NEED OF BIOMASS ENERGY IN INDIA

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***Abstract*: Present paper deals with the present scenario of the biomass energy in India. Biomass energy is available at cheaper cost and it does not harm the environment .In some ways it also controls the pollution of the environment. Biomass energy can be good renewable energy source for rural areas in India. Production of Biomass energy has huge scope for innovation and its application in remote & rural areas. For that we will need efficient resources, Sustainable, renewable, non-conventional and equally essential resources of energy is needed to full fill the potential of India in the future. Biomass results in the production of biofuel which acts like treasures of renewable energy in the world.**

Index Terms: Biomass Energy, Non-conventional Energy Biofuel

I. INTRODUCTION

India concludes 17.5% of the total world population. i.e., 1210 crores of population, which makes it, second most populous country in the world [12, 14]. India has the second largest economy of the world. India is placing gargantuan demand on its energy resources due to its substantial and sustained economic growth over the years [1]. To compete up with such a huge demand of energy resources in the future, India needs to set up an effective system which generates energy from biomass, corresponding to the need of energy requirements in India. Biomass is the product of green plants converting sunlight into plant material through photosynthesis and it includes land based as well as water based vegetation, and all organic waste.
The biomass resources can be taken as organic matter in which the energy of sunlight is stored in chemical bonds. When the bonds between adjacent carbon, hydrogen and oxygen molecules are broken by digestion, combustion or decomposition they release their energy that is stored in chemical form. Biomass has always played a vital role of energy production by food and animal wastage. Now a days 10-14% of energy comes from it that is supplied to our country [2, 13]. The present time uses of biomass in India is calculated about 500 million metric tons per year. Data presented by the

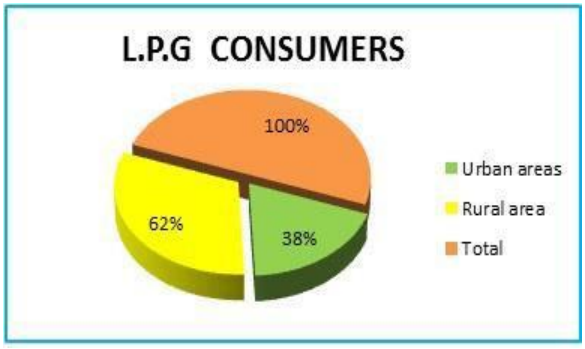

Fig 1 : It represents total number of consumers of L.P.G in India (millions)

Ministry of power has calculate the biomass usuability is about 120-150 million metric tons per annum corresponding to a potential of 18000 MW [5].
India produces about 450-500 million tons of biomass per year. Biomass provides 32% of all the primary energy use in the country at present. It has been calculated the power from biomass in India varies from about 18000 MW. The scope of biomass is defined to a high of 50000 MW. The current share of biofuels in the total consumption of fuel is extremely low and is limited to 5% blending of ethanol in gasoline, which the government has made compulsory in 10 states.

II. SOURCES OF BIOMASS IN INDIA

Plants like Jatropha, curcas, neem, mahua, taad, barley, and other wild plants may be used for the production of biodiesel. There are about 63 million hectare of land in India which is not in use, out of which 40 million hectare area can be used for the

plantation of Jatropha, curcas. India induced villagers to rehabilitate such waste lands through the cultivation of Jatropha. The Indian government had planned earlier for the plantation of Jatropha on 11.2 million hectare of land area by 2012. The ministry of new and renewable energy (MNRE) provides central financial assistance (CFA) in the form of capacital subsidy and financial incentives to

the biomass energy projects in India. CFA is allotted to those projects which have best efficiency, energy production and its utilization etc. [4]. The process of formation of energy from biomass is divided into two categories as shown in Fig 2.

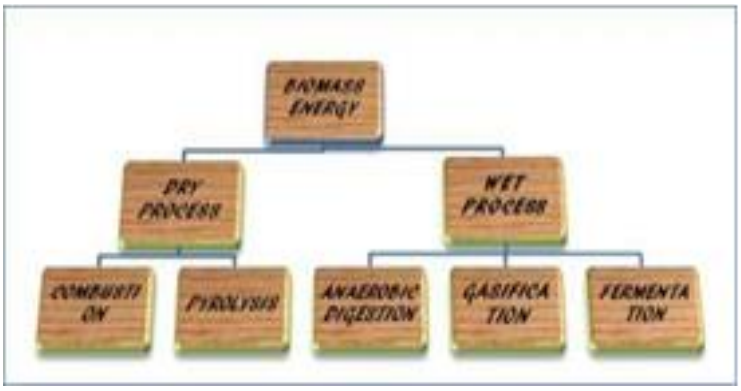

Fig 2: It shows the various process of deriving energy from biomass

Methane Gas Production: The technique of methane gas production through biomass (with the help of vegetation aquatic crops, forest and agriculture residues and animal wastage) has been complete for natural and utilizing reservoirs of methane in the environment. Methane production is very simple method from vegetation and animal wastage in the absence of atmospheric oxygen.

Objective:

- To make a simple generation of Methane
- Methane production is simulated to the natural environment.
- To determine some of the condition necessary for the optimum production of methane.
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Important Terms: Methane, biomass, Natural gas, Anaerobic digestion, Fertilizer, Manometer, Slurry.
Materials: Glass jug, 1 glass gas collector bag, To hole rubber stopper, 1 manometer, two length of rubber tubing, two tubing clamp, one glass "Y" , 1 sack of manure, glass clippings,

Combustion: The combustion is the efficient technique to separate energy from biomass and the technology of direct combustion is well understood this technology is commercially available and economically cheaper. Combustion systems are available in wide range of shapes and sizes. Some system utilizes fuel in the form of kitchen manure and agricultural waste and forest and animal dung, hay, husk, tree trunks, municipal refuse and scrap tyres. In some systems the heat emitting from burning waste is used for water heating, industrial processing and electric generation. The main drawback of such systems is its very low efficiency. Most of the heat in such systems is wasted and is not used to cook or for any other purpose. The way in which such methods can be improved in under developing countries is to build stoves out mud and scrap iron [6].

Pyrolysis: A vast range of energy fuel can be generated by smouldering of wood chips, wood, animal dung and hay, dry. This process is under practice since ancient times to produce charcoal. The material is grinded or blended then charged into a reactor and heated in the vacuumed flask. Pyrolysis can also be performed in the small presence of O_2 (gasification) water (steam gasification) or H_2 (hydrogenation), CH_4 (methane) is the most efficient fuel used for electricity generation using high efficiency gas turbines [6].

Anaerobic Digestion : The process of production of biogas in the absence of O_2 using animal dunk or green plants wet sewage, sludge, are allowed to decompose in sealed tank. Wood chips, animal dungs, forest and agriculture waste can also be used but the digestion takes much longer time. 1 kg of organic material must be exist to yield 450-500 liters of biogas. The residue left after decomposition is a valuable fertilizer [6].

Fermentation: The Fermentation of sugar solution and natural yeast through the Ethyl alcohol is generated. 30 hours taken to the completes fermentation process, and it get to the solution contains 6-10% of the alcohol, which can be removed by distillation process and can be extracted as a fuel. If the fermentation of sugar is done then yeast can be added to it. Hence, the fermentation process produces alcohol which had very high reserves of energy and can be used as a fuel in cars. This practical used has been successfully tried in Brazil [6].
Gasification: It is a process which produces a flammable gas. This process mainly utilizes wood and produces gas mixture of H_2, CO, CH_4 and other non-flammable by-products. This process is done by partially burning and partially heating the biomass, a natural by-product of burning biomass is formed which is known as charcoal. The use of petrol in cars can be replaced by gas, which reduces the pollution emitted by vehicles up to 40%. In the coming future the power stations will utilize this fuel as a major

source of energy. Typical chemical composition of producer gas is given as:-CO 18-20%, H_2 15-20%, CH_4 1-5%, CO_2 9-12%, N_2 45-55%. Calorific value of producer gas is in the range of 1000-1200 kcal/m [6].

[1] BIOMASS ENERGY PRODUCTION IN KEY INDIAN STATES

Madhya Pradesh: The total energy generated from biomass in the state of Madhya Pradesh is 1386.2 MW from agricultural sources and 2060.6 MW from forest waste land. Total production of electricity in Madhya Pradesh on 19 Nov, 2010 was around 32 MW & power potential from different biomass sources is shown in Table 1 [7].

Table 1: Table represents the production of energy from various types of biomass [7]

BIOMASS (WASTE)	POWER POTENTIAL (KW)
HUSK	248.161
STALKS	886.57
LEAVES	561.467
COBS	41.08
SHELL	158.11
BARK	477.15
RESIDUE	0.3
BRANCHES	477.15
TWIGS	477.15
STRAW	44
PODS	74.9

Karnataka: Government of Karnataka plans bamboo cultivation for biomass power. The forest department plans to cultivate bamboo on its waste land at a large scale, to produce biomass power which could help to reduce the power starved. After launching its state report the announcement for conservation action plan for forest of Shimoga district, prepared a team of expert selected by the Western Ghats task force in Bangalore. Government of Karnataka is in the process of assessing the extent of land that could be used for cultivation of bamboo as well as the potential for power generation.

District	Area (kha)	Crop Production (kT/Yr)	Biomass Generation (kT/Yr)	Biomass Surplus (kT/Yr)
Bijapur	1035.3	7401.1	2696.9	811.1
Mysore	433.1	3330.1	2144.7	531.4
Bellary	568.0	1629.1	2015.6	490.4
Chitradurga	505.2	1686.4	1558.5	515.3
Shimoga	260.9	2863.2	1826.2	445.7
Raichur	714.4	1451.9	2011.2	410.9

Bangalore	93.6	373.1	458.1	128.2
Total	3610.5	18734.9	12711.2	3333

Table 2: Table represents the district wise production of energy from biomass [8]

Karnataka government plans to cultivate bheema variety of bamboo for gathering biomass. This variety could results revenue of rupees 2000 per ton which is higher as compared to the revenues collected from sugarcane cultivation. According to experts 2000 acres of bamboo cultivation will fulfill the need of power plant with a capacity of 1 MW. The total land area which the Karnataka government is planning to introduce for bamboo cultivation is about 30000 acres of waste land [8].

Andhra Pradesh: From January 2007, the 4 MW capacityof the plant is running in Andhra Pradesh and power is being supplied to the grid. The maximum power generated per year is estimated to be 27.38 MUs and minimum of 330 days of service in year. The technology has been estimated to generate GHG emission free electricity by utilizing stored energy from biomass. The project is based on renewable energy project leads to sustainable development through efficient utilization of available biomass and generation of additional employment for the local citizens [9].

STATES	2016 MW	2015 MW	2014 MW	2013 MW
Andhra Pradesh	380.75	389.75	380.75	380.75
Gujarat	56.3	55.9	49.3	30.5
Karnataka	872.18	664.28	603.28	491.38
Maharashtra	1220.78	1033.4	940.4	756.9
Uttarakhand	76	30	30	10
Uttar Pradesh	870	888.5	776.5	776.5
Madhya Pradesh	35	36	26	16
Gujarat	56.3	55.9	49.3	30.5
TOTAL	3567.31	3153.73	2855.53	2492.53

Table 3: Table represents biogas based state wise grid power generation in MW

Table represents total power generated in the key states. Power production in India less than 2% currently, biomass comprises only about 2650MW of installed capacity, out of a total off 172000 MW of total electricity installed capacity in May 2007.

IV. A NOTE ON RENEWABLE ENERGY EDUCATION IN INDIA

After India is a developing country which fulfill its need form the export energy material (conventional energy resources). Now central government of India is looking forward to generate energy from renewable resources. They put these in their five year plan. Technical institutes of India offer one or two semester courses related to renewable energy in their institutions. Some technical institutions in India started undergraduate & postgraduate program dedicated to renewable energy. Government is also giving funding to the students project based on renewable energy source. Government started NPTEL for video lectures which is free to all & Shodhganga for research doctoral thesis free to all [15].

V. CONCLUSION

India has huge reserves of biomass, which is about 500 million metric tons per year, of which 120-150 million metric tons is used for energy production. The demand of electricity in India is about 255681.46 MW and total installed capacity of 258.701 GW as on end of JAN 2015. The produced alcohol with help of the fermentation process of biomass has a very high reserves of energy and can be used as a fuel in automobiles which is already tried in Brazil. The government of India
In India modernization of biomass energy production could bring social and economic benefits to both rural and urban areas. If biomass energy systems are well prepared, they can form part of energy supply which is environmentally beneficial and also contributes sustainable development. In the present scenario if biomass can make any significant energy contribution for development, it must be produced in greater quantities. Biomass is also economically justifiable and environmentally sound energy system. That ensures more traditional modes of production and also uses efficient and sustainable way. As it is expected that up to the year 2025 the need of biomass energy will rise considerably because of population growth, greater use in industries and technological developments which also improves biomass fuel or the conversion of biomass fuel into effective energy carriers.

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