230	3,546,952
Hendrina	Coal	12,296,687	12,143,292	11,938,206
Kendal	Coal	23,841,401	23,307,031	25,648,258
Komati	Coal	-	1,016,023	2,060,141

Kriel	Coal	18,156,686	15,906,816	18,204,910
Lethabo	Coal	23,580,232	25,522,698	25,500,366
Majuba	Coal	22,676,924	22,340,081	24,632,585
Matimba	Coal	26,256,068	27,964,141	28,163,040
Matla	Coal	21,863,400	21,954,536	21,504,422
Tutuka	Coal	21,504,122	19,847,894	19,067,501
Acacia	Gas (Jet kerosene)	-	971.00	992.00
Port Rex	Gas (Jet kerosene)	-	322.00	5,507.00
Ankerlig	Gas/Diesel Oil	-	6,303.00	-
Gourikwa	Gas/Diesel Oil	-	5,817.00	-
Gariep	Hydropower	-	-	-
Vanderkloof	Hydropower	-	-	-
Colleywobbles	Hydropower	-	-	-
First Falls	Hydropower	-	-	-
Second Falls	Hydropower	-	-	-
Ncora	Hydropower	-	-	-
Koeberg	Nuclear	13,004,000	12,806,000	12,099,000
Klipheuwel	Wind	2,000	1,000	2,000
PetroSA biogas to energy	CDM	23,286	23,286	23,286
Bethlehem Hydroelectric project	CDM	8,983	8,983	8,983
Durban Landfill-gas-to-electricity project – Mariannhill and La Mercy Landfills	CDM	3,744	3,744	3,744
Durban landfill gas Bisasar Road project	CDM	31,723	31,723	31,723
Total		**224,764,661**	**228,828,053**	**232,394,838**

<u>Amount of fossil fuel type *i* consumed by power plant/unit *m* in year *y*</u>

		$FC_{i,m,y}$ (kg/year)		
Name	**Type**	**2008-2009**	**2009-2010**	**2010-2011**
Amot	Coal	6,395,805,000	6,794,134,000	6,525,670,000
Camden	Coal	3,876,211,000	4,732,163,000	4,629,763,000
Duvha	Coal	11,393,553,000	11,744,606,000	10,639,393,000
Grootvlei	Coal	674,538,000	1,637,371,000	2,132,979,000
Hendrina	Coal	7,122,918,000	6,905,917,000	7,139,198,000
Kendal	Coal	15,356,595,000	13,866,514,000	15,174,501,000
Komati	Coal	0	664,497,000	1,271,010,000
Kriel	Coal	9,420,764,000	8,504,715,000	9,527,185,000
Lethabo	Coal	16,715,323,000	18,170,227,000	17,774,699,000
Majuba	Coal	12,554,406,000	12,261,833,000	13,020,512,000
Matimba	Coal	13,991,453,000	14,637,481,000	14,596,842,000
Matla	Coal	12,689,387,000	12,438,391,000	12,155,421,000
Tutuka	Coal	11,231,583,000	10,602,839,000	10,191,709,000
Acacia	Gas (Jet kerosene)	0	-	347,066.46
Port Rex	Gas (Jet kerosene)	0	-	219,913.98
Ankerlig	Gas/Diesel Oil	0	-	0

Gourikwa	Gas/Diesel Oil	0	-	0

Appendix 5: Further background information on the monitoring plan

No additional information

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History of the document

Version	Date	Nature of revision(s)
02.0	EB 66 13 March 2012	Revision required to ensure consistency with the "Guidelines for completing the programme design document form for small-scale CDM programmes of activities" (EB 66, Annex 13).
01	EB33, Annex43 27 July 2007	Initial adoption.
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