

Biomass Energy

Slide	Index
1	Introduction
2 – 3	Biomass Energy:
2	What is Biomass?
3	Resources
4 – 9	Uses of Biomass:
4	Schematic Representation
5	Combustion (Electricity)
6	Combustion (Heating & Cooking)
7	Anaerobic Digestion (Biogas)
8	Fermentation (Biofuel)
9	Mechanical Processing (Biodiesel)

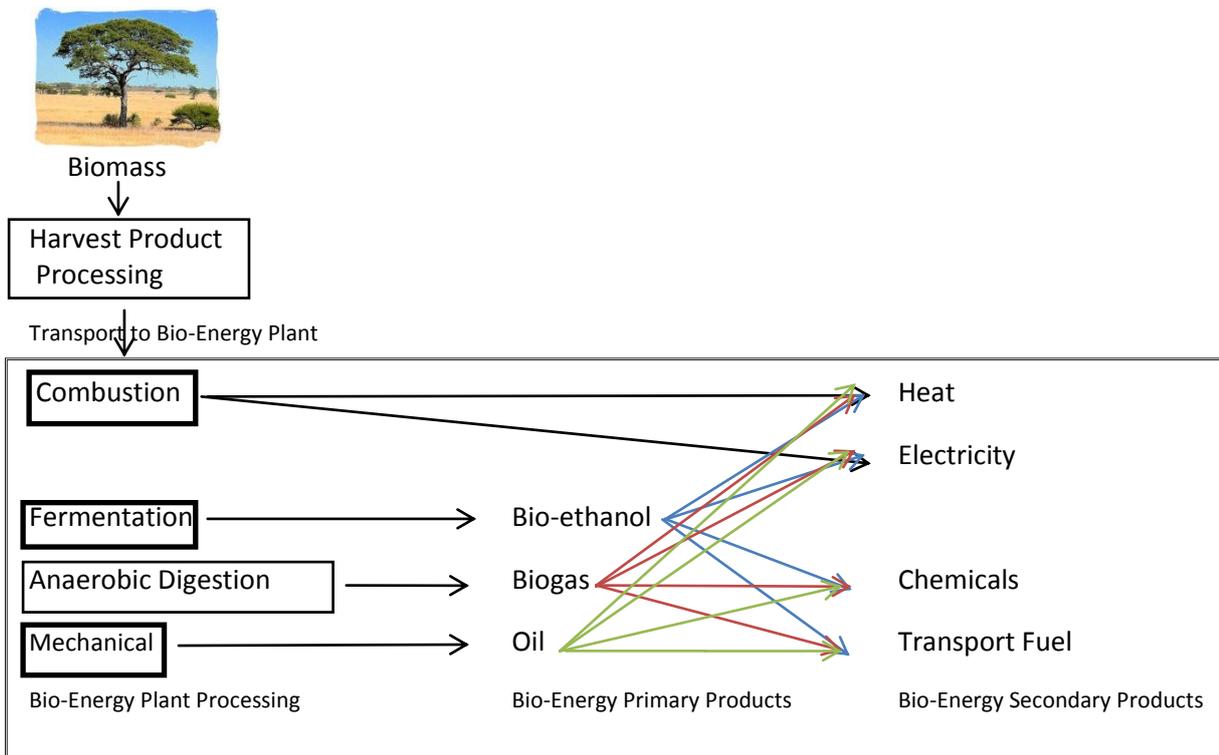
Slide 2: *Biomass Energy: What is Biomass?*

- Through photosynthesis light energy from the sun is converted to chemical energy which is stored in plants.
- Biomass is stored solar energy that can be converted into electricity, fuel, heat or fertilizer.

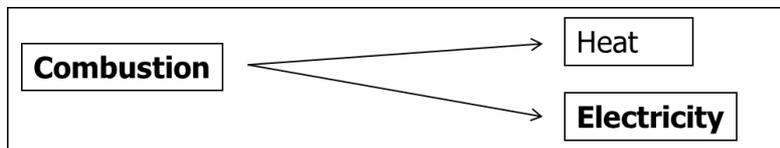
Slide 3: *Biomass Energy: Resources*

- Biomass is available almost everywhere in the world.
- Types of biomass: wood, rubbish and landfill gas, alcohol fuels, crops, algae and other plants, as well as agricultural and forestry residues.
- Good biomass energy resources have a high yield of dry material and use minimal land.
- Crops should generate more energy than their production consume.
- Biological power sources are renewable, easily stored and, if harvested sustainably, CO₂ neutral.
- This is because the gas emitted during their transfer into useful energy is balanced by the CO₂ absorbed whilst the plants were still growing.

Slide 4: Uses of Biomass: Schematic Representation



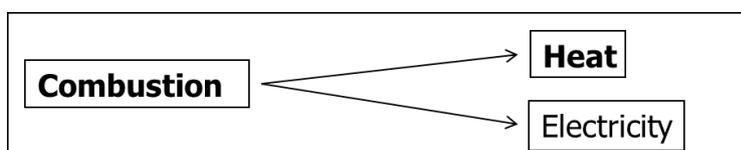
Slide 5: Uses of Biomass: Combustion (Electricity)



Generating Electricity:

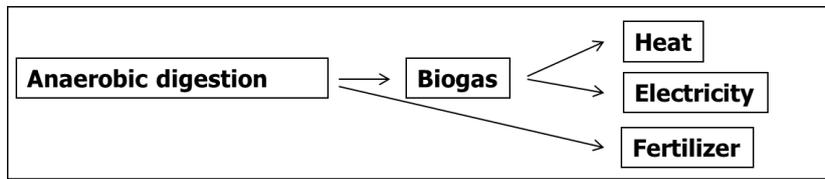
- When wood is burned the chemical energy in biomass is released as heat and light energy.
- Biomass power plants work on a similar principle to natural gas or coal power plants.
- The heat energy being released boils water to form steam, which then turns a generator.
- In combined heat and power systems, the surplus heat energy can also be utilized, for example for heating water or nearby homes.
- These power plants are usually not as large as coal power stations because their fuel supply has lower energy content and is not as abundant as coal.

Slide 6: Uses of Biomass: Combustion (Heating & Cooking)



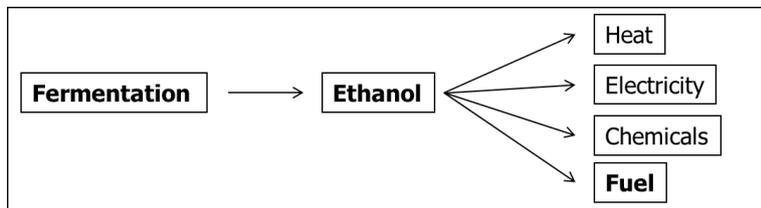
- Wood can be burned for heating living spaces or to prepare food.

Slide 7: Uses of Biomass: Anaerobic Digestion (Biogas)



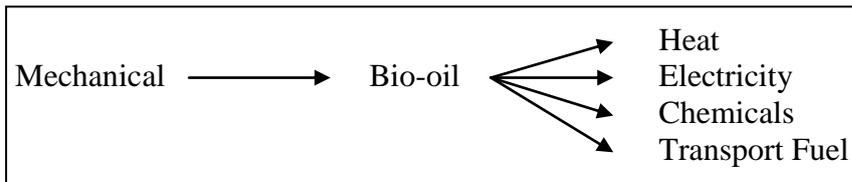
- Biogas technology simply formalizes the natural decomposition process. This happens in the absence of oxygen, hence the name ‘anaerobic digestion’.
- A biogas digester consists of one or more airtight reservoirs into which a suitable feedstock – cow dung, human waste, abattoir waste or plant material – is placed. The waste should have a high moisture content.
- Small-scale digesters for household use are commonly made of concrete, bricks, metal, fibreglass, or plastic.
- Larger commercial biogas digesters are made mainly of bricks, mortar, and steel.
- Digestion is accomplished by anaerobic bacteria. The compounds produced by this process is a combination of:
 1. Methane-rich gas which can be used to generate heat and thus also electricity.
 2. An odourless phosphorus- and nitrogen-laden slurry – an excellent fertilizer!
- Depending on temperature and moisture content, it takes about 6 – 25 days to fully process a batch; simpler digesters may take longer.

Slide 8: Uses of Biomass: Fermentation (Biofuel)



- Biomass fuel, or biofuel, is a broad term to describe material of biological origin that can be used as a source of energy.
- Biomass can be converted into liquid biofuels through fermentation.
- Maize and sugar cane can be converted into:
 1. Ethanol – a liquid biomass fuel.
 2. Methane – a gas.
- In Brazil, ethanol from sugar cane crops is a major contributor to fuel resources, and is called gasohol.
- This reduces the amount of fossil fuels needed to power cars.

Slide 9: Uses of Biomass: Mechanical Processing (Biodiesel)



- Oil from sunflower seeds, soybeans and other crops can be converted into biodiesel.
- These fuels are often more effective than wood, since they represent a more concentrated energy source.
- With biofuels we need to ask the following questions:
 1. What is the effect of monocrops on nature?
 2. Dare we use food for fuel?