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Energy from Biomass

Many countries are showing increasing interest in obtaining larger fractions of their energy from biomass. Their efforts were described when leading experts in bioenergy from 76 countries met on 21 to 24 April in Atlanta to conduct a World Congress and Exposition on Bio-Energy. At the meeting it was evident that Brazil, China, Sweden, and the United States are leaders in the field. The Brazilian program is impressive, especially in the production and use of alcohol. At present, most Brazilian automobiles burn gasohol, which in their case usually contains 20 percent alcohol. But the Brazilians are moving beyond gasohol to employ only alcohol as a motor fuel. This year, Brazil plans to build 250,000 cars that are designed to burn alcohol and will convert another 70,000 or 80,000 existing automobiles to use it. The source of their fuel is fermentation of sugar from sugarcane, and scores of distilleries are being built in rural areas. The Brazilians are also looking to other sources such as cassava roots and eucalyptus trees.

Another interesting effort to expand the use of biomass is being made by Sweden, which is in the initial stages of a program to shift away from 70 percent dependence on imported oil. The Swedes face a very difficult situation; they have no coal, no oil, no natural gas. Prudence and economics dictate that they adapt to other energy sources. Fortunately, a large area of the country is covered with trees. At the congress they stated that there is sufficient forest potential to shift to wood as a prime source of energy, and they can even visualize that the gross national product could increase while they do so. They plan to grow fast-rotation trees that can be harvested every 3 to 5 years and are experimenting with willow and birch. The trees are mowed down and the wood is collected in the winter. The next spring, new shoots arise from the stumps, so that the tree does not have to use energy in establishing a new root system.

The efforts of the People's Republic of China to produce methane from biomass wastes are very impressive; they have about 7.5 million biogas installations. In many developing countries, a shift to production of biogas methane would take away pressure to use forest products. One of the dark things that is happening today in many countries is that the forests are being cut down for cooking fuel, with consequent deforestation and ultimate soil erosion. In the southern part of the People's Republic of China, replacement of wood with methane derived from human and animal wastes helps make it feasible to have a program of reforestation.

In the United States we are conducting at least 600 or 700 different research and development projects that are aimed at increasing use of bioenergy. New results are being obtained, but to me the most impressive thing at this conference was the display of equipment at the exposition. Particularly noteworthy was a machine that could reduce a sizable tree, branches and all, into chips, each about the size of a dollar, in about 30 seconds. Other pieces of equipment were designed to handle the collection and processing of biomass. One item was a portable device that encompassed all phases necessary to obtain alcohol from grain, including grinding, making the mash, fermenting it, and distilling the alcohol.

One of the problems of processing biomass is that the material usually must be collected and hauled to a production plant. Transportation costs can be high. Why not bring the processing to the biomass? It was amusing to see an exhibit of a piece of mobile equipment that could pyrolyze crop waste residues to combustible gas, fuel oil, and char. The gas is used to furnish heat and power to the equipment, which is then self-sufficient.

Many of the other exhibits at the exposition were items capable of playing a role in small, decentralized energy systems. These displays made it evident that soon other ingenious and useful devices will be available that will make the processing and use of biomass much easier and more practical, thus facilitating the transition to a larger role for bioenergy.

—PHILIP H. ABELSON