
Part I.

Biomass Resource Base

Chapter 1

INTRODUCTION AND SUMMARY

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The biomass resource base potentially includes hundreds of thousands of different plant species and various animal wastes. In principle, plants can be cultivated anywhere there is a favorable climate with sufficient water, sunlight, and nutrients. In practice, there are numerous limitations, and the most important of these appears to be the soil type for land-based plants and cultivation and harvesting techniques for aquatic plants.

The largest area of underutilized land that is well suited to plant growth is the Nation's forestland. Through more intensive forest management—particularly on privately owned lands—the supply of wood for energy, as well as for traditional wood products, could be substantially increased. However, haphazard wood harvest could cause severe environmental damage and reduce the available supply of wood.

The highest *quality* land suitable for intensive cultivation of plants is the Nation's cropland. The best cropland is dedicated to food production, but there is some underutilized hayland and pastureland as well as land that can be converted to cropland. To a certain extent, grains—especially corn—can be grown for ethanol production and the distillery byproduct used as an animal feed to displace soybean production. More grain can then be grown on the former soybean land. As the ethanol production level grows, however, the animal feed market for the distillery byproduct will become saturated and grass production quickly will become a more effective energy option for the cropland. To a certain extent, environmental damage appears to be practically unavoidable with grain production, but grass cultivation is more environmentally benign.

The candidates for bioenergy crops are numerous, but crop development directed to-

ward energy production is needed to compare the options and to establish cultivation requirements and yields.

In addition to energy crops, substantial quantities of crop residues can be collected and used for energy without exceeding cropland erosion standards.

The third major land category is rangeland, which vary from highly productive wetlands to deserts. Cultivation and harvesting techniques and plant growth are uncertain, and in drier regions the lack of water will limit yields unless the crops are irrigated. However, irrigation greatly increases the energy needed for farming and it is uncertain whether it will be socially acceptable to use the available water for energy production.

Aside from natural wetlands, there are other areas where freshwater plants might be grown and there are vast areas of ocean in which ocean farms might be built. Cultivation and harvesting techniques and crop yields are highly uncertain.

In addition to crop cultivation and residues there is biomass potential from processing and animal wastes. * Most processing wastes currently are used for energy, animal feed, or chemical production, but much of the remainder could be used for energy. Moreover, most of the manure from animals in confined livestock operations could be used for energy.

These biomass sources and various other aspects of the resource base are considered in the following chapters.

*Wastes are defined as byproducts of biomass processing that are not dispersed over a wide area and therefore need not be collected. Residues must be collected.