

EXPLORING THE OPTIONS FOR FUELWOOD POLICIES TO SUPPORT POVERTY ALLEVIATION POLICIES: EVOLVING DIMENSIONS IN SOUTH AFRICA

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EXPLORING THE OPTIONS FOR FUELWOOD POLICIES TO SUPPORT POVERTY ALLEVIATION POLICIES: EVOLVING DIMENSIONS IN SOUTH AFRICA

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ABSTRACT

Access to secure and affordable energy supplies is widely acknowledged as a critical foundation for sustainable development; inadequate access exacerbates household poverty. In the developing world poor households are frequently reliant upon fuelwood for all or most of their energy needs. However, national poverty alleviation policies commonly do not consider fuelwood within their strategies, and similarly, energy policies rarely consider the poverty alleviation potential of a comprehensive fuelwood strategy. Consequently, synergies between poverty alleviation and energy policies – with fuelwood (and its derivatives) as the bridge – are needed. This paper discusses this potential using South Africa as a case example. The current policy environment that either favours or hinders a linkage between the poverty and energy sectors and policy options and strategies available to develop such links, are discussed.

Key Words: biomass, domestic energy supplies, alternative fuels, rural livelihoods, wood stoves, woodland extension service,

INTRODUCTION

Access to secure energy supplies is a critical foundation for sustainable development, and access to clean and affordable energy is a prerequisite

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for achievement of the Millennium Development Goals that concentrate on alleviating world poverty. Consequently, the links between energy policies and those addressing poverty are irrefutable (Karekezi *et al.* 2002, Biggs *et al.* 2004). The challenge is to design and implement appropriate policies at national and local levels.

The response in many countries has focused on massive electrification programmes, with mixed success (e.g. Habtetsion and Tsighe 2002, Howells *et al.* 2006, Bhattacharyya 2006). Yet even within the more successful ones, large sectors of society – usually the poorest – will have to wait many decades before being connected to reliable electricity supplies (IEA 2002). Consequently, there is a pressing need for pro-poor energy policies that consider alternative energy options for these neglected communities. Given that fuelwood (or charcoal derived from fuelwood) is generally the dominant energy form in poor communities throughout the developing world (IEA 2002, Millennium Ecosystem Assessment 2005), fuelwood must be central to any pro-poor alternative energy policy. In regions with large biomass resources, appropriate energy policies could act as a catalyst for development, promoting jobs (van der Plas and Abdel-Hamid 2005) and additional income for rural farmers supplying local and urban markets (Scherr 2004). This paper considers such policy opportunities and strategies for harnessing fuelwood energy within national poverty alleviation strategies, using South Africa as a case example.

The energy sector in South Africa has both first and third world elements. South Africa produces and consumes over 60 % of the electricity on the African continent and is the twelfth highest carbon emitter in the world, and yet over 90 % of South Africa's rural households use fuelwood energy, as do numerous urban households (Davis 1998, Shackleton *et al.* 2004). In 2003 approximately 30 % of households in South Africa (some 3.4 million households and 13.5 million people) did not have access to grid electricity (DME, Draft Free Basic Electricity Policy for SA, June 2004). Even with a substantial national household electrification programme over the last ten years and currently one of the lowest electricity prices to consumers in the world, most newly electrified households continue to use fuelwood because they cannot afford the appliances and/or the monthly costs. This prompted the government to introduce a Free Basic Allowance (FBA) of 50 kWh per household per month (Howells *et al.* 2005, 2006, Madubansi and Shackleton 2006), but this obviously fails to include those 3.4 million households not connected to the national grid. Moreover, even in areas where it is operating, 50 kWh per month is often insufficient to meet a household's total cooking needs. Consequently, even electrified households make use of alternative fuels, including fuelwood, for part of the month (e.g. de Lange and Wentzel 2003, Madubansi and Shackleton *op cit.*). A significant number of households are expected to use fuelwood to some extent for decades to come, typically those marginalized either geographically or financially. Yet, current energy policy and programmes pay little heed to fuelwood as an energy source in spite of the scope for considering fuelwood supply and demand by these households within a poverty alleviation paradigm.

Within South Africa, poverty alleviation was elevated to a national policy goal following the democratic transition in 1994. Poverty is greatest in rural areas where it is estimated that 70 % of rural people are poor (Carter and May 1999, Government of South Africa 2000). Fuelwood resources and demand are greatest in the rural areas and the availability and affordability of alternative energies is the least. Thus, poverty alleviation strategies in South Africa must include fuelwood, whilst energy security programmes must consider the depth of poverty in large areas of the country. This applies not only to South Africa, but also to many other developing countries (Karekezi 2002a).

The use of biomass, mostly fuelwood, offers both opportunities and constraints (Karekezi *op cit.*). On the one hand fuelwood is a renewable resource and, if harvested sustainably, can meet the energy needs of the rural and peri-urban poor into the future. Simple technological interventions (such as improved stoves with chimneys) can reduce both fuelwood consumption and the health hazards associated with smoke exposure. Moreover, the maintenance of trees in the environment and on people's farms and homesteads for sustainable fuelwood harvesting has environmental, economic and socio-cultural benefits. Carbon sequestration potential and international trading of carbon credits commands growing international interest (Smith and Scherr 2002, Scholes 2004). The challenge is how to channel these benefits towards the poor, especially those with limited or no access to electricity. What interventions, if any, can the South African Government make to reduce poverty through improved access to and the sustainable use of fuelwood or fuelwood based technologies?

On the other hand, use of fuelwood poses both health and environmental hazards. Poor households have a higher risk of respiratory ailments (e.g. Eberhard and van Horan 1995, IEA 2002). The possible ill-health effects are potentially more marked in peri-urban communities where cooking areas are often poorly ventilated. In rural areas, many households cook on fires outside which helps reduce the health hazards. Other health problems are associated with the carrying of heavy bundles of wood.

Where harvesting of fuelwood is unsustainable (by no means everywhere, e.g. Banks *et al.* 1996, Madubansi and Shackleton 2007) there may be a reduction or loss of many ecosystem goods and services (e.g. soil fertility, fruits and fungi, bark for medicine, non timber forest products, carbon sequestration potential, etc.), which further exacerbates local poverty. Fuelwood shortages not only affect people's ability to cook and provide heating, but also exacerbate poverty through higher costs of alternative energy sources, notably paraffin and liquid petroleum gas. Other negative effects on people's livelihoods include the extra time spent by women collecting scarce supplies of wood that could have been used for other productive activities such as food production or income generation, and their vulnerability to attack and injury when collecting in the wild. Thus, whilst trying to contribute to poverty alleviation through a national fuelwood programme, such a programme must seek to minimize these potential negatives.

This paper considers the requirements for a national policy and associated strategies linking poverty and fuelwood issues, using South Africa as a case

example. Some aspects are unique to the South African situation, but many aspects and the central tenet of considering fuelwood and poverty issues simultaneously are of international relevance. Indeed, they are closely akin to the international drive of enhancing rural development and poverty reduction through equitable use of forest resources (Anderson *et al.* 2006), of which fuelwood is one.

A PROFILE OF FUELWOOD SUPPLY

Recent descriptions of the fuelwood supply situation in South Africa are given in Williams and Shackleton (2001), Biggs *et al.* (2004) and Shackleton *et al.* (2004). The primary source of fuelwood is from the woodland biome that covers 34 % of South Africa. Other sources of fuelwood include indigenous forests, community woodlots, commercial plantation forestry, and trees growing in people's fields and residential plots. At a national scale, sustainable annual production of fuelwood is sufficient to meet annual demand (Williams and Shackleton 2001). However, much of the national annual production is on State or private lands where it is unavailable to, or too far away from, fuelwood reliant communities. Consequently, the situation locally is extremely variable, with some communities and households enjoying adequate, 'free' supplies within easy collection distance, some have to walk several kilometers to access meager supplies of poor quality species (see case examples in Banks *et al.* 1996, Masekoameng *et al.* 2003), whilst a proportion have no access to local 'free' fuelwood supplies and either buy fuelwood and/or substitute it with other fuels such as dung or paraffin. Nationally, there has been a general decline in woody biomass resources. However, rural people actively participate in tree growing (Paumgarten *et al.* 2005), albeit rarely specifically for fuelwood, and use the deadwood produced for kindling and fuelwood. There is an increasing network of small-scale traders who harvest and transport wood from areas of adequate or excess supply to areas of shortage (Twine *et al.* 2003, Shackleton *et al.* 2006). These fuelwood markets help alleviate energy poverty in some areas, and provide local employment, although wages and profitability are low. Local and traditional institutions are generally weak and unable to manage, guide or police local woody resources and harvesting (Twine *et al.* 2003, Lawes *et al.* 2004). The national programme of clearing invasive alien trees (Binns *et al.* 2001) (known as the Working for Water programme) has increased short-term supplies of fuelwood in many areas, but in the long run may exacerbate energy poverty in areas reliant on alien species for their fuelwood needs (Shackleton *et al.* 2006).

A PROFILE OF FUELWOOD DEMAND

Full descriptions of the fuelwood demand situation in South Africa can be found in Williams and Shackleton (2001) and Shackleton *et al.* (2004). The

national demand for fuelwood was pegged at 13 million m³ in the mid-1980s and has never been updated since. Fuelwood use is widespread with over 90% of rural households using it to some degree (Shackleton *et al.* 2004). The use of fuelwood is most prevalent in the poorest and most rural provinces in South Africa (Statistics South Africa 2001). National demand is unlikely to grow from the current levels in light of (i) the HIV/AIDS pandemic which has stagnated population growth for the next 10–20 years, (ii) increasing urbanization and hence distance from wood stocks, and (iii) large-scale electrification programmes. At the same time, because of the widening gap between rich and poor, the number of households that rely on fuelwood for cooking and heating is unlikely to decrease significantly in absolute terms below the current figures over the next few decades. With rapid urbanization, urban and peri-urban demand constitutes an increasing share of the national fuelwood need. Newly electrified and/or urbanized households tend to continue to use fuelwood for a variety of reasons (including its low price or ‘free’ availability, cultural reasons, lack of cash to buy alternatives, lack of cash to buy appliances for other energy forms, etc.) (Howells *et al.* 2005, Madubansi and Shackleton 2006), but in the longer term per capita consumption is expected to decline. Estimates of household consumption rates range from 0.6 tonnes per year to over 7.5 tonnes per year, with a mode of between 3 and 4 tonnes per household per year. The gross monetary value is variable because prices differ widely in different parts of the country, with a mean of approximately R2,000 per rural household per year (2001 monetary value) – or R3 – 4 billion annually in the national economy (Shackleton *et al.* 2004). Fuelwood is also a vital fallback resource when cash or other energies are in short supply. Users perceive fuelwood to be a cheap resource relative to other energy forms (Madubansi and Shackleton 2006). Collection of fuelwood for domestic purposes is generally undertaken by women and children, whereas men dominate the marketing of fuelwood (Shackleton *et al.* 2006).

OPPORTUNITIES IN SOUTH AFRICA FOR MERGING FUELWOOD USE AND POVERTY REDUCTION STRATEGIES

Potential opportunities from seeking synergies between fuelwood and poverty issues within South Africa and in other developing countries may be grouped in six broad areas:-

- overlap between the debates on poverty with those on energy security and fuelwood;
- abundance of fuelwood – a renewable resource and a national asset;
- options to augment or increase fuelwood supplies;
- information available;
- legislation and institutional frameworks for sustainable natural resource use;
- accelerating international interest in biomass as an energy source.

Overlap between the debates on poverty with those on energy security and fuelwood

The primary users of fuelwood are the poor (Arnold *et al.* 2006, Shackleton and Shackleton 2006), who are a major concern of national and local governments, NGOs and multinational agencies. Hence, any programmes promoting energy security to the rural poor via fuelwood should find political will and commitment from politicians and government. Moreover, the rural poor in South Africa are concentrated in the wooded biomes (Shackleton *et al.* 2007), where fuelwood is a primary energy source and is available either “free” or cheaply – relative to other energies. Poverty reduction orientated subsidies and programmes offering free basic services already exist in South Africa, hence there is a framework and precedence for energy-related household subsidies for communities and households not covered by the electricity FBA. Additionally, the harvesting, transport, and processing of fuelwood could create job opportunities in the poor, rural areas and contribute to poverty alleviation.

Abundance of fuelwood – a renewable resource and a national asset

Fuelwood is abundant in many areas, and being a renewable resource it has potential to be harvested and managed sustainably. Most savanna species readily coppice (Shackleton 2000, Luoga *et al.* 2004) providing an opportunity for rotational harvesting at relatively short intervals (Shackleton 2001). There is also a lot of wood discarded from State and private lands under plantation forestry, clearing of bush-encroachment and clearing of alien invasive species. Fuelwood is readily accepted and widely used, requiring only a small limited capital investment from the household. Although cheap to consumers, the national fuelwood resource is extremely valuable, representing billions of Rands annually that can be sustainably harnessed. But if it is used unsustainably, this national asset will be lost – undermining the energy security of the poor, accelerating environmental decline and further exacerbating poverty – with the resultant need for direct State assistance.

A range of options to augment or increase fuelwood supplies

As a range of energy options is available for energy security, policies can be flexible, especially at the local level, so ‘one-size’ does not have to fit all, but rather policies can be shaped to accommodate local-level conditions and preferences. Some local communities may opt to develop their own fuelwood resources and technologies such as charcoal production as a means of securing the benefits locally (e.g. van der Plas and Abdel-Hamid 2005). Already, South Africa has a vibrant and developing small-grower forestry sector that can augment local-level supplies of fuelwood with off-cuts and thinnings.

Information available

There is a wealth of information and lessons to be learnt from previous fuelwood energy initiatives, especially the Biomass Initiative of the late 1980s and mid 1990s (Williams *et al.* 1996), that can be accessed, synthesized and updated. Additionally there are scenario frameworks (e.g. Banks and Schäffler 2005) and models (e.g. Howells *et al.* 2005) of fuelwood production within a suite of energy options to guide decision-making and interventions, although the latter usually have been parameterized at only one or two localities. Additionally, there are several national multi-sectoral initiatives that could have a more explicit fuelwood component (e.g. Working for Water; Extended Public Works Programmes, Land Care Programme), and second generation models and pilot schemes of public-private sector partnerships in energy issues are emerging.

Legislation and institutional frameworks for sustainable natural resource use

Since 1998 each municipality, including rural districts, has to prepare and regularly update a local Integrated Development Plan, although capabilities to do so are weak in many areas. These plans set the foundation for sustainable resource use through the zoning of parcels of land for specific purposes. The new Tenure Reform and Rights Act means that some of the uncertainties regarding fuelwood resource tenure and access may be resolved when it is adequately implemented. There is also a strong government commitment to raising the profile of gender imbalances in all spheres. Since fuelwood access and use is predominantly a female role, this could be a focus for effective intervention.

Accelerating international interest in biomass as an energy source

There is increasing interest internationally in the growing and sustainable harvesting of trees (for fuelwood or other purposes) as one mitigatory measure against global climate change (Scholes 2004). Carbon trading is a reality and will grow. Thus there are opportunities to develop funding and technology partnerships. This is paralleled by renewed interest in biomass energy in the developed world because it is potentially carbon neutral, renewable, and has biodiversity benefits (Bernades *et al.* 2003). All of these signify a potential move away from viewing fuelwood as an outdated source of energy or simply as an issue of how to augment supply (usually as woodlots) in certain areas, to ecosystem restoration and holistic management.

CONSTRAINTS TO USING FUELWOOD WITHIN POVERTY REDUCTION STRATEGIES

Whilst a large array of opportunities exist for making fuelwood a integral component of poverty alleviation strategies, there are also a number of challenges that need to be addressed if these opportunities are to be developed. These have been classified into five areas:

- Lack of consensus within government;
- The resource is spatially variable and poses health hazards;
- Existing legislation does not favour woodlots or large areas planted to trees;
- Much of the available information is out of date;
- Lack of capacity at the local levels.

Lack of consensus within government

There is a lack of a uniform view in the South African government regarding the opportunities around fuelwood. For example, some stakeholders seek to reduce the use of fuelwood as much as possible due to supposed health impacts, environmental concerns and social stigma. Stigma is particularly compelling, with most politicians wary of promoting what they fear might be viewed as a second-rate solution (especially with the inequities of apartheid still high in the national consciousness), and as such would either rather do nothing about energy security for their constituents or blindly promote electricity in areas that will not be electrified for decades, as has been noted for other developing countries (Karekezi *et al.* 2002). On the other hand others see it as a renewable resource with considerable value and benefits for the rural poor. Additionally, the hugely debilitating impacts of HIV/AIDS are exacerbating poverty for many households, which may lead to a greater use of fuelwood. But lack of high level acceptance of the HIV/AIDS crisis means it is rarely factored into other policy processes.

The resource is spatially variable and poses health hazards

The nature of the resource results in three constraints that need to be addressed. Firstly, there is high spatial variation in the supply and demand curves meaning that generic models for large spatial scales have only limited value (Banks *et al.* 1996). Consequently, interventions, if any, need to be at a local or even household level (Arnold *et al.* 2006). Models need to be able to identify geographic areas and villages experiencing pressing energy insecurity, as well as households within villages. Internationally, prioritisation has been based on energy surveys but, if linked into poverty alleviation strategies, it could be best done via social surveys and existing services to identify poor households (which

are already well developed in South Africa). Appropriate mechanisms to secure supplies are required. This includes zoning of urban expansion to conserve existing fuelwood stocks and to provide access to fuelwood stocks on State land. Transport of fuelwood from remote State land to high demand areas cannot be profitable but, if part of a poverty alleviation and energy security policy, might be subsidised and promote opportunities for small-scale local level markets and entrepreneurs.

Secondly, there is a strong conservation lobby against the harvesting of fuelwood, even though it is a renewable resource. Yet, if harvested within sustainable limits, these arguments can be dispelled (Shackleton *et al.* 2004).

Thirdly, long-term use of fuelwood potentially has a number of negative implications for health (e.g. Eberhard & van Horan 1995). These can be addressed by a suite of readily available technologies ranging from low cost (e.g. installation of improved stoves and chimneys) to high tech (e.g. gasifiers).

Existing legislation does not favour woodlots or large areas planted to trees

Whilst much fuelwood is harvested from arable fields and homesteads there is very little planting of trees by the State or individuals for fuelwood purposes. Even where this is encouraged, the current regulations for afforestation (and because of its impacts on water resources) hinder the development of woodlots in areas with limited natural woody resources. Similarly, the legislation around alien plants limits the planting of fast growing alien species in areas with acute fuelwood shortages. There are also biodiversity concerns. Even where afforestation is pursued, access to large numbers of tree seedlings and other resources for large-scale interventions is limiting (Paumgarten *et al.* 2005). These constraints need to be addressed.

Much of the available information is out of date

The available information in South Africa consists largely of several detailed studies from a few sites. Most of these were undertaken 2–3 decades ago. There is limited information pertaining to peri-urban use and broad-scale surveys over large areas. There has been no spatial mapping of poverty levels in relation to fuelwood access and demand.

Lack of capacity at local level

Local governance and institutions are frequently weak, lacking skills, capacity and adequate finances, especially in rural areas, and will be hard pressed to manage either energy security strategies or the fuelwood resource. Consequently,

fuelwood issues are rarely addressed in Integrated Development Programme (IDPs), and even when they are, implementation is weak or non-existent. Moreover, there is widespread confusion between municipal and traditional roles in land management, with disempowerment of traditional authorities and community members – such that many commonage areas are open to abuse and harvesting by non-locals (Twine *et al.* 2003, Lawes *et al.* 2004).

POTENTIAL POLICY OPTIONS

The lessons from previous work in South Africa and internationally are varied and context specific. Very few were learnt within a context of approaches for poverty alleviation, but more aligned with the paradigms of the fuelwood crisis and social forestry. Some of these could be applied directly to a poverty alleviation and energy security approach, but others require adaptation. Drawing on these lessons from South Africa and internationally, a menu of twenty-one options are identified as available to the national and provincial governments (Fig. 1). These options are outlined below, grouped into five themes. It will be beyond the mandate and resources of any single government department to implement all of these alone and simultaneously. Moreover, no single option implemented alone will have a significant impact countrywide on energy security for the poor. Rather, several options will have to be integrated and pursued in collaboration between different role players, including a range of government departments (energy, social welfare, finance, forestry, environment), communities and business, taking into account regional variations in fuelwood supply and demand situations.

Improving institutional frameworks and capacity

Foster an enabling environment

Uncertainty and conflict between different sectoral policies at the national level and weak capacity of government at the local level (and sometimes conflict or lack of cooperation between traditional and elected local government (Guyot 2005)) means there is a lack of vision, direction, and implementation of existing legislation. There is a fixation in many circles that provision of grid electricity is the only solution (as seen in many other countries (Karekezi *et al.* 2002)), even though millions of people are currently external to the grid. The fuelwood poverty nexus needs to be firmly acknowledged and government (at all levels) promote an enabling environment in which consumers, suppliers and markets can operate selecting from the mix of energies (fuelwood and others), opportunities and subsidies or grants, available to them.

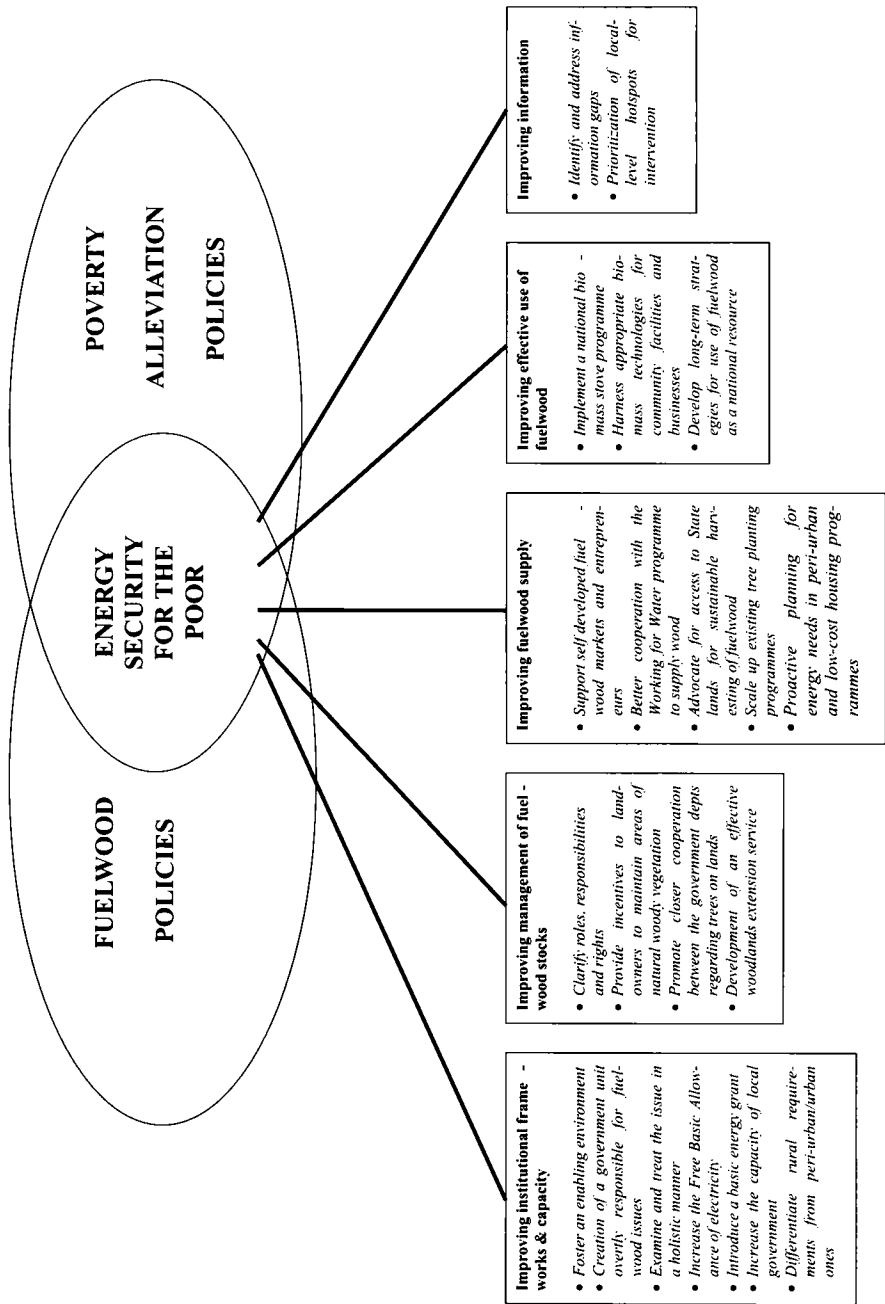


Figure 1.

Creation of a government directorate overtly responsible for fuelwood issues

Since the early 1990s there has been relatively little attention given to fuelwood issues in South Africa, paralleling trends internationally (Arnold *et al.* 2006). If real progress is to be made in using this valuable renewable resource in a sustainable fashion for enhanced benefits to poor households, it will require political will, direction and funding, which is potentially best achieved via a specific unit at national level to provide the necessary vision, impetus, advocacy and liaison with other government sectors. Given that it is more than just an energy issue (it relates to poverty alleviation, tree establishment, woodland management, social services and subsidies, economics, changing mindsets, health, etc.), such a unit would require links across a number of national departments as well as down to local government.

Examine and treat the issue in a holistic manner

Most energy crisis interventions in Africa over the past two to three decades have attempted to deal with the issue of potential fuelwood scarcity in a sectoral fashion, undermining the potential for success (Williams *et al.* 1996). Any meaningful intervention must recognize and make provision for the multiple dimensions of the challenge, multiple ecological regions, multiple sources of fuelwood, multiple uses of wood resources and the multiple stakeholders involved. It is not simply a case of making more wood available. Nor is it simply a matter of reducing demand so biomass stocks are retained longer for use by poorer households and communities. It is not solely a fuelwood issue, or an energy planning one, but also one with health, social, economic and environmental dimensions. There is a need for an inter-sectoral approach between the relevant Government departments, local government, research agencies and NGOs. This complexity is compounded by the extreme local variability of biomass energy supply and demand along with poverty status and availability of alternative energy forms (e.g. Madubansi and Shackleton 2007). Priority areas need to be identified – typically requiring a spatial mapping dimension (e.g. Drigo *et al.* 2002, Top *et al.* 2004), and then local-level energy security solutions found for each area in a multi-sectoral frame – building on existing local government infrastructure and social support services. In other words, a holistic rural energy policy needs to be developed in which the fuelwood component is explicitly acknowledged within the overall energy mix.

The interrelationship between fuelwood supply, other thermal energy fuels (such as liquid paraffin gas (LPG) or paraffin), and electricity provision is fairly well understood from a consumption perspective. However, there is seldom significant interaction between suppliers of more modern energy resources and the fuelwood sector, despite an emerging interest in the provision of an integrated energy service. South Africa has a number of rural Integrated Energy Centres, and some of the public-private-partnership off-grid electricity service providers have become LPG distribution agents (Banks 2004, Niemand and Banks 2006). If one

assumes increasing involvement of both government and the private sector in off-grid electricity supply, thermal fuels provision (LPG, biofuels) and perhaps even grid electricity provision, then the distribution agencies established will become an important energy aware resource in rural areas. The relationship between these agencies and the fuelwood sector needs to be explored. They could for example be used for information dissemination, or to assist in the distribution and retail of fuelwood and improved fuelwood stoves.

Increase the Free Basic Allowance of electricity

Significant numbers of rural and peri-urban households that receive the FBA also make use of fuelwood, especially since the priority uses of electricity are for lighting, refrigeration and entertainment appliances. Use of fuelwood typically increases towards the end of the month as cash resources become short. Therefore there is potential to reduce fuelwood demand by increasing the FBA so that it covers the needs for the entire month.

Introduce a basic energy grant

National government provides a number of social grants to poor households, including old-age pensions, disability grants, child care grants, school feeding schemes, and the FBA. There is also much current debate around the feasibility of a general poverty reduction grant known as the Basic Income Grant. Given these foundations it is feasible that a general energy grant could be paid to poor households instead of the FBA (Howells *et al.* 2006). Such an energy grant would cover all poor households, whereas the FBA assists only those connected to grid electricity. Each household could then use the energy grant to purchase the most accessible or affordable fuels in their area, whether it is fuelwood, paraffin, gas, or electricity.

Increase the capacity of local government

In South Africa energy poverty and tree/woodland management are generally low on the agenda of local governments. There is often a lack of awareness, compounded by constraints on funding and capacity. There is a need for education and training, with backup funding, to raise the profile of biomass energy as a crucial resource for poor households, and to inform local government that many fuelwood sources are on municipal or communal land under the jurisdiction of local government. Intervention is frequently limited to fining harvesters for cutting trees. Local-level land use zoning processes must take biomass energy supplies into account. New infrastructural developments repeatedly result in the clearance of all woody resources and replacement with housing estates, dams, golf courses, recreation/conservation areas, etc.; consequently poor households are forced to walk further and further to locate fuelwood for their basic needs. Local government needs to be given the capacity and funding to develop and

monitor appropriate fuelwood strategies and programmes especially targeted at the poor. In particular local government should work with communities to manage and police fuelwood resources effectively, and reduce competition for the resource between local domestic users and commercial interests (e.g. Twine *et al.* 2003). Local government agencies must be able to enforce local user rights. National government could catalyze a mind-shift by local government, away from purely infrastructural development to local integrated development and IDPs. Natural resources need to be regarded as valuable local capital that can be used sustainably to support rural development and poverty alleviation (see van der Plas and Abdel-Hamid (2005) for an example from Chad).

Differentiate rural requirements from peri-urban/urban ones

As evidenced from many countries the situation around supply and demand of fuelwood in urban and peri-urban areas is different to that of remote rural areas (Table 1). Consequently, different policies and strategies will be required for the two settings, which need to be appreciated by both planners and implementing agencies.

TABLE 1

Different characteristics and opportunities between rural and urban/peri-urban areas for fuelwood

Urban/peri-urban	Rural
<ul style="list-style-type: none"> • Frequently limited or scarce fuelwood stock in immediate vicinity 	<ul style="list-style-type: none"> • Variable situations with some areas having plenty of fuelwood close by, whilst others experience critical shortages
<ul style="list-style-type: none"> • Relatively high disposable incomes to spend on energy needs, including fuelwood 	<ul style="list-style-type: none"> • Limited cash resources, which increases the comparative advantage of collecting 'free' wood
<ul style="list-style-type: none"> • Usually better developed fuelwood markets 	<ul style="list-style-type: none"> • Development of fuelwood markets is variable, usually in response to localized scarcity
<ul style="list-style-type: none"> • Reasonable or good access to a range of different energies as reasonable pricing 	<ul style="list-style-type: none"> • Access to only a limited range of energies or only available at high prices
<ul style="list-style-type: none"> • Limited access to land to grow own trees 	<ul style="list-style-type: none"> • Greater access to land for tree growing
<ul style="list-style-type: none"> • Lower mean per capita consumption of fuelwood 	<ul style="list-style-type: none"> • Higher mean per capita consumption of fuelwood
<ul style="list-style-type: none"> • Rapidly changing situations in supply and demand 	<ul style="list-style-type: none"> • Local situations evolve relatively slowly
<ul style="list-style-type: none"> • Sensitive to changes in relative prices of different energies 	<ul style="list-style-type: none"> • Because of limited range of options, and lower disposable incomes relative pricing is less significant
<ul style="list-style-type: none"> • Better access to inputs such as water and fencing to support tree planting 	<ul style="list-style-type: none"> • Poor access to water and fencing, constraining tree planting

Fostering management of woodlands and trees

Clarify roles, responsibilities and rights

Local communities, stakeholders and leaders will not manage woodland resources effectively until there is certainty with regard to ownership, responsibilities and rights between stakeholders, traditional authorities and local government. In most areas local government has not taken responsibility for these resources (due to lack of awareness, experience, capacity or finances), but the land allocation and management functions of traditional authorities have been weakened, if not completely eroded, by the political transition (Lawes *et al.* 2004). An informed and empowered leadership is needed urgently.

Development of an effective woodlands extension service

There is a clear requirement for a woodlands extension service operational at the local level, supporting local municipalities, landowners, farmers, traditional authorities and individual households. At the moment there is no such service. The key mandate of any such an extension service would be to promote the sustainable use of woodland resources through:

- ensuring security of access and use for the rural poor,
- disseminating technical information and management options to land owners, land managers and institutions regarding sustainable use and management of woodlands and trees,
- monitoring and feedback,
- facilitating case projects and directed research, and
- identifying and reporting persistent unsustainable practices.

Provide incentives to landowners to maintain areas of natural woody vegetation

A significant driver of the decline in biomass resources is land transformation, typically from natural land to agricultural and urban lands. The initial clearance provides fuelwood for a time but, once used, there is no more from that land. As neighbouring land users clear more and more land, entire landscapes are changed, often with negative environmental, aesthetic and social implications. Government should encourage land users and developers to adopt a more conservation-friendly approach by maintaining viable patches of natural woody land on parts of their properties. Examples include shelter belts of natural vegetation between orchards/fields, maintenance of riparian fringes, natural belts along one side of service roads, agroforestry, delineation of farm boundaries, neighbouring farmers cooperating on identifying and maintaining adjacent patches of natural land (and hence creating a large and more viable unit). This requires collaboration between different government departments, including forestry, agriculture, conservation,

and land affairs to provide incentives (such as planning support, materials, tax deductions or exemptions) to land owners/managers for maintaining areas of naturally wooded land on their properties, and promoting sustainable harvesting of wood from these lands. The Conservation Farming project of the South African National Biodiversity Institute is such an example. The new legislation permitting municipalities to levy rates from agricultural land is an opportunity to guide landowner behaviour.

Promote closer cooperation between the government departments regarding trees on lands

Farming is one of the key drivers of decline in biomass resources. In South Africa, clearing of trees off fields is encouraged by agricultural extension officers, and applies to both small-scale and large-scale, commercial agriculture. Yet there are farming models that seek to optimize the contribution of trees in the environment to provide biomass as well as other important environmental and social services. Training curricula for extension officers need to be adjusted accordingly, coupled with an incentive system for the maintenance of trees and patches of natural, wooded land.

Improving fuelwood supply

Support self developed fuelwood markets and entrepreneurs

There is a growing local-level trade in fuelwood in South Africa and other developing countries as entrepreneurs transport wood from areas of abundance to areas of scarcity and growing peri-urban and urban demand (van der Plas and Abdel-Hamid 2005, Arnold *et al.* 2006, Shackleton *et al.* 2006). Urban demand for charcoal is significant in many countries, but not South Africa. The source of the wood for these markets varies from region to region, including communal lands, off-cuts from commercial forestry plantations, wood from clearing operations by Working for Water (WfW) or bush-clearing operations. Often the transport costs are hidden when the produce travels “free” as a perquisite of the driver. This trade helps alleviate energy poverty and provide jobs. Yet on the basis of very limited research, the profitability of these micro-enterprises in South Africa is in question (Gandar 1994, Shackleton *et al.* 2006), in parallel with findings internationally (Arnold *et al.* 2006). Economies of scale may be crucial; fuelwood is a bulky product and true transport costs are high. Government could support these micro-enterprises through a number of ways, such as

- business skills training,
- a recapitalization programme modeled on the one for the country’s commuter taxi industry,

- direct energy subsidies per tonne of wood delivered (provided that it is certified to come from a sustainably managed resource), or
- facilitating the sourcing of fuelwood supplies from State lands, Working for Water operations and offcuts from commercial plantations.

Better cooperation with the Working for Water programme to supply wood

The Working for Water Programme (WfW) is the most successful public works programme in South Africa's history, accruing considerable international acclaim (Binns *et al.* 2001). It has had large-scale impacts on alien invasive plants, providing skills and temporary employment to thousands of poor households, whilst simultaneously promoting environmental benefits and improved water yields (MacDonald 2004). The project has resulted in significant volumes of wood from alien species available to fuelwood users. In some areas small-scale entrepreneurs pay a small fee to access the felled timber and sell it as fuelwood to rural communities or urban markets. In other areas, the wood is left *in situ* and local people come and collect it free. There has also been experimentation with manufacturing and selling charcoal from the wood. On the down side has been the removal, in some areas, of very precious wood stocks (albeit of alien species), exacerbating energy insecurity and hence poverty (de Neergaard *et al.* 2005). There is an opportunity for a coordinated programme with WfW, drawing upon their experience, expertise and infrastructure to:

- make stronger efforts to ensure the wood generated benefits the rural poor in most need – this might include subsidizing transport of the wood to local markets or households at an affordable price to the end consumers, and
- prioritize geographically WfW operations to avoid clearing aliens in the short-term near communities that are still strongly reliant on them for fuelwood.

Permit access to State lands for sustainable harvesting of fuelwood

Whilst national demand for fuelwood is less than the sustainable national supply, a large proportion of the potential supply is unavailable as it is on private, corporate or State lands. The Dept of Water Affairs and Forestry needs to engage with national and provincial land holding government departments and parastatals, as well as large corporations (commercial forestry companies, mining houses, etc.) to promote sustainable harvesting of fuelwood resources from such lands.

Scale up existing tree planting programmes

As in other parts of the world (e.g. Arnold and Dewees 1997) rural people in most areas of South Africa plant trees, typically for the provision of fruit, shade, aesthetics and cultural services (Paumgarten *et al.* 2005). This has numerous social, economic and environmental benefits. A key one is the provision of

fuelwood as a by-product, which is a primary source of fuelwood for many households. Government encourages tree planting, with the flagship programme being National Arbor Week held annually in the first week of September. However, it has had only a limited effect in rural areas (Guthrie and Shackleton 2006). Public education and communication around National Arbor Week is widespread, but most interventions are focused on schools and institutions, rather than individuals. The focus needs to be widened to include tree planting at individual homesteads adopting social forestry and agroforestry models around trees in livelihoods (rather than just for the environment), and to address constraints to tree planting (e.g. water, fencing, availability of seeds) rather than just focusing on the provision of trees.

Proactive planning for energy needs in peri-urban and low-cost housing programmes

There are large-scale programmes for the provision of housing to poor families in both rural and peri-urban settings. The issue of energy efficiency should be a mandatory consideration in planning the location and layout of housing developments, as well as in the design of individual housing units. Moreover, recognising that poorer households make use of fuelwood for all or part of their energy needs – even when electricity is available – requires that

- zoning of areas for housing developments should avoid primary sites used for the collection of fuelwood by existing communities,
- energy efficient designs are employed, and
- housing specifications include a well ventilated cooking shelter with a chimney or space for a stove.

Improving effective use of fuelwood

Harness appropriate biomass technologies for community facilities and businesses

Many small-scale businesses in rural areas, such as smoking fish, brick kilns, bakeries and restaurants, etc., rely on fuelwood. A range of technologies are available at a range of capital costs to improve efficiencies and limit harmful emissions from such operations. These should be promoted within the business sector, as well as for community infrastructure such as schools, clinics and halls.

Develop long-term strategies for use of fuelwood as a national biomass resource

This paper has focused on policy options regarding the use of fuelwood to contribute to the alleviation of energy poverty. Yet in the very much longer-term,

with economic growth, increasing education and modernity, and improved access to alternative energies, the proportion of fuelwood reliant households will decline, although there will still be millions of people using fuelwood for several decades to come. As the number of users decline, fuelwood will still be produced and available, and not to use it will be a lost opportunity. Therefore, investigation and planning for the longer-term use of this valuable and renewable resource needs to start; for example, the use of fuelwood in small-scale industrial applications in rural villages and towns in the form of charcoal, energy chips and biofuels that may contribute electricity to the national grid (Karekezi 2002b). A national, sustainable and long-term biomass strategy based on fuelwood and charcoal has multiple benefits for communities, land owners and South Africa, including:

- a contribution to poverty reduction through the provision of a cheap and sustainable energy supply,
- job creation,
- additional value to land,
- biodiversity benefits,
- empowerment of communities in managing such a critical resource, and
- potential access to international funding available for environmental, participatory forestry and carbon credit programmes.

Implement a national biomass stove programme

There have been a number of biomass stove projects in South Africa over a long period, led by research agencies and NGOs, but there has never been strong commitment from, or involvement of, national government departments. This is in contrast to some Asian and east African countries where national or provincial governments have been actively involved in promoting stoves as a means of reducing fuelwood demand rates and health hazards (e.g. Edwards *et al.* 2004). In southern Africa and Asia the beneficial impacts of stoves seems to be higher in peri-urban communities than strongly rural ones (Munslow *et al.* 1988). Currently, cultural and economic factors hinder the large-scale adoption of biomass stoves by the rural poor, and this necessitates consideration and innovative marketing. The real advantages of stove programmes may be more in reducing potential health hazards than in extending the life of fuelwood resources. Respiratory disease is the second highest cause of infant mortality in the country, seemingly correlated with the inhalation of smoke from cooking fires (Eberhard and van Horan 1995).

Improving information

Identify and address information gaps

There is much information on fuelwood supply and demand in South Africa, as well as on the profiles and location of chronic poverty. However, much of the

former is seriously dated, most being 15 years old or greater. There is a need to:

- collate the existing information,
- assess its broad-scale validity against the few more recent studies,
- draw explicit links with poverty profile data and understanding, and
- identify and prioritize immediate information gaps that could be addressed in a short and focused research programme.

This information must be used at all levels of policy- and decision-making concerning the management and use of fuelwood stocks.

Prioritization of local-level hotspots for intervention

A system is required to identify:

- geographical communities experiencing or facing energy poverty, and
- individual, poor households struggling to meet energy requirements within serviced communities.

Whilst not neglecting the needs of the second group, concentration of intervention resources on the first will result in meeting the needs of the largest number of people in a given time at a stated cost level. These geographical communities could be identified through GIS mapping on the basis of:

- poor availability of, or access to, woody biomass stocks,
- high rural population densities,
- isolation from the national electricity grid in the medium- to long-term, and
- located in poor municipalities.

Already this has been partially achieved through the recent work of the Southern African Ecosystem Millennium Assessment (Biggs *et al.* 2004). Once energy poor communities have been identified strategies of intervention at the local level can be devised.

CONCLUSION

There are a number of strategic options available to the South African authorities at national, provincial and local levels to help alleviate energy poverty and, thus, overall household poverty. It is important that the approach recognizes that:

- there will be households dependent on fuelwood to a greater or lesser degree for decades to come (in common with most of sub-Saharan Africa (Karekezi 2002a)), and

- the identified options for alleviating poverty are not seen in isolation from one another, but rather more as a suite of interventions and policy changes that complement one another to address the issue in a holistic fashion.

Some interventions can be implemented relatively quickly given political will and financial resources. Others need longer-term planning, and will only yield results over a much longer time scale. All need to be pursued within a spirit of partnerships between government departments, stakeholders and affected communities. All need to be cemented within an integrated approach considering not just supply, nor just demand, but supply and demand within a defined and functional institutional and resource framework and real life management strategies on the ground, whilst recognizing and building on the flexibility and adaptability of local livelihoods.

The departments currently responsible (Dept of Water Affairs and Forestry and the Dept of Mineral and Energy Affairs) need to focus on providing an enabling environment so that energy poor households can select from a range of options to meet their fuelwood and broader energy needs. Key amongst these is the need for:

- strengthening local institutions to manage existing tree resources and enforce the rights of local users,
- advocacy around renewable energies and fuelwood issues at all levels of government,
- developing an integrated approach in collaboration with other government departments, and
- replace the FBA with an energy or poverty grant.

The lead approach for these would be the establishment of a prescribed directorate and the development and deployment of a woodlands extension service. Creating institutional links and enabling environments, along with training and capacity building, have been identified as key policy recommendations in other countries seeking to overhaul rural energy policies (e.g. Habtetsion & Tsighe 2002, Karekezi 200b).

The challenges for South Africa mirror those in other developing countries, particularly those with high levels of urban and rural poverty with a high dependency on fuelwood in the rural and peri-urban populations (Karekezi 2002b). Consequently, many of the policy options and barriers to implementation that we have outlined above will resonate with those of other countries, although some will have particular South African nuances (such as the need for greater collaboration with the Working for Water programme). There is a clear nexus between poverty issues and programmes related to fuelwood which, within the context of increasing global interest in reducing reliance on fossil fuels and increasing the use of renewable energies, presents a vital window of opportunity to reduce energy insecurity for millions of people around the world.

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