

The Status and Implementation of Biomass in India: a Review

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Abstract:- Biomass occupies the third primary energy in India and remains the principal energy source in rural areas and different traditional sectors even with many commercial energies. 90% of biofuels in rural villages and 40% in urban areas are mainly using in water heating and cooking food similarly 56% of total bio mass energy contributes in conventional and craftsman industries as wood fuels. Biomass involving in power generating technology which fulfills the niche applications i.e supplying electricity in decentralized location further its produce biowaste. Uttar Pradesh produces highest biomass based power generating about 6045MW later Punjab with 3585 MW followed by Maharashtra with 3139 MW, Haryana with 2300 MW per every year and respectively but these values varies significantly due to facing lot of challenges. Atmospheric conditions i.e. raining, fog, moisture etc. are the main difficulties to collection of biomass thereby coal based electricity generation becoming competing source. Households are the main source of supplying biomass then government supplying through forestry. Biomass technology existing since last decades for motive power, thermal power and gasfired technology in India.

Keywords:- Biomass Energy, Electricity Generation, Wood Materials and collection, challenges.

I. INTRODUCTION

Biomass has been using as fuel since thousands of years. Before middle 19th century biomass play dominated role in the world energy consumption then due to rapid increase of fossil fuel its contribution minimizing steadily over the country. Still its contribution is 38% in energy consumption in developing countries and occupying 14% in world total energy consumption. It is estimated that the capacity of biomass energy residues per year are 56×10^{18} joules from agriculture industries over the world that means it is equal to nearly one-fourth of world total use of 230×10^{18} joules (WEC,1994) by means of charcoal, wood fuels are the main biomass energy sources. Majority purpose of biomass collecting is for house holds i.e self needs not for trading. It's uses making improper causes ill health by producing indoor air pollution. In developing countries it is acts as traditional source of economy and extensive uses in rural areas.

India facing energy demand to meet the raising needs. In rural villages especially the poor uses solid biofuel

for cooking food . The fire wood becoming primary source in villages then depends on LPG. According to survey reports, in India between 2007 and 2008 in rural villages 77.6% peoples i.e 159 million house holds used fire wood , 9.1% were used LPG, 7.4% were used dung cake and 0.6% of house holds were used kerosene and other fuels respectively. Where as in urban areas 62% of people i.e 63 million house holds using LPG as

primary cooking fuel. 20% and 8% of urban house holds are using firewood and kerosene as primary cooking fuel. Only 1% of urban population uses dung cake for cooking fuel as primary energy source. The using of house holds increases steadily in biofuels in rural areas as primary energy consumption while there is no significant change on LPG over the India. Kerosene and LPG are replacing unprocessed biomass by the reason of its thermal efficiency of 60% is equal to 15% of biomass dependent devices. According to survey the report from 2001 to 2009 using kerosene constantly decreasing in both rural and urban areas. There are many applications to Biomass especially used to generate heat, electricity or both heat and electricity (CHP) plants. Further it is also uses in combining with fossil fuels as co-firing to improve the efficiency and avoid the constructive of firing residues. Biomass also uses in place of petroleum as a source for transportation fuels.

II. RESEARCH METHODOLOGY

The present study was reported the scenario of utilization of Biomass in India and bring to awareness on the advantages of Biomass and to solve the power crises and to encourage the renewable sources. Further, to know the resources of biomass in rural areas. The main source of the data and information taken from various articles, various web sources like Biomass fuels in India , Renewable energy sources, and other books.

A. Status of Biomass Energy In India

India produces nearly in between 450 and 500 million tones biomass per year. Presently it fulfills 32% of all type of primary energy in India. According to EAI reports it is estimated that the power produces in short term is nearly 18,000MW onwards then if it became traditional the range maybe be expand to high about 50,000MW. The contribution of biofuels in total energy consumption is very low and in that of 5% due to ethanol mixture in gasoline which is compulsory in 10 states as government policy. Government is not trading for biofuel but giving permission to

establishing biodiesel filling stations and also plans to fulfill 20% of total country's diesel through biodiesel by 2020. There are many types of plants identified like Mahua, Jatropha, curcas, and other plants are suitable for producing biodiesel which are plenty available in India. There is huge waste land nearly 63 million hectares in the country, some of which area can plantation be developed with Jatropha and other plants. Indian government taking several initiative steps for cultivation Jatropha by villagers in wasteland and it is cultivating more than 11.2 million hectares. Moreover, biofuel based electricity generating states in India is varies from state wise and place wise. Uttar Pradesh occupies the highest position nearly 6045 MW then Punjab occupies second position generating nearly 3585 MW followed by Haryana with 2300 MW per every year. Further these values varies significantly depending on various parameters from place to place.

B. Related Technologies To Generate Biomass Energy

There are different technologies employing to recover energy is potential from biomass with complex class of feed stock. Various technologies classified on the basis of thermo chemical principles for biomass namely gasification, pyrolysis, combustion, biochemistry as transesterification, fermentation and anaerobic digestion. The main principle of each technology is to generate mixture of by-products and major calorific end product. The brief description of technologies for energy recovering from biomass as follows:

- *Combustion Technology*

In combustion technology biomass is directly burns at high temperature about 800 °C in the presence of oxygen liberating heat, combustion gases and ash thereby resulting in heat transfer from 65% to 85% causes the hot air, hot air, produces steam etc. The producing steam uses in turbines to generate electricity.

- *Transesterification Technology*

Transesterification technology is the traditional method which produces biodiesel from biomass through a chemical reaction. By using this method oil produces from biomass then processed with transesterification reaction and finally gives biodiesel.

- *Anaerobic Digestion Technology*

Anaerobic digestion technology is a method which converts the organic matter such as animal excrete and manures, organic waste, green energy field (grass,field etc.) converts into biogas by bacteria-induced fermentation in absence of air. In this method the liberated biogas contains 40% -70% methane with CO₂, hydrogen sulphide and ammonia. This bio gas has lot of applications mainly for heating, cooking, generating motive power or electricity through gas engines or dual-fuel, in low-pressure gas turbines or steam turbines.

- *Alcoholic Fermentation Technology*

In Alcoholic Fermentation Technology biomass is convert to biofuels with three steps viz. 1) Converting biomass to sugar or other fermentation feedstock 2) Fermenting these biomass-derived feedstocks using microorganisms for fermentation and 3) processing the fermentation product to produce many fuels like grade ethanol and other type.

- *Gasification Technology*

In this method, at high temperatures biomass react with air as a result production of producer gas, to produce power or react with oxygen produces synthesis gas for fuel production. The producer gas, combustible gas has a calorific value lie in between 4.5 and 5.0 J/C³ meter. A huge range of biomass is rendered in the form of agriculture residues or wood can be used for producer gas.

- *Pyrolysis Technology*

Pyrolysis technology is the process that the organic material is heated until the molecules thermally break down the large molecules to become a gas comprising smaller molecules of oil gas and carbon black in absence of air.

There are two types of main methods of Pyrolysis are "fast" pyrolysis and "slow" pyrolysis or conventional pyrolysis. Yields are effected by operating temperature of the reactor and the type of pyrolysis. The conventional pyrolysis generate more syngas with increasing temperature. Conventional pyrolysis favours to generate extensively more char i.e nearly 50% together with organic gases but it takes with order of hours to finish the process. In case of fast pyrolysis yields, 20% biochar, 20% syngas and 60% bio-oil can be done in seconds.

III. CONCLUSION

In India biomass meets the energy demand as third prime energy. There are many types of plants are identified namely Mahua, Jatropha curcas, Mahua and other plants are suitable for producing biodiesel which are plenty available in India. More than 63 million hectares are rendered as waste land which is favorable for the cultivation of identified plants for produce biodiesel. The contribution of biofuels in total energy consumption is very less and in that of 5% due to ethanol mixture in gasoline is compulsory in some states in India as government policy. Indian government plans to raise the utilization of biodiesel as sharing 20% of total country's diesel by the year 2020 in such a way several initiative steps taking i.e. cultivation Jatropha by villagers in wasteland more than 11.2 million hectares as one of the steps. Uttar Pradesh occupies the first place in biomass based generated electricity which is nearly 6045MW then Punjab occupies second place followed by Maharastra, Harayana respectively. There are different technologies namely Combustion, Transesterification, Anaerobic Digestion, Pyrolysis and Gasification are mainly using to recover energy from biomass.

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