

FORESTRY AND ENERGY

CONTRIBUTION OF CHARCOAL EXTRACTION TO DEFORESTATION:

1.0: Introduction

In Tanzania forests and woodlands cover about 34 million hectares (Hurskainen, 1996; URT, 1998). These forests have unique environmental and biodiversity values, and made available a wide range of products for subsistence use. The most predominant use of wood is in the form of firewood and charcoal by the majority of Tanzanians in both rural and urban areas. Firewood is preferred in rural areas simply because it is obtainable free of charge.

Fuelwood accounts for 92% of the primary energy consumed in Tanzania while petroleum and electricity account only for 7% and 1% respectively (Ishengoma & Ngaga, 2001). Most of the industrial wood energy is consumed by small-scale industries which include food processing industries and service sectors such as brewing, fish smoking, salt production, baking, restaurants, schools, hospitals and food vending; agro-processing industries such as tobacco curing, tea drying and beeswax processing; and production of building materials such as burnt bricks, lime, smiths, foundries, pottery and ceramics. These industries and domestic activities, which rely upon wood energy, provide employment and income for rural people particularly during off-season in agricultural production (Monela & Kihyo, 1999).

The Tanzania energy policy of 1997 stresses on development and use of indigenous energy sources such as bioenergy, coal, natural gas and

hydropower (URT, 1997). The majority of woodfuel consumers cannot afford the high investment costs associated with alternative commercial energy sources (Moyo *et al.*, 1993). Availability, reliability of supply and cheaper prices renders wood fuels more preferable than alternative sources of energy.

2.0 General information

Charcoal is commonly used as a source of domestic energy in Tanzania, particularly in urban centers. Some of the factors influencing the choice of using charcoal instead of fuel wood in urban areas include;

- Charcoal has a higher calorific value per unit weight than fuel wood (About 31.8 MJ per kg of completely carbonized charcoal with about 5 percent moisture content as compared to about 16 MJ per kg of fuel wood with about 15 percent moisture content on dry basis).
- Due to its high calorific value per unit weight, it is more economic to transport charcoal over longer distances as compared to fuel wood.
- In storage, charcoal takes less area hence make it easy to store as compared to fuel wood.
- Charcoal is almost smokeless and sulphur – free, as such it is ideal fuel for towns and cities.
- Charcoal is not liable to deterioration by insects and fungi which attack fuel wood.

Due to the above factors, charcoal is expected to continue to be a major source of domestic energy in the urban and peri-urban areas of Tanzania for the near future. Low income by the majority of charcoal users and unavailability of affordable alternative energy sources are also make people to rely on charcoal.

Based on 1999 estimates the Tanzania urban population was estimated to be 7.964 million people (Bureau of Statistics 2000). It is estimated that around 85% of the total urban population are using charcoal as their main source of domestic energy. Charcoal is also widely used by food vendor, restaurants and institutions.

Various charcoal consumption studies in the urban areas of Tanzania have indicated that average annual charcoal consumption per family is around 1080 kg at the rate of 3 bags of about 28 kg each per month (World Bank 1988, Kimaryo 1989). Family size is estimated at 6 members as such the per capita annual charcoal consumption is around 180 kg. At the average consumption rate of 180 kg per annum per capita, the total amount of charcoal consumed in Tanzania in 1999 was estimated to be around 1,206,000 tones or 43.1 million bags of 28 kg each. However, simple earth kilns with low recovery rate are widely used for charcoal production in Tanzania. Research on charcoal production has shown that on average one cubic meter of firewood produces 2-3 bags of charcoal by using earth kilns. Therefore a total of 14.37 million m³ of fuel wood are used to produce the estimated 43.1 million bags of charcoal. Net deforestation due to charcoal production is therefore estimated at 369,514 ha for 1999 alone, just as an example.

3.0 CHALLENGES

- **Lack of awareness on available technologies and services:** Lack of awareness due to lack of information is identified as a major obstacle to the spread of improved energy service/technologies in rural areas. This applies to users, suppliers, and energy planners.

- **Lack of capital and credit facilities:** Unavailability of credit is one of the reasons for lack of initiative and development. Specific credit facilities might be instituted to target certain areas of renewable energy expansion.
- **Lack of training opportunities:** In order to promote, spread, manufacture, and maintain energy saving stoves, there is a need for skilled personnel.
- **Poor infrastructure and institutional framework:** Ministries, institutions, organizations and private companies have a role to play as far as rural energy issues are concerned. Unfortunately, there is a weak institutional framework governing energy services among the existing stakeholders.
- **Poor management of wood-based biomass energy resources:** Demand for wood fuel in Tanzania is alarming and in some areas, there is already a wood fuel deficit. Forests are depleted through demand for fuel wood in both rural and urban households and conversion into permanent cropland.
- **Variations in the Prices of Petroleum Products:** Virtually the only aspect rural people come to face is the cost of kerosene, the major lighting fuel. Kerosene is generally the second most important fuel after diesel. Price variations in the two fuel types affect the demand patterns.

- **Limited Access to Electricity and Low Consumption:** High connection fees and tariff; geographical; economic and financial limitations affect the wider use of electricity. The up front connection fee for a service line is around TZS.105,000.00 (~US\$ 130). The estimated average tariff per unit kilowatt-hour is about Tshs.82.40 (~US\$.0.103).

4.0 WAY FORWARD

Charcoal will remain a dominant source of energy for the urban household sector in Tanzania. Currently the charcoal industry seems to function well, through an informal system based on market forces.

- **Co-ordination and Monitoring**

Appropriate legal mechanism should be put in place to enhance the role of GoT to play a greater role in this very important energy source. The government should monitor on an ongoing basis, the activities of the charcoal industry such as price trends, volumes of production and consumption. This should be done in conjunction with other relevant stakeholders in charcoal production and distribution.

- **Management and Sustainability of the Forest Resources for Charcoal Production.**

Sustainable utilisation of the indigenous forest resources for charcoal production depends on better management and planning. More trees are being grown on community and public lands as a way of reducing pressure on miombo woodland and promote their conservation. Also, concerted conservation efforts are being made by the GoT in collaboration with relevant

stakeholders through participatory management approaches to enhance sustainable management of forest resources

- **Revenue Collection**

The government should devise an effective method of charcoal revenue collection. The charcoal industry countrywide could raise more than 100 billion shillings as revenue. In doing this, it will be necessary to take into account the interests of various actors such as the Forest Department, local communities, producers, etc. The aim should be to create a system whereby each actor holds a stake and revenue collected is ploughed back to improve the management of resources and the functioning of the system.

- **Supply Stabilisation**

Seasonal fluctuations in the supply of charcoal especially during the rain season have a major impact on the price of charcoal. Possibilities of encouraging private sector to institute storage depots should be assessed.

- **Alternative Fuels**

Electricity and kerosene can meet part of the household energy demand that is now predominantly met by charcoal. The extent of use of these alternative fuels should be left to market forces to determine their economic viability and social acceptability.

- **Technology**

Present charcoal production kilns are very inefficient. Charcoal producers should be trained on improved charcoal production skills. Deliberate efforts should be made to ensure wide scale adoption of improved charcoal stoves. The thermal efficiency of commonly used metal charcoal stoves in Tanzania is reported to range between 12-15 percent (World Bank 1988, TFAP 1989,

Kaale 1985). Improved ceramic charcoal stoves with thermal efficiency of about 25 percent have been introduced. The outreach of improved charcoal stoves is reported to be around 20 percent in urban areas, mainly in Dar es Salaam (TaTEDO 1998). Low extension services on production and wide use of improved stoves have been identified as the main hindering factor to wide use of improved charcoal stoves.

- **Fuel wood stoves**

Thermal efficiency of the commonly used three stone fuel wood stoves in Tanzania is reported to be within 7-12 percent. Efforts have been made to improve the thermal efficiency of fuel wood stoves to around 20 percent. Various models of improved firewood stoves have been introduced in most regions using women groups as the main target. However, outreach of improved fuelwood stoves is estimated to be around 10-15 percent of the total rural households (IUCN 2000, Maagi et. al 1997, Africare 1999). Recent woodfuel studies in Tabora, Rukwa, Coast and Mwanza regions have reported that majority of rural women are interested to use improved fuelwood stoves, but they lack skills and technical assistance on how to construct the improved fuelwood stoves. Shortage of extension service has been identified as the main cause hindering wide adoption of improved fuelwood stoves in rural areas (IUCN 2000, DANIDA 1999, Africare 1999). NGOs, CBOs and the private sector are encouraged to promote wide use of improved fuelwood and charcoal stoves as most of them are operating at local level with target groups close contact. Wide adoption of improved fuelwood stoves could minimize fuelwood consumption in the rural areas.