

GUEST EDITORIAL

RENEWABLE ENERGY AND DEVELOPMENT

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Due to concerns about burning fossil fuels, which is the principal cause of carbon dioxide accumulation in the atmosphere and by inference the main catalyst for global warming, there is a concerted effort to increase the share of renewable energy worldwide. In addition, for truly sustainable development, most energy will have to be renewable.

By far the largest current form of renewable energy is from so called 'traditional' biomass—wood, crop residues and dung—used mainly by people in developing countries for household cooking (an estimated 500 million households), the service sector and by (rural) industries to manufacture charcoal and to provide heat, steam and electricity for crop drying, food processing, brick/tile and ceramic manufacture, and beverage production. Final renewable energy consumption accounts for 18% of total energy use in 2006 of which 13% or nearly three quarters is traditional biomass (Ren21 2007).

However, most investment in renewable energy is for so-called 'modern' uses—water, wind and solar, which are used mainly for electrical generation, and liquid fuels for motive power such as biodiesel from palm oil and ethanol distilled from sugar/molasses. These 'new renewables' are capital intensive and have the largest investments in developed countries.

There are an estimated 350 million households without electricity in developing countries and it is a priority of governments and aid agencies to electrify these houses. While this will improve the quality of life by providing illumination and enhance the livelihood potential, electricity is an expensive cooking fuel and would require massive capital investments to meet peak power demands. The only practical substitutes for cooking are kerosene, natural gas and liquid petroleum gas (LPG). While these are more convenient to use, many (rural) households still collect their fuels and cannot afford to purchase kerosene, etc. for cooking. This is a dilemma for

energy planners: should they encourage the use of fossil fuels by subsidies or should they promote renewable biomass fuels, for example through intermediate and end-use efficiencies?

Although biomass is considered to be 'non-commercial', in many African countries it is the most important traded fuel in terms of energy, employment and value. Based on information from studies undertaken in Africa, about 13 million 'full-time' people were employed in traded woodfuel in sub-Saharan Africa alone in 2008 and may be over 30 million for developing countries, of which an estimated 15 million are woodfuel producers, 4.5 million transporters and 10.5 million traders (Openshaw 2009). By way of contrast, for 2006, the employment generated by the 'formal' forestry sector in roundwood production, wood processing and pulp and paper in developing countries is an estimated 8.4 million (FAO 2009). These figures illustrate the importance of the 'informal' woodfuel sector. If one goal is poverty alleviation, then promoting traded biomass energy should be vigorously pursued!

Globally, 53% of forests products (1.9 billion m³) are woodfuels and for tropical countries (excluding China), 80% (1.4 billion m³) is wood energy in 2006 (FAO 2009). Of course, fuelwood and charcoal come from most landuse types. Indeed in many countries, trees outside the forest, crop residues and dung provide the bulk of biomass energy. Some foresters pay little attention to wood energy and many planners maintain that its use is a principal cause of deforestation. However, for tropical countries as a whole, the annual growth of woody biomass on all landuse types is three to four times the annual demand. There are pockets of shortage, but with improved forest access, management, marketing, training, tree planting and local governance the use of wood and non-wood forest products (NWFP) in all forms could be increased. In fact, NWFP are another important source of income

for rural people and many are exported for cosmetics, industrial use, medicine and food such as shea butter (from *Butyrospermum parkii*), gum Arabic (*Acacia Senegal*), Malva nut (from *Scaphium macropodium*/*Sterculia lychnophora* trees—a popular medicine in China) and bamboo shoots.

The principal cause of deforestation is clearing land for subsistence agriculture and cash crops. This is in response to a three-fold population increase in tropical countries over the past 50 years, reaching over 4 billion today (excluding China)—this could reach 6 billion plus by 2050! Despite the ‘green revolution’, agricultural productivity, especially in Africa, has not kept pace with population increase. Therefore, there has to be a concerted effort to increase agricultural productivity if deforestation is to be reversed. The last G8 summit in Italy (10 July 2009) issued a statement on global food security (University of Toronto 2009), in which it pledged an additional USD20 billion over the next three years for sustainable agricultural development, especially on small farms. If such funds are forthcoming, this may help reduce deforestation and make ‘forestry’ interventions such as REDD (Reduced Emissions from Deforestation and Degradation) and those under the CDM (Clean Development Mechanism) more meaningful. One of the few positive outcomes of the December 2009 ‘UN Global Climate Summit’ in Copenhagen was a pledge of USD30 billion over three years from developed countries to help poorer countries mitigate climate change. Some of this money will go to REDD. It is hoped that some will also go to help increasing agricultural productivity.

Meanwhile, forest and agricultural services, NGOs and donors can help by promoting tree planting, such as shelterbelts and hedges, and especially agroforestry trees on farms, marginal land and abandoned areas. Above all, they must provide improved seeds and seedlings to rural people and train fuelwood and charcoal producers to sustainably manage the wood resource, while promoting more efficient and less polluting stoves, etc. Providing more opportunities for rural people to expand their production and use of biomass energy and NWFPP could increase their cash earnings, decrease poverty and reduce deforestation.

Turning to the modern use of biomass energy, plant oil from *Jatropha curcas* is being promoted as a biodiesel feedstock. However, it should be cautioned that its productivity depends on the amount of available water and nitrogen. Inter-planting this tree with nitrogen-fixing species could maintain productivity but in many cases the money received from selling jatropha fruit may be marginal. There is a neglected ‘alcohol’, namely, methanol or wood alcohol that can be used as motor fuel or turned into petroleum products. This is made by the destructive distillation of biomass waste and, therefore, does not compete with food crops such as maize. Local people could collect such waste but of course methanol production, like ethanol manufacture, is capital intensive.

While the promotion of modern biomass is receiving priority, it will do little to help the bulk of poor people living in tropical countries. Modest investments in time, money, good governance and policy reform could reverse the deforestation trend. Bringing the poor into partnership with government and providing more opportunities to earn money from all aspects of tropical forests, plantations, woodlands and trees outside the forest could reap great environmental and economic rewards and help alleviate poverty.

REFERENCES

- FAO (FOOD AND AGRICULTURE ORGANIZATION). 2009. *State of the World's Forests 2009*. FAO, Rome.
- OPENSHAW K. 2009. *Biomass Energy: Employment Generation and Its Contribution to Poverty Alleviation*. Elsevier Publications, Oxford. <http://www.sciencedirect.com>
- REN21. 2007. *Renewables Global Status Report 2007*. REN21 Secretariat, Paris.
- UNIVERSITY OF TORONTO. 2009. *Report on G8 Summit, L'Aquila, Italy*. G8@utoronto.ca.

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