CLEAN DEVELOPMENT MECHANISM
SMALL-SCALE PROGRAM ACTIVITY DESIGN DOCUMENT FORM (CDM-SSC-CPA-DD)
Version 01

CONTENTS

Annexes

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)[1,2] 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.

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

[2] 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).

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- 001
Version Number: 2
Date: 17/08/2010

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 59 000 SWHs[3].

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[4]. Therefore, CPA-001 is a voluntary action of the CPA implementer, SASSA.

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, SASSA, 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 801 885 tCO_2 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[5]:

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

[4] The Department of Human Settlements 2009, The National Housing Code – Technical and General Guidelines.

[5] 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

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 140 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, SASSA, 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-001 is SASSA. 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 001

A.4.1.1. Host Party:

Republic of South Africa

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-001 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 managing entity. The geographical boundary of CPA-001 is that of:

- Nelson Mandela Bay Metropolitan Municipality (NMBM) - Eastern Cape Province (no 7)[6];
- Ekurhuleni Metropolitan Municipality (EMM) - Province of Gauteng (no 31);
- Free State Province (FSP) with the districts Xhariep¸ Motheo, Lejweleputswa, Thabo Mofutsanyane, Fezile Dabi (no 14-18);
- eThekwini Metropolitan Municipality (eTh) - KwaZulu Natal Province (no 50);
- Western Cape Province with the districts City of Cape Town Metropolitan Municipality, West Coast, Cape Winelands, Overberg, Eden and Central Karoo (CoCT) - (no 1-6)
- North West Province (NWP) no with the districts Bojanala Platinum, Ngaka Modiri Molema, Dr Ruth Segomotsi Mompati, Dr Kenneth Kaunda (24-27);

in South Africa.

The Figure 1 and 2 maps show the provinces and districts in South Africa indicating the municipalities and provinces included within the geographical boundary of CPA-001.[7]

All installations within the CPA-001 can be uniquely identified by the combination of CPA number, serial number, ERF number (23 digit national property), Street Address, and GPS coordinates.

[6] The number refers to the districts in the right map below.

[7] In case uptake in one of the areas is pure the CPA may included lesser areas (municipalities and/or provinces). Further CPAs can also include installations in the above mentioned areas or other municipalities.

Figure 1. Geographical boundary of CPA-001: South African Provinces and Cities

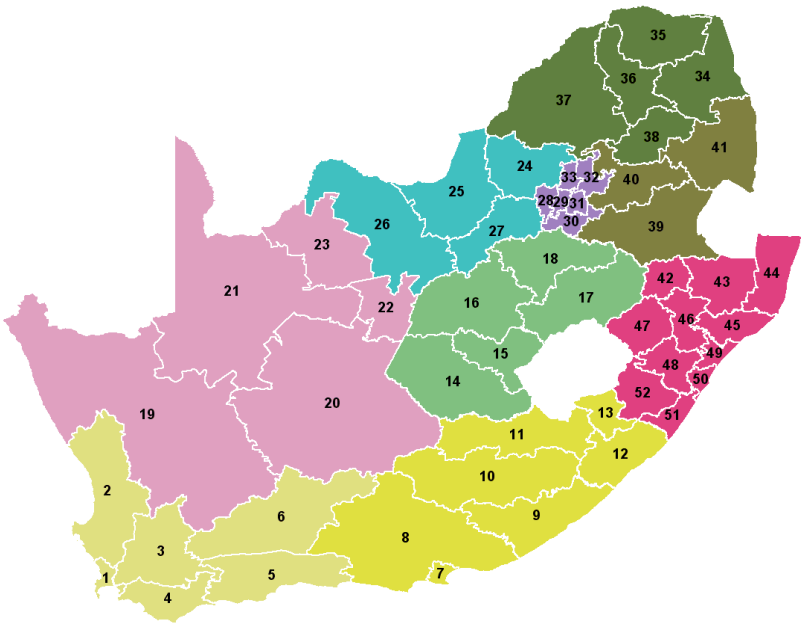

Figure 2. Geographical boundary of CPA-001: municipalities and provinces within CPA-001

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-001 is 01/07/2010, which is the date when the first residential agreement for the SWH installation and ceding of the carbon rights was signed.

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.[8] 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 01/03/2011, or the date of the PoA is registered and the CPA-001 is included into the registered PoA.

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-001. It is expected that the CPA-001 will generate greenhouse gas emission reductions of 801 885 tCO_2e over this crediting period. The table below shows the estimated annual emission reductions.

[8] Solar Direct Website 2 May 2010: http://www.solardirect.com/swh/swh.htm

Year	Emission reduction per annum (ton CO_2e)
2011	66 260
2012	80 250
2013	80 250
2014	80 250
2015	80 250
2016	80 250
2017	80 250
2018	80 250
2019	80 250
2020	80 250
2021	13 375
Total estimated reductions (tonnes CO_2 e)	**801 885**
Total number of crediting years	**10**
Annual average of the estimated reductions over the crediting period	**80 188.5**

A.4.5. Public funding of the CPA:

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-001 does not include systems that are not greater than 1 % of the 64 000 m^2 SSC limit i.e. typical installation is likely to be the 110-litre SWH, which has an absorber area of 1.08 m^2. The maximum collector area for SASSA SWHs is 1.8 m^2 (200 litre SWH), and the maximum collector area for 300 litre storage tank SWHs is 4 m^2 which is less than 0.007 % of the small scale 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-001 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 coordinating entity, 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 XXX (shall be added when available) .

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. Please see table 1 below.

Table 1. Eligibility criteria for inclusion of a SSC CPA-001 in the PoA

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.	Yes the CPA is solar water heating and hence fulfils the conditions of AMS.I.C.
2	The CPA to be included in SWHs PoA shall meet SSC additionality, leakage and debundling rules, relevant to PoAs.	Yes. Please see section A.4.6, B.3 and B.5.2
3	All installations shall take place in residential buildings within the geographical boundaries of South Africa.	Yes. The installations will take place in residential buildings in NMBM, EMM, eTh, CoCT, NWP, and FSP.
4	All the SWH under the SSC-CPA are comply with all relevant SABS/SANS Standard Specification for SWH systems.	Yes, all installations will fulfil the relevant SABS and SANs requirements.
5	All SWH under the SSC-CPA are low pressure (also called as non pressurised) systems without an electric backup system.	Yes. All installations are low pressure system feed storage solar water heaters.
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 .	Yes. From each installation serial number, EMR-number, GPS coordinates and address are recorded into the database.

7	All households joining the programme shall cede the rights to the subsidy and carbon to SASSA.	Yes. This is a condition for joining the CPA. Each household shall sing an residence agreement, in which subsidy and carbon rights are ceded to SASSA in order to obtain the SWH.
8	All households joining the programme shall have electricity and water connection.	Yes. This is inspected and recorded in installation sheet. This is also a condition for Eskom subsidy.
9	All residences joining the programme shall have a proof of identity (ID).	Yes. A condition for joining. The ID is recorded in the installation sheet and database.
10	Each SSC-CPA must be approved by the coordinating entity and DOE prior to its incorporation into the PoA.	Yes (Shall be confirmed after DOEs review.)

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 CPA-001. Therefore, all the barriers to implementation of the SASSA Low Pressure Solar Water Heater Programme PoA, provided in detail in the PoA-DD, will also apply to CPA-001.

For the additionality of CPA-001, a specific investment comparison analysis has been conducted. The detailed analyses, for the two scenarios with and without carbon, are available in appendix V and VI. The table 2 shows the most important key data used for comparison analyses.

Table 2. Key Parameters for investment analysis.

Item	***ZAR With CERs***	***ZAR Without CERs***
Cost per SWH		
Production Cost	2508	2508
Installation Cost	1523.04	1523.04
Maintenance, Monitoring and Management	518.70	518.70
Total	4549.74	4549.74
Revenue		
Subsidy per SWH	4240	4240
CER Price	105	105
Other Variable		
CPI	5.1 %	5.1 %
VAT	14 %	14 %
Exchange Rate (EUR-ZAR)	10.5	10.5
Finance Cost	2.5 %	2.5 %
IRR	6.15 %	- 6.45 %

The below figure 2 presents the cash flow model without CER income and the figure 3 presents the cash flow model with CER income, showing clear difference in internal rate of return (IRR). Therefore, CPA-001 is additional.

Figure 3. Summary the Cash Flow Statement with CERs.

				2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	
Units Installed															
	2010			26 320											
	2011				32 680										
Income															
	Eskom Subsidy		4240	41 636 800	208 523 200	-									250 160 000
	CER's - annual							1 701 617	8 172 444	8 172 444	8 172 444	8 172 444	8 172 444	8 172 444	50 736 281
	CER's - upfront (50euro)			2 793 000	28 182 000	-									30 975 000
															0
				44 429 800	236 705 200	-	-	1 701 617	8 172 444	8 172 444	8 172 444	8 172 444	8 172 444	8 172 444	331 871 281
Expenses		Excl	Incl (14%)												
	Unit cost	2200.00	2508.00	-66 010 560	-88 643 078	0									-154 653 638
	Finance charge	88.40	100.78	-2 652 424	-3 293 360	0									-5 945 784
	M&V	65.00	74.10	-437 190	-437 190	-437 190	-437 190	-437 190	-437 190	-437 190	-437 190	-437 190	-437 190		-4 371 900
	Insurance/admin/overheads	100.00	114.00	-3 000 480	-3 725 520	0									-6 726 000
	Installation	1336.00	1523.04	-40 086 413	-49 772 947	0									-89 859 360
	Maintanence	190.00	216.60	0	0	0	-4 259 800			-4 259 800			-4 259 800		-12 779 400
	Education/training	40.00	45.60	-269 040	-282 761	-297 182	-312 338	-328 267	-345 009	-362 604	-381 097	-400 533	-420 960		-3 399 793
	Marketing & Project Managemn	60.00	68.40	-403 560	-424 142	-445 773	-468 507	-492 401	-517 514	-543 907	-571 646	-600 800	-631 441		-5 099 689
	0	0.00	0.00	0	0	0									0
	0			0	0	0									0
	CDM Reg		0.00	0	0	0	0	0	0	0	0	0	0	0	0
	CER Mngt		0%	0	0	0	0	0	0	0	0	0	0	0	0
					-	-									
				-112 859 667	-146 578 998	-1 180 145	-5 477 835	-1 257 858	-1 299 713	-5 603 501	-1 389 933	-1 438 523	-5 749 391	0	-282 835 564
Expected profit/loss				-68 429 867	90 126 202	-1 180 145	-5 477 835	443 759	6 872 731	2 568 943	6 782 511	6 733 921	2 423 053	8 172 444	
Cumulative				-68 429 867	21 696 335	20 516 191	15 038 355	15 482 114	22 354 845	24 923 788	31 706 299	38 440 220	40 863 273	49 035 717	
	IRR	6.15%		-282 835 564	44 429 800	236 705 200	-	-	1 701 617	8 172 444	8 172 444	8 172 444	8 172 444	8 172 444	

Figure 4. Summary the Cash Flow Statement without CERs.

				2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	
Units Installed															
	2010			26 320											
	2011				32 680										
	2012														
Income															
	Eskom Subsidy		4240	41 636 800	208 523 200	-									250 160 000
	CER's - annual		0	-	-	-	-	-	-	-	-	-	-	-	0
	CER's - upfront (50euro)		0	-	-	-	-	-	-	-	-	-	-	-	0
															0
				41 636 800	208 523 200	-	-	-	-	-	-	-	-	-	250 160 000
Expenses		Excl	Incl (14%)												
	Unit cost	2200.00	2508.00	-66 010 560	-88 643 078	0									-154 653 638
	Finance charge	88.40	100.78	-2 652 424	-3 293 360	0									-5 945 784
	M&V	65.00	74.10	-437 190	-437 190	-437 190	-437 190	-437 190	-437 190	-437 190	-437 190	-437 190	-437 190		-4 371 900
	Insurance/admin/overheads	100.00	114.00	-3 000 480	-3 725 520	0									-6 726 000
	Installation	1336.00	1523.04	-40 086 413	-49 772 947	0									-89 859 360
	Maintanence	190.00	216.60	0	0	0	-4 259 800			-4 259 800			-4 259 800		-12 779 400
	Education/training	40.00	45.60	-269 040	-282 761	-297 182	-312 338	-328 267	-345 009	-362 604	-381 097	-400 533	-420 960		-3 399 793
	Marketing & Project Managemn	60.00	68.40	-403 560	-424 142	-445 773	-468 507	-492 401	-517 514	-543 907	-571 646	-600 800	-631 441		-5 099 689
		0.00	0.00	0	0	0									0
				0	0	0									0
	CDM Reg		0.00	0	0	0	0	0	0	0	0	0	0	0	0
	CER Mngt		0%	0	0	0	0	0	0	0	0	0	0	0	0
					-	-									
				-112 859 667	-146 578 998	-1 180 145	-5 477 835	-1 257 858	-1 299 713	-5 603 501	-1 389 933	-1 438 523	-5 749 391	0	-282 835 564
Expected profit/loss				-71 222 867	61 944 202	-1 180 145	-5 477 835	-1 257 858	-1 299 713	-5 603 501	-1 389 933	-1 438 523	-5 749 391	0	
Cumulative				-71 222 867	-9 278 665	-10 458 809	-15 936 645	-17 194 503	-18 494 216	-24 097 717	-25 487 650	-26 926 173	-32 675 564	-32 675 564	
	IRR	**-6.46%**		-282 835 564	41 636 800	208 523 200	-	-	-	-	-	-	-	-	

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- 001 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^2. 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:

Data / Parameter:	**EF_{grid}**
Data unit:	tCO2e/MWh
Description:	The emission factor for the electricity system.
Source of data used:	Calculated
Value applied:	0.9798 tCO_2e/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.

Data / Parameter:	Q
Data unit:	TJ
Description:	Daily solar energy output by the SWH in the day
Source of data used:	SABS test results
Value applied:	13.692
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.

Data / Parameter:	**$N_{estimate}$**
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:	59 000
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 59000 installations, based on the collector area of 1.08 m^2. The maximum total collector area of each CPA shall be 64 000 m^2.
Any comment:	Note the number is the maximum number and subject to uptake.

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,

Symbol	***Description***	***Value Applied***
BE_y	= Baseline Emissions in year *y*, tCO_2e	80 250 (annual average)
$EG_{BL,y}$	= Energy baseline in year *y*, MWh	81 904 (annual average)
EF_{CO2}	= CO_2 Emission factor, tCO_2/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[9], which has been calculated as follows:

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

Where,

[9] The SABS test results determine also the level of Eskom subsidy.

Symbol	*Description*	*Value Applied*
Q	= Energy output in MJ SABS test	13.692
H	= The energy input i.e. irradiation in MJ per m^2 SABS test	16
T_a	= The ambient air temperature	32
T_c	= Incoming cold water temperature SABS test	22
α_1	= Specific coefficient determined in the SABS test	0.55017679
α_2	= Specific coefficient determined in the SABS test	0.22948380
α_3	= Specific coefficient determined in the SABS test	2.59481799

The determination of $Q_{i,y}$ complies with the SANS 6211-1: 2003 test[10] 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_2 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-001.

Leakage

According AMS.I.C. leakage shall be considered if the SWH is transferred from another activity, or 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-001.

Emission Reductions

$ER_y = BE_y – PE_y - LE_y$

For more detailed information please see the appendix IIII (Emission reduction calculations for CPA 001).

[10] South African National Standard as published by the South African Bureau of Standards (www.sabs.co.za)

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

Years	Estimation of project activity emissions (t CO2 e)	Estimation of baseline emissions (t CO2 e)	Estimation of leakage (t CO2 e)	Estimation of overall emission reductions (t CO_2 e)
2011	0	66 260	0	66 260
2012	0	80 250	0	80 250
2013	0	80 250	0	80 250
2014	0	80 250	0	80 250
2015	0	80 250	0	80 250
2016	0	80 250	0	80 250
2017	0	80 250	0	80 250
2018	0	80 250	0	80 250
2019	0	80 250	0	80 250
2020	0	80 250	0	80 250
2011		13 375		13 375
Total (tCO_2 e)	**0**	**801 885**	**0**	**801 885**

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-001 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 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 liked 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 giver 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.

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.

Annex 1

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

Organization:	The Solar Academy of Sub Saharan Africa (Pty) Ltd
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Annex 2

INFORMATION REGARDING PUBLIC FUNDING

No public funding will be used or required for this CPA

Annex 3

BASELINE INFORMATION

Please see annex 3 of the PoA-DD.

Annex 4

MONITORING INFORMATION

Please see annex 4 of the PoA-DD.

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