COMPONENT PROJECT DESIGN DOCUMENT FORM FOR SMALL-SCALE COMPONENT PROJECT ACTIVITIES (F-CDM-SSC-CPA-DD) Version 02.0

COMPONENT PROJECT ACTIVITIES DESIGN DOCUMENT (CPA-DD)

SECTION A. General description of CPA

A.1. Title of the proposed or registered PoA

>> Energy Efficient Ceratech for Residential, institutional and commercial buildings in Botswana

A.2. Title of the CPA

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Energy Efficient Ceratech for Botswana Development Corporation (BDC) factory shell/commercial buildings in Selebi Phikwe-Botswana- CPA001

A.3. Description of the CPA

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Botswana is a semi-arid to arid country experiencing extreme temperatures as much as over 40 ° Celsius in summer. Steel building materials and metal sheets are widely used for roofing residential houses, school buildings, some office buildings, factories, warehouses and even farm houses. These cladding materials are subjected to these extreme temperatures causing indoor discomfort for occupants of such buildings. In response, HVAC systems and fans are in demand to control the temperature in buildings in Botswana in general and air-conditioning which is really effective for cooling accounts for half to three quarters of the energy (electricity) consumption in buildings in Botswana. Application of a thermal barrier roof coating can reduce demand for HVAC systems to cool such metal clad buildings.

The purpose of the PoA will be to apply reflective ceramic insulating roof coating (Mirutex Ceratech Thermal Barrier Roof Coating) on roofs of residential, institutional and commercial buildings with metal roofing to reduce solar heat gain and lower internal temperatures to comfort levels. The Ceratech will offset use of powered cooling systems and also suppressed demand of energy that would have been required for indoor cooling in summer in buildings. The energy offset by this PoA is electricity on the basis that only HVAC can provide adequate indoor comfort particularly in summer in Botswana. Electricity generated in Botswana is 100% coal-based, hence avoided electricity demand will translate into reductions in greenhouse gases.

CPA 001 will involve application of Ceratech on metallic roofs of 13 factory shell/commercial buildings belong to the Botswana Development Corporation in the town of Selebi Phikwe in NE of Botswana. The roof area to be painted is 109633m^2 (translated to floor area equivalent of 72509m^2).

The factory shells currently do not have any HVAC systems yet the indoor air temperatures are unbearable in summer hence representing suppressed demand. Ceratech is expected to meet that suppressed demand by improving indoor comfort.

The proposed CPA001 is expected to reduce 167662.5 tCO_2 over a 10 year fixed period.

PoA under which CPA001 falls is a voluntary action, not required by law of Botswana and is being promoted and undertaken by AGNA Ventures that is in the business of water proofing. AGNA is the CME and also the proponent for CPA001.

The CPA001 will meet sustainable development criteria set by the Department of Meteorological Services of Botswana which is the DNA for the country. Sustainable development dimensions that CPA001 will meet are as follows:

Social dimension
The introduction of the Ceratech in Botswana will create new employment and training opportunities. Ceratech creates indoor comfort and will prevent heat exhaustion and other heat related illnesses and stresses.

Environmental dimension
Part from reducing greenhouse gas emissions through avoided use of coal based electricity in HVAC systems, Ceratech coating has properties that will restore and prolong the life of metal roofing materials as it prevents rust and has a long time span after application of 20 years

Economic dimension

Botswana currently depends on imported electricity to meet its demand and hence avoided electricity demand on HVAC will also contribute to reducing demand thus reducing costs of investment of power imports and local electricity generation for the country.

The PoA is necessary to move away from the current dependence on coal-based electricity to cost effective energy efficient alternative, Ceratech, which currently is not commonly used in Botswana and the Southern Africa region. This presents an opportunity for wide adoption of a new technology in the country.

A.4. Entity/individual responsible for CPA
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AGNA Ventures, a company duly registered and operating in Botswana will be the coordinating and managing entity (CME) of the PoA and will be responsible for ensuring that all eligible CPA project activities are installed in accordance to the PoA. AGNA Ventures will also ensure development, implementation and execution of the Monitoring Plan for the PoA.

A.5. Technical description of the CPA001
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Ceratech Heat Barrier Coating is a ceramic insulating paint manufactured by Ceratech Holdings in South Africa[1]. The paint when applied on metal roofs has been proven to reduce heat load in buildings at a recommended thickness of coating of 500 micron (µm) wet thickness and 375 micron dry thickness.

[1] www.ceratechcoatings.co.za

The Ceramic radiant heat barrier coating is a liquid insulation consisting of ceramic beads that provides thermal and acoustic insulation. Ceratech reflects up to 75% heat in the direction of the source, allowing little heat transfer into the building therefore reducing the temperature inside buildings by up to 45%. Unpainted metallic roofs that tend to be darker reflect only 10 to 20% of sunlight hence demanding high energy for Air Conditioning due to high heat build up in the roof space. Ceratech furthermore has an ultraviolet resistance of 96%, a solar reflectance of over 80%, and an emissivity of 90%; and reduces roof degradation by up to 80%.

The application of Ceratech radiant heat barrier coating on roof coverings is a simple cost effective, energy efficient, passive cooling system that could be widely used to cool the built environment.

The PoA, under which CPA001 falls, is based on the premise that when metal roofed buildings are coated with Ceratech, they will not require to use air-conditioning both in Summer and Winter. Current usage of electricity for air conditioning in residential, institutional and commercial buildings is based on the standards used for determining the size of HVAC needed for various sizes of rooms' floor spaces, type of roofing, occupancy and location with regard to exposure to the sun (http://www.ehow.com/). By converting the painted roof surface area to equivalent building floor surface area, it will be possible to estimate the equivalent HVAC capacity size that would be needed for that floor area and hence the kWh that would have been required without Ceratech coating.

A.6. Party(ies)

The entity responsible for CPA001 is AGNA which is also the CME.

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)
Botswana	AGNA Ventures	No

A.7. Geographic reference or other means of identification

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The coordinates of the CPA001 are Latitude 22.5°S and Longitude 28°E within Botswana close to the border with South Africa and Zimbabwe. The boundary of the CPA001 is the BDC site for the Factory shells/commercial buildings. The 13 factory shell buildings will each be allocated a unique number and surface area painted with Ceratech and date of such painting as indicated on the AGNA quotation and Invoice to BDC.

A.8. Duration of the CPA
A.8.1. Start date of the CPA
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The starting date for the CPA001 is when Ceratech application on factory shell starts

A.8.2. Expected operational lifetime of the CPA
>>
20 years

A.9. Choice of the crediting period and related information
>> A Fixed Crediting Period of 10 years

A.9.1. Start date of the crediting period
>>
1st January, 2013, this is the expected date by which Registration will have been completed

A.9.2. Length of the crediting period
>> 10 years

A.10. Estimated amount of GHG emission reduction

For the fixed crediting period of 10 years adopted, CPA001 is expected to generate 167662.5 tCO2 as per the table below

Year	Emission reductions ($t CO_2e$)
Year 1	**16762.2**
Year 2	16766.7
Year 3	16766.7
Year4	16766.7
Year 5	16766.7
Year 6	16766.7
Year 7	16766.7
Year 8	16766.7
Year 9	16766.7
Year 10	16766.7
Total	167662.5
Annual average over crediting period	16766.25

A.11. Public funding of the CPA
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CPA001 will not receive public funding from Parties included in Annex 1 of the UNFCCC.
AGNA is providing services of painting factory shells using Ceratech and BDC is paying for the services.

A.12. Debundling of small-scale component project activities
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The CPA is not a debundled component of another project activity as this is a unique contract by BDC for this time in that part of Botswana. CPA001 in accordance with Modalities for Small Scale CDM project does not exceed 60GWh per year.

A.13. Confirmation for CPA
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CPA001 is not registered as part of another PoA nor is it part of a registered CDM project activity. AGNA that is the only company applying this technology in Botswana has no record of CPA001 as having been implemented before as a CDM project activity of PoA component project activity.

SECTION B. Environmental analysis
B.1. Analysis of the environmental impacts
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The CPA is exempt from EIA as per the letter of Exemption provided by the Department of Environmental Affairs of Botswana.

The following considerations in relation to use of Ceratech are to be observed in accordance with the letter of exemption.

- Appropriate measures should be taken to ensure proper waste disposal during project implementation;
- No waste shall be buried or disposed off at the projects sites;
- Appropriate measures should be taken to raise environmental awareness among staff for the protection of the environment;
- Appropriate measures should be taken to avoid the risks of soil, air and water pollution as may be caused by the project;
- Workers should be provided with protective clothing;
- The emergency response procedures attached to the application forms must be complied with during implementation;
- The project operator should ensure that spectators are kept away during spraying the paint and all spillages must be attended to immediately;
- Where the paint comes into contact with the skin, the affected skin should be washed with soap and water and a physician must be consulted if irritation occurs and persists.
- Communities living within and around the proposed project sites should be informed of the impending development so that in the event new issues arising, appropriate mitigation measures are put in place to address them;

SECTION C. Local stakeholder comments
C.1. Solicitation of comments from local stakeholders
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These were done at PoA level and indicate no objection to application of Ceratech on metallic roof surfaces

C.2. Summary of comments received
>>
Not applicable

C.3. Report on consideration of comments received
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Not applicable

SECTION D. Eligibility of CPA and Estimation of emissions reductions
D.1. Title and reference of the approved baseline and monitoring methodology(ies) selected:
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The small scale baseline and monitoring methodology used for the CPA is AMS II.E Version 10 (***II.E. "Energy efficiency and fuel switching measures for buildings."***

D.2. Application of methodology(ies)
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AMS.IIE version 10 is applicable to CPA001 under this PoA since the methodology mentions application for measure, such as such as efficient appliances, better insulation[2]and optimal arrangement of equipment that is implemented at a single building, which may include a commercial, institutional or residential building, or group of similar buildings, such as a school, district or university.

- The CPA001 comprises application of Ceratech coating to metallic building roofing, which is a better insulation measure (*paragraphs 1, AMS II.E Version 10*) in accordance with the PoA for this project.
- CPA001 individually does not exceed the applicable SSC equivalent of 60 GWh per year, stipulated in the Modalities for Small Scale Project activities.

The energy baseline consists of the energy use of the minimum service equipment in this case HVAC that is avoided in terms of suppressed demand or replaced in the case of retrofit measures and avoided in the case of a new facility. The energy form in the emission baseline is multiplied by electricity grid emission coefficient calculated in accordance with provisions under category AMS.I.D (version 17), which in turn uses the "Tool to calculate the emission factor for an electricity system" (ver. 2.2.1-EB63). Botswana is part of the Southern African Power Pool (SAPP) grid for which a grid emission factor has been determined and this is the emission factor that has been used for this PoA.

[2] Under which Ceratech has been classified for this PoA.

D.3. Sources and GHGs

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The physical boundary for CPA001 is the site of the BDC factory Shells in Selebi Phikwe and the Botswana national electricity grid (which is also part of the Southern African Power Pool grid.

The GHG reduced through the CPA001 is mainly CO_2 for the baseline emissions. The reduction takes place through the avoidance of fossil fuels (predominantly coal) used in the production of electricity for air conditioning in buildings, in the absence of the CPAs. For the project GHG emissions, CO_2, CH_4 and N_2O from combustion of gasoline used for incremental transport to the site of CPA001 have been considered.

D.4. Description of the baseline scenario

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The baseline scenario of CPA001 is premised on demand for electricity from the grid that would have been required to provide air-conditioning in factory shells. The minimum service level to meet preferred air-conditioning that can provide indoor comfort in summer is provided by HVAC equipment. Use of all other alternatives such as fans, ventilations, ceiling insulations is not effective.

Currently the factory shells do not have HVAC equipment and thus occupants bear the brunt of severe summers temperatures. The baseline scenario is also based on suppressed demand, which refers to a state where current levels of access to energy services, before any CDM intervention, are inadequate because of income or infrastructure constraints, thus not reflecting real demand for energy services that can achieve adequate indoor comfort. The paragraph 46 of the CDM Modalities and Procedures states that “the baseline may include a scenario where future anthropogenic emissions by sources are projected to rise above current levels, due to the specific circumstances of the host Party.” Hence the baseline refers to a situation that would occur, if suppressed demand did not exist.

For purpose of CPA001 only energy offset in the 7 months of summer have been calculated ex-ante baseline GHG emissions, as Ceratech is well demonstrated to reach indoor comfort for cooling. The annual stretch is from September to March, when temperatures in Botswana can soar to 40°C or more and this is the period for which CERs will be claimed in each year of the crediting period. Although Ceratech also moderates winter indoor temperatures, this is not being claimed as a conservative approach.

D.5. Demonstration of eligibility for a CPA

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The CPA001 is unique as defined by the contract between AGNA and BDC.
Eligibility of the CPA001 is demonstrated in the Table below:

Eligibility Criteria	Status of CPA001
1. Application of Baseline and Monitoring methodology AMS.II.E Version 10 or later	Yes
2. Additionality conditions stipulated for the PoA	Yes
3. Type of buildings in this case residential, institutional and commercial buildings with metal roofing	Factory Shells are commercial buildings
4. Ceratech products that have also passed South Africa bureau of Standards (SABS) and satisfies SANS 940.2005 for emulsion of roof paints, passed ASTM C1055-99 standards for protection from burn injuries, ASTM C236 and ASTM C518-85. The products is also being examined for passing by the Bureau of Botswana Standards (BOBS)	Ceratech Product to be used at factory Shells is approved by SABs
5. CPA shall neither be in another PoA nor registered as a standalone project activity	Yes AGNA has verified that
6. Owners of buildings shall cede their rights of the CERs to AGNA	Letter to that effect will be obtained by AGNA that BDC will not make any claim to the CERs generated
7. All buildings or cluster of buildings where CPA is implemented will have electricity	Yes electricity exists at the factory Shells
8. CPA shall be approved by AGNA before included in the PoA.	Yes approved

AGNA as the CME has ensured that the CPA001 complies with the full eligibility criteria.

The barriers for individual CPA001 are identical to the PoA. In accordance with the "Attachment A to Appendix B" of the simplified modalities and procedures, the following barriers have been identified for the CPAs:

The barriers to applying Ceratech as part of the baseline are presented below.

Barrier Analysis

The application of Ceratech as an alternative is hampered by a number of barriers, namely;

a. Limited Information barrier;

The lack of awareness of Ceratech radiant heat barrier coating and its energy efficiency benefits, especially in the poor segment of property owners has hindered the uptake of Ceratech passive cooling technology. AGNA Ventures has for the past 4 years been marketing the product through various fora including exhibitions and the market is still slowing growing. Whilst AGNA could use other roof coatings, the thrust to market the product have also been prompted by the opportunity to gain from carbon offsets that the Ceratech can achieve compared to the other coatings. AGNA Ventures has been promoting use of Ceratech as a CDM project candidate for the past 2 years.

b. Financial barrier:

The Ceratech heat barrier coating has high upfront costs compared to the other coatings that are in use which is another barrier for the adoption of the technology. AGNA Ventures is having to consider passing some of CER benefits to its customers to lower cost of the coatings and to create a market for Ceratech. Ceratech currently costs in the range of BWP[3]44-49/m^2 compared to BWP 33-38/ m^2 for the conventional roof paintings which is a 30% additional cost.

c. Technological barrier;

Lack of skills to apply the paint is another barrier that is limiting penetration of the technology, as special equipment, skills and calibration of equipment is required to be able to apply a consistent layer of Ceratech on roof surfaces. AGNA Ventures has organized special training for its staff to be able to apply Ceratech as part of this PoA.

d. **Competition**

Competition from cheaper and less efficient coatings is also a constraint in uptake of Ceratech radiant heat barrier coating, as consumers of the alternative coatings have not appreciated the energy saving benefits offered by Ceratech.

To get contract for CPA001 AGNA undertook the following:

1. Aggressive marketing,
2. Acquisition and providing coating services for the Ceratech;
3. Training the technicians to apply quality Ceratech coating;
4. Educational communication and awareness campaigns in order to intensify the acceptability and demand for Ceratech coatings.
5. Persuaded BDC to take the Ceratech alternative on the basis of AGNA arguments for energy savings.

Common practice analysis.

Ceratech is not common practice in Botswana and AGNA Ventures is still promoting the product in Botswana and there are no similar products that have proved to have similar energy efficiency properties as Ceratech that are already in use in the country. AGNA Ventures is currently the only company that is promoting the Ceratech product in Botswana

D.6. Estimation of emission reductions

D.6.1. Explanation of methodological choices

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The baseline scenario is the electricity that will be offset from the national grid to power HVAC equipment in the factory Shells with metal roofs that are to be painted with Ceratech.

[3] June 2012 US$1=BWP7.5

The baseline emissions are the product of electrical energy baseline $EG_{BL,y}$ expressed in MWh of electricity offset from the grid multiplied by the grid emission factor in accordance with AMS.I.D which is referenced in AMS.II.E for calculation of baseline emissions.

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

Where:

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

$EG_{BL,y}$, the electricity that will be offset by the Ceratech coating has been calculated backwards from the surface area that is coated with Ceratech. That roof surface will be adjusted to floor area using the formula below.

Roof Area (RA) m^2	**Floor Area (FA) m^2**
RA	RA/1.08/1.4
109633	72509

Air conditioning companies in Botswana use a similar formula to estimate the capacity size of HVAC equipment for a particular room of a surface floor size. That floor area is translated into HVAC BTU equivalent based on 650 BTU/m^2. The BTUs are then transferred to kW equivalent (Appendix 3). The avoided HVAC equipment would have operated for 1272 hours per year (6[4] hours per day for 5 days a week and 7 months a year).

$EF_{CO2,grid,y}$, the emission factor has been calculated in a transparent and conservative manner basing on the "Tool to calculate the Emission Factor for an electricity system (version 2.2.1)". Table 4 summarizes the Operation Margin (OM), Build Margin (BM) and Combined Margin (CM) values that were calculated for the SAPP grid to which Botswana belongs (UNEP study)[5]. The value approved for all projects other than wind or solar projects is 0.9644 tCO_2/MWh and that is the Grid emission factor that has been adopted for CPAs under this PoA-DD[6].

The parameters and values for equation 1 are presented in the table below.

[4] Factory shells/commercial buildings normally operate for 8 hours per day but 6hours has been chosen to be conservative.

[5] CDM-EB73-A03-2013. This SAPP GEF is conservative for Botswana that individually had a higher emission factor of 1.0824 in tCO_2/MWh

[6] **UNEP Risoe Center Analysis on Grid Emission Factors for the Electricity Sector in Sub-Saharan Africa The Case of the Southern African Power Pool**

Parameter	Description	Value
BE_y	Baseline emissions tCO_2 for year y	16766.7
EG_y	Energy baseline in year y (MWh)	17385.63
$EF_{CO2, grid, y}$	Grid Emission factor tCO_2/MWh	0.9644

Emission reduction ER_y are represented by the equation below

$$ER_y = BE_y - PE_y - LEy$$

Where

- BE_y are the baseline emissions estimated as described above
- PE_y- are project emissions-resulting from application of Ceratech
- LE_y- leakage emissions in the event that some existing equipment no longer in use when Ceratech is applied are transferred for use in other locations

The project GHG emissions due to incremental transport to Selebi Phikwe from Gaborone (400 km one way) have been calculated ex-ante (Appendix 3) the transport emissions have been determined from kilometres, average fuel consumption per 100km and energy and carbon content of gasoline which is the fuel AGNA uses. The conversion factors are in accordance to IPCC 2006 Guidelines.

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

Data / Parameter	EG_m^2
Unit	kWh/m^2/year
Description	Electricity consumption avoided by energy efficiency- Ceratech per square metre painted
Source of data	Estimated from standard sizes for HVAC equipment and operating hours
Value(s) applied	Residential- low cost= medium cost= 160.8 kWh/m^2 Institutional & Commercial=240 kWh/m^2
Choice of data or Measurement methods and procedures	Was done through comprehensive sampling of building types and floor sizes and using established parameter values
Purpose of data	To derive total electricity offset by each CPA through application of Ceratech.
Additional comment	

Data / Parameter	$EF_{CO_2,grid,y}$
Unit	t-CO_2/MWh.
Description	Grid emission factor that will be used to derive emission reductions from the avoided HVAC electricity consumption/demand
Source of data	CDM-EB73-A03
Value(s) applied	0.9644
Choice of data or Measurement methods and procedures	Derived using Tool to calculate the Emission Factor for an electricity system (version 2.2.1)"-EB63. The data value will only be changed after revision and resubmission
Purpose of data	To derive emission reductions for electricity offset from the national/SAPP grid.
Additional comment	

Data / Parameter	$F_{roof-floor}$
Unit	Number
Description	Converting roof surface to building floor surface area
Source of data	Ceratech website- www.ceratechcoatings.co.za
Value(s) applied	0.66
Choice of data or Measurement methods and procedures	Provided by the provider of Ceratech and hence is considered reliable
Purpose of data	HVAC is based on building floor surface area-so the roof painted should be converted to floor area first to derive avoided HVAC capacity (BTU).
Additional comment	

Data / Parameter	$F_{btu-kwh}$
Unit	Number
Description	Converting BTU to kW capacity of air conditioning
Source of data	Botswana HVAC service providers- http://www.ehow.com/
Value(s) applied	0.00029kW/BTU
Choice of data or Measurement methods and procedures	Provided by the Botswana HVAC installation companies and hence considered relevant for the country
Purpose of data	Transform HVAC capacity to electricity equivalent capacity.
Additional comment	

Data / Parameter	$kgCO_2$/fuel type used
Unit	Kg or tonnes
Description	Converting incremental transport distances to CO_2 equivalent
Source of data	IPCC 2006 Guidelines
Value(s) applied	Will depend on whether it is petrol or diesel
Choice of data or Measurement methods and procedures	Standard for petroleum products in IPCC emission factors
Purpose of data	Calculate project emissions due to incremental transport to sites where Ceratech will be applied.
Additional comment	

D.6.3. Ex-ante calculation of emission reductions

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The calculation of the emission reductions for baseline and project emissions in presented below.

Baseline emissions tCO2 eq	
Commercial- Factory shells	**Value**
commercial roof area m^2	109633
Floor area equivalent- m^2	72509
BTU/m^2	650
total BTU	47130850
kW/BTU	0.00029
kW equivalent	13667.95
operating hours per year	1272
MWH equivalent	17385.63
tCO_2/MWh	0.9644
Baseline emissions tCO_2 eq	**16766.7**
ER first year	**16762.2**

Project emissions	Value
total distance (km)- 3 trips of 400km 1-way	2400
consumption Litres at 10litres/100km	240
MJ/litre-gasoline	34.8
kgCO_2/GJ	541.9
tCO_2 in first year of painting	**4.5**

D.6.4. Summary of the ex-ante estimates of emission reduction

Year	Baseline emissions (t CO_2e)	Project emissions (t CO_2e)	Leakage (t CO_2e)	Emission reductions (t CO_2e)
Year 1	16766.7	4.5		**16762.2**
Year 2	16766.7			16766.7
Year 3	16766.7			16766.7
Year4	16766.7			16766.7
Year 5	16766.7			16766.7
Year 6	16766.7			16766.7
Year 7	16766.7			16766.7
Year 8	16766.7			16766.7
Year 9	16766.7			16766.7
Year 10	16766.7			16766.7
Total	167667.0	4.5		167662.2
Total number of crediting years	10			
Annual average over the crediting period	16766.7	0.45		16766.2

D.7. Application of the monitoring methodology and description of the monitoring plan
D.7.1. Data and parameters to be monitored
(Copy this table for each data and parameter.)

Data / Parameter	RA
Unit	m^2
Description	Roof Area of metal roof painted with Ceratech
Source of data	Measured
Value(s) applied	To be determined
Measurement methods and procedures	Measured using measuring tape
Monitoring frequency	At time of painting
QA/QC procedures	Verify with building floor measurement
Purpose of data	To determine equivalent energy offset by avoiding HVAC equipment.
Additional comments	This is the main parameter needed to calculate avoided HVAC capacity and then electricity consumption avoided

Data / Parameter	D
Unit	Km
Description	Distance travelled to and from location of building painted Ceratech
Source of data	Measured
Value(s) applied	To be determined
Measurement methods and procedures	Speedometer
Monitoring frequency	At time of travelling to undertake painting
QA/QC procedures	Verify with distance maps
Purpose of data	To determine Project emissions.
Additional comments	This parameter is to be coupled with fuel consumption of vehicle used e.g. litres/100km and default value of $kgCO_2$/fuel type

D.7.2. Description of the monitoring plan
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The monitoring plan for CPA001 will ensure correct/reliable HVAC use avoided and when comfortable indoor are temperatures are achieved in accordance with application of the methodology and the defined variables for purpose of deriving CERs.

The key parameter to be measured is the surface of roof painted and the roof should be painted to a consistent thickness to ensure consistent performance of the coating for off-setting heat gains. This will be ensured by using calibrated spray painting equipment. Calibration will be done prior to painting on each metal surface at CPA sites.

AGNA will deploy trained technicians to apply Ceratech at the factory shells and monitor when Ceratech has provided tolerable indoor comfort for a certain range of temperatures (18°C to 30°C)[7] and the instances when temperatures will be too high or too low to have required HVAC cooling support. The installed thermometers will record times when temperatures are about 18-30°C range and adjust ex-ante GHG emission reductions. Such monitoring of extreme cases will be coupled by checking meteorological data of extreme temperatures that may have occurred.

The Monitoring plan will allow checking the operating times in factory shells for which HVAC would have been needed. These times will be based on the operating hours of the buildings when the HVAC equipment may be needed. Actual operating hours will be used to adjust the ex-ante GHG emissions reductions.

AGNA will also install an infra red thermometer that will also track the indoor temperatures to verify if the Ceratech coating is achieving the required indoor comfort as expected. Similarly the times temperatures are below or above comfortable levels (18-30°C) will be used to adjust operating hours and hence the ex-ante GHG emissions reductions.

AGNA will keep a record of all the data that are captured for CPA001 that will be uniquely identified. This will enable determining the baseline emissions and hence the emission reductions of that CPA.
Some important data items to keep in the database are:

	Monitored items	**Frequency**
1.	Unique identification number of CPA 001 or contract number	Once at start
2.	Date when Ceratech was applied	Once at completion
3.	Size of roof surface coated with Ceratech (RA)	Twice at quotation and invoice stage
4.	Measured indoor temperatures	Hourly in Summer(September to March)
5.	Days and hours when additional system would be needed to moderate indoor temperature to acceptable comfort levels	Derived from item 4
6.	Operating hours of the buildings covered by the CPA	90/10 sampling times
7.	Daily outdoor temperature recorded by the Meteorological Services	When deriving item 5-annually

AGNA will ensure that all these data to be monitored are collected and archived appropriately by skilled members of staff. Where building owners are tasked to record any data, AGNA shall follow up to ensure that those data are reliably collected.

[7] Source: Poor People's Energy Access, 2012

Where sampling of monitoring procedure is adopted, a 90/10 rule shall apply e.g. for monitoring indoor air temperatures of the 13 factory shell buildings.

Responsibilities

AGNA is the CME and is also the SSC-CPA representative for CPA001 at the start of the implementation of the PoA. This means that AGNA will do the following:

- Registration of the SSC-PoA with UNFCCC CDM Executive Board.
- Inclusion of SSC-CPA-001 to the SSC-PoA upon satisfaction of the eligibility criteria stipulated in the SSC-PoA-DD.
- Official communication with the CDM–EB, DOE and Botswana DNA.
- Prepare database of all CPAs including CPA001
- Selection of monitoring survey for the buildings.
- Allocation of CERs to the building owners, when such there are such agreements.

For data collection that will require participation of CPA001's building owners, AGNA shall develop a data collection template, that will be left with the building owners at the time of applying Ceratech coating Such a template is to ensure consistent, reliable and transparent data collection, which includes at least detailed instructions on data collection procedures and the related data forms that are used for the data collection during Survey(s). Procedures that are applied are to ensure a sufficient level of quality assurance.

All the building owners' staff members to be involved in implementing the CPA001will be trained before the start of the relevant monitoring steps and there should be evidence of such training having taken place.

SECTION E. Approval and authorization

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

Organization	AGNA Ventures
Street/P.O. Box	Box 50092
Building	Fair grounds Mall
City	Gaborone
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Appendix 2: Affirmation regarding public funding

No public funding from Annex I countries has been received for this PoA except for the support to develop this PoA-DD from an EU capacity Building project.

Appendix 3: Applicability of the selected methodology(ies)

Project emissions	**Values**	**Comments**
total distance (km)- 3 trips of 400km 1-way	2400	
consumption Litres at 10litres/100km	240	
MJ/litre-gasoline	34.8	
kgCO2/GJ	541.9	
tCO2 in first year of painting	**4.5**	
Baseline emissions tCO2 eq	**Values**	**Comments**
Commercial- warehouse	**Area**	
commercial roof area m2	109633	
Floor area equivalent- m2	72509	
BTU/M2	650	
total BTU	47130850	
kW/BTU	0.00029	
kW equivalent	13667.9465	
operating hours per year	1272	
MWH equivalent	17385.62795	
tCO2/MWh	0.9644	**approved for SAPP Grid by CDM EB73-A03**
Annual Baseline emissions tCO2 eq	**16766.69959**	
ER first year	**16762.2**	

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

Type of Building	Site Position	Total No buildings	Roof Area (m2)	Floor area (m2)
Commercial Factory Shells	La 22.5°S Long 28°E	13	109633	72509

1.

2.

3.

1.

Appendix 5: Further background information on monitoring plan

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 component project design document form for small-scale component project activities" (EB 66, Annex 17).
01	EB33, Annex44 27 July 2007	Initial adoption.
Decision Class: Regulatory **Document Type:** Form **Business Function:** Registration		