

**SMALL-SCALE CDM PROGRAMME ACTIVITY DESIGN DOCUMENT FORM  
(CDM-SSC-CPA-DD) - Version 01**



**NAME /TITLE OF THE PoA: SASSA Low Pressure Solar Water Heater Programme**



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<b>CLEAN DEVELOPMENT MECHANISM SMALL-SCALE PROGRAM ACTIVITY DESIGN DOCUMENT FORM (CDM-SSC-CPA-DD) Version 01</b>
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**NOTE:**

(i) This form is for submission of CPAs that apply a small scale approved methodology using the provision of the proposed small scale CDM PoA.

(ii) The coordinating/managing entity shall prepare a CDM Small Scale Programme Activity Design Document (CDM-SSC-CPA-DD)<sup>1,2</sup> that is specified to the proposed PoA by using the provisions stated in the SSC PoA DD. At the time of requesting registration the SSC PoA DD must be accompanied by a CDM-SSC CPA-DD form that has been specified for the proposed SSC PoA, as well as by one completed CDM-SSC CPA-DD (using a real case). After the first CPA, every CPA that is added over time to the SSC PoA must submit a completed CDM-SSC CPA-DD.

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<sup>1</sup> The latest version of the template form CDM-CPA-DD is available on the UNFCCC CDM web site in the reference/document section.

<sup>2</sup> At the time of requesting validation/registration, the coordinating managing entity is required to submit a completed CDM-POA-DD, the PoA specific CDM-CPA-DD, as well as one of such CDM-CPA-DD completed (using a real case).

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**SECTION A. General description of small scale CDM programme activity (CPA)**

**A.1. Title of the small-scale CPA:**

SASSA Low Pressure Solar Water Heater Programme – CPA- **XXX** [indicate number]

Version Number: **X**

Date: **dd/mm/yyyy**

**A.2. Description of the small-scale CPA:**

The proposed small-scale CDM Programme Activity (hereafter referred as CPA) consists of a group of SWHs under the SASSA Low Pressure Solar Water Heater Programme (hereafter referred as PoA) within the boundaries of South Africa. The CPA will install low pressure vacuum tube SWHs that have been approved by the South African Bureau of Standards (SABS). The size of the SWH may vary, but will most likely be 110-litre storage tank SWHs, in which case a CPA will include maximum 59 000 SWHs<sup>3</sup> [confirm installation size and number].

The proposed CPA is a voluntary initiative taken by the coordinating and managing entity of the PoA, Solar Academy of Sub Saharan Africa (Pty) Ltd (hereafter referred to SASSA).

There are no mandatory laws that require either the installation of SWHs or replacement of electric water heaters. Warm water service is not installed as a component of low cost housing delivery in South Africa. The National Housing Code determines the minimum requirement to be a metered single standpipe<sup>4</sup>. Therefore, CPA-**XXX** is a voluntary action of the CPA implementer, **XXX** [name(s)].

The installation will take place in low income households and will most likely replace electric kettles or electric and paraffin stoves and hence displace carbon intensive fossil fuels currently used for water heating. The CPA implementer, **XXX** [name(s)], will provide the SWHs free of charge for the households, with the condition that the resident cedes all rights to subsidies and carbon to the managing entity.

The proposed SSC CPA is expected to reduce **XXXXXXXX** tCO<sub>2</sub> over the selected ten years crediting period.

The project fulfils the national sustainable development criteria determined by the Department of Minerals and Energy of South Africa and contributes to sustainable development as follows<sup>5</sup>:

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<sup>3</sup> The SASSA 111-litre SWH has a collector are of 0,9 m<sup>2</sup> i.e. a small scale CPA can include maximum 71 1000 SWH to respect the small scale limits of 64 000 m<sup>2</sup> installed collector area.

<sup>4</sup> The Department of Human Settlements 2009, The National Housing Code – Technical and General Guidelines.

<sup>5</sup> Sustainable development criteria for approval of clean development mechanism projects by the designated national authority of the CDM, 2004, Department of mineral and energy, p. 3, available under:  
[http://www.dme.gov.za/dna/pdfs/sustainable\\_criteria.pdf](http://www.dme.gov.za/dna/pdfs/sustainable_criteria.pdf)

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**Economic Dimension**

Load shedding is one of the major problems in South Africa. Current electricity supply is not enough to meet projected future demand and it is hindering the fast growing economy of the country. The proposed CPA will reduce electric water heating loads and help South Africa to correct the energy mix, with a greater focus on renewable energy. Further the project will create local job opportunities during the installation period as well as maintenance of the SWHs. It is estimated that a minimum of **X** [no.] employees are needed for installation and maintenance work of this CPA.

**Environmental dimension**

The program will contribute towards a sustainable low carbon economy by making use of renewable energy and reducing electricity consumption and thereby reduces the amount of greenhouse gases (GHGs) produced by fossil fuel combustion at the national electricity grid.

**Social dimension**

Through the programme, jobs will be created in the solar sector, with training provided for technicians to install and maintain the SWH systems. Hence the project will lead to skills and know-how development. Further the CPA implementer, **XXX** [name(s)], will implement an Educational Program in the target communities to increase awareness of the residents and understanding of climate change, energy efficiency and SWH. Further a community based business programme will offer training on SWHs, installation, maintenance and replacement. This training programme will increase the local entrepreneurs understanding of the opportunities within the SWH business. The provision of solar water heaters free of charge will result in improved service delivery to residents and a major social upliftment.

**A.3. Entity/individual responsible for the small-scale CPA:**

The entity responsible for the proposed CPA-**XXX** is SASSA, **and entity XXX** [in some cases SASSA may share the implementer role with another entity]. SASSA is also the coordinating and managing entity of the PoA, as indicated in the PoA-DD.

**A.4. Technical description of the small-scale CPA:**

**A.4.1. Identification of the small-scale CPA:**

SASSA Low Pressure Solar Water Heater Programme – CPA **XXX** [identify number]

**A.4.1.1. Host Party:**

Republic of South Africa

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**A.4.1.2. Geographic reference or other means of identification allowing the unique identification of the small-scale CPA (maximum one page):**

The physical boundary of CPA-XXX is the SWHs in the individual households that have received a SWH under this PoA and have ceded all their subsidy and carbon rights to the managing entity. The geographical boundary of CPA-XXX is that of:

- XXX [might be several municipalities], in South Africa.

The Figure 1 maps show the provinces and districts in South Africa indicating the municipalities and provinces included within the geographical boundary of CPA-XXX.

*[Insert the figure(s) of geographical boundary]*

Figure 1. Geographical boundary of CPA-XXX

All installations within the CPA-XXX can be uniquely identified by the combination of CPA number, serial number, ERF number (23 digit national property), Street Address, and GPS coordinates.

**A.4.2. Duration of the small-scale CPA:**

**A.4.2.1. Starting date of the small-scale CPA:**

The starting date of the CPA is dd/mm/yyyy, which is the date when the first SWH of the proposed CPA was installed.

**A.4.2.2. Expected operational lifetime of the small-scale CPA:**

15 years

The lifetime of SWHs have proven to be in excess of 10 years, typically between 15 to 30 years.<sup>6</sup> SASSA will ensure training and maintenance of the SWHs with in a CPA for ten years.

**A.4.3. Choice of the crediting period and related information:**

Fixed crediting period of ten years.

**A.4.3.1. Starting date of the crediting period:**

The starting date of the crediting period is dd/mm/yyyy, which is the date of the first installation or the date of including the CPA-001 in the registered PoA.

<sup>6</sup> Solar Direct Website 2 May 2010: <http://www.solardirect.com/swh/swh.htm>

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**A.4.3.2. Length of the crediting period, first crediting period if the choice is renewable CP:**

Not applicable.

**A.4.4. Estimated amount of emission reductions over the chosen crediting period:**

Fixed crediting period of 10 (ten) years is adopted by the CPA-XXX. It is expected that the CPA-XXX will generate greenhouse gas emission reductions of XXX tCO<sub>2</sub>e over this crediting period. The table below shows the estimated annual emission reductions.

Year	Emission reduction per annum (ton CO <sub>2</sub> e)
20XX	XXX XXX
20XX	XXX XXX
20XX	XXX XXX
20XX	XXX XXX
20XX	XXX XXX
20XX	XXX XXX
20XX	XXX XXX
20XX	XXX XXX
20XX	XXX XXX
20XX	XXX XXX
Total estimated reductions (tonnes CO <sub>2</sub> e)	X XXX XXX
Total number of crediting years	10
Annual average of the estimated reductions over the crediting period	XXX XXX

*[In case the crediting period starts in middle of the year, adjust the table with additional year]*

**A.4.5. Public funding of the CPA:**

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The proposed CPA will not receive any public funding from Parties included in Annex I of the UNFCCC.

**A.4.6. Information to confirm that the proposed small-scale CPA is not a de-bundled component**

In Accordance with paragraph 9, Annex 32 “Guidelines on assessment of de-bundling for SSC project activities” of the EB 36, if each of the independent subsystems/measures (e.g. solar home system) included in the CPA of a PoA is no greater than 1% of the small scale thresholds defined by the methodology applied, than the CPA or PoA is exempted from performing de-bundling check i.e. considered as not being a de-bundled component of a large scale activity.

The CPA-XXX does not include systems that are not greater than 1 % of the 64 000 m<sup>2</sup> SSC limit i.e. the installed SWHs are maximum X % of the SSC threshold.

**A.4.7. Confirmation that small-scale CPA is neither registered as an individual CDM project activity or is part of another Registered PoA:**

CPA-XXX has not been registered as an individual CDM project activity. Prior to registering of the CPA, the coordinating entity has checked the CDM project database to ensure that the installation is not a part of another CPA under the PoA. As the coordinating entity SASSA is the CDM implementer, and the households included in the CPA and the PoA are uniquely identified and they cede the rights of the carbon to SASSA, it can be assured that the individual installations have not be registered as part of a another PoA.

**SECTION B. Eligibility of small-scale CPA and Estimation of emissions reductions**

**B.1. Title and reference of the Registered PoA to which small-scale CPA is added:**

SASSA Low Pressure Solar Water Heater Programme registered under the reference no XXXX.

**B.2. Justification of the why the small-scale CPA is eligible to be included in the Registered PoA :**

The SSC CPA meets all the eligibility criteria for inclusion of a SSC CPA in the PoA as listed in section A.4.2.2. of the PoA-DD.

No	Criteria	Analysis
1	The CPA to be included in SWHs PoA shall meet the applicability requirements of the CDM methodology AMS.I.C- Thermal energy production with or without electricity, version 17.	[add]
2	The CPA to be included in SWHs PoA shall meet SSC additionality, leakage and debundling rules, relevant to PoAs.	
3	All installations shall take place in residential	

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	buildings within the geographical boundaries of South Africa.	
4	All the SWH under the SSC-CPA are comply with all relevant SABS/SANS Standard Specification for SWH systems.	
5	All SWH under the SSC-CPA are low pressure (also called as non pressurised) systems without an electric backup system.	
6	Each CPAs shall be uniquely identified and defined by way of the unique identifying numbers (series numbers) attached to each SWH to, ensure that all CPAs under its PoA are neither registered as an individual CDM project activity nor included in another registered PoA .	
7	All households joining the programme shall cede the rights to the subsidy and carbon to SASSA.	
8	All households joining the programme shall have electricity and water connection.	
9	All residences joining the programme shall have an proof of identity (ID).	
10	Each SSC-CPA must be approved by the coordinating entity and DOE prior to its incorporation into the PoA.	

**B.3. Assessment and demonstration of additionality of the small-scale CPA , as per eligibility criteria listed in the Registered PoA:**

SASSA is responsible for financing and implementation of each CPA, including CPA-**XXX**. Therefore, all the barriers to implementation of the SASSA Low Pressure Solar Water Heater Programme PoA, provided in detail in the PoA-DD, apply to CPA-**XXX**.

*[Provide financial analysis with relevant figures, or use simplified additionality argumentation for the CPS in question.]*

Therefore, CPA-**XXX** is additional.

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**B.4. Description of the sources and gases included in the project boundary and proof that the small-scale CPA is located within the geographical boundary of the registered PoA.**

As defined in AMS.I.C, the project boundary is the physical, geographical site of the renewable energy generation including the residential facility consuming the thermal energy produced. Hence the boundary for the CPA- **XXX** comprises the physical site of each SWH within the CPA as well as the South African grid system, as the SWH will replace grid electricity. The GHG reduced through the CPAs is CO<sup>2</sup>. The reduction takes place through the avoidance of fossil fuels (predominantly coal) used in the production of electricity to heat water, in the absence of the CPAs.

**B.5. Emission reductions:**

**B.5.1. Data and parameters that are available at validation:**

<b>Data / Parameter:</b>	<b>EF<sub>grid</sub></b>
Data unit:	tCO <sub>2</sub> e/MWh
Description:	The emission factor for the electricity system.
Source of data used:	Calculated
Value applied:	0.9798 tCO <sub>2</sub> e/MWh
Justification of the choice of data or description of measurement methods and procedures actually applied :	The factor is calculated according to the guidance given in the Tool to calculate the emission factor for an electricity system, Version 02.
Any comment:	Please see Appendix III (emission reductions master CPA document) for more detailed information.

<b>Data / Parameter:</b>	<b>Q</b>
Data unit:	TJ
Description:	Daily solar energy output by the SWH in the day
Source of data used:	SABS test results
Value applied:	[input]
Justification of the choice of data or description of measurement methods and procedures actually applied :	The solar water heater system analysis is based on SANS 6211-1:2003. The SABS test determines the energy output of the SWH.
Any comment:	The SABS test result is used for ex-ante calculation. For ex-post calculation the SABS test is adjusted with annual average irradiation and temperature, as well as measurement results of the metered SWHs.



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<b>Data / Parameter:</b>	<b>N<sub>estimate</sub></b>
Data unit:	Units
Description:	Estimated number of units installed under the CPA
Source of data used:	Estimated based on size of collector area
Value applied:	[input]
Justification of the choice of data or description of measurement methods and procedures actually applied :	It is estimated that the no of SWH installed with this CPA include XXXXX installations, based on the collector area of X m <sup>2</sup> . The maximum total collector area of each CPA shall be 64 000 m <sup>2</sup> .
Any comment:	

**B.5.2. Ex-ante calculation of emission reductions:**

**Baseline Emissions**

AMS-I.D determines that the baseline emissions are the product of electrical energy baseline expressed in kWh produced by the renewable generating unit multiplied by an emission factor:

$$BE_y = EG_{BL,y} * EF_{CO2}$$

Where,

<i>Symbol</i>	<i>Description</i>	<i>Value Applied</i>
BE <sub>y</sub>	= Baseline Emissions in year y, tCO <sub>2</sub> e	[add]
EG <sub>BL,y</sub>	= Energy baseline in year y, kWh	[add]
EF <sub>CO2</sub>	= CO <sub>2</sub> Emission factor, tCO <sub>2</sub> /MWh.	0.9798

The Emission Factor is calculated according to “Tool to calculate the emission factor for an electricity system”. The Energy Baseline is the energy output determined by SABS test<sup>7</sup>, which has been calculated as follows:

$$Q = \alpha_1 H + \alpha_2 (T_a - T_c) + \alpha_3$$

Where,

<b>Symbol</b>	<b>Description</b>	<b>Value Applied</b>
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<sup>7</sup> The SABS test results determine also the level of Eskom subsidy.

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Q	= Energy output in MJ SABS test	[add]
H	= The energy input i.e. irradiation in MJ per m <sup>2</sup> SABS test	[add]
T <sub>a</sub>	= The ambient air temperature	[add]
T <sub>c</sub>	= Incoming cold water temperature SABS test	[add]
α <sub>1</sub>	= Specific coefficient determined in the SABS test	[add]
α <sub>2</sub>	= Specific coefficient determined in the SABS test	[add]
α <sub>3</sub>	= Specific coefficient determined in the SABS test	[add]

The determination of  $Q_{i,y}$  complies with the SANS 6211-1: 2003 test<sup>8</sup> for the solar absorption efficiency of a domestic solar water heating system.

***Grid Factor***

The grid emission factor is calculated according to the “Tool to calculate the emission factor for an electricity system”. The calculation has been determined in the PoA DD.

***Project Emissions***

According AMS.I.C the project emissions consist of CO<sub>2</sub> emissions from onsite fossil fuel consumption. As this PoA does not include an electric backup system, there are no emissions related to the project activity. The managing entity could not identify any other emission sources associated to the project implementation. Hence project emissions in year y is zero ( $PE_y = 0$ ) under the CPA-XXX [confirm].

***Leakage***

According AMS.I.C. leakage shall be considered if the SWH is transferred from another activity, or the the PoA includes replacement of existing equipment. As the PoA takes place in low income households that currently lack proper water heating equipment, and hence the SWH is rather seen as new installation opposite to replacement of an existing equipment (see section E.4 for suppressed demand justification ). Leakage ( $LE_y$ ) is considered to be zero under this the CPA-XXX [confirm].

***Emission Reductions***

$$ER_y = BE_y - PE_y - LE_y$$

For more detailed information please see the appendix X [determine] of this CPA DD.

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<sup>8</sup> South African National Standard as published by the South African Bureau of Standards ([www.sabs.co.za](http://www.sabs.co.za))

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**B.5.3. Summary of the ex-ante estimation of emission reductions:**

<b>Years</b>	<b>Estimation of project activity emissions (t CO<sub>2</sub> e)</b>	<b>Estimation of baseline emissions (t CO<sub>2</sub> e)</b>	<b>Estimation of leakage (t CO<sub>2</sub> e)</b>	<b>Estimation of overall emission reductions (t CO<sub>2</sub> e)</b>
20XX	0	XXX XXX	0	XXX XXX
20XX	0	XXX XXX	0	XXX XXX
20XX	0	XXX XXX	0	XXX XXX
20XX	0	XXX XXX	0	XXX XXX
20XX	0	XXX XXX	0	XXX XXX
20XX	0	XXX XXX	0	XXX XXX
20XX	0	XXX XXX	0	XXX XXX
20XX	0	XXX XXX	0	XXX XXX
20XX	0	XXX XXX	0	XXX XXX
20XX	0	XXX XXX	0	XXX XXX
<b>Total (tCO<sub>2</sub> e)</b>	<b>0</b>	<b>XXX XXX</b>	<b>0</b>	<b>XXX XXX</b>

*[In case the crediting period starts in middle of the year, adjust the table with additional year]*

**B.6. Application of the monitoring methodology and description of the monitoring plan:**

**B.6.1. Description of the monitoring plan:**

As described in the PoA DD, and with respect of AMS-I.C, the monitoring of the CPA-XXX will consist of the following:

1. Confirmation of operation of the systems, through a technical inspection (1 % of the sample) as well as recorded system failures (continues data capturing)
2. SABS test result
3. Real-time measurements: annual average solar radiation, annual average ambient temperature, inlet and outlet water temperature and water flow ( 1/10000 measurement group)

To confirm the number of operating systems 1 % of the installations in each CPA are sampled for functionality, as well as to check the data capture accuracy. The database will annually allocate the 1 in 100 sites for inspection by an automated random number generator, which will be set to never select the same site for inspection over the 10 years period. Therefore 10 percent of all the installations will be inspected over the 10 years monitoring period. The results are used to adjust the ex-post emission

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reduction calculation (i.e. % of SWHs operational). Please see Annex 4 of the PoA-DD for more details on sample size.

1 of 10 000 SWHs are measured real-time for annual average solar radiation, annual average ambient temperature, inlet and outlet water temperature and water flow. This data is used to adjust the energy output determined in the SABS for the specific SWH (calibrated simulation approach). This is done in a way that each SWH is linked in the data base to the nearest measurement point (maximum distance 50 km). In case the measured daily energy output is less than 13.692 MJ (SABS test result), the daily energy output of all the SWHs linked to that specific measurement point are reduced accordingly. No adjustments are done if measurement results give higher daily energy outputs. This is a conservative approach. The data at each of the metered sites is recorded every 5 minutes and integrated daily. At midnight every day, the simulation is executed on each household/SWH based on the daily measured values. As a cross check measure the measurement results are compared to measurements from universities or weather stations

The SASSA Monitoring and Verification Plan determines the detail measures for sampling and measurement, as well as calibration of the measurement equipment. The pyranometer, the ambient temperature probe and the cold-water temperature probe will at all times have a valid calibration certificate. The calibration expiry period will be programmed into the on-line database and monitoring system which will warn the relevant responsible person that the calibration expiry period is approaching. One month prior to the expiry period a new works order will be issued and the relevant instrumentation will be replaced with a calibrated unit and the removed item either recalibrated for future use or disposed of.

The managing entity SASSA will subcontract a specialised company for record keeping and maintaining of the data. The following data is recorded in the database for monitoring purposes from each CPA:

- Unique identification the SWH (series number and ERF number);
- Installation date of the SWH system;
- System specifications including size, collector area and SABS test results;
- Number of systems operating based on the sample group;
- System problems: the reason for any system problems and dates when system stops operation and restarts operation;
- Real-time measurement results: daily solar irradiation, daily ambient air temperature, daily water flow and inlet and outlet temperatures (for sample group).

The database to be used is a SQL database that is hosted in a secure hosted environment. The information can be easily drawn from the database and utilized for reporting. Data will be archived for two years once the 10 year crediting period has lapsed. Relevant data capture, verification and storage procedures will be followed in maintaining the data to ensure its accuracy, validity and completeness. Please see section A.4.4.1 of the PoA-DD for more details on the data capturing.

International Carbon will assist the coordinating entity to produce a monitoring report for each monitoring period in order to verify the information related to the emission reductions contained in the CPA.

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The PoA record keeping procedures will prevent double counting across CPAs. SASSA will keep all monitoring data for a period of at least two years after the crediting period.

**SECTION C. Environmental Analysis**

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

☒ Please tick if this information is provided at the PoA level: the environmental regulation and impacts have been analysed in the PoA level.

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

Not applicable.

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

Not applicable.

**SECTION D. Stakeholders' comments**

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

☒ Please tick if this information is provided at the PoA level: local stakeholder process was undertaken in the PoA level.

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

Not applicable.

**D.3. Summary of the comments received:**

Not applicable.

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

Not applicable.

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**Annex 1**

**CONTACT INFORMATION ON ENTITY/INDIVIDUAL RESPONSIBLE FOR THE SMALL-SCALE CPA**

Organization:	The Solar Academy of Sub Saharan Africa (Pty) Ltd
Street/P.O.Box:	15 Cleveland Road / P.O. Box 145588
Building:	15 a
City:	Cleveland / for P.O. Box: Bracken Gardens
State/Region:	Gauteng
Postfix/ZIP:	145588 / for P.O. Box: 1452
Country:	South Africa
Telephone:	+27 86 1111 203
FAX:	+27 865169581
E-Mail:	
URL:	<a href="http://www.tasolsolar.co.za">www.tasolsolar.co.za</a>
Represented by:	
Title:	Mr
Salutation:	
Last Name:	Nelson
Middle Name:	
First Name:	Chris
Department:	
Mobile:	+27 8255 24513
Direct FAX:	
Direct tel:	+ 27 11 621 8300
Personal E-Mail:	chrisn@rtc.co.za

Organization:	Standard Bank Plc
Street/P.O.Box:	20 Gresham Street
Building:	
City:	London
State/Region:	
Postfix/ZIP:	EC2V 7JE
Country:	United Kingdom
Telephone:	+44 20 3145 6890
FAX:	+44 20 3189 6930
E-Mail:	co2@standardbank.com
URL:	<a href="http://www.standardbank.com">www.standardbank.com</a>
Represented by:	
Title:	
Salutation:	Mr.

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**NAME /TITLE OF THE PoA: SASSA Low Pressure Solar Water Heater Programme**



**CDM – Executive Board**

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Last Name:	Sinclair
Middle Name:	
First Name:	Geoff
Department:	
Mobile:	
Direct FAX:	
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Personal E-Mail:	

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Represented by:	
Title:	
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**CDM – Executive Board**

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Represented by:	
Title:	
Salutation:	
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Department:	
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CDM – Executive Board

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Annex 2

**INFORMATION REGARDING PUBLIC FUNDING**

No public funding will be used or required for this CPA

SMALL-SCALE CDM PROGRAMME ACTIVITY DESIGN DOCUMENT FORM  
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CDM – Executive Board

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Annex 3

**BASELINE INFORMATION**

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MONITORING INFORMATION

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