International Journal of Scientific Engineering and Technology
Volume No. 6, Special Issue 1, PP : 39-42

ISSN : 2277-1581
22-23 Dec. 2017

Bio Fuel: Need for the Sustainable Generation

Sunil Sharma, Vishnu Inani
Department of Electronics & Communication Engg, Pacific University, Udaipur
Corresponding Author: ersharma.sunil@gmail.co, vishnuinani77@gmail.com

Abstract : Bioenergy is energy derived from biofuels. Biofuels are fuels produced directly or indirectly from organic material – biomass – including plant materials and animal waste. Overall, bioenergy covers approximately 10% of the total world energy demand.
Keywords : Biofuels , fuelwood, conventional food

INTRODUCTION

Traditional unprocessed biomass such as fuelwood, charcoal and animal dung accounts for most of this and represents the main source of energy for a large number of people in developing countries who use it mainly for cooking and heating. More advanced and efficient conversion technologies now allow the extraction of biofuels from materials such as wood, crops and waste material. Biofuels can be solid, gaseous or liquid, even though the term is often used in the literature in a narrow sense to refer only to liquid biofuels for transport. Biofuels may be derived from agricultural crops, including conventional food plants or from special energy crops. Biofuels may also be derived from forestry, agricultural or fishery products or municipal wastes, as well as from agro-industry, food industry and food service by-products and wastes.

A distinction is made between primary and secondary biofuels. In the case of **primarybiofuels**, such as fuelwood, wood chips and pellets, organic materials are used in an unprocessed form, primarily for heating, cooking or electricity production. **Secondary biofuels** result from processing of biomass and include liquid biofuels such as ethanol and biodiesel that can be used in vehicles and industrial processes. Bioenergy is mainly used in homes (80%), to a lesser extent in industry (18%), while liquid biofuels for transport still play a limited role (2%)

TYPES OF LIQUID BIOFUELS

The most widely used liquid biofuels are ethanol and biodiesel.

Ethanolisa type of alcohol that can be produced using any feedstock containing significant amounts of sugar, such as sugar cane or sugar beet, or starch, such as maize and wheat. Sugar can be directly fermented to alcohol, while starch first needs to be converted to sugar. The fermentation process is similar to that used to make wine or beer, and pure ethanol is obtained by distillation. The main producers are Brazil and the USA. Ethanol can be blended with petrol or burned in nearly pure form in slightly modified spark-ignition engines. A liter of ethanol contains approximately two thirds of the energy Provided by a liter of petrol. However, when mixed with petrol, it improves the combustion performance and lowers the emissions of carbon monoxide and sulphur oxide.

Biodiesel isproduced, mainly in theEuropean Union, by combining vegetable oil or animal fat with an alcohol. Biodiesel can be blended with traditional diesel fuel or burned in its pure form in compression ignition engines. Its energy content is somewhat less than that of diesel (88 to 95%). Biodiesel can be derived from a wide range of oils, including rapeseed, soybean, palm, coconut or jatropha oils and therefore the resulting fuels can display a greater variety of physical properties than ethanol.

SECOND-GENERATION BIOFUELS

Currently used liquid biofuels, which include ethanol produced from crops which is containing sugar and starch and biodiesel from oilseeds, are referred to as first-generationbiofuels. These fuels only use a portion of the energy potentially available in the biomass.

Most plant matter is composed of cellulose, hemicellulose and lignin, and "second-generation biofuel"technologies refer toprocesses able to convert these components to liquid fuels. Once commercially viable, these could significantly expand the volume and variety of sources that could be used for biofuel production.

Potential cellulosic sources include municipal waste and waste products from agriculture, forestry, processing industry as well as new energy crops such as fast-growing trees and grasses. As a result second generation biofuel production could present major advantages in terms of environmental sustainability and reduced competition for land with food and feed production. It could also offer advantages in terms of greenhouse gas emissions. Various techniques are currently being developed to produce second generation biofuels. However, it is uncertain when such technologies will enter production on a significant commercial scale.

The conversion	from
cellulose to ethanol involves	two steps.
The cellulosic and hemi	cellulosic

components of the plant material are first broken down into sugars, which are then fermented to obtain ethanol. The first step is technically difficult, although research continues on developing efficient and cost-effective ways of carrying out the process. Lignin cannot be converted to ethanol, but it can provide the necessary energy for the conversion process.

ISSN : 2277-1581
22-23 Dec. 2017

Current world oil demand amounts to about 4000 Million tonnes of oil equivalent (Mtoe)While the production of liquid biofuels amounts to 36 More representing less than 1% of this world demand.
Around 85% of the liquid biofuels are currently produced in the form of bioethanol with the main producers being Brazil and the USA. Biodiesel production is essentially concentrated in the European Union.

Large-scale production of biofuels from crops requires large land areas to grow them, which generates increasing competition for natural resources, notably land and water. Crop yields per hectare vary widely depending on the type of crop, the country and the production system. Currently, ethanol production from sugar cane and sugar beet produces the highest yields per hectare.

DRIVERS OF BIOFUEL POLICIES

The main drivers behind government support for biofuels in OECD countries are concerns aboutclimate change and energy security, and the political will to support the farm sector through increased demand for agricultural products.

Energy Security Secure access to energy is a longstanding concern in many countries. The recent increases in oil and other energy prices have increased the incentive to promote alternative sources of energy. Strong demand from rapidly developing countries, especially China and India, is adding to concerns over future energy prices and supplies. The transport sector depends mainly on oil. Liquidbiofuels represent the main alternative source that can supply fuels suitable for use in current vehicles, without radical changes to transport technologies.

Climate change There is increasing concern about human-induced climate change, and the effects of greenhouse gas emissions on rising global temperatures. Bioenergy is often seen as a way to reduce greenhouse gas emissions.

policy measures are influencing biofuel development?
Policies on agriculture, energy, transport, environment and trade all have an influence on biofuel production. Schemes to promote and supportbiofuels have been introduced both in OECD and developing countries. Without these incentives, widespread biofuel production would in most cases not have been commercially viable.

The policies used by governments to promote and support biofueldevelopment include various instruments. They can support the biofuel supply chain at different stages.

o **Agricultural policies** existed well beforethe introduction ofbiofuels. They include agricultural subsidies and price support mechanisms which directly affect

production levels and prices of biofuel crops as well as production systems and methods. These policies also have implications at international level for agricultural trade and geographical pattern of agricultural production.

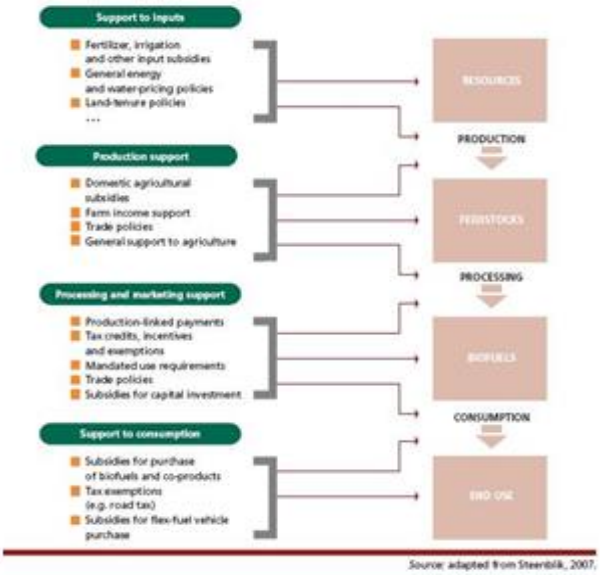
o **Blending mandates** defining the overallamount or proportion of biofuel that must be blended with petrol and diesel are increasingly being imposed.

o **Subsidies and support** for thedistribution and use of biofuels are key policy components in most countries that promote the use of biofuels. Several countries are subsidizing or mandating investments in infrastructure for biofuel storage, transportation and use, especially towards bioethanol which requires major investments in equipment.

o **Tariffs or import barriers** are dutiesusually imposed on imported goods. They are widely used on biofuels to protect the national agriculture and biofuel sectors, support domestic prices of biofuels and provide an incentive for domestic production.

o **Tax incentives** or penalties are among themost widely used instruments for stimulating demand for biofuels and can drastically affect the competitiveness of biofuels compared to other energy sources.

o **Research and development** is generallyaimed at improving the efficiency and cost-effectiveness of biofuel production, and identifying sustainable feedstocks. In developed countries an increasing proportion of public research and development funding is directed towards



second-generation biofuel technologies, in particular cellulosic ethanol andbiomass-derived alternatives to petroleum-based diesel.

Impacts of biofuel policies on international markets and trade?

o assesses the net effect on greenhousegas emissions of replacing fossilfuels by biofuels, we need to analyseemissions throughout the whole process of producing, transporting and

ISSN : 2277-1581
22-23 Dec. 2017

using the fuel. Life-Cycle Analysis is the main tool used todo this. It compares a specific biofuel system with a reference system – in most cases petrol.Greenhouse gas balances differ widely depending on the type of crop, on the location, on how feedstock production and fuel processing is carried out. Biofuels from some sources can even generate more green house gas emissions than fossil fuels.

A significant factor contributing to greenhouse gas emissions is the amount of fossilenergy used for feedstock production and transport, including for fertilizer and pesticide manufacture, for cultivation and harvesting of the crops, and or in the biofuel production plant itself.
Emissions of nitrous oxide are another important factor. It is released when nitrogen fertilizers are used and its greenhouse gas effect is about 300 times stronger than that of carbon dioxide.
By-products from biofuel production such as proteins for animal feed make a positive contribution to climate change mitigation because they save energy and greenhouse gas emissions that would otherwise have been needed to produce the feed by other means.

ENVIRONMENTAL IMPACTS OF BIOFUEL PRODUCTION

To assess the net effect on greenhouse gas emissions of replacing fossil fuels by biofuels, we need to analyse emissions throughout the whole process of producing, transporting and using the fuel. Life-Cycle Analysis is the main tool used to do this. It compares a specific biofuel system with a reference system – in most cases petrol.

Greenhouse gas balances differ widely depending on the type of crop, on the location, and on how feedstock production and fuel processing are carried out. Biofuels from some sources can even generate more greenhouse gas emissions than fossil fuels.

A significant factor contributing to greenhouse gas emissions is the amount of fossil energy used for feedstock production and transport, including for fertilizer and pesticide manufacture, for cultivation and harvesting of the crops, and or in the biofuel production plant itself.

Emissions of nitrous oxide are another important factor. It is released when nitrogen fertilizers are used and its greenhouse gas effect is about 300 times stronger than that of carbon dioxide.

By-products from biofuel production such as proteins for animal feed make a positive contribution to climate change mitigation because they save energy and greenhouse gas emissions that would otherwise have been needed to produce the feed by other means. Most studies have found that producing first generation biofuels usually yields reductions in greenhouse gas emissions of 20 to 60% when fossil fuels are replaced provided the most efficient systems are used and carbon dioxide emissions from changes in land-use are excluded.

CHALLENGES OF BIOFUEL POLICIES

Government incentives and support for biofuel production and use have been largely guided by national or regional interests rather than a more global perspective. The desire to support farmers and rural communities has been one of the strongest drivers.

There is a need for a more consistent set of policies and approaches, based on a clearer

understanding of the economic, environmental and social implications, in order to balance the potential and risks.

These policies must be formulated in a situation of considerable uncertainty.

o The exact role of biofuels in future global energy supplies is unknown. Yet even if the contribution of biofuels to global energy supply remains small, it may still imply a considerable impact on agriculture and food security.

o The future economic viability of biofuels is uncertain, because it depends on

fluctuating fossil fuel prices and on policy developments.

o Technological developments may also influence their profitability on the medium and long term. For instance, commercial competitiveness of second generation biofuel technologies may significantly improve the prospects for biofuel development.

REFERENCES

i. *Evans, G. "International Biofuels Strategy Project. Liquid Transport Biofuels - Technology Status Report, NNFCC 08-017", National Non-Food Crops Centre, 2008-04-14. Retrieved on 2011-02-16.*
ii. *"ADEME" (PDF). ADEME. Retrieved 22 September 2015.*
iii. *Oliver R. Inderwildi, David A. King (2009). "Quo Vadis Biofuels". Energy & Environmental Science. 2: 343. doi:10.1039/b822951c*
iv. *Peterson, Andrew (9 July 2008). "Thermochemical biofuel production in hydrothermal media: A review of sub- and supercritical water technologies". Energy & Environmental Science. 1 (1): 32–65. doi:10.1039/b810100k.*
v. *Ramirez, Jerome; Brown, Richard; Rainey, Thomas (1 July 2015). "A Review of Hydrothermal Liquefaction Bio-Crude Properties and Prospects for Upgrading to Transportation Fuels". Energies. 8: 6765–6794. doi:10.3390/en8076765.*
vi. *National Non-Food Crops Centre. "NNFCC Newsletter – Issue 19. Advanced Biofuels", Retrieved on 2011-06-27*
vii. *National Non-Food Crops Centre. "Review of Technologies for Gasification of Biomass and Wastes, NNFCC 09-008", Retrieved on 2011-06-24*
viii. *R. Inderwildi; David A. King (2009). "Quo vadis biofuels?". Energy Environ. Sci. 2: 343346. doi:10.1039/B822951C. "Refuel.com biomethanol". refuel.eu.*

ISSN : 2277-1581
22-23 Dec. 2017

ix. Knight, R. "Green Gasoline from Wood Using Carbona Gasification and Topsoe TIGAS Processes." DOE Biotechnology Office (BETO) 2015 Project Peer Review (24 Mar 2015).

x. Lu, Yongwu, Fei Yu, Jin Hu, and Jian Liu. "Catalytic conversion of syngas to mixed alcohols over Zn-Mn promoted Cu-Fe based catalyst." Applied Catalysis A: General (2012).

xi. Quarderer, George J., Rex R. Stevens, Gene A. Cochran, and Craig B. Murchison. "Preparation of ethanol and higher alcohols from lower carbon number alcohols." U.S. Patent 4,825,013, issued April 25, 1989.

xii. Subramani, Velu; Gangwal, Santosh K.; "A Review of Recent Literature to Search for an Efficient Catalytic Process for the Conversion of Syngas to Ethanol", Energy and Fuels, 31 January 2008, web publication.

xiii. Larry Rother (2006-04-10). "With Big Boost From Sugar Cane, Brazil Is Satisfying Its Fuel Needs". The New York Times. Retrieved 2008-04-28.

xiv. "Biofuels in Brazil: Lean, green and not mean". The Economist. 2008-06-26. Retrieved 2008-11-28.

xv. "Greenhouse Gas Reduction Thresholds". U.S. Environmental Protection Agency. Archived from the original on 2011-11-14. Retrieved 2015-06-14.

xvi. "EPA designates sugarcane ethanol as advanced biofuel". Green Momentum. Archived from the original on 2011-07-11. Retrieved 2015-06-14.

xvii. Garten Rothkopf (2007). "A Blueprint for Green Energy in the Americas". Inter-American Development Bank. Retrieved 2008-08-22. See chapters Introduction (pp. 339-444) and Pillar I: Innovation (pp. 445-482)