

Carbon dioxide from the atmosphere and water from the earth are combined in the photosynthetic process to produce carbohydrates (sugars) that form the building blocks of biomass. The solar energy that drives photosynthesis is stored in the chemical bonds of the structural components of biomass. If we burn biomass efficiently (extract the energy stored in the chemical bonds) oxygen from the atmosphere combines with the carbon in plants to produce carbon dioxide and water. The process is cyclic because the carbon dioxide is then available to produce new biomass.

Environmental impacts pose another significant distinction between biomass and fossil fuels. When a plant decays, it releases most of its chemical matter back into the atmosphere. In contrast, fossil fuels are locked away deep in the ground and do not affect the earth's atmosphere unless they are burned.

### **Where can we get it from?**

Wood may be the best-known example of biomass. When burned, the wood releases the energy the tree captured from the sun's rays. But wood is just one example of biomass. Various biomass resources such as agricultural residues (e.g. bagasse from sugarcane, corn fiber, rice straw and hulls, and nutshells), wood waste (e.g. sawdust, timber slash, and mill scrap), the paper trash and urban yard clippings in municipal waste, energy crops (fast growing trees like poplars, willows, and grasses like switchgrass or elephant grass), and the methane captured from landfills, municipal waste water treatment, and manure from cattle or poultry, can also be used.

### **How useful is it?**

Biomass is considered to be one of the key renewable resources of the future at both small and large-scale levels. It already supplies 14 % of the world's primary energy consumption. But for three quarters of the world's population living in developing countries biomass is the most

important source of energy. With increases in population and per capita demand, and the depletion of fossil-fuel resources, the demand for biomass is expected to increase rapidly in developing countries. On average, biomass produces 38 % of the primary energy in developing countries (90 % in some countries). Biomass is likely to remain an important global source in developing countries well into the next century. Even in developed countries, biomass is being increasingly used. A number of developed countries use this source quite substantially, e.g. in Sweden and Austria 15 % of their primary energy consumption is covered by biomass.

In the USA, which derives 4 % of its total energy from biomass (nearly as much as it derives from nuclear power), now more than 9000 MW electrical power is installed in facilities firing biomass. But biomass could easily supply 20% more of US energy consumption. In other words, due to the available land and agricultural infrastructure of the country, biomass could, sustainably, replace all of the power nuclear plants generate without a major impact on food prices. Furthermore, biomass used to produce ethanol could also reduce oil USA imports up to 50%.

### **Environmental Benefits**

The use of biomass energy has many unique qualities that provide environmental benefits. It can help mitigate climate change, reduce acid rain, soil erosion, water pollution and pressure on landfills, provide wildlife habitat, and help maintain forest health through better management.