



renewable  
energy  
& energy  
efficiency  
partnership



## **Alex Renewal Project (ARP): Installation of solar water geysers in 520 FLATS and Nobuhle ( M2) hostel.**

Written and compiled by Dr Ruth Rabinowitz May 2009.

The Alexandra Renewal Project is one of 8 urban nodes that form part of the South African government's Integrated Sustainable Rural Development and Urban Renewal Programme announced by President Mbeki in his State of the Nation Address to Parliament in 2001. The estimated national budget was R1,3 billion over 7 years. The sub project selected for this study involves a rental housing development in which solar water geysers were installed and a hostel upgrading in which solar geysers were not considered. The cost of the installation in 520 flats was expensive and several lessons were learnt in the process. These lessons could contribute towards a better understanding, by legislators, the energy utility, planners and administrators, of the obstacles to increased uptake of solar water geysers in SA and in particular in low cost urban housing developments.

The Project belongs in the following categories

End user area:

New buildings, financial instruments, industry, legal initiatives, planning issues, sustainable communities, user behavior and education

Target Audience:

1. citizens
2. households
3. property owners
4. decision makers
5. local and regional authorities
6. utilities
7. architects
8. engineers
9. financial institutions

Technical:

1. energy efficiency
2. heating
3. appliances
4. solar energy



renewable  
energy  
& energy  
efficiency  
partnership



## INTRODUCTION

Alexandra is a prime location for the urban poor. While the physical infrastructural capacity of Alexandra should carry only 70 000 people, in reality it houses 5 times that number. An estimated 350 000 people live in Alexandra. They occupy 8500 formal houses, 34 000 shacks, 3 hostel complexes, 2 500 flats and numerous old factories and buildings. The purpose of the ARP (Alexandra Renewal Project) is to upgrade the living conditions and human development potential within Alexandra.

Since 2007 SA has been under pressure to conserve energy demand on Eskom, the electricity utility. This has necessitated solutions that enhance energy efficiency, decentralize energy sources and improve the environment, by reducing the country's carbon footprint.





renewable  
energy  
& energy  
efficiency  
partnership



## OBJECTIVES

Poverty alleviation and sustainable development are key priorities of the current SA government. Since the ARP will continue to develop Alex, through new buildings and upgrading of existing buildings, the objective of this study is to identify optimal financial instruments and legal initiatives that would foster SMART planning of solar water heating programs, to promote the industry in low cost housing and to establish sustainable communities. Once these instruments are identified, they could form the basis of a program that can be shared with managers of similar programs around the country.

By examining the mechanisms used in '520 flats' and M2 hostel, to upgrade the existing housing environment, create affordable housing, de-densify households to appropriate land and create an integrated and functional settlement, we hope to highlight the strengths and weaknesses of the current approach.

## METHODOLOGY.

As part of the national governments strategy of Breaking New Ground, the City of Johannesburg tasked the ARP to identify a piece of available land in Alex on which to create rental stock for people in transit. Rental ranges between R300/month for cardboard and hessian shacks to R1000 for a brick structure. 520 flat was pegged at R520. The project was undertaken by JOSHCO the Johannesburg Social Housing Company which is owned by the City of Johannesburg.

The budget was approved by province in April of 2006, based on a preliminary costing done by the ARP, and signed into law in May. The program was fast tracked as a national priority, therefore the usual wait for filtering feed back from the province was shorter than usual. Once approved the project must begin within one year and moneys not used within three years are returned to province.

The ARP nominated a professional team of designers Kevin and Dodd to implement the program having designed the footprint thereof. A Bill of quantities with construction drawing was put out to tender in terms of the Johannesburg Building Contractors Committee that provides a standard legal framework designed by the Master Builders Association. 6 tenders were submitted and rated according to the Construction Industry Development Board criteria. Grinnaker LTA building division was awarded the tender.

The task of erecting the double storey flats was initiated, with the intention of having electricity via pre paid metering and gas for cooking. However in Oct 2008 following the collapse of the energy supply in South Africa a change of plan was required.



renewable  
energy  
& energy  
efficiency  
partnership



The COJ sought to reduce reliance on electricity and build a more self sustaining structure. A search for borehole water was not successful but the plans were altered to cater to solar water geysers. This required an increased allocation from the province which would delay the construction. The increased amount was estimated as R 500 000 rand. The contractor, on the basis of good faith, carried the risk of the increased cost occasioned by changing the roof structure to carry solar water heaters and of purchasing these heaters. Based on their desire to obtain the Eskom Subsidy for installing solar water heaters, Grinakker installed heaters that subscribed to Eskom's minimum standards and had SABS approval, expecting to claim back the Eskom subsidy.

This has not been possible because the subsidy only allowed for geysers that REPLACE existing geysers. It has recently been adapted and possibly the rebate could be accessed retrospectively. The result of this confusion was a lack of competitiveness in the pricing and a feeling that installation of solar water heaters is far too costly to consider for future buildings.

In this respect the three storey M2 Hostel offers an interesting comparison to the 520 flats. It was built in the early 1970's and solar panels were installed to heat water for communal showers. Bottom floor users invariably had no hot water. The panels were stolen and the people have spent the years since then, stealing electricity by taking illegal connections from the lines traversing the region.

Since 2005 the hostels have been expanded and renovated in several phases. At no time were solar water geysers considered. During the public participation process with the hostel residents committee the residents were informed that if they had solar panels they would have to share them. If they had a single geyser they could each have their own. The residents opted for the single geyser model, little realizing that this was in fact based on a single gas geyser for the entire building, installed and fed by Egoli gas. The cost to the residents of using gas would be approx three times the cost of electricity.

As part of the hostel revitalization program residents were persuaded to break down their existing hall and have it rebuilt as a state of the art theater which would house boxing tournaments and glamorous theatrical events. To date, three contractors have come and gone. A once vibrant mini hall has been knocked down and a large social hall that could have been adapted with minor alternation has been demolished. The plans have been scrapped and it is intended to return the building to its original state when a new contractor is assigned.

## **FINANCIAL RESOURCES AND PARTNERS**

156 SWH units in 520 Flats cost R 24 948 each, or a total of R 3 891 888. The required alterations added R 560 000, pushing up the cost of the units to R 28 538.



The price of gas installations at the hostel, by Egoli gas, excluding gas pipes installed by ARP, was estimated at 44million rand for 1042 units i.e. R40 000 per unit. A review conducted by architects Savage and Dodd decreed this cost to be excessive. Hence the hostels will be upgraded using prepaid meters. Each meter will cost R1000 hence the total for 1042 units would be R1 042 000. The overall cost for electrical installations will be an additional R12 million. Currently the residents of the hostel pay R70 per month in rental for a single unit. The additional cost of running electricity for geysers and communal lighting will be carried by the Joburg City Council, hence ratepayers, and that cost has not been factored into the building plans.

The overall budget for the ARP project was R1.6 billion from national government. The province the City of Johannesburg were each expected to contribute another R800 million from a combination of national budgets and local taxes. In reality no money has been contributed by either of these entities. Instead there is continued conflict about which level of government and which department should bear responsibility for spending on specific criteria.

## Findings and Outcomes

For new house construction the following rules apply:

1. The **National Housing Building Regulating Council (NHBRC)** which governs and ensures quality control on Reconstruction and Development (RDP) houses, has decreed that all products used in RDP houses have to adhere to South African Bureau of Standards (SABS) codes.  
This impacts negatively on the delivery of SWH, as only 33 SWH are approved by SABS. The size of the geysers varies from 300 to 150litres, with a rebate that ranges from R5 000 down to R1900, depending on location and size of geyser.
2. **Eskom Subsidy:** The suggested guideline cost (Eskom website) ranges from Maximum R35 000 to R11 000 with an average of R16 000 per SWH including installation costs. Until recently Eskom required the installer to obtain a Certificate of Competency (CoC) certifying that existing geyser was decommissioned or removed before rebate could be claimed. This mitigated against new installations.
3. The **Design of an RDP house** does not allow for the point weight load (150l SWH = +/- 180kg) on the roof to carry the SWH and the required design pushes the price of RDP beyond the current housing subsidy of R71 000 per unit, if only SABS accredited SWHs are used.
4. **Water Demand .** The calculation for the medium average is 50litres per person per household. The average family living in a RDP unit is 6 persons, but since less water is used by lower income groups 50litre per RDP unit should suffice.



5. **Installation.** Houses are positioned and designed to accommodate the maximum number of houses on the smallest amount of land. No attention is paid to optimal facing for SWH installation or to designing for shortest possible route between geyser and point of water use. Other factors to consider are the vertical angle of the installation to ensure maximum solar exposure and the insulation of all pipes to ensure heat preservation.

### Political considerations

1. To promote renewable energy consumption, the City of Johannesburg (CoJ) Municipal owned Entity (MoE), City Power (CP) has issued a tender for 300 000 solar water heaters, where economies of scale are expected to reduce the cost of SWH's.

This tender conflicts with City Power's income model which seeks to maximize income through sale of electricity. The financing from electricity savings still needs to be defined. Further the installation policy of who qualifies, who installs, maintains and insures, is yet to be clarified.

2. Planning and implementation of environmentally sound buildings is complex and haphazard. There are multiple departments involved, with conflicting regulations and in some instances duplication. The City of Cape Town was not able to implement a bye law that enforced all new geyser installations to be solar because of conflict with dept of environment and confused funding mandates.

The problems were as follows:

1.1 Speaker of the House in the City declared SWH an environmental issue and referred the matter to province who constitutionally has a joint mandate around environment.

1.2 Province felt it was a city mandate as it related to Building regulation implementation.

1.3 Building regulations are in fact a jurisdiction of National Government viz the Dept of trade & industry – DTI through SABS which sets standards and building regulations

1.4 If implemented it would have been an unfunded mandate of the City/Building inspectorate and beyond their scope.



renewable  
energy  
& energy  
efficiency  
partnership



3. Public participation, in this case meeting with the Hostel Residents Association, is often a farce, as the residents are not explained the full implication of the programs and are consulted merely for process approval, not for their best interest in terms of personal and global health. Often ulterior or political motives are the driving factors behind decisions. In the case of the M2 hostel mini hall, a strong Zulu flavor infiltrated the hostel though the cultural activities held there and the ARP managers in charge of this particular project wanted this influence neutralized.

## CONCLUSIONS AND PROPOSALS

1. Neither planners nor the public has adequate awareness of the value of using alternative energy technologies or a commitment to plan housing developments with such technologies in mind.
2. Municipal building codes conflict with provincial and national laws under several line functions including environment, housing and department of local and provincial government. They are also not well aligned in terms of the PFMA (Public finance management act) and the MPFMA (Municipal Public finance management Act). A bottom up system of planning and responsibility based on need and outcomes would be far simpler to steer and manage, resulting in more cost effective and environmentally desirable outcomes.
3. The mechanism for providing equal amounts of hot water to all three or more levels of multiple storey buildings is not yet well understood. Possibly some smart technology exists whereby each level can be provided with the same share of water each day, so that top users do not use more and enjoy better heat than bottom users.
4. Planning for maximum benefit from directional sunlight should be an essential feature of all building codes, as should building of RDP homes with appropriate insulation or of housing projects with grey water solutions and recycling depots.
5. Upliftment or housing development projects should begin with a needs assessment of the people in terms of healthy lifestyle as well as sound environmental and energy principles. This should be aligned with an analysis of future costs to the public, the financially responsible entity and the planet. This requires a comparative measure for financial, environmental and energy costs. As yet there is no user friendly, or freely available, embedded carbon footprint measure for construction projects or different kinds of energy installation. This is an urgent priority need for future planning of sustainable development in SA.
6. A voluntary body of concerned citizens should be set up to assist in coordination of local initiatives or an NPO should work together with different government departments to rationalize legislation and bring opposing groups out of their silos.



renewable  
energy  
& energy  
efficiency  
partnership



7. The Eskom subsidy for SWHs should be more accessible and include models that have been approved by accredited bodies in other countries. This would introduce pricing competition and increase the uptake of SWHs. It must clearly include new building as well as altered systems.



#### REFERENCES:

Working documents from ARP

Interviews with hostel residents and Hostel Residents' Committee

Interviews with Egoli Gas managers.

Information shared by present and past employees of City of Cape Town.



renewable  
energy  
& energy  
efficiency  
partnership



**For more information on the Alex Renewal Project please contact:**

Dr Ruth Rabinowitz.

TEL: 011 802 1826

The Democracy Foundation.

FAX: 011 804 4221

Address: P.O Box 437 Rivonia 2128.

MOB: 0825793698

[reureka@iafrica.com](mailto:reureka@iafrica.com) (Web site under construction)