Pyrolysis of Biomass

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Abstract -- Energy is considered to be an instrument for the progress and prosperity of nations and societies, it is the basis of economic and organized development. The increasing alertness of harmful environmental results as a result of blocking availability of fossil fuels and greenhouse gas emissions has strengthened the supremacy of biomass in the form of energy resources in the developed and developing countries. This paper shows a summary of biomass for the application of energy production, a theory and application of biomass pyrolysis, as well as some factors which may affect the production of bio-fuel biomass biofuels. It was considered in the examination that most biomass stores deposit themselves sufficiently for the strategy of pyrolysis and one variable from each component is dissected on one side or the effect on biomass pyrolysis and the basis of working conditions the ideal or maximum motivator for each feedstock.

Index Terms - Biomass, bio-fuel, char, chemical composition, energy, Solar thermal energy, Pyrolysis, Reactors, Syngas

I. INTRODUCTION

Energy is important part in daily life purpose. The measure of level of social-economic growth and standard of living of the people of any nation are largely energy dependent. Demand for energy is increasing because of the growth of population. Worldwide energy demand is forecast to be five times greater than today. Biomass is a renewable energy resource, which is easy to get and generate electricity without harming our environment. Biomass is an energy which gets from Nature like Agriculture, Wood, Human wastage etc. Through the method of chemical change, chlorophyll in plants captures the sun's energy by changing carbonic acid gas from the air and water from the bottom into carbohydrates, i.e., complicated compounds composed of carbon, hydrogen, and oxygen. Once these carbohydrates square measure burned, they flip back to carbonic acid gas and water and unharness the sun's energy they contain. During this means, biomass functions as a form of natural battery for storing solar power.

Pyrolysis word is coined from the Greek-derived elements pyro "fire" and lysis "separating". Pyrolysis is a thermochemical decomposition of organic materials at raised temperature in the absence of Oxygen. It is mostly used for treatment of the Organic materials. Human is easy with its original nature Live has used this limited non-usable experiment Resources. The crisis is one in 1973. The increase in the price of petroleum products was Western countries are needed and Looking for deprived countries Alternative fuel

Another prominent hypnotic. The reason for seeing alternative methods of fossil fuels is Global warming. Main contribute to Global Carbon dioxide is the main culprit of warming Contributing carbon to global warming Dioxide CO 2 emits more than 50%The transportation sector is more than 70% electric field.

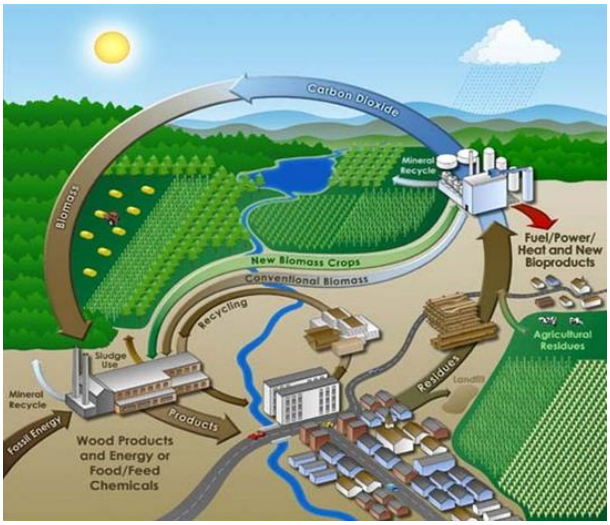

Figure 1: Biomass Energy Cycle

II. STATUS OF BIOMASS ENERGY

Biomass content is used to meet the needs of human life with thousands of people Energy The main sources of biomass energy are trees, crops and animal waste unless in the middle.

In the 19th century, biomass dominates global energy supply with seventy percent share (Grueler and Nascinovich, 1988). In biomass energy sources, there are wooden fuels Most famous With the rapid increase in the use of fossil fuels, part of biomass in total energy By the replacement of coal in the nineteenth century and later by the refined oil continuously declined During the twentieth century and gas Despite the decline in energy, global Increase in wood consumption continues. From 1974 to 1994, global timber Consumption of energy has increased at an annual rate of 2 percent (Figure 1). in present, Biomass sources contribute 14% of global energy and 38% energy in developing countries (Woods & Hall, 1994) Worldwide, the energy content of biomass residues in agriculture is based Industries have an annual estimate that 56 axes, approximately one-fourth of the global primary energy use 230 Exagulals (WEC, 1994).

III. ADVANCEMENTS IN BIOMASS ENERGY TECHNOLOGIES

Technical advancement in biomass energy has come from two areas - Biomass Energy A rich experience of managing production practices and energy conversion techniques Commercial Energy Plantation in Various Climate Conditions During Last Two Years Decades (Hall et al, 1993) Preparation of soil, planting, improvement of farming practices, Species maturing, bio-genetics and insect, disease and fire control have increased in yield. After the development of improved harvesting and harvesting, technologies have also contributed Technical progress in biomass to reduce the cost of biomass energy conversion comes from three sources - increased efficiency of biomass energy Conversion techniques, improved fuel processing technologies and increased efficiency Versatility of modern biomass technologies Feedstock has increased with small economic size and co-firing with others Has opened the fuel. Biomass is the capability of integrated gasified / joint cycle (BIC / CC) technology Competitor (Reddy et al, 1997; Johansen et al, 1996) is more than biomass as a feedstock

Due to its low sulfur content and low reactive character gasification for coal gasification. Biomass fuels are suitable for highly efficient power generation cycles Gasification and pyrolysis processes have consistently increased in the size of biomass technologies Contributed to the reduction of fixed unit cost. For power generation, the two most competitive technologies are direct combustion and Gasification. The size of specific plants in the current range is 0.1 to 50 megawatts. Co-production Applications are very efficient and economical liquid bodied combustion (FBC) efficient And the flexible gasifier in converting different types of fuels first converts solid biomass into Gaseous fuel, which is then used through the vapor cycle or directly through the gas turbine / engine. Gas turbines are commercially available in sizes ranging from 20 to 50 megawatts. The technology Development indicates that the 42 MW capacity of 40 MW combined cycle gasification plant With the capital cost of US $ 1.7 million, it is possible with the limitations of power generation4 cents / kWh (freeze, 1993).

IV. BIOMASS ENERGY IN ASIAN DEVELOPING COUNTRIES

Biomass remains the primary energy source in Asia's developing countries. Part of Biomass varies in energy - in Nepal more than three quarters of more than in Laos, Bhutan, Cambodia, Sri Lanka and Myanmar; Approximately half in Vietnam, Pakistan and the Philippines; About one-third of India and Indonesia, less than 10 percent in China and 7 percent in Malaysia (FAO, 1997) In the wake of rapid industrialization and marketing during the last two years For decades, high penetration of commercial fossil fuels in most Asian developing countries Biomass energy has decreased in part due to the full consumption of biomass However, in the last two decades, energy is increasing at an annual rate More than 2 percent (FAO, 1997) Increasing population and deficiency or many factors like

Commercial fuels are increasing in rural and traditional areas. The use of biomass is mounting pressure on existing forests already important Deforestation In spite of policy intervention by many Asian governments, deforestation During the 1980s (Houghton, 1996), the tropical forests were more than afforestation (in the ratio of 8.5: 1). Deforestation and land degradation have emit tropical Asian forests pure Atmospheric CO2 (Dickson et al, 1994) Continuous

development of biomass energy in Asia So with modern plantation, existing biomass resources will need to be increased and By presenting energy crops and efficient biomass energy conversion techniques. Recently, Many Asian countries have started such programs.

V. BIOMASS ENERGY IN INDIA: STATUS

Biomass contributes one-third of primary energy to India, primarily biomass fuel. Used for cooking and water heating in rural households, as well as traditional and artisan Industries Biomass provides more energy for domestic use (rural - 90% and urban -40%) In India (NCAER, 1992) wood fuel contribution is 56% of total biomass energy (Sinha et al.

Al, 1994). In the last two decades, wood consumption has increased annually by 2 percent. The estimated biomass consumption is highly variable (Rabindranath & Hall, 1995; Joshi et al., 1992) Since most of the biomass does not transact on the market. Supply side estimates (Rabindranath & Hall, 1995) Biomass Energy is reported to be: fuelwood for domestic Area - 218.5 million tonnes (dry), crop residues - 96 million tonnes (estimated 1985 est.), And cattle Dung cake - A recent study of 37 million tonnes (Rai and Chakraborty, 1996) estimates in the estimates India is 201 million tons (Table 1) for fuel. The supply of biomass is mainly fuel Govt sponsored which are grown in homes or collected by households for their own needs Social forestry program has added 40 million tons of fuel wood Annual (Rabindranath & Hall, 1995).

Consumption of Fuel wood	Million Tons
1. Household	
(a) Forested Rural	78
(b) Non Forested Rural	74
(c) Urban Areas	10
Sub Total	162
2. Cottage Industry	25
3. Rituals	4
4. Hotels etc.	10
Total	201

VI. PYROLYSIS PROCESS

According to agbontolor (20071), changing the biomass to the renewable form is a number of conversion pathways Energy, one of which is remarkable pyrolysis. Pyrolysis is related to the thermos-chemical process of pyrolysis Biomass can be described as the direct thermal dissolution of organic matrix in the absence of oxygen. Getting an Array for Solid, Liquid and Gas Products (Girar, et al., 2005; Pro-Natural International, 2004) As a thermometer-chemical process, long-term organic content has been employed in pyrolysis. Chemistry and Energy Products (Tapetu, 2000a; Bridgewater, 2002; Chopra and Jain, 2007; Demiribas, 2009).

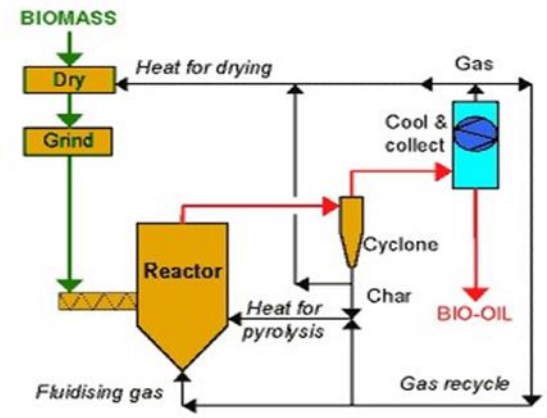

Figure 2: Pyrolysis Process

VII. HISTORY OF PYROLYSIS

In the United States, the history of pyrolysis in the late 1990s is related to related problems. Dioxin-induced crematorialators to develop municipal solid waste to develop pyrolysis process With moisture content of 30 to 70% (Syzyric and Bridgewater, 2004). In developing countries, most pyrolysis Processes are done with the sole goal of producing charcoal, low in piles, earth's roof and pit kilns. Quality (Bamigby and Onia, 2003).

VIII. ADVANTAGES OF PYROLYSIS

Pyrolysis process offers the following advantages among others:-

a. Since pyrolysis takes place in oxygen free environment, there is no or fewer air emissions and this is beneficial to both

human and ecology (Eunomia Research and Consulting, 2008).

b. The pyrolysis plants are modular. They are made up of small units, which can be added to or taken as waste streams or volumes change (e.g. with increased recycling) and are therefore more flexible and can operate at a smaller scale than mass burn incinerators (Eunomia Research and Consulting, 2008).
c. Pyrolysis plants are quicker to build and set up.
d. Pyrolysis processes produce more useful products than standard incineration. This is because; gases, oils and solid char obtained from the process can be used as bio-fuels or purified as a feedstock.

IX. PRODUCTS OF PYROLYSIS

There are three major products of pyrolysis of biomass residues. These are the char, the bio-oil and pyrolytic gas.

All these are discussed in section 1 to 3

1. CHAR PRODUCT

This is a solid product of pyrolysis, it is usually for bulk density, which involves proximal analysis. Moisture, volatile, ash content and fixed carbon content. Further characterization includes basic analysis (carbon, hydrogen, oxygen and nitrogen), energy value (low and high heat price) and porous properties (Nugrand, 1997) All these characteristics are generally determined by various American standards. Test Content (ASTM).

2. LIQUID PRODUCT

It is usually obtained from the process of bio-oil pyrolysis. Usually its physical chemical analysis is done Properties (Biomass Technology Group, 2003) Oil contains 40-50% of the amount of hydrocarbons. Fuel (Yemen, 2004). However, it should be noted that there may be some problems in combustion systems when Without upgrading these liquids are burned raw because they have too much water content and this is In addition to harmful for ignition, organic acids in the oils are highly corrosive for the general construction material. Occasionally, there can be solid liquids and it can block the injector or crush the turbine blade. However, partial distillation of organic acids in Bio-oil (Bamgbei and Onia, 2003). On the side, over time, the reaction of some components in the oil can produce a larger molecule As a result of high viscosity and slow combustion (Osman and Kjernick, 1999).

3. GAS PRODUCTS

It is also known as pyrogases or syngases, they were generally identified and quantified by gas chromatographs. Some of the gases that can be identified with thermal conductivity detector are CO2, H2, O2, N2, CO, CH4 and others Based on the structure of the original biomass feed stock, son (Oladeji, 2012b).

X. APPLICATIONS OF PRODUCTS OF PYROLYSIS

The main products of pyrolysis are four, bio-oil and pyroxenes. Each of these products has a specific application. For example, four products obtained can be used for traditional and industrial cottages Application as a fuel in the form of domestic cooking and in the open earth furnace for blacksmithing and gold smithing Operations (FABETU, 2000A and B) Bio-oil can be used in internal combustion engine (Brew water and Peacock, 2000; Biomass Technology Group, 2003), while pyrolite gas can be used as domestic cooking As gas for gas and gas lamps (Bamiegbe and Onia, 2003; Bridgewater, 2002), pyro gas can be collected And the pyrolysis reactor is used as a supplement fuel for heating. In addition, there are many other applications Biomasses is available for gases from pyrolysis. Conclusions show that compared to traditional pyrolysis gas Gasification gas is more beneficial because it is high in heating value and can be applied in gas as a result Other combustion engine for turbines or power generation (Chen, et al., 2003 A and B). In addition to use Highlights as fuel, pyrolysis products can be used in special areas. For example, pyrolytic four usually there is a porous structure and a surface area suitable for use as an activated carbon (Yemen, 2004). The fluid obtained from pyrolysis contains many chemical compounds, which can be used as a feedstock for synthesis. Fine chemistry, adhesive, fertilizer and so on (Mer and Faix, 1999). In ancient Egypt, chemical products was

used for the protection of the dead body (Czernik and Bridgewater, 2004) obtained from pyrolysis.

XI. ELECTRICITY FROM BIOMASS

Electrical energy can be obtained from biomass using one of the many processes in direct form Combustion, gasification, pyrolysis, anaerobic Digestion One of the popular methods is direct combustion. In this method, biomass is converted into steam and vapor is used to rotate the turbine Steam in some industries is connected to the generator Is also used in the manufacturing process or in the heat Building Improve co-generation viability Profitability of sugar industries Now-a-day co-firing is increasing too In popular co-firing for power generation Biomass can be used with coal for the production of electricity. Energy is the same in the current thermal power plant economically and even less polluted since it lowers air emissions, especially sulfur Dioxide power plant removed from coal. Electricity from biomass reduces our dependence Being a renewable source of energy on fossil fuels There is no risk of running out of resources Electricity produced by biomass reduces the risk Clearing of global climate change from biomass Forest areas help to prevent forest jungle. Biomass The sub-product eliminates the methane gas odor and Reduces Air Pollution Using Biomass Waste Electricity production eliminates the need to replace it in landfill.

XII. BIOMASS POWER AS EMBEDDED GENERATION

Embedded generation is growing rapidly Is popular and it has been established in distribution. In recent years to complete the development in the system [6] Demand generation plays an important role Combined heat and power (CHP) is considered in this form the most important type of embedded generation. The CPP also has some time in delivery system

Known as co-generation which can be established Villages and small towns supported by bio mass It has been estimated that more than 2 billion Residents living in the world are without electricity and Its services like education, Telecommunication, Entertainment and Social Security. On the other hand there are a big The number of limited villages, which have limited electricity Grid is connected without service or electricity Villages also received due to poor quality service For large voltage drop and high distribution loss Applications of Renewable Energy Technologies Provides better solutions for electrification in rural Regions Install embedded generator into Distribution network may face problem As a result by the rural electrification system. The demand from the grid can be low.

XIII. CONCLUSION

Pyrolysis produces biodiesel and ethanol, these can be both Fossil-oil can be potential alternatives of derivative products, and can be used for transport and also in fixed engines, which designed to generate electricity. This letter focuses on classification, mechanism, processes Biomass pyrolysis as well as its related latest Technologies Based on the aspects of pyrolysis, The model has been developed in the lab-level, the future is very much Occupational Use Opportunities This Experimental Set-Up Includes a fixed bed reactor, a condensing unit with a spiral Tube configuration, a liquid receiver unit and a rotary vacuum Pump [9] work is in progress and has shown one to date Rawal's husk-to-pyrolysis liquid conversion of 34% oilseed It will be organized and involved in more experiments Extended paper.

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