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

CONTENTS

Annexes

NOTE:

This form is for the submission of a CDM PoA whose CPAs apply a large scale approved methodology.

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

SECTION A. General description of programme of activities (PoA)

A.1 Title of the programme of activities:

Wind and solar PoA in South Africa
Version 2
Date: 20/04/2012

A.2. Description of the programme of activities:

1. General operating and implementing framework of PoA

The programme of activities (hereafter referred to as "the PoA") is a programme for the installation of wind and solar projects generating electricity into the national grid across South Africa. Each CDM programme activity (CPA) will be implemented in geographically distinct area within South Africa.

The PoA and the inclusion of each CPA will be managed by a managing/coordinating entity (CME), CDC Climat Asset Management. The CPAs themselves will be implemented by the CPA implementer, or any relevant third party.

The PoA would cover grid-connected renewable power generation project activities that (a) install a new power plant at a site where no renewable power plant was operated prior to the implementation of the project activity (greenfield plant) and/or (b) involve a capacity addition. Capacity expansions would however be treated as new and distinct CPA's under the PoA. Applications (c) retrofit and (d) replacement of (an) existing plant(s) are not included in this PoA.

The following renewable energy technologies can be implemented under the PoA:

- Wind Power
- Solar Power

2. Policy/measure or stated goal of the PoA

This PoA aims at developing wind and solar power plants to provide renewable energy to the South African grid and to reduce greenhouse gas emissions by displacing the electricity generated by grid connected power plants that contain a majority of fossil-fuel fired installations
Renewable energy constitutes a negligible share of South Africa's installed power capacity: in 2011, the total installed capacity was 41,194 MW, of which only 600 MW came from hydro-electric (1.5%) and 3 MW from wind (0.01%)[1]. The proposed PoA will help the promotion of renewable energy in the country.

The contribution of the PoA to sustainable development is assessed as follows by using the sustainable development criteria[2] of the South African DNA under the Ministry of Energy:

[1] Source: Eskom key facts (http://www.eskom.co.za/)

[2] DNA Guidance for applicants of CDM in South Africa
http://www.energy.gov.za/files/esources/kyoto/kyoto_frame.html

Environmental benefits:

- The PoA encourages the development of renewable energy plants that replace energy generated from fossil fuels and reduces emissions of pollutants including greenhouse gas emissions.
- The PoA will have no negative impact on water resources, on the contrary, the projects will displace the use of coal-fired power plants which have extensive use of water
- Renewable energy contributes to natural resource conservation, for instance coal.

Economic benefits:

- The PoA diversifies sources of electricity generation that are necessary to meet a growing demand for energy and facilitates the transition away from fossil fuel electricity generation. On a long-term, the reduction of fossil-fuel dependence will contribute to a reduction of cost of energy
- The PoA is the voluntary action of a French company, it contributes to foreign investment in South Africa
- There will be an opportunity to improve skills levels as the need for local labour to operate and maintain the installations grows.
- The implementation of solar and wind power plants will be a demonstration that renewable energies are a good opportunity for the country and will encourage replication of this kind of projects.

Social benefits:

- Temporary and permanent jobs will be created in the construction and operation phases of the CPA projects;
- The PoA increases employment opportunities in the area where each CPA is located, leading to a general increase in local-community income.
- The proposed projects have no negative impacts on community social structure and heritage.

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

The proposed PoA is a voluntary action coordinated by CDC Climat Asset Management.
The proposed PoA is consistent with mandatory laws and regulations:

- There are no laws or regulations preventing the continued use of fossil fuels for the generation of energy
- There are no laws preventing the development of wind or solar plants
- There are currently no mandatory regulations requiring the partial or full use of energy from renewable sources

A.3. Coordinating/managing entity and participants of PoA:

Coordinating or managing entity of PoA as the entity which communicates with the Board
CDC Climat Asset Management.

Project participants under the PoA

Name of Party involved	Private and/or public entities Project Participants	Does the Party involved wish to be considered as a Project Participant
South Africa (host)	iNca Energy (Pty) Limited	No
France	CDC Climat Asset Management	No

A.4. Technical description of the programme of activities:

A.4.1. Location of the programme of activities:

A.4.1.1. Host Party(ies):

South Africa

A.4.1.2. Physical/ Geographical boundary:

The boundary of a PoA is defined as the geographical area within which all the CPAs included in the PoA will be implemented, taking into consideration the requirements of applicable national and/or sectoral policies and regulations of the host country.
The boundary of the PoA is South Africa.

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

A typical CPA consists of a newly-built or the capacity addition of a grid-connected Solar (excluding solar thermal) or Wind power plant.

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

The CPA will utilise wind turbines or solar panels as well as the appropriate materials and technology for balance of plant and electrical connections.

For wind farms:
A description of the equipment(s) and systems that will be installed within the project activity will be provided in the CPA-PDD. For wind farms, it typically includes the following:

- Wind turbines;
- Concrete foundations to support the turbine towers;
- Electrical distribution cabling between the turbines;
- Substations on the site in an appropriate position to receive generated power via distribution cabling from each wind turbine;
- Overhead or underground power lines;
- Electricity meter(s) for monitoring the amount of electricity generated;
- Roads to the site from the main road/s within the area.

For solar plants:
A description of the equipment(s) and systems that will be installed within the project activity will be provided in the CPA-PDD. It typically includes the following:

- Electrical infrastructure;
- Substations;
- Solar receptors in the form of panels;
- Electricity meter(s) for monitoring the amount of electricity generated;
- Roads to the site from the main road/s within the area;
- Fencing.

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

To be part of this PoA, each CPA must meet the following criteria:

N°	Criteria	Compliance Rationale
a)	The geographical boundary of the CPA including any time-induced boundary is consistent with the geographical boundary set in the PoA.	The CPA must be grid connected to the South African national electricity grid and fall within the boundaries of the Republic of South Africa as they may exist at the time of CPA inclusion
b)	Conditions that avoid double counting of emission reductions like unique identifications of product and end-user locations (e.g. programme logo).	Each CPA will follow the procedures established by the CME and described in Section A.4.4.1 to avoid double accounting and comply therewith Each CPA shall be uniquely identified and defined in an unambiguous manner by amongst other aspects providing geographic information (GPS coordinates) and the installed capacity of the plant
c)	The specifications of technology/ measure including the level and type of service, performance specifications including compliance with testing/ certifications.	The CPA shall demonstrate that the technology to be installed is wind or solar equipment that will meet the host country or international standard/ requirements in terms of testing / certifications and will be able to generate electricity to supply to the grid.
d)	Conditions to check the start date of the CPA through documentary evidence;	The start date of the CPA must be in accordance with the CDM Glossary
e)	Conditions that ensure compliance with applicability and other requirements of single or multiple methodology/ies	Each CPA must meet the criteria for methodology ACM0002 version 12.3.0. No other methodology will be used.

	applied by CPA.	
f)	The conditions that ensure that CPAs meet the requirements pertaining to the demonstration of additionality.	The CPA's need to demonstrate additionality in one of the ways described in section E.5.1.
g)	The PoA-specific requirements stipulated by the CMEs including any conditions related to undertaking local stakeholder consultations and environmental impact analysis.	g (1) Local stakeholders must have been consulted g (2) The CPA must be compliant with the Host Country requirements in terms of environmental impact analysis. g (3) For each CPA, there should be an agreement between the CPA implementer and the CME.
h)	Where applicable, target group (e.g. domestic/commercial/industrial, rural/urban, grid-connected/off-grid) and distribution mechanisms (e.g. direct installation).	The target group is prospective wind and solar project developers in South Africa. There are no specific distribution mechanisms.
i)	Where applicable, the conditions related to sampling requirements for a PoA in accordance with the approved guidelines/standard from the Board pertaining to sampling and surveys	All CPAs will be verified nevertheless a sampling procedure may be applied for selecting an onsite assessment if several CPAs are included in one verification. Refer to section A.4.4.2 for sampling details.
j)	Where applicable, the conditions that ensure that CPA in aggregate meets the small-scale threshold criteria and remain within this threshold throughout the crediting period of the CPA	Though the methodology applied in the proposed PoA is a large scale methodology, some individual CPA may fall under the small-scale threshold criteria. In that case, the corresponding guidelines on additionality demonstration will be applied – see eligibility criteria m) below – and the CPA implementer should be able to demonstrate that the CPA will remain within this threshold throughout the corresponding crediting period.
k)	Where applicable, the requirements for the debundling check, in case CPAs belong to small-scale (SSC) project categories	Though the methodology applied in the proposed PoA is a large scale methodology, some individual CPA may fall under the small-scale threshold criteria. In that case, the corresponding guidelines on additionality demonstration will be applied – see eligibility criteria m) below) – and the CPA implementer should be able to demonstrate that the CPA is not a debundled component of a large activity as described in the latest "Guidelines on assessment of debundling for SSC project activities"
l)	Conditions to provide an affirmation that funding from Annex I Parties, if any, does not result in a diversion of official development assistance.	In each CPA-DD, it shall be confirmed that the CPA does not involve any public funding or that in case public funding is used a confirmation that official development assistance is not being diverted to the implementation of the PoA
m)	Conditions pertaining to the	The additionality of a CPA that falls below the small

	demonstration of additionality of a CPA that falls below the small scale thresholds criteria (< 15 MW)	scale threshold (< 15 MW) can be demonstrated using the latest version of Attachment A of Appendix B of the "Simplified modalities and procedures for small-scale CDM project activities"

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

(i) The proposed PoA is a voluntary coordinated action;

The proposed PoA is a voluntary action, coordinated by CDC Climat Asset Management, to promote the development of renewable energy in South Africa.
There are no mandatory laws or regulations in South Africa for the development of solar or wind power. The national regulatory framework for the electricity supply industry in South Africa is the Electricity Regulation Act 4 of 2006. Currently, there are no laws or regulations:

- preventing the continued use of fossil fuels for the generation of energy
- preventing the development of solar or wind power plants
- or requiring the partial or full use of energy from renewable sources.

The proposed PoA can be, therefore, regarded as a voluntary coordinated action.

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

This is the additionality condition of each CPA and it will be demonstrated in each CPA-DD following ACM0002 and the relevant tools requirements.
If each CPA can demonstrate additionality at CPA level then it can be concluded that none of the CPA's under the PoA would occur in the absence of CDM

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

Not applicable as the proposed PoA is not implementing a mandatory policy/regulation in the selected geographical boundary.

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

Not applicable as the proposed PoA is not implementing a mandatory policy / regulation in the selected geographical boundary.

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

A.4.4.1. Operational and management plan:

The proposed PoA involves a range of operational activities in order to implement and manage each CPA by the CME and CPA implementer within the PoA.

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

Operation, monitoring and management of the projects will be at the CPA level: all relevant parameters included in the monitoring plan shall be monitored and recorded in each CPA by maintaining a record keeping system supervised by the CME.
The CME will ensure that each CPA will maintain standard records documenting and will be responsible for centralizing and archiving the monitored data.
The monitored data will be kept for the full crediting period, plus two years after the end of the crediting period or the last issuance of CERs for this CPA (whichever occurs later).

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

Prior to including a new CPA under the proposed PoA, the CME will check the CPA and PoA databases in the UNFCCC website to ensure that the same CPA has not been registered already.
Each CPA included in this PoA will be referenced with a unique identification number and the geographic coordinates of the corresponding facility location.

(iii) Provisions to ensure that those operating the CPA are aware and have agreed that their activity is being subscribed to the PoA;

The CPA operator shall enter into a contractual arrangement with the coordinating entity including respective provisions that:

- the CPA has not been and will not be registered as a single CDM project activity or as a CPA under another PoA;
- the project implementer is aware that the CPA will be subscribed to the present PoA; and
- there is an agreement between the CPA and the CME to participate into the present PoA.

A.4.4.2. Monitoring plan:

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

All the CPAs will be verified. If several CPAs are included within a verification, the following sampling procedure may be applied by the DOE:

- Full desk review and site visit for each and every CPA included in the verification; or
- Full desk review for each CPA included in the verification and site assessment on a sample-based approach. The sampling procedure to determine the CPAs that will be verified on site will be based on a stratified random sample, the strata being solar or wind power plant. At least one onsite assessment will be conducted. The DOE itself will chose randomly on which site(s) it will conduct a verification. Since the number of CPAs included in the proposed PoA will evolve during the crediting period, the sampling process is to be carried out for each verification.

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

double accounting occurs and that the status of verification can be determined anytime for each CPA;

All data collected as part of the monitoring will be archived electronically and be kept at least for 2 years after the end of the last crediting period. All measurements will be conducted with calibrated measurement equipment according to relevant industry standards and/or manufacturer specifications.
The monitoring plan for parameters included in section E.7.1 will be implemented for each CPA with assistance from the CME as follows:

- the CPA operator will implement its CPA
- the CPA operator or any relevant third party will monitor and record all parameters included in section E.7.1
- the CME (or any relevant subcontractor chosen by the CME for that purpose) will provide guidance to the CPA operator on how the monitoring should be conducted and data should be collected with regards to emission reduction calculations
- the CPA operator will provide data on monitored parameters and QA/QC procedures included in section E.7.1 to the CME either directly into a database provided by the CME or by sending the information to the CME.

A more detailed description of the monitoring plan is elaborated in section E.7.2.

A.4.5. Public funding of the programme of activities:

The PoA has not received any public funding. Any public funding that may be provided to individual CPA will be described in the corresponding CPA-DD. In case public funding is received for a CPA, an affirmation will be provided that such funding does not result in a diversion of ODA.

SECTION B. Duration of the programme of activities

B.1. Starting date of the programme of activities:

01/07/2012, corresponding to the expected registration date of the PoA.

B.2. Length of the programme of activities:

28 years

SECTION C. Environmental Analysis

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

1. Environmental Analysis is done at PoA level ☐
2. Environmental Analysis is done at CPA level ✔

The PoA includes various renewable energy types and hence it is inappropriate to conduct an environmental analysis at the PoA level. The type of CPA activity and location will determine whether or not a full scale EIA process will be needed.

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

The documentation of the analysis of environmental impacts, including transboundary impacts, will be conducted at CPA level.

C.3. Please state whether in accordance with the host Party laws/regulations, an environmental impact assessment is required for a typical CPA, included in the programme of activities (PoA),:

See information regarding EIA requirements from the host Party described in eligibility criteria g (1) g (2) g (3) in section above A.4.2.2.

SECTION D. Stakeholders' comments

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

1. Local stakeholder consultation is done at PoA level ☐
2. Local stakeholder consultation is done at CPA level ✔

Stakeholder consultation will be undertaken at the CPA level and for each CPA so as to ensure that a wider group of stakeholders is reached since each CPA affects different geographical positions and different groups of stakeholders.

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

This will be described at CPA level.

D.3. Summary of the comments received:

This will be addressed at the CPA level.

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

This will be addressed at the CPA level.

SECTION E. Application of a baseline and monitoring methodology

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

Methodology ACM0002 version 12.3.0, "*Consolidated baseline methodology for grid-connected electricity generation from renewable sources*", is applied to this PoA.

In line with the application of ACM0002 methodology, the PoA refers to the following tools:

- *Tool to calculate the emission factor for an electricity system version 2.2.1*
- *Tool for the demonstration of additionality version 6.0.0*
- *Combined tool to identify the baseline scenario and demonstrate additionality version 3.0.1 (not used)*
- *Tool to calculate project or leakage CO2 emissions from fossil fuel combustion version 2 (not used)*

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

All the CPAs included in this PoA will be in compliance with the applicability conditions of ACM0002 version 12.3.0 as listed below:

- The CPAs are grid-connected renewable power generation project activities that (a) install a new power plant at a site where no renewable power plant was operated prior to the implementation of the project activity (greenfield plant); (b) involve a capacity addition. Cases (c) retrofit of (an) existing plant(s) and (d) involve a replacement of (an) existing plant(s) are not included in the PoA.

- The CPAs are the installation or capacity addition of a power plant / unit of one of the following types: wind power plant/unit, solar power plant/unit.

- In case of capacity addition, (except for CPAs for which the electricity generation of the existing power plant(s) or unit(s) is not affected): the existing plant started commercial operation prior to the start of a minimum historical reference period of five years, used for the calculation of baseline emissions and defined in the baseline emission section, and no capacity addition or retrofit of the plant has been undertaken between the start of this minimum historical reference period and the implementation of the project activity.

- The CPAs do not include:
  - Project activities that involve switching from fossil fuels to renewable energy sources at the site of the project activity, since in this case the baseline may be the continued use of fossil fuels at the site;
  - Biomass fired power plants;
  - A hydro power plants[2] that results in the creation of a new single reservoirs or in the increase in an existing single reservoirs where the power density of the reservoir is less than 4 W/m^2

In addition to the applicability conditions of ACM0002 version 12.3.0, all the CPAs included in the PoA will also meet the applicability conditions of the following tools:

Tool to calculate the emission factor for an electricity system (version 2.2.1):
This tool will be applicable since the proposed CPAs will substitute electricity from the grid.

Tool for the demonstration of additionality (version 6.0.0)

This tool is applicable to demonstrate the additionality of the projects.

Combined tool to identify the baseline scenario and demonstrate additionality (version 3.0.1):
Some steps of this tool are applicable in the case the project is a retrofit or replacement of existing grid-connected renewable power plant/unit(s) at the project site. Since the PoA does include cases of retrofit or replacement, this tool will not be used.

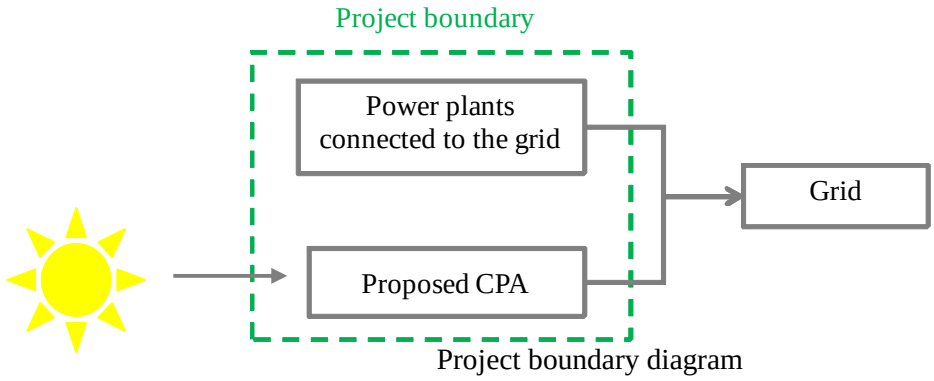
Tool to calculate project or leakage CO_2 emissions from fossil fuel combustion (version 2):
This tool will not be used since the proposed PoA will not include geothermal and solar thermal projects.

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

As per ACM0002 version 12.3.0 the spatial extent of the project boundary includes the project site and all the power plants connected physically to the electricity system.
According to the methodology, a grid-connected wind/solar power project like the proposed CPA is required to consider only the CO_2 emissions from fossil fuels fired power plants in baseline scenario.

The following sources and gases are considered within the CPA boundaries:

	Source	Gas	Included	Justification / Explanation
Baseline	CO_2 emissions from electricity generation in fossil fuel fired power plants that are displaced due to the project activity	CO_2	Yes	Main emission source
		CH_4	No	Minor emission source
		N_2O	No	Minor emission source
Project Activity	For geothermal power plants, fugitive emissions of CH_4 and CO_2 from non-condensable gases contained in geothermal steam	CO_2	No	Not applicable since the PoA does not include any geothermal power plant
		CH_4	No	Not applicable since the PoA does not include any geothermal power plant
		N_2O	No	Minor emission source
	CO_2 emissions from combustion of fossil fuels for electricity generation in solar thermal power plants and geothermal power plants	CO_2	No	Not applicable since the PoA does not include any solar thermal or geothermal power plant
		CH_4	No	Minor emission source
		N_2O	No	Minor emission source
	For hydro power plants, emissions of CH_4 from the reservoir	CO_2	No	Minor emission source
		CH_4	No	Not applicable since the PoA does not include any hydro power plant
		N_2O	No	Minor emission source



Project boundary diagram

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

Due to the differing nature of the renewable power generation projects potentially applicable under ACM0002, within each CPA a description of how the baseline scenario for that CPA is identified and a description of that identified baseline scenario will be provided.

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

- Electricity delivered to the grid by the project activity would have otherwise been generated by the operation of grid-connected power plants and by the addition of new generation sources, as reflected in the combined margin (CM) calculations described in Version 2.2.1 of the "Tool to calculate the emission factor for an electricity system".

If the project activity is a capacity addition to existing grid-connected renewable power plant/unit, the baseline scenario is the following:

- In the absence of the CDM project activity, the existing facility would continue to supply electricity to the grid at historical levels, until the time at which the generation facility would likely be replaced or retrofitted ($DATE_{BaselineRetrofit}$). From that point of time onwards, the baseline scenario is assumed to correspond to the project activity, and no emission reductions are assumed to occur.

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

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

According to ACM0002 v12.3.0, the additionality of the CPA shall be demonstrated and assessed using the latest version of the *Tool for the demonstration of additionality*.

Alternatively, if the CPA falls below the small scale (< 15 MW) threshold, the additionality of the CPA might be demonstrated using the latest version of Attachment A of Appendix B of the "Simplified modalities and procedures for small-scale CDM project activities". The CPA will have to demonstrate that it would not have occurred anyway due to at least one of the following barriers: investment, technological, prevailing practice or other barriers.

In addition, a solar project of installed capacity up to 15 MW will be automatically defined as additional without further documentation of barriers.

Step 1: Identification of alternative scenarios to the project activity consistent with current laws and regulations

Sub-step 1a: Define alternatives to the proposed CPA

The following scenarios are alternatives to the proposed CPA:

- Alternative 1: the project is undertaken without registration as a CDM project
- Alternative 2: continuation of current situation, i.e. no project activity is undertaken and the electricity continues being generated by the operation of grid-connected power plants and by the addition of new generation sources.

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

Both alternatives listed above are consistent with local mandatory laws and regulations:

- Alternative 1: there are no laws preventing the development of wind or solar power plants;
- Alternative 2: the current situation is compliant with existing laws or regulations.

Step 2: Investment analysis

Sub-step 2a: Determine appropriate analysis method

Since the project will produce revenue through the sale of renewable energy, and one alternative includes not investing in the project, a benchmark investment comparison analysis is most appropriate.

Sub-step 2b: Option III: Apply benchmark analysis

Shall be carried out at the CPAs level.

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

Shall be carried out at the CPAs level.

Sub-step 2d: Sensitivity analysis

Shall be carried out at the CPAs level.

Outcome of step 2: the investment analysis carried out at the CPAs level shall conclude that the proposed CPA undertaken without CDM is unlikely to be the most financially/economically attractive option.

Step 3: Barrier analysis

As an alternative to the investment analysis the CPA will be entitled to utilize the barrier analysis to show that the project is additional.
This step shall be done as described in the *Tool for the demonstration of additionality v6* if the CPA is above the large scale criteria of 15 MW.

The barrier analysis shall be carried out at the CPAs level.

Outcome of step 3: the barrier analysis carried out at the CPAs level shall conclude that the proposed CPA is additional.

Step 4. Common practice analysis

The following applies:
As for common practice analysis, the following applies:
- the applicable geographical area is South Africa
- the measure is (b) switch of technology with change of energy source
- the output is electricity generation for delivery to the grid

Step 1: Calculate applicable output range as +/-50% of the design output or capacity of the proposed project activity.
Step 2: In the applicable geographical area, identify all plants that deliver the same output or capacity, within the applicable output range calculated in Step 1, as the proposed project activity and have started commercial operation before the start date of the project. Note their number N_{all}. Registered CDM project activities and projects activities undergoing validation shall not be included in this step;
Step 3: Within plants identified in Step 2, identify those that apply technologies different that the technology applied in the proposed project activity. Note their number N_{diff}.
Step 4: Calculate factor $F=1-N_{diff}/N_{all}$ representing the share of plants using technology similar to the technology used in the proposed project activity in all plants that deliver the same output or capacity as the proposed project activity.
The proposed project activity is a common practice within a sector in the applicable geographical area if both the following conditions are fulfilled:
(a) the factor F is greater than 0.2, and
(b) $N_{all}-N_{diff}$ is greater than 3.

This analysis shall be carried out at CPA level.
Outcome of step 4: the common practice analysis carried out at the CPAs level shall conclude that the proposed CPA is additional.

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

CPA implementers must demonstrate additionality based on the analysis contained in the previous section. The key criteria for assessing additionality of a CPA are:

- If the CPA is above the large scale criteria of 15 MW, the additionality will be assessed using the "Tool for the demonstration of additionality" v6 and the barrier and/or the investment analysis will be carried out.

- If the CPA is a solar project of installed capacity up to 15 MW, it will be automatically defined as additional without further documentation of barriers, as defined in Attachment A of Appendix B of the "Simplified modalities and procedures for small-scale CDM project activities" version 8.

- If the CPA is a wind project of installed capacity up to 15 MW, the additionality may be demonstrated using the latest version of Attachment A of Appendix B of the "Simplified modalities and procedures for small-scale CDM project activities".

- If a CPA is identified as a first of its kind, it will be automatically defined as additional without further documentation of barrier or investment analysis.

In all cases, comprehensive and objective argumentation shall be provided in the CPA-DD.

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

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

The methodological choices that will be applied in relation to each of the CPAs are based on the methodology ACM0002 (Version 12.3.0) and referred tools (see Section E.1).

Determination of Baseline Emissions
The *ex-ante* baseline emissions are calculated considering all project electricity generation above baseline levels would have been generated by existing grid-connected power plants and the addition of new grid-connected power plants and using the "Tool to calculate baseline, project and/or leakage emissions from electricity consumption" (version 2.2.1).

Determination of Project Emissions
No project emissions will be accounted since the PoA includes no geothermal, solar thermal or hydro power plants.

Determination of Leakage
No leakage emissions are considered.

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

I. Equation used for calculation of Emissions Reduction

$\mathbf{ER_y = BE_y - PE_y}$
Where:
ER_y Emission reduction in year *y* (tCO_2e)
BE_y Baseline emissions in year *y* (tCO_2e)
PE_y Project emissions in year *y* (tCO_2e)

II. Equation used for calculation of Project Emissions

No project emissions for wind and solar power plants are accounted: $\mathbf{PE_y = 0}$.

III. Equation used for calculation of Baseline Emissions

$\mathbf{BE_y = EG_{PJ,y} * EF_{grid,CM,y}}$
Where:
BE_y Baseline emissions in year y (tCO_2e)
$EG_{PJ,y}$ Quantity of net electricity generation that is produced and fed into the grid as a result of the implementation of the CDM project activity in year *y* (MWh)

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

III.i Equation used for determining $EG_{PJ,y}$

(a) Greenfield renewable energy power plants

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

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

Where:

$EG_{PJ,y}$ Quantity of net electricity generation that is produced and fed into the grid as a result of the implementation of the CDM project activity in year *y* (MWh)

$EG_{facility,y}$ Quantity of net electricity generation supplied by the project plant/ unit to the grid in year *y* (MWh)

(b) Capacity addition to an existing renewable energy power plant

The PoA is only applicable in the case where the addition of new capacity does not affect the electricity generated by existing plant(s) or unit(s), provided that the electricity fed into the grid by the added power plant(s) or unit(s) is directly metered and used to determine $EG_{PJ,y}$.

The electricity fed into the grid by the added power plant(s) or unit(s) addition is separately metered:

$$\mathbf{EG_{PJ,y} = EG_{PJ,Add,y}}$$

Where

$EG_{PJ,y}$ Quantity of net electricity generation that is produced and fed into the grid as a result of the implementation of the CDM project activity in year *y* (MWh)

$EG_{PJ,Add,y}$ Quantity of net electricity generation supplied to the grid in year *y* by the project plant/ unit that has been added under the CPA (MWh)

III.ii Equation used for determining $EF_{grid,CM,y}$

The grid emission factor that applies to the CPA, is calculated as per the "Tool to calculate the emission factor for an electricity system" v2.2.1, by calculating the combined margin (CM), based on the combination of the operating margin (OM) and the build margin (BM) factors.

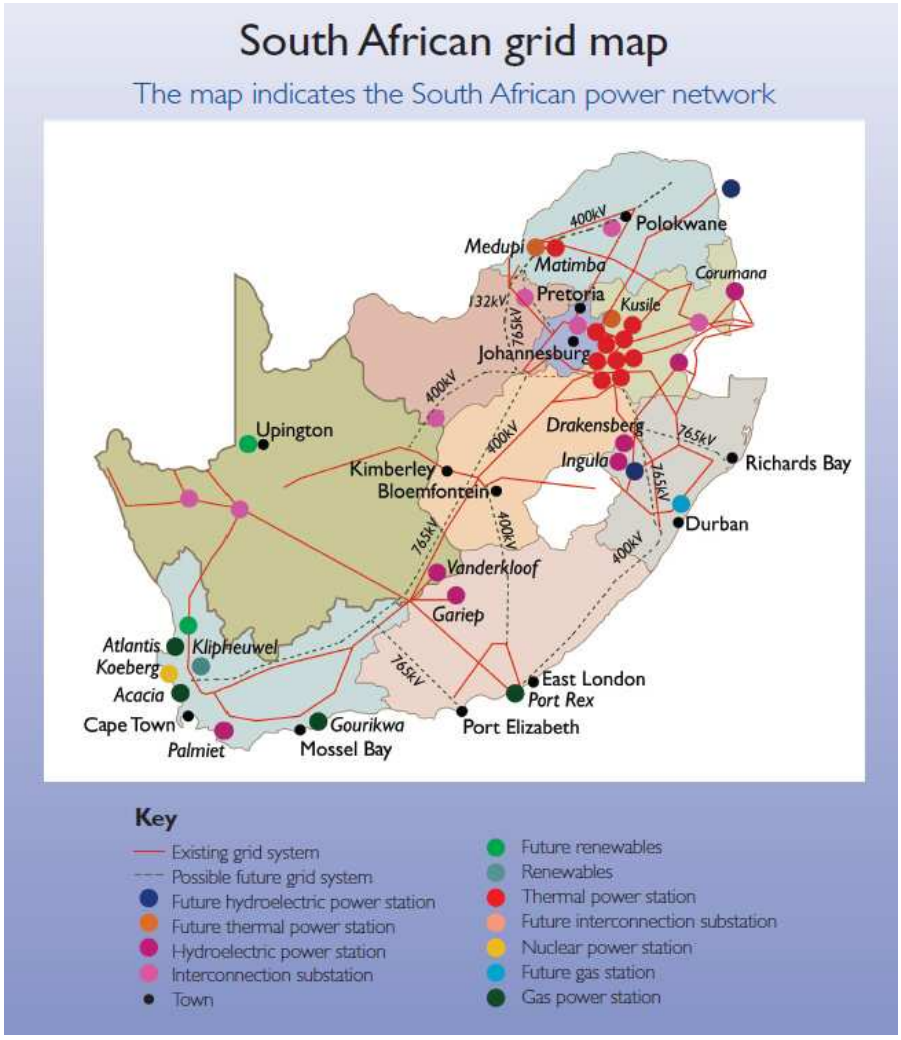
The source for all figures used to calculate the EF is Eskom, the national grid electricity company[3].

STEP 1 Identify the relevant electricity systems

The relevant project electricity system is identified as the South African national grid, which consist of 95%[4] of Eskom generated electricity. The relevant electricity system is delimited in the map below:

[3] http://www.eskom.co.za

[4] Source: Eskom company information



STEP 2 Choose whether to include off-grid power plants in the project electricity system (optional)

We choose Option I: only grid power plants are included in the calculation.

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

As shown on the table below[5], low cost/must-run resources constitute less than 50% of total grid generation in the five most recent years. Thus we will use the simple OM method. We choose to apply the ex-ante option: the emission factor is determined once at the validation stage, thus no monitoring and recalculation of the emissions factor during the crediting period is required.

Electricity generation by Eskom	2011	2010	2009	2008	2007
Coal-fired (GWh)	220,219	215,940	211,941	222,908	215,211
Hydro-electric (GWh)	1,960	1,274	1,082	751	2,443

[5] Source: Eskom key facts

Pumped storage (GWh)	2,953	2,742	2,772	2,979	2,947
Gas turbine (GWh)	197	49	143	1,153	62
Nuclear (GWh)	12,099	12,806	13,004	11,317	11,780
Wind energy (GWh)	2	1	2	1	2
Total electricity generation (GWh)	237,430	232,812	228,944	239,109	232,445
% of low-cost resources in total grid generation	6%	6%	6%	5%	6%

STEP 4 Calculate the operating margin emission factor according to the selected method

The Simple OM will be calculated by using option A, based on the net electricity generation and an emission factor of each power unit.

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

Where:

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

And for each plant:

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

Where:

$EF_{EL,m,y}$	CO_2 emission factor of power unit *m* in year *y* (tCO_2/MWh)
$FC_{i,m,y}$	Amount of fossil fuel type *i* consumed by power unit *m* in year *y* (Mass or volume unit)
$NCV_{i,y}$	Net calorific value (energy content) of fossil fuel type *i* in year *y* (GJ/mass or volume unit)
$EF_{CO2,i,y}$	CO_2 emission factor of fossil fuel type *i* in year *y* (tCO_2/GJ)

Details of the calculations are described in an excel sheet provided for validation.
The main results of the operating margin are as follows:

Plant	$EF_{EL,m}$ (tCO_2/MWh)		
	2008-2009[6]	2009-2010	2010-2011
Arnot	0.9691	0.9329	0.9719
Duvha	0.9506	0.9447	0.9535
Hendrina	1.0521	1.0329	1.0862
Kendal	1.1699	1.0806	1.0746
Kriel	0.9424	0.9711	0.9505
Lethabo	1.2875	1.2931	1.2660
Matimba	0.9679	0.9507	0.9414
Majuba	1.0055	0.9969	0.9601
Matla	1.0542	1.0290	1.0267
Tutuka	0.9486	0.9703	0.9708
Camden	1.0816	1.1503	1.1226
Grootvlei	0.9802	1.1196	1.0922
Komati		1.1879	1.1206
$EF_{grid,OM,y}$	**1.0418**	**1.0342**	**1.0291**
$EF_{grid,OM,2008-2011}$ tCO_2/MWh			**1.0350**

The calculated operating margin for the most recent years is **1.0350 tCO_2/MWh**

STEP 5 Calculate the build margin emission factor

We choose to apply the ex-ante option (option 1): the build margin emission factor is determined once at the validation stage, without requirement to monitor and recalculate it during the crediting period.

The sample group of power units *m* used to calculate the build margin should be determined as per the following procedure:
a) Identify the set of five power units, excluding power units registered as CDM project activities, that started to supply electricity to the grid most recently ($SET_{5\text{-}units}$) and determine their annual electricity generation ($AEG_{SET\text{-}5\text{-}units}$, in MWh);

Plant $SET_{5\text{-}units}$	Year	EG_m (MWh)
Camden	2005	7,490,836
Majuba	1996	24,632,585
Kendal	1988	25,648,258
Matimba	1987	28,163,040
Tutuka	1985	19,067,501
$AEG_{SET\text{-}5\text{-}units}$		**105,002,220**

b) Determine the annual electricity generation of the project electricity system, excluding power units registered as CDM project activities (AEG_{total}, in MWh). Identify the set of power units, excluding power units registered as CDM project activities, that started to supply electricity to the grid most recently and that comprise 20% of AEG_{total} (if 20% falls on part of the generation of a unit, the generation of that unit

[6] Year ends on 31 March

is fully included in the calculation) ($SET_{\geq 20\%}$) and determine their annual electricity generation ($AEG_{SET-\geq 20\%}$, in MWh)

Plant	Year	EG_m (MWh)
Camden	2005	7,490,836
Majuba	1996	24,632,585
Kendal	1988	25,648,258
$AEG_{SET-\geq 20\%}$	**24%**	**57,771,679**
AEG_{TOTAL}	**100%**	**237,430,000**

c) From $SET_{5\text{-units}}$ and $SET_{\geq 20\%}$ select the set of power units that comprises the larger annual electricity generation (SET_{sample}). $SET_{sample} = SET_{5\text{-units}}$

d) Exclude from SET_{sample} the power units which started to supply electricity to the grid more than 10 years ago.
Only one of the identified plant has started to supply electricity less than 10 years ago: Camden.

Include in that set the power units registered as CDM project activity, starting with power units that started to supply electricity to the grid most recently, until the electricity generation of the new set comprises 20% of the annual electricity generation of the project electricity system) to the extent is possible. Determine for the resulting set ($SET_{sample-CDM}$) the annual electricity generation ($AEG_{SET-sample-CDM}$, in MWh).
There are no CDM power plant currently supplying electricity to the grid, thus no CDM plant can be included in the sample group.

e) Include in the sample group $SET_{sample-CDM}$ the power units that started to supply electricity to the grid more than 10 years ago until the electricity generation of the new set comprises 20% of the annual electricity generation of the project electricity system.
f) The sample group of power units *m* used to calculate the build margin is the resulting set ($SET_{sample-CDM->10yrs}$).

Conclusion of steps e) and f):
The sample group of power units *m* used to calculate the build margin $SET_{sample-CDM->10yrs}$ is the same as $SET_{\geq 20\%}$.

The build margin emission factor BM is calculated as follows:

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

Where:

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

Plant	Year	Type	EG_m (MWh)	$FC_{i,m}$ (t)	$EF_{EL,m}$ (tCO_2/MWh)
Camden	2005	coal	7,490,836	4,629,763	1.1226
Majuba	1996	coal	24,632,585	13,020,512	0.9601
Kendal	1988	coal	25,648,258	15,174,501	1.0746
Total electricity generation $SET_{\geq 20\%}$ (MWh)			57,771,679		
Total electricity generated in 2010-11 (GWh)			237,430		
% of the set of power plants *m*			**24%**		
$EF_{grid,BM,2010-2011}$ (tCO_2/MWh)			**1.0320**		

The calculated build margin for the most recent year is **1.0320 tCO_2/MWh**

STEP 6 Calculate the combined margin emission factor

The combined margin emission factor CM is calculated as follows:

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

Where:

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

Using default values set in the *Tool to calculate the emission factor for an electricity system:* **w_{OM} = 75% and w_{BM} = 25%** for wind and solar power plants.

$EF_{grid,OM,y}$	1.0350 tCO_2/MWh
$EF_{grid,BM,y}$	1.0320 tCO_2/MWh
$EF_{grid,CM,y}$	**1.0327 tCO_2/MWh**

Thus, the grid emission factor in South Africa is calculated as **1.0327 tCO_2/MWh**.

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

Data / Parameter:	**$EF_{grid,CM,y}$**
Data unit:	tCO_2/MWh
Description:	Combined margin emission factor for grid connected power generation in year *y*
Source of data:	Calculated using the "Tool to calculate the emission factor for an electricity system" based on government records / official sources.
Value to be applied:	1.0327
Justification of the choice of data or description of measurement methods and procedures actually applied:	Calculated using the "Tool to calculate the emission factor for an electricity system" based on government records / official sources.

Any comment:	Ex-ante option is chosen: the emission factor is not monitored during the crediting period of each CPA but shall be updated when possible for each CPA inclusion

The emission factor has been calculated based on the following parameters, which will not be reported at CPA level (in CPA-DD):

Data / Parameter:	**$FC_{i,m,y}$**
Data unit:	Mass or volume unit
Description:	Amount of fossil fuel type *i* consumed by power plant / unit *m* in year *y*
Source of data:	Utility or government records or official publications (Eskom)
Value to be applied:	Refer to tables in section E.6.2. and excel file provided at validation
Justification of the choice of data or description of measurement methods and procedures actually applied:	Eskom is the relevant utility for South African grid
Any comment:	Ex-ante option is chosen, this parameter will not be monitored.

Data / Parameter:	**$NCV_{i,y}$**
Data unit:	GJ/mass or volume unit
Description:	Net calorific value (energy content) of fossil fuel type *i* in year *y*
Source of data:	IPCC default values
Value to be applied:	18.9 TJ/Gg for sub-bituminous coal
Justification of the choice of data or description of measurement methods and procedures actually applied:	IPCC default values
Any comment:	Ex-ante option is chosen, this parameter will not be monitored.

Data / Parameter:	**$EF_{CO2,i,y}$**
Data unit:	tCO_2/GJ
Description:	CO_2 emission factor of fossil fuel type *i* used in power unit *m* in year *y*
Source of data:	IPCC default values
Value to be applied:	96.1 tCO_2/GJ for sub-bituminous coal
Justification of the choice of data or description of measurement methods and procedures actually applied:	IPCC default values
Any comment:	Ex-ante option is chosen, this parameter will not be monitored.

Data / Parameter:	**$EG_{m,y}$**
Data unit:	MWh
Description:	Net electricity generated by power plant/unit *m* in year *y*
Source of data:	Utility or government records or official publications (Eskom)

Value to be applied:	Refer to tables in section E.6.2. and excel file provided at validation
Justification of the choice of data or description of measurement methods and procedures actually applied:	Eskom is the relevant utility for South African grid
Any comment:	Ex-ante option is chosen, this parameter will not be monitored.

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

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

Data / Parameter:	**$EG_{facility,y}$**
Data unit:	MWh
Description:	Quantity of net electricity generation supplied by the project plant / unit to the grid during the year *y*
Source of data:	Onsite measurement
Value of data applied for the purpose of calculating expected emission reductions	Determined at CPA level
Measurement procedures (if any):	Electricity meter(s)
Monitoring frequency:	Continuous measurement and at least monthly recording
QA/QC procedures:	Cross check measurement results with records for sold electricity. Maintenance and calibration to be performed in compliance with the relevant standards for electricity metering
Any comment:	-

Data / Parameter:	**$EG_{PJ,Add,y}$**
Data unit:	MWh
Description:	Quantity of net electricity generation supplied to the grid in year *y* by the project plant / unit that has been added under the CPA
Source of data:	Onsite measurement
Value of data applied for the purpose of calculating expected emission reductions	Determined at CPA level
Measurement procedures (if any):	Electricity meter(s)
Monitoring frequency:	Continuous measurement and at least monthly recording
QA/QC procedures:	Cross check measurement results with records for sold electricity. Maintenance and calibration to be performed in compliance with the relevant standards for electricity metering
Any comment:	Applicable in case of capacity addition

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

The purpose of the monitoring plan will be to measure and record the net electricity delivered to the electrical grid. Details of the CPA monitoring plan will be described within each CPA.

Responsibilities
The CME will be responsible for the CDM aspects of the project. The CME may outsource some CDM tasks.
The CPA implementer will be responsible for the operation of the project.

Monitoring management structure
The CPA operator will identify the responsible persons/entities for operations, monitoring, data collection and archiving. The management structure valid at the time of validation will be presented in the CPA-DD. This structure may evolve during the lifetime of the project and should be updated within each monitoring report.

Data collection, transmission and storage
The main data for calculating emission reductions of a CPA is the net electricity supplied to the grid by the power plant/ unit or, in the case of capacity addition, by the project plant/unit that has been added under the project activity.
This data will be monitored by electricity meter(s) and will be cross-checked against the relevant electricity sale receipts (and purchases) and/or records from the grid.
The data measured on site will be collected manually or automatically by the CPA operator or any relevant third party on a regular basis.
The monitored data at each CPA level will be sent to the CME – or its subcontractor as relevant – for centralization and archiving.
The CME or its subcontractor will ensure that each CPA maintain standard records and documentations and will be responsible for centralizing and archiving the monitored data of all CPAs included in the PoA.
The monitored data will be kept for the full crediting period, plus two years after the end of the crediting period or the last issuance of CERs (whichever occurs later).

Maintenance and calibration
Maintenance and calibration of measuring instruments will be carried out periodically and appropriately, according to the procedures, timing and methods recommended by the manufacturer or national/ international standards, as available.

Quality control
General malfunction of equipment: if the equipment fails repairs will be carried out. If the damaged equipment cannot be repaired, it will be replaced at the earliest by the same or an equivalent unit. If necessary and feasible, portable tools will be used in order to carry out monitoring of the missing parameter(s). This data will be recorded manually.
Discrepancies: to avoid discrepancies between projected data in the DDs and actual data, cross-checks between meter readings and external sources (e.g. electricity invoices) will be carried out. Any source of inconsistencies will be clarified.

Emergency

For the case of emergency (earthquakes, explosions, fires etc.), an emergency preparedness plan will be adapted to the project activity. All employees involved in the project on-site will be trained in the code of conduct and required actions at time of commissioning of the plant.

Training
Personnel will be trained on both operational and CDM aspects of the project.
Training will be carried out internally and/or externally, either on site or remotely.
The CME or its subcontractor will provide guidance to the CPA implementing entity on how the monitoring should be conducted and data should be collected with regards to emission reduction calculations.

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

Date of completion of the application of the baseline study: 20/02/2012
Responsible person / entity: Anne-Sophie Zirah / Ably Carbon.
Contact details : 3, rue Pelouze, Paris, France, www.ably-carbon.com

Annex 1

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

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Annex 2

INFORMATION REGARDING PUBLIC FUNDING

The PoA has not received any public funding. Any public funding that may be provided to individual CPA will be described in the corresponding CPA-DD. In case public funding is received for a CPA, an affirmation will be provided that such funding does not result in a diversion of ODA.

Annex 3

BASELINE INFORMATION

Additional information shall be added at CPA level, if relevant.

Annex 4

MONITORING INFORMATION

Please refer to sections A.4.4 and E.7.