

cent and sometimes more of the total energy used. In many areas there is now an acute and growing shortage of firewood, with the attendant problems of deforestation and soil erosion. There is an urgent need to attack this problem. There are several approaches that are already in hand in many developing countries but the present effort is not strong enough to avoid the onset of actual crises in many countries in the Sahel, Nepal and others.

The following types of programs will continue to form part of the Canadian initiatives in this field.

- i) To introduce ways and means of increasing the efficiency with which traditional fuels are used;
- ii) To set up reforestation and afforestation programs and to attempt to increase yields;
- iii) To rationalise firewood and charcoal supply industries;
- iv) To check the feasibility of fuel delivery from remote locations and to implement viable systems;
- v) To find substitute fuels or methods of displacing the need for firewood;

Biomass Energy Combustion and Conversion Systems

New sources of feedstock for all the principal processes for the conversion of biomass should be investigated, among them crop residues and aquatic plants. The types of loads which these systems might serve must also be identified. The International Development Research Centre in Canada has carried out a state-of-the-art study on biomass conversion systems; this review has drawn attention to the following recommended lines of research in relations to developing country needs:

- (a) Investigation of new feedstocks, including crop residues and aquatic plants;
- (b) Investigation of new microbial strains for anaerobic digesters;
- (c) Study of the chemical engineering aspects of digesters in order to reduce cost;
- (d) More investigation of the use of carbohydrates as feedstocks for fuel alcohol production (the inter-relationship between energy and food production must be carefully considered);