A REVIEW ON CHARACTERIZATION OF THE BIOMASS

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Abstract: The effect of air distribution on the performance of an actual agricultural up -draft biomass gasification stove was investigated, and the temperature distribution in gasification stove, gas composition, gas heat value and global energy utilization efficiency were measured. Results show that in the present gasification stove the highest temperature located at 75mm above bottom and in the range of 950-1100oC. the air distribution between gasifier and burner was important and there was an optimum distribution ratio. With the increasing in the ratio of gasifier air and burner air, the global energy utilization efficiency increased first and then decreased, and the optimum ratio was around 1:3 when the flame above burner showed blue and stable. Results of dynamic test indicated that the gasified gas composition and energy output achieved stability until 20min after ignition
Keyword: Biomass, Gasifies, Ignitions,

I. INTRODUCTION

Biomass is widely regarded as a potential renewable energy resource of CO2 zero emission and is especially important in developing countries countries(often more than 90% in developing countries but 10 -15% all around world),and more and more attentions have been focused on biomass utilization under the conditions of global warming and energy shortage [1, 2]. Even though the traditional small scale stoves degrades air quality and is thermally inefficient biomass is still commonly used in the small-scale furnaces, local house hold cooking or warming because it is the simplest and cheapest way [3].

Reduction of greenhouse gas emissions from electric generation based on fossil fuel combustion is crucial for the control of global climate change since it accounts for a large fraction of man-make carbon dioxide emissions. Renewable power sources such as wind, solar and hydro powers currently are not able to meet the electricity demands in terms of volume, stability, and cost [4-5].Coal is often a preferred fossil fuel for power generation due to the relatively low cost and worldwide reserves. But they are also responsible for a large proportion of carbon emissions. Carbon dioxide capture and sequestration technologies have attracted intense research interests [6].

II. CORBON BIOMASS ALGORITHUM DEVELOPMENTS

Climate change as the effect of global warming with the increase of atmospheric and seawater temperature was related with the increase of greenhouse gasses from industrial and human activities. That is caused by excessive accumulation of greenhouse gasses such as CO2, CH4, NOX, CFC. One effective solution to prevent or reducing of global warming are adaptation and mitigation [7]. Mitigation with replantation and rehabilitation on mangrove ecosystem would be expected to reduce the concentration of CO2 in the atmospher. Therefore need a quantification method to measure carbon mangrove trees (trunk, branch, leaf) as baseline in the mangrove rehabilitation and management. Rehabilitation of mangrove was one effective meassures to increase biomass and carbon and will decresase CO2 [8]. Ecologically, mangrove ecosystem role as buffer zone in coastal area and in specific role as spawning ground, nursery ground as well as for feeding ground for coastal organisms, which highly dependence to mangrove ecosystem. Mangrove role as primary productivity with large number of organic, detritus from mangrove leaf and nutrients [9-11].

A. EXTRACTION AND CHARACTERIZATION OF LIGININ BIOMASS

The main constituents of a biomass are cellulose, hemicellulose and lignin. Another growing application of cellulose is in composite materials as reinforcement in polymeric materials. Still, the disadvantages that come with using cellulose are the incompatible nature of the material with hydrophobic polymers, the aggregation of cellulose during processing, and the high water absorption properties. These characteristics can significantly reduce overall prop-artiest of cellulose which can also be a direct result of the extraction technique and plants used for the extractions [9].

III. DRIVERS INFLUENCING BIOMASS AVAILABILITY

All biomass resource models and assessments revolve around analysing the influence of different drivers. As such the range of drivers listed within literature that are identified as being influential of biomass resource availability is extremely broad.

A. Built-up land area

Urbanizations is a further driver that influences food and agriculture systems. Changes in the extent of built-up land area directly influence the potential availability of biomass through reducing the area of land that could otherwise be dedicated for biomass prduction. [10].

B. Food production system drivers

Improvements and variances in food and crop systems productivity result from the collective influence of a range of manageable and external inputs [11].

IV. CONCERNS OF BIOFUEL PRODUCTION

Based on the current energy trends across the globe, biofuels are thought by the governments and environmentalists as the most promising renewable alternatives needed in achieving the goals of reducing the overall dependence on fossil fuels as well lowering CO2 emissions as this to a greater deal will support local agriculture and develop economies [12, 13]. Late 2000s have seen biofuels being characterized by environmental and developmental groups as 'a big green con' and crime against humanity' [14, 15]. The resourcefulness of the product of biomass and its residues has been a common factor to the developmental needs of its use as a feedstock for energy improvement. Though this has not suffices that there are not issues that militates against its full potential, but this varies from one country to another. As some proponents of biofuels argue that biofuels are unfairly demonized while the use of land for food and other non-food goods escapes scrutiny [16] and it is therefore important to consider the wider industrial agricultural system of which biofuels are a part. This therefore becomes questionable as to controversy surrounding biofuel. In furtherance to this, [17] highlighted the legitimacy problems of biofuels not being able to address by sustainability indicators or new technologies alone as they have risen from the spatial ordering of biofuel production. On the contrary, despite its advantages over petroleum-based fuels, biofuel production and use may result in significant negative consequences for biodiversity through pollution, soil degradation, and climate impacts from their cultivation, transportation, refining, and burning [18] and since there are no legislative or rather few of them in place, that provides follow up standards and principles in the of the environment. In achieving environmental goals that will provide protection to biodiversity, policies will then need to be outlined to deal with such issues of environmental standards for biofuel production [19].

A. Main Challenges

The greatest challenge of biomass use in energy production and development is its sustenance which has competes favorably well, as compared to other renewable energy sources (RES). In fact, it is topmost amongst the (RES). This competitiveness of biomass has therefore make biofuels a serious option to compete with oil in the transport system compared to other technologies such as hydrogen, because biofuel technologies are already well developed and available in many countries. Bioethanol and biodiesel when mixed with the petroleum products (gasoline and diesel) they serve as substitute which can be burned in traditional combustion engines with blends of up to 10 per cent biofuels without there quirement for modifications of engine [20]. And as the future starts now, its development and uses is becoming more pre-eminent. This having previously been considered as the favourable choice of fuel consumption due to their renewability, biodegradability and generating acceptable quality exhaust gases [21] and it as one of many energy alternatives within such as hydrogen, natural gas and synthesis (syngas). These four are likely to emerge as the strategically important fuel sources in the foreseeable future. [23] forecasted biofuels therefore as emerging as one of the most strategically important sustainable fuel sources and are considered an important way of progress for limiting greenhouse gas emissions, improving air quality and finding new energetic resources. Another challenge pose to it, is the use of arable land for sourcing its crops and these therefore have limited those land from growing crops for human consumption but on the other hand, the waste from these foods have also now taken the position of the land being saved for human crops consumption. As part of the future challenges and sustainability concern on the use of biomass, [24] pushed it further that biologically derived energy carriers do offer an alternative to traditional petroleum-derived fuels but may be uneconomical, energy insufficient and environmentally deleterious while Srirangan et al. [25] eventfully summed it up that challenges could results in the form of; viability economically and policy implementations, efficient scalability (that is; land availability and natural resources valuation), social concerns and socioeconomic impacts, as well as environmental aspects. These challenges need to be overcome for commercial-scale production of biofuels to be realized.

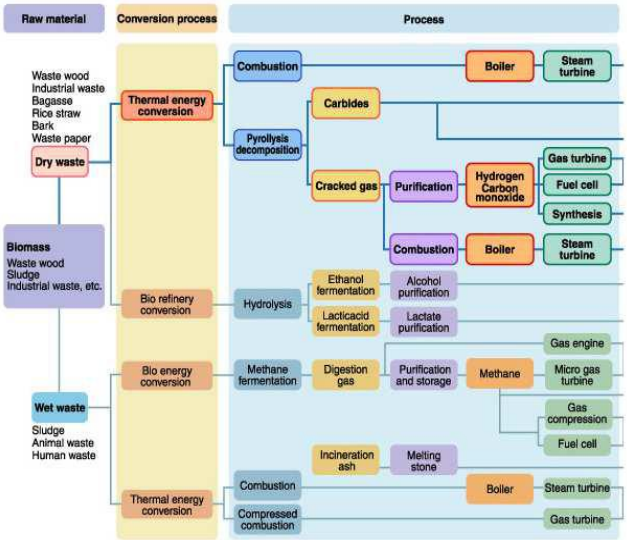

Figure 1: Biomass Conversion Technology [26]

B. Biomass – An energy source of a wider scope

There has been renewed interest all over the world in terms of biomass being an energy source with a difference and situation has really called for this. As analyzed by [27], considering the technological developments as regards its conversion and as known, it available on a renewable basis, either through natural processes or made available as a by-product of human activities. Biomass use for energy production will not only serve as solution to eventful correction of climate and environmental disaster but, it will also provide an avenue for creating jobs. As purported, Thornley et al. [28] have it that investment in renewable energy sources are linked to the creation of new jobs and employment opportunities in all stages of the biomass energy supply chain. Through its social issue consideration, its cohesion and stability, regional development, decrease in

rural migration, increase in net labour income, and self-sufficiency in energy production were also observed as social benefits of the bioenergy [29] Retrospectively, when compared against other renewable energy sources, there are reasons for biofuel to be considered as the energy need of the future. Biofuels have been seen to be part of the energy discussions for decades, apart from prices which has shown to be on the rise with crude oil, governments on their own part have viewed it beyond this path by considering a greater interest in the product even when the subsidies needed are commercially viable. These accordingly [20] considers as being energy security, concerns about trade balances, desire in decreasing GHG emissions as well as potential benefits to rural livelihoods. As the potential of biomass energy derived from forest and agricultural residues worldwide is estimated at about 30 EJ/year, when compared to world-wide energy demand annually, results over 400 EJ [27].

C. Biomass Conversion Technologies

The introduction of flexibility into biomass use as an energy source is considered through the interplay between these two aspects. In using biomass as energy production substrates, various technologies are involved in the conversion process. Hence it is the only form of energy which can be utilized in reducing the energy production impact and use on the global environment. This in conformance with the previous study, [31] highlighted that there are limitations on the use and biomass application and this must compete not only with fossil fuels but renewable energy sources like wind and solar. As biomass involve the conversion of one product (substrate) to another product for energy purposes, the key combustion issues today are concern with efficiency and environmental performance which is similar to fossil fuels while on the contrary, it stand out from fossil fuel in that the emissions of carbon dioxide derived from biomass combustion to the atmosphere are essentially in an equilibrium such that there are uptake of carbon dioxide from photosynthesis by the biosphere [32]. Since biomass is used in meeting variety of energy needs including generating electricity, heating homes, fueling vehicles and for providing process heat for industrial facilities, the conversion technologies required for utilizing this biomass therefore can be separated into four basic categories. These are direct combustion processes, thermochemical processes, biochemical processes and agrochemical processes [33] and further stressed that thermochemical conversion means is subdivided into gasification, hydrolysis, supercritical fluid extraction and direct liquefaction. The various products and conversion technologies applied, is dependent on the characteristics of the region and the type of biomass material considered [26] (as shown in figure 1). For example, gasification is a known form of paralysis' performed under high pressure so as to optimize gas production and is the latest form in the generation of biomass energy conversion processes for improving efficiency and in reducing the investment costs of biomass electricity generation through using gas turbine technolog

V. CONCLUSION

Changing from fossil fuel and nuclear energy to renewable energy source as energy provision means will be great transition, which is going to be accomplished over time even as the population grows. Biomass use as envisaged will come to provide the bulk of the energy as compared to other energy source. This is because biomass availability, developed conversion technologies and most importantly, the cost of converting biomass energy and implementation which is going to be easily affordable in the nearest future will make biomass take the lead of energy producing resources. Biomass has much to offer in the drive for energy development and as such it will be considered a way forward through its development and application to solving the world's problem. It would be impossible to unite the entire world to tackle the issue of climate change/global warming because only a fraction of the entire world accepts the threat that it poses [40]. Though the world will need to eventually accept this fact as a change to energy use but it will take a while to have this completely implemented.

REFERENCE

[1] D. Qiu, S. Gu, P. Catania, K. Huang, Diffusion of improved biomass stoves in China, Energy Policy, 24 (1996) 463-469.
[2] S.C. Bhattacharya, P. Abdul Salam, Low greenhouse gas biomass options for cooking in the developing countries, Biomass and Bioenergy, 22 (2002) 305-317.
[3] N.L. Panwar, Design and performance evaluation of energy efficient biomass gasifier based cookstove on multi fuels, Mitig Adapt Strategic Glob Change, 14 (2009) 627-633.
[4] International Energy Agency (IEA), World Energy Outlook 2007-China and India Insights, IEA Publications: 2007.
[5] Energy Information Administration, Annual Energy Outlook 2008, DOE/EIA: 2008.
[6] Shuster E., Tracking New Coal-fired Power Plants, National energy Technology Laboratory: 2011.
[7] Houghton, J. T., Y. Ding, D. J. Griggs, and M. Nouger. 2001. Climate Change: The Scientific Basis. Cambridge
[8] Firman, A.2009. Mangrove and Climate Change. Fac of Fisheries and Marine Science, Universitas Padjadjaran.
[9] Brinchi L, Cotana F, Fortunati E, Kenny JM. Production ofnanocrystalline cellulose from lignocellulosic biomass:technology and applications. Carbohydr Polym2013;94:154–69.
[10] Muller A, Schmidhuber J, Hoogeveen J, Steduto P. Some insights in the effect of growing bio-energy demand onglobal food security and natural resources. Rome, Italy: Food and Agriculture Organisation; 2007.
[11] Prieler S. Built-up and associated land area increases in Europe. Laxenburg, Austria: International Institute for Applied Systems

Analysis; 2011. MOSUS Model: WP3 Environmental Evaluation.
[12] Farrell, A. E., Plevin, R. J, Turner, B. T, Jones, A. D, O'Hare, M., & Kammen. D. M. (2006). Ethanol can contribute to energy and environmental goals. Science 311:506–508
[13] Goldemberg, J. (2007). Ethanol for a sustainable energy future. Science 315:808–810.
[14] BBC, (2007). Biofuels 'Crime Against Humanity'. Available at: http://news.bbc.co.uk/1/hi/world/americas/7065061.stm.[Accessed January 2, 2014]
[15] Friends of the Earth, (2007). Biofuels e a Big Green Con?. Available at: http://www.foe.co.uk/news/biofuels.html [Accessed January 3, 2014].
[16] Wenner, C., (2012). Biofuels industry does not deserve to be demonised. Available at: The Guardian. http://www.guardian.co.uk/environment/2012/oct/16/biofuelsindustry- demonised [Accessed December 21, 2014]
[17] Raman, S., & Mohr, A. (2013). Biofuels and the role of space in sustainable innovation journeys. Journal of Cleaner Production.
[18] Cook, J. H., J. Beyea, and K. H. Keeler. (1991). Potential impacts of biomass production in the U.S. on biological diversity. Annual Reviews of Energy and Environment 16:401–431.
[19] Groom, M. J., Gray, E. M., & Townsend, P. A. (2008). Biofuels and biodiversity: principles for creating better policies for biofuel production. Conservation biology, 22(3), 602-609.
[20] Dufey, A. (2006). Biofuels production, trade and sustainable development: emerging issues (No. 2). IIED.
[21] Bhatti, H. N, Hanif , M. A, Qasim, M, Ata-ur-Rehman. (2008). Biodiesel production from waste tallow. Fuel; 87: 2961- 6.
[22] Nigam, P. S., & Singh, A. (2011). Production of liquid biofuels from renewable resources. Progress in Energy and Combustion Science, 37(1), 52-68.
[23] Delfort B, Durand I, Hillion G, Jaecker-Voirol A, Montagne X. (2008). Glycerin for new biodiesel formulation. Oil Gas Sci Technol- Rev IFP;63(4):395 - 404.
[24] Solomon, B. D., (2010). Biofuels and sustainability. Ann NY Acad . Sci; 1185: 119–34.
[25] Srirangan, Kajan, et al. (2012): Towards sustainable production of clean energy carriers from biomass resources. Applied Energy 100: 172-186.
[26] Biomass conversion technology, Available at: http://www.tsk-g.co.jp/en/tech/industry/pop.html. [Accessed January 17, 2014]
[27] McKendry, P. (2002). Energy production from biomass (part 1): overview of biomass. Bioresource technology, 83(1), 37-46.
[28] Thornley, P., Rogers, J., Huang, Y., (2008).Quantification of employment from biomass power plants. Renew. Energy 33(8), 1922-1927.
[29] Krajnc, N., Domac, J., (2007). How to model different socio-economic and environmental aspects of biomass utilisation: Case study in selected regions in Slovenia and Croatia. Energy Policy 35, 6010-6020
[30] Alper, H., Moxley, J., Nevoigt, I. E., Fink, G. R. & Stephanopoulos, G. (2006). Engineering yeast transcription machinery for improved ethanol tolerance and production. Science, 314, 1565–1568.
[31] McKendry, P. (2002). Energy production from biomass (part 2): conversion technologies. Bioresource technology, 83(1), 47-54.
[32] Overend, R. P. (2007). Biomass conversion technologies. In na conf."Sustentabilidade na geração e.

