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Business case for a special funding application to NERSA

Final Report

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Executive Summary

This report presents an indicative business case in support of Eskom's application to the National Energy Regulator of South Africa (NERSA) for large scale residential solar water heating installation and implementation as part of the Demand Side Management (DSM) funding mechanism.

Solar water heaters represent an elegant and flexible contribution to the management of electrical supply and demand (load) matching. This is depicted graphically in Figure 5. The option presents simultaneous reduced demand and renewable energy supply contributions as well as a combined energy efficiency and load management[1] options.

In summary a solar water heating programme would provide:

- A contribution to after diversity load management per system of 0.5 kW and 0.4 kW in the morning and evening water heating peaks respectively (This can be increased to 1.0kW and 0.6kW respectively with the inclusion of timers or where ripple controllers are in place through separate initiatives). The water heating peaks occur between 6:00 and 8:00 and between 18:00 and 22:00 with the national system peaks being at 10:00 and 19:00.

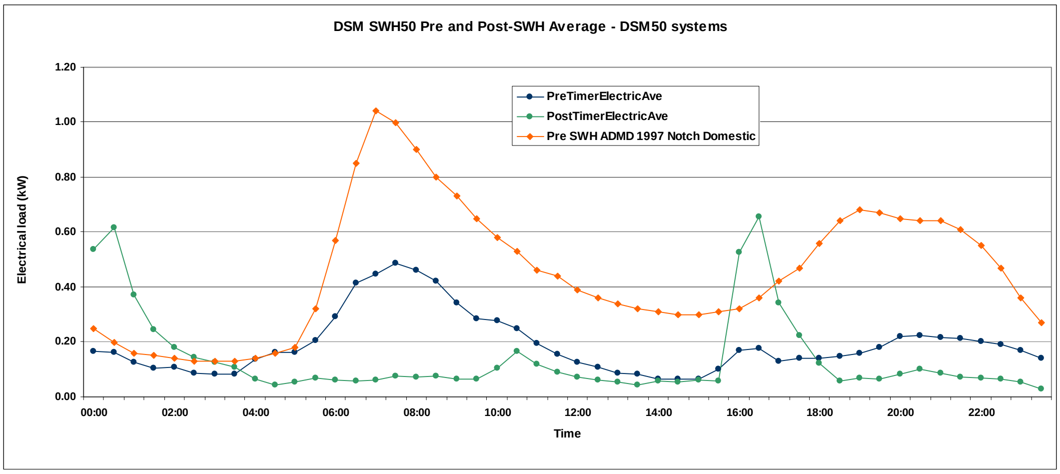

Figure 1 After diversity electrical demand before and after inclusion of solar energy

- total electrical energy savings of 2 300 GWh per year[2], approximately 1% of total electricity sent out nationally and contribute 2 500 GWh to primary renewable energy supply. This is approximately 25% of the national renewable energy target.

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[1] It is important to take cognisance of where the 'take back' type load (tempered in this case by solar input), similar to that experienced in ripple control programmes, might be relocated. In municipal load management this shifted load peak has been shown to reach as much as double the demand elsewhere as that of the peak which electrical system operators sought to shift.

[2] This is based on achievement of 10 000 additional systems from the programme in 2008 and an annual growth rate of 90% per annum thereafter resulting in approximately 1 000 000 systems in year 5 of the programme.

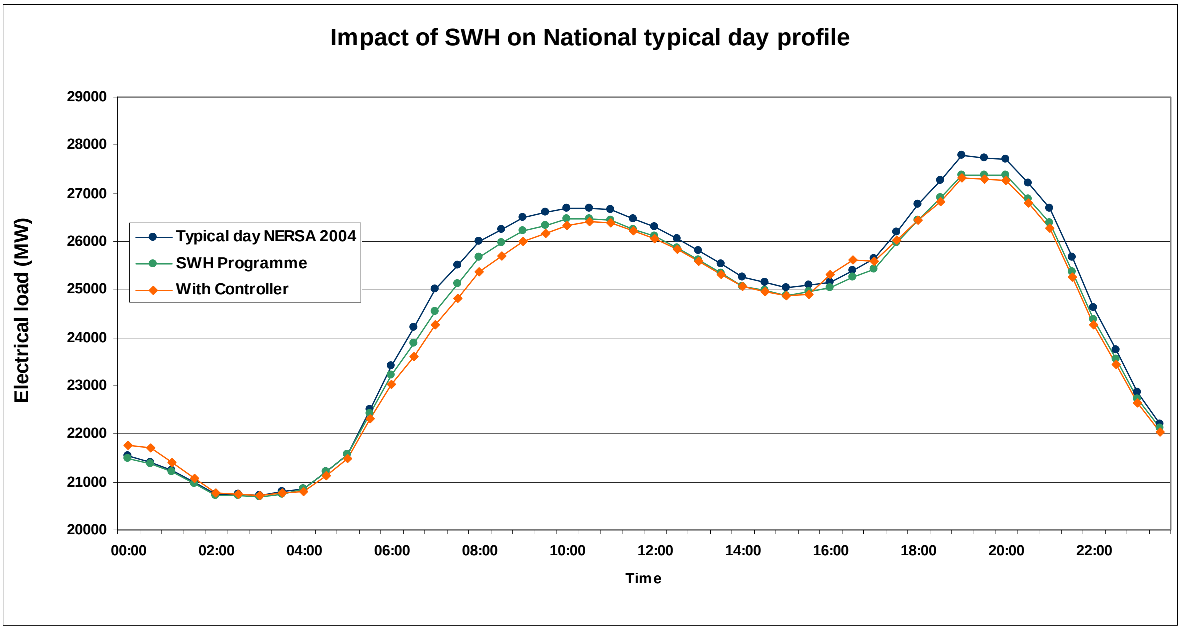

Figure 2 National electrical system benefits

A recommended programme of 1million solar water heaters would require a total incentive of approximately R 4 billion to be made available to consumers and recovered through the DSM mechanism over the 5 year duration of the programme. This represents a capital cost to the ESI of less than R 11 million per MegaWatt of verifiable demand reduction. The current allocation is R3.5 million per MegaWatt of verifiable demand reduction, and it is believed that this is not sufficient. This business case suggests based on feedback from suppliers that an incentive value closer to an average of R 7 million per MegaWatt would be more appropriate, particularly when provision is to be made for a reduction in the incentive over time (“degression”). The remaining capital expenditure (in the order of 30%) will be bourn by the consumers. Careful monitoring will inform the actual uptake and whether the incentive is sufficient to encourage the uptake rate required of the technology in alleviating both current and long term electrical supply stability.

1. Introduction and background

Eskom's Demand Side Management (DSM) programme has been actively reducing electricity consumption patterns for several years. The focus of DSM is on energy efficiency and actively managing electricity demand by consumers. Efficiency improvements include load shifting (scheduling of consumption activities to off-peak periods) and installation of technological solutions to actively reduce peak consumption (load alleviation). Public education and awareness building is also a large component of this programme.

There is an opportunity for additional electricity load demand reduction through the application and implementation of alternative energy solutions, such as solar water heaters. To this end, Eskom is applying to NERSA for approval to increase the DSM funding mechanism in order to promote the installation of residential solar water heating systems effectively. Large scale installation of solar water heating systems will reduce the demand on the total electrical load and consumption at large. It is estimated that approximately 40% of residential electricity consumption results from water heating.

2. Business case considerations

In order to build a suitable business case to support the application, the following items will be addressed:

- Current DSM funding mechanism and structure
- Pilot project experience and outcomes (Eskom and CEF)
- Financial constraints and incentive structuring
- Risks associated with programme implementation
-

3. Eskom Demand Side Management funding mechanism

To date, DSM funding has only been made available for verifiable projects which effect savings of 500kW. Available funding for these projects amounts to 50% of capital cost related to implementation in energy efficiency projects and 100% in load management.

Essentially, the current mechanism is one whereby the end user/customer enters into a performance contract with an Eskom approved ESCO to implement a DSM initiative. The customer contributes 50% of the capital cost related to implementation of the energy efficiency project, while Eskom provides the other 50%.

Eskom applies to NERSA for approval of the total DSM budget and associated MW targets. NERSA is responsible for approval of DSM project funding and targets, approval of the DSM plan and approval of M&V costs. Eskom effects all payments related to DSM implementation, M&V and other directly to service and product providers (ESCOs, distributors and independent contractors).

4. Pilot project experience

4.1. Eskom SWH50

This project was designed to gather the maximum data measurement, understand data collection methodology and the evaluation of energy savings under two varying locations using remote monitoring equipment which will be analyzed in a central database. The information gathered was intended to allow Eskom to evaluate the capital saving potential that can be achieved by using solar hot water heater systems on a large scale against new generation capacity. The goal was to gather the information on a real time basis, perform an analysis and to make a statistical report to Eskom DSM within 6 months.

The intended major outputs required of the project were:

1. The gathering of quality data to enable the formulation of an Eskom policy relating to the use of solar water heaters in large scale demand Side Management interventions.
2. The analysis and evaluation of the data received from remote data monitoring systems which were installed on each installation.
3. Completion of a cost benefit analysis on the 50 installed systems to enable a “subsidy” or “incentive” amount to be recommended.

4.1.1. Methodology employed

To be able to gather the data needed to arrive at the project goal it was been decided to use remote monitoring. In order to recompense the customer for the possible intrusion into their homes to view the solar hot water system and the monitoring equipment installed a once off incentive rebate of R5 000 was paid. The project steering committee created a consumption history of the customer by analyzing previous municipal accounts. This should ideally have been for a 12 month period. Install the solar hot water system with all data monitoring equipment tested and functioning. Further monitoring methodology will be used within the 12 week period to maximize the data information.

4.1.2. Project roll-out specifics

Of 50 systems installed 33 yielded data included in analysis of the pilot programme.

4.1.3. Continuous measurement and verification details

Half-hourly data was recorded for each of the systems for the duration of logger installation.

4.1.4. Results of pilot

The measured electrical energy delivered, calculated energy converted in heating water and derived solar contribution meeting the demand of the pilot are presented on a daily basis for the duration thereof in Figure 3. The same data has been analysed to yield an average performance per system per day in Figure 1 and in extrapolation thereof to a national programme as in Figure 2

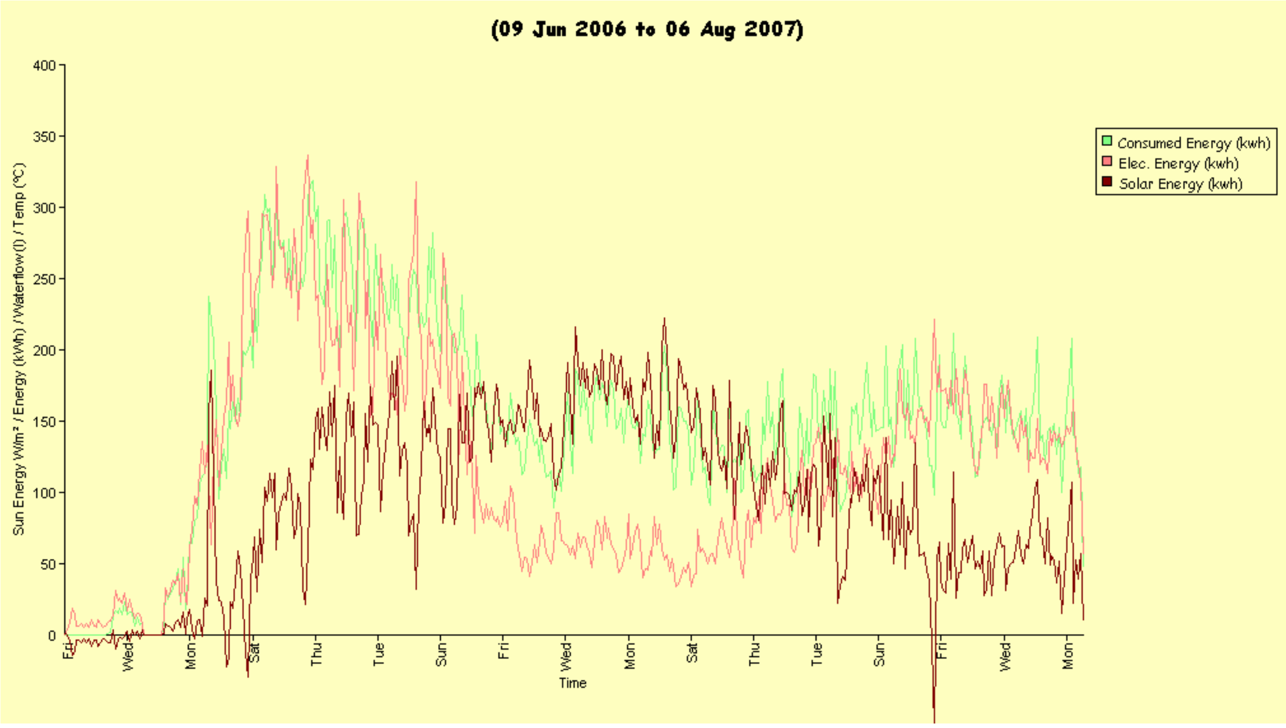

Figure 3 Derived solar energy contribution to water heating demand

Figure 3 indicates the solar contribution to energy demand from the 50 systems fitted with solar water heaters during the Eskom DSM pilot project. It indicates broad trends such as reduced peak electrical contribution after installation of timers to move electrical consumption out of peak periods.

4.2. Central Energy Fund SWH500

4.2.1. Project roll-out specifics

4.2.1.1. Training

Training and certification of 60 persons was conducted ahead of demonstration phase of the project. The SABS Code of Practice was developed for this purpose.

4.2.1.2. Testing

Mechanical and thermal test rigs were installed at SABS. The thermal rig is an outdoor rig with space for simultaneous testing of 4 solar water heating units. 40 tests have been done to date.

The electrical certification tests are also conducted according to SABS151, which is a pre-requisite of SANS1307 and the South African building regulations.

4.2.1.3. Demonstration

An analysis of South African statistics identified Gauteng, Western Cape and Kwazulu Natal's big cities as the most appropriate test locations for the pilot project. A tender process was run to identify suitable suppliers and six companies were selected. Only 200L and 300L systems were selected to form part of the study. SABS testing started January 2007 and was concluded by the end of February 2007.

The project was officially launched on the 7th of March 2007. The total incentive of R2.5 million was allocated as follows:

Table 1 Incentive schedule for CEF SWH500 project

	200L	300L
1 March – 30 April (or 1st 200 units)	R5000	R6000
1 May – 30 June (or 2nd 200 units)	R4000	R5000
1 July – last unit (or last 100 units)	R3000	R4000

Advertisements of incentives were placed in large newspapers and suppliers were to solicit business directly and competitively. CEF paid 50% of the incentive directly to the suppliers on contract agreements with customer and the 50% balance upon auditing of the system installed.

4.2.1.4. Monitoring

50 of the installed systems were, at the time of writing, being fitted with data loggers, spread evenly across the three provinces. Monitoring will be conducted for one year and commenced in August 2007. The aim is to compile a closure report highlighting all findings.

4.2.2. Continuous measurement and verification details

The installed systems were being fitted with loggers at the time of writing in order to monitor performance over at least a year period. Meaningful results have therefore not yet been obtained. There will be value in analysing the results form monitoring at the end of a year's monitoring programme and adding them to those from the Eskom DSM SWH50 project. Similarly, the size of the sample of the programme systems that should be included in a monitoring design for the programme will need to be scrutinised. The sample size needed can be determined in year 1 of the programme as the 100 monitored systems from the approximately 550 between the Eskom and CEF projects, although being a high sampling rate (100% for the Eskom project and 10% for the CEF project), still do not yield sufficient data for a thorough statistical analysis.The cost of monitoring 1000 of an envisaged 10 000 systems in the first year of the programme would be significant but important in plotting the course ahead and degression accurately.

4.2.3. Results of pilot

Interest in solar water heating systems as a result of the incentives scheme was higher than initially expected, with suppliers fielding hundreds of calls in the first few days after advertising. Gauteng's uptake was fastest, with all 167 systems being installed within the first six weeks.

4.2.4. Challenges experienced

- Some implementation challenges related to advertising lag times and resulting customer unhappiness for having missed the incentive offer.
- Contractual obligations not met by one manufacturer

4.3. Key lessons learned

4.3.1. Implementation

Implementation of the project was reasonably easy given great interest from public to participate. Potential bottleneck identified for large scale roll-out is installation capacity in the country and limited installation training or certification.

4.4. Notch tests and the use of ripple controllers

Eskom conducted notch tests during May and August 1997 to determine the coincidence of peak electrical load and geyser-related water heating at 12 municipalities countrywide. The results of the test are attached in Appendix C. The sample size is accepted to have covered more than 20% of all geysers in these municipalities which were fitted with relays at the time of the experiment. A short synopsis of findings of a variety of notch tests follows:

- Peak time water heating demand is higher and over a shorter period during the morning than during the evening
- Morning peak hot water demand is between 6:00 and 8:00, while evening peak hot water demand is between 18:00 and 22:00 and displays a lower peak, as a result of being spread over a longer period.
- Peak demand load (MW) correlates well with ambient outside temperatures as measured in the different geographic areas.
- The result of shedding 124,000 geyser loads was an average of 100MW during morning peak and 60MW during evening peak periods.
- Should these results be extrapolated to an estimated 2.4 million formal residential geyser installations, the resultant load shift potential approximates 2.5GW during morning peak and 1.6GW during evening peak.
- However, it was also determined that the geyser load shed during peak periods will lead to increased load demand upon reconnection after peak periods. A representative sample of one municipality indicated that load demand will double from pre-geyser shed demand, upon reconnection.
- Indications of these tests were that load could effectively be shifted through shedding geyser loads during peaks, but total electricity consumption will not necessarily decline.

Solar water heaters are compatible with and the programme would benefit from overlapping with increasing ripple control or timer initiatives conducted separately. The need for timing of electrical input to solar water heating systems is a function of the goal which is intended, be it peak demand reduction (or shifting) of energy efficiency generally. Timers are only a prerequisite if a full 1 kW per system impact on peak demand reduction is to be achieved. Without timers or ripple controllers a benefit of only half of this is achieved. From an electrical energy consumption perspective the difference between the two options present is negligible when the cost benefit ration of the options is considered.

5. Proposed incentive programme

This is an Eskom Demand Side Management (DSM) programme whereby incentives shall be provided to Customer's in line with the purchase and installation of Registered SWH systems from Accredited Participating Suppliers. The incentive shall be calculated according to a formula relating to the efficiency of the SWH system as determined by the SABS test output and hence the amount of energy displaced. A modifier for local content will be included in the incentive calculation to promote the stimulation of the local economy. This modifier will however remain '1' for the first year of operation after which it will be phased in appropriately. It is planned to address BEE the SABS and the provision of a rebate on test fees depending on the BEE status.

The programme is open for Suppliers that meet the following requirements:

- Suppliers that have a valid SABS Test Report (limited to 18 months from date of first test report) or a valid SABS Mark Approval.
- Suppliers that have been cleared by the appointed facilitating auditors.
- Member of SESSA SWHD

The supplier side of the programme will be run by Deloittes, installation checks shall be done via Eskom appointed technical auditors and the customer interface and information sharing component will be facilitated through the Eskom DSM Help Desk.

The programme is open for Registration and Registered Systems sold by Accredited Participating Suppliers and installed by Registered Installers will qualify for the incentive. Only sales transactions made by Accredited Participating Suppliers will be eligible for the Incentive and no back payments will be made.
This list of available suppliers will be available on the Eskom SWH website, or via the newly established DSM Helpdesk.

Contact details for the programme:
www.eskom.co.za/dsm

011 800 4744
solar@eskom.co.za

The intent is for the programme to operate for a period of five years; however Eskom reserves the right to terminate or extend the programme.

5.1. Incentive structuring considerations

The incentive structuring is described in version 5.1 of the DSM Solar Water Heating Operation Plan prepared by Eskom DSM in June 2007. The calculation of the incentive to be paid towards the installation of a specified solar water heater is given by:

$$R = R_{base} \times Q_f \times f_{LC} \qquad (1)$$

Where:

R is the system specific incentive value in Rand,
R_{base} is the base incentive value in Rand days per kWh ($\left[R \cdot days \cdot kWh^{-1}\right]$),
Q_f is a measure of the solar to electrical conversion efficiency of the system in kWh per day, f_{LC} is a modifier to make provision for additional incentive provision for local content ratings which will be phased in during later phases of the programme. The base incentive value and efficiency rating are in turn functions of other parameters including those subject to regulatory scrutiny.

The system 'quality factor' Q_f is determined through testing by the South African Bureau of Standards as a measure of the effectiveness of the specified system to offset electrical energy. The SABS will determine a

Q factor for every system tested by them. This Q factor will indicate the kWh electricity to be saved by the system on a typical day.

The base incentive parameter R_{base} is calculated by considering the peak electrical load or system electrical capacity which the solar water heater reduces or replaces (Load reduction- measured in kW) and multiplying this by the benchmark capital expenditure required per MW of load reduction (R_{NERSA} – MW saved sometimes called NegaWatts) measured in R/kW or Rmillion/MW. This is in turn divided by Q_f in kWh/day to yield R_{base}. The calculation is therefore as follows:

$$\overline{R_{base}} = \frac{\overline{R_{NERSA} \times Loadreduction}}{Q_f} \qquad (2)$$

Substituting (2) in (1) and taking the modifier ratios to be 1 in year 1 yields:

$$R = R_{NERSA} \times Loadreduction \times \frac{Q_f}{\overline{Q_f}} \qquad (3)$$

This emphasises the importance of the NegaWatt impact of the measure and the acceptable magnitude of the capital subsidisation thereof. The ratio of the performance of the specific system for which the incentive value is being calculated, to that of the measured average system performance is the other factor in the calculation and emphasises efficiency and quality of the systems.

This is also potentially a good basis for design of an incentive regression through which the incentive value can be reduced over time with increased market volumes and improvements in efficiency. The more efficient individual systems benefit by the incentive being directly proportional to their individual performance.

5.1.1. Size of the programme

It is estimated that there are 1.4 million to 1.6 million geysers currently installed suited to this programme in South African formal residences. This number is growing at an estimated rate of 30 000 electrical geyser installations per month according to the insurance industry.

The proposed DSM project will cover the installation of systems over a five year period. These systems can be new installation or retrofitted installations. Uptake should increase over time, with initial installation volumes being higher than current volumes and increasing over the long term. For indicative purposes, a first year achieved installation of 10 000 systems with an annual increase over five years of 80% annually has been modelled here. This would result in approximately 1 million installed by 2014.

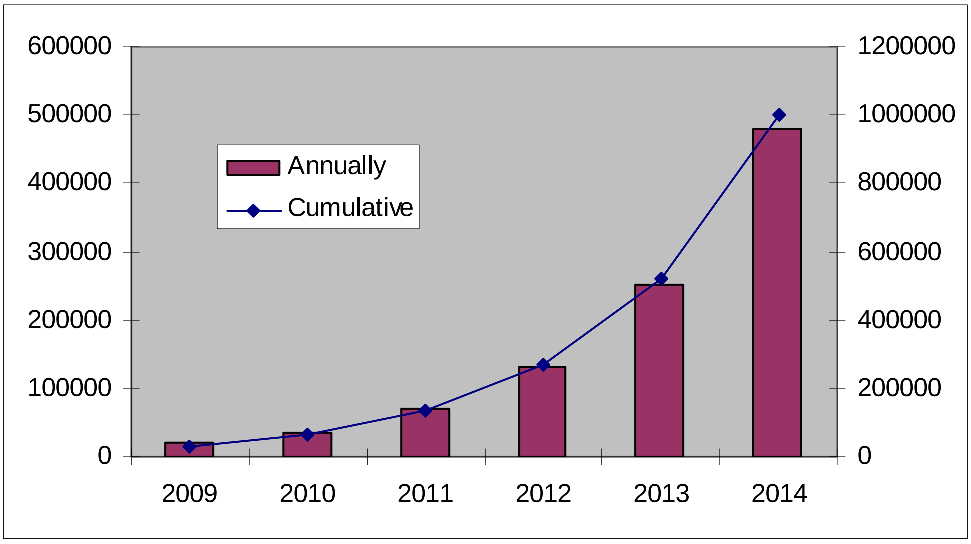

Figure 4 Indicative uptake of SWH through the Eskom DSM mechanism

A programme of 1 million solar water heaters would require a total incentive of approximately R 4 billion to be made available to consumers and recovered through the DSM mechanism over the 5 year duration of the programme. This represents a capital cost to the ESI of less than R 11 000 per MegaWatt of verifiable demand reduction. The remaining capital expenditure (in the order of 30%) will be bourn by the consumers.

5.1.2. Verifiable savings achievable

5.1.2.1. Energy savings and primary energy contribution

Results from monitoring of the Eskom 50 project indicated the following daily electricity consumption by solar water heater supported electrical heating systems:

SWH with controllable electrical feed	3.3 kWh
SWH without timers	4.6 kWh
Comparative geyser consumption	10.3 kWh

Considering these results it is easy to estimate that average daily consumption savings, by switching from geysers to solar water heaters for the programme above will be will be in the order of 2 300 GWh annually in year 5.

This number can be increased by approximately 30% where the electrical input to solar water heater systems is controllable.

The systems in a programme of the magnitude modelled here will contribute 2 500 GWh to primary renewable energy supply. This is approximately 25% of the national renewable energy target.

5.1.2.2. Electrical demand savings

A contribution to after diversity load management per system of 0.5 kW and 0.4 kW in the morning and evening water heating peaks respectively (This can be increased to 1.0kW and 0.6kW respectively with the inclusion of timers or where ripple controllers are in place through separate initiatives). The water heating peaks are at 7:00 and 19:00 with the national system peaks being at 10:00 and 19:00.

5.1.3. Determining avoided financial and economic costs

5.1.3.1. New generation capacity

Based on a programme of the size modelled and suggested here, the construction of at 500 MW base load power station capacity can be avoided. Figures for the range of base load Capex include the Grootvlei Refurbishment at R4Million/MW (EEPublishers, Dec 2007) through to the 4 800 MW Medupi at R16.4million/MW (Engineering News Nov 2007).

Eskom manages a three-year project pipeline of R482-billion (South African Association of Consulting Engineers (Saace), Feb 2008) of which R3.8Bn is for DSM (NERSA, pers comm, Jan08) as per the DSM budget in multi-year price determination. These figures indicate that the R 7 000.00 per MW requested in a 70% capital subsidization of the solar water heater programme, although being outside the sometimes cited DSM 50% capital benchmark of R3 500.00 per MW for load management projects and requiring preparation of this special case application, is well within the bounds of reasonable average electrical energy offset capital expansion cost.

5.1.3.2. Cost of Energy (CoE)

If a life cycle costing approach to the cost of energy delivered by solar home systems is taken, one obtains in the order of 60c/kWh.

In addition to the purely financial approach, the full economic benefit of a solar water heating programme includes several positive economic externalities. These have been quantified in various studies including World Bank 2004, WWF 2001 and DME 2003. Estimates are in the order of 10c/kWh excluding Carbon revenues through Kyoto flexible mechanisms and approximately double this at presiding market prices for greenhouse gas mitigation.

Externalities reported as associated with coal fired power by Eskom includes consumption of resources and waste, such as quantity of greenhouse gases emitted and total volume of water as consumed during operations. Greenhouse gas emissions are typically reported in tons CO2 equivalent per annum and water consumption in litres per annum.

Using total consumption or savings per 1 kWh, as per Eskom Annual Report and a successful rollout through the programme of 1000 000 systems installed over a period of 5 years results in the following reduced stock resource depletion, and local and global environmental impact mitigation:

Table 2 Avoided resource depletion and externalities

	Quantity	Units
Coal	1.265	Million tons
Water	3,105	Million litres
Ash	361,100	Tons
Particulates	460	Tons
CO2	2.204	Million tons
SO2	19,782,300	Tons
NOx	9,807,200	Tons

The following table aims to estimate associated monetary savings or potential for revenue generation, using projected 2008 market prices for thermal coal, Rand Water prices for water and achievable carbon credits, as will be generated through implementation of this programme.

Table 3 Financial benefit from a national SWH programme

Item	Price	Quantity	Savings	ZAR savings
Coal	$80/ton	1.265 Mt	$101 million	R 809 million
Water	R5.20/kl	3,105 Ml	R 16 million	R 16 million
CO2	€20/ton	3.204 Mt	€ 44 million	R 485 million
Total				**R 1.3 billion**

5.1.3.3. New distribution infrastructure

Savings achieved related to infrastructure costs can be indicated by estimating the infrastructure required to support generating capacity as saved by the solar water heaters. This is however not a scientifically based method, with low associated confidence and we will not attempt to quantify these savings directly in this report. A detailed study will be required to report on such savings.

5.1.4. Capital cost related to programme roll-out

Should this programme be rolled out to 1 million customers at an average cost of ZAR 11 000/kW or R5 500 per solar water heating system (prices will vary between R 7 000 to more than R 20 000 dependent on manufacturer, system size and household demand), the total estimated capital cost related to the programme is ZAR 4.1 billion[3].

The avoided cost related to construction and operation of a existing electrical mix generation, transmission and distribution infrastructure to supply the peak demand and energy saved by installation of the systems by contrast is in the order of ZAR 7 billion

5.1.5. Estimated payback periods

The total achievable energy savings per 1 million solar water heater systems is in the order of 2 300 GWh per annum. At an average residential tariff of ZAR 47c/kWh, cost savings to customers are approximately ZAR 1.1 billion annually.

Total avoided costs related to capacity expansion and externalities associated with coal fired power, are in the order of ZAR 10.9 billion per annum, indicating a project payback period of 1.5 years. Initial total incremental capital estimate of approximately ZAR 4 billion, contributed by the ESI through the rate based DSM mechanims, will be paid back in just over 3 years.

5.1.6. Current solar water heater supply market considerations

The current size of the solar water heating market in South Africa is in the order of ZAR 100 million per annum, equating to an average total installations of up to seven thousand systems. The solar water heater terms of reference document was circulated to potential service providers during December 2007.

Current supply capacity is in the order of 10,000 systems per annum, but can be increased through expanding local manufacturing facilities and companies and increasing imports of foreign equipment. There may be a case to motivate for reduced import duties on equipment to further assist roll-out of this programme.

5.1.7. Future market considerations

It is anticipated that with development of technology and the local renewable energy sector, solar water heating technologies may be marginally cheaper in future. Calculation of an incentive should take these

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[3] Based on an average subsidy cost of R 4 100 per system.

market development dynamics into consideration and include evaluation of potential reductions in incentives over time, as technologies become cheaper and roll-out scales up.

New job creation and technology transfer and development should result from this programme. There will be a requirement for local skills development however, as limited skilled people currently exist to manufacture, install and maintain systems.

5.1.8. Degression

Degression refers to the reduction of an incentive measure over time in reducing reliance by an industry upon it and as commercial economies of scale come into play. The term was used in describing the need for such as part of the proposed renewable energy regulatory framework to support the feed-in-tariff under consideration by the NERSA.

Similarly, an increase in demand for solar water heating systems may in the short term lead to natural escalation in market prices, while over the long term the demand-supply dynamics and economies of scale will likely effect reduction in pricing. As noted in the previous paragraph, consideration must be given to reduction of incentives over time. This will ensure higher initial uptake, while moderating and stabilising market dynamics towards the end of the 5 year programme.

Associated with the solar water heating market dynamics, ongoing increases in electricity tariffs, will make the business case for solar water heaters more attractive to customers in the long term and reduce the magnitude of the incentive required to achieve the desired uptake of solar water heating.

5.2. Additional considerations

Refinement of the programme design should make reference to issue including:

- customer requirements in terms of pricing and benefits and therefore the estimated rate of uptake. This in turn allows for feedback in revising the incentive levels.
- technical and measured data to backup energy savings achievable
- accurate costing related to new infrastructure avoidance
- quality and variability of SWH systems
- geographically distributed vs. concentrated installation patterns for programme phases.

6. Risks

6.1.1. Financial (savings effected and payback on capital)

The financial risks associated with roll-out of this programme are low. It has been proven that MWh savings and subsequent financial savings are achievable through implementation of such a programme and uptake will depend on market demand. Given the prospect of increasing electricity tariffs over the coming years, financial arguments in favour of this programme are only strengthened.

6.1.2. Technical (pilot project results representative)

Systems currently available and supplied in South Africa vary with respect to quality of product, origin and pricing parameters. As can be expected, locally manufactured products are more affordable, while imports are priced at a premium. Testing has been conducted by the SABS on six different systems to date. These test results do not necessarily indicate SABS approval. There is a requirement for equipment standards and installation standards and training in South Africa. This can however only be driven by industry to ensure quality of product and service which is not damaging to the industry.

There is always a risk of equipment failure and it is industry's responsibility to ensure quality of installation and appropriate maintenance standards are adhered to. Current guarantees are up to 5 years on equipment.

6.1.3. Supply (product availability)

Initial supply shortfalls is a concern, but longer term security of supply can be ensured through action by industry

6.1.4. Skills (installation and implementation)

The lacking skills associated with manufacturing and installation of systems could initially be a problem and create installation bottlenecks, but as skills are rapidly developed and are already developing, these shortfalls should be ironed out.

7. Conclusion

7.1. Incentive structuring and business case for roll-out

The incentive calculation is described in section 5.1. The proposed inception level for the incentive level for the programme for approval as a special DSM case is R 11 000 per kW or approximately R 5 500 per system.

The roll out is nation wide and there is a planned communication strategy for the programme. Municipalities will piggy back on the programme to assist large scale roll out in their regions.

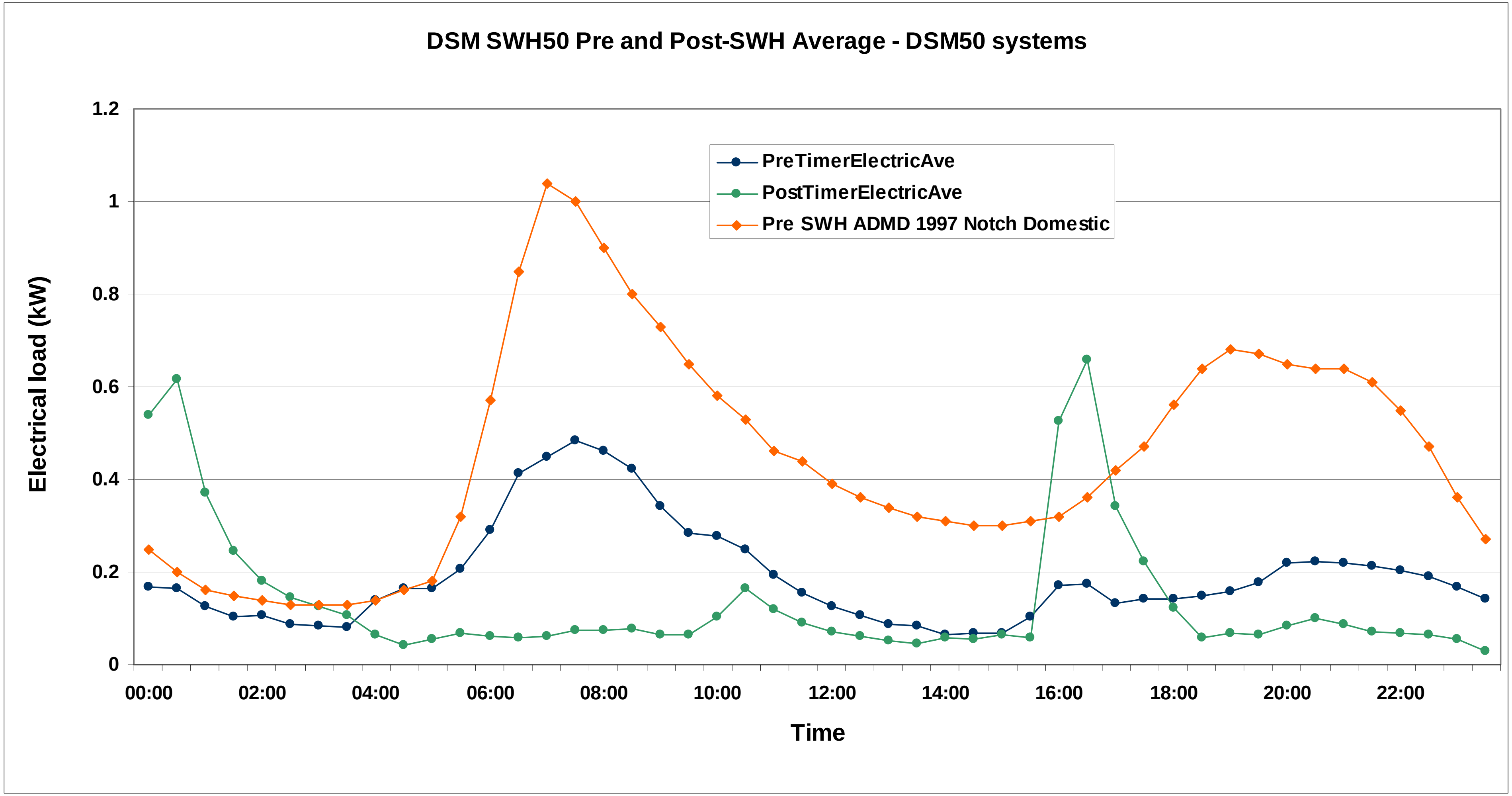

Figure 5 DSM SWH50 Pre and Post-SWH Average - DSM50 systems