Future of Food: Journal on Food, Agriculture and Society
1 (1) Summer 2013

Biofuel as the solution of alternative energy production?

Richard Beccles*[1],

[1] University of Kassel, Germany

* Corresponding author: *richardbeccles@yahoo.com*

Data of the article

First received : 08 July 2012 | Last revision received : 16 April 2013
Accepted : 23 April 2013| Published online : 5 August 2013
urn:nbn:de:hebis:34-2014021044986

Keywords

Biofuel, Food security, Livelihood, Environment, Land Acquisition

Abstract

There have being increasing debate on the prospects of biofuel becoming the next best alternative to solving the problem of CO2 emission and the escalating fuel prices, but the question is whether this assertion is true and also if it comes without any cost to pay. This paper seeks to find out whether this much praised alternative to solving these problems is a better option or another way for the developed countries to find more areas where they could get cheap land, labour and raw materials for the production of biofuel. This will focus mainly on some effects the growing biofuel production has on food security, livelihood of people, the environment and some land conflicts developing as a result of land grabbing for biofuel production in the developing countries.

Introduction

As the world's population grows bigger and bigger, the magnitude of aggregate demand for goods and services also enlarges, this in effect, causes a growth in the consumption of energy. This phenomenon is more pronounced in the developed countries partly due to the dramatic movement of workers to the status of middle-income level which drives both the personal and commercial demand for transport fuel upwards (Mitchell, 2010:1). Stated by Birur et al (2008), energy is an important factor of production in the global economy. 90% of the commercially produced energy is from fossil fuels such as crude oil, coal, and gas, which are non-renewable in nature (Birur et al., 2008:1). Based on the increasing dependence of the economies to function with the help of oil, the crisis of the 1970's provided the initial drive for the search of new energy sources. The price volatility of oil was a huge problem for countries to contend with. Aside from the price volatility, debates also shifted to focus on the pending environmental hazards the rise in oil production causes. There have been serious concerns raised in regards to CO_2 emissions and what this source of energy releases into the environment, which is one of the major factors leading to climate change. This has led to a scramble for a cleaner and more secure energy source (Rice 2010: 6).

In light of changing demand and supply of oil, most countries for want of enhancing energy security, have promoted the production of biofuel which is a renewable energy source. This has also led government all over the world to set biofuel production targets. They place a legal obligation on fuel companies to blend a certain volume or percentage of biofuels with the petrol and diesel they sell. According to an Oxfam briefing paper (2008), the European Commission proposed that by 2020, all member states must meet at least 10% of their transport energy needs through 'renewable sources' (Renewable Energy Sources Directive). In this same direction, the USA, has also established a Renewable Fuel Standard in the Energy Policy Act of 2005. This energy security act mandates the annual use of 36 billion gallons of renewable fuels, mainly ethanol, by 2022. This direction taken, according to the EC and the US, is the best way to handle the problem of climate change and improve fuel security

Citation (APA):
Beccles, R. (2018). Biofuel as the solution of alternative energy production?. *Future of Food: Journal on Food, Agriculture and Society*, 1(1), 22-26.

(Oxfam, 2008: 6).

Energy consumption varies drastically between the rich and poor countries. An example stated in the Oxfam briefing paper, revealed that "the per capita oil consumption in the USA is more than 100 times that of Tanzania". The promotion of this biofuel by rich countries prompts many to wonder whether biofuels, which can be produced more efficiently in the South, actually offers the solution to all parties (ibid: 25).

Eide (2008) mentions that, the European and American demand for liquid biofuel has motivated substantial production in countries like Indonesia and Malaysia who engage in biodiesel production from palm oil. The most recent addition is the production of biodiesel from Jatropha, a plant producing non-edible oily seeds (Eide, 2008:10).

Biofuel use constitutes a very limited part of the total energy consumed and derived from biomass. However the extent of agricultural lands used to produce this small portion of total energy produced from biomass is largely effecting food production (Eide, 2008:10). The anticipation that biofuel can be the alternative to solving the energy crises has led to the increasing demand and supply of it, which in effect has also led to so many people who are mainly the poor and vulnerable in society to suffer through land conflicts.

In the mist of all these changes with regards to the supply and consumption of oil, this paper would want to find out whether these policies being embarked upon by the developed countries would be beneficial to the developing countries. The paper would first try to give some little background information on biofuel and how it is seen as the next best alternative energy source to solving the problem posed by fossil fuel. Though some argue that this is actually an effective way of solving the energy crises and CO2 emission problems leading to climate change, this paper would try to view the other side of the coin by outlining some effects biofuel production has on food security, livelihood of people, environment and lands in the developing countries.

Meaning of Biofuel

Biofuel is most commonly defined as a renewable source of energy, which is produced from biological material or biomass, such as sugar cane, corn, or vegetable oils etc. in other words "Biofuels are liquid fuels that are directly derived from renewable biological resources, especially from purpose-grown energy crops" (Molony and Smith, 2010). "Woodfuel, which has been used for thousands of years for cooking and heating, is also a biofuel. Bioenergy in all its forms is energy produced from biomass, non-fossil material of biological origin including forest and agricultural plants, wild or cultivated as crops. It can be processed and used in solid, liquid or gas forms. Biofuel in forms of gas includes methane" (Eide 2008:9).

This fuel is obtained from plants and animal materials which can be grouped into liquid, solid and gas form. Solid biofuel includes fuelwood and charcoal whiles liquid biofuel mainly includes bioethanol and biodiesel and in gas form is methane. To tease out the difference between biofuel fuel and fossil fuel, the former is gotten from plants while the latter from biological materials that has been dead for hundreds and thousands of years. According to Molony and Smith (2010), virtually all of the commercially available biofuels are 'first generation' energy crops, by that they mean energy that are produced from crops like sugar cane, maize (bioethanol) whiles oilseeds such as rapeseed, soy, palm or jatropha (biodiesel) are also used. They stated that many of the crops used are edible and this has prompted research into finding alternatives crops that are non-edible so as to reduce the threat posed by biofuel production on food. There is also the 'second generation' or 'advanced' biofuel created from processes that convert cellulosic agricultural and forestry wastes into energy by using them for bioethanol or biodiesel. This second generation biofuel would be a way of preventing future problems of using food for fuel, but until it is well developed, the first generation biofuel still poses serious threat to food security and development as it's the target of heavy investment companies and countries (Molony and Smith, 2010).

Implications of Biofuel Production

At a first glance of why there is a great focus or shift to biofuel as the alternative to solve the problem posed by fossil fuel thus to reduce CO_2 emissions and also find ways of alternative energy supply for price reasons, one could also state that this transition is not devoid of implications. These implications, as earlier mentioned in the introduction, varies from country to country based on the existing conditions. Developed countries very much support biofuel and think it's a way to solve their hunger for energy and ignore implications to the developing countries. The bargain is between the strong and weak players.

As Wade (2003) talks about issues of bargaining steered by morality, he categorises morality into two parts, where the first is 'a-bit-better-than-the- jungle morality of tit-for-tat' where he means the powerful always survive and have their way. The second is the 'all-men-are

brothers morality' where the strong have the duty to restrain themselves to help the weak (Wade 2003:623). But the stronger countries move by their own interest and disregard the consequences of what would happen in the long-run when every land is used for the production of biofuel.

An extrapolation into the future does not give the right signals to the current rush for biofuels. This is because the acceleration has created a whole raft of environmental and social problems, ranging from deforestation to farm worker displacement, higher food prices, and increased carbon emission. Now, the scientific community is calling for a more cautionary approach to ameliorate further suffering and destruction (Chryso-stomou 2008). Against this backdrop, the discussion would now focus on some specific impacts the current wave of biofuel development is having on the developing countries. These include:

Impact on Food Security

Eide (2008) states that, "food security exists when all people, at all times, have physical, social and economic access to sufficient, safe and nutritious food that meets their dietary needs and food preferences for an active and healthy life" (Eide 2008:7). So why would biofuel production affect food security?

A key driver of food prices increases is the global demand for biofuels (Oxfam, 2012: 12). The dramatic rise in oil prices seen in the last decade has enabled liquid biofuels to become cost-competitive with petroleum-based transportation fuels, and as we already know, bioethanol and biodiesel are derived from commodities that are used for food, so logically the more such materials are channeled into the production of energy it affects the price also since its in competition with a rising opposition (fossil fuel) (Gomez et al 2008:473). In December 2007, the United Nations Food and Agriculture Organisation (FAO) calculated that world food prices rose 40% in 12 months prior, and the price hikes affected all major biofuel feedstocks, including sugarcane, corn, rapeseed oil, palm oil, and soybeans (Tenenbaum 2008).

As biofuel production increasingly expands, prices of food also hike up, leading to low income families to be vulnerable to hunger and malnutrition. Though price hikes can't only be attributed to biofuel, it stands as a major factor (BirdLife International, 2008). This puts a country's food security at risk when people are not even having two square meals a day. Georgis and Glantz (2009) assert that the impact of biofuel is much felt in Africa. They contest that it is unacceptable ethically to use food crops to produce biofuel whiles Africa is a food-deficit continent. Democratic societies must strongly reject this prioritising of land use. African policy makers make biofuel a priority instead of food security, this they state does not go without opportunity cost because there is always a price to pay for this trade off (Wolde-Georgis and Glantz 2008).

Looking at the effects of biofuel on developing countries, it cannot currently be seen as solving the problem since it's now leading to high prices of food and contributing to foods crisis. This rising food prices had led to placing poor people, who often spend over half of their income on food, in an untenable situation. According to Oxfam it's estimated that the crisis has endangered the livelihoods of at least 290 million of the world's rural and urban poor (Oxfam, 2008: 5).

Impact on Livelihoods

The fast growing interest of huge investors to invest in biofuel in developing countries can militate against the livelihood of the rural poor. When there is land grabbing, it further marginalises those who rely on land for their livelihoods (Molony and Smith, 2010). Large-scale biofuel companies are forcefully ejecting small-scale farmers from their farmlands since they have the resources to negotiate and have their way. As mentioned earlier on, the stronger use their strength to have their way by suppressing the weak. Also these large companies destroy plants such as shea nuts and medicinal plants which villagers rely on. This affects their livelihood and threatens rural development and other economic resources. When such actions take place many farmers are displaced of their livelihood and deepens their poverty. The impact of land deals for biofuels on food production goes beyond what investors choose to grow on the land they acquire. They also deny millions of families' access to the land they depend upon to survive (Oxfam, 2012: 16).

Impact on Environment

One of the fundamental justifications for a shift to biofuels as an alternative energy source has to do with the climatic benefits that are anticipated to occur from the substitution for fossil fuels, whose combustion results in much greater CO_2 emissions, to fuels whose combustion releases gases sequestered through cultivation and which are therefore considered greenhouse gas (GHG) neutral (Schoneveld and Pacheco, 2011). This is seen as neutral because, it's believed that when these crops are growing, they keep carbon from the atmosphere. Nevertheless, when they are burned as biofuel, this carbon is simply released back. This means that over the lifecycle of the fuel, the net impact on atmospheric carbon is neutral. Despite this explanation there are still some emissions associated with all stages of their lifecycle, particularly if the crops are grown intensively, using nitrogen-based fertilisers and machinery, or if the refining

ISSN-Internet 2197-411x OLCL 862804632

process requires large inputs of fossil energy (Oxfam, 2008:7).

Aside this form of emission, there are further GHG emmissions associated with the process of bringing new land into production. As trees and grasses are burnt (forest) this contributes to some level of emission. Ploughing up soil also allows carbon previously held under ground to oxidise. Together, soils and vegetation store nearly three times as much carbon as the atmosphere. Clearly it's shown that clearing new lands to grow biofuels results in potentially significant emissions. As a result of this fact, the more the demand for biofuels increases, new land will be cleared to grow the crops (ibid:8), which also puts our forest at risk. Forest plays an important environmental role in the production of timber, wood, fuel, and other products, in the conservation of biodiversity and wildlife habitats, as well as in the mitigation of global climate change and the protection of watersheds against soil degradation and flood risk (Gunther Fischer et al 2009:30).

Rice (2010) argues that biofuel is not the solution to the emission of GHGs compared to fossil fuels because land, fertiliser and energy needed to grow the plants, and manufacture and transport the fuels can have a large and negative climate impact (Rice 2010:28).

Impact on Land

Biofuel production can have enormous effects on land both scientifically and socially, this section would advance argument in different dimensions of how the use affects the land directly as well as some land conflicts that emerges as a result of changing use of land. Rice (2010) states that the increasing use of industrial biofuel actually results in a changing use of land. He categorises the use of land into two forms thus direct and indirect use. There is a direct land use change when forests, peatlands, grasslands or other non-agricultural lands are converted for industrial biofuel production. This change also leads to the extermination of carbon-rich habitats in the soil which has increasing effect on the carbon stored in the soil and vegetation. The more biofuel production increases new lands are also converted leading to an increase in the direct land change usage. The indirect land use is, however, lands which were formally used for growing food or animal feed which is converted to be used for growing industrial biofuels. According to Rice (2010), this displaces the original agricultural land use onto land in new areas. He explains that though the biofuel crop itself may not cause new land clearance directly, it can still be held responsible because of its displacement impact (Rice 2010:26).

In the quest to developing and expanding biofuel production, there have also being a massive increase in land conflicts around the world. According to Bird Life International (2012), until July 2001, there have been 261 conflicts which involved 566 villages for about 569,000 hectares of land recorded in Indonesia (quoted from FoE, 2005b). Tens of thousands of people's livelihoods are threatened due to this poor land leases systems (BirdLife International 2012).

Unfortunately, one of the side effects of biofuel production is the rush of rich and powerful investors to buy lands which does not have strong land tenure systems. This action potentially displaces vulnerable communities whose rights are poorly protected (Oxfam, 2008: 21). "Nearly half Tanzania's land area has been identified as suitable for biofuel production. Already this is causing tensions as investors' land requirements come into conflict with those of communities. For example, 1000 farmers in the Wami Basin-a rice growing area currently face clearance to make way for a Swedish investor looking to develop 400,000 hectares of sugarcane plantations" (ibid: 22).

It's clear that the poorer the recognition of rural land rights is in a country, the more likely it is to host land deals many of which are to grow crops for biofuels. Many investors fail to deliver on promised compensation and job creation, and skewed power relations in negotiations over access to land often lead to a bad deal for the local communities (ibid).

Conclusion

Throughout this article, the main focus has been to spell out delicate issues concerning the impact of the current biofuel production trend. Most clearly biofuel has generated discourse on the problems it causes or it might cause. Nevertheless the worries over climate change and increasing fuel prices led to the rise of this new wave of a search for an alternative energy source. Proponents of biofuel, believe that it's the best way to drastically reduce carbon dioxide emission and save the world, but however it should also be stated that opposition to biofuel are not against the whole idea of biofuel but rather give a careful prompt to how priority is given to the alternative energy.

In the discussions of the article, it was realised that biofuel is a threat to food security because crops consumed by humans are now diverted for the processing of biofuel which contributes to the deduction of food supply for human consumption. Furthermore, the demand for biofuel has increased competition for land that would

have being used for cultivating food crops for human consumption. This has led many farmers to lose their livelihood. Lastly, more production of biofuels will force food prices up and make it more difficult for poor people to purchase food leading to malnutrition and hunger.

Considering the impacts biofuel production has on developing countries as outlined in the discussion, it could be said that this approach to solving fuel and climate change crises might not be the best alternative now. This pending issue could possibly be solved through an effective coordination between the developed and developing countries in global governance to finding a sure and true alternative solution to energy and climate change crises. Much ground would be covered if the principle of "all-men-are-brothers" morality by Wade (2008) is applied. Where a holistic consideration would be attached to all decisions made in the quest to solving these crises. In this sense, all parties should be actively involved to avoid decisions skewing toward the interest of only one party. In handling the issue this way, much focus would not be on only a solution to the fuel crises but would also focus on reducing poverty, advancing social equity and ensure environmental protection in the global world.

Acknowledgement

I will first want to thank the Federation of German Scientist and the Future of Food Journal for this great opportunity to publish this article. I will also like to express my profound gratitude to the anonymous reviewers of FOFJ who through their valuable comments shaped this article. And will lastly want to thank all my friends especially Jonathan Tetteh, Julius Bradford and Eunice Asiedu for their feedback.

Conflict of Interests

The author hereby declares that there is no conflict of interests.

References

BirdLife International. (2008). Available on, *http://www.birdlife.org* (Accessed 20th July 2012)

Chrysostomou, Andy. (2008). 'Biofuels Can Damage Environment More than they Benefit It' . Available on *http://www.celsias.com/article/biofuels-can-do-more-damage-to- the-environment-tha/-(Accessed 25th June 2012)*

Eide, Asbjorn. (2008). 'The Right to Food and the Impact of Liquid Biofuels (Agrofuels)', Right to Food Studies, Rome, F.A.O,, pp. 1-54

Gomez, Leonardo, Steele-King, Clare and Mac-Queen-Mason, Simon. (2008). Sustainable Liquid Biofuels from biomass: the writing's on the walls', *Tansley review*, CNAP:, UK: Department of Biology, University of York, pp. 1-7.

Molony, Thomas and Smith, James. (2010). 'Biofuels, food security, and Africa', Available on *http://afraf.oxfordjournals.org/content/109/436/489* (Accessed 20th July 2012)

Mitchell, Donald. (2010). 'Biofuels in Africa-opportunities, prospects, and challenges' Africa Knowledge Lab Report, *http://africaknowledgelab.worldbank.org/akl/node/67-* (Accessed 20th June 2012)

Oxfam International. (2012). *'The Hunger Grains: The fight is on. Time to scrap EU biofuel mandates;, Oxfam briefing paper* 161, pp. 1-33.

Oxfam International. (2008). '*Another Inconvenient Truth: How biofuel policies are deepening poverty and accelerating climate change', Oxfam International briefing paper 114*, pp. 1-58.

Rice, Tim. (2010). *The Impact of Industrial Biofuels on people and global hunger: Meals per gallon',* UK, ActionAid, pp. 1-23.

Tenenbaum, David. (2008). 'Food vs. Fuel: Diversion of Crops Could Cause More Hunger'. E*nvironmental Health Perspectives*,Vol.116(6) Available on *http://www.ncbi.nlm.nih.gov/pmc/articles/PMC2430252/-(Accessed 25th July 2012).*

Wade, Robert. (2003). 'What strategies are viable for developing countries today?': The World Trade Organization and the Shrinking of 'development space, *Review of International Political Economy*, London UK , Routledge Publisher,. pp. 621-644.

Wolde-Georgis, Tsegay and Glantz, Michael. (2009). *'Biofuels in Africa: A pathway to Development', International Research Center for Energy and Economic Development Occasional Papers*, No. 43, U.S.A., Willowbrook Road, pp. 1-23.

ISSN-Internet 2197-411x OLCL 862804632