

Low cost energy efficient housing by South African housing associations

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1. INTRODUCTION

When the Government of National Unity came to power in South Africa in 1994, it inherited a housing sector with severe abnormalities as a result of the policies and political turbulence of the Apartheid era (DoH, 2000). One of the main problems was and is the enormous housing backlog. The total housing demand for the coming 20 years is estimated on 5.7 million houses (ECN, 2000). To cope with this demand for housing, the government adopted in 1994 a housing policy aimed to build one million low cost houses by the year 1999. By the end of 1999 the delivery of the promised one million houses was not met and the current delivery experiences also problems. The houses produced in general did not meet the standards as set by the government. Especially the quality and affordability of the housing products were not satisfactory.

A possible solution to the demand can be offered by means of housing associations. Housing associations are an 'alternative' between public and private housing. Their core activities are the construction and management of houses and their main sources of income are rent from tenants and government subsidies (Wal, 2000). Rental housing, built by housing associations, is a type of housing hardly built in South Africa up till now and can be an answer to the enormous housing demand. The recent shift in policy by the Department of Housing from stand-alone freehold houses to medium density rental accommodation is most welcomed in this regard.

The current housing delivery mainly focuses on quantity. The quality is insufficiently taken into account (Thomson, 2001). The situation gives several opportunities to improve the quality of the houses, especially on the aspect of energy efficiency. Significant energy related interventions could be made to reduce energy consumption and to improve health- and comfort levels (Mahomed, 2000). A certain quality level is a prerequisite for effective interventions aimed on energy efficiency.

Several housing projects, which were aimed at energy efficient housing delivery, have recently been and are currently being implemented. These projects are laying a foundation for others to follow on a larger scale (Mahomed, 2000). A successful implementation of energy efficient housing projects proves to be a problem. Problems concerning affordability and acceptability are often experienced during the introduction and implementation of energy efficient technologies. Energy efficient housing by means of housing associations seems to be an interesting approach in this respect. It is therefore explored whether housing associations are a feasible instrument for the dissemination of low cost energy efficient housing.



Figure 1 Typical subsidy houses in East London, South Africa. Often called 'hot boxes', as a result of the indoor climate (Page, 2000).

2. APPROACH

First, an analysis of energy efficient housing is made. Energy efficient low cost housing is often associated with or considered to be an integral part of sustainable development. It is therefore pointed out what sustainable development means and what it means for energy efficient housing. Secondly, an analysis of South African housing associations is made. Two South African housing associations, which are being established in East London, are analysed on both their organisation as well as on their housing products. Finally possibilities and constraints following from the two analyses are combined, from which conclusions are drawn and recommendations are formulated, concerning a low cost energy efficient housing practise by South African housing associations.

3. ENERGY EFFICIENT HOUSING

The discussion on sustainable development started after studies on the earth's resources, in which it was pointed out that the earth has finite resources and that the earth will eventually run out of fuel, water and food necessary to satisfy the needs of the growing global population. A new model was suggested, that of 'sustainable development'. Sustainable development was defined as 'meeting the needs of the present without compromising on the ability to meet those of the future' (Brundtland, 1987).

The definition of sustainable human settlements differs in its scope from the definition of sustainable development. The main difference is the focus on human settlements and thus on housing. Sustainable human settlements are defined on a spectrum of four elements (Mahomed, 2000): The social/institutional element in general includes aspects such as improvement of the quality of human life. The financial/economical element is mainly focused on employment creation and on ensuring affordability for intended beneficiaries. The biophysical/ecological element includes aspects such as the reduction of the use of resources and aims at a maximum resource reuse and recycling. The technical element focuses on the construction of durable, reliable and functional structures.

Low cost energy efficient housing is defined as a technical focus, particular on energy efficiency, within sustainable human settlements. Numerous housing solutions are possible within the spectrum of sustainable development. Certain solutions may suit certain aspects very well, but may at the same time fail on other aspects. It is therefore important that solutions are being sought in an integral way.

Energy efficient technologies, or interventions, in housing involve the application of energy flow principles and climatic characteristics of a region in the design and construction of houses so as to achieve thermal comfort and other energy services, with minimal conventional energy input (Wits, 2000). Energy efficient interventions vary from orientation of houses and roof overhang to solar water heaters and solar home systems. Each of the technologies is available for a certain price and has its own benefits. In numerous projects throughout South Africa and elsewhere they have proved to be effective to a certain extent.

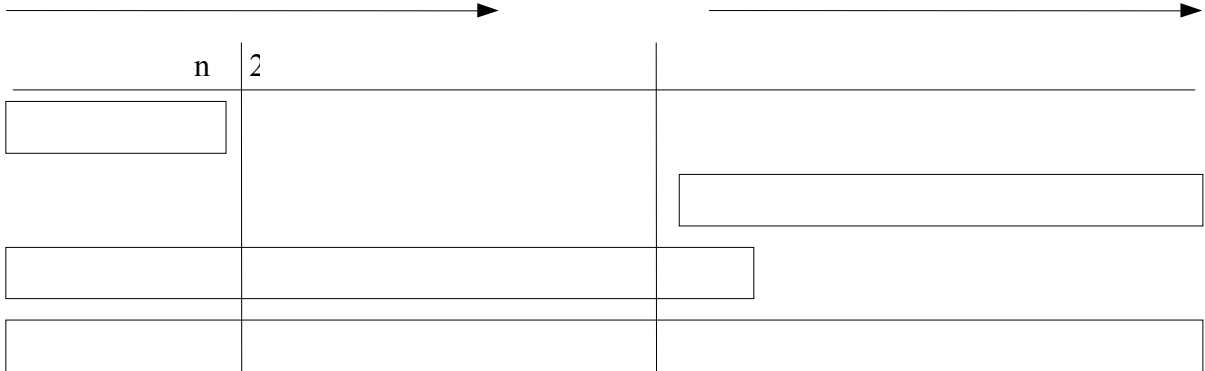


Figure 2 Required input during the life span of an intervention

During the life span of the interventions input is necessary to assure a successful outcome. In figure 2 the required input is outlined during the life span of a possible intervention. As indicated, marketing is needed in the first phase to adjust or change perceptions about the intervention. Acceptance by the end users is essential in this phase. Education can lead to an appropriate use of the intervention. The operational phase starts after the installation- and construction phase. During this phase maintenance is needed and management. Management, like supervision and monitoring is necessary during the whole life span of the intervention to organise and to assure a proper introduction, installation and use of the intervention. During the use of for instance a solar water heater management is required on how to combine the costs of the initial investment and maintenance, with the benefits from the energy savings.

3.3 Suitability and feasibility

It should be born in mind that energy efficient technologies, or interventions, basically represent one out of four elements of sustainable development. Technical solutions are part of a broader solution. Considering applying these technologies is a matter of making a set of decisions in which aspects and criteria of sustainable human settlements should be taken into account. There is however no single blueprint model for low cost housing projects. Sustainable aspects can only be applied as a framework in which numerous specific solutions are possible.

The question whether a technology is suitable for broader implementation is often re-formulated as whether a technology is financially and economically feasible. Studies have pointed out that application of energy efficient technologies actually opens the gate to additional and/or alternative financing forms and that the expenses on housing, such as energy expenses, decrease. A key element in this respect is how to combine both the costs as the benefits of possible interventions. Rental housing, provided by housing associations, seems an interesting option in this respect. Housing associations can offer housing on a life cycle based price analysis. Energy efficient housing is more cost effective than conventional housing when such a price analysis is applied.

4. SOUTH AFRICAN HOUSING ASSOCIATIONS

South Africa does not have a history of rental housing by means of housing associations, as a result of the former Apartheid regime. The Housing Association East London (HAEL) and the Own Haven Housing Association (OHHA) are two of the few housing associations, which are being established in South Africa. Both are used as examples of housing associations and their situation was analysed. They are still in start up phase and externally funded, trying to reach their critical mass. Critical mass is the number of houses needed by a housing association to cover the operational costs of the association fully out of the income from the rent (Ravestein, 2001). Because they are in start up phase the organisations are small and most of the activities are subcontracted, such as maintenance and rent collection.

The average dwellings constructed by HAEEL have one to three bedrooms, cost R 50 000 (approx. € 5000) to R 73 000 and are part of two- to three storey blocks. The rents range from R 625 per month for a 35^{m²} unit to R900 for a 67^{m²} unit, targeted at those earning R 2000 to R 3500 per month (HAEL, 1999). The housing associations are confident with their current type of dwellings, although quality remains an issue. Because the concept of medium density housing by housing associations is new in South Africa, problems arise at both the housing associations themselves as their tenants, leading to inappropriate use of the dwelling by the tenants and high operational costs for the housing associations. AIDS is starting to affect both the tenants as the organisation. The future impact can only be guessed at.

There is consideration given to energy efficiency and sustainability by housing associations, but because they are in their start up phase no extraordinary nor innovative features were built in. However the housing associations are interested in sustainable building practices and energy efficient interventions and strive to give more and more consideration to those matters in future projects. The main constraint for implementation is the fact that interventions in general have certain prerequisites, which the current associations can not answer. The day-to-day operational matters already consume most of the time, leaving no 'space' for additional matters and the available resources are just enough to built and manage standard housing. For the near future the associations see themselves only implementing those interventions which require the least investment and effort, such as a proper orientation of the dwellings.



Figure 3 The current dwellings of HAEL in East London, South Africa

5. ENERGY EFFICIENT HOUSING BY HOUSING ASSOCIATIONS

From a social/organisational point of view housing associations seem a suitable instrument to implement energy efficient housing. Housing associations can organise the input required for a successful implementation of energy efficient interventions, but have capacity problems, due to the fact that they are organisations in their start up phase, with little to no capacity left for additional matters. The main social/organisational condition to provide energy efficient housing is that housing associations are assisted to overcome the capacity problems.

From a technical point of view the housing associations seem a suitable instrument to implement energy efficient interventions, because of their quality and maintenance awareness, which are prerequisites for a successful implementation of interventions. However, this awareness exist mainly in the organisations themselves and the actors housing associations are dealing with have different opinions about and standards of quality and maintenance, resulting in difficulties for the housing associations to assure the desired quality and adequate maintenance. The main technical condition under which housing associations successfully can offer low cost energy efficient housing is that they are assisted in assuring the desired quality and maintenance and that they are assisted in raising quality awareness among their actors.

Housing associations offer housing on a life cycle based price analysis and seem therefore an appropriate instrument to implement energy efficient interventions, which are financially feasible when the life cycle costs are taken into account. Again, the current organisational capacity is insufficient to implement interventions successfully and the initial investments of the interventions are considered too high. A main condition in this respect is that housing associations are assisted to overcome capacity and financial problems.

6. CONCLUSIONS AND RECOMMENDATIONS

It can be concluded that housing associations are a suitable instrument to spread and implement a low cost energy efficient housing practise in South Africa, but that external input is needed to overcome capacity and financial constraints. The main condition for housing associations to provide low cost energy efficient housing is that they will be assisted in recognising, developing and implementing their full potential regarding low cost energy efficient housing.

This research is concentrated on low cost energy efficient housing by housing associations, which is aimed at those earning between R 2000 and R 3500 per month. Further research should be conducted on the possibilities and constraints of an environmentally sound housing practise in other income segments. For further research it is recommended that the relations between the housing associations and their environment are further clarified and that sustainable development is defined on a (inter) national level for housing associations in particular. Further research should be conducted on the possible interventions and the required input. This in combination with their possible effect and the relation between the required input and the effect, leading to the development of a decision tool for housing associations, to assist them in decisions on what interventions to implement and to what extent.

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