Financial Case for a City Driven SWH Mass Implementation Approach in South Africa

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Overview

Solar water heaters are increasingly being highlighted as one of the most effective energy efficiency interventions currently available to South Africa. Not only are the arguments for a mass rollout of solar water heaters sound for national energy reduction (hence Eskom's SWH incentivisation programme), employment creation and greenhouse gas mitigation, but for the first time a really strong financial argument can be made for the technology due to the steep increase in the electricity price over the past year.

The question of how a SWH mass rollout can potentially take place has been grappled with over the past few years, and several approaches have been suggested. Now that a strong financial argument can be made for them, there is an excellent case to leave it up to business to sort out, with peripheral assistance from government as and when it is required. Business is geared to deliver a quality service and product, and to make the financial model sustainable. To read more on this approach, please refer to the document ***'The Financial Case for SWH mass Implementation businesses in SA Cities'***.

However, there is also an argument that forms the basis of this document: – that Cities should treat solar water heaters as the provision of a service, and that they be installed as part of City owned infrastructure, for which the building owner will pay a monthly rate.

While there are concerns around the capacity of a City to perform this function and indeed whether it is their core function, the benefit of this system is that the City can diversify its traditional income stream of electricity sales into one of electricity sales (which will be reduced with the installation of a SWH) and hot water provision. With the private SWH business model, a City stands to lose up to 30% of its income from residential customers who install a SWH.

This document looks at the financial case for City based SWH mass implementation, from both a City and an end user's perspective. The intention of this document is to provide an indication of its potential for implementation, and to serve as a basis for further discussion.

Criteria

The basic premise of this model is that the City owns, maintains and replaces Solar Water Heaters, while customers pay for the service through their monthly rates bills.

In order for this to be effective, the following criteria need to be met:

1. The city needs to procure a service provider with a proven track record who can perform most of these functions on the City's behalf. Specifically, the service provider will be required to perform the following functions:
    a. Supply quality (10 year warranty min) Eskom approved SWH
        i. Annual product reviews to be built into system

b. Market on City's behalf
c. Install SWH to SABS Standards
d. Manage claim for Eskom Incentive (arrange electrical certificate of compliance (CoC))
e. Maintain system on annual basis
f. Manage customer care
    i. Call centre
    ii. Response team
g. Sign up end user for the city billing system

2. The City will pay the service provider for
    a. Each unit once electrical CoC is provided
    b. a marketing, maintenance and customer care retainer
3. The City will own the SWH.
4. The City must access local or international infrastructure development financing,
    a. At 5% (development bank financing)
    b. At 0% for 5 years from Enerkey Solutions, and 5% (development bank) for the last 5
5. The City should work on a 10 year replacement model

Assumptions

In order to make a financial case for the City over a ten year cycle, it is necessary for the City to **better or at least match what the end user would pay** if he or she installed a SWH privately and paid it off over 10 years through the house bond. In this light, the following core assumptions are made:

CORE ASSUMPTIONS	Elec geyser cost (incl install)	R6,900
	Elec geyser cost/month	R193
	SWH cost (incl install)	R14,000
	SWH elec cost/month	R66
	Finance rate	15.0%
	Financed over (years)	10
	Discount rate	20%
	Electricity Increase Rate	15%

Note: SWH cost **includes** Eskom incentive

Using these as a basis, the following end user business cases for private SWH installation can be made:

End user business cases

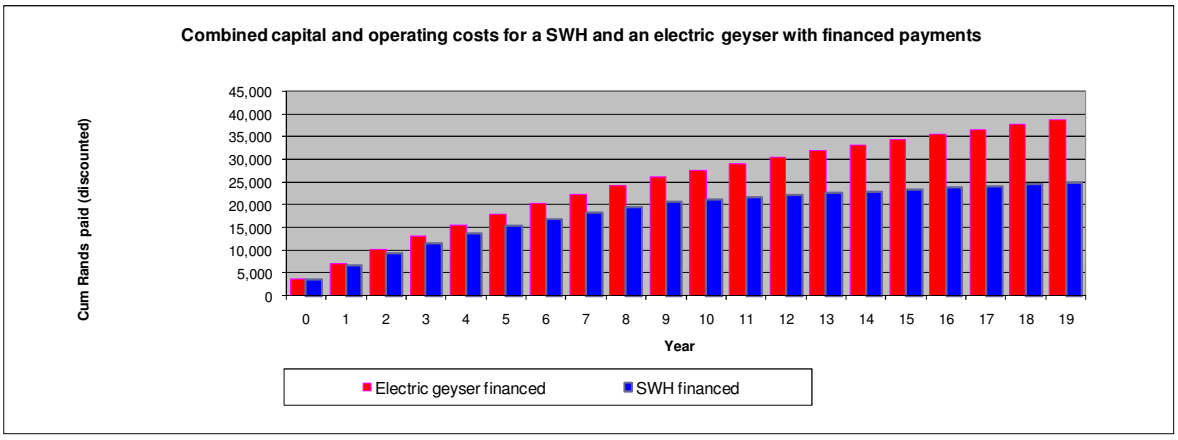
Business case 1

- This case applies specifically to a new build scenario, or where a broken geyser needs to be replaced
- End user pays monthly bond charge of R232.46, calculated on above assumptions
- Immediately beneficial financially to end user (see table and graph below)

End user business case (150l system)

	Year									
	1	2	3	4	5	6	7	8	9	10
SWH										
Financed payments	R 2,790	R 2,325	R 1,937	R 1,614	R 1,345	R 0	R 0	R 0	R 0	R 0
Electricity	R 786	R 754	R 722	R 692	R 663	R 636	R 609	R 584	R 559	R 536
Total (Annual)	R 3,576	R 3,078	R 2,659	R 2,306	R 2,008	R 636	R 609	R 584	R 559	R 536
Total (Cumulative)	**R 3,576**	**R 6,654**	**R 9,313**	**R 11,620**	**R 13,628**	**R 14,264**	**R 14,873**	**R 15,456**	**R 16,016**	**R 16,552**
Electric Geyser										
Financed payments	R 1,375	R 1,146	R 955	R 796	R 663	R 0	R 0	R 0	R 0	R 0
Electricity	R 2,313	R 2,216	R 2,124	R 2,035	R 1,951	R 1,869	R 1,791	R 1,717	R 1,645	R 1,577
Total (Annual)	R 3,687	R 3,362	R 3,079	R 2,831	R 2,614	R 1,869	R 1,791	R 1,717	R 1,645	R 1,577
Total (Cumulative)	**R 3,687**	**R 7,049**	**R 10,128**	**R 12,959**	**R 15,573**	**R 17,442**	**R 19,233**	**R 20,950**	**R 22,595**	**R 24,172**
Annual Savings from choosing a SWH instead of a geyser	**R 112**	**R 395**	**R 815**	**R 1,339**	**R 1,945**	**R 3,178**	**R 4,361**	**R 5,494**	**R 6,579**	**R 7,620**

This table shows that when the financed payments and electricity costs for a new SWH are compared to those of a similarly sized new electrical geyser, a SWH is more financially beneficial from year 1 (R112), showing increased savings over time with an increase in electricity prices.



This graph illustrates the financial benefit of choosing to install a SWH (blue) instead of an electrical geyser (red)

Business Case 2

- This case applies specifically to a retrofit scenario, where a working electric geyser is replaced
- End user pays monthly service charge of R232.46 calculated on above assumptions
- Costs the end user R1337 extra over 10 years (R11 extra per month effectively) for a SWH. This is assuming that the existing electric geyser does not need replacing over the period (worst case scenario). Savings will immediately be realised were the end user to have replaced the geyser during this period.

	Year									
	1	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**
SWH										
Financed payments	R 2,790	R 2,325	R 1,937	R 1,614	R 1,345	R 1,121	R 934	R 779	R 649	R 541
Electricity	R 786	R 754	R 722	R 692	R 663	R 636	R 609	R 584	R 559	R 536
Total (Annual)	R 3,576	R 3,078	R 2,659	R 2,306	R 2,008	R 1,757	R 1,543	R 1,362	R 1,208	R 1,077
Total (Cumulative)	**R 3,576**	**R 6,654**	**R 9,313**	**R 11,620**	**R 13,628**	**R 15,385**	**R 16,928**	**R 18,290**	**R 19,498**	**R 20,575**
Electric Geyser										
Financed payments	R 0	R 0	R 0	R 0	R 0	R 0	R 0	R 0	R 0	R 0
Electricity	R 2,313	R 2,216	R 2,124	R 2,035	R 1,951	R 1,869	R 1,791	R 1,717	R 1,645	R 1,577
Total (Annual)	R 2,313	R 2,216	R 2,124	R 2,035	R 1,951	R 1,869	R 1,791	R 1,717	R 1,645	R 1,577
Total (Cumulative)	**R 2,313**	**R 4,529**	**R 6,653**	**R 8,688**	**R 10,639**	**R 12,508**	**R 14,299**	**R 16,016**	**R 17,661**	**R 19,238**
Annual Savings from choosing a SWH instead of a geyser	**-R 1,263**	**-R 2,125**	**-R 2,661**	**-R 2,932**	**-R 2,989**	**-R 2,877**	**-R 2,629**	**-R 2,274**	**-R 1,837**	**-R 1,337**

This table shows that the end user will pay approximately R100 pm more initially for a new SWH, but over a 10 year period will effectively only pay R11pm, as from year 6 the SWH costs are less than the electric geyser's.

City Business Cases

In order for the City to provide a compelling business case to the end user, it needs to be able to provide a quality SWH at a monthly repayment rate less than or equal to the monthly bond repayment (R232.46) calculated in the end user business cases above. For the City, the monthly repayment from the household must cover their monthly loan repayment obligation. This will definitely be the case as development financing enjoys substantially lower interest rates than traditional bank financing. However the city will have additional costs for administration and insurance, as well as additional payments to the service provider for customer care, marketing and maintenance.

Business Case 1: City secures 5% development bank loan with repayment over 10 years

Based on the above assumptions and related end user business cases the city stands to profit from the service given due to its better loan repayment rate of 5%.

City pays (per unit installed)	R 14,000
Interest rate of	5.0%
Over (years)	10 years
City Monthly repayments	R 151.09
Customer monthly repayments	R 232.46
Cumulative income/unit/year	R 976.46
End user's monthly electricity savings	R 127
NPV (10 years,10% discount)	R 6,000

Note: The cumulative income needs to cover maintenance, marketing and customer care retainer for the Service provider, as well as insurance considerations.

Based on the table above, the City stands to make a cumulative income of just under R1000 per unit per year, with a net present value of R6000 after 10 years. This can then provide the following income scenarios for the City:

City Income Scenarios

Signed up SWHs	Gross profit for City (10 years, NPV 10%)
1000	R 5,999,953.65
5000	R 29,999,768.24
10000	R 59,999,536.48
50000	R 299,997,682.40

It is unclear at this time what the additional costs (administrative, insurance, service provider retainer) will amount to, but on the surface the business case looks strong. Further fleshing out of these details will be required to see whether this is indeed the case.

Business Case 2: City secures 0% loan repayment over initial 5 years and 5% loan for final 5 years

This business case is identical to the one above, but raises the possibility of an interest free loan for the first 5 years (as proposed by Enerkey solutions) and then a standard development bank loan for the last 5 years. Obviously in this case, the city stands to profit further from the service given due to its better loan repayment rate of 0% for years 1-5 and 5% for years 6-10.

City Business Case (150l system)

City pays	R 14,000
Interest rate of	0.0%
Over first	5 years
Interest rate of	5%
Over last	5 years
City Monthly repayments for SWH	R 116.67
Customer pays/month	R 232.46
Cumulative income/unit/year	R 1,389.53
End user electricity savings	R 127
NPV (10 years,10% discount)	R 7,494

This scenario provides better cumulative income results to cover the maintenance, marketing and customer care retainer for Service provider, as well as insurance considerations.

City Income Scenarios

Signed up SWHs	Net profit for City (10 years, NPV 10%)
1000	R 7,494,083.87
5000	R 37,470,419.37
10000	R 74,940,838.74
50000	R 374,704,193.71

Conclusions

Based on the analysis in this document, an initial business case can be made for Cities to install SWHs in houses as part of its infrastructure. This needs to be further expanded to include additional costs for insurance, administration and additional service provider services. If the City can still make a profit once these items are included in the model, the surplus could be used as a cover for reductions in electricity usage and payment defaulters.

There are considerable challenges for a capacity constrained City though, and these should not be underestimated. This additional service will require extra administration and management, as well as a degree of financial risk taking (although this could be limited through good management of the programme). A City needs to be prepared to embark on such a programme for a minimum of 10 years. If the capacity of the City is already strained, and the management of such a programme cannot be guaranteed, then it would be advisable not to pursue this approach.