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Biomass and Sources of Biomass



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Biomass?

The term "biomass" describes organic (i.e. carbon containing) material. Biomass comprises:

- ❖ Natural phytoplankton and zooplankton (plants and animals),
- ❖ The resulting residues,
- ❖ By-products, and waste (e.g. animal excreta),
- ❖ Dead (not yet fossil) phytoplankton and zooplankton (e.g. straw).





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Biomass Sources

- **Forests:** Eucalyptus, poplar, pine, jojoba, karanj, Jatropha curcas are specially cultivated for the purpose of energy.
- **Agricultural residues:** Straw, rice husk, coconut shell, sugarcane bagasse are gasified to obtain producer gas. Alternatively, these are converted to fuel pellets or briquettes & used as solid fuel.
- **Energy crops:** Certain cultivated plants produce raw materials for biofuels. Eg: sugarcane, sweet sorghum, sugar beet, cassava, Jerusalem Artichoke, maize, barley, sunflower, rapeseed, palm oil, castor oil etc.
- **Aquatic plants :**Some water plants grow faster than land-based plants & provide raw materials for producing biogas or ethanol. Eg: Water hyacinth, seaweed, algae, kelp.
- **Urban wastes:** It is of two types: Municipal solid waste(MSW or garbage), and Sewage(Liquid waste). Energy from MSW can be obtained from direct combustion(incineration) or as a landfill gas. Sewage can be used to produce biogas after some processing.

Biomass Sources



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Rice Straw

Rice Husk

Paper Mill Waste

Bark

Sawdust



Peat

Wood Chips

Nut Shells

Wheat Straw

Bagasse

Olive Stones



**Corn Cobs
and Stalks**

**Forest
Residue**

Cotton Stalks

**Cotton Ginning
Solid Waste**

Energy Crops



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Biomass Sources



Putranjiva roxburghii



Schleichera triguga



Thevetia peruviana



Madhuca indica



Simmondsia chinensis



Melia azedarach



Cerbera odollam



Calophyllum inophyllum



Sapindus mukorossi



Hevea brasiliensis



Argemone mexicana



Azadirachta indica



Ricinus communis



Pongamia pinnata



Jatropha curcas



Deoiled cake



Algae

Non edible seed



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USABLE FORMS OF BIOMASS

- Fuel wood
- Charcoal
- Fuel pellets & briquettes
- Bio-diesel
- Bio-ethanol
- Biogas (Methane(50-60%), Carbon dioxide(30-40%), Hydrogen(5-10%), Nitrogen(.5-.7%), Trace amounts of oxygen & hydrogen sulphide.)
- Producer gas (Carbon mono-oxide(19%), Hydrogen(18%), Methane(1%), Carbon di-oxide(11%), Nitrogen(51%))
- Bio oil/ pyrolysis oil



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Biomass Conversion Technology

- Basically, grouped into four types:
- Physical method (Pallitilization, Briquetting, Expelling)
- Incineration(Direct method)
- Thermo-chemical methods (Pyrolysis, Gasification, Carbonization, Liquefaction)
- Biochemical method (Fermentation and anaerobic digestion)
- Transesterification



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Uses of Biomass

- 80% of biomass energy is produced for residential use.
- 79% of the biomass we use today comes from burning wood and chips.
- Biomass is used to heat homes, Wood is burned in open fires or wood pellet boilers and stoves.
- 18% of biomass is produced for industrial use.
- 2% of biomass energy is produced for transport.



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Advantages of Biomass

The main Advantages of Biomass are:

- Biomass is a renewable fuel source.
- Biomass energy production results in minimal environmental impact.
- Employment generation in rural areas.
- Alcohol fuels are efficient and clean burning.
- The availability of biomass fuels is universal.



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Disadvantages of Biomass

- When combusted to produce energy it contributes directly to global warming.
- An expensive source to produce and convert.
- On a small scale there is a likely net loss in energy; as energy must be put into grow the plant mass.



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The future of Biomass

- Infinite fossil fuel resources are depleting.
- Our dependency on oil must be reduced.
- Renewable forms of energy generation will be required to serve the global energy requirements.
- Ireland has a goal of 16% use of renewable energy by 2020 (3.9% in 2008)
- Today it accounts for 10% of the world's energy consumption.



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THANK YOU

