

Sustainable access to modern energy services for South Africa's urban and rural poor. How can research contribute?

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INTRODUCTION

The global development agenda has become increasingly focused on poverty reduction in response to the dire state of the populations of most developing countries, particularly in sub-Saharan Africa. At the top of the United Nations Millennium Development Goals is the alleviation of extreme poverty and hunger. In line with this, both the New Partnership for Africa's Development and the Southern African Development Community have poverty reduction as the overarching goal of their programmes.

South Africa, though relatively well developed in comparison with other African states, has one of the world's highest levels of inequality. Clearly scientific research must pay attention to addressing increasingly urgent issues around poverty, and work closely with policy makers. A correlation has been demonstrated between per capita modern energy consumption and development indicators such as GNP per capita.

There has been a general failure in initiatives meant to deliver modern energy services to the poor. The central issues in successful delivery of modern energy services to the poor revolve around clear understanding of the needs and circumstances of the poor and clear communication of the positive and negative implications of any intended interventions to the poor.

This paper, based on a survey of the literature, highlights the poverty-focused efforts within the CSIR energy-sector research to deploy decision support and other tools to ensure more successful delivery of energy services to the poor.



Figure 1: Clean energy from organic wastes: A biogas lamp in Rwanda



Figure 2: The open fire has proved to be hard to displace. Efforts continue with mixed results



Figure 3: Urban poverty: Firewood dependence in an electrified peri-urban area

POVERTY AND ENERGY

The poorest countries show high levels of traditional energy reliance. Poor sub-Saharan African countries such as Malawi, Mozambique and Ethiopia, for example, have traditional biomass contributing around 90% of their total national energy consumption. Modern energy services expand the opportunities for productive activities by allowing the operation of faster and more efficient machinery and facilitate provision of improved health and educational services.

The provision of energy services does not in itself cause development in the absence of other support measures, including transport, communications, markets and credit, and electricity is not a basic need like food and shelter, for example.

The high level of inequality in South Africa is demonstrated by South Africa's relatively high gini coefficient (a measure of income inequality) of 57.8. Urban poverty is also a growing problem given that migration to urban areas is increasing the population in those areas at about twice the rate of population growth in sub-Saharan Africa. Clearly scientific research must pay attention to addressing increasingly urgent issues around poverty and work closely with policy makers.

GENERAL FAILURE OF ENERGY SERVICE DELIVERY INITIATIVES AIMED AT THE POOR

A large number of energy service delivery initiatives aimed at the poor implemented across Africa and elsewhere in the world have met with little success. The reasons for the failure of many energy initiatives may be traced to flawed approaches to dissemination, typically the top-down approach to the planning and implementation of projects, resulting in failure to address the needs of the intended beneficiaries. A selection of energy service delivery cases from the region is presented below to illustrate successes and failures and the factors responsible.

ZIMBABWE'S RENEWABLE ENERGY PROJECTS

Immediately after independence in 1980, Zimbabwe embarked on an ambitious rural development programme to bring development to the previously neglected rural majority. Experience over two decades showed that a number of project implementation components tend to contribute to the success or failure of the initiatives. These include training, institutional framework, financing, maintenance and targeting real needs.

The biogas and woodstove projects were predominantly of the welfare type, largely implemented by government in the 1980s with high subsidies in a predominantly top-down approach. Another category of projects, which include PVP and the GEF solar project were partially welfare in that end users had to pay a portion of both installation and maintenance costs. The last category of initiatives, including industrial gasifiers, gensets and windmills were predominantly private sector driven and almost all powered income-generating activities. Where financing was necessary, it tended to be through normal commercial channels and maintenance was through the equipment supplier or an agent. The success of the initiatives was greater for the more commercial programmes where the approach was necessarily bottom up.

BIOGAS IN BOTSWANA AND INDIA

During the 1980s Botswana embarked on a biogas water pumping programme that was spearheaded by the Rural Industries Innovation Centre (RIIC) in Kanye. These were village biogas plants up to 110 m³ in size, installed free at selected villages. Other villages not in the programme used government-supplied diesel pumpsets (diesel engine coupled to a water pump and sold as one unit). The programme failed after a few years as the digesters fell into disuse. The reasons for failure included failure to provide mechanisms for collection of funds for operation and maintenance, difficulty and reluctance to collect dung, perceived unfairness in paying for water with dung, and lack of a sense of ownership of the biogas digesters.

An instructive example of successful implementation of a village biogas scheme is that of Pura village near Bangalore in Karnataka state, South India. Here many of the problems encountered in Botswana were addressed through careful integration of the biogas project into the village. This included community organisation, employment of operators, supply of electricity and water, powering productive enterprises, and a scheme to return digested slurry to the villagers for use as manure.

EXPERIENCES FROM THE WATER SECTOR

In a study of selected delivery lessons from southern Africa, the CSIR's sustainable energy futures research group looked at a number of regional energy programmes as well as other sectors from which lessons could be drawn. Not surprisingly, experiences from the water sector in efforts to deliver services to communities paralleled those in the energy sector. Findings confirm the value of coupling with other services like sanitation to provide more holistic solutions, and appropriate technology choice. This requires that the implementing agency be able to first ascertain the needs of the communities.

SUMMARY OF ISSUES

The foregoing discussion has looked at some initiatives in the southern Africa region, and a number of points may be highlighted:

- Given the need to deliver packaged interventions tailored to the needs of the recipient communities, an interdisciplinary approach to the design and implementation has much to recommend it.
- Understanding the context into which any given technology is to be introduced, is a critical initial step.
- Approaches to the delivery of renewable energy and energy efficiency have components such as information dissemination, financing arrangements, training and maintenance. Some of these components are more critical than others to the success of the delivery models.
- How critical a given component is, may change depending on the point at which the dissemination process is. For example, financing is generally critical in the early stages when beneficiaries need to acquire devices whereas maintenance becomes more important later once the devices have been disseminated.

While modern energy services for the poor can speed up development, many initiatives have failed. CSIR researchers investigate this in an effort to create an improved decision support tool for planning community energy service initiatives.



- Local knowledge is important for the long-term success of initiatives. Climate may affect the usability of improved stoves, as can local preferences and customs.
- Supportive and consistent policies are important to the long-term success of dissemination initiatives.

TOWARDS MORE SUCCESSFUL IMPLEMENTATION FOR POVERTY REDUCTION

Clearly, research needs to respond to the identified shortcomings in the way energy service delivery initiatives have been implemented with limited success. The CSIR is planning to collaborate with Imperial College London on a decision support tool for use in planning community energy service initiatives. The tool will be adapted for South Africa with inclusion of bioenergy options. The eventual outcome should be much more successful energy service delivery for poverty reduction.