4. Solar water heater implementation

4.1 The case

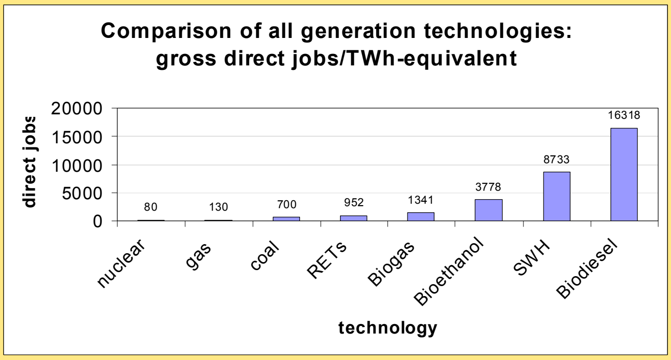
Residential solar water heaters

The residential sector in South Africa consumes 17% of the country's electricity. The largest electricity consuming appliance in our houses is usually the electric geyser. It makes up typically 30% of the total electricity used in many households which translates to around 5% of the country's energy consumption. A solar water heater may reduce this energy consumption figure by more than half.

Most Solar Water Heaters are fitted with an electrical element for those cold overcast days when the sun can't do its job properly!

From a city and national perspective this reduction will have the following benefits:

- The reduction in residential power use will improve the energy security of a city as it needs to draw down less power from the grid supply.
- The reduction in demand (during peak times in particular) from the residential sector means that fewer power stations need to be planned for in the future. Eskom has recognized that solar water heaters will play a major role in its demand side management (DSM) programme.
- Jobs will be created in the solar water heater industry – both in manufacturing and system installation. Employment creation is a huge national and city priority.



Source: Employment potential of Renewable Energy in SA (2003)

Job creation potential from solar water heaters is significant

Photo: Sustainable Living Projects

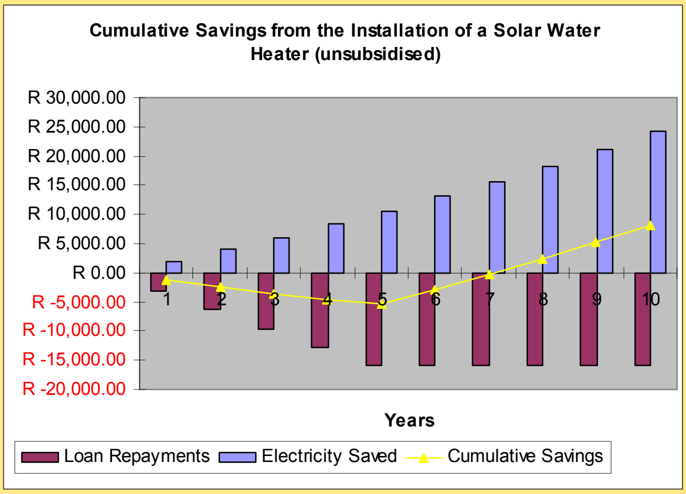
Simple installation and robust technology, along with obvious economic, environmental and social benefits makes solar water heaters a viable option for mass rollout

- As water is heated mostly by the sun, a solar water heater will reduce a city's CO_2 emissions by about 2.6 tons per household per year (Eskom).

For households, a solar water heater (SWH) also has several benefits:

- Water heating costs for a mid-high income household can be reduced by some 60% with a SWH. This amounts to about a 25 to 30% saving on an average monthly electricity bill. With the price of electricity projected to increase sharply in the next few years, this adds up to a lot of money saved over time.

- From an environmental perspective, water will be heated mostly by the sun reducing a household's CO_2 emissions by about 2.6 tons per year (Eskom). A useful comparison is if an average family car drives 7800km, it will produce the same amount of CO_2.



Savings in electricity costs can be used to offset the additional cost of a SWH. Depending on the system used and the amount of hot water required by a household, studies show that a SWH will pay for itself in electricity saved over a 4 – 8 year period. After that, all savings from the SWH will be cash in the pocket for the homeowner.

- Improved quality of life and a reduction in electricity costs can be expected in a low income household, where energy costs are often a large component of household expenditure and the SWH may replace the use of "dirtier" fuels, such as paraffin, for water heating.

Commercial and industrial use of SWHs

Solar water heaters can be used effectively in several commercial applications (eg hotels), as well as in hospitals, clinics and old age homes. Although the hot water demands here may be higher than residential, the increased roof area of these buildings allows for more collectors to be installed. Efficiency figures comparable to those of the residential sector can be achieved.

Solar water heaters are not suited to replace boilers and other high temperature water apparatus in industry. However they can be used for preheating purposes, so that at least a percentage of the heating operation draws on solar, rather than carbon-based, energy.

Photo: Suntank

4.2 What is a solar water heater?*

A solar water heater uses energy from the sun to heat water. A solar water heater works on two basic principles. Firstly when water gets hot it rises due to density differences between hot and cold water (thermosiphon effect) and secondly that black objects absorb heat.

A solar water heater comprises three main parts: the collector, the storage tank and an energy transfer fluid.

Solar water heaters are classified as either active or passive and direct or indirect systems. They may make use of either flat plate collectors or evacuated tubes. Below the differences are briefly discussed.

Active vs passive

Active: Uses a pump to circulate the fluid/water between the collector and the storage tank.
Passive: Uses natural convection (thermosiphon) to circulate the fluid/water between the collector and the storage tank.

Direct vs indirect (open-circuit)

Direct: The collector heats the water directly and the water then circulates between the collector and the storage tank. A direct system can only be used in areas which are frost and lime free, without treated or borehole water.
Indirect: The water is stored in the storage tank, and is heated by a heat transfer fluid. This is heated in the collector and flows around a jacket which surrounds the tank and thereby heats the water. An indirect system can be used in all conditions.

* Much of this information was drawn from the Solar Heat Specialist Handbook

Flat-plate vs evacuated tube

Flat-plate collectors: The main components of a flat plate collector are a transparent front cover, collector housing, and an absorber. This technology has been used for over 50 years by manufacturers and has a well established track record of reliability performance.

Evacuated-tube collectors: This comprises a closed glass tube, inside which is a metal absorber sheet with a heat pipe in the middle, containing the heat transfer fluid. Evacuated tubes are a newer technology manufactured mostly in China. Generally evacuated tubes have exceptional performance but have not yet had time to establish a track record of reliability.

Photo: Solar Heat Exchangers

Flat-plate collectors

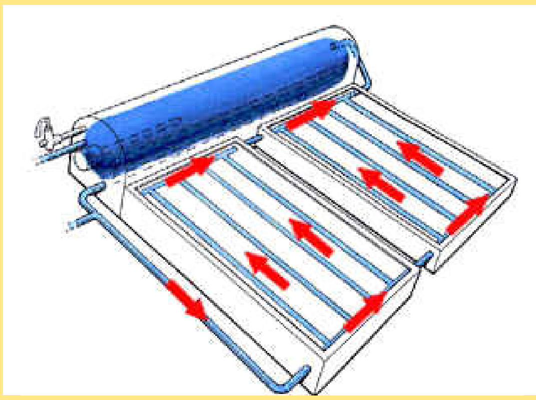
Photo: New Energy

Evacuated tube collectors

Installation methods

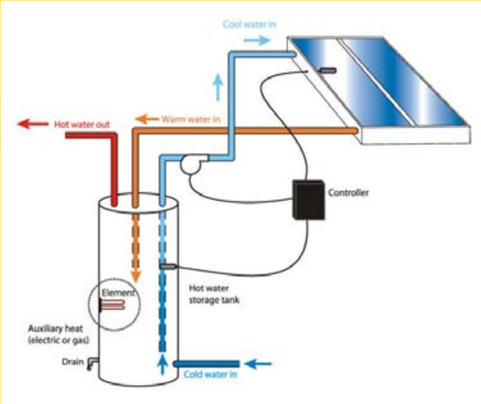
Close coupled system: This is the most energy efficient and most commonly used installation. It consists of a roof-mounted solar collector, combined with a horizontally-mounted storage tank which is located immediately above the collector.

Photo: Solar Heat Exchangers



Close coupled system

Split coupled systems: These refer to systems where the water storage tank is situated elsewhere – usually within the roof. Where the tank can be installed above the collectors a passive systems can be used (using thermosyphon to circulate water), where not, a pump (active system) would need to be installed to circulate water through the collectors.



Split Coupled System (active)

Water is pumped from the storage tank, through the collector and back again. Pump rate is usually controlled electronically.

Source: Sustainable Living Projects

Split Coupled System (passive)

4.3 Potential for rollout

How much energy, carbon and peak demand power would be saved if 15 of SA's major cities had solar water heaters installed today?

	10% penetration of SWHs (thousands of systems)	Peak demand reduction (MW)	Energy saving (GWh/yr)	Carbon reduction potential (thousand tons CO_2/yr)	**50% penetration** of SWHs (thousands of systems)	Peak demand reduction (MW)	Energy saving (GWh/yr)	Carbon reduction potential (thousand tons CO_2/yr)	**100% penetration** of SWHs (thousands of systems)	Peak demand reduction (MW)	Energy saving (GWh/yr)	Carbon reduction potential (thousand tons CO_2/yr)
Buffalo City	19	12	42	50	96	60	210	248	191	119	420	497
Cape Town	76	48	167	198	380	238	836	988	760	475	1,672	1,976
Johannesburg	105	66	231	273	525	328	1,155	1,365	1,050	656	2,310	2,730
Tshwane	56	35	124	146	282	176	619	732	563	352	1,239	1,464
Ekurhuleni	75	47	164	194	373	233	820	969	745	466	1,639	1,937
eThekwini	79	49	173	205	394	246	866	1,023	787	492	1,731	2,046
King Sebata	9	6	20	23	45	28	98	116	89	56	196	231
Mangaung	19	12	41	48	93	58	204	241	185	116	407	481
Msunduzi	13	8	29	34	65	41	143	169	130	81	286	338
Nelon Mandela	26	16	57	68	131	82	287	339	261	163	574	679
Potchefstroom	3	2	7	8	16	10	35	42	32	20	70	83
Saldanha Bay	2	1	4	5	9	6	20	23	18	11	40	47
Sedibeng	23	14	50	59	114	71	250	295	227	142	499	590
Sol Plaatje	5	3	10	12	24	15	52	61	47	29	103	122
uMhlatuze	7	4	15	17	34	21	74	87	67	42	147	174
ALL CITIES	**515**	**322**	**1,133**	**1,340**	**2,576**	**1,610**	**5,667**	**6,698**	**5,152**	**3,220**	**11,334**	**13,395**

Assumptions (from Eskom DSM estimates):

Peak demand reduction (after diversity)	0.625	kW/household
Energy savings:	2200	kWh / system / year
Tons CO_2 saved per system:	2.6	tons/yr

There is huge potential for a mass rollout of solar water heaters in cities around South Africa. This is demonstrated within modeling done for five South African cities using LEAP energy modeling software (See section: 'Using this manual'). This explored a business-as-usual (no SWHs) scenario and a SWH installation intervention scenario.

To see the complete set of outputs from LEAP for all the cities modeled, visit the Sustainable Energy for Cities website at www.sustainable.org.za/cities

The impact of a large SWH programme in a city: the case of Tshwane

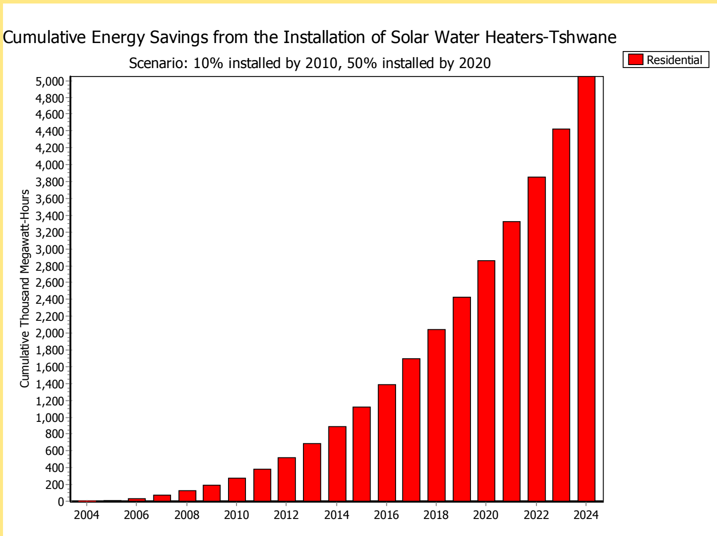
In their Energy Strategy of 2006, the City of Tshwane set targets for household penetration of solar water heaters of:

- 10% by 2010
- 50% by 2020.

These targets are similar to those adopted by other cities in South Africa. Incorporating these figures into LEAP, the following results arose:

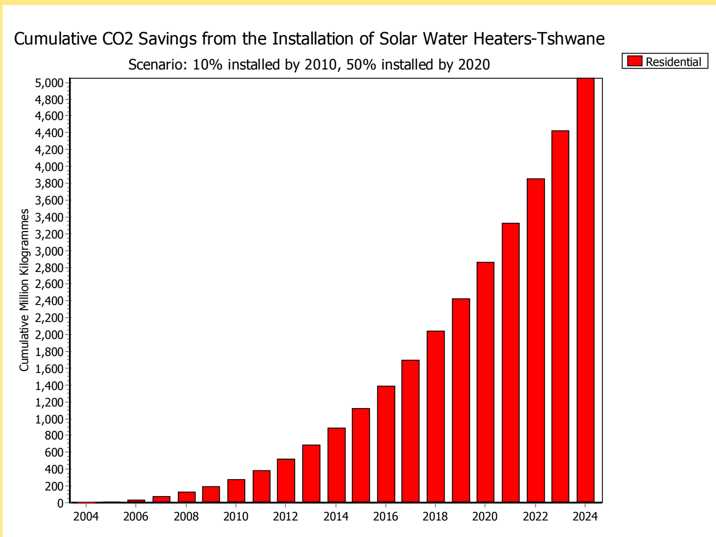
Energy savings

Achieving SWH targets in Tshwane will result in a cumulative saving of 5 million MWh of electricity by 2024. In power station capacity terms it will create a 350MW peak power reduction (10% of ESKOM's biggest power station's capacity) in 2024.



Carbon savings

If the city achieves its targets, nearly 5 billion kilograms of CO_2 will have been saved by 2024.

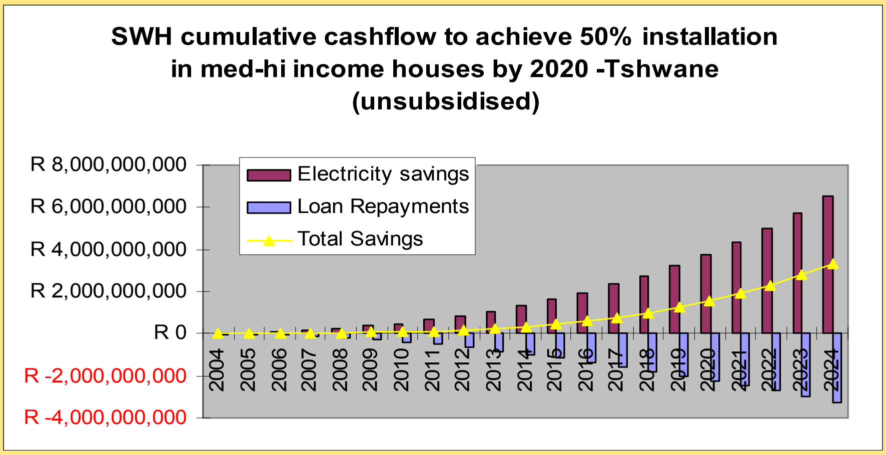


Financial analysis

Considering rollout from a project perspective using the same targets, two separate projects were considered based on different housing income categories:

Project 1: Rolling out SWHs amongst medium to high income households

Due to the high use of electricity for water heating in this income group, a SWH rollout will work financially as the system will begin to pay for itself over a short period of time.



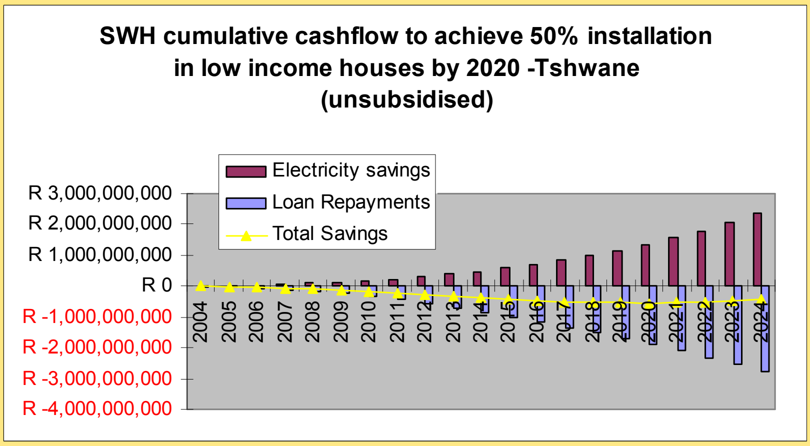
Net Present Value (10% discount rate):
5yrs: R27,237,517
10yrs: R117,706,744
20yrs: R716,574,919

This graph shows the total project financial viability

Assumptions: Systems cost R10000 paid back over 10yrs @12% p.a., electricity price increase of 5% p.a., SWH price increase of 5% p.a.

Project 2: Rolling out SWHs to low income houses

Here the project does not look viable due to the relatively low use of electricity and other fuels for water heating purposes.

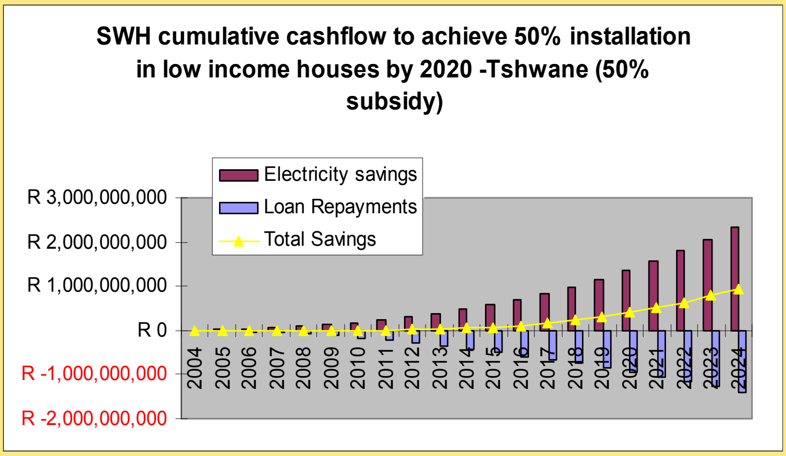


Net Present Value (10% discount rate):
5yrs: R63,444,581
10yrs: R173,013,159
20yrs: R222,425,170

Remember that this graph shows total project financial viability – as opposed to the single residence graph shown earlier.

Assumptions: System cost R6000 paid back over 10yrs @12% p.a., electricity price increase of 5% p.a., SWH price increase of 5% p.a.

However, if this low-income SWH project received a 50% subsidy it would be financially viable:



Net Present Value
(10% discount rate):
5yrs: R736,894
10yrs: R7,348,642
20yrs: R187, 283,785

Assumptions: System cost R3000 (subsidized) + R3000 paid back over 10yrs @12% p.a., electricity price increase of 5% p.a., SWH price increase of 5% p.a.

It should be noted that good quality, small (55litre) solar water heaters are available for around R3000 fully installed. The graph above shows that if these systems were installed instead of the larger and more expensive ones modeled, the rollout would be financially viable, even without being subsidized.

Solar water heaters: viable in low income households?

Conventional assessments indicate that SWHs are not financially viable in these households, largely because they do not spend enough money on energy for water heating. The saving from using solar energy for this purpose would not repay the cost of the SWH, even with very attractive financing terms.

However, some experience indicates that the potential for SWH adoption in this income sector is economically much more beneficial and viable than currently held. Consider the following factors and external costs for such households, cities and state:

- Negative safety and health impacts and costs of water heating using dangerous and dirty fuels such as paraffin.
- Increased affordability of SWHs as incomes rise and economies of scale bring SWH costs down.
- Opportunity cost of time for a person to heat water using more 'traditional' fuels, such as wood.
- Potential for peak load reduction, and avoiding network capacity constraint that accompanies the common use of kettles for water heating in low income houses.
- Likely Eskom subsidy for SWHs is expected to improve their affordability significantly.

From a simple economic as well as welfare point of view, therefore, it seems that SWHs in the low income sector should remain a strong focus, and innovative solutions to rollout should be further explored.

4.4 Barriers to implementation

South Africa has one of the highest insolation (hours of sunshine) rates in the world. Despite this less than 1% of households across the country have solar water heaters – a great contrast to a country such as Israel, which has installation rates of 60%.

Various barriers have hindered the full-scale implementation of solar water heaters. These include:

Financing/low electricity prices: South Africa has one of the lowest electricity prices in the world. This means that the SWH system payback period is longer than most households are prepared to consider. In addition, systems are expensive, partly because the industry is still a relatively small one, and economies of scale are not realised.

Standards: The standards for SWH's have until recent years been voluntary and will remain so in the next few years. However projects and clients can enforce compliance with South African National Standard (SANS) 1307 which will regulate the quality of systems. In 2007 the South African Bureau of Standards (SABS) purchased a SWH test rig which can accurately test systems against SANS 1307, and manufacturers are becoming compliant against with standard.

Trained plumbers and installers: There is a lack of trained plumbers and installers who are qualified to install solar water heaters in South Africa, particularly if there is going to be a radical growth in the market over the next few years. The Central Energy Fund (CEF) has launched training programs through various training providers and a registered qualification through the South African qualification authority exists.

Awareness: There is a lack of general awareness of the benefits of solar water heaters.

Long term support from government: There are currently no subsidy or incentive schemes to entice consumers to purchase a solar water heater (although a significant subsidy from the Eskom DSM fund seems likely).

4.5 How to go about implementation

Solar water heaters are a truly sustainable solution to water heating. The benefits for the country and individual users are clear. They are a particularly important way to reduce middle to high income electricity consumption and to provide low income houses with a better quality of life. Some initial mechanisms and incentives to facilitate mass implementation and 'kick start' the market are outlined below.

Solar water heater bylaw

A city bylaw can enforce the installation of solar water heaters in, for example,

- i) all new buildings built in the city
- ii) all additions to existing buildings in the city where extra water heating will be required.
- iii) all existing buildings (retrofit)

Considering a bylaw?
SEA has a SEED Update developed to support your city in implementing a SWH bylaw. Copies obtainable from Sustainable Energy Africa: 021 702 3622 info@sustainable.org.za.

This is a potentially very effective mechanism to drive implementation and stimulate the solar water heater industry. In order to allow for initial supply capacity deficits, a tiered introduction process can be adopted to ensure the industry keeps up with the new growth in demand. For example for the first year of the bylaw, only new houses or additions exceeding R1,000,000 in value need to install SWH, then the following year all new houses and additions exceeding R750,000 need to install SWH, and so on.

A bylaw does hold particular challenges for a city:

i) Building inspectors will need additional training so that they can approve installations and enforce the law correctly.

ii) The tiered method of introduction should be carefully considered in order to make the bylaw practicable.

City of Cape Town the first SA city to embark on Solar Water Heater Bylaw process

Cape Town is currently in the process of implementing a solar water heater bylaw. The drafting of the bylaw was initiated under the City's Energy and Climate Change Strategy. The bylaw is currently going through the stakeholder awareness process, and should be ready for submission to council by mid 2007.

To find out more about the Cape Town by-law go to www.sustainable.org.za and click on the 'Solar Water Heaters and Cape Town Bylaw' tab.

Fee for service mechanism

The idea behind this mechanism is that people buy a service, in this case hot water, from an energy services company (ESCO), rather than energy to perform the service (e.g. purchasing electricity so it can be used to heat water). The ESCO buys and installs the solar water heater(s) at their own cost. They retain ownership. They can then sell the hot water to the owner / business in the following ways:

i) metering the hot water / volume

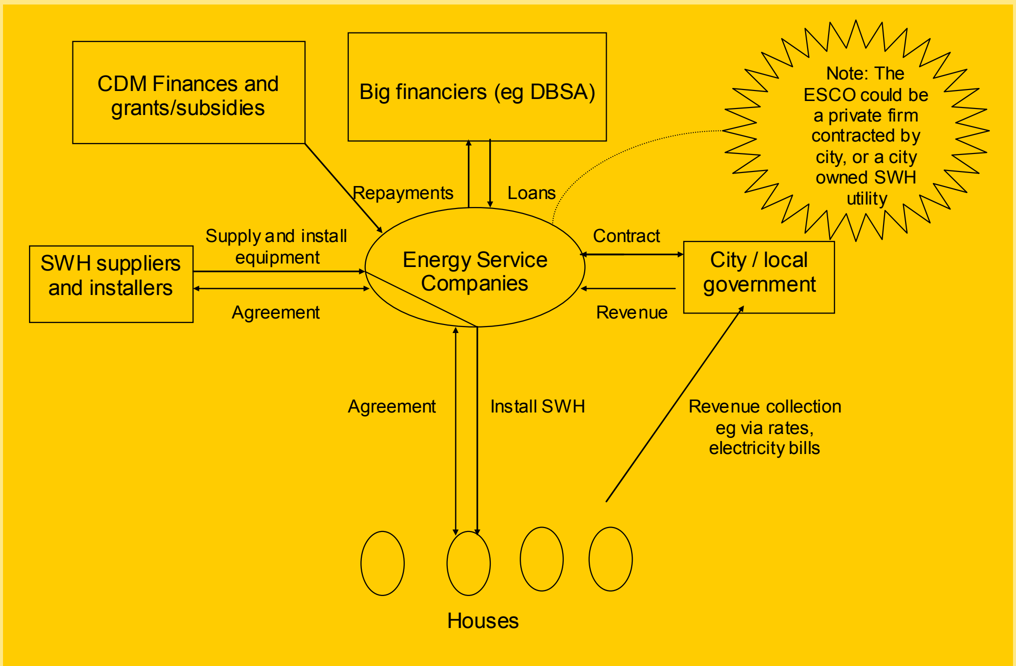
ii) a lease or hire/purchase agreement over a fixed period for the SWH equipment

iii) a fixed monthly tariff - which is ideally comparable to the monthly electricity saving from a solar water heater

This mechanism is attractive because the hot water user (house/ hospital etc) bears no capital costs and doesn't worry about the maintenance of the system. Although in the long run users will pay more than if they bought and installed a system themselves, this mechanism works well as it avoids prohibitive capital costs and is relatively 'hassle free' (no maintenance, repair, responsibility etc).

This provides a useful mechanism for cities to consider implementing within their own facilities (council housing schemes, public facilities, large buildings, etc). Within the residential or commercial sector cities could play a role in supporting fee for service mechanisms through administering and collecting the monthly tariff (service fee) on the ESCO's behalf, through their established rates collection process.

Fee-for-service mechanisms are being used within large institutions, such as flats and retirement homes. Their application within low cost housing schemes is being explored and institutional and financial models that will have important applications for city housing delivery and under development.



Solar Water Heating Energy Service Company (ESCO) Model

The Nelson Mandela Bay Metropolitan Renewable Energy Project

NMBM, through their Electricity and Energy Business Unit, are pioneering a renewable, clean and energy efficiency project in which the private sector will provide the relevant 'services', supported by the municipality. A call for renewable, clean and energy efficiency projects was put out by the NMBM in February 2006 and three bids offering a range of wind, solar, DSM, cogeneration and landfill gas technologies were accepted.

The Metro will support these projects on two levels. They will provide financial support through the negotiation of pricing structures that will ensure the projects' financial viability. They will also provide administrative support, such as the inclusion of relevant projects within the municipal billing system.

The basic premise underlying the model is that the Metro will not incur any costs other than the purchase of 'green' electricity (at a premium). It will make use of supplementary finance mechanisms available to green energy, to offset the cost of this electricity and in so doing reduce the price differential between renewable energy and Eskom grid electricity.

Tradeable Renewable Energy Certificates (TRECs)

TRECs (Tradable Renewable Energy Certificate System) have been traded since 2002 in South Africa. It is currently working well in Europe, parts of America and Australia. When completely operational in South Africa, the TREC system may provide a useful mechanism to subsidise the capital cost of installing a solar water heater. The sale of TRECs generated over the lifetime of a solar water heater can cover roughly 15% of the SWH's capital cost.

Looking for more info on TRECs in SA?
Go to www.dme.gov.za

Once the system is up and running, a TREC can be issued to anyone who displaces 1MWh of conventionally generated 'dirty' grid electricity (e.g. through installing solar water heaters) or anyone who generates 1MW-hr of 'clean' electricity (e.g. a wind farm). This certificate can then be sold on the open market to individuals or businesses who want to 'green' their electricity consumption.

"Incentivising" SWH installation: the Australian REC system

The government of Australia supports renewable energy by offering rebates to households who install solar water heaters. In addition to the rebate, households are also eligible for up to $900 through renewable energy certificate (REC) sales. A REC is the equivalent of 1 MWh of energy.

The number of REC's a consumer receives is calculated as displaced energy over 10 years, based on the daily sunlight hours and system efficiency.

Through adopting this simple demand pull system the return on investment for the end user has dramatically increased, and demand has grown, assisting government towards reaching their mandatory renewable energy target. For more information please visit:

http://www.bcse.org.au/default.asp?id=289
http://www.orer.gov.au/publications/mret-overview.html
http://www.orer.gov.au/recs/index.html

What about Solar Water Heaters in informal housing?

It is often feasible to provide electricity to informal settlements, but there are no widely available solar water heating solutions for these houses at present. Informal houses have little or no plumbing, which means that conventional solar water heating systems are not applicable. However simple, cost effective ideas such as coiled rubber tubing on the roof or even black buckets could work.

Utility subsidies

Eskom has recently committed itself to promoting the use of solar water heaters as an element of its demand side management (DSM) programme. Eskom looks likely to implement a significant subsidy to support large scale SWH implementation in South Africa. Depending on the level of the subsidy, it will make the purchase of solar water heaters even more attractive to medium to high income groups, and is likely to make them financially viable for use by low income groups as well. The subsidy will most likely occur on the manufacturer and supplier side, in order to allow financial and quality control.

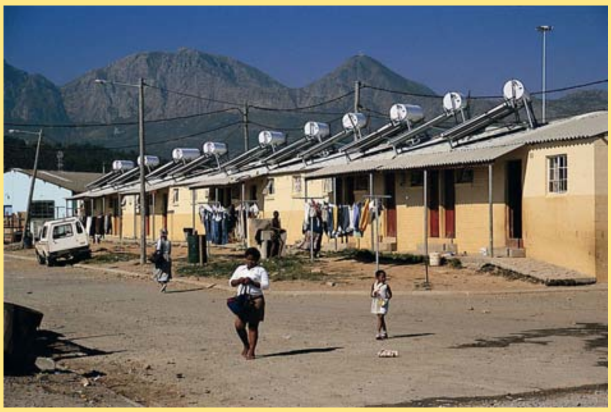
Using the Cleaner Development Mechanism (CDM)

Up until November 2005, only individual projects could register as CDM projects. For small carbon saving projects, the net carbon revenue (after taking off transaction costs) is very small, due to the costs of designing the project, taking it through the CDM process and the sales transaction costs for a small carbon credit volume. In response to this problem a new type of CDM, Programmatic CDM, has been established enabling the pooling and crediting of all emission reductions occurring under a programme of similar projects. This significantly increases the volume of credits generated, hence tapping into economies of scale. However, work in this area is still proceeding and the mechanism is not yet readily available to cities.

For more details on a programmatic approach to CDM visit www.southsouthnorth.org

4.6 Case studies

Case study: SWH implementation in low-income households - the Lwandle solar water heater project



The Lwandle hostel, host to the largest SWH installation initiative to date in South Africa, lies tucked away in Lwandle township in Somerset West, within the Western Cape. The hostel, owned by the Helderberg Municipality originally served as a single men's accommodation for the Gants food and canning factory. Through an extensive community participation process motivated by the closure of the Gants factory in the late 1980s, the community announced their primary needs as being jobs, privacy, toilets and hot water.

The community development project which ensued worked towards meeting the needs of the community and came to be known as the Lwandle Hostel to Homes Rental Project. The hostel was converted into family units with some provision for singles, giving rise to 967 units owned by the local authority and available for rental from R114-R172.

In terms of satisfying the community need for hot water, 305 SWHs were installed (without electricity back-up) to provide hot water. Provision of SWHs was made possible through the local authority securing a low interest loan from the Development Bank of Southern Africa. Residents paid a fixed rate for hot water as a way of servicing the loan. The SWHs are mounted on stands on the existing rooftops in order to receive the best orientation (north) for the heating of the panels.

Initially the community expressed a high level of satisfaction with the hot water service. A survey conducted in 2003 found residents continuing to use the SWHs, but complained of heaters not heating water sufficiently over the cold rainy winter months of the Cape. Systematic maintenance did not seem to be taking place either.

The SWH systems are now owned by the City of Cape Town, and residents/tenants continue to pay a fixed monthly rental fee (the monthly rental fee increased from R17.50 to R23 by 2003) included in their monthly rent to cover the repayments on the capital cost of the SWHs. As regards the current situation, little is known, except for anecdotal evidence of some systems being broken or in need of maintenance. Momentum around this project has ceased and the City of Cape Town should be encouraged to assess the current status and develop a plan to take project forward to a more sustainable situation.

Case study: Facilitating solar water heating in cities through commercial installation in new, private developments and fee for service models

Photo: Trevor van der Vyver

Photo: Trevor van der Vyver

An increasing number of companies are emerging in the area of solar water heating with a range of innovative approaches and products. These ‘products’ provide opportunities for cities to adopt solar water heating within their own buildings (residential and public institutional facilities) without incurring up-front capital costs. Cities may also be able to promote widespread use of such mechanism through providing administrative support in the form of monthly tariff collection through city rates tariff systems. Cities might also prompt new, private housing development to include solar water heating through encouraging this in development approval application processes.

Solar water heater installation in new housing development

A new housing estate development in Randburg, Johannesburg included solar water heaters in the housing development. It considered this to be an important basis for responsible development in addition to providing energy savings for prospective homeowners. Additional bond repayment cost is negligible and the energy saving exceeded the cost of the SWH. The housing development, consisting of 52 two bedroom units, targets new, small, mid-income families. Units were fitted with 190 litre evacuated tube systems (without electricity backup). The SWH's are used as pre-heaters for conventional 230volt 150 litre geysers.

- Typical electricity savings per unit is 93 600 kWh per year.
- Typical carbon dioxide emissions avoided are 103 tons per year.
- Typical water savings from avoided electricity generation is 117 936 litres.

Case study: Commercial scale SWH installation at a retirement centre through a fee-for-service arrangement

Power cuts resulting in increased dissatisfaction among tenants led a private retirement centre in Pretoria to convert its water heating system from a conventional electric system to a solar heating system with an electric back-up, in 2005. The retirement centre is home to 100 residents. The solar water heating system has been fitted by an energy services company. The retirement centre leases the system and only pays for the energy consumed during the month. 90 solar panels with a collector surface area of 120m^2 were installed with a maximum demand control unit built into the circulation unit. The storage capacity of the system is 9000 litres. The system uses a forced pump circulation, and has a differential thermostat control together with antifreeze protection. The savings accrued are:

- Energy savings (90 panels) = 197.1MWh per year
- Financial Savings: R56,000 - R60,000 per year
- Environmental Saving: 18tons of coal, 90 tons annual CO_2 emissions avoided

Photo: Solar Beam

Large scale solar water heating on mid-high income Durban apartment block

Photo: Suntank

Photo: Suntank

Solar water heating on retirement centre

4.7 Support organisations

Key role-players to support implementation of Solar Water Heater projects

AGAMA Energy (Pty Ltd)

Energy services model

AGAMA Energy offers a 'fee-for-service' scheme targeted at households with SWHs. This scheme has potential for application in large city SWH projects.

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Cell: 083 780 9460
Email: glynn@agama.co.za
Website: www.agama.co.za

Department of Minerals and Energy – Renewable Energy Finance and Subsidy Office (REFSO)

Financial assistance

REFSO manages renewable energy subsidies and offers advice to project developers and other stakeholders on renewable energy finance and subsidies. This includes information on the size of awards, eligibility, procedural requirements, and opportunities for accessing finance from other sources.

REFSO Office
Tel: 012 317 8569
Fax: 012 317 8511
Email: Refso@dme.gov.za

Development Bank of Southern Africa (DBSA)

Debt financing and a limited technical assistance grant facility

DBSA is able to support cities through offering a carbon finance facility in association with the World Bank.

DBSA will consider debt financing of commercially viable clean energy projects.

DBSA also has a technical assistance facility that may support cities to finalise a component of their detailed clean energy feasibility study.

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E+Co

Business model

E+Co, a public purpose investment company which finances energy enterprises, has a particular focus on the provision of consumer finance for large SWH systems (having identified this to be a particular need in the market). E+Co can assist cities through offering a bulk SWH 'fee for service' financing facility and can be approached for financing of bulk water heating schemes. E+Co also offers a SWH supplier/industry finance facility.

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Energy Development Corporation - Central Energy Fund (Pty Ltd)

Financial and technical assistance

The Energy Development Corporation (EDC) a division of CEF as part of its focus invests in renewable energy and alternate energy fields. The EDC supports energy development through commercial, developmental and social projects. Thus EDC is potentially able to assist cities as a promoter, facilitator and developer of commercially viable SWH projects through investment.

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Energy Service Company (ESCO)

Technical assistance

A number of private ESCOs are registered in South Africa that are able to assist cities with saving energy and improving energy efficiency thereby reducing costs, managing risk and enhancing a competitive edge.

ESCOs offer this through a package, which includes a comprehensive energy audit service, a financing mechanism, equipment pro-