

Energy Sustainability for South Africa's Poor

Weighing up the Alternatives

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Preface

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Introduction

Energy is a basic need. Energy resources assist humans in meeting daily needs – in pumping, transporting and heating water, in cooking food, in keeping warm or cool, in promoting good health, in transportation, in enhancing opportunities to become educated and in striving for improved security. Energy also assists people in achieving, at the very least, a minimal level of economic and social development. Poor households tend to spend a relatively higher proportion of their household income on energy services than do households with more resources. Many poor people live in rural areas where it is difficult to access modern energy forms and thus rely on traditional fuels such as wood and agricultural and animal wastes. Often, collection and use of various types of these fuels have devastating environmental impact. And often, households are not able to afford to consume the amounts of energy needed by modest income-generating activities. 'Energy poverty' is not restricted to households in rural areas. Even in built-up urban centres it is not uncommon to find households, without access to grid (or off-grid) electricity services, that are using coal and other 'dirty' and relatively expensive fuels to satisfy basic energy needs.

A challenge to developing country governments is to implement measures that meaningfully increase poor people's access to modern energy forms such as electricity, paraffin, diesel and liquid petroleum gas (LPG) (Davidson & Sokona, 2001; Redwood-Sawyer, 2002). At a meeting of African energy ministers in Nairobi in January 2001, it was stated unambiguously that this is the most important challenge for energy sector decision-makers in Africa today. Yet, as also noted in the political statement that emerged out of this meeting, this must be achieved in a sustainable fashion. The premise of this statement is that 'poverty, and specifically energy poverty, is a major impediment to development and the sustainability of development cannot be achieved because of this critical situation of poverty'. It notes that 'improving access to energy implies finding ways and means by which energy services can be delivered in a reliable, affordable, environmentally sound and socially acceptable manner, in urban and rural areas'. Interestingly, the statement mentions that since biomass resources still have the largest share of consumption in Africa, actions in the 'field of energy for sustainable development should focus on... "improving the production and consumption of biomass, promoting a progressive shift to other energy sources especially renewable energy, and supporting the development as well as promotion of energy services based on grid extensions and/or decentralised technologies"' (UNEP, 2001).

This paper focuses on energy sustainability for South Africa's poor people. It describes the energy situation that many households find themselves in, and outlines current governmental and other stakeholder initiatives towards improving energy access in the country. Finally, it comments on key elements that a programme in this area must include if improved energy access is to contribute towards development that is sustainable. The paper is underpinned by three basic propositions, namely that:

- improving access to energy does not necessarily mean that physical access alone is addressed. While physical access is fundamentally important, it is also critical that poor

people's ability to afford modern (and traditional) energy carriers is improved. The experiences of a small village in Semonkong in Lesotho are insightful. The Ministry of Agriculture organised for their staff housing there to be connected to grid electricity. This was done. Unfortunately, the inhabitants of these houses found it too expensive to use the electricity, particularly for their cooking and heating requirements. They approached the Ministry of Agriculture which then agreed to install solar photo-voltaics (PV). These households reverted to using paraffin and/or gas for cooking and heating, and are using the solar home systems for lighting and perhaps social communication activities;

- electricity access does not automatically bring with it economic development, neither does it necessarily contribute to sustainable development. In short, electricity access is not necessarily the panacea of energy poverty; and
- strengthening the capacity of poor people to fight poverty by building their assets is an essential ingredient of a pro-poor sustainable development strategy.

An introduction to sustainable development

The United Nations, and the organisers of the World Summit on Sustainable Development in Johannesburg in August 2002, recognise that energy is a central component of sustainable development. The major thrust of the development debate over the past decade regarding the relationship between growth, development and the reduction of poverty and inequality has shifted significantly. While no blueprint exists for how to achieve growth while simultaneously addressing poverty and inequality, there is increasing consensus based on international experience that while economic growth does contribute to a reduction in absolute poverty, it may or may not lead to a reduction in inequality (May, 2000).

In 1987, the World Commission on Environment and Development published a report entitled *Our Common Future*. This

defined sustainable development as 'development that meets the needs of the present generation without compromising the ability for future generations to meet their needs'. This concept sought to unify and harmonise the position of both the powerful industrial economies of the North and the increasingly marginalised voices of the South. It attempted to create a balance between the need for economic growth and development and equity.

The UN Conference on Environment and Development of June 1992 established the mutually inclusive principles of sustainable use of the environment, economic growth, social equity and peace in an attempt to set a framework for sustainable development. According to the United Nations Development Programme (UNDP), two key principles emerged from this conference, namely that:

- human beings are at the centre of concerns for sustainable development. They are entitled to a healthy and productive life in harmony with nature; and
- to achieve social development, environmental protection shall constitute an integral part of the development process and cannot be considered in isolation from it.

The focus of these principles is offset by the management of natural resources as a result of economic and social needs and the potential impact this will have on the ecology, which includes:

- provision of resources for production and raw material;
- recreational resources and goods;
- absorption of wastes for production process as well as consumption processes; and
- basic survival infrastructural services like climate.

Development theorists and practitioners are increasingly attracted to this approach. Sustainable development is, however, a slippery concept with several interpretations, and should include social, economic and environmental dimensions of development. An appropriate policy framework around sustainable development for the reduction of poverty

and inequality in South Africa is the underlying politico-economic structure of the country. At one level, the forces that have perpetuated a vicious circle of poverty needs to be broken, while on another, income, wealth and opportunity must be encouraged. Strengthening the abilities of poor people to fight poverty by building their assets is an essential ingredient of a pro-poor sustainable development strategy. Making poverty and inequality an integral part of policy enables government to assess its potential to build people's assets, identify the threats which could erode those assets, and provide missing assets which are critical for survival and equal participation in society (May, 2000).

Being poor in South Africa

The definition of poverty has been the subject of debate among policy analysts. An emerging consensus sees poverty as generally characterised by the inability of individuals, households or entire communities to command sufficient resources to satisfy a socially acceptable minimum standard of living (May, 2000). Within any consideration of poverty, it is important to consider whether it is a 'residual' problem of incomplete or uneven development, or a 'relational' problem arising from structural characteristics of society and the social relationships they give rise to (Cousins, 2001). These understandings of poverty are important because they deeply influence the design of policies and other interventions to address the problem. Post-apartheid South Africa has yet to address a deeply embedded, systemic crisis of poverty, unemployment and structural inequalities in access to economic assets, services, processes and institutions (Cousins, 2001). The bulk of rural-dwellers, and many of the urban unemployed, are not so much excluded as included on highly adverse terms in the functioning of the economy.

May (2000) argues that while poverty is multifaceted, with differing experiences for highly differentiated communities and individuals, a number of consistent views of poverty are evident

in the 1996/1997 South African Participatory Poverty Assessment (SA-PPA):

- alienation from the community and institutions of kinship;
- food insecurity;
- overcrowded conditions and inadequate dwellings;
- use of basic forms of energy particularly as the poor lack access to safe and efficient sources;
- lack of adequately paid, secure jobs; and
- fragmentation of the family.

These experiences, articulated during the PPA, starkly portray the high level of poverty and inequality in South Africa, the highest in the southern African region and the second highest in the world after Brazil. This is the product of past policies that discriminated against the majority of the population. In 1995, based on a per-adult equivalent poverty line of R352 per month, 61 per cent of Africans were poor, 38 per cent of coloureds, 5 per cent of Indians, and 1 per cent of whites (May, Woolard & Klasen, 2000). Although this is based on old data, and the percentages have more than likely changed in the meantime, the stark racial differentiation still remains. There is also a strong geographical dimension to the poverty. Based on the same data set, 72 per cent of all poor people (those below the poverty line) reside in rural areas, and 71 per cent of all rural people are poor (Aliber, 2002). The poorest provinces are those encompassing the most populous former homeland areas – KwaZulu-Natal, Northern Province and Eastern Cape (May & Vaughan, 1999).

Table 1: Distribution of poor individuals by rural/urban classification

	Population share %	Poverty share %	Poverty rate %
Rural	50.4	71.6	70.9
Urban	49.6	28.4	28.5
All	100	100	49.9

Source: Orkin *et al*, 1999 – from the 1995 Income and Expenditure Survey, StatsSA

Among those who were below the poverty line in 1995, the unemployment rate was 55 per cent, whereas among those above the poverty line, the unemployment rate was 14 per cent (May et al, 2000). In terms of formal-sector employment, in the five years since 1996 there has been a contraction of more than 800 000 jobs, or about 5 per cent of the workforce (Aliber, 2001). While there has been a countervailing increase in informal-sector employment, it is known that these jobs are much less remunerative on average. The implication is that, most likely, the prevalence of income poverty has worsened over the past half decade.

Poverty extends beyond insufficient income and includes other forms of deprivation, including access to essential services and the marginalisation of certain people. By the standards of middle-income countries, an excessive number of South Africans live in shacks without access to potable water, sanitation facilities, electricity or telephones (Aliber, 2002). According to the 1999 October Household Survey, about 12.3 per cent of all South Africans and 16 per cent of the African population live in shacks in informal settlements. A comparison with figures of 11.7 per cent and 13.7 per cent in 1996 shows that the situation has worsened – a higher percentage of the population is living in shacks (Aliber, 2002). This is most likely caused by an influx of rural-dwellers to urban and peri-urban areas, as well as informal settlements around rural towns.

South Africa's health services are relatively well funded, but provide poor coverage despite the shift of emphasis towards primary health care (Aliber, 2002). Services remain inaccessible to a large number of poor people owing to distance, inappropriate facilities and the cost of medicines. According to the 1998 October Household Survey, 41 per cent of households have to travel five km or more to the nearest medical service. In addition to this, approximately 14 million South Africans are vulnerable to food insecurity, according to the Department of Health. The minimum recommended dietary intake requires a minimum monthly spend of R286.50 per person (Bonti-Ankomah, 1999).

Given that 50 per cent of all households in South Africa have incomes of less than R1 200 per month (Aliber, 2001), this would suggest that only African households with four or fewer occupants achieve this recommended monthly dietary intake. While a precise figure as to average African household occupancies in South Africa is not available, our research would suggest that this figure of four or fewer applies to a minority of African households, urban and rural.

Energy-poverty in South Africa

A dominant feature of energy-use patterns in poor households in South Africa is a tendency to use multiple sources of energy to meet needs (Eberhard & van Horen, 1995; Mehlwana & Qase, 1996; Spalding-Fecher et al, 1999). In addition, many households with meagre resources tend towards frequent purchases of small quantities of fuel, a more expensive practice than buying in larger quantities but affordability and cash flow issues rule this out (Simmonds & Clark, 1999). As noted, many households are not able to access modern energy forms and subsist on traditional energy forms, which offer little opportunity for making improvements in economic well-being. Women, especially in rural areas, bear the brunt of poverty, including energy poverty. As will be shown, these energy end-use characteristics hold important implications for public-sector policy development and intervention.

In 1994, the Reconstruction and Development Programme (RDP) recognised these problems:

Although energy is a basic need and a vital input into the informal sector, the vast majority of South African households and entrepreneurs depend on inferior and expensive fuels. Rural women in particular face a heavy burden collecting wood, which is an inefficient and unhealthy fuel. Coal, where it is available, is cheap but results in severe health problems, an underpaid workforce and the failure to assess and internalise environmental costs. Although Eskom has excess generating capacity, only 36 per cent of South African households have access to electricity, leaving more than

three million households unelectrified. Furthermore, some 19 000 black schools (86 per cent) and around 4 000 clinics are currently without electricity. Little attention has been paid to utilising sustainable energy sources such as solar power ...

Past South African energy policies concentrated on achieving energy self-sufficiency at enormous cost, but seriously neglected the household sector. Future energy policy must concentrate on the provision of energy services to meet the basic needs of poor households, stimulate productive capacity and urgently meet the energy needs associated with community services such as schools, clinics and water supplies (ANC, 1994).

Eight years down the line, there are still millions of poor people in South Africa and energy poverty remains a considerable concern. Interestingly, the focus of energy policy has shifted from energy self-sufficiency to the achievement of a range of economic and developmental objectives. The power industry is running out of excess electricity capacity (new peaking capacity would probably be required by about 2006) yet, now, around 70 per cent of South African households have access to electricity. More – though still not enough – emphasis has been placed on off-grid renewable-energy solutions to improve energy access to remote and poor people (see below).

Efforts to improve energy access

In 1994, the Reconstruction and Development Programme announced a plan to increase access by the poor to modern energies. Most importantly, the RDP outlined an accelerated electrification programme to connect 2 500 000 more people to grid electricity between 1994 and 2000, thereby radically increasing the level of access to electricity to about 70 per cent of all households (double the 1994 number). This programme has been very successful, thanks mainly to Eskom, South Africa's state-owned electric utility.¹ In fact, during this period targets were overshoot: by the end of 2000, Eskom alone had electrified 2 006 773 additional homes in South Africa (Eskom,

2000b). The electrification programme is currently in a new phase, and is now called the Integrated National Electrification Programme (INEP). Eskom has been converted into a company with share capital and limited liability and is now paying tax. Electrification will no longer be its primary responsibility. This will be transferred to the six Regional Electricity Distributors (REDs), an amalgamation of Eskom Distribution and the country's 350-plus municipalities/local authorities. An EDI (Electrical Distribution Industry) Holdings Company is being established to support the process. It will set up an electrification division to ensure that each of the six REDs has the capacity and skills to implement their electrification commitments. When the REDs are established and stable, electrification implementation will be transferred from the EDI Holdings Company to the REDs. The Department of Minerals and Energy will maintain overall responsibility for electrification.

Another indicator of electricity access is the price at which electricity is sold to poor customers. Again, in this area, Eskom has performed well: by the end of 2000, it had succeeded in reducing the real price of electricity by 15 per cent (Eskom, 2000b), in so doing becoming the world's least costly supplier of electricity.² In addition to this, studies now indicate that the average price at which electricity is sold to poor people (and to the domestic sector in general) is somewhat below cost-reflective levels. Indeed, as the electricity industry moves towards market-based tariffs, it has been suggested that tariffs charged to the domestic sector will need to rise by 50 per cent or higher.

The grid-electrification programme for this new phase is to be funded with a subsidy for capital investments, financed by a surcharge levied on electricity customers. In addition to the subsidy for capital investments, the South African government has announced that it will investigate and implement a poverty tariff or 'electricity basic support services tariff', according to which low income households are to be given 50 kWh each month.³ The poverty tariff for electricity, like the monthly free water allocation, is seen as one of the ways that government can

alleviate poverty and the dire daily circumstances of many South Africans. By late 2001/early 2002, the poverty tariff was being piloted in various parts of the country.

The government has also initiated an off-grid electrification programme as a component of the Integrated National Electrification Programme. Private-sector concession companies are negotiating with government to install solar home systems into rural and remote communities in the country. This programme has progressed extremely slowly, largely because of administrative hurdles. During negotiations between government, the National Electricity Regulator, Eskom and private-sector companies, some of the concession companies have withdrawn from the process or have become disqualified because communities originally planned for off-grid have been connected to the grid. The off-grid programme will also receive a subsidy per system installed and there has been mention of extending the poverty tariff to the off-grid programme.

At the same time, government, utilities and other stakeholders have noted that most poor households use a range of fuels to satisfy their energy requirements. Electricity is either unavailable or too expensive, especially for cooking and heating so liquid petroleum gas (LPG), paraffin, coal, wood fuels and even crop residues and animal manure are used for these purposes. If electricity is available, poor households try to utilise it for lighting and for media (social communication) purposes where it is cost-effective. The alternatives to electricity for lighting and media are candles, LPG or paraffin and batteries respectively, which, in most cases, are less cost-effective than electricity, which is by far the 'cleanest' and most user-friendly fuel for use in the home. Moreover, paraffin use can cause serious respiratory disease and there are other negative health effects – paraffin is generally bought daily in small, subsistence-size bottles that have been mistaken for cold drink (by children) and, along with LPG and candles, can be a fire hazard.

While continuing to prioritise increased electricity access, a broader energisation programme is now favoured and is being spearheaded by the Department of Minerals and Energy

(DME). Government, in partnership with various stakeholders, is initiating the establishment of Integrated Energy Centres in various parts of the country. In addition, government is encouraging the implementation of a 'hybrid' mini-grid (or localised energy grid) model in which a broader range of services is offered to poor communities. In 2001, for instance, government, the National Electricity Regulator (NER), the Council for Scientific and Industrial Research (CSIR), Shell Renewables and the Eastern Cape Provincial Government worked together to design an integrated system consisting of energy (renewable energy, solar water heaters and LPG), water purification and telecommunication services in the Hluleka Nature Reserve. Government is extending this service to other communities and small economic activities (mainly agricultural) in the Eastern Cape. After an assessment of the pilot projects, government aims to roll out this model in other provinces and is also hopeful that off-grid concession companies will ultimately deliver a more comprehensive service to its customers, based on this model. Some concession companies are already either selling, or planning to sell, other energy carriers (particularly LPG) to franchise customers.

This is similar to the approach adopted by Eskom some years ago to deliver a comprehensive energy service to rural communities. Their energisation programme involved the delivery of a balanced energy solution of different energy sources to ensure availability of an efficient, cost-effective package within the means of the targeted community. This has consisted, broadly, of an essential electricity component for lighting and entertainment combined with an alternative energy (paraffin or LPG, for example) for cooking, and with water-heating and space-heating needs met (perhaps) by solar heating. Eskom's energisation projects included in-depth consultation with communities and their leaders at each stage in the planning, design and implementation, including involvement with the LPG industry, the Department of Minerals and Energy and various stakeholders within Eskom (Eskom, 2000a).

Other initiatives aimed specifically at increasing poor peoples' access to clean, affordable fuels include, broadly, a low-smoke coal programme and a variety of public awareness programmes led by the Department of Minerals and Energy, various initiatives driven by NGOs in collaboration with oil companies (and donor organisations) to extend LPG and paraffin supply and distribution networks to rural and remotely located rural communities, and a price cap on paraffin. These initiatives fall into government's Integrated Strategic Rural Development Strategy (ISRDS). The ISRDS, launched at the end of 2000, aims to 'attain socially cohesive and stable rural communities with viable institutions, sustainable economies and universal access to social amenities, able to attract and retain skilled and knowledgeable people, who are equipped to contribute to growth and development'. Its components are:

- a vision of the growth process in rural areas;
- a mechanism for integrating existing programmes;
- design of new programmes if needed;
- a defined locus of decision-making;
- a meaningful role for local government;
- a clarification of financial flows and channels;
- key performance indicators;
- procedures to monitor indicators; and
- sequencing of actions.

The ISRDS vision of economic growth is premised on the notion of growth drivers and multipliers. Essentially the ISRDS is intended to develop co-ordination and integration of existing programmes, including those pertaining to energy, so that they can achieve a broad range of developmental outcomes.

Contributions to energy sustainability for the poor

The approaches that have been adopted in South Africa to increase poor peoples' access to electricity contribute in some

ways to sustainable development but in other ways, do not. This is best explained by the examples that follow:

- most of South Africa's electricity is generated by coal-fired power stations. This results in notable outdoor air pollution, greenhouse gas emissions and water pollution. Yet, increased access by poor people to electricity does extend their opportunities to undertake income-generating or productive activities. It reduces the time spent by women – not to mention the physical burden – in securing sufficient environmental resources to satisfy household energy needs and access to electricity enables learners to study after dark. Thus, while electricity access may contribute to local economic development, and perhaps to economic growth and poverty alleviation, it does not necessarily contribute towards environmental sustainability. The situation might be different if electricity generation was not coal-fired;
- paraffin use (and to a lesser extent LPG) can, as noted, have a significant negative impact on health and safety. The same can be said of candles, wood, and crop and animal residues. Yet, access to LPG and paraffin may bring benefits to poor people in terms of hours spent collecting resources, physical exertion, reduction in land degradation and improved service.

South Africa's energy access programmes must contain various specific elements if they are to contribute more convincingly to sustainable development, both from the national societal perspective and, more specifically, from the perspective of poor people. Importantly, access programmes must encourage energy efficiency and the use of renewable energy resources, where appropriate. Access programmes must also continue to fit into a broader rural development strategy and one in which a comprehensive service is offered and communities and women are integrally involved. Furthermore, access programmes should focus on enabling poor people to become more increasingly productive with their time and efforts rather than utilising

energy for consumptive and subsistence purposes alone. It is the view of the authors that if these principles are adhered to, South Africa's access programmes will have an increased opportunity to contribute to sustainable development in the country.

Many aspects of the energy industry both locally and internationally are undergoing far-reaching reforms. Increased private-sector participation and competition are being considered for some aspects of the energy industries. In the electricity industry, vertically integrated electric utilities that previously operated as natural monopolies in generation, transmission and distribution, are being unbundled. In the liquid fuels industry, new energy sources are being tapped, and supply and distribution networks are being rethought. Fresh legislative and regulatory frameworks to support these new contexts are being drafted. Innovative technologies are being used in most aspects of these industries; new cost structures are emerging. As these changes occur, it is critical that the public-service obligations⁴ – access programmes, energy efficiency, renewable energy and integrated rural development programmes – are taken into account and not allowed to fall by the wayside as has happened in many parts of the world (Brook & Besant-Jones, 2000; Wamukonya, 2002). In fact, it could be argued that with new players, sources of finances, legislation, regulation and global pressures, energy sector reforms bring with them tremendous opportunities to advance investment in these public-service obligations.

Energy efficiency and energy sector frameworks

Energy efficiency brings significant benefits to society (Simmonds & Clark 1999; Spalding-Fecher et al, 1999). From a national/societal point of view, this is often because the financial and economic costs associated with saving energy are less than those incurred in producing it. From a consumer's point of view, energy bills are reduced but the service delivered is not diminished and may, in fact, be improved.

From a poor household's point of view, the benefit derived from energy and thermal efficiency can be very significant given the high proportion that these households spend on fulfilling essential fuel requirements.

The Reconstruction and Development Programme of 1994 notes that:

Energy efficiency must be a cornerstone of energy policies. This will involve the adoption of least-cost planning approaches; the improvement of dwelling thermal performance; the promotion of energy-efficient appliances; the use of solar water heaters; appliance labelling and the implementation of time of use electricity tariffs. Financial assistance to ensure households have access to efficient appliances will be essential. The environmental impact of different energy sources must be assessed (ANC 1994).

This approach was later echoed in the 1994 White Paper on Energy Policy for the Republic of South Africa. Interestingly, however, the link between energy and thermal efficiency and poverty-alleviation measures has only recently been articulated at a high level. In 2001, the Minister of Minerals and Energy mentioned at various public occasions that energy efficiency must be employed as an important tool to alleviate poverty in South Africa. Indeed, as the results of countless analyses illustrate the tremendous annual burden that the poverty tariff will place on the electricity industry, the minister has become even more vocal on the role that energy efficiency can play in poverty alleviation. During 2001, for example, the minister asked Bonesa, the public interest company established to facilitate installation of energy efficient lighting into all market sectors, to explore seriously ways of integrating their programmes to low-income households with governmental poverty tariff initiatives. Thus, in some pilot schemes around the country, instead of offering 50 kWh of electricity free to customers, a compact fluorescent lamp (CFL) is now being given to households, together with a smaller free monthly electricity allowance.

These pilot projects are also seeking to create new opportunities for local employment and income generation activities.

And, early on in 2002, the minister asked the Central Energy Fund (CEF) to play an active role in assisting with the implementation of energy efficiency and renewable-energy projects. In line with this, the CEF has recently established an Energy Development Division (EDD) that now houses programmes in Renewables, Energy Efficiency, Climate Change and Low-Smoke Fuels.

Energy-efficient practice at household level can make a valuable contribution to sustainable development. Widespread electricity efficiency, for instance, will reduce the need for power generation, thus reducing emissions, air pollution and water pollution. Electricity efficiency will also result in reduced household electricity bills while maintaining the same – or higher – levels of service. This has particularly important consequences in many households where, for affordability, only one electric light is used. The same can be said of the efficient use of all other types of fuels. Environmental damage and resource use is minimised, health impacts are reduced, scarce income is freed for other household uses and an improved energy service then possibly becomes more affordable.

On a national level, energy-efficiency investments and better use of demand-side resources (as opposed to investing in new supply-side capacity) create new jobs and economic growth. Thermal efficiency plays an important role, especially for poor households in that less fuel is required for heating (and during summer), and indoor thermal comfort is enhanced. Importantly for poor households, energy costs are reduced. Tremendous improvements can be achieved with limited finances and minimal effort.

In 1998, the Energy Policy White Paper outlined three focus areas for intervention in this area: thermal efficiency in low-cost housing, appliance labelling and public awareness. As of mid-2002, insufficient attention has been given by government to these areas and consequently very little progress has been made. A three-year Danish-funded project on building capacity in energy efficiency and renewable energy has been

based in the Department of Minerals and Energy from 2001 so there is, however, some prospect of these issues being addressed. In the meantime, Eskom has invested considerable funds over the past few years, and of late, in public awareness and education around energy efficiency and particularly lighting efficiency. As the electricity industry gets set for considerable change, it is unclear whether this public-interest investment will be continued by Eskom, hence the need for increased attention by government.

Using renewable energies appropriately

Small-scale renewable energy solutions – such as solar PV – for poor people are generally more expensive in financial terms than those linked to grid electricity.⁵ More broadly, if externality costs associated with energy supply and distribution were to be internalised, renewable energy would be a strong economic competitor for conventional energy supplies. However, in the current political environment where improvement in energy access is high on the development agenda, it is unlikely that this would happen. In the context that it is government's priority to increase access to energy for the poor, renewable energy technologies must be seen predominantly as an appropriate and very useful solution in areas where supply of other energies – particularly grid electricity – is very unlikely or impossible.

As we have seen, the government is establishing an off-grid electrification programme that will involve the granting of installation concessions to private companies in defined geographical regions and according to set performance standards (Banks, 2001b). Various public and private companies have already undertaken significant implementation in this area, essentially outside the concessions process. The Shell Eskom Joint Venture, for example, installed about 6 000 solar home systems into households in the Eastern Cape without a subsidy (Banks, 2001a). It is more likely that this programme will

achieve its objectives once contracts for this public-private partnership are signed and, importantly, the subsidy flow is operational. In addition to the challenge of installing these small-scale renewable energy solutions into rural households, these systems must also be maintained, protected from vandalism and theft, and rendered affordable to poor communities. The experience of the telecommunication industry's attempt to deliver phone lines to poor and rural areas are valuable here. By mid-2002, only 667 039 of the 2,67 million lines delivered were still in service because subscribers had either not been able to afford the service, or they had moved to cellular phone technology.

Rural and remote communities can benefit substantially from off-grid renewable energy solutions. With subsidy support, these energy carriers and technologies enable poor people to use electricity for lighting, media and refrigeration. There are benefits from longer productive working time, extended study time and health gains arising from the capacity to store medicines. There are opportunities for creating income-generating activities, such as home-sewing industries, and improved farming and agricultural practices, and from solar drying facilities and water pumping.

The South African off-grid electrification process is still in its infancy. While the public-private partnership model has been able to draw in a number of important resources and role-players for the concession areas, delivery has not yet begun in earnest. It might be argued that this represents an opportunity forgone. It has been suggested that it would have been better if the Department of Minerals and Energy had permitted the start of small, discrete projects immediately after the selection of the concession companies and not allowed the contracting process to hinder critically needed service provision (Banks, 2001a).

In mid-2002, the government released a draft White Paper on Renewable Energy. This document outlines four areas for intervention, and again mentions the new and important role of the Central Energy Fund. These areas include developing

appropriate financing and fiscal arrangements, formulating regulation and legislation to encourage further utilisation of renewable energy resources, promoting the development of renewable energy technologies, and finally raising awareness, capacity-building and education in this area. Importantly, the White Paper recognises the importance of renewable energy policies and technologies in increasing electricity access in South Africa.

From the point of view of access improvements, the distributed generation of electricity with renewable energy resources is currently far more relevant than the bulk generation of power from renewable energy resources such as wind. For example, the Darling Wind Farm in the Western Cape will generate 'green power' (which domestic industry competing internationally appears keen to purchase) and is likely to generate new jobs and encourage local economic development, but it will be more expensive (or, more accurately, perceived to be more expensive) (Ramboll & Partners, 2001). Any tariff increases would have a direct negative impact on a low-income household's ability to afford electricity.

Generating additional household income

The transition from using traditional fuels to modern energy forms creates extensive opportunities for households to embark on income-generating activities, which may not have been possible or feasible previously. Access to diesel and a generator, for instance, could allow a poor rural household to begin a small-scale production of goods or services required by the local community. These opportunities are significantly increased as poor people gain access to the grid or off-grid electrical solutions in particular, as well as when households begin to utilise energy more efficiently and effectively.

Experience in the power sector over the past few years, illustrates how governments and utilities have been faced with a

choice between providing a service that poorer households can afford, or a service which these households may not afford but could 'grow into' over time. For example, Eskom and municipalities in South Africa have agonised over whether to install 'shoe-string' infrastructure (or distribution networks that are cheap to erect, but last only a few years) and/or limited current (2-amp as opposed to a 60-amp system), or to spend additional funds on infrastructure and provide a more comprehensive service, which 'hopefully' would reap financial returns to the utility in terms of increased electricity sales. Simply put, there is a trade-off involved between the realistic level of affordability-reduced levels of service non-payment and prospects for poverty upliftment through additional productive activities and increased sales. One innovative solution created by Eskom has been to investigate the possibility of manufacturing a small and affordable refrigerator that could be used by rural and remote households in an attempt to create additional income. The reasoning behind supporting the development of this appliance was to make electricity consumption more affordable to poor people, benefit from electricity sales and receive a pay back on the infrastructure investment while creating opportunities for local economic development.

The model of RAPS (Rural Area Power Solutions), one of the private-sector concession companies linked to the off-grid electrification programme, is instructive in this regard. Mandated with the task of installing off-grid solutions into a concession area in KwaZulu-Natal, RAPS aims to create opportunity for local economic development by organising the establishment of energy centres, which directly provide an off-grid solar service to rural customers. The energy centres will ultimately also include the sale of gas, paraffin and support services to customers and small, emerging business. The energy centres are run by local residents, trained and supported by RAPS staff, to deliver the various services (Banks, 2001a, 2001b).

Interestingly, the 1998 White Paper on Energy Policy does not make meaningful mention of the relevance and

importance of prioritising and designing energy access programmes that support the development of small-scale productive activities. But the Department of Minerals and Energy has begun looking, albeit slowly, into this area, probably as a partial result of the developmental objectives of the over-arching Growth, Employment and Redistribution macro-economic strategy (GEAR) and Cabinet decisions to prioritise economic growth and job-creation.

The present challenge to government and utilities/service providers is to continue the search for opportunities that minimise investor risk but at the same time create openings for households to break away from the pattern of using energy for consumptive purposes and move towards using energy for productive activities. Energy-access programmes that contain this element are better placed to contribute to sustainable development in South Africa.

Energy subsidies for the poor

Reforms in energy industries around the world call for a move towards cost-reflective tariffs and energy prices, as well as a transparency in setting energy prices (UNEP/IEA 2001). This, essentially, requires a comprehensive reassessment of prevailing energy subsidies. Clearly, this has ramifications for access programmes, and South Africa is not exempt from this process. As noted earlier, a move towards cost-reflective tariffs in the electricity sector will require an increase in domestic tariffs in the order of 50 per cent.

While there are clear benefits to introducing market-based tariffs and energy prices, governments have realised that such a policy cannot fully extend to poor households without impacting negatively on the sector. Thus, governments in many developing countries seek to narrow the focus of energy subsidies to exclude traditionally subsidised sectors such as agriculture and industry, but continue to include – and perhaps even increase – subsidy levels to people living in poverty. As we

have seen, the South African government has chosen, within the context of energy sector reforms, to continue to subsidise energy utilised by poor people. This is deemed by most energy sector players to be appropriate although it has been argued that a deeper understanding needs to be developed of what these subsidies amount to in currency terms, as well as how and by whom these fuels will be cross-subsidised.

Encouraging integrated rural development

Genuinely increased access to sustainable energy will only be realised through an integrated approach to energy delivery, and through active community participation. An integrated approach ensures that a better quality of service is achieved at the lowest overall cost with least use of scarce resources and skills. This is particularly important where resources are scarce and where needs are many. Meaningful participation of communities ensures ownership and sustainability of projects.

During the 1970s, in an effort to extend the benefits of development to rural people, a regional or area-based approach was developed and adopted by many countries and international agencies. The approach aimed to engage with rural poverty in a cross-sectoral manner through integrated rural-development projects. Mixed results and experiences led to a detailed critique, which, among other things, highlighted as major shortcomings the failure to involve local people in a participatory process and the failure to build capacity.

Integrated rural development is now back in vogue. More recent experience indicates that for a decentralised system to work effectively, co-operation is required at local level between formal government institutions and the less formal non-governmental and community-based organisations. An integrated approach must also involve the active participation of the poor, of women, indigenous peoples, the disabled, the elderly and other under-represented groups in civil society. These people, who lack access to 'modern' energy, should have

key institutional roles in energy decision-making at all levels and in all sectors producing and using energy, both public and private. It is this consensus-building, achieved through participatory processes, which provides the framework for practical implementation of decentralisation to effectively take place.

After the 1999 general election, the government renewed its commitment to integrated rural development. The intention to initiate an integrated and sustainable rural-development strategy has been to capitalise on potential synergies among the various government programmes in order to promote and support more rapid and equitable development in the country. The ISRDS was formulated to provide a framework for existing and future projects and programmes, including spatial development initiatives (SDIs) and community-based public works programmes. The Ministry of Minerals and Energy has also released a document (Towards Implementing an Integrated Rural Development Programme), which articulates the ministerial priorities in mining and energy, and which supports the overall ISRDS policy framework.

The Independent Development Trust (IDT) argues that the reform of local government gives organs of local government a central role in integrating programmes to achieve synergistic rural development. They are required to clearly identify local development needs and opportunities and to plan a response to these, as decentralised and accountable entities managing participatory planning and implementation processes. The Integrated Development Plan (IDP) process is intended to establish a primary locus on integration at municipal level. Municipalities will choose, from those on offer, 'investments and services that suit their priorities and abilities to maintain'. The capacity of weak rural municipalities will be strengthened to enable them to carry out these functions. An implementation plan building on existing programmes, while initiating selected new programmes, together with a 'bottom-up' approach through participatory processes and better co-ordination, is intended to deliver results quickly.

Some strides in this area have been made by government and its implementing and funding partners. The Department of Minerals and Energy has begun to achieve this through its energisation programme and, in particular, its mini-grid hybrid system. We noted earlier that the Minister has recently given a large implementation role to the Central Energy Fund (CEF) to make progress in this area. The challenge to government is to follow through with these planned initiatives or, more specifically, to guide them successfully from pilot phase through to full-scale implementation.

To date, the ISRDS has had mixed results in South Africa's diverse rural localities. In many instances, local municipalities have struggled through lack of capacity to finalise their IDPs to complement the broad framework offered by the strategy, and have been compelled to engage development consultants to design their programmes. This skills shortage seriously challenges the real impact that municipalities working within the ISRDS will have on poverty alleviation. A recent report argues that local government's envisaged role as the engine of development in South Africa has been unviable for a number of reasons, one of which is a lack of capacity (Xundu, 2002). This capacity constraint needs to be addressed before decentralisation can be effective because the ISRDS is not a programme financed by government but a framework in which various development processes are to be streamlined and co-ordinated. For IDPs to become effective programmes of action, they require capacity for implementation.

Conclusion

It is evident that energy can contribute to poverty alleviation and, at the very least, assist people to achieve a minimal level of economic and social development. Therefore a challenge to any developing country government is to implement measures that meaningfully increase poor people's access to modern energy forms. Improving access to energy implies finding ways and means by which energy services can be delivered in a reliable,

affordable, environmentally sound and socially acceptable manner in urban and rural areas. This is most effectively achieved through integration within a broad development framework at both local and national levels.

The paper has emphasised that the approaches adopted in South Africa to increase poor people's access to electricity contribute in many ways to sustainable development. However, while access to electricity by poor people may contribute to local economic development, and to economic growth and poverty alleviation, it does not necessarily contribute towards environmental sustainability. South Africa's energy-access programmes must contain various specific elements if they are to contribute more convincingly to sustainable development, both from the national societal perspective and from the perspective of poor people. Importantly, access programmes must encourage energy efficiency and the use of renewable energy resources where appropriate. Furthermore, access programmes should focus on enabling poor people to become increasingly productive with their time and efforts rather than utilising energy for consumptive and subsistence purposes alone. Access programmes must also continue to fit into a broader rural development strategy and one in which a comprehensive service is offered and communities, particularly their women, are integrally involved.

It is clear that in South Africa, a broad framework exists in which potentially these elements can be met. For it to be effective, however, various things need to happen. It is essential that participation, true integration and grassroots consultation are firmly embedded within the framework in order to build the assets of the poor. It is equally important to increase the effective capacity within municipalities – and to keep that capacity – for the various programmes and strategies to meet their objectives. A related concern is the need for the various tiers of government to communicate with each other for effective co-ordination.

Above all, in order to build an integrated approach that would contribute towards sustainable development in South Africa, it

is essential that genuine communication exists between interest groups, not just in different energy sub-sectors, but also between sectors including, at the very least, water, housing, telecommunications, health and education. Indeed, decision-makers and relevant interest groups, including poor communities, must work together to provide comprehensive solutions to immediate concerns.

Notes

- 1 Eskom is South Africa's state-owned electric utility which has been a vertically integrated monopoly since its inception. It currently owns and operates 24 of the country's 53 central-station power plants. Municipalities own 22 power plants and private interests own the remaining seven. South Africa has a total licensed capacity of 48 124 MW. Eskom holds licensed capacity of 44 852 MW (93 per cent of the total), and 368 municipalities hold 2 436 MW (5 per cent). A handful of private interests hold 836 MWs (2 per cent) (NER 1999). In 1999, South Africa's national peak demand was 29 398 MWs and its total surplus electricity generation capacity was 18 726 MWs (NER 2000). Eskom also owns and operates the country's transmission system, which connects the power stations to large urban and industrial areas within South Africa and to its neighbouring countries.
- 2 However, if the full costs of electricity generation – including costs associated with environmental externalities – were taken into account, it is unlikely that Eskom would be able to claim this status.
- 3 Given the heavy administrative requirements associated with the poverty tariff, most local authorities are giving the first 50kWh to all households, even though this special tariff is for low-income households.
- 4 Public-service obligations are not necessarily those that must be implemented by the public sector. Indeed, experience has shown that many public-service obligations are more effectively and efficiently implemented by private-sector players. These activities remain public-service obligations in the sense that the public sector must maintain overall responsibility for them since, if they do not, it is unlikely that the market will make provision for them.

- 5 The exception to this is solar water heating. Analysis has shown that using solar energy to heat water is the most cost-effective option for poor households (see Simmonds & Clark 1999).

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