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Knowledge network on sustainable household energy
in Southern and Eastern Africa

Scenario Analysis

Zambia

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An initiative of



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and Southern Africa (Zimbabwe/Mozambique)



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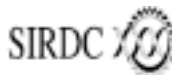
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Executive summary

Except for petroleum, which is wholly imported, Zambia is endowed with many types of energy resources including woodfuel, hydropower, coal and renewable energy sources. Woodlands and forests are estimated to cover 50 million hectares, that is, 66% of total land area. Woodfuel in the form of firewood and charcoal is the principal source of energy in the country. The national hydropower potential is estimated at 6000 MW and the installed capacity is only about 1700 MW. Petroleum is the only major source that is wholly imported. Established infrastructure include among other things the 1,704 km TAZAMA pipeline and the INDENI refinery. The proven coal reserves at Maamba exceed 30 million tonnes. Zambia is endowed with a variety of renewable energy resources such as solar, mini hydro and wind, some of which occur in large quantities though they remain largely untapped.

Despite the abundant energy resources distribution of modern energy resources has been poor for sometime now resulting in poor households relying on traditional fuels which are normally dirty. This scenario has led to indoor pollution and has resulted in respiratory infections especially in mothers and children. Women and children have to travel long distances to gather firewood and have very little time left for other income generation activities. The use of inefficient biomass stoves has also seen the prevalence of ALRI due to IAP. This has seen the women and children being further burdened by having to care for the sick. The time spent in collecting firewood, preparing meals and looking after the sick leaves very little time to embark on income generating projects. The accessible energy forms are also not very appropriate for these purposes. This has resulted in increasing poverty in the country. Domestic energy has not received the same attention in terms of policy as industrial and commercial sectors. Accessibility of to energy resources has been limited in some cases due to poor infrastructure and low disposable incomes of most of the poor households.

The attainment of macroeconomic stability has continued to be elusive due to the effects of unsustainable fiscal deficits and occasional exogenous shocks. Real GDP growth was 3.3% in 2002 and 5.1% (expected) in 2003. In 2003, the recovery of agriculture largely explains the expected pick up in growth. The growth rates are however still dismally low to make any significant impact on headcount poverty which is about 73% as indicated in the Living Conditions Monitoring Survey II. Due to a sharp acceleration in food prices arising from the drought, the 12-month inflation rate shot up to 26.7% in 2002 from 18.7% in 2001. In 2003, 12-month inflation fell to 17.2%. This is however, still high considering the year target of a single digit figure. Zambia's external debt overhang continues to be enormous. As at June 2003, the external debt stock stood at US\$ 6,862.6 million or 182% of GDP. The poor economy has made the choice of energy be very limited for the poor households.

The setting up of the Rural Electrification Authority brings a ray of hope that rural electrification can be accelerated. It is also hoped that new hydropower generation plants will be constructed to avert the impending power shortages in the Southern African Power Pool. This is expected to increase the electrification rate and hopefully benefit the poor households. The efforts being made by the Ministry of Energy and water Development to promote usage of LPG and gel fuel will help to reduce dependence on charcoal in urban areas.

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1 Introduction

Sparknet is a multi-stakeholder interactive Knowledge Network focusing on how people, in the context of acute poverty, can gain access to better energy services and improve their livelihoods.

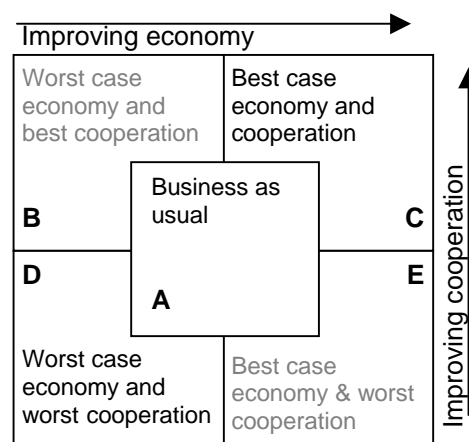
The network aims to make available resources for policy makers, companies, and civil society on energy poverty in Southern and East Africa. These are published through the network website www.sparknet.info. Sparknet focuses on three key themes – Health, Gender and Forestry – and the relationship of these issues with energy poverty. Output include detailed country reports, scenario analyses, and policy assessments. Two e-conferences will be held during the project – one on the scenarios, and another on policies.

Through a network of associates in Africa and Europe, Sparknet brings together 70 organisations and over 110 people from research institutes, NGOs, Governments and private companies.

1.1 Scenarios – what they are and why we have done them

Scenario analysis is simply a way of exploring realistic futures and predicting, based on our knowledge and experience how things could look in the future, how things could develop. As with all predictions we are likely to get it not entirely correct but the exercise is useful to stimulate debate on key issues. Scenario building is a *process* providing a structure for discussion and debate on what is could happen within a timeframe of the next ten to fifteen years. We will explore how things could change and how these changes are likely to impact on access to household energy in each country and across the Sparknet region. From these discussions, we hope to be able to make policy recommendations for poverty alleviation through identifying the key areas where policy action needs to take place. The intention is not to produce definitive studies but to stimulate relevant policy dialogue and serve as a basis for further research. Using management jargon we are looking here for 'blue sky thinking'. To do this we need to know the status quo (work-package 2, the country reports – which are now available on the Sparknet web site) and also to have identified influential organisations and projects and key actors who will shape the future of household energy provision (work-package 3, the draft version also available online).

External influences, such as changes in economic growth and levels of regional cooperation, are circumstances over which we have limited control. By identifying what policies might be effective under varying best and worst scenarios we have a good basis for debating potential policy actions which are pro-poverty alleviation, take into account our three themes – health, gender and natural resources / forestry – and are realistic under a broad range of external circumstances. As defined in the original Sparknet proposal, the intention is to develop a number of scenarios based on levels of economic prosperity and regional cooperation. The five possible scenarios – A to E – are shown in the 'box matrix' figure alongside. We believe it is sufficient to deal only with scenario A (business as usual), C (best case economy and co-operation), and D (worst case economy and co-operation). The other two are variations of these main scenarios. Both variables relate strongly to globalisation and market developments. This is the reason for including regional co-operation, since the Sparknet proposal was submitted to a funding window, which explored impacts of globalisation on energy poverty.



Because of the limited time/funding resources, these analyses are based – to a certain extent – on a subjective interpretation (the opinion of well-informed researchers, organisations and individuals in each country) of the impact of key variables and on findings of earlier studies (if available). It is focused mainly, but not exclusively on the issues identified by the three Northern partners on Health, Gender and Forestry (these papers are available online from the www.sparknet.info website.)

The scenario development follows the following process:

1. The development of peer reviewed scenario analyses for each country including 'business as usual' and alternatives based on levels of 'economic prosperity' and of 'regional co-operation'. This current document is a working version of the scenario.
2. An international e-conference (through the Internet) will be held based on the scenarios for each country. The provisional date for this conference is the end of September, over a 2-week period (see the www.sparknet.info website for additional details).

3. Publishing of conference proceedings from the e-conference on scenarios

The scenario analysis will lead naturally to an analysis of ‘*what do we think will happen*’ and ‘*what do we want to see happening*’ (or *how best we can deal with it if it does happen*) in each country and the region, and leads directly into work-package 5 (how to get from one to the other – ie. policy recommendations).

1.2 Background information on the Scenarios

1.2.1 Energy Resources

Except for petroleum, which is wholly imported, Zambia is endowed with many types of energy resources including woodfuel, hydropower, coal and renewable energy sources.

Woodlands and forests are estimated to cover 50 million hectares, that is, 66% of total land area. Woodfuel in the form of firewood and charcoal is the principal source of energy in the country. The national hydropower potential is estimated at 6000 MW and the installed capacity is only about 1700 MW. Petroleum is the only major source that is wholly imported. Established infrastructure include among other things the 1,704 km TAZAMA pipeline and the INDENI refinery. The proven coal reserves at Maamba exceed 30 million tonnes. Zambia is endowed with a variety of renewable energy resources such as solar, mini hydro and wind, some of which occur in large quantities though they remain largely untapped.

1.2.2 Energy Supply Trends

Below is a table illustrating the energy supply trends:

Table 1 Final Energy Consumption by source (%)

Year	Petroleum %	Electricity %	Coal %	Woodfuel %	Total %
1986	12	13	8	67	100
1990	14	12	6	68	100
1995	12	14	2	72	100
2001	9	10	2	79	100

Petroleum usage has been fluctuating due to many factors among them being breakdowns and fires at the refinery. Overall there has been a decline in the consumption of petroleum products from 12% in 1986 to 9% in 2001. Electricity use has declined from 13% in 1986 to 10% in 2001 despite an increment in 1995. The reduction has been attributed to the reduced production capacity of the copper mining sector, which is the single largest consumer of electricity in the country. The contribution of coal to energy utilization has continued to decline over the years moving from 8% in 1986 to 2% in 2001. This is mainly attributed to the reduction in the mining activities and problems being experienced by the Maamba Collieries the only coal mining company. Woodfuel remains the most dominant form of energy accounting for 67% in 1986 and 79% in 2001.

1.2.3 Household Energy

Woodfuel is the major source of household energy mainly used from cooking and heating. Electricity is the second most common sources of heating and heating. Only 20% of the population have access to electricity despite the excess power that is locally generated. The average electrification rate of rural areas is 2% most of the domestic energy needs are met by firewood. It is evident though that even most of households connected to the electricity grid do use fuelwood for cooking and prefer to use electricity for cooking. However, the rate of rural electrification is expected to improve following governments move to set a up the Rural Electrification Authority (REA) whose main function will be to accelerate the rural electrification project by mobilising resources from both the private and the public sectors in Zambia. The government is also working with the World Bank to mobilise resources in form of loans and grants to accelerate rural electrification. The private sector will be expected to service economically viable communities.

Below is a table indicating the major sources of domestic energy for cooking:

Table 2: households by main source of energy used for cooking, rural/urban percentage, Zambia

Energy source	Zambia Total			Rural			urban		
	1980	1990	2000	1980	1990	2000	1980	1990	2000
Electricity	8.8	8.9	13.8	4.1	0.8	1.5	18	22.7	37.1
Gas, paraffin	2.8	2.8	0.6	2.4	2.3	0.7	3.4	3.9	0.4
Wood, charcoal. Coal	87.5	87.4	85.1	92.2	95.7	97.2	78.4	72.8	62.3
Other	0.9	0.9	0.5	1.4	1.2	0.6	0.2	0.6	0.2
Total	100	100	100	100	100	100	100	100	100

Table 2 shows the dependence of households on woodfuel as a cooking fuel. The reduction in usage of charcoal, wood and coal in the urban households is attributed to the rapid electrification of compounds by the MMD government, which took power in 1991. The decline of usage of electricity in rural areas as a fuel for cooking from 1980 to 1990 was due to lack of investments in rural electrification. The increase from 1990 to 2000 is mainly attributed to the rural electrification fund, which funded rural electrification projects from 1994.

Table 3: households by main source of energy used for lighting, Zambia (2000)

Residence	Main Source of energy Used for lighting (%)							
	electricity	Gas	wood	Candle	paraffin	Solar	other	Total
Zambia	16.6	0.1	10	16.6	51.2	0.2	5.3	100
Rural	2.2	0.1	14.7	8.9	66	0.2	7.9	100
Urban	44	0.1	1	31.2	23.2	0.2	0.3	100

As discussed earlier it is clear that more urban households use electricity for lighting than cooking. This could be due to lack of electric stoves and also different cooking practices which favour traditional fuels like charcoal and firewood.

Overall, the poor state of the economy has also contributed to reliance on woodfuel, which is readily available and can be purchased in smaller quantities. The Zambian economy has been undergoing economic reforms, which included among other things privatisation of state owned enterprises. One of the end results was mass redundancies and some people had to stay for a long time waiting for redundancy packages. Some of them are yet to receive their packages. The government has been battling to reduce inflation to a single digit, a task which has proved difficult and the annual inflation rate is about 17%. Due to reduced local borrowing government, the interest rates are now coming down from 55% last year to between 25-30% this year.

2 Development of the scenarios

This section of the report is the main body. The summary table in Appendix A gives an Overview of the Scenarios and the important points in each section.

2.1 Business-as-usual scenario

The attainment of macroeconomic stability has continued to be elusive due to the effects of unsustainable fiscal deficits and occasional exogenous shocks. Real GDP growth was 3.3% in 2002 and 5.1% (expected) in 2003. In 2003, the recovery of agriculture largely explains the expected pick up in growth. The growth rates are however still dismally low to make any significant impact on headcount poverty which is about 73% as indicated in the Living Conditions Monitoring Survey II. Due to a sharp acceleration in food prices arising from the drought, the 12-month inflation rate shot up to 26.7% in 2002 from 18.7% in 2001. In 2003, 12-month inflation fell to 17.2%. This is however, still high considering the year target of a single digit figure. Zambia's external debt overhang continues to be enormous. As at June 2003, the external debt stock stood at US\$ 6,862.6 million or 182% of GDP.

In July 2002, the Zambian Government officially launched the first National Poverty Reduction Strategy Paper (PRSP) for the period 2002-2004. In 2001, 0.3% of the national budget was allocated to the energy sector and 45% of the total sector allocation was spent on PRPs.

2.1.1 Fuel Access

The government has plans to start preparing a Rural Electrification Master Plan, which is expected to capture each and every settlement in Zambia. The REMP will be implemented by the REA, however a lot of issues have to be sorted out before the REA starts to implement the project. Zambia is a vast country (756000 sqkm) with a population of 10 Million. The issue of ownership of the new extensions to the grid and new mini grids has not been sorted out. Should the public utility continue running them or should private sector take over. Should concessioning be considered if so what should be done to make some of the areas as attractive as Lusaka and the Copperbelt. Zambia has one of the lowest electricity tariffs in the region because most of the power stations are old and the loans have been paid back. The low tariff is a barrier to new investments in the power generation sectors. Sometimes power lines have to run for hundreds of kilometres just to go and electrify a very low load due to the scanty distribution of settlements. The electricity levy, which is collected on every unit of electricity used, is not enough to bring about positive change in electrification rates. It means access to electricity will still remain low because circumstances do not favour rapid electrification. The poor people the majority of whom reside in rural areas will still not have access to electricity. The performance of the economy does not promise active participation of the private sector in the electricity sector. Independent power producers will have to work extra hard to compete with ZESCO the public utility which is currently being commercialised. The cost of domestic petroleum products (kerosene and LPG) has been unaffordable by the majority of poor households and will remain so for the next ten years. These products are only available to households in urban areas, most rural areas do not have access to these products due to the distance from Ndola refinery (price of fuel increases with the distance from the refinery in Ndola) and poor infrastructure in all rural areas. The situation is likely to remain the same because the road maintenance in rural areas is very poor. Kerosene is likely to continue being the most common source of domestic energy for lighting. Coal has not been a common domestic fuel due to lack of stoves and costs more than charcoal and firewood. Most of the poor households cannot afford the cost of coal and those who can afford already have electricity or have other cleaner alternatives. Coal is unlikely to be promoted as a domestic fuel due to lack of government policy. Charcoal and firewood are likely to continue being the most dominant sources of domestic energy in most poor households for the next ten years because the economy will not support switching to more cleaner and expensive fuels. Government however has allocated some money to pilot the promotion of LPG and Gel fuel as alternatives to charcoal. These efforts may contribute to the reduction of usage of charcoal but the majority of the people who will afford to buy the fuel even if it is subsidised will be those in higher income brackets. The poor are likely to fail to pay even for the subsidised fuel.

2.1.2 Fuel choice

The economic hardships have seen a good percentage of urban dwellers being unable to afford electricity. They are therefore using electricity for lighting and to power such appliances as television sets and turning to fuelwood for cooking and water heating. The rural poor will have very little choice apart from firewood for heating and kerosene for lighting. People have to travel distances to go and purchase kerosene although some people now have started buying kerosene from filling stations at Bomas and circle to far places to sell. In other places, agriculture residues and cow dung will still be the only possible sources of energy at household level leaving the people with no other choice. The urban people have a far much wider choice than the rural dwellers. The new alternatives (LPG and Gel fuel) being promoted now will need more time, however some people in the urban areas have a choice to use LPG although gel fuel has to be imported since there are no ethanol production facilities locally.

2.1.3 Gender rural

In the rural areas women and the girl child are burdened with the responsibility of all kitchen chores that include firewood collection and meal preparation. With the continued high dependency on fuelwood for cooking and the relatively high population densities in most rural communities, the distances travelled to collect firewood and the time for collection will continue to increase. The female-headed homesteads will remain poor, as there will be little time left for income generating activities. Prevalence of ALRI in the females will continue to be higher than those of males because of the higher periods of exposure to pollution. The effect of ALRI on infants will also remain high as they also spent a considerable time in the smoke filled kitchens with the women folk.

Lack of access to sources of energy such as electricity will generally mean that most of the income generating projects in the rural areas will be manual, which in turn implies that the living standards for the people will be low and poverty will be prevalent in most households.

The girl child will remain disadvantaged in school because of the time spent in meal preparation and wood collection.

Communication and access to such gadgets as TVs and the Internet, will remain low in the rural areas thereby further limiting the horizon of all people especially students in the rural areas.

2.1.4 Health

In the business as usual scenario there is very little being done in disseminating information on improved biomass stoves and the risks of IAP. Although the Ministry of Energy and Water Development is very keen on doing so, currently they do not have the funding to push through this project. With over 65% of the population in Zambia using biomass for cooking, and with very small number of these people being aware of and capable of accepting the improved biomass stoves the prevalence of ALRI will continue as is due to IAP. Again as a result of the lower standards of living due to very little meaningful income generation because of lack of access to electricity, malnutrition should continue to affect the rural people with the most significantly affected age group being that below 5 years and those above 65 years.

The prevalence of risks to diseases mentioned above increases the burden on households because of the need to look after the sick. This has the effect of increasing poverty among the people.

2.1.5 Forestry

The problem of affordability of electricity to the urban poor has forced some households to resort back to use of wood fuel for cooking and water heating. Wood is legally poached from the peri-urban areas and rural areas that are relatively close to the urban areas to cut down on transportation costs. This has led to rapid deforestation of the forests in these areas.

The wide usage of biomass as a source of energy because of lack of alternative sources of energy has seen rapid deforestation of the natural forests. Localised deforestation has been experienced in some parts of the country especially in areas surrounding major settlement areas like Lusaka and the Copperbelt. Use of indigenous firewood has further accelerated the depletion because these take longer to mature.

There have been new settlements around the urban areas because of people who lost jobs due to privatisation of state companies. These people have resorted to charcoal production and have cleared most of the land for settlements.

2.1.6 Policy options

- Funding for the development of the mini grid power units and sustainable renewable energy systems drive

- Pricing policies that will not only provide affordable sources of energy to all people but also look at their being enough returns to attract investors to source for and distribute the energy.
- Work on distribution channels to make the energy accessible to all people
- Built up investor confidence for both local and foreign investors to invest in the energy sector.
- Dissemination of information on IAP and ALRI with regional and cross ministry participation
- Look at the plight of women and children
- Look at the effect of the charcoal production on deforestation and put measures in place to control it
- Promote affordable energy sources for cooking to substitute charcoal.
- Use energy to energise the economic growth through export of excess electricity and localising production of biofuels for the transport sector.

2.2 Worst-case scenario

In this scenario the inflationary environment will continue and even become worse. It also assumes a low economic annual growth rates being affected by poor agriculture output arising from poor rainfall. The Zambian economy is sensitive to agriculture output because a poor harvest of maize, the staple food means importing the commodity, which strains the foreign exchange supply. Agriculture also depends on the amount of rains received because most of the production is rain fed. The scenario also assumes that the price of copper on the international market will remain low, over 80% of foreign exchange in Zambia is earned through the export of copper. The scenario also assumes that the price of petroleum products on the international market will still remain high. The scenario also assumes that, the development of the proposed Kafue Gorge Lower Hydropower plant (600MW) and Itezhi Tezhi (120MW) will not take place resulting in shortage of power. Poverty will even be higher and the debt position will also be worse.

2.2.1 Fuel Access

Access to electricity will go down if the Power Utility to supply power to all customers. The resultant load shedding and power cuts will affect industry, reduce the GDP and put further strain on the standards of living of the Zambians and increase poverty. Use of biomass in food preparation, which is normally prevalent when there are power cuts to residential loads, will increase. In the rural areas use of biomass will continue because of lack of other alternatives such as LPG and kerosene, which will also be in short, supply because of high prices. Poverty will ensure that even those on the grid will minimise usage because of unaffordability of the electricity. Use of agricultural residue will be on the increase during and immediately after the harvest seasons.

2.2.2 Fuel choice

A higher percentage of households in Zambia will depend on biomass because of the limited access to electricity and because of not being able to afford the electricity when it is available because of increased poverty. More urban poor households will resort to using other types of fuel like plastic and other dirty fuels. There will also be very little choice because high international prices will make LPG and kerosene more expensive. Extension of solar home systems will not be possible because of the high poverty levels.

2.2.3 Gender

The burden on women and children will increase because with more people getting dependent on biomass, distances and time spent in collecting firewood will increase. Meal preparation times will be relatively higher. ALRI will still be prevalent because of limited dissemination of information on IAP risks and use of more efficient biomass stoves that have fewer emissions. Poverty will remain prevalent in rural areas because the prevalence of ALRI will mean that the women and children will have to spend time in caring for the sick. The girl child will be disadvantaged in school because they will have less time for study and will probably be tired because of the burden of collecting firewood, difficult and lengthy meal preparation, and caring for the sick. Prevalence of ALRI will be higher in the women and children as they spend more time in the polluted kitchens. This lack of access to energy will mean that there will be very few successful income generating projects from the rural areas.

In the urban areas, the women from the urban poor households will spend more time in meal preparation.

2.2.4 Health

Prevalence of ALRI will continue with the rural women and children being most affected as they spend more time in the kitchens. This will generally increase poverty in the rural areas. Malnutrition should also be prevalent in the rural areas because the women and children will spend more time in collecting firewood and wood preparation and will have little time left for income generating projects. The limited choice of alternative and better sources of energies will prevent women from embarking on income generating projects to improve their standard of living.

2.2.5 Forestry

There will be rapid deforestation in peri-urban areas and the communal areas close to the urban areas as a result of the increase in wood fuel usage in the urban poor households. There will also be rapid deforestation in the rural areas since urban areas will have to source woodfuel from rural areas. The poor rainfall will also affect the rate at which forests regenerate and this will result in less stocks of wood.

2.2.6 Policy options

- Work on drawing up data on levels of IAP and verification of link between this and ALRI
- Find mechanisms to provide wide choice of energy forms for household use and for income generation projects to improve standard of living of the rural and urban poor
- Come up with schemes for people to purchase the required equipment and gadgets to use with the different sources of energy
- Regional co-operation on IAP and ALRI information dissemination, management and control
- Promote projects and production with the view to improve the economy so that it would be possible to implement the RE programmes, and extend the current electricity generation capacity.
- Commercialisation and opening up of the power sector to private investors (ongoing)
- Strengthen regional power interconnections to deal with power shortages.
- Use energy to energise the economic growth through export of excess electricity and localising production of biofuels for the transport sector.

2.3 Best case scenario

This will be characterised by an economic boom with no trade deficits such that the country will have as much foreign currency as it needs. Improved economic growth will also increase the supplies of LPG, kerosene and money to purchase equipment and accessories required for grid extension. More hydropower plants will be constructed and the Rural Electrification Authority will promote the utilisation of renewable energy resources as a reliable means of electrification. Renewable energy sources will be developed to a level where they will replace more biomass resources. The Zambian economy will be diversified and not copper dependant. The international price of petroleum products will remain stable and irrigation will be promoted as a source of water for maize growing.

The economic boom characterised by high employment levels and general increase in the standard of living. This will enable the urban poor to purchase and use electricity and will also enable more villages to access electricity using the RE scheme, as they will have money to pay for it.

2.3.1 Fuel Access

There will be increased availability of electricity through the successful expansion of the grid by the REA, construction of the Kafue Gorge Lower and Itezhi Tezhi hydropower station outputs and more connections in the urban areas. Generally, this will improve accessibility to electricity in both rural and urban areas. In the rural areas continuation of the solar home systems project and the installation of the stand alone small hydropower stations will further increase electricity accessibility especially in areas that will be far-away from the grid. Consumers will also have access to LPG and kerosene subject to the development of a good distribution system.

2.3.2 Fuel choice

Almost all consumers will have many fuel choices such as electricity (grid, stand alone hydro and solar), biomass, kerosene, ethanol gel and LPG. Charcoal will still play a limited role as a source of fuel. In an economic boom it is assumed that people will have the money to purchase the energy sources such that the determining factor of which fuel to use will depend mainly on the application, convenience and ease of accessibility, price (on a comparative basis) and cultural practices that include the fact that even though they may have electricity, rural communities prefer to use wood fuel for cooking.

2.3.3 Gender

Access to electricity, LPG, kerosene and other renewables and the ability to pay for them means that the burden on women and children for collecting firewood may become less in the rural areas. Wood fuel usage may not fall out completely because of cultural values that may still see people using electricity for lighting and pumping water but still using wood fuel for cooking. Meal preparation times will reduce significantly. The reduced incidences of ALRI will reduce the burden of caring for the sick. Women will spend less time on sourcing energy resources and more time to attend to other chores like working on income generating projects. Poverty will generally go down. Improved communication and use of Internet facilities will broaden the horizon and ideas from all people in the rural communities and this should reduce poverty. However, with access to electricity women may do more and sleep later than normal doing other jobs such as ironing or sewing. The children, especially the girl child, will have more time to concentrate on schoolwork and get better opportunities to improve their live and prospects for prospering in their chosen career paths.

2.3.4 Health

There will be reduced incidences of ALRI because of the switch to other energy sources such as electricity. Dissemination of information on improved biomass stoves that are more efficient and the risks of IAP should also further reduce the incidences of ALRI. Malnutrition should also go down because of the income generating activities that will ensure that there is enough food for people to live on. Due to reliable energy sources rural communities will be able to benefit from health programmes on TV and radio.

2.3.5 Forestry

The use of alternative sources of energy which include electricity, LPG, kerosene and other renewable sources of energy should also reduce the demand on woodfuel and eventually again reduce the effect on deforestation. The tree-planting programmes can also be managed better, given the required resource and intensified especially in areas such as the Seke communal lands where the land has become bare due to the need for firewood.

2.3.6 Policy options

- Planning of the afforestation programme
- Work on the distributional channels of LPG and kerosene so that they reach all people including the rural communities
- Work on verification of dissemination of information on IAP and risks on ALRI, draw up programmes to encourage people to use more efficient biomass stoves, regional programmes may be embarked on since there are similarities in wood usage patterns especially in the sub-Saharan African countries
- Have Ministries join hands on common issues such as the Ministry of Environment, The Ministry of Health, Ministry of Natural Resources and the Ministry of Energy and Power Development on biomass energy
- Plan for expansion of grid electricity to cater for all Zambians.
- Use the most effective way of electrifying areas
- Promote energy efficient utilisation of energy resources
- Promote community participation in management of energy resources to enhance sense of belonging
- Encourage downstream usage of electricity especially to the beneficiaries of the REA to embark on income generating projects
- Encourage use of clean energy technologies

Closure

The issues that have to be addressed in the Zambian situation include putting in place mechanism to provide a wider choice of energy forms to all people, encourage downstream income generating activities once the energy forms are available to eradicate poverty. There is need to look at all distribution channels and pricing policies of the energy forms to make them affordable to all people. There is also need to address the risks of IAP, levels of IAP and ways of reducing the risks to households. There is need to look closely at the link between failure to access certain energy forms and the impact on poverty and address this.

The setting up of the Rural Electrification Authority brings a ray of hope that rural electrification can be accelerated. There is also great need to promote public and private sector partnership in the development of the energy sector in Zambia. Deliberate policies have to be made to attend to the needs of the poor especially those in rural areas where they have a very limited choice of energy resources. Policies have to be developed to promote the usage of affordable alternatives to charcoal. Energy should be used as a catalyst for economic advancement especially with the excess hydropower capacity.

References

www.sparknet.info

Ministry of Finance and Planning-Zambia First PRSP Implementation Progress Report January 2002-June 2003

Appendix A Overview of scenarios

Please do not be constrained by the space available here. The table will expand as necessary and will probably span a number of pages

Criteria/Issue	A: Business as usual	C: Best case economy and co-operation	D: Worst case economy and co-operation
<p>Current situation – short summary: What are the key issues / constraints which you have identified within your country regarding provision of household energy at the current time – particularly with regard to health, gender and forestry?</p>	<p>Foreign currency shortages slowing down the RE drive, limiting purchases of LPG & kerosene and slowing down new urban connections onto the grid and hence limiting fuel choices available to users. Insufficient funding to promote other technologies such as biogas & ethanol gel and disseminate information on IAP. High unemployment levels and a high percentage of people living below the poverty datum line making other forms of energy unaffordable to some people. Women and children burdened with firewood collection and spending long hours in the kitchen and being at more risk of suffering from ALRI. Communication problems in some areas because of lack of access to other forms of energy. Use of biomass in inefficient stoves leading to rapid deforestation.</p>		
<p>What are the impacts on Fuel Choice for household energy under BAU and worst case / best case scenarios for the economy and regional co-operation over the next 10-15years?</p>	<p>Very limited choice, biomass widely available in both rural and urban areas. Electricity available but sometimes not affordable to some poor consumers.</p>	<p>Wide choice of energy form to choose from. Alternatives include electricity, LPG, kerosene and ethanol gel. Role of wood fuel still significant because of cultural considerations. Wide use of improved and more efficient biomass stoves.</p>	<p>Limited choice of energy form alternatives. Biomass most available to all classes of people. Reduced access to electricity.</p>
<p>What are the impacts on Fuel Access for household energy under BAU and worst case / best case scenarios for the economy and regional co-operation over the next 10-15years?</p>	<p>Limited access to electricity in the rural areas despite the RE drive because of affordability and inability to secure enough foreign currency to buy all equipment and accessories required by the REA to electrify all intended institutions. Shortages of LPG and kerosene because of foreign currency shortages. Distances to collect firewood increasing in most areas. Inability to make people switch from the traditional biomass stoves to more efficient ones</p>	<p>Large percentage of the population will have access to electricity due to the RE drive and ability to clear backlog on new connections in urban areas. With the grid now extended to all rural districts in Zimbabwe, access can go up to as high as 80%. The expansion of the generation output of Hwange and Kariba power stations should also increase security of the supply. Regional co-operation which can also ensure that the cheapest potential power</p>	<p>Limited access to electricity in the rural areas despite the RE drive because of affordability and inability to secure enough foreign currency to buy all equipment and accessories required by the REA to electrify all intended institutions. Shortages of LPG and kerosene because of foreign currency shortages. Distances to collect firewood increasing in most areas. Inability to make people switch from the traditional biomass stoves to more efficient ones</p>

Criteria/Issue	A: Business as usual	C: Best case economy and co-operation	D: Worst case economy and co-operation
		generation points in the region are developed may make electricity relatively cheaper and affordable to more people. Development of the small hydro-stations in identified sites. Use of solar home systems in areas that are difficult and expensive to extend the grid to.	
<p>In the left hand side boxes below, review specialist paper and others and identify issues which will be impacted by the changes identified above</p>	<p>In each of the boxes below, jot down points on the relevance, developments, implications of each of the scenarios on the issues raised in the left hand column.</p>		
Health Issues - impacts on health	Prevalence of IAP and the risks of ALRI. Malnutrition in rural areas as women and children spent more time collecting firewood and preparing meals with limited time for income generating projects	Reduced IAP risks. Improved nutrition because of less time spend in firewood collection and food preparation which will leave more time for income generating projects. Malnutrition related disease levels will go down	Prevalence of IAP and the risks of ALRI. Malnutrition in rural areas as women and children spent more time collecting firewood and preparing meals with limited time for income generating projects
Health Issues - policy options on health	Regional drive to work on IAP levels, creating awareness on IAP and ALRI and promotion of use of efficient biomass stoves and ventilation requirements in kitchens	Regional drive to work on IAP levels and continued dissemination on ALRI and promotion of use of efficient biomass stoves (cultural considerations may still see wood fuel playing an important role even when electricity is available)	Regional drive to work on IAP levels, creating awareness on IAP and ALRI and promotion of use of efficient biomass stoves and ventilation requirements in kitchens Put in place mechanisms to provide access to cleaner energy sources that have reduced risk to users
Gender Issues - impacts on gender	Women and children spend much time in collecting firewood and preparing meals. Higher risk of women and children of catching ALRI due to exposure to IAP for longer periods. Burden on women of looking after the sick caused	Women and children will have more time to concentrate on other income generating activities because of reduced time to collect firewood and for meal preparation. Fewer IAP risks and reduced burden of caring for the sick.	Women and children spend much time in collecting firewood and preparing meals. Higher risk of women and children of catching ALRI due to exposure to IAP for longer periods. Burden on women of looking after the sick caused

Scenario Outlines

Criteria/Issue	A: Business as usual	C: Best case economy and co-operation	D: Worst case economy and co-operation
	by ALRI which increases poverty	Empowerment of women through income generation and by starting up micro-enterprises.	by ALRI which increases poverty
Gender Issues - policy options on gender	Empowerment of women by availing wider choices of energy forms that do not take too much of their time. Where there is access to electricity, encourage starting up of micro-enterprises Look at the barriers of the girl child in furthering education for betterment of her future	Assistance of women in availing starting capital for income generating projects. Policies to assist and encourage all that benefit from the RE programme to put energy to improve livelihoods through starting up of micro-enterprises.	Empowerment of women by availing wider choices of energy forms that do not take too much of their time. Where there is access to electricity, encourage starting up of micro-enterprises Look at the barriers of the girl child in furthering education for betterment of her future Looking at tariff structures and classes to enable the disadvantaged to afford the different energy forms
Forestry Issues - impacts on forestry	Rapid deforestation as people from both urban and rural areas look for firewood	Reduced deforestation	Rapid deforestation as people from both urban and rural areas look for firewood
Forestry Issues - policy options on forestry	Enforcement of the forestry protection laws by ensuring that people have access to and can afford other forms of energy	Enforcement of the forestry protection laws Encourage switching to other energy forms to discourage people from using wood fuel.	Avail funds to develop the small hydro where possible. Look at distribution channels for provision of all energy forms