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

Part A: Project Proponent Details

Project Name	Residential Hot Water Efficiency Programme in South Africa
Date of Submission of PDD	30/05/2012

Project Developer	
Name	*eThekwini Municipality*
Organizational Category	*Select most applicable:* *National Government/ Government Agency/ Provincial Government/* ***Municipality****/ Private Company/ Non-Governmental Organisation/ Other (give details)*
Legal Status	*eThekwini Municipality as established in terms of Provincial Notice 343 of 2000*
Street Address	City Hall Pixley KaSeme Street Durban 4001 South Africa
Postal Address (if different from above)	PO Box 1014 Durban 4000

Website Address	Not applicable
Main Activities	*The main activities of the Municipality is to:* • *Ensure the provision of services to communities in a sustainable manner;* • *Promote a safe and healthy environment; and* • *Encourage the involvement of communities and community organizations in the matters of local government.*
Summary of Financial Performance in last fiscal year	*The operating budget (2010/11) (revenue) of eThekwini was R18.7 billion. The money is utilized to finance the services, labour costs and other responsibilities and commitments of the Municipality. The highest of total spend within the operating expenditure budget is 'procurement and infrastructure,' followed by 'health and social services.'* *This operating budget has been increased to R23.5 billion in the 2011/12 financial year.*
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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	Not applicable
Nature of partner	Not applicable
Organizational Category	Not applicable
Legal Status (if private company)	Not applicable
Street Address	Not applicable
Postal Address (if different to Street Address)	Not applicable
Website Address	Not applicable
Main Activities	Not applicable
Contact Person(s)	Not applicable
Telephone	Not applicable
Fax	Not applicable
Email Address	Not applicable
Contractual Arrangements	
Contractual arrangements between various entities involved	Not applicable

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

Technical Summary of the project	
Objective of the Project	*The small-scale Programme of Activities (henceforth referred to as PoA) is a programme for the installation of solar water heaters and heat pumps at residential facilities throughout South Africa. The objective of the PoA is to reduce greenhouse gas emissions through the roll out of energy efficient water heating technologies in South Africa which displace the consumption of fossil fuels or electricity. The technologies included in this PoA are solar water heating systems and heat pumps.*

Project Description

Present a brief description of the project (approximately ½ page A4)

The PoA involves the implementation of solar water heaters or heat pumps in existing residential units:

- *Low income households: Low pressure solar water heaters are installed in low income households;*
- *Community residential units: Low or high pressure solar water heaters or heat pumps are installed in community residential units; and*
- *Middle and high income households: High pressure solar water heaters or heat pumps are installed in middle and high income households.*

The PoA involves two project models:

1. *The Component Programme Activity (CPA) implementer will provide solar water heaters or heat pumps to community residential units free of charge or at a nominal amount and solar water heaters to low income households free of charge or at a nominal amount. These units are provided on the condition that the resident cedes all rights to subsidies and Certified Emission Reductions (CERs) to the managing entity.*
2. *The CPA implementer will provide solar water heaters and heat pumps to middle and high income households at a discount. The CPA implementer will facilitate and coordinate the installation with the condition that the resident cedes all the rights to the CERs to the managing entity.*

The coordinating and managing entity of the PoA is the eThekwini Municipality.

Project Constraints

Are there any constraints affecting project operations or commissioning? *(Brief description: 1 paragraph or less) Note: these may be due to energy supply, infrastructure, other resources etc.*

The major barriers to this programme are:

- *Financial: costs associated with setting up the governance framework for this programme. In addition, the costs of solar water heaters and heat pumps are higher than the traditional alternatives.*
- *Technological: the lack of experience with solar water heating and heat pumps in South Africa is a barrier to the demand for these technologies.*

Technical Summary of the project	
Technology to be employed	The PoA involves the installation of solar water heaters and heat pumps. These technologies reduce the amount of grid electricity or fossil fuel required for water heating. The PoA applies only to existing residential facilities in South Africa. *Is the technology one that has been previously tried and tested in South Africa or internationally? If yes, provide details (1 paragraph)* *Yes, solar water heating and heat pumps have been tried and tested internationally. The technologies are available in South Africa, but the market is still immature given the barriers such as investment, technological and prevailing practice.* *Have the project operators had any previous experience or expertise with operating the technology?* If yes – provide brief details (1-2 lines) The CME has shortlisted a number of suppliers of these technologies based on their track record and SABS approval. The suppliers have experience with installation and operation of the technologies.
Greenhouse Gases Targeted	*Identify which greenhouse gas(es) this project will target.* *CO_2*
Emission reductions	*The volume of emission reductions depends on market demand for solar water heaters and heat pumps, the number of CPAs included in the PoA and the technologies employed.* *The life of the PoA is 28 years and CPAs may be added throughout the 28 years. The crediting period of each of the CPAs will be ten years.* *The calculation of the emission reductions will be done in accordance with the selected methodologies.* *It is difficult to estimate the emission reductions upfront for a CPA. Based on a specific rollout, it is possible that the first CPA will generate 60,226 tons CO_2e per year. However, this depends on the technologies used and the number of households included in the CPA.*
Baseline & Additionality Assessment	***Baseline*** *The baseline for the PoA will be established using procedures set out in the selected methodologies. The detailed process of establishing the baseline will be included in the PoA documentation. The theoretical baseline for the PoA is the fuel that would have been consumed in the absence of the installation of the solar water heaters and/or heat pumps.* ***Additionality***

Technical Summary of the project	
	Additionality will be demonstrated using the rules and requirements of the CDM. *The installation of solar water heaters and heat pumps is not common practice in South Africa. In addition, there are a number of barriers to the installation of solar water heaters and heat pumps in South Africa:* • *Technological barrier: people are still unfamiliar with solar water heating and heat pumps. The conventional method of heating water involves the use of fossil fuel or electric water heating systems. This coupled with the lack of knowledge, experience and skills to install and maintain solar water heating and heat pump systems is causing a barrier to the uptake of solar water heaters and heat pumps in this country.* • *Investment barriers: a significant barrier to solar water heaters and heat pumps is the associated high upfront costs. Electric geysers are generally half the price.* • *Prevailing practice: using electric water heating systems is prevailing practice in South Africa. Historically, this is due to the relatively low cost of electricity in the country. As a result, electric water heating systems are preferred and renewable energy and energy efficiency technologies are further marginalised.* *These barriers create significant challenges to the implementation of solar water heaters and heat pumps in South Africa.*
Monitoring	*A detailed monitoring plan has been developed for this PoA. The monitoring plan will allow the DOE to verify the emission reductions for each CPA using sampling procedures as per the requirements in the selected methodologies. The CME will be responsible for the monitoring of the emission reductions.*
Type of project/activities	*Identify which type of activity is involved in this project – and for each, provide brief details*
a. Energy Supply	*Select if applicable:* ***Renewable Energy (excluding biomass)/*** *Biomass/ Cogeneration/ Improving energy efficiency by replacing existing equipment/minimization of transport and distribution/ fuel switch/ other* *The PoA involves the installation of solar water heaters which use solar power (renewable energy) to heat water. In addition, the PoA involves the installation of heat pumps which ensure that energy is used efficiently.*
b. Energy Demand	*Select if applicable:* ***Replacement of existing 'household equipment'****/ improvement of energy efficiency of existing production equipment/ other* *The PoA involves the installation of solar water heaters and heat pumps which displace the existing fossil fuel or electric water heating method in existing households.*

Technical Summary of the project	
c. Industrial Process	*Not applicable*
d. Transport	*Not applicable*
e. Waste Management	*Not applicable*
f. Forestry/ land use	*Not applicable*
g. Other	*Not applicable*
Project Boundary Define the Project Boundary (Approximately 1 paragraph) The boundary of the PoA is the borders of South Africa. The first CPA will be implemented in the eThekwini Municipality. The existing water heating method and the new technology installed are included in the project boundary. The power plants included in the South African national electricity grid form part of this project boundary for the purposes of calculating the grid emission factor.	
Indicate Emissions outside the Project Boundary	The existing water heating technology is not transferred to another application outside the project boundary. The removed equipment is scrapped. The technologies installed will be new equipment and will not be transferred from another application.

Location of the Project	
Province	The PoA covers the whole of South Africa. The first CPA is in the eThekwini Municipality.
Municipality	The PoA covers the whole of South Africa. The first CPA is in the eThekwini Municipality.
Nearest city/large town	Not applicable
Brief description of the location of the project site	Not applicable

Project Schedule/Timetable	
Earliest Project Start Date	*2013/01*
When is the expected first year of CER delivery	*2013*
Project Lifetime	*The PoA has a crediting period of 28 years. Each CPA has a crediting period of 10 years. The technology installed under the PoA has a warranty of 5 years. Carbon credits can only be generated for the lifetime of the existing equipment.*
Project End Date	*2041/01*
Crediting Period	*The PoA has a crediting period of 28 years. Each CPA has a*

Project Schedule/Timetable	
	crediting period of 10 years.
Current Status or phase of the project	*Select most applicable:* *Under discussion/ planning/**preparation**/construction or other actions already commenced/ Other (explain)* *The PoA is currently being set up - the CME has pre-selected suppliers to be part of the PoA.*
DNA Approval	*Has this project been submitted to the DNA for approval previously?* *Yes, a PIN was submitted for this project and approved by the DNA. A letter of no objection was issued for the project.*
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 project has not at this stage been submitted to any other Government departments 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?

- Solar water heaters make use of renewable energy to generate warm water. The use of renewable energy (solar radiation) to generate hot water results in a saving in electricity or fossil fuel consumption. Heat pumps use electricity more efficiently and hence also reduce the costs associated with heating water. Therefore this PoA will reduce household expenditure on electricity and will protect end users from the rising electricity and fossil fuel prices.

- The PoA will result in a reduction in power demand which will help avoid power shortages in the future. Reliable power supply and access to power is an important requirement for economic development.

- Eskom foresees future power shortages which is a significant hindrance to the fast growing economy of the country. The proposed PoA will reduce electricity demand for water heating and correct the energy mix, with a greater focus on renewable energy. This will assist in the diversification of the sources of hot water supply, which is important for meeting growing energy demands and facilitating the move away from fossil fuels.

- The PoA will strengthen the solar water heating and heat pump industries in South Africa by providing state-of-the art technology, creating job opportunities in the supply, installation, operation and maintenance fields as well as stimulating the interest of new investors in the solar energy sector and energy efficiency.

- The Municipality is showing foresight in innovation by taking this route to supplying hot water to its residents.

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

- The PoA will provide households and community residential units with a clean, practical and convenient way to meet their daily hot water demand. It will increase energy security for warm water supply in households and community residential units. It will assist in reducing the household's and South Africa's dependence on fossil fuels.

- The PoA will contribute to social development by income and employment generation. The PoA will create job opportunities in solar water heating and heat pump manufacturing, supply, distribution, installation and maintenance. In addition, the solar water heaters provide access to a renewable source of energy, which will reduce household expenditure on electricity and both technologies will reduce their users' exposure to increases in electricity prices.

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

- The PoA will result in a reduction of greenhouse gas emissions by increasing the efficiency of domestic water heating. The installed solar water heaters will displace coal-fired grid electricity and fossil fuels with heat being generated using renewable resources. The heat pumps will heat water more efficiently than conventional electric geysers, reducing electricity consumption. The reduction in the consumption of electricity and fossil fuels for water heating results in a reduction in greenhouse gas emissions. This reduction in greenhouse gas emissions will play a role in assisting South Africa to achieve its emission reduction target of 34% below business-as-usual by 2020.

- Apart from reducing greenhouse gas emissions, the PoA will displace the negative impacts of coal-mining and beneficiation as well as the adverse environmental impacts of combusting coal (particulate and sulphur emissions and water consumption and contamination). The success of this PoA will increase the uptake of solar water heaters and heat pumps in South Africa.

i) That the **disturbance of ecosystems and loss of biological diversity** are avoided, or where they cannot be avoided, are minimised and remedied	*The PoA will not have an impact on ecosystems and will not result in the loss of biological diversity. The PoA involves the installation of solar water heaters and heat pumps in the residential sector.*
ii) That **pollution and degradation of the environment** are avoided, or where they cannot be altogether avoided, are minimised and remedied	*The PoA will not result in pollution or degradation of the environment. In fact, the PoA will promote the use of renewable energy for heating and energy efficiency. As such, the PoA will displace the use of fossil fuel and electricity for water heating.*
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 installation of solar water heaters and heat pumps will not result in the disturbance of landscapes and sites that constitute the nation's cultural heritage. The solar water heaters and heat pumps will be installed in residential units.*

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 PoA will not involve the generation of waste. The PoA will encourage the use of renewable resources and energy efficiency in residential units.*
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 PoA will involve the use of solar energy which is a renewable resource. Solar energy will be used for heating water. In addition, the programme will involve the use of heat pumps which are a very efficient way of heating. The PoA aims to encourage the sustainable use of energy in residential units.*
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 PoA involves the installation of solar water heaters and heat pumps. Solar energy is renewable and the programme encourages the use of renewable energy. The programme encourages the efficient use of electricity.*
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	*A risk adverse and cautious approach has been followed in the design of this PoA. This is evident from the selection of technology providers that have a track record in the water heating industry and have SABS approval for their technologies.*
vii) That **negative impacts on the environment and on people's environmental rights** be anticipated and prevented, and where they cannot be altogether prevented, are minimised and remedied	*There are no negative impacts on the environment anticipated. In addition, the PoA will not infringe on people's rights. The idea is to rollout solar water heaters and heat pumps in residential units. The PoA will encourage the uptake of solar water heaters and heat pumps and develop a local solar water heating and heat pump industry. This will result in the creation of jobs.*
Other comments **Please provide any other comments on how this project contributes to sustainable development in South Africa (**optional) Not applicable	

Indicators in Support of the Project Approval Criteria			
Category		**Indicator**	**Comment**
Environmental	Impact on local environmental quality	• 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)	The PoA will have a positive impact on local environmental quality. The PoA involves the installation of solar water heaters and heat pumps. The PoA will have the following positive impacts: • Reduce greenhouse gas emissions which assists in improving air quality. • Encourage the sustainable use of water and energy. • Displace coal-based electricity and associated negative impacts of coal mining, transportation and combustion. • Displace the use of fossil fuels.
	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 PoA involves the use of solar energy which is a renewable resource. Hence, the programme is aimed at encouraging the sustainable use of natural resources and the switch to renewable and less carbon-intensive alternatives. In addition, the programme will involve the installation of heat pumps which use electricity efficiently.
	Impacts on biodiversity and ecosystems	• Changes in local or regional biodiversity arising from the project	The PoA will not impact on biodiversity.

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 PoA will not impact foreign exchange requirements. • The PoA will result in a reduction in the energy bill of the purchaser of the solar water heater and/or heat pump as they are less reliant on grid electricity and fossil fuels to heat their water.
	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	• There will be a positive implication with regard to the transfer of technology. The solar water heaters and heat pumps may become more common promoting renewable energy and energy efficiency technology transfer. • The skills to service the technology is not common or present in South Africa and therefore up skilling of people will need to be undertaken. • Once the skills for maintaining and servicing solar water heaters and heat pumps have been instilled in people, replication potential is possible as well as the possibility for people to begin new businesses due to the new skill set that has been developed. The skill set is currently absent in South Africa.

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 PoA is aligned with national government objectives as the Integrated Resource Plan (IRP) 2010 plan to have 1617 MW of solar water heating installed by 2017. Eskom has also stated that it is aiming to install 925 000 solar water heaters by 2013 to result in an energy saving of 578 MW. The PoA is thus aligned to assist in meeting this target. • As the programme is a PoA, the developmental objectives fall within the national boundaries of South Africa. As such, the above statement stands and the PoA is aligned to the objectives. • The PoA will not impact the provision or access to basic services in the area. • The PoA will not result in any relocation of communities.

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	• The PoA will grow the solar water heating and heat pump industry in South Africa and thus create jobs. • The PoA will not impact social structures. • The PoA will not impact social heritage. • The PoA will not impact the social amenities to the community.

Indicators in Support of the Project Approval Criteria			
Category		**Indicator**	**Comment**
General	General Project Acceptability	• Are the distribution of project benefits deemed to be reasonable and fair?	The distribution of the benefits is deemed to be reasonable and fair.

Part D: Finance

Project Costs	
Development Costs (R's)	The costs of the PoA are not currently available.
Installed Costs (R's)	
Other Costs (R's)	
Total Project Costs (R's)	
Sources of Finance	
Equity	*Name of Organisation(s) and amount (R's) contributed by each*
Debt (long term)	*Name of organization(s) and amount (R's) for each*
Debt (short term)	N*ame of organization(s) and amount (R's) for each*
Amount not identified (R's)	*Amount (R's) and a brief summary of the needs and any outstanding issues* *(1 paragraph or less)*
Total CDM Contribution sought	*Amount (R's) and a brief summary of the needs and any outstanding issues* *(1 paragraph or less)*
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)* *Price? (R's)*
Indicate the **projected Internal Rate of Return** for the project with and without CER revenues.	*Note: Please indicate assumed price of CER as used in your calculation*

Constraints on tradability of carbon credits	*Have any commercial arrangements been made that may impact the tradability of the carbon emission reductions? If yes, please define.Note. Examples would be subjection to a mortgage, government tax etc.*
Preliminary discussions with potential purchasers	*Have you had any preliminary discussions with any potential purchasers of the carbon credits (CERs)* *If yes, please give brief details.*