



UEMP Information Sharing Event Summary of Session 5

Urban Environmental Management Programme



Experience and way forward with the rollout of Solar Water Heaters (SWHs) in low-income areas

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The aim of this session was to plan a way forward towards the mass implementation of SWHs in low income areas. Lessons and barriers encountered in implementation were first addressed as this is extremely important, since it often points directly at factors impeding mass implementation - what exactly is hindering implementation and identifying who to work with (city departments, national government) in an attempt to ease the barriers. The session proceeded with discussion and subsequent formulation of an action plan on how to make SWH implementation sustainable and replicable (some projects may be implemented on a 'grant funding' model, for example, from which lessons are undoubtedly learnt, but may not be that easily transferrable into a replicable, sustainable rollout).

Objectives of the session:

To inform UEMP projects and others looking to implement low-income SWH projects by:

- Reviewing some key experiences
- Assessing different implementation models
- Making recommendations on good practice
- Clarifying key next steps
- Identifying where further research may be necessary to support implementation

Outputs of the session:

1. A Review of Experience
2. Key Criteria to make low-income SWHs work
3. Recommendations for best practice
4. Key actions to move forward



1. A Review of Experience

In the past, it has been difficult to argue for the installation of SWHs in low income households. This is because these houses typically do not have electric geysers installed. Recent approaches to low pressure SWH system implementation in low income households, notably at Kuyasa in Khayelitsha, are beginning to make a financial case for SWHs in this sector. Low unit prices are key to this financial case. This is becoming a reality through:

- Bulk purchase discounts: Installed costs of R4500 are possible for low pressure systems
- The Eskom subsidy being made available to low pressure systems: This is a relatively new development, and further price reductions of R1000-R2000 can be expected.
- Future carbon funding imminent: The argument of 'suppressed demand' (measure of potential future energy use of household) is one which has been made to and accepted by the CDM board, and agrees fundamentally with the concept of sustainable cleaner development. The large scale methodology of claiming carbon credits for low income SWH installations is in the final phase of being completed, which will then open the door for the registration of mass low income SWH projects with the CDM. At this point it is anticipated that the methodology will be accepted in mid 2009

High Pressure vs. Low Pressure

Solar water heaters can be designed to function as high water pressure systems or low water pressure systems. High pressure systems are generally more expensive than low pressure systems. This is because the materials used for high pressure systems must be of high quality and strength in order to withstand the pressures created by the system.

Low pressure systems need to be durable, but do not need to withstand any pressure other than that generated by the weight of water they contain, keeping material costs down. Low pressure systems also do not require any additional valves to regulate the internal pressure of the system, further reducing costs. Low pressure systems are 'gravity fed' - therefore the higher the SWH, the stronger the water pressure at the water point. Mixing water, for example in a shower, is difficult with low pressure systems, as the cold water supplied by the municipality is at a substantially higher pressure. In South Africa, high pressure systems are usually targeted for the mid-high income sector, while low pressure systems are targeted for the low income sector.

All of these factors need to be taken into account when making a financial model for low income households.

Through a creative financing model which uses CDM funding, the Eskom incentive and development bank loans, a sustainable system of SWH delivery can be established in low income households.

The main premises of the financial model for low income SWH rollout are based on research conducted by the Kuyasa low income housing project. This project has secured carbon funding to assist in the installation of SWHs, insulated ceilings and efficient lights in 2000 low income households in Kuyasa, Khayelitsha. The following premises are used:

- people in the community are prepared to pay R20-R30 per month for hot water (following a survey conducted in the Kuyasa community)
- carbon certificates generated by the project can fetch €10/T on the carbon market
- through the CDM methodology used, the SWHs generate 1.4T of carbon credits per year.

Based on the above, a strong financial model based on low monthly repayments (R30 or less) can be developed, and make a compelling case for low income solar water heaters. Broadly the model will work in the following way:

1. The SWH implementing agent (company/local municipality) registers their project with the CDM using the large scale SWH methodology
2. The implementing agent secures a development bank loan to cover supply, installation and maintenance costs of the SWH
3. The implementing agent ensures that the SWH used is SABS approved and qualifies for the Eskom incentive
4. The community is approached to determine who would like to sign up with the programme. This would require that they agree to pay around R30 per month for their solar water heater (including maintenance)
5. The electricity distributor in the area recoups the R30 through the prepaid metering system – a critical element in the scheme. This can either be through a deduction from the first electricity payment of the month, or a reduced number of FBE kWh's available (though this may be trickier institutionally, given that profit is gained through determining a suitable repayment period.

Indicative quantitative financial analysis

Cost of 110l SWH	R 5,000
Eskom Incentive	R 1,500
Annual payment <small>*Development bank @ 8% pa, 10 yrs</small>	R 521.60
Tonnes of CO2/unit/year	1.4
CDM Income pa (€10/T)	R 154.00
End user payment/year	R 367.60
End user payment/month	R 30.63

Key Criteria required to get this model working

1. Buy in from distributor (City/Eskom) that collection for SWHs occurs through prepaid meter system
2. Access to attractive financing
3. CDM financing available
4. Eskom incentive available

Cities can choose to be the implementing agent, or assist a private implementing agent by collecting via the prepaid meter system on their behalf.



2. Key Criteria necessary to make low-income SWHs work (outcomes from workshop)

1st level criteria

- Real attractive finance to be made available (loans or government funds)
- CDM programmatic methodology to be in place and be accessible project developers
- Collection system using pre-paid metering system to be in place
- Free Basic Electricity incentive to be used
- Guaranteed Eskom subsidy (already in existence)– adapted appropriate for low-income housing developments

2nd level criteria

- Institutional support required
 - National support, leadership and co-ordination
 - National Sustainable Housing Facility
 - Energy service companies & service agreements
 - National SWH infrastructure rollout via public private partnerships
 - Buy in from National Department of Human Settlements (e.g. roof structure)

3. Recommendations for best practice

a. Sustainable service model to be developed

- i. Monthly collection through already installed prepaid meters
- ii. City/Eskom collection through monthly payments
- iii. Programmatic CDM in place
- iv. Eskom incentive in place
- v. Installation and Maintenance programme
 1. Local job creation
 2. ESCO service level agreement to be possibly regulated as a means to ensure that maintenance of SWHs can be carried out

b. Community buy-in

- i. Engagement process, awareness around benefits, maintenance issues etc
- ii. Individuals have choice
- iii. Education of community

c. Reliable technology

- i. Minimum 5 year warranty
- ii. SABS approved systems and/or systems appropriate to application / quality.
- iii. Installation guarantee/maintenance plan

4. Key actions to move forward

Research/Actions	Who	Timeframe
Establish Prepayment/repayment collection system through City/Eskom	SEA to coordinate, Eskom, Cities support	End July
Information and support to engage with programmatic CDM	Carl Wesselink to coordinate, Sustainable Housing Facility (SHF), info to be disseminated via SEA website	End July
6 monthly meeting of all players to share and learn experiences, additional issues	SEA to coordinate, cities, Eskom with a focus on 'doers' in the low income sector	November
Generate resource point for providing case studies, CDM information, Terms of references, lessons learnt, technical info	SEA website	ASAP
Establishing financing mechanisms (funding/loans) at national level. Recommendation: 1) to keep as part of energy infrastructure investment and the Regulator role to ringfence the amount of funds required, 2) When developing mechanism consider using elements of the current off-grid electrification concession model w.r.t. PPP's and regulating ESCO service level agreement to include performance of maintenance of SWHs.	SEA to coordinate, Yaw (DBSA), Cedric(Eskom), SHF	Every 3 months
Engage with national government for leadership around SWHs	Eskom SWH secretariat	Every 3 months
Health impact – polycarbonate/ fibreglass/ stainless steel quality and potability	SEA to get information from CSIR – Carl Wesselink to support	August
Is water heating an energy use priority linked to FBE collection mechanism?	SEA	August
Establish how the Eskom subsidy will be administered for low-income housing	Cedric (Eskom board)	Unknown
Establish Eskom guarantee period	Done - 5 yrs	Done



Rebound effect	ERC/UCT conducting research (SANERI funded) – information to be provide	
Do people need hot water? What quantity etc... (recommendation to keep as part of energy infrastructure investment)	SEA to coordinate	August
Investigate the amount of low-income households to be potentially targeted Identify what services are actually required by households Explore service provision and linkages with the IDP with a view to hot water provision	SEA to coordinate	August
Explore the appropriateness of hot water provision for communal bathing facilities versus individual households	SEA	
Develop scenarios – a 20 year plan for hot water delivery nationally and the impact thereof on electricity planning as a means to acquire national buy-in to this process.	SEA	August
Determine the amount of increased water use from SWHs & impact on national water shortages and planning (when carrying out this synthesis deduct water use from electricity generation)	SEA	August