Clean Development Mechanism South Africa
Designated National Authority

energy
Department:
Energy
REPUBLIC OF SOUTH AFRICA

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Project Design Document (PDD)

Project reference number (office	
Date received (office use only)	

NOTES ON COMPLETING THIS PROJECT DESIGN DOCUMENT

1. Please provide this PDD in both hard-copy (one copy) and electronic formats (MSWord)

Part A: Project Proponent Details

Project Name	Sustainability CFL Replacement Programme of Activities in South Africa
Date of Submission of PDD	6th February 2012

Project Developer	
Name	*Eskom Holdings SOC Limited*
Organizational Category	*State-owned Enterprise*
Legal Status	*State-owned Enterprise - Limited*
Street Address	*Megawatt Park* *Maxwell Drive* *Sunninghill* *Sandton*
Postal Address (if different from above)	*PO Box 1091 Johannesburg 2001*
Website Address	www.eskom.co.za

Main Activities	*Eskom generates approximately 95% of the electricity used in South Africa and approximately 45% of the electricity used in Africa. Eskom generates, transmits and distributes electricity to industrial, mining, commercial, agricultural and residential customers and redistributors. Additional power stations and major power lines are being built to meet rising electricity demand in South Africa.*
Summary of Financial Performance in last fiscal year (ending 2011)	*Total Assets - Rm 328,145* *Total Revenue - Rm 91,447* *Total Profits - Rm 8,356*
Contact Person(s)	Enoch Liphoto
Telephone	Work: +27 11 800 6995 Cell: +27 72 356 6373
Fax	+27 86 556 4656
Email Address	Enoch.Liphoto@eskom.co.za
Project Partners Provide the following Information for **all** project partners (copy and paste relevant sections of the table if information is to be provided on more than one partner organisation)	
Name	**BNP Paribas**
Nature of partner	Financial Institution
Organizational Category	Bank
Legal Status (if private company)	Private Company
Street Address	10 Harewood Avenue, London NW1 6AA
Postal Address (if different to Street Address)	10 Harewood Avenue, London NW1 6AA
Website Address	www.bnpparibas.com
Main Activities	Bank
Contact Person(s)	Francois Carre
Telephone	+44 207 595 3418
Fax	N/A
Email Address	francois.carre@uk.bnpparibas.com
Name	**RAMP Carbon Pty Ltd**
Nature of partner	CDM consultant
Organizational Category	Private Company
Legal Status (if private company)	Privately held company
Street Address	244 High Street Northcote, Victoria 3070, Australia
Postal Address (if different to Street Address)	c/o PO Box 480, Camberwell, Victoria 3124, Australia

Website Address	www.rampcarbon.com
Main Activities	RAMP Carbon is an expert advisory and project development company operating in carbon markets and the clean energy sector.
Contact Person(s)	Philip Cohn
Telephone	Cell: +61 410 411 161
Fax	N/A
Email Address	phil@rampcarbon.com
Contractual Arrangements	
Contractual arrangements between various entities involved	Eskom has signed an Emission Reduction Purchase Agreement with BNP Paribas for the purchase of the carbon credits generated by the Programme of Activities. RAMP Carbon has been commissioned by BNP Paribas to support the CDM process and documentation of the PoA and work collaboratively with Eskom to ensure all information is available and described in the Project Idea Note and Project Design Document.

Part B: Project Overview (Technical Summary, Location and Schedule)

Technical Summary of the project	
Objective of the Project	The objective of the PoA is to sustainably maintain the energy efficiency of South Africa's residential lighting stock achieved by previous Eskom CFL projects by distributing Compact Fluorescent Lamps (CFLs) free of charge to households across South Africa. While Eskom has encouraged and supported the adoption of CFLs in residential households, due to the economic capacity of the majority of people in South Africa, CFLs remain an item outside of the household's budget. Current data has shown incandescent lightbulbs are still the preferred option for lighting including the cases where a household previously received CFLs from other Eskom campaigns and those CFLs have reached their end of lifetime and failed.
The Program of Activity aims to distribute 20 to 40 million CFLs to households across all the 9 South African provinces. • Eastern Cape • Free State • Gauteng • KwaZulu-Natal • Limpopo • Mpumalanga • North West • Northern Cape • Western Cape	

Technical Summary of the project

By providing CFLs free of charge to each household via direct installation (all possible CFLs in the household) or by exchange (up to 6 CFLs), the programme will abate greenhouse gas emissions, significantly reduce national electricity demand and stress on energy infrastructure, and save individual households money on their electricity bills.

The Programme of Activities will include awareness raising through an information pamphlet provided with the CFLs, as well as targeted media. Such environmental messaging will promote behavioural change, encouraging further energy savings through addressing use of energy intensive technologies such as electrical appliances.

CFLs will be made available via the following distribution mechanisms:

Door to door installation

Door-to-door (direct) installation will be conducted by Energy Service Companies (ESCOs) staff, upon receiving agreement to do so by the householder. All working incandcents lamps and/or failed CFLs from previous Eskom campaigns will be replaced by their equivalent CFL providing equal or better luminosity.

An example of the replacement would be:

i. 100 W incandescent must be replaced with a higher wattage CFL(18 or 20 Watts)
ii. 60 W & 40 W incandescent must be replaced with lower wattage CFL(14 or 15 Watts)
iii. Outside lights and rooms larger than 4m by 4m must be fitted with 18W or 20W lamp if in stock.

GATE TO GATE EXCHANGE

The gate-to-gate exchange will be conducted by ESCO's staffs at the door step of the householder when not granted permission, by the householder, to enter the premises and proceed with the installation. Up to six working incandescents or failed Eskom CFLs will be exchanged for free of charge. All replacement will occur as detailed above.

STATIONARY EXCHANGE POINT

A large number of distribution points will be located within the area covered by the Programme of Activities. Residents will come to distribution points with their old incandescent bulbs or failed Eskom CFLs and exchange them for up to 6 CFLs free of charge. All exchanges will occur as detailed above. Each stand will have a computer with a data management system collecting the information (name, address, contact details) of each household as well as the wattages and number of incandescents exchange for CFLs.

In all cases, a data form has to be filled and signed by the household containing the following information:

- Home owner's name & surname
- House number (Pole numbers to be used where there are no house numbers)
- Street name (Transformer numbers where there is no street name)
- Suburb/Village
- Ward number
- Municipality
- ID number
- Meter number
- Details of CFL's installed
- Details of incandescents removed or Details of the failed CFLs
- Installers ref number

Technical Summary of the project

- Exchange point (only if done through an exchange program)
- Date of installation
- Type of exchange
- Household signature accepting to transfer all the carbon credits to Eskom

All data forms will be captured within the data management system within 48 hours of product being installed/exchanged.
Incandescent bulbs collected during the exchanges will be destroyed to prevent leakage. This process will be independently verified.

Project Constraints

There are currently no resource related, or technical constraints affecting operations or commissioning of the Programme of Activities.

Technology to be employed

The PoA will provide energy efficient light bulbs, in the form of compact fluorescent lamps (CFLs), to replace incandescent light bulbs in residential properties.

Compact Fluorescent Lamps (CFLs) use 80% less electricity than standard incandescent globes, whilst producing the same lumen output. Replacing incandescent globes with CFLs is a simple way in which to effect significant greenhouse gas abatement and reduce demand loads on energy infrastructure.

The CFLs will be selected from one or several international lighting suppliers.

The table below provides an indicative list of the CFLs that may be installed under the Programme of Activities.

15 Watts	Cold White
15 Watts	Warm White
20 Watts	Cold White
20 Watts	Warm White

All CFLs will be available on B22 and E27 cap-bases.
All CFLs are for 22-240-grid voltage.
All CFLs comply with the ELI Guidelines
Expected lifetime 10,000 (for 50% of the CFLs)

Notes:
- Additional lighting products may be added to this list of technologies to be provided to participating Households;

Greenhouse Gases Targeted

CO_2

Emission reductions

An example has been provided below of the CER generation of a typical CPA based on the following assumptions:

- Total number of lightbulbs – 20 million
  - Incandescent lightbulbs composition:
    - 100W – 25%

Technical Summary of the project

- 60W – 40%
- 40W – 35%
  - CFLs composition:
    - 20W – 60%
    - 15W – 40%
- Daily Hours of use – 3.5
- Transmition and Distribution Losses – 8.3%
- Emission Factor (tCO_2/MWh) – 0.9506

Year	Emission reductions (tCO_2)
1	1,060,431
2	988,074
3	915,717
4	843,360
5	771,004
6	698,647
7	626,290
8	-
9	-
10	-
TOTAL	**5,903,522**

The numbers presented above are for illustrative purposes only. An Excel worksheet setting out the calculation of the above example is provided as an attachment to this submission.

Baseline & Additionality Assessment

Baseline Scenario

Three alternative baseline scenarios to the proposed Programme of Activities are possible:

1. Mandatory replacements of old lighting technologies with new lighting devices with greater levels of efficiency.

This alternative is not applicable because there are currently no mandatory regulations in South Africa requiring to replace incandescent lightbulbs with more efficient technologies.

2. Autonomous replacement of old lighting technologies with new lighting devices with the same or greater levels of efficiency.

In the absence of the Programme of Activities households would continue to utilize inefficient lighting technologies or revert to incandescent lightbulbs in the case that they had received CFLs

Technical Summary of the project	
	from previous Eskom campaigns. Well documented barriers to the uptake of efficient lighting, including financial barriers, lack of information, and common practice barriers, are all present in the South African residential lighting sector. Without any external project interventions it is unlikely that there will be an autonomously generated improvement in the energy efficiency of South Africa's residential lighting systems. ***3. Continued use of existing lighting technologies*** Continuation of the current situation is also a possible alternative scenario. The baseline alternatives include either continued use of existing household lighting, or autonomous replacement of current lights with new technologies or measures of either the same or greater efficiency. Achieving the same outcome as the Programme of Activities would entail large- scale autonomous uptake of CFLs by households. As discussed above, their cost and information barriers hamper autonomous uptake of CFLs and as such the most likely outcome of a continuation of the current situation would be the provision of light for households mainly through the use of cheaper incandescent lamps. **Additionality Assessment** The Programme of Activities will use a small-scale methodology, and as such, will assess additionality against one or more of the barriers listed in Attachment A to Appendix B of the *"Simplified modalities and procedures for small-scale CDM project activities".* Project participants shall provide an explanation to show that the Programme of Activities would not have occurred anyway due to at least one of the following barriers: ***Technology barrier*** The Project Participant has estimated that the penetration of CFLs in South Africa (considering all previous Eskom Demand Side Managemnt Programs) remains no higher than 20%, including all residential and commercial data. This information has been calculated using available data from annual sales figures of incandescent and compact fluorescent lightbulbs of 5 years.[1] Several reports confirm the low uptake of energy efficiency products in South Africa. In a report by Accenture titled "Understanding consumer preferences in energy efficiency – South Africa", one of the key findings states that "Consumers are unwilling to undertake more significant changes on the demand side" due to the fact that the costs associated with CFLs are the biggest barrier for the uptake of this technology.[2] It is estimated that without the implementation of this Programme of Activities, the total penetration of CFLs in South Africa will remain low. In a report from North West University in

[1] Department of Energy and Department of Trade and Industry, Phase out of Incandescent Plans 2010 Report

[2] Understanding Consumer Preferences in Energy Efficiency, Accenture, 2010

Technical Summary of the project	
	2009, it is estimated that only 6.3% of people within the sample group had bought CFLs outside of Eskom DSM programs.[3] Other perceptions such as flickering of the light from fluorescent tubes, slow start rates, "cold" light only options and lack of availability for fixtures and sizes have contributed to the low uptake of compact fluorescent lightbulbs worldwide[4]. Most of these perceptions however are being addressed with the newer generations of compact fluorescent lightbulbs however it takes time, research and investment form households to remove preconceptions on technological solutions. ***Barrier due to prevailing practice*** There are no laws or regulations preventing the continued use of existing inefficient lighting technologies by South Africa householders. In South Africa, as in many developed country settings, householders' understanding of the benefits of energy efficiency remains rudimentary[5]. The South African government continues to provide information regarding the economic and environmental benefits of investing in energy efficient technologies, however, as demonstrated by the case of CFLs, uptake remains low in the absence of free distributions such as the proposed Programme of Activities. *Lack of Information* Barriers to obtaining and applying information relating to energy efficiency are significant, including: – Time lag between energy consumption and payment of energy bills. Energy price information is divorced from the time at which it is consumed. This time lag can impact the efficacy of price information in influencing consumer awareness and behaviour with regard to household energy use. In this regard many "consumers act as if they have no control over their electricity bill, and the limited feedback they receive is often too late for them to respond."[6] – Aggregated energy prices may limit householders' understanding of the individual appliance use and its impact on energy bills. Consumers are not aware of which particular appliance or equipment is contributing to the total price they ultimately pay for electricity for a given period, militating against behaviour change, demand response and investment in energy efficient technologies such as CFLs.

[3] A Report on "The Factors that influence the demand and energy savings for Compact Fluorescent Lamp door-to-door rollouts in South Africa", Mascha Botha-Moorlach, North-West University, March 2009

[4] Compact Fluorescent Lights (CFLs) Primer Enlightening Facts, Hinkle Charitable Foundation

[5] Department of Minerals & Energy, South Africa. *Energy Efficiency Strategy for the Republic of South Africa 2005.*

[6] Productivity Commission, *The Private Cost Effectiveness of Improving Energy Efficiency,* 2005, p.105.

Technical Summary of the project	
	Transaction/search costs Even where a consumer is able to obtain information that is accurate, current and complimentary, they must still spend time to identify and assimilate it. There is an opportunity cost associated with the use of one's time to undertake these tasks. In a Californian study by Sathaye et al (2004)[7], it was estimated that if consumers were aware that CFLs could save them money, they would need to take 45 minutes to accurately assess potential savings and locate a shop that sold these lamps. If individuals valued their time at $20/hour, this would more than double the price of the first purchase of this lamp type. ***Other Barriers – Access to finance*** Scaling-up investment in energy efficiency is essential to achieving significant reductions in energy related emissions. However, despite energy efficiency's recognised advantages as an investment with immense climate change mitigation benefits, most of energy efficiency opportunities remain unrealised due largely to the significant "investment gap" that exists between the theoretical returns that energy efficiency investments can provide, and the limited capital that is available to make those investments[8]. This investment gap can be particularly pronounced at the level of households in developing countries such as South Africa where CFLs are more expensive than ICLs. The International Energy Agency estimates that the buildings sector is responsible for close to 30% of today's world energy consumption, and is a source of considerable untapped efficiency potential[9]. Based on Eskom data, the residential sector in South Africa consumes 19.7% of electricity generated, equivalent to 45,788GWh per year[10], or 46.7MtCO2 of emissions. Lighting contributes a significant proportion of this consumption, however, due to financial barriers, many households are unable to invest in CFLs in an effort to reduce their consumption and associated emissions. This efficiency potential should be an attractive investment opportunity, as energy efficiency measures in the buildings sector generally have net-negative cost abatement opportunities. In the case of CFLs in South Africa, the payback on investment for those purchasing a CFL is relatively short. However, it is the higher upfront costs, and additional financing requirements that they bring, that acts as a considerable barrier to the take up of energy efficiency opportunities. In the context of residential energy efficient lighting, access to finance barriers come in a number of interrelated forms which the Programme of Activities helps to overcome:

[7] Sathaye, J et al, 2004. *Market Failures, Consumer Preferences and Transaction Costs in Energy Efficiency Purchase Decisions,* California Energy Commission, Berkley

[8] International Energy Agency, 2010. "Money Matters – Mitigating risk to spark private investment in energy efficiency". Information Paper, Energy Efficiency Series. Paris, September, 2010.

[9] International Energy Agency (2008), Energy Technology Perspectives Paris: OECD/IEA.

[10] Analysis of 2007 Eskom sales data, Eskom Annual Report, 2010.

Technical Summary of the project	
	1. A lack of available capital to make required investments in CFLs; 2. The perception that energy efficiency investments are high-risk which discourages deployment of any available capital (as discussed in previous section – Technology Barrier); and 3. Split incentives which mean that those responsible for paying for efficient lighting may not be the beneficiaries of cost savings. *Access to Capital* Particularly relevant to households in South Africa is the fact that CFLs are more expensive than incandescent light bulbs. In the process of prioritising household expenditure towards basic requirements such as food, healthcare and education, there may be very little opportunity for spare capital to be targeted towards investments in energy efficiency. Despite the financial savings delivered by energy efficiency improvements, the upfront capital requirement acts as a significant barrier to their uptake by households. *Discount Rates* In addition to the inability of households to access capital, studies of consumer behaviour towards investments in energy efficient technologies also draw attention to the high discount rates applied, with consumers placing more emphasis on the upfront purchase cost than whole-of-life costs. A range of studies have estimated implicit discount rates applied by consumers to energy efficiency investments range from 25% to 300% across a range of technologies[11]. *Split Incentives* Split incentives occur when two participants in an economic exchange have different or even competing goals or incentives. In the context of energy efficient lighting in households, such split incentives occur when building owners are required to pay for building equipment upgrades, but it is the tenants that are required to pay for electricity bills. In this situation, the entity making the investment (landlord) receives no benefit (energy cost savings), because such benefits accrue to the building occupants (tenants). Tenants are also unlikely to make the investment themselves because they ultimately will not own the equipment installed in the building, and may leave the house before enough energy savings have accrued to pay for the initial investment in efficient lighting equipment.
Monitoring	The Programme of Activities will use AMS II.J (version 4). As per the monitoring requirements of the methodology, monitoring will consist of the following elements:

[11] Stansad, A, Hanemann, W, and Auffhammer, M (2006), *End-use Energy Efficiency in a "Post-Carbon" California Economy*, 2006. See also, Ruderman, H. et al, (1987) "The Behaviour of the Market for Energy Efficiency in Residential Appliances including Heating and Cooling Equipment", Energy Journal 8(1):101-124.

Technical Summary of the project	

	• 90-Day Survey to estimate hours of use in South African households.
	  o The North West University will design a sample and survey methodology that meets the precision requirements stipulated by the AMSIIJ methodology with regards to confidence level and margin of error for surveys within CDM projects.
	  o Once the households have been selected and identified, metering equipment will be installed in 6 lightbulbs in high usage areas of the house to monitor the hours of use for such lightbulbs within a 90 day period
	  o All data will be collected by North West University and a final report prepared showing the final results as well as the relevant statistical and precision parameters obtained from the survey
	
	• Yearly survey to determine the Lamp Failure Rate (LFR) of the equipment over the crediting period.
	  o It is expected that this survey will be designed and implemented by North West University
	
	• The following survey principles will be followed:
	  o The sampling size is determined by minimum 90% confidence interval and the10% maximum error margin; the size of the sample shall be no less than 100;
	  o Sampling must be statistically robust and relevant i.e., the survey has a random distribution and is representative of target population (size, location);
	  o The method to select respondents for interviews is random;
	  o The survey is conducted by site visits;
	  o Only persons over age 12 are interviewed;
	  o The project document must contain the design details of the survey.

Type of project/activities	*Identify which type of activity is involved in this project - and for each, provide brief details*
a. Energy Supply	N/A
b. Energy Demand	Improved energy efficiency through installing CFLs in residential buildings.
c. Industrial Process	N/A
d. Transport	N/A
e. Waste Management	N/A
f. Forestry/ land use	N/A

Technical Summary of the project	
g. Other	N/A
Project Boundary The Project Boundary will be defined by the specific location of the installed lamps. The Project Boundary also includes the electricity grid to which the buildings are connected. The Programme of Activities aims to distribute between 20 to 40 million CFLs to households in the following provinces: • Eastern Cape • Free State • Gauteng • KwaZulu-Natal • Limpopo • Mpumalanga • North West • Northern Cape • Western Cape The project developer has considered each participating household as the project boundary. A data management system will be in place to ensure that no duplication will occur in the calculation of energy savings and emission reductions. A two step process will take place: 1) Exchanges or direct installation will occur only once per participating household. Duplication will be avoided by using the DMS and either denying an existing household to participate more than once in the exchange or by visiting each household only once. 2) If it is found in the DMS that a household participated more than once in the program, all duplicates will be removed and those CFLs won't be used to calculate energy savings and emission reductions.	
Indicate Emissions outside the Project Boundary	There are no significant emissions attributable to the Programme that occurs outside the Project Boundary. Emissions leakage will be prevented by scrapping of the old lighting technologies collected during the installation process.

Location of the Project	
Province	• Eastern Cape • Free State • Gauteng • KwaZulu-Natal • Limpopo • Mpumalanga • North West • Northern Cape • Western Cape
Municipality	All municipalities in each province
Nearest city/large town	• Eastern Cape – Port Elizabeth • Free State - Bloemfontein

	• Gauteng - Johannesburg • KwaZulu-Natal - Durban • Limpopo - Polokwane • Mpumalanga - Nelspruit • North West - Rustenburg • Northern Cape - Kimberley • Western Cape – Cape Town
Brief description of the location of the project site	*Residential households in the provinces mentioned above*

Project Schedule/Timetable	
Earliest Project Start Date	*31 August 2011*
When is the expected first year of CER delivery	*2012*
Project Lifetime	*5 Years*
Project End Date	2015
Crediting Period	*10 Years*
Current Status or phase of the project	*Eskom will commence progressive distribution of the lightbulbs on August 2011 in selected provinces. This will contribute to the energy security of South Africa by reducing the need for electricity production, peak load, and infrastructure.*
DNA Approval	*Has this project been submitted to the DNA for approval previously?* The Programme of Activities has not been submitted previously to the DNA.
Approval by other bodies	*Has this project (or any elements of the project) been submitted to any other national, provincial or local government departments or agencies for regulatory or legal approval (excluding EIA process - see Part C). If so - provide brief details.* The Programme of Activities has not sought approval from any other agency or department for approvals.

Part C: Performance Against the DNA's Sustainable Development Criteria

South Africa has identified the following sustainable development criteria and indicators against which each CDM project will be assessed. Please provide your interpretation of how this project will address each of these **criteria and indicators** where they are relevant to the project. If the space provided is not sufficient please append additional information as required.

NOTE: For all indicators which are of relevance to the project show how the performance of the project against these indicators can be objectively monitored and measured on an ongoing basis.

1. Economic: Does the project contribute to national economic development?

The Programme of Activities will contribute significantly to South Africa's national economic development through encouraging the more efficient use of electricity by residential energy consumers. Energy savings at both individual homes and national levels make important contributions to South Africa's economic efficiency and sustainability, particularly in the context of the rising demand for electricity currently occurring in South Africa.

The DSM programme administered by Eskom has recognized the contribution that lighting can make to achieve national energy efficiency objectives in its Accelerated Energy Efficiency Plan (AEEP)*. This plan aims to save 3 000MW by 2012 and a further 5 000MW by 2025. The website states: "The efficient use of electricity has become a national priority, a necessity for the future development of the South African economy and effective provision of electricity."

Government has recognized the specific need for energy efficiency in the residential sector since at least 2005, with the publication of the Energy Efficiency Strategy. This document set a target for reduction of electricity consumption in the residential sector of 10% by 2015.

* Eskom DSM. http://www.eskomdsm.co.za/?q=Programme+Overview

2. Social: Does the project contribute to social development in South Africa?

In order to deliver this program, Eskom will engage (directly and through partnerships) a large workforce over the short to medium term, to install and maintain the lighting products, this will have positive social impacts in terms of employment through the creation of a number of semi-skilled jobs in Energy Services Companies (ESCOs) and local Universities.

Estimated number of people to be employed by CFL Sustainability Program (for 20 million CFLs)

Estimated Job Creation: CFL Sustainability Programme - 20 million CFLs						
ESCO Resources	**Southern Region**	**Northern Region**	**Eastern Region**	**North Western Region**	**Central Region**	**Overall Total**
Project Managers	47	107	53	0	27	**234**
Supervisors	157	253	307	0	67	**784**
Store Managers	50	120	67	0	13	**250**
Drivers	67	200	40	0	27	**334**
Field Workers	3,870	5,480	6,720	1,733	1,547	**19,350**
Admin	53	133	53	0	27	**266**
Data Capturers	107	253	107	0	67	**534**
TOTAL	**4,351**	**6,547**	**7,347**	**1,733**	**1,773**	**21,751**

As well as the direct financial benefit to households in terms of savings on their electricity bills each year, the Programme of Activities will also generate a range of less tangible social outcomes in education and awareness. This raised awareness creates an opportunity for collective action on climate change, enhancing a sense of community, and empowering individual households.

3. Environmental: Does the project conform to the National Environmental Management Act principles of sustainable development?

Please provide **brief** comment for each of these below.

i) That the **disturbance of ecosystems and loss of biological diversity** are avoided, or where they cannot be avoided, are minimised and remedied	The proposed Programme of Activities will have no negative impacts on ecosystems or biological diversity.
ii) That **pollution and degradation of the environment** are avoided, or where they cannot be altogether avoided, are	The proposed Programme of Activities will have no negative effects in terms of pollution or environmental degradation.

minimised and remedied	The introduction of energy efficient light bulbs in households will reduce the consumption and hence generation of electricity. The Programme of Activities will therefore reduce the harmful gases and particulate matter produced during the burning of fossil fuels to produce electricity. Given the small amount of mercury contained in compact fluorescent lightbulbs, a lamp recovery program will be carried out as part of the Programme of Activities. Eskom has been working with leading retail chains to encourage household to bring back failed CFLs to dispose them responsibly.
iii) That the **disturbance of landscapes and sites that constitute the nation's cultural heritage** is avoided, or where it cannot be altogether avoided, is minimised and remedied	The proposed Programme of Activities will not disturb any landscapes or sites that contribute to South Africa's cultural heritage.
iv) That **waste is avoided**, or where it cannot be altogether avoided, minimised and reused or recycled where possible and otherwise disposed of in a responsible manner	The Project Activity is expected to generate some waste through the collection and scrapping of baseline lamps. Because of methodological requirements of the CDM, old lights cannot be reused and must be destroyed. However, the project proponents are committed to recycling materials contained in collected and scrapped lighting technologies. As part of their responsible environmental management practices the project proponents will, to the full extent feasible, recycle all collected lighting components and materials. Those materials that cannot be recycled will be disposed of responsibly. Scrapping will be performed in accordance with the requirements set out by the National Environmental Management Act: Waste Act 59 of 2008 and any related legislation. Lighting Industry in collaboration with South African government and Eskom have published 'CFL Recovery, Recycle & Disposal Guideline', provides guidance from waste source to disposal site. Furthermore Department of Environmental Affairs (DEA) is working with Lighting Industry (IESSA) to develop 'Waste Management Plan for Spent Mercury containing Lamps' in South Africa.
v) That **the use and exploitation of non-renewable resources is responsible and equitable**, and takes into account the consequences of the depletion of the resource	The Programme of Activities will have a very positive impact on the use of non-renewable energy resources. Because of the energy savings created by the Programme of Activities, the use of fossil fuel energy resources will be reduced.
vi) That the **development, use and exploitation of renewable resources is responsible and equitable**, and takes into account the consequences of the depletion of the resource.	The Programme of Activities will endeavour to utilise any applicable renewable resources in a manner that is responsible and equitable. Because of the nature of the proposed Programme of Activities, the intensity of resource consumption is relatively low, and the risk of resource depletion is minimised.
vii) That **a risk averse and cautious approach** is applied, which takes into account the limits of current knowledge about the consequences of decisions and actions	The Programme of Activities will implement a risk averse, precautionary approach. The technologies implemented by the Programme of Activities have all been tested to international health and safety standards. The Programme itself does not involve any major construction, development or disturbance of natural systems, and as such is felt to be very low risk in terms of potential environmental impacts.
vii) That **negative impacts on the environment and on people's environmental rights** be anticipated and	The primary environmental impacts of the Programme of Activities relate to the physical waste created by the collection of old, inefficient light bulbs. The methodology requires that these items be

prevented, and where they cannot be altogether prevented, are minimised and remedied	collected and destroyed in order to prevent leakage. Considerable effort will be made by the coordinating entity to deal with the waste created by this equipment. In many instances, base materials of old appliances (e.g. glass and metals from light bulbs) can be recycled. Where possible, the coordinating entity will work with local businesses to implement a recycling strategy to deal with the waste accumulated through the collection of incandescent bulbs. CFLs contain a very small amount of mercury sealed within the glass tubing – 5 milligrams on average (roughly equivalent to the tip of a ball-point pen). Mercury is an essential, irreplaceable element of CFLs as it allows the bulb to be an efficient light source. By comparison, older home thermometers contain 500 milligrams of mercury and manual thermostats up to 3000 milligrams. There is no current substitute for mercury in CFLs; however, manufacturers have taken significant steps to reduce mercury levels in fluorescent lighting products over the past decade, with some beginning research into the production of mercury-free CFLs.
Other comments **Please provide any other comments on how this project contributes to sustainable development in South Africa** (optional)	

<table>
<tr><th colspan="3">Indicators in Support of the Project Approval Criteria</th></tr>
<tr><th colspan="2">Category</th><th>Indicator</th><th>Comment</th></tr>
<tr><td>Environmental</td><td>Impact on local environmental quality</td><td>• Impact of the project on air quality
• Impact of the project on water pollution
• Impact of the project on the generation or disposal of solid waste
• Any other positive or negative environmental impacts of the project (such as impacts on noise, safety, visual impacts, or traffic)</td><td>The introduction of energy efficient lighting technology in residential buildings will reduce the consumption, and hence generation of electricity. The Programme of Activities will therefore reduce the harmful gases and particulate matter produced during the burning of fossil fuels to produce electricity.

It is estimated that in 2009 electricity generation in South Africa lead to the emission of 1.87Mt SO2, 2,801t NOx, 10 tonnes of Mercury and 55,600 tonnes of particulates*. The Programme of Activities will cut electricity consumption by up to 60 GWh/year making a significant contribution to a reduction in these harmful gases. The table below lists the estimated annual emission reductions of these pollutants based on 60 GWh of electricity savings per year:
<table>
<tr><th>Pollutant</th><th>Annual Emission Reductions from 60GWh electricity saving</th></tr>
<tr><td>NOx</td><td>0.70 tonnes</td></tr>
<tr><td>SO2</td><td>466 tonnes</td></tr>
<tr><td>Mercury</td><td>2.5 kg</td></tr>
<tr><td>Particulates</td><td>13.83 tonnes</td></tr>
</table>
* Sources: Eskom Annual Report, 2009; and "Emissions of mercury associated with coal fired power stations in South Africa, 2010", South African Department of Environmental Affairs & Tourism</td></tr>
</table>

Indicators in Support of the Project Approval Criteria			
Category		**Indicator**	**Comment**
	Change in usage of natural resources	• Impact of the project on community access to natural resources • Impact of the project on the sustainability of use of water, minerals or other non renewable natural resources • Impact of the project on the efficiency of resource utilisation	The proposed Programme of Activities has a positive impact against each of the listed indicators for this category. As stated above, by improving the efficiency of residential lighting technology there will be improved access to limited electricity resources for other parts of the South African community and economy. Further, by using electricity more efficiently the Programme of Activities contributes to the reduced consumption of non-renewable fossil fuels. The high dependence on coal and conventional thermal power stations in the electricity generation sector of South Africa means that energy efficiency interventions have a significant positive impact on the sustainability of fossil fuel reserves.
	Impacts on biodiversity and ecosystems	• Changes in local or regional biodiversity arising from the project	The Programme of Activities is not expected to have a material impact on the biodiversity of ecosystems.

Indicators in Support of the Project Approval Criteria			
Category		**Indicator**	**Comment**
Economic	Economic impacts	• Impact of the project on foreign exchange requirements • Impact of the project on existing economic activity in the area • Impact of the project on the cost of energy • Impact of the project on foreign direct investment	The major economic impacts of the project relate to reduced energy costs, and increased economic activity in the area of energy efficiency. Firstly, whilst not reducing the per kWh price of electricity for end consumers, the Programme of Activities will reduce the overall cost associated with lighting use electricity consumption. It is hoped that these cost savings will have a materially positive impact on their purchasing power. Secondly, the Programme of Activities will have a positive impact on the local labour market via the creation of a number of semi-skilled jobs in order to install and maintain the lighting equipment. Finally, the sale of CERs in the international carbon market by the project proponents will have a positive foreign exchange impact for South Africa.
	Appropriate technology transfer	• Positive or negative implications for the transfer of technology to South Africa arising from the project • Impacts of the project on local skills development • Demonstration and replication potential of the project	The Programme of Activities will facilitate the transfer of leading energy efficiency lighting technology into South Africa. This transfer largely occurs "South-South" (between developing countries), as the products to be used in the Programme of Activities are manufactured in China. By removing key barriers, the Programme of Activities will increase demand for, and provide access to leading clean technologies and products. Further transfer of knowledge is also made possible through the education and awareness-raising aspects of the Programme of Activities. Individual households will receive information regarding the benefits (financial and environmental) of energy efficiency. This information will empower these households who will better understand how their consumption behaviour and purchasing decisions relating to energy impact on their financial position. Finally, by its very nature the Programme of Activities provides a framework for replication of projects.

Indicators in Support of the Project Approval Criteria			
Category		**Indicator**	**Comment**
Social	Alignment with national provincial and local development priorities	• How the project is aligned with provincial and national government objectives • How the project is aligned with local developmental objectives • Impact of the project on the provision of, or access to, basic services to the area • Impact of the project on the relocation of communities if applicable • Contribution of the project to a any specific sectoral objectives (for example, renewable energy targets)	The Programme of Activities will support the Residential Energy Efficiency Strategy of South Africa. The strategy links energy sector development with national socio-economic development plans, and sets a target for improved energy efficiency in South Africa's residential sector of 10% by 2015.

Indicators in Support of the Project Approval Criteria

Category	Indicator	Comment
Social equity and poverty alleviation	• Impact of the project on employment levels? (specify the number of jobs created/lost; the duration of time employed, distribution of employment opportunities, types of employment, categories of employment changes in terms of skill levels and gender and racial equity) • Impact of the project on community social structures • Impact of the project on social heritage • Impact of the project on the provision of social amenities to the community in which the project is situated • Contribution of the project to the development of previously underdeveloped areas or specially designated development nodes	In order to deliver this program, Eskom will engage (directly and through partnerships) a large workforce over the short to medium term, to install and maintain the lighting products, this will have positive social impacts in terms of employment through the creation of a number of semi-skilled jobs in Energy Services Companies (ESCOs) and local Universities. As well as the direct financial benefit to households in terms of savings on their electricity bills each year, the Programme of Activities will also generate a range of less tangible social outcomes in education and awareness. This raised awareness creates an opportunity for collective action on climate change, enhancing a sense of community, and empowering individual households. As an example, the table below demonstrates the amount of personnel estimated for the distribution of 20 million CFLs as part of the Eskom Sustainability initiative.

Sustainability Estimated Job Creation: CFL Sustainability Programme - 20 million CFLs

ESCO Resources	Southern Region	Northern Region	Eastern Region	North Western Region	Central Region	Overall Total
Project Managers	47	107	53	0	27	**234**
Supervisors	157	253	307	0	67	**784**
Store Managers	50	120	67	0	13	**250**
Drivers	67	200	40	0	27	**334**
Field Workers	3,870	5,480	6,720	1,733	1,547	**19,350**
Admin	53	133	53	0	27	**266**
Data Capturers	107	253	107	0	67	**534**
TOTAL	**4,351**	**6,547**	**7,347**	**1,733**	**1,773**	**21,751**

<table>
<tr><th colspan="3">Indicators in Support of the Project Approval Criteria</th></tr>
<tr><th colspan="2">Category</th><th>Indicator</th><th>Comment</th></tr>
<tr><td>General</td><td>General Project Acceptability</td><td>• Are the distributions of project benefits deemed to be reasonable and fair?</td><td>The distribution of benefits accruing from the Programme is fair and equitable. In addition, the project participants will use CER revenues to offer a new lighting technology free of charge.

The electricity tariffs paid by average residential electricity users in South Africa are listed below, showing that the value accrued through saving electricity is significant.
<table>
<tr><th>Year</th><th>Average price/kWh *</th><th>Value of saving 1 MWh</th></tr>
<tr><td>2010/2011</td><td>R0.6060</td><td>R606</td></tr>
<tr><td>2011/2012</td><td>R0.6883</td><td>R688.3</td></tr>
<tr><td>2012/2013</td><td>R0.7862</td><td>R786.2</td></tr>
<tr><td>Average</td><td>R0.6935</td><td>R693.5</td></tr>
</table>

For every MWh of electricity saved, the Programme of Activities will generate approximately 1 CER. Assuming a carbon price of R100, means that the project proponents will receive approximately R100 of revenue from the sale of each CER, whilst building owners and occupiers will achieve an average R693.5.00 in energy cost savings over the MYPD2 period.

*Source: Nersa, ‘Nersa’s Decision on Eskom’s Required Revenue Application - Multi-Year Price Determination 2010/11 to 2012/13 (MYPD2)’ media release http://www.nersa.org.za</td></tr>
</table>

Part D: Finance

Project Costs	
Development Costs (R's)	R2.5 million
Installed Costs (R's)	R97.8 million
Other Costs (R's)	R299.5 million
Total Project Costs (R's)	R399.8 million
Sources of Finance	
Equity	*ESKOM - R399.8 million*
Debt (long term)	*N/A*
Debt (short term)	N/A
Amount not identified (R's)	*N/A*
Total CDM Contribution sought	*R654.9 million* *(based on old carbon price of €10, but price is now fallen significantly to about $3.8)*
Expected Price of CER in case of a contract to purchase for: A period of 7 years A period of 10 years A period of 14 years (2x7 years)	 *Price? (R's)* *Price? (R's) – R91 (assuming 10 Euros carbon price)* *Price? (R's)*
Indicate the **projected Internal Rate of Return** for the project with and without CER revenues.	*Without CER Revenue – IRR 0%* *With CER Revenue – IRR 10.5%*
Constraints on tradability of carbon credits	*There are no constraints on tradability of project CERs*
Preliminary discussions with potential purchasers	*ERPA discussed and signed between BNP Paribas and Eskom Holdings for the totality of the carbon credits generated by the Programme of Activities.*