



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

PROGRAMME OF ACTIVITIES DESIGN DOCUMENT (PoA-DD)

PART I. Programme of activities (PoA)

SECTION A. General description of PoA

A.1. Title of the PoA

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

Version Number of Document 1.1

30th June, 2012.

A.2. Purpose and general description of the PoA

Botswana is a semi-arid to arid country experiencing extreme temperatures as much as over 40 ° Celsius in Summer and as -5 ° Celsius in Winter. 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 consumption in buildings in Botswana and this can be much higher in commercial buildings.

Low cost houses and some schools have uncomfortable working environments and they cannot afford the powered cooling systems, representing suppressed demand. Commercial warehouses and some industrial offices also do not have effective cooling systems. Such demand is expected to increase when higher temperatures are experienced as a result of climate change.

The PoA will apply reflective ceramic insulating roof coatings (Ceratech Thermal Barrier Roof Coating) on roofs of such commercial, residential and institutional buildings in different settlements (cities, towns and villages) located in the 10 Districts of Botswana, 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 and warming the buildings. The energy offset by this PoA is assumed to be electricity currently generated from coal.

The stated goal of the PoA is to introduce cost effective energy efficiency in buildings in Botswana and to enable those who cannot afford HVAC systems to enjoy indoor comfort and be able to be productive in hot Botswana. This is against the backdrop of contributing to alleviating the shortage of power in Botswana and the region that has been experiencing power deficit since 2007. Besides, the power on which Botswana depends on is all generated from coal within the country and even from the imports that originate largely from the coal-based South African grid.



The PoA is necessary to move away from the current dependence on coal-based electricity to cost effective energy efficient alternatives such as Ceratech, which currently is not commonly used in Botswana and the Southern Africa region. Apart from avoided energy consumption and GHG emissions, the PoA has several sustainable development gains that include, reducing costs of investment of power imports to meet demand in Botswana as the country currently imports 70% of its electricity demand. 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 (20 years). 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.

The PoA 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.

A.3. CMEs and participants of PoA

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.4. Party(ies)

Name of Party involved (host) indicates a host Party	Private and/or public entity(ies) project participants (as applicable)	Indicate if the Party involved wishes to be considered as project participant (Yes/No)
Botswana	AGNA Ventures	No

A.5. Physical/ Geographical boundary of the PoA

The PoA will cover all settlements within the boundaries of Botswana where Ceratech will be applied on buildings with steel/metal roofing.



Each CPA shall consist of quantities of surface area of metal roofing that will be coated with Ceratech on the various types of buildings in the residential or institutional or commercial categories, within the confines of Botswana.

A.6. Technologies/measures

Ceratech Heat Barrier Coating is a ceramic insulating paint manufactured by Ceratech Holdings in South Africa¹. The paint when applied on metal roofs has been proven to reduce heat load in buildings at a recommended thickness of coating of 500micron (μm) wet thickness and 375 micron (μm) dry thickness.

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

¹ www.ceratechcoatings.co.za

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 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 for cooling and Winter for space heating. 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.

All painting with Ceratech will be done by AGNA (Picture 1) that has already experience applying it. In the event that other contractors participate in the PoA as CPAs, then AGNA will first train them and verify if the coating has been properly applied.



Picture.1. AGNA coating a metallic roof with Ceratech

Where AGNA paints various types of building roof surfaces, the CPA can be a cluster of such painted surfaces from different types of buildings. A Component Programme of Activity will thus be an area of surface painted at a single building or a number of buildings either of one type of building (e.g. residential) or a combination of building categories (residential and/ or institutional and/or, commercial) contracted at once. The CPA will also include existing buildings and new buildings.



To date AGNA the sole promoter of Ceratech, has coated an estimated 220,000 square metres of roof surface for all types of buildings that include residential, institutional, commercial, industrial and agricultural in the last years averaging 40000 square meters per year; the largest share of the painting being for commercial buildings (Table 1).

Table 1 Area so far painted by AGNA on the various types of buildings

Building Type	Area m ² January 2007 to June 2012	Area per month -m ²	Area per year--m ²
Residential -	8,538.13	130	1557
Institutional -	1,415.50	22	258
Commercial -	187,604.34	2851	34214
Industrial -	14,470.00	220	2639
Agricultural -	6,838.80	104	1247
TOTAL	218,866.77	3326	39915

Considering the vast numbers of residential, institutional and commercial buildings in the country, this level of painting is negligible so far.

It is expected that the PoA will stimulate the market for Ceratech Botswana and the related training for delivery of the service in Botswana.

A.7. Public funding of PoA

The development of the PoA-DD is being supported by the EU CDM project “Capacity Building related to Multilateral Environmental Agreements (MEA) in African, Caribbean and Pacific (ACP) Countries”. The implementation of the PoA and related CPAs will however be fully funded through debt and equity by AGNA Ventures.

SECTION B. Demonstration of additionality and development of eligibility criteria

B.1. Demonstration of additionality for PoA

The additionality test for Ceratech PoA is based on the “**Tool for the demonstration and assessment of additionality.-(Version 06.0.0)**. In accordance with paragraph 28 of the “Simplified modalities and procedures for small scale CDM project activities”, the small-scale project activity must demonstrate at least one of the barriers listed in Attachment A to Appendix B of the Simplified modalities and procedures, due to which the project activity would not have occurred in any case. In this respect, the following barriers have been identified for this PoA.

There are several alternatives to achieving indoor comfort that are being practiced in Botswana that include use of fans, ceiling fibre glass insulation, other roof coatings, roof ventilators and HVAC equipment, all of which are consistent with mandatory laws and regulations of Botswana.

Use of fans is not effective in Summer as it creates hot drafts that create discomfort during Summer when temperatures are higher than 30°C. Roof insulation materials such as fibre glass are used in low and medium Botswana Housing Cooperation (BHC) houses and their effect on indoor comfort is not effective particularly in Summer as only less than 10-20% reduction in indoor temperatures can be realized. Similarly the other roof coatings have lower performance than Ceratech. Roof ventilators provide relief from heat build-up, allowing rising heat to escape and drawing in fresh air. While ventilators and roof vents do provide for the release of stale air from buildings and the ingress of fresh ambient air, unfortunately, the ambient air temperature may be stifling and, combined with heat drawn in through the existing roofing material, could result in an unbearable working environment or a cooling system working overtime to cope. Though all these alternatives have been tried they would not be enough to eliminate air-conditioning or to decrease the indoor temperature to comfortable levels.

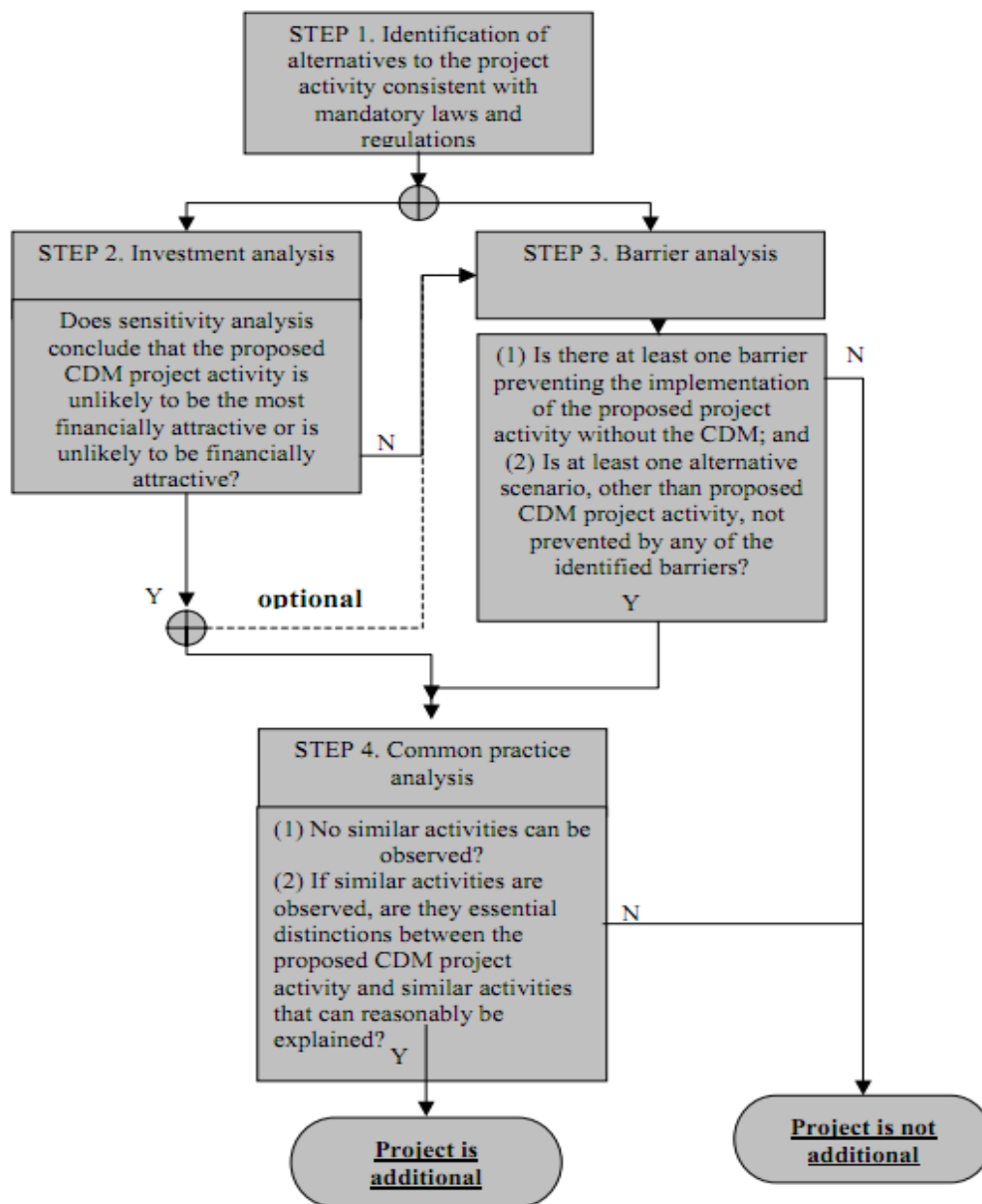


Fig 1: Steps for proving Additionality



Consideration of these baseline alternatives would point to HVAC as the baseline that would provide the needed indoor comfort. Whilst the other alternatives provide some form of relief, it has been proven to be in-adequate to provide the necessary indoor environment. If low cost house owners could afford air conditioning they would also have opted for that option. This is being adopted as the **minimum service level** for this PoA.

Empirical evidence derived in monitoring indoor comfort using Ceratech has shown that where the paint is applied on metal roofs of buildings, there is no need to use air conditioning particularly in Summer for cooling. This has been demonstrated institutional buildings with metal roofs. There are however barriers to applying Ceratech as part of the baseline as demonstrated by the additionality test for Ceratech based on barrier analysis below².

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 slowly growing. Whilst AGNA could use other roof coatings, the thrust to market the product has also been spearheaded by the opportunity to gain credits 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. This sharing of CERs is now part of AGNA's marketing strategy. Ceratech currently costs in the range of BWP³44-49/m² compared to BWP 33-38/ m² for the conventional roof paintings.

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 to organize 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.

² Barrier analysis is sufficient to prove additionality of small scale projects

³ June 2012 US\$1=BWP7.5



For the PoA to go ahead under CDM, AGNA will therefore need to undertake the following:

1. Marketing, acquiring and providing coating services for the Ceratech;
2. Training the technicians to apply quality Ceratech coating;
3. Educational communication and awareness campaigns in order to intensify the acceptability and demand for Ceratech coatings.
4. Persuade building owners to take the Ceratech alternative by offering to share some of the carbon benefits with the owners.

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

Each CPA will demonstrate additionality within a CPA-DD following this stepwise approach.

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

There is no mandatory requirement for the implementation of energy efficient roof coatings in Botswana.

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

There is no mandatory requirement for the implementation of energy efficient roof coatings in Botswana and the building regulations of Botswana do not mention such roof painting or insulation as a requirement for buildings in Botswana (Chapter 65:02 Building Control⁴)

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

The eligibility criteria for the inclusion of a CPA in a PoA are as follows:

Each CPA must meet the eligibility criteria of Small Scale methodology that is applicable to this PoA, namely AMS I.E Version 10 “***II.E. Energy efficiency and fuel switching measures for buildings***”. The Methodology comprises any energy efficient and fuel switching measure implemented at a single building, such as a commercial, institutional or residential building, or group of similar buildings, such as a school, district or university. This category covers project activities aimed primarily at energy efficiency⁵; Examples include technical energy efficiency measures (such as efficient appliances, better insulation⁶ and optimal arrangement of equipment) and fuel switching measures (such as switching from oil to gas). The technologies may replace existing equipment or be installed in new facilities. The aggregate energy savings of a single project may not exceed the equivalent of 60 GWh per year. In this

⁴ <http://www.bing.com/search?q=Botswana+Building+Regulations&form=MSNH14&qs=n&sk=&pc=skyp>

⁵ a project activity that involves primarily fuel switching falls into category III.B.1

⁶ Ceratech falls in better insulation category



case energy efficiency through better insulation using Ceratech will be applied to either roof surfaces of a single building or cluster of buildings-residential, institutional and commercial. Such buildings shall either be existing or new. Where the avoided electricity consumption of a single CPA exceeds 60GWh/year, then in that case 60GWh/year will be the cap of avoided electricity for which the baseline emissions will be claimed.

In determining the GHG emissions due to avoided electricity consumption for air conditioning in various houses, the “Tool to calculate the emission factor for an electricity system” (ver. 2.2.1-EB63) shall be applied.

- Each CPA will demonstrate the additionality of the CPA according to section B1
- Each CPA must implement the operational and management plan as detailed in Section C of this PoA.
- Each CPA must provide, monitor and collect data as specified by the parameters as listed in sections E.6.2 and E.7.1 related to the type of buildings involved.

The CME will ensure that all CPAs for this PoA are neither registered as an individual CDM project activity nor included in another registered PoA. The CPA representative will sign that declaration in relation to this PoA

Each CPA shall be uniquely identified within a database of all CPAs maintained by the CME under this PoA. Therefore the following data must be provided to the CME prior to inclusion in the PoA:

- a. Name of the CPA-represented by contract number
- b. Name of the implementing entity of the CPA, if not AGNA;
- c. Contact details of the implementing entity including contact person, address, telephone and email address; if not AGNA
- d. Types of building or cluster of buildings for which Ceratech painting will be applied;
- e. Area of total surface to be painted for each building type or cluster of buildings and building specifications of each CPA;
- f. Location of the CPA (GPS coordinates of the building or cluster of buildings) within Botswana;

B.3. Application of methodologies

The approved small scale baseline and monitoring methodology used is AMS I.E Version 10 “***I.E. Energy efficiency and fuel switching measures for buildings***”. This is applicable as it mentions application for measure that is implemented at a single building, such as a commercial, institutional or



residential building, or group of similar buildings, such as a school, district or university. This category covers component project activities that include technical energy efficiency measures (such as efficient appliances, better insulation⁷ and optimal arrangement of equipment). The technologies may replace existing equipment or be installed in new facilities as long as the aggregate energy savings of a single CPA will not exceed the equivalent of 60 GWh per year, as stipulated in Simplified modalities and procedures for small scale CDM project activities”.

The energy baseline consists of the energy use of the existing 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 an emission coefficient and in this PoA it is the electricity avoided or displaced. The emission coefficient is calculated in accordance with provisions under category I.D, which in turn uses the “Tool to calculate the emission factor for an electricity system” (ver. 2.2.1-EB63)

SECTION C. Management system

The CME- AGNA will be in charge of the various activities and verification related to this PoA as indicated below.

Applicable provision	Justification/Responsibility
Compliance with methodology	CPAs to be compliant with adopted methodology AMS II.E
Documentation of building type and surface type	AGNA to confirm type of building surfaces and keep a record of types of building surfaces painted for each CPA
Ensuring area of surface painted and thickness used with Ceratech for each building type	AGNA to keep a record area of surfaces painted per type of buildings for each CPA
Adopting official conversion of floor and roof surface to the required air conditioning capacity sizes (Btu- kWh).	Keep records of both floor and roof surface areas for the buildings painted with Ceratech
Limit to energy saving of 60GWh/year for small scale projects	Each CPA shall contribute up to 60GWh/year and if above the limit will be capped at 60GWh/year. AGNA to ensure that capping also to be supported by surface areas painted
Ensuring that removed HVAC equipment if any are accounted for as leakage if reused or documented if no longer in use or the number of hours existing equipment has been used.	AGNA to keep a record of HVAC equipment on each building that has been painted with Ceratech and whether it continue to be used and if so to keep record of operating hours for that HVAC equipment

Each CPA shall have an identification number, with geographical coordinates and name of building owners. For each CPA, a sheet will be prepared for documentation of identification number, owners of

⁷ Under which Ceratech has been classified for this PoA.



buildings that will also sign that Ceratech has been applied to their roof surface stipulating area of surface painted. The sheet will be attached together with declaration by owner of building that they have ceded the CERs for the CPA to AGNA ventures.

SECTION D. Duration of PoA

D.1. Start date of PoA

Start Date of the PoA is the registration date of the PoA.

D.2. Length of the PoA

28 years

SECTION E. Environmental impacts

E.1. Level at which environmental analysis is undertaken

The PoA has been introduced to various stakeholders including the national Environmental Authority, the Department of Environmental Affairs of Botswana. The DEA has issued a letter of Exemption to undertake a detailed EIA for the PoA, which will apply to all CPAs.

E.2. Analysis of the environmental impacts

The expected environmental considerations in relation to use of Ceratech have been stipulated in the Exemption Letter as follows:

- 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;

A copy of the letter of Exemption is attached as Appendix 6.

SECTION F. Local stakeholder comments

F.1. Solicitation of comments from local stakeholders

The local stakeholder consultation process was performed at the PoA level as the CPA will be undertaken throughout the country and are of similar nature.

The stakeholder consultations were made through

- Direct meetings on the product with key stakeholders such as Department of Energy, Technology promoters etc.
- Media e.g. presenting the product over the radio and getting responses from listeners and through newspaper advert;
- Displaying and presenting Ceratech at national Expos and exhibitions/fairs.
- Interviews
- As part of marketing.

These means allowed reaching of a wide spectrum of stakeholders regarding the product to be used in the PoA and getting a feedback.

The list of stakeholders' consultations, date of occasion, number of people engaged and relevance of occasions are listed in the Table 2 below.

Table 2. The stakeholders consulted by AGNA Ventures with regard to Ceratech and the PoA.

Stakeholder	Activity and Date	Number of people who visited the stall	Relevance of the Stakeholder
Local Enterprise Authority (LEA)	Exhibition 27/04/11	102	The workshop was held in order to facilitate the relationship between entrepreneurs and financiers and to also give exhibitors a platform to market their products
Property Investment and Construction Expo'11	16/06/11	126	This is an exhibition for property investment and construction.
Presentation to Energy Affairs	27/06/11	10	Energy Affairs Department's overall goal as policymakers for the energy sector is to provide affordable, environmentally friendly and sustainable energy services in order to promote socio-economic development
Gaborone International Trade Fair	27/07/11	108	The Fair is held to give all entrepreneurs to show-case their products to the local and international stakeholders
Building Botswana Construction and Expo'11	15/09/11	112	The fair was specifically for developers, construction professionals (consultants, architects, quantity surveyors and engineers, construction contractors) to learn about new products and services and their worth in the industry.
Global Expo'11	27/11/11	112	The Expo covers most stakeholders and invites international stakeholders from the



			SADC region and other parts of Africa, Asia, America and others
SAIS Launch (Botswana Innovation Hub)	28/02/12	120	It was a launch organized by Botswana Innovation Hub and deals with clean technologies that are used for climate change adaptation and mitigation
Earth Hour	31/03/12	300	Organized by WENA environmental trust, an NGO dealing with climate change adaptation and mitigation.
Earth Hour at Parliamentary Awareness	3/4/2012	98	The event is the same as the Earth Hour but the focus group is decision makers, mainly the parliamentary climate change committee consisting of legislators and policy makers
2012 Carbon Expo Exhibition, Cologne, Germany	29/05/2012	78	The Carbon Expo Exhibition was a platform for AGNA Ventures to showcase their products to the world market.
Radio Botswana	Radio interview		The Radio is an easy and fast way of disseminating information to the entire nation.
Duma FM	Radio interview		The Radio is an easy and fast way of disseminating information to the area covered by the radio station.
Kgalagadi Beverage Limited	Meeting 27/06/11		Direct promotion of product to a large potential customer
Botswana Bureau of Standards (BOBS)	29/06/11		BOBS offers technical services in the areas of standardization, testing of goods, certification of products, industrial & trade metrology, quality management systems, environmental management systems, information and training. BOBS is also a member of the World Trade Organization (WTO). BOBS is preparing standards for Ceratech.
Local Government and Lands (Khumo Mathare)	24/10/11		These are the stakeholders who own most rural and urban residential and institutional buildings in the country
Botswana Housing Corporation	30/11/11		The meeting with BHC was to introduce the product. BHC is the biggest residential housing Corporation in Botswana
Gaborone Sun Climate Change Workshop	18/03/12		Attend the workshop to disseminate information about the product as a mitigation measure to climate change

The above mentioned stakeholders have made comments and had questions. The frequently asked questions and the responses that were given are provided in table 3.



Table 3 Summary of Frequently asked Questions and responses given

Frequently Asked Question	Response to Stakeholder questions
Does Ceratech contain harmful chemicals?	Ceratech coating is free of all volatile chemicals and toxins and is recognized as safe under the Federal Food, Drug and Cosmetic Act. It is non-toxic, odour free and environmentally friendly.
Can we guarantee your utility bills will be cut by 30%, 40% or even 50%?	There are no guarantees but the result of the paint when it comes to cutting utility bills by 30%, 40% or even 50% depends on how much area the customer applies the product. Other considerations include, amount of attic ventilation, amount of air infiltration into one's home, type of roofing material, existing insulation. AGNA Ventures guarantee that for the 3-4 cents per square meters it cost for Ceratech Insulating Addictive one will not find a better solution to their high utility bills for that price.
What is the cost of the paint?	The paint cost P80 per litre. Rate after application varies from P44 to P49 per square meter depending on the distance from the capital city which is Gaborone
How many coats of paint should I apply?	. For the best results of the paint 2 coats are recommended to ensure an even distribution of the ceramics. AGNA Ventures provide turnkey services for quality services.
Should I use insulating paint on the roof?	Yes! For the optimum in energy efficiency it is best to use insulating paints both inside and outside, however either application alone will increase your energy efficiency.
How do I apply the paint on the roof?	Simply remove all filters from your spray equipment (or they will strain out the addictive) and use a slightly larger spray tip than normal. Recommended tip sizes are 019-025.
Can I paint any roof with insulating paint?	Ceratech coating offers a complete line of insulating roof coatings which can be applied to any roof, asphalt shingles, cement tile, ply, basically any roof material
Where can I buy Ceratech?	For quality reasons we provide turkey services, we do not sell paint.
What colours are available?	All our ready mix paints come to you in bright white.
How much paint do I need?	Measure from drawings or on site and use formula or use our Ceratech Calculator to work out areas and quantities of paint required.
Do insulating paints work in Winter months?	Yes! The heat inside your home wants to escape toward the cold outside air. A paint film with reflective ceramics will help stop this outward heat loss and help to lower your heating bills.
What brand of paint should I use?	Ceratech work with any brand of interior and exterior paint. The Ceratech line of ready mixed paints has the insulating ceramics included in them, simply apply the paint and lower your high power bills.

**F.3. Report on consideration of comments received**

The questions which were asked by the stakeholders were attended to and the critical questions were those regarding whether the paint is harmful, whether Ceratech can reduce energy demand for air conditioning and if that also applies to Winter. The cost of the paint in relation to traditional alternatives is also a crucial one. The CME adequately answered these questions as indicated in Table 3 above:

SECTION G. Approval and authorization

The CDM Focal Point, the Designated National Authority, which is the Department of Meteorological Services under the Ministry of Environment, Wild Life and Tourism of Botswana, has already issued a Letter of No Objection in relation to the development of this PoA. The letter of Approval will be made available at the time of validation of the PoA.

PART II. Generic component project activity (CPA)**SECTION A. General description of a generic CPA****A.1. Purpose and general description of generic CPAs**

The purpose of the CPA will be to apply reflective ceramic insulating roof coatings (Ceratech Thermal Barrier Roof Coating) on roofs of commercial, residential and institutional buildings in different settlements (cities, towns and villages) located in the 10 Districts of Botswana, 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 for 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 in both Summer and Winter in Botswana. Electricity generated in Botswana is 100% coal-based, hence avoided electricity demand will translate into reductions in greenhouse gas emissions.

AGNA has experimented the application of Ceratech on metal roofs of classrooms of Ramotswa Community Junior Secondary School, in Botswana. The classrooms do not have HVAC and yet in Summer temperatures soar to over 40°C creating an unbearable condition for occupants. One classroom block had its roof painted while the other one remained unpainted for control (Picture 2 below).



Picture 2. Ceramic Painted (white) and unpainted metal roofs (dark) of semi-detached buildings at Ramotswa CJSS.

Daily temperatures were recorded in the afternoons for 11 days comparing temperatures for each of the classrooms. Temperatures were measured using non-contact Infra-Red thermometers MT697-MT699. The measurements were made in April 2008 which is the transition from Summer (autumn) to Winter, and some temperatures were taken in the morning to see if Ceratech also retains warmth in cold conditions.

Figure 2 shows the results that were obtained and the key results are that:

- Ceratech applied on roof surface lowered the temperatures on metal roofing (top and underside) and inside the building by up to 68%.
- When it is hot, the painted building is cool and when it is cold, the painted building is cool- not as cold as the unpainted building.
- The experiment showed that the inside temperatures can be reduced up to 45% when hot conditions prevail outside.

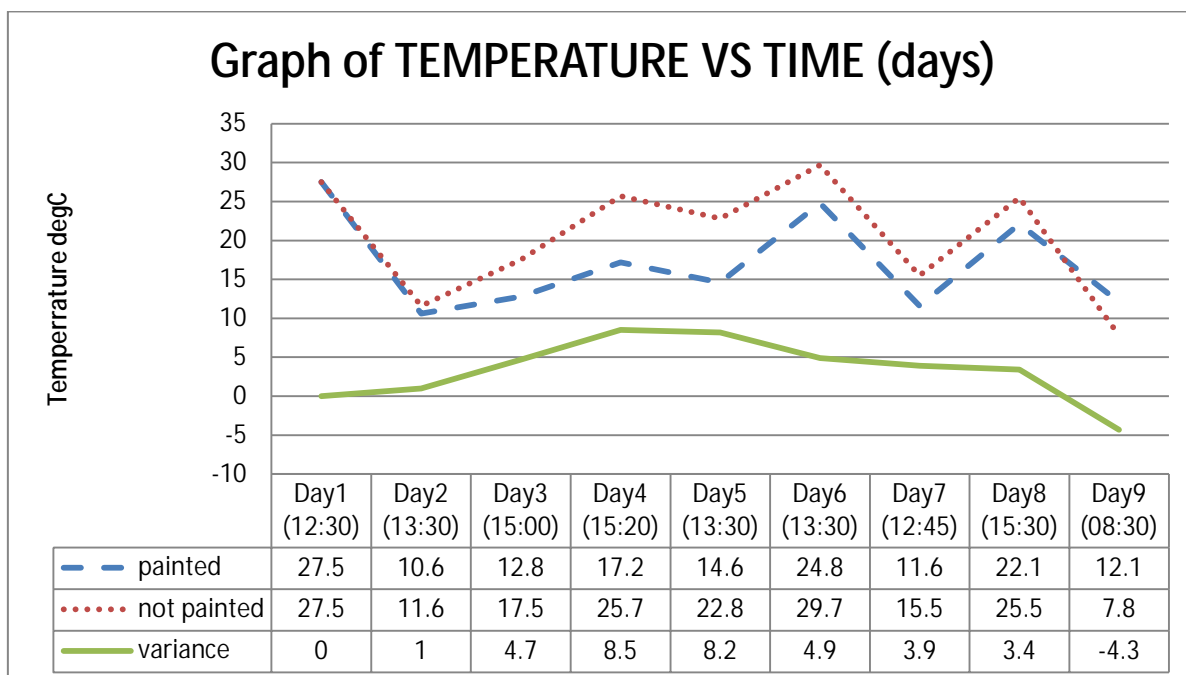


Figure 2 Results of effect of Ceratech on indoor temperatures at Ramotswa CJSS, April 2008.

A similar application is proposed for the CPA in various metal roofed residential, institutional and commercial buildings. This is expected to meet indoor comfort in such buildings without the need for HVAC systems. Cooling the roof means more than half the job is done in cooling the entire building as surface area of the roof is about 75 – 100% that of building floor surface area. Some of the targeted buildings that have metal roofing under residential, institutional and commercial categories are as follows:-

Category of Buildings	Targeted buildings	Location
Residential Buildings	Botswana Housing Corporation ⁸ - low and medium cost houses	Mostly in urban settlements
Institutional Buildings	All School buildings- primary, junior secondary, senior secondary Clinic, hospitals Police blocks and Army barracks	Both in urban and rural settlements
Commercial Buildings	Factory shells Industrial buildings-office blocks	Urban Settlements

⁸ Largest residential housing provider in Botswana and these are the two types of houses that have metal roofing.

SECTION B. Application of a baseline and monitoring methodology

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

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.”*)

B.2. Application of methodology(ies)

AMS.IIE version 10 is applicable to a Small Scale-CPA (SSC-CPA) under this PoA since the methodology mentions application for measure, such as such as efficient appliances, better insulation⁹ 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 CPAs included in this PoA comprise application of Ceratech coating to metallic building roofing, which is a better insulation measure (*paragraphs 1, AMS II.E Version 10*)
- A SSC-CPA 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 (Ref. CDM-EB73-A03).

B.3. Sources and GHGs

The GHG reduced through the CPAs under this PoA is mainly CO₂. 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.

B.4. Description of baseline scenario

The baseline scenario of each CPA is premised on demand for electricity from the grid for providing air-conditioning in residential, institutional and commercial buildings that may be stand alone or in cluster with metal roofing. The minimum service level to meet preferred air-conditioning that can provide indoor comfort in both Summer and Winter is provided by HVAC equipment. Use of all other alternatives such as fans, ventilations, ceiling insulations are not effective (refer to A2, AMSII.E Version 10).

⁹ Under which Ceratech has been classified for this PoA.



Currently residential buildings (low cost and medium cost houses), institutions (schools, clinics, hospitals etc.) and warehouses and some office blocks do not have HVAC equipment and thus occupants bear the brunt of severe Summers and Winters. 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.

This PoA will also provide Ceratech coating including to residential, institutional and commercial metal roofed buildings that currently don't have HVAC equipment. The occupants of such metal-roofed buildings experience indoor discomfort because they cannot afford to buy HVAC appliances i.e. the demand is suppressed due to income constraints or lack of access to funds. Lack of access to funds also includes even government institutions as they do not have HVAC equipment for their classrooms in Primary and Secondary schools, health institutions and police and army buildings.

For purpose of this PoA, only energy offset in the 7 months of Summer will be claimed as the baseline, 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.

B.5. Demonstration of eligibility for a generic CPA

Eligibility of the CPA shall comply with the following

1. Baseline and Monitoring methodology AMS.II.E Version 10 or later
2. Additionality conditions stipulated for the PoA
3. Type of buildings in this case residential, institutional and commercial buildings with metal roofing
4. Ceratech products that have 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)
5. CPA shall neither be in another PoA nor registered as a standalone project activity
6. Owners of buildings shall cede their rights of the CERs to AGNA
7. All buildings or cluster of buildings where CPA is implemented will have electricity
8. CPA shall be approved by AGNA before included in the PoA.

AGNA as the CME will ensure that the CPA complies with these eligibility criteria.

The barriers for individual CPAs 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 application of Ceratech as an alternative is hampered by a number of barriers.

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 small. Whilst AGNA could use other roof coatings, the thrust to market the product has 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 place which is another barrier for the adoption of the technology. AGNA Ventures has to consider passing some of CER benefits to its customers to lower cost of the coatings and to create a market for Ceratech. This sharing of CERs is now part of AGNA's marketing strategy. Ceratech currently costs (25-30% more) in the range of BWP¹⁰44-49/m² compared to BWP 33-38/ m² for the conventional roof paintings.

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 to organize 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

B.6. Estimation of emission reductions of a generic CPA

B.6.1. Explanation of methodological choices

The baseline scenario is the electricity that will be offset from the national grid to power HVAC equipment in residential, institutional and commercial buildings with metal roofs that are to be painted with Ceratech.

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.

¹⁰ June 2012 US\$1=BWP7.5



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

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)
$EF_{CO_2,grid,y}$	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)	Floor Area (FA)
RA	RA/1.08/1.4

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/m². The BTUs are then transferred to kW equivalent (Appendix 3). This however will require the mean operating hours of the HVAC in the different categories of buildings. Air conditioning, like lighting, in residential houses is for an average of 4 hours per day and in institutions and commercial buildings is for 8 hours. To be conservative, the operating hours for institutions and commercial buildings will be reduced to 6 hours for 5 days of the week for 7 Summer months. For residential buildings, the operating time of 4 hours per day for 7 days a week and 7 Summer months will be used to determine the baseline emissions.

$EF_{CO_2,grid,y}$, 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 approved by the CDM Executive Board for the SAPP grid to which Botswana belongs (UNEP study)¹¹. The value approved for all projects other than wind or solar projects is 0.9644 tCO₂/MWh and that is the Grid emission factor that will be assumed for CPAs under this PoA-DD.

¹¹ CDM-EB73-A03

**Table 4: Summary of the Regional SAPP GEF approved by CDM EB73-A03**

OM Emission Factor (in t-CO ₂ /MWh)	0.9958		
BM Emission Factor (in t-CO ₂ /MWh)	0.9331		
	OM	BM	CM Emission Factor (in t-CO ₂ /MWh)
Wind and solar power generation project activities for the first crediting period and for subsequent crediting periods	0.75	0.25	0.9801
All other projects for the first crediting period	0.5	0.5	0.9644
All other projects for the second and third crediting period	0.25	0.75	0.9488

Emission reduction ER_y are represented by the equation below

$$ER_y = BE_y - PE_y - LE_y$$

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

There may be need to consider transport related GHG emissions when Ceratech is applied in remote areas from Gaborone, the central location of AGNA. The transport emissions will be determined from fuel consumed using IPCC 2006 Guidelines.

**B.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
Purpose of data	To derive total electricity offset by each CPA through application of Ceratech.
Additional comment	

Data / Parameter	EF_{grid}
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	

B.6.3. Ex-ante calculations of emission reductions

For an adopted fixed period of 10 years, the table below shows the estimated annual emission reductions for each CPA.

	Year	Emission Reductions
1	20xx	XX XXX
2	20xx	XX XXX
3	20xx	XX XXX
4	20xx	XX XXX
5	20xx	XX XXX
6	20xx	XX XXX
7	20xx	XX XXX
8	20xx	XX XXX
9	20xx	XX XXX
10	20xx	XX XXX
Total estimated Reductions (tonnes CO ₂ e)		XXX XXX
Total number of Crediting years		10
Annual average of the estimated reductions over the crediting period		XX XXX

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

(Copy this table for each data and parameter)

Data / Parameter	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

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

The monitoring plan will be to ensure that what is planned to be achieved is achieved in accordance with application of the methodology and ensuring that correct data for the defined variables are collected 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.

This will also require that skilled personnel are deployed to apply the coatings. AGNA will take technicians for that purpose through a training of using appropriate Ceratech products and spraying equipment.



Ceratech will provide tolerable indoor comfort for a certain range of temperatures and in some cases the temperatures may still be too high or too low to require backup cooling support. The owners of buildings will be trained to monitor the days and times they have used any additional support to cool or warm the buildings. Such monitoring of extreme cases will be coupled by checking meteorological data of extreme temperatures that may have occurred to warrant that additional cooling/warming support.

The Monitoring plan will also check the operating times in all the three variety of buildings 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 exante 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 (22-30°C) will be used to adjust operating hours and hence the exante GHG emissions reductions.

AGNA will keep a record of all the data that are captured for each CPA 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:

1. Unique identification number of CPA or contract number
2. Date when Ceratech was applied
3. Size of roof surface coated with Ceratech (RA)
4. Measured indoor temperatures
5. Days and hours when additional system was needed to moderate indoor temperature to acceptable comfort levels
6. Operating hours of the buildings covered by the CPA
7. Daily outdoor temperature recorded by the Meteorological Services

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.

Monitoring shall be done in sampled buildings for each type of category of buildings- namely residential, institutional and commercial. This will be thus a stratified sampling with 10% of coated surface for each category sampled for monitoring.

Responsibilities

AGNA is the CME and is also the SSC-CPA representative 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-CPAs 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
- Selection of monitoring survey for the buildings.
- Allocation of CERs to the building owners, when there are such agreements¹².

For data collection that will require participation of 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 PoA will be trained before the start of the relevant monitoring steps and there should be evidence of such training having taken place.

¹² CERS to building owners will incentivise them to assist in monitoring of project performance.

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

Organization	AGNA Ventures
Street/P.O. Box	Box 50092
Building	Fair grounds Mall
City	Gaborone
State/Region	South East
Postcode	BW
Country	Botswana
Telephone	+2673901391; 2673654539
Fax	
E-mail	agnaventures@gmail.com
Website	
Contact person	Mr Percy Lekoba
Title	Managing Director
Salutation	Mr
Last name	Lekoba
Middle name	
First name	Percy
Department	
Mobile	+26772240621
Direct fax	
Direct tel.	
Personal e-mail	percyl@botsnet.bw ;

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: Application of methodology(ies)*Instructions on how to get to the BTUs (British Thermal Units) HVAC capacity size for a room of certain floor surface area*

1 Find out how many BTUs it takes to heat one (1m²) in the area of the country in which you live. In Africa for example is 650 BTU/m².

2 Take the length and width of room/warehouse (=floor area) and multiply those two numbers together and get the area covered in square metres.

3 Multiply the calculation from Step 2 by the number of BTUs it takes to heat one square metre in the area in which you live. So if your house is (12m²) squared and it takes 650BTUs to heat one (1m²)square metre, you need 7,800 BTUs to heat your room, but since there is no such size of air conditioner, go to the next size which is a 9 000 BTU¹³ and so on. This is the case of a single room, but the principle can be

¹³ 1 BTU_{IT} = 0.00029307107017 kWh. However, a kWh is a **quantity of energy over time**, while BTUs are **energy content**.: http://wiki.answers.com/Q/How_do_you_convert_kwh_to_btu#ixzz1yuXr93jO

applied to a single building and/or a cluster of buildings. In the event that Ceratech would offset use of HVAC, then it would offset use of air conditioning of that BTU capacity.

Reference link <http://www.ehow.com/>

The roof surface area painted will first be transformed into floor area equivalent and then divided by 650 BTU/m² to get equivalent Btu capacity that would have been required of HVAC cooling. The initial estimates are that air conditioners operate for 4 hours per day for residential buildings; and institutional and commercial HVAC operate for 8 working hours. The hours have been reduced to 6 hours per Summer day to be conservative considering that there are also holidays when buildings are not used that much. These times are taken for the 7 Summer months of cooling from September to March. Air conditioning is also required for heating in Winter but this has been left out for conservativeness. Table 5 shows the estimated operating hours for various types of buildings.

Table 5. Estimated operating hours for the various buildings to be painted using Ceratech.

Category of buildings	BTU	Equivalent kW	equivalent Floor area m ²	operating hours per day	Total operating hours per year ¹⁴
Residential	9000	2.5	12	4	848
	12000	3.5	18	4	848
	18000	5.5	28	4	848
	24000	7.0	37	4	848
Institutional and Commercial	9000	2.5	14	6	1272
	12000	3.5	18	6	1272
	18000	5.5	28	6	1272
	24000	7.0	37	6	1272

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

Baseline emissions are to be estimated from the estimated offset HVAC demand multiplied by the SAPP grid emission factor.

Project emissions can be estimated for the transport emissions-in the case of retrofitting existing buildings with Ceratech.

Appendix 5: Further background information on the monitoring plan

AGNA will monitor roof are painted as they already do in table 6 below

¹⁴ Operating for 7 months from September to March for cooling (212 days).

**Table 6. Owners. Buildings and surface area painted with Ceratech by AGNA January 2007 to June 2012**

N O	DATE	OWNE R	PROPERTY	COMPANY	ADDRESS/ LOCATION	SQUARE METERS- PAINTED OF BUILDIN G	BUILDING TYPE
1	4/1/2007	Kobus Straus	Wholesalers shop		Ghanzi	285.70	Commercial
2	4/1/2007	J.J. Van De Merwe	Farm House		Box 19,Ghanzi	180.20	residential
3	5/1/2007	Kobus Straus	GFS Hardware Shop		Ghanzi	733.40	Commercial
4	6/1/2007	Kobus Straus	Butchery	Farm	Ghanzi	181.90	Commercial
5	17/1/2007	Willie de Graaf	Flat	Dekota Farm	Ghanzi	80.90	residential
6	17/1/2007	S.W. Bruwer	Farm House	Tsama Farm	Ghanzi	254.40	residential
7	18/1/2007	Kobus Straus	House 1		Ghanzi	218.90	residential
8	18/1/2007	Kobus Straus	House 2		Ghanzi	535.00	residential
9	19/1/2007	Dudley Barns	Farm House	Brahmans Botswana PTY Ltd	Southern Cross	208.80	residential
10	14/2/2007	Mario	House-Plot 13044	5 Star Construction	Gaborone	124.00	residential
11	2/3/2007	Ivan Lo	Restaurant - Railway Station		Gaborone	225.50	Commercial
12	6/3/2007	Lesly	Exact Exhaust		Gaborone	74.10	Industrial
13	13/3/2007	Santos		Kharbros Garments	P.O. Box 394 Gaborone	305.80	residential
14	14/3/2007	Khan	Ext 14 House 2 Gabs		Gaborone	123.10	residential
15	16/3/2007	Khan	House & Garage	Kharbros	Gaborone	97.40	residential



				Garments			
16	21/3/2007	Dr Charles D. Wilson	Flat		P.O. Box 45425,Riverwalk	102.40	residential
17	2/4/2007	Sada Snr	Trade World	Blue Chip Investment	Gaborone	2,882.00	Industrial
18	13/4/2007	Mr Khan	Clothing Store	Timba Trading	Gaborone	560.90	Industrial
19	14/4/2007		Classroom	Maru-a-Pula School	P.O. Box 0045,Gaborone	105.30	institutional
20	27/7/2007	Abes	Main Office & Display Room	Abes Furniture	Broadhurst	503.40	Commercial
21	6/8/2007	Ben Van Rooyen	Rebuild Bay	Bells Equipment Sales	Gaborone	6,149.60	Industrial
22	31/7/2007	Tim Calvert	factory	S.T.C. Chemicals	Gaborone	964.80	Industrial
23	5/9/2007	Tim Calvert	Cleaning Services Hanger	S.T.C. Chemicals	Gaborone	4,328.20	Industrial
24	13/9/2007	Krishane	Chicken House 2	Maya Enterprises	Kumakwane	256.20	agricultural
25	13/9/2007	Krishane	Chicken House 5	Maya Enterprises	Kumakwane	663.30	agricultural
26	14/9/2007	Hendrik Roodtman	Agrico Farming Enterprises	warehouse	Lobatse	515.50	agricultural
27	25/9/2007	Attie Pienaar	Farm House	Feather Weight Holding	1299,Lobats e	153.50	agricultural
28	27/9/2007	Jan Kotze	Chicken Fowl Houses 4&5	Tlhokomela Chickens	733,Ghanzi	258.00	agricultural
29	27/9/2007	Leon Vorster	Farm House	L.J. Vorster	328,Ghanzi	362.40	residential
30	4/10/2007	Johan	Hardware Shop	Jab(PTY)Ltd T/A	54,Ghanzi	698.60	Commercial
31	5/10/2007	Joop Lewis	Farm House			314.13	residential
32	11/10/2007	Jan Kotze	Chicken House 7&8	Tlhokomela Chickens	733,Ghanzi	259.90	agricultural



33	11/10/2007	Oubaas Bekker	Farm House	J.P. Bekker	246,Ghanzi	324.80	residential
34	16/10/2007	Michael Adams	Farm House	Koffie Holdings	61,Ghanzi	249.40	residential
35	17/10/2007	Hennie Bason	Church House	DRCB Pastorie		257.70	institutional
36	14/10/2007	Jan Tok	Hanger House	Kachikau Investments	10700,Lobatsse	151.30	agricultural
37	4/10/2007	Jan Tok	Workers House 1	Kachikau Investments	10700,Lobatsse	148.30	residential
38	11/10/2007	Oubaas v d Berg	Farm House	Devades Holdings	509,Ghanzi	306.80	residential
39	4/10/2007	Jan Tok	Workers House 2	Kachikau Investments	10700,Lobatsse	45.60	residential
40	27/10/2007	Hendrik Bekker	Farm House	H.J.J. Bekker	23,Ghanzi	400.40	agricultural
41	27/10/2007	Hendrik bekker	Farm Butchery	H.J.J. Bekker	23,Ghanzi	103.50	agricultural
42	1/11/2007	Kobus Straus	Spar	Spar		1,051.50	Industrial
43	5/11/2007	Ben Van Vuuren	Haile Selasie Road	Bell Equipment		264.60	Industrial
44	13/11/2007	M.J. van Heerden	Kalahari Arms Hotel	Kalahari Arms Hotel	29,Ghanzi	259.12	Commercial
45	16/11/2007	Hennie Bason	Church	DRCB Congregation		498.50	institutional
46	17/11/2007	Oom Buli Vorster	Farm House	Finlay Farm	54,Ghanzi	326.30	agricultural
47	18/11/2007	Tuki	Sowing Room	Artok Pty (Ltd)	94,Ghanzi	46.62	Commercial
48	18/11/2007	Tuki	Farm House	Artok Pty (Ltd)	94,Ghanzi	296.70	Commercial
49	18/11/2007	Tuki	Butchery	Artok Pty (Ltd)	94,Ghanzi	215.10	Commercial
50	18/11/2007	Tuki	flat	Artok Pty (Ltd)	94,Ghanzi	149.10	residential
51	19/11/2007	Fred van Vuuren	Farm House	Marknet Investment	54,Ghanzi	145.50	residential



52	28/11/2007	Dr Krishane Buateia	Chicken House 7&12	Maya Enterprises,Kumakwane		726.70	agricultural
53	29/11/2007	Dr Krishane Buateia	Chicken House 13 & 14	Maya Enterprises,Kumakwane		1030.20	agricultural
54	12/2/2008			Premier Workwear	Gaborone	6,542.00	Industrial
55	12/2/2008			Bell Equipment	Gaborone	4,642.00	Industrial
56	12/2/2008			STC,VODAC LEAN	Gaborone	2,793.00	Industrial
57	12/2/2008			BDC Village Square	Gaborone	2,102.00	Industrial
	12/3/2008	Notwane East	Chicken Farmhouses	Bokomo	Tlokweng	1,994.00	agricultural
58	10/10/2008			Trade World	Gaborone	19,250.00	Industrial
	6/9/2008			Taung House	Gaborone	103.00	residential
	16/10/2008	Zakes Mokowe		Block 5 House	Gaborone	150.00	residential
	3/11/2008	Kentshitsuwe		Tlokweng House	Tlokweng	347.00	residential
	12/11/2008		Classroom Block	BDC	Francistown	554.00	institutional
59	11/3/2009			ABES Furniture	Gaborone	1,766.00	commercial
60	15/04/2009			Trans Africa Cash & Carry	Gaborone	9,465.00	commercial
61	16/10/2009			it4AFRICA	Gaborone	1,565.00	industrial
62	20/10/2009			Spar	Ghanzi	1,501.00	commercial
63	24/10/2009			Ghanzi Hardware	Ghanzi	698.00	commercial
64	26/10/2009			Ghanzi GFS	Ghanzi		industrial



Appendix 6. Letter of Exemption to undertake detailed Environmental Impact Assessment for the PoA



Republic of Botswana

Telephone: (267) 3902050
Fax: (267) 3902051/ 3914687
Email: envirobotswana@gov.bw

Department of Environmental Affairs
All Correspondence to be addressed to the Director
Ministry of Environment, Wildlife and Tourism

Private Bag 0068
Gaborone
Botswana

RE: DEA/BOD /ENE/ELE 045 (2)

09 MARCH, 2012

AGNA VENTURE (PTY) LTD
P.O. BOX 50092
GABORONE

Attention: Percy S. Lekoha

RE: PRELIMINARY ENVIRONMENTAL IMPACT ASSESSMENT FOR ENERGY EFFICIENCY IMPROVEMENT IN BUILDINGS -PASSIVE COOLING OF BUILDING USING CERATECH THERMAL BARRIER ROOF COATING IN THE EAST, SOUTH AND WEST PARTS OF BOTSWANA.

1. Reference is made to the Preliminary Environmental Impact Assessment report that you submitted to us for review.
2. We have reviewed the report and have resolved in accordance to Section 6 (3) of the Environmental Impact Assessment Act, to exempt the project from being subjected to a detailed Environmental Impact Assessment study.
3. The exemption of the proposed project is however subject to the following conditions:
 - All operations of the project should be aligned to regulating Botswana laws and standards;
 - Planning permission must be obtained from relevant authorities before project implementation;
 - 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;

**History of the document**

Version	Date	Nature of revision(s)
02.0	EB 66 13 March 2012	Revision required ensuring consistency with the "Guidelines for completing the programme design document form for small-scale CDM programmes of activities" (EB 66, Annex 13).
01	EB33, Annex43 27 July 2007	Initial adoption.
Decision Document Business Function: Registration		Class: Type: Regulatory Form