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Growing pertinence of bioenergy in formal/informal global energy schemes: Necessity for optimising awareness strategies and increased investments in renewable energy technologies



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ABSTRACT

Biomass, most of which is presently in the form of lignocellulose, is an important source of energy in many developing countries, particularly those in sub-Saharan Africa. The intensity of sourcing and use of these renewable natural resources in these countries are increasing owing to multifarious reasons. Series of reported studies and experiences have shown that this trend is not likely to reverse in the nearest future in these countries and that there is also very likely to be an upward global surge in this regard perhaps because of the expected positive responses to the increasing campaign for gradual energy switch to biofuels partly in order to contribute to the series of efforts at controlling the presently experienced global climate change as a result of fossil fuel combustion on one hand and finiteness of this non-renewable resource (fossil fuel) on the other. In line with these concerns, some developed countries are already increasing biofuels in their energy supplies, main source of which are expected to likely be from less developed tropical countries in future with series of projections concerning this. Therefore, there is the need for sustainable means of producing biomass for this purpose in these developing countries coupled with strategies that will capture future possibilities of supplying this resource to other parts of the world when the demand arise. However, literature showed that irrespective of the increasing importance of biofuels, the present awareness levels concerning this and investment in renewable energy technologies are still low, noting that most of the efforts in these regard appear to be more in the developed countries. Increased awareness and investments in bioenergy is therefore also imperative in developing countries bearing in mind this region's importance in its future sourcing and supply. The concept behind this article is to highlight the growing global importance and usage of biomass energy and their influence on both formal and informal global energy schemes, hoping this will be valuable to the various stakeholders that influence growth and development in this sector, particularly in the developing countries.

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1. Introduction

The significant roles played by energy and associated systems in human development for years have been variously acknowledged from different perspectives. For instance, access to energy have been

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very important in the provision of heat, light, transportation, among others, where and when needed. Similarly, businesses, commerce, industries, public services such as modern health care, education, communication, among others, are also highly dependent on the availability, quantity and quality of energy required. Accordingly, it should be expected that the types and levels of advancement in technologies for energy generation, conversion and use will be among the main determinants of the different levels of “development” worldwide [1–3]. Nevertheless, it is noteworthy that the “quality” of sources and forms of energy is not substantive.

The non-substantive nature of quality of sources and forms of energy entails that different forms of energy cannot be easily substituted for each other or aggregated into an overall index [4]. However, in line with the earlier assertions that are based on informed opinions, establishing direct relationship between the absence of adequate and qualitative energy services and many poverty indicators will logically follow. In a similar manner, experiences have also shown that achieving sustainable development in every part of the world will be a more difficult task if the series of issues concerning sustainable generation and utilisation of energy are not properly conceptualised and executed in ways that will not only enhance sourcing and usage but also the processes surrounding the improvements in research and development concerning them.

Today, the perceived or real disparity among the different parts of the world in terms of “development” is mainly described using level(s) of technological advancement and material well-being. However, it is worth noting that the designations “developed”/“developing” are mainly intended for convenience and most times do not necessarily express a judgement about the stage reached by a particular country or geographical area in the development process [5] as the levels of development may vary widely within the so-called developing countries, with some of them having high average standards of living [6,7]. Nonetheless, most of geographical entities termed “developing” are currently located in Africa, Asia, Latin America, and the Caribbean regions.

These developing countries, many of which are with lots of renewable natural resources (RNR), are predominantly inhabited by people with average standard of living lower than those of developed countries perhaps because of the disparity in the levels of education and industrialisation between these two described entities. Paradoxically, most of these developed countries are with comparatively lesser RNR. This lend credence to the assertion by Erakhrumen [8] that neither lack nor availability of RNR determines the poverty or affluence status of any country but lack or availability of appropriate and adequate human resources to develop and make use of science and technology in adding value to these RNR and also to attract investments. This appears to be the case in all facets of life including energy and associated systems related to development worldwide.

For instance, the principal means of generating energy earlier known to mankind was the combustion of biomass, whose use later declined significantly in industrialised countries, owing to the discovery and subsequent large-scale use of fossil fuels. This switch, understandably, resulted from the realisation that energy density of fossil fuels is comparatively higher than that for biomass coupled with the claim that there is the need for a lot of energy to collect biomass for biofuel. In addition, biomass is also considered to be bulky when compared to fossil fuels. However, biomass still presently serves as the main source of energy in many developing countries, especially in their rural areas [3,9–14]. This source of energy has been seen as a means of contributing to rural development and job creation, as revenues from biomass and biomass-derived products could provide a key lever for development and enhanced agricultural production in these areas [15].

Similarly, many of the developed countries that are currently largely dependent on fossil derived fuels, with financial resources for this, are also gradually increasing bioenergy in their energy supplies/mix [3,11,12] perhaps partly because biofuel hold out the prospect of replacing substantial volumes of imported oil in the coming decades coupled with other considerations. Therefore, owing to these recent developments and future projections, this article was conceived in order to highlight the increasing importance and usage of biomass energy and their influence on both formal and informal global energy schemes. It is expected that this contribution will be valuable to the various stakeholders that influence growth and development in the energy sector, (in this case biomass energy), most especially in the developing countries.

2. Some salient issues concerning renewable sources of energy

In defining what “renewable sources of energy” are in this article, an attempt is made by applying the definitions used in the United Nations system and that by European Parliament and Council. Renewable sources of energy was defined as large- and small-scale hydropower, modern and traditional biomass energy, solar energy, wind energy, ocean energy, urban and rural organic waste, and geothermal energy [16]. Similarly, the directive 2009/28/EC of the European Parliament and Council under article 2 considered the earlier mentioned energy sources, including aerothermal, hydrothermal, landfill gas, sewage treatment plant gas and biogas to be energy from “renewable sources”. However, documented reports showed that large-scale hydropower and traditional biomass are the most important among these in terms of application for energy generation.

Interests in issues concerning renewable energy (RE) are gradually increasing worldwide, however, another paradox is that research and development efforts concerning them presently appear to be more and are also increasing in developed countries in comparison with other parts of the world, particularly the developing countries, where biomass still serves as the main source of energy [2]. This growing interest in RE, and in biomass energy particularly, might not be unconnected with the fact that the current energy system is unsustainable, as fossil fuels are finite, thus, making it better to start early looking for sustainable alternatives [2,17].

Presently, the demand for energy in the developing countries is rising rapidly and acute shortage could be a bottleneck to economic and social development [3,18,19]. This is partly the reason why some current opinions have it that while many developing countries will aim at reducing dependence on traditional bioenergy fuels as part of policies to improve access to modern energy services, the global trend is expected to focus on how to increase the share of modern bioenergy in the global energy mix [20]. In addition, security of energy supply is a global issue that elicit series of national and international policies. For instance, a large proportion of known conventional oil and gas reserves are concentrated in politically unstable regions of the world [15].

This implies that increasing the diversity in energy sources is important for many nations to secure a reliable and constant supply of energy [15]. Biomass use for the production of heat and other types of energy is also seen to possess potentials for carbon neutrality when considering climate change mitigation [21], as biomass, when grown and converted for this purpose in a closed-loop feedstock production scheme, generates no net carbon dioxide (CO₂) emission, thereby, claiming a neutral position in the build-up of atmospheric greenhouse gases (GHGs) [2,22]. This, in line with certain opinions, simply means that when biomass,

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