



Biomass energy- the alternate energy

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Abstract: Biomass energy is the Indian future in energy. We can use the waste in very use-full manner. The biomass is used as primary source of energy since ancient times. Due to various problems like improper combustion, high price, insufficient technology and air pollution. The biomass energy hasn't gained much popularity. In this paper we have discussed about the technology and possibility that can be used for the biomass energy such as thermo-conversion technology, biomass cogeneration, and for fuels biomass oils, biomass briquetting ,etc.

Keywords: MNES, ARC.

INTRODUCTION

According to Indian history, energy plannings have been a very important part. It was in early 1940s that biogas was promoted through various programmes and was starting era of cook stoves. Energy survey committee was appointed in India 10 years before oil crisis in 1973 it was later MNES i.e ministry of non-conventional energy sources that around 1992 which further guided and resulted in enhanced RET programme. It was CMIE in year 1996, that replaced 8.8 million litres of oil annually generating 42 million kilo watt hour of electricity using over 1600 gasifier system. which had total capacity of 1600MW. Here now the commissioned grid power capacity of biomass is nearly 55MW with 90MW capacity under construction. There are 4 gasifier action research center (ARCs) are found to be situated within different national institutes. These ARCs are supported by MNES. About 12 gasifiers model have been developed which range from 3.5 to 100KW. It was in 1993, that biomass electricity projects started to take proper shape and it was task force that advised thrust on biogas based on cogeneration. It was in late 1994 that programme were initiated involving biomass combustion based power. It was then that two projects were approved followed by launching of the well-known pilot programme. It was further followed by extension of lines for the biogas based power plant was done in the year 1995. It was under the same programme that involved Initiation of grid connected biomass gasification project which had capacity of 500KW. Another initiation was taken in the year 1995 to support the demand of 10 to 15MW of small projects which worked upon the aspect of self-sufficiency in the rural areas where occurred deficiency of electricity. This programme initiated is famous by the name decentralized electricity generation programme. This aimed at the utilization of basically the residues from the agro-industries as well as the agriculture waste which had an approximate value of 350 million tons produced annually in India.

1) In Asia, mainly India, it was the last 2 decades which transformed the biomass energy use along three main ways:

- 2) Improvement of technologies for use in traditional applications for example cooking and industries
- 3) Superior fuel conversion from raw biomass.
- 4) Electricity producing technologies using raw biomass.

Biomass thermo-conversion technologies—

Bio-oils are derived from the source biomass and is used at an increased rate as an alternate source of various fuels and chemicals. There are many processes which are used mainly For conversion of biomass into into liquid fuels.

Mainly technology used is thermo-conversion

It can be further sub-divided into 2 groups:-

HPL(high pressure liquefaction).

Fast pyrolysis.

HIGH PRESSURE LIQUIFICATION:-

From this method a complex mixture volatile in nature such as acid, aldehyde, etc. and some non-volatile components. The mixture obtained is said to be bio-oils. These bio-oils were distilled at 200 oC.

Table 1 Physical and chemical properties of bio-oil

Water analysis	Water content 1.5 % by weight
Elemental analysis (carbon, hydrogen, and nitrogen analysis)	Carbon - 70.9 % by weight Hydrogen -8.8 % by weight Oxygen - 20.3 % by weight No nitrogen was detected.
Viscosity	313 Kpa
Density	1000 kg/m ³
Stability behaviour	With time, viscosity and distillation characteristics changed.

Source Smouse and Scott 1998.



➤ FAST PYROLYSIS:

Various processes which involved the fast pyrolysis technique. This technique works on high rate of heat transfer and product vapour is then sent to the reactor for a very small time period i.e less than seconds. It is operated in the moderate temperature range of 450degree c- 450 degree c. At elevated pyrolysis temperature ,amount of these oxygenated organic components decreases, and more aromatic compounds retain which leads to more and more heating value (ref).

Biomass-based power generation

Biomass energy is suitable alternative to deplete the use of fossil fuels consumption. Biomass based power plant are typically smaller than 50MW, thermal efficiency is lower (25% or less) and the price of fuel driven by competitor . The major biomass power technology include:

1. Co-firing- involves coal in industrial boilers by which steam turbine in driven.
2. Direct combustion- is a containing fluidized bed which leads to driving of steam turbine.
3. Landfill gas recovery.
4. Advanced conversion technology are anaerobic digestion, fermentation, pyrolysis and gasification(ref)

#BIOMASS BRIQUETTING:

The masses in India produces very large amount of agricultural residue and is used in traditional activities.

Biomass briquetting basically refers to densification of residues obtained to produce pellets.

Briquetting leads to improved handling characteristics. Increases volumetric calorific value and results in easy availability .

In India, a very common practice follows tradition of producing pellets of raw biomass without binder.

Screw and piston press technology is widely used in this technology.

In screw –press technology, biomass extruded through a taper die, which is heated externally to reduce function.

In piston-technology , die is punched by biomass by a reciprocating ram at high pressure.

The lignin in biomass is fluidized which acts as binder.

CHALLENGES:

The biggest challenge for electricity supply is coal based plants.

1. The cost of raw biomass available is not same everywhere followed with the variable availability.
2. Coal based power plants built have standard size of 500MW whereas grid based biomass plants vary in the range 1MW to 50MW.
3. The base price of coal in india is Rs 48 per giga joule(GJ) and that of biomass is Rs 72 per giga joule(GJ).
4. It is observed that cost of biomass based electricity is higher by 15 percent as compared to delivering cost of coal based electricity.

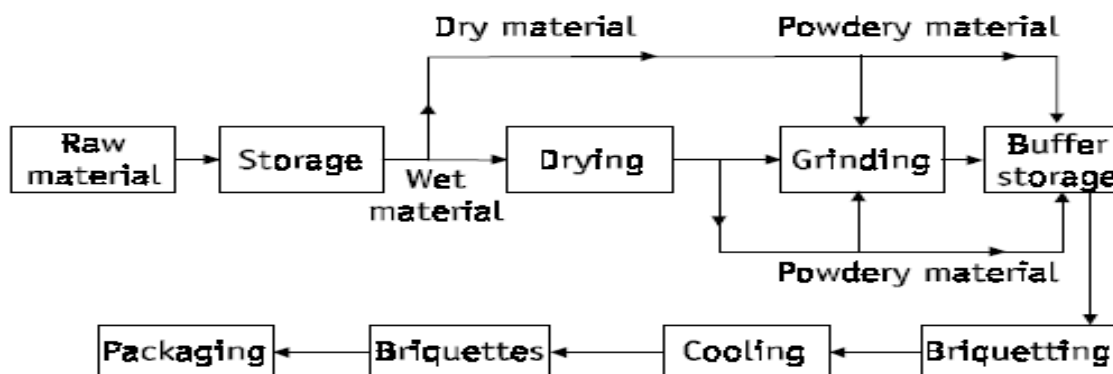


Figure 1 Flow diagram of briquette production process
Source Tripathi et al. 1998.

Biomass potential in India:

In India, biomass trend can reach at its peak only when services can compete fairly in market. Potential of biomass in India can sustain 10,000MW power. Policies being followed in future use are;

- Short-term (1 to 5 year)
 1. Enhanced crop utilization.
 2. Technology transfer .
 3. Subsidy to biomass technology.
- Medium-term (5 to 20 year)
 1. R & D conversion technologies.

2. Biomass plantation.
3. Removal of distortion in fossil fuel traffic.
4. Local institutional developments.

Advantages

Biomass usage is actually not cost-competative with fuels like coal, but still has variety of benefits such as:

1. Offsetting emission of green house gases.
2. Increased income of farmers has provided jobs in rural area.
3. It is cheap compared to other energy sources.
4. This helps in restoration of waste lands.



5. Very eco-friendly fuel as it reduces acid rain by cutting down sulphur content to a very low level.

Future of biomass in India:

Though advancements have been in India, made scenario of biomass still confined to traditional use only. The primary obstacle in modern technology is the less availability of biomass energy. Now growing experience leads to a conclusion that Indians need to have market pull policies. In India modernization in biomass in following segments :-

1. Processing heat application.
2. Cooking energy in domestic & commercial sector
3. Electricity generation.
4. Transportation sector.

Analysis of power sector in the Indian MARKAL model leads to a conclusion that Indian markets have significant potential to allow biomass penetration.

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