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A study on the renewable biomass energy in India

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Abstract
This article discusses a comprehensive review of biomass energy sources, types of biomass, Biomass Potential and Availability in India, Technologies involves in biomass production and Biomass Energy in India. This includes all the biomass energy technologies, sources of Biomass, biomass energy technologies. The current literature is reviewed regarding the ecological, social, cultural and economic impacts of biomass technology. This article gives an overview of present use of biomass. However, to be truly competitive in an open market situation, higher value products are required. Results suggest that biomass technology must be encouraged, promoted, invested, implemented, and demonstrated, but especially in remote rural areas

Keywords: Biomass, technologies, rural areas

Introduction
There is strong scientific evidence that the average temperature of the earth's surface is rising. This was a result of the increased concentration of carbon dioxide (CO2), and other greenhouse gases (GHGs) in the atmosphere as released by burning fossil fuels Omer (2008) [1].

The global warming will eventually lead to substantial changes in the world's climate, which will, in turn, have a major impact on human life and the environment. Energy use reductions can be achieved by minimizing the energy demand, by rational energy use, by recovering heat and the use of more green energies. In green energies includes Biomass, which refers to organic matter that has stored energy through the process of photosynthesis. It exists in one form as plants and may be transferred through the food chain to animals' bodies and their wastes, all of which can be converted for everyday human use through processes such as combustion, which releases the carbon dioxide stored in the plant material. Many of the biomass fuels used today come in the form of wood products, dried vegetation, crop residues, and aquatic plants.

Biomass has become one of the most commonly used renewable sources of energy in the last two decades, second only to hydropower in the generation of electricity. It is such a widely utilized source of energy, probably due to its low cost and indigenous nature, that it accounts for almost 15% of the world's total energy supply and as much as 35% in developing countries, mostly for cooking and heating.

Main sources of biomass energy are trees, crops and animal waste. Until the middle of 19th century, biomass dominated the global energy supply with a seventy percent share Grubler and Nakicenovic (1988) [2]. Presently, the biomass sources contribute 14% of global energy and 38% of energy in developing countries Woods and Hall (1994) [3]. Globally, the energy content of biomass residues in agriculture based industries annually is estimated at 56 exajoules, nearly a quarter of global primary energy use of 230 exajoules WEC (1994) [4].

Types of Biomass
Biomass is highly diverse in nature and classified on the basis of site of origin, as follows:
a. Field and plantation biomass
b. Industrial biomass
c. Forest biomass
d. Urban waste biomass
e. Aquatic biomas

Sources of Biomass

Biomass is highly diverse in nature and classified on the basis of site of origin, as follow

Table 1: Sources of biomass

Field and plantation biomass	Industrial bio mass	Forest bio mass
Agricultural crop residues-Cobs, stalks, Straw, Cane thrashes and etc	Agro-industrial processed biomass and their wastes-Husk	Timber Log residues
Edible matters from crops-Environmentally spoiled grains, pulses, fruits, nuts, spices, seeds and lint etc	Oil cake	Forest floor debris
Dedicated energy crops-Bamboo, Prosopis, Casuarinas, Willow and poplar etc	Sugar bagasses Sugar molasses Whey	Animal carcass
Plantation debris-Leaves, stubbles, barks and trunks etc	Hides and skin wastes	
Livestock wastes from fields, slaughter houses and animal husbandries etc	Fruit and pulp debris Saw dust Wood pulp and paper shavings Fermented microbial mass etc	

Biomass Potential and Availability in India

India is the 7th largest country in the world spanning 328 Million hectares and amply bestowed with renewable sources of energy. It has been estimated that India produces about 450 million tonnes of biomass per year, of which about 200 million tonnes is surplus. Biomass tops the list in providing 32% of all the primary energy use in the country. The tables illustrated shows the bioenergy potential of various crop residues in India

Technologies involved in Biomass Energy Production

Biomass is a complex class of feed stocks with significant energy potential to apply different technologies for energy recovery. Typically technologies for biomass energy are broadly classified on the basis of principles of thermo chemistry as combustion, gasification, pyrolysis and biochemistry as anaerobic digestion, fermentation and trans-esterification. Each technology has its uniqueness to produce a major calorific end product and a mixture of by-products. Choice of a processing method often depends on nature and origin of feed stocks, their physio-chemical state and application spectrum of fuel products derived from it.

Biomass Energy in India

India produces about 450-500 million tonnes of biomass per year. Biomass provides 32% of all the primary energy use in the country at present.

EAI estimates that the potential in the short term for power from biomass in India varies from about 18,000 MW, when the scope of biomass is as traditionally defined, to a high of about 50,000 MW if one were to expand the scope of definition of biomass.

The current share of biofuels in total fuel consumption is extremely low and is confined mainly to 5% blending of ethanol in gasoline, which the government has made mandatory in 10 states.

Currently, biodiesel is not sold on the Indian fuel market, but the government plans to meet 20% of the country's diesel requirements by 2020 using biodiesel.

Plants like Jatropha curcas, Neem, Mahua and other wild plants are identified as the potential sources for biodiesel production in India.

There are about 63 million ha waste land in the country, out of which about 40 million ha area can be developed by undertaking plantations of Jatropha. India uses several incentive schemes to induce villagers to rehabilitate waste lands through the cultivation of Jatropha. The Indian government is targeting a Jatropha plantation area of 11.2 million ha by 2012.

Summary

India is 7th largest country in the world and providing large bioenergy potential (450-500 million tonnes per year). Plants like Jatropha curcas, Neem, Mahua and other wild plants are present and identified as the potential sources for biodiesel production in India.

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