ROLE OF UNEP IN RENEWABLE ENERGY DEVELOPMENT IN AFRICA

Dr Yehia ElMahgary
Senior Programme Officer in Charge of Energy
United Nations Environment Programme
Nairobi, Kenya

INTRODUCTION

In Africa commercial energy consumption is relatively low, reflecting the low level of industrialisation and general low economic development. Consumption of commercial energy in Africa is typically concentrated in urban areas, where the beneficiaries are mainly industry, the commercial sector and those few belonging to the upper and upper-middle class societies. In rural areas and in urban slums, where the vast majority of the population live, most household's energy needs are still met by non-commercial energy such as fuelwood, agricultural residues and animal manure, as well as by human and animal power. Although no reliable regional statistics exist on the current use of non-commercial sources of energy, estimates indicate that these energy resources occupy more than 60 per cent of the total energy consumption in Africa. In Ethiopia, Sudan, Kenya and Nigeria, about 90 per cent of the population depend on fuelwood.

The consequences of heavy reliance on these non-commercial fuels are expanding deforestation, devegetation, declining water table, soil erosion, silting, and flooding as forests are destroyed - and rising prices for wood and charcoal. Where wood or charcoal are marketed, families may spend as much as 25 per cent of their household budget for cooking fuel, as is the case in parts of West Africa. Most fuelwood, however, never enters the market place. In central Tanzania, providing a family's annual firewood requires between 250 and 300 days of labour. And in parts of Upper Volta, women spend an average of four and a half hours a day for hunting for fuelwood. Since the burden of firewood collection almost always falls on women and children, critical but unpaid household tasks such as nutrition, sanitation and education suffer.

The cost of this mounting burden shows up not in conventional economic indicators, but in indices of infant mortality, disease and illiteracy. Recently, attention has been given to the development of technologies for the better harnessing and more efficient use of these non-commercial sources of energy and other renewable energy sources. This is increasingly being integrated into broader rural development programmes through the provision of adequate sources of energy.

International agencies have an important contribution to make to this process, through creating a forum for transfer of ideas, technology and training and also through promoting and supporting demonstration and pilot programmes. The work of UNEP in promoting renewable energy programmes to combat deforestation and desertification is offered as an example of the role of international agencies.

UNEP's ACTIVITIES ON RENEWABLE ENERGY SOURCES IN AFRICA

Great potential exists in Africa for the development of several renewable sources of energy. The development of one or more of these resources will vary

from one country to another depending on site suitability, natural resources, climate, manpower resources and national policies. Unfortunately, policy-makers tend to believe that "large" is beautiful. Priority is nearly always given to constructing large power plants rather than small decentralised plants based on renewable sources of energy.

UNEP's Energy Unit has followed a three pronged approach to alleviating deforestation and erosion. This includes the development and demonstration of appropriate renewable sources of energy using locally available resources as solar, wind, biogas, gasifiers and mini hydro-power.

Solar energy could be harnessed in several ways. Photovoltaic systems enable the conversion of one of the world's most abundant and wide spread energy resources into one of the most versatile and valuable forms of energy. In a photovoltaic cell solar energy is converted directly to electricity. Photo-voltaic systems offer individuals an opportunity to generate their own electricity. In Senegal, photovoltaic systems have proved their feasibility, reliability and environmental soundness. In Niaga Wolof in Senegal, a system of 5kW peak, produced between 16 and 23 kW hour per day of solar energy. This has been used in house lighting, running individual pieces of equipment like refrigerators, radios, televisions, in public lighting of the streets and in providing electricity for commercial equipment. Drinking water is now available, thanks to electricity provided by solar energy.

In Niaga Wolof in Senegal, windmills were used to produce electricity which was then stored in batteries and used in the same way as the electricity produced from solar energy. Two blade windmills produce from 40 to 87 kW hour per day depending on the average wind spread in each month.

Apart from substitution of fuelwood by other renewable energy resources, the improvement of the current extremly low efficiency of fuelwood stoves and open fires represents the second approach of UNEP to the main goal of decreasing fuelwood consumption. Several fuelwood stoves currently in use in Indonesia and rural areas were tested. Although fuelwood stoves have been constructed and used for a long time, only a few of them are efficient and very few are environmentally-sound. In Ruiru in Kenya, UNEP co-sponsored a project for the construction, testing and distribution of efficient, environmentally-sound and socially acceptable fuelwood stoves. The project included the construction of different types and their testing for efficiency within households in a village in Ruiru.

The women who are the real users of these stoves were then asked which type they preferred, thus ensuring the social acceptability of the stove. The villagers were then trained on the construction, operation and maintenance of the selected types.

The workshops currently produce two types of stoves. The first is round without a chimney, which take one pot supported by three bricks protuding from the stove's inside walls. The second takes two pots secured in the stove by a ring around their edge and has a chimney. It is called a "pogbi" stove, but in spite of its bigger size, still uses a very small firebox.

It is designed so that the fire has to go around the (first) pot. Then it goes through a hole in the next compartment. The hole leading to the chimney at the other side has a fire break in front of it, so that the flames have to go all around

both pots before exiting through the chimney. Thus, the "seeret" of this technology is that the body of the cooking pot is completely immersed in the stove and the heat generated by the firewood does not have a direct escape route to the open air. Even when the firewood is used up in these stoves the clay retains the heat.

For the many families which now buy their fuelwood, the higher initial cost of such efficient and environmentally sound stoves should not be discouraging. The savings on fuelwood outstrip the capital cost in a relatively short period. Subsidies and loans for these families could be an effective investment.

Similar projects for the construction of efficient and environmentally-sound stoves was also launched by UNEP and CETEC in Bolivia and Brazil.

The third approach to alleviating the problem of fuelwood is a direct one through plantation of fast growing tree species. Several fast growing species have been tried in different countries. Leuceaua was found suitable in the Philippines wheras Kaliandra was recommended in Indonesia. Different species including Jacaranda, Acacia and Eucalyptus were found suitable to relatively higher altitudes in Kenya.