Solar Water Heater Installation in 'GAP' Housing: the business case

Introduction

Solar water heaters (SWHs) are one of the most viable energy efficiency technologies in the country. Many municipalities have set household SWH targets within their energy and climate change strategies. But implementation remains a challenge.

New developments, where the choice can be made between installing a SWH *instead* of a traditional electric geyser, provide a particularly good opportunity for installation of SWHs. Under the current electricity prices, with a 15-20% discount on the units from Eskom DSM and a creative financing scheme, SWHs can be installed at **no or very little additional cost to the end user**.

The business scenarios in this study make the case for installing 150l SWHs in place of 150l geysers in GAP housing developments in South Africa. A SWH will typically reduce household water heating electricity use by 40-60%. This, along with the offsetting of the SWH cost with that of the traditional geyser and the Eskom subsidy, enables the combined cost of the monthly bond repayment and electricity payments under the SWH scenario to be less than that under a conventional geyser scenario and ensures feasibility of the intervention.

Three scenarios are presented. Each scenario will be implemented by a **SWH Implementing Agent (IA)** who will pull together financing, SWH technology and plumbers/installers and present an attractive monthly repayment option to the end user.

Cities have an important catalysing role. They can strongly encourage developers/banks of municipal housing projects to adopt the model and support the development of local SWH Implementing Agents.

Although the business case stands as is, additional subsidies may also make the various scenarios more attractive. Municipalities could seek donor funding for this, or encourage business to establish a trust fund that would support SWH installation and explore possible ways of generating BEE points to incentivize such schemes.

Scenario 1: Developer/Bank as Implementing Agent: The SWH is included in the development (in place of the traditional geyser) and added to the client's home loan.

Scenario 2: Not for Profit Organization as Implementing Agent: the IA (in this case a not for profit organization) co-ordinates the financing and installation of SWHs. The bank contributes the amount it would have paid for provision and installation of an electric geyser towards the SWH (i.e. bond unchanged as per standard GAP house).Attractive development financing is applied by the IA. Additional benefits for low income household energy poverty alleviation also come from this scenario.

Scenario 3: Private Business as Implementing Agent: The IA co-ordinates the financing and installation of SWHs. The bank contributes the amount it would have paid for provision and installation of an electric geyser towards the SWH (i.e. bond unchanged as per standard GAP house). Attractive short term financing is applied by the implementing agent.

All three scenarios will result in more sustainable GAP housing development projects and contribute to municipal electricity conservation.

Ekurhuleni get SWH models moving

Ekurhuleni Metropolitan Municipality (EMM) has been working, through its Electricity and Energy department, to get a SWH mass implementation mechanism established. To this end they have developed, and are soon to release, a Request for Proposals (RFP) which will facilitate the establishment of private (city endorsed) SWH implementing agents, who will provide attractive financed SWH solutions to homeowners.

Within its Environmental department an opportunity to use Danida Urban Environmental Management Programme funds to fit 2000 new-build GAP houses in Albert Luthuli has been identified. The housing project is being developed by ABSA bank.

EMM would like to see this funding opportunity as a chance to support and catalyse the service delivery mechanism being pursued at the broad municipal level. This process is currently in progress.

Assumptions for Business Model

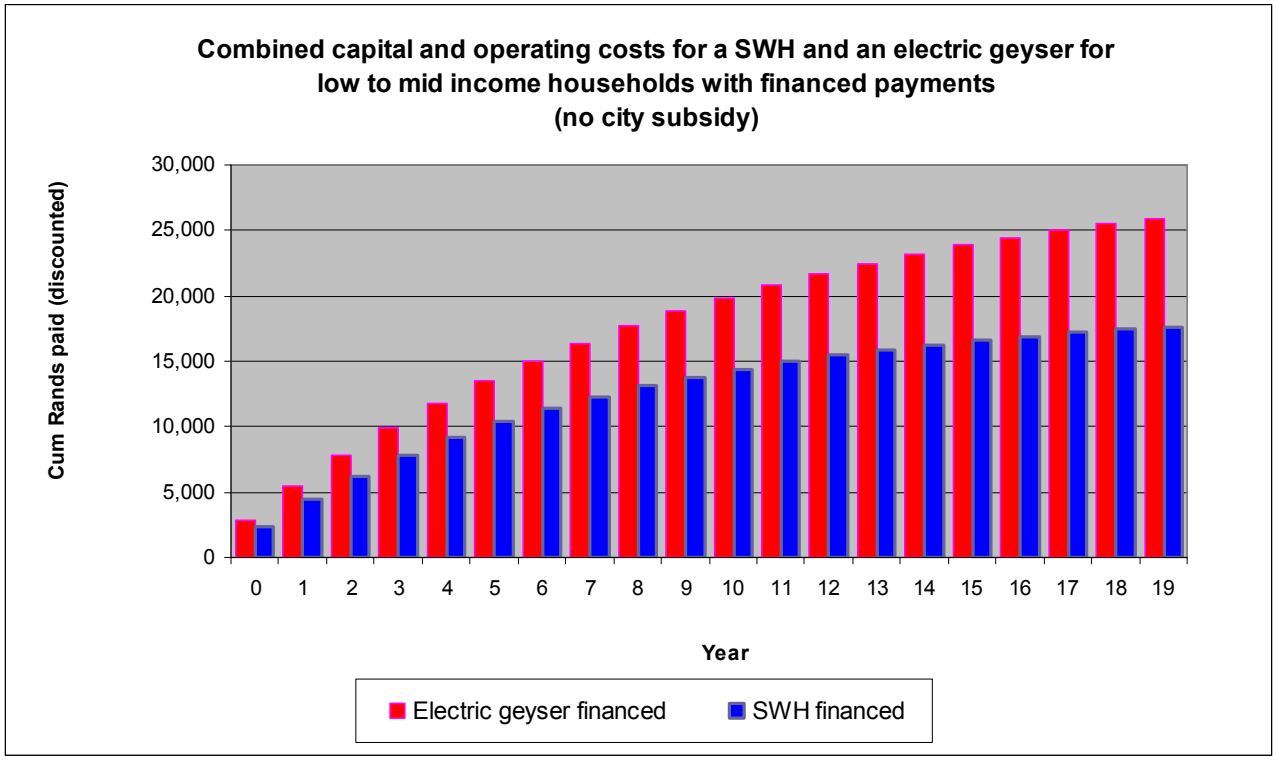
- Electricity rates are based on the July 2008 rates for Ekurhuleni Metropolitan Municipality (EMM) of R0.62/kWh including VAT. These rates are comparable to other cities around the country.
- Electricity savings per year are calculated given that the cost of electricity to run a SWH is approximately 60% of the cost of electricity to run an electric geyser.
- The SWH cost of R11094 is an average of the 150 litre vacuum tube SWHs from Eskom's Solar Water Heating Accredited Suppliers List retrieved from http://www.eskomdsm.co.za/sites/default/files/u1/Accredited_participating_suppliers_list.pdf.
- The electric geyser cost of R4500 was determined in discussions with the EMM Housing Department and is based on a high pressure 150 litre tank.

Scenario 1: Developer/Bank as implementing Agent

In this scenario the bank will include the additional cost of a SWH into the bond. The end user will experience additional monthly repayments on the bond, but a significant decrease in monthly electricity costs. Viewed from this perspective, the end user realizes overall monthly savings from year 2 onwards, while the bank benefits from larger bond repayments.

Scenario 1a: No additional subsidy

This scenario is applicable for cities that have no access to additional funding. Although the electricity savings per year do not exceed the SWH payments (i.e. higher bond repayment) until year two, it only costs an additional R10.5 per month for that first year. It is not until the second year that the electricity savings surpass the financing payments, resulting in a savings of R9/month.

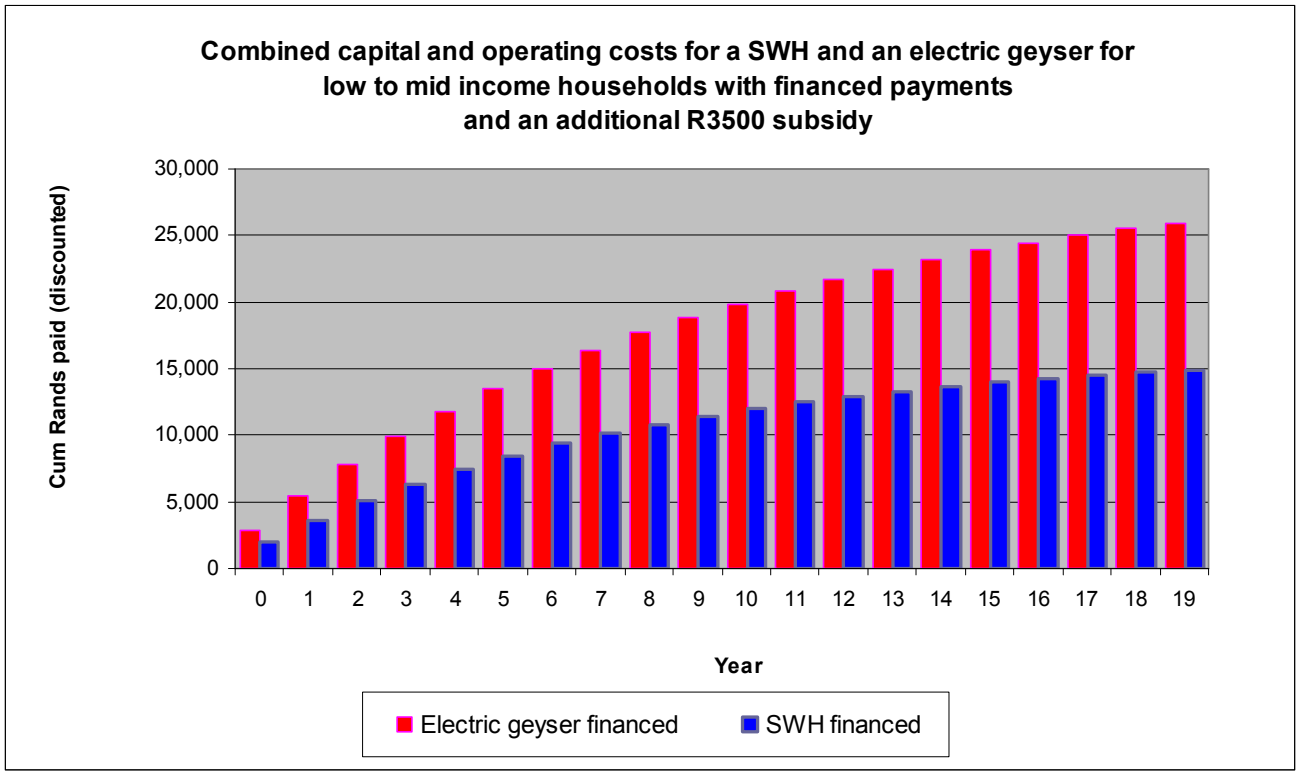


Assumptions: SWH system costs R11094 installed (after Eskom subsidy), based on a 150 litre vacuum tube SWH. 150 litre Electric geyser system costs R4500. Both are financed over 20 years @ 12% p.a. An electricity price increase of 10% p.a. is used, along with a discount rate of 20%. The cost of electricity is based on low-usage residential supplies.

Scenario 1b: GAP houses equipped with SWHs with R3500 per unit municipal (donor) subsidy

This scenario proposes that 150l SWHs be installed utilizing a municipal subsidy of R3500 per unit.

The bond required will increase by R3094 (the cost of an electric geyser subtracted from the new cost of a SWH), but the electricity savings per year are R1361 and immediately exceed the financing payments of R1017 for this portion of the bond, resulting in savings of R344 for the first year.



Assumptions: SWH system costs R7594 installed (after Eskom and municipal subsidies), based on a 150 litre vacuum tube SWH. 150 litre Electric geyser system costs R4500 Both are financed over 20 years @ 12% p.a. An electricity price increase of 10% p.a. is used, along with a discount rate of 20%. The cost of electricity is based on low-usage residential supplies.

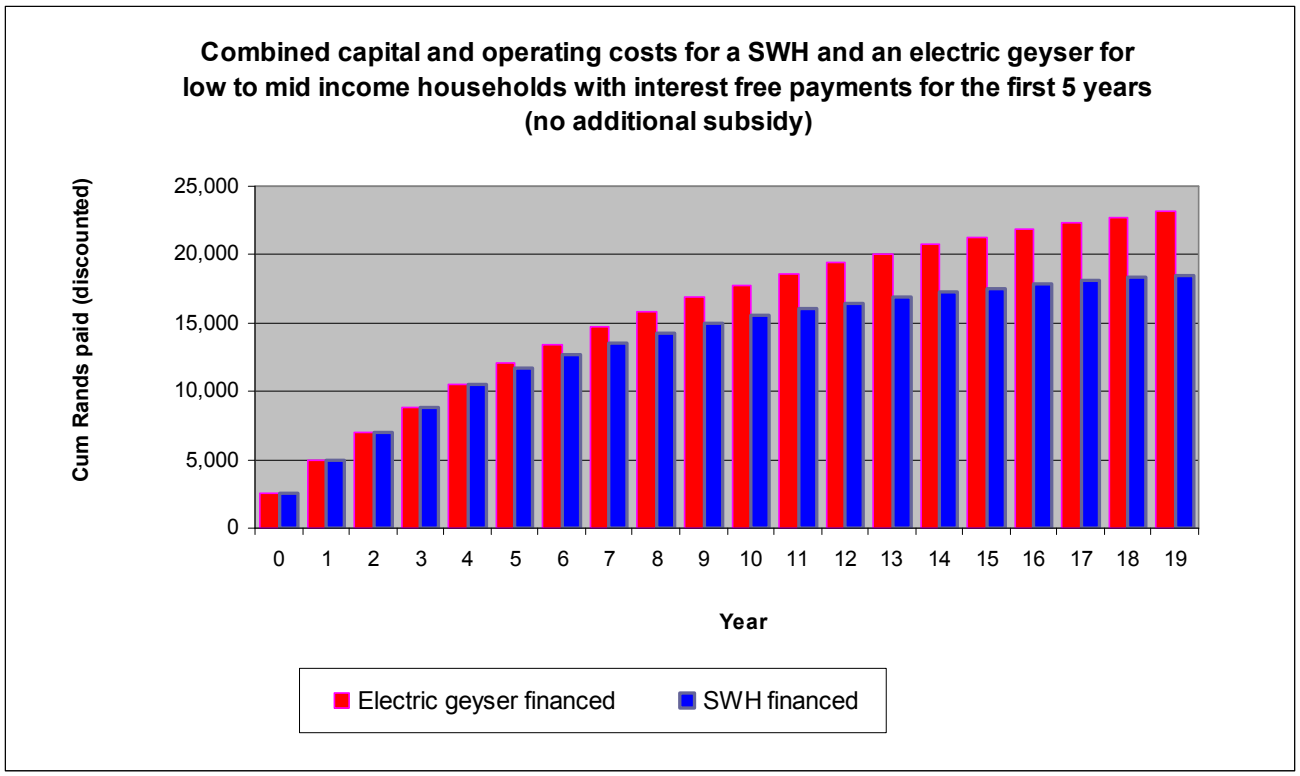
Scenario 2: Not for Profit Company as Implementing Agent

This business model has been put forward by Enerkey Solutions (ES), a Section 21 Company (not for profit) which is focusing on implementing solutions which emerge from the Enerkey project, a combined energy research/implementation project with the Cities of Ekurhuleni, Tshwane and Joburg, the University of Johannesburg, Eskom, CSIR and German partners. ES has access to development funding which is **interest free for the first five years**. This benefit can be directly passed onto the end user of the SWH. ES plans to use any profit from repayments to finance low income household energy efficiency solutions, focusing primarily on safe and clean-burning stoves.

ES will install the SWHs at their expense. The bank will provide a standard home loan including the cost of an electric geyser. However, this additional amount will be paid over to ES as loan finance towards the capital cost of the SWH. The bank will collect the monthly repayment for the SWH on behalf of Enerkey Solutions for the first 5 years, and pass it on. This monthly payment will equal the electricity saved by the SWH.

Scenario 2a: GAP houses equipped with SWHs with interest free payments for the first five years of financing with no additional subsidy

This scenario is financially viable to both the homeowner and Implementing Agent. The monthly payments for the first five years will equal the savings in electricity. Beginning in year 6, payments will be made on the principle for the SWH until year 20. These payments (R269 in year 6) are immediately less than the electricity savings per year (R881), resulting in a savings of R611 to the homeowner for that year. The most substantial difference that results in this case is that the financing takes the full 20 years to be completed and the Implementing Agent does not receive the full return on investment until then.

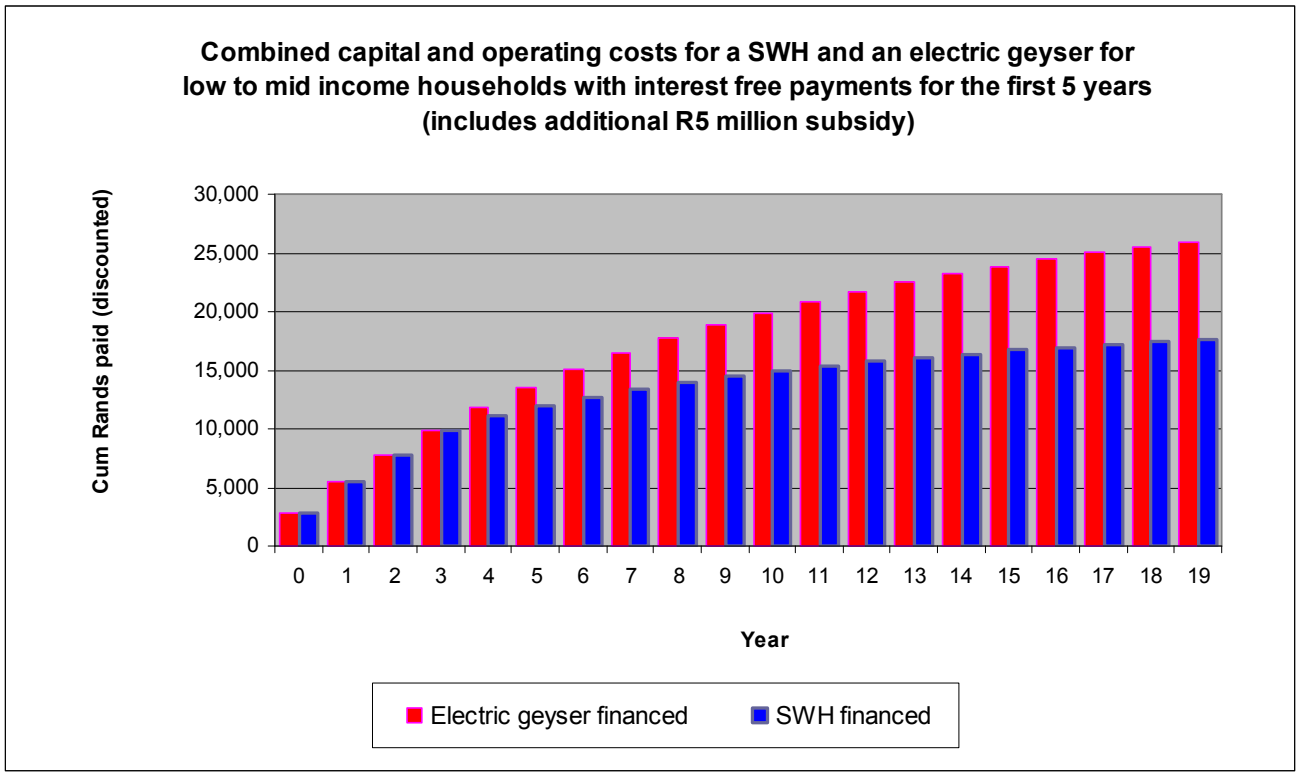


Assumptions: SWH system costs R11094 installed (after Eskom subsidy), based on a 150 litre vacuum tube SWH, and is financed from years 6 to 20 @ 12% p.a. 150 litre Electric geyser system costs R4500 and is financed over 20 years at 12%p.a. An electricity price increase of 10% p.a. is used, along with a discount rate of 20%. The cost of electricity is based on low-usage residential supplies.

Scenario 2b: GAP houses equipped with SWHs with interest free payments for the first five years of financing with additional R2500 subsidy per unit

For this case, the SWH will have been paid for upon completion of the first five years, and no payments will have to been made for years 6 through 20. For this model R1000 from the initial 5 year repayment was taken to fund a clean fuel stove, and will be recovered in the final bonded amount.

This scenario uses a subsidy of R2500 per household. The balance will be used by ES for business plan development, awareness raising and marketing and M and E. With this R2500 rand, a household is able to use the savings in electricity to pay off the SWH in the five years of interest free payments, and incurs an electricity savings of R666 in the final year. Electricity savings per year (R881) will immediately benefit the owner in year six.



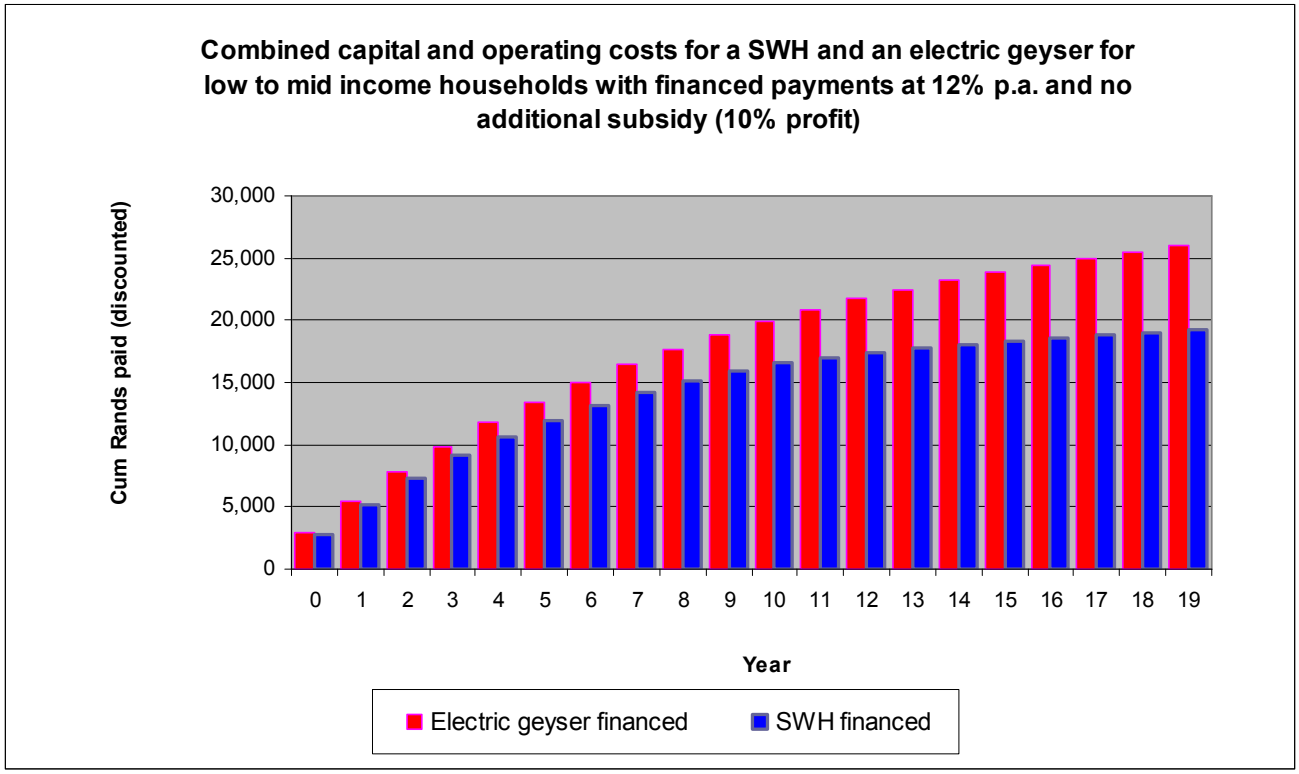
Assumptions: SWH system costs R8594 installed (after Eskom and municipal subsidies), based on a 150 litre vacuum tube SWH, and is financed from years 6 to 20 @ 12% p.a. 150 litre Electric geyser system costs R4500 and is financed over 20 years at 12%p.a. An electricity price increase of 10% p.a. is used, along with a discount rate of 20%. The cost of electricity is based on low-usage residential supplies.

Scenario 3: Private business as implementing agent

This business model is based on a private company sourcing financing and coordinating the installation of the 2000 SWHs. The bank will provide a standard home loan including the cost of an electric geyser; however, this additional cost will have been paid to the implementing agent to reduce the capital cost of the SWH. The implementing agent will add 10% to the capital cost of the SWH in order to make a profit.

Scenario 3a: Gap houses equipped with SWHs with no additional subsidy, 10% profit, financing at 12%

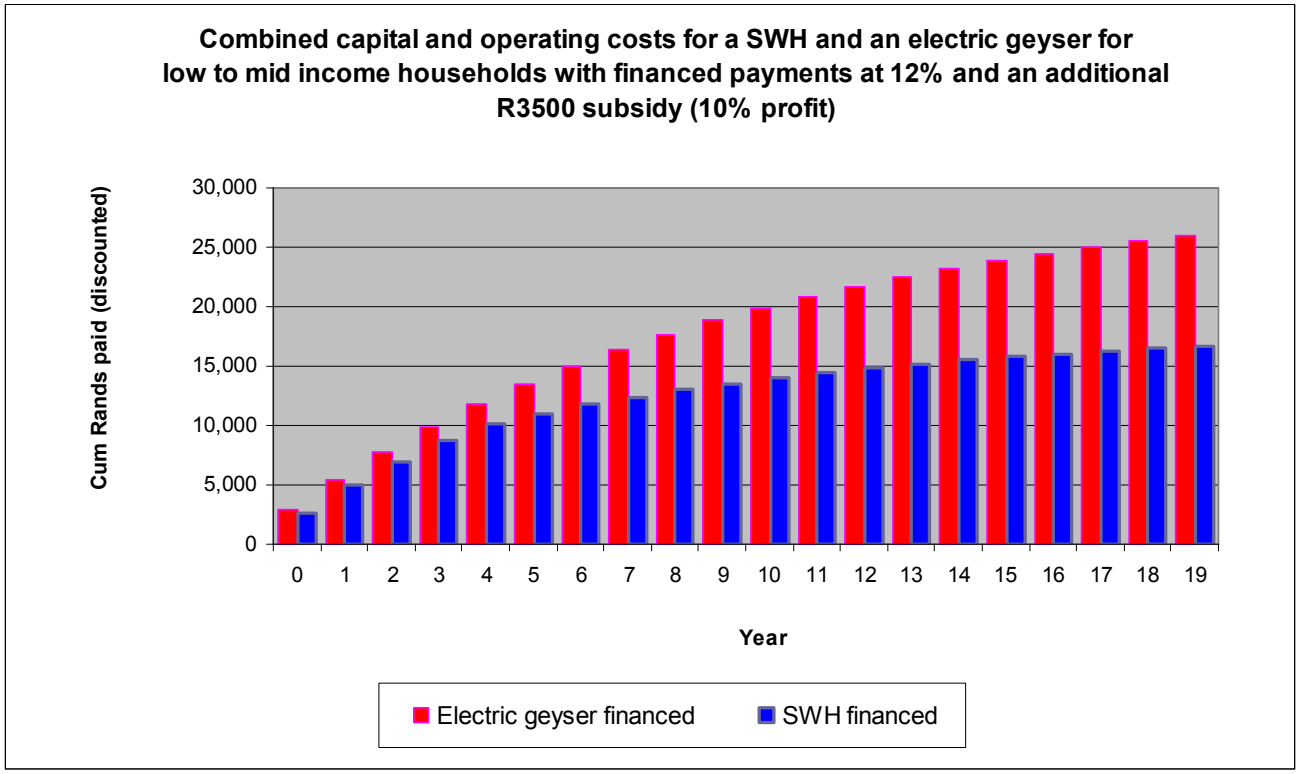
This scenario is still financially viable to the homeowner and to an Implementing Agent even where an additional subsidy is not available. The only difference is that financing is completed over 11 years rather than 5 years where the subsidy is included, making the case less attractive to both parties. The savings in electricity are R1361 for the first year, exceeding the financing payments of R1162 and resulting in a savings of R63 for that year.



Assumptions: SWH systems cost R11094 installed (after Eskom subsidy), based on a 150 litre vacuum tube SWH, 150, financed over 14 years @ 12% p.a. 150 litre electric geyser system costs R4500, financed on bond over 20 years at 12%p.a. An electricity price increase of 10% p.a. is used, along with a discount rate of 20%. The cost of electricity is based on low-usage residential supplies.

Scenario 3b: GAP houses equipped with SWHs with R3500 municipal subsidy, 10% profit, financing at 12%

The R7 million municipal subsidy is included. This scenario is appealing to both the homeowner and the SWH supplier since the financing can be completed over 5 years. Immediate savings are also seen in this case where the electricity savings per year start at R1361 for year 1, exceeding the financing payments of R1166 and resulting in a savings of R195 for that year.



Assumptions: SWH systems cost R7594 installed (after Eskom and municipal subsidies), based on a 150 litre vacuum tube SWH, 150, financed over 5 years @ 12% p.a. 150 litre electric geyser system costs R4500, financed on bond over 20 years at 12%p.a. An electricity price increase of 10% p.a. is used, along with a discount rate of 20%. The cost of electricity is based on low-usage residential supplies.

Summary and Conclusion

The table below provides the benefits to the homeowners for the 3 scenarios with and without subsidies:

	SWH Financing Terms		Municipal Subsidy	Benefit to homeowners (R discounted)	
Scenario	Years of financing	Financing Rate	per Household	Year 1	Year 6
1a	20	12%	0	-125	284
1b	20	12%	R3500	344	472
2a	15	12%	0	0	611
2b	5	12%	R2500	0	881
3a	11	12%	0	63	359
3b	5	12%	R3500	195	881

Scenario 1 is the least complicated approach, with only the bank to be brought on board. It will be more attractive to the bank as the home loan value will increase by R3094, thereby securing more income for the bank. If implemented, this scenario can set the tone for future bank-as-developer housing development projects.

Scenarios 2 and 3 have the benefits of not being linked to a specific bank / housing project, and allow for creative financing solutions outside of traditional banking structures. The finance rate of 12% used for these scenarios is therefore very conservative, and assumes a worst case scenario. Like scenario 1, both scenarios 2 and 3 also make sense without subsidization. Creative financing solutions for these businesses may include development bank loans which could be as low as 5%.

It is important to note that Scenario 2 carries the additional benefit of cross subsidizing a clean stove solution for a low income house. This scenario therefore will have a greater environmental and energy poverty relief impact on any city as a whole.

This business case report underlines the benefit of installing solar water heaters in any South African city. Any of the 3 scenarios are attractive and make business sense. Depending on the specific resources available in particular cities, the appropriate business case can be selected for implementation.

Sustainable Energy Africa, September 2008