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BIOFUELS: AN EMERGING TECHNOLOGY

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ABSTRACT

There exists today a significant demand in industrialized countries for biofuels, driven largely by regulatory mandates for blending of biofuels into petroleum fuels. This demand is likely to grow considerably in the years ahead, driven by increasingly ambitious regulatory mandates, sustained high oil prices, and energy security concerns. Biofuel demands in many developing countries will also grow, driven by similar factors. Opportunities for trade in biofuels or biofuel feedstocks will be expanding. The technologies described in this publication imply a number of issues relating to the development of biofuels industries in developing countries supplying domestic and/or global markets.

INTRODUCTION

Any discussion of the topic of biofuels is compounded by the considerable diversity of energy sources, production methods and scale. Technologies range from millennia-old traditional bio-energy (e.g., using livestock dung for heating) to modern technologies (e.g., dedicated bioenergy crops to produce liquid fuels to replace petroleum-based sources in transport). The topic therefore requires perspective. Prior to the very recent advent of fossil fuels as the dominant energy source – bioenergy sources were the norm, and in particular unsustainable use of forest timber and whale oil. Even among modern technologies there are diverse applications where impacts vary considerably according to locally specific conditions. The information landscape is populated by examples which can be used to defend or attack biofuels. This is one subject where unsubstantiated generalizations are widespread, exceptions easily found and where there is a conspicuous role for better science.

The current report discusses biofuels largely as the term is popularly used today; that is, the production of significant amounts of bio-energy derived fuels largely as perceived as an alternative to petroleum based sources. There is, therefore, already an element of scale to the topic. Beeswax candles at the local craft market are no less a biofuel

than ethanol at the nearby gas station – but it is the latter where scale determines relevance.

So far, modern biofuels that are in commercial production today, or "first generation" ethanol and biodiesel from food crops, have not come close to replacing fossil fuels, as biofuels represent about 2% of total transport fuels used globally today (IEA 2011). This is mostly due to the constraints in land and water to grow biomass for biofuels, as well as the lack of cost-competitive and efficient technologies to produce biofuels (Giampetro *et al*. 1997; Schubert 2006). Ligno-cellulosic "second generation" biofuels produced from the woody part of the plant such as wheat straw, corn husks, trees or prairie grass, and especially those produced from waste and surplus biomass from existing agricultural or forestry systems are a potentially more abundant energy source than food crops (Schubert 2006; Sanderson 2011). The production of biofuels from ligno-cellulose instead of food crops could help

reduce competition with food production and the need for land and resources, which are rapidly being depleted by competing uses (Nuffield Council on Bioethics 2011). However, the processing of ligno-cellulose is currently expensive and is restricted by technological limitations,

although there has been much research to overcome these constraints (Schubert 2006; Sanderson 2011). Algae are another option that could be 200 times more productive

per hectare than a land-based crop, and reduce pressures on land use (although they may shift these pressures to other ecosystems such as wetlands) (Schubert 2006; Nigam and Singh 2011). Advances in synthetic biology have increased interest in this avenue and there has been progress producing larger quantities of algal biofuels and reducing production costs (see review by Dixon 2012).

Biofuels can offer some benefits over fossil fuels but there are concerns with regard to biodiversity conservation and sustainable use. Although small-scale production of biofuels may be sustainable and have many beneficial applications, there have been concerns about the sustainability of large-scale production of biofuels. Biofuels in commercial production today often involve significant biodiversity loss through destruction of natural habitats

Advantages

1) Biodiesel fuel is a renewable energy source unlike petroleum-based diesel.
2) An excessive production of soybeans in the world makes it an economic way to utilize this surplus for manufacturing the Biodiesel fuel.
3) One of the main biodiesel fuel advantages is that it is less polluting than petroleum diesel.
4) The lack of sulfur in 100% biodiesel extends the life of catalytic converters.
5) Another of the advantages of biodiesel fuel is that it can also be blended with other energy resources and oil.
6) Biodiesel fuel can also be used in existing oil heating systems and diesel engines without making any alterations.
7) It can also be distributed through existing diesel fuel pumps, which is another biodiesel fuel advantage over other alternative fuels.
8) The lubricating property of the biodiesel may lengthen the lifetime of engines.
9) Cost: Biofuels have the potential to be significantly less expensive than gasoline and other fossil fuels. This is particularly true as worldwide demand for oil increases, oil supplies dwindle, and more sources of biofuels become apparent.

10) Source material: Whereas oil is a limited resource that comes from specific materials, biofuels can be manufactured from a wide range of materials including crop waste, manure, and other byproducts. This makes it an efficient step in recycling.
11) Renewability: It takes a very long time for fossil fuels to be produced, but biofuels are much more easily renewable as new crops are grown and waste material is collected.
12) Security: Biofuels can be produced locally, which decreases the nation's dependence upon foreign energy. By reducing dependence on foreign fuel sources, countries can protect the integrity of their energy resources and make them safe from outside influences.
13) Economic stimulation: Because biofuels are produced locally, biofuel manufacturing plants can employ hundreds or thousands of workers, creating new jobs in rural areas. Biofuel production will also increase the demand for suitable biofuel crops, providing economic stimulation to the agriculture industry.
14) Lower carbon emissions: When biofuels are burned, they produce significantly less carbon output and fewer toxins, making them a safer alternative to preserve atmospheric quality and lower air pollution.
15) It is made from renewable resources
16) Fossil diesel fuel is a limited resource, but biofuels can be manufactured from a wide range of materials
17) Significantly less harmful carbon(CO2*, CO, THC) emission
18) Viability of the first generation biofuel Production
19) Relatively less flammable compared to fossil diesel
20) Significantly better lubricating Properties
21) Significantly less harmful carbon emission compared to standard diesel
22) Significant reduction of PM emission
23) Biofuel is nontoxic, biodegradable, and free from sulfur.
24) These fuels offer direct energy needs that are available at constant rates for a truly reliable source and replacement to traditional fossil fuels.
25) In some cases they are utilizing the human waste stream for additional energy use
26) Technology in place to use readily available gas
27) Byproduct of digesters is to produce agricultural compost for a marketable use as well.

28) Carbon-neutral

29) Available for small operations in developing nations

30) Utilization of current waste stream in some cases

31) There exists today a significant demand in industrialized countries for biofuels, driven largely by regulatory mandates for blending of biofuels into petroleum fuels. This demand is likely to grow considerably in the years ahead, driven by increasingly ambitious regulatory mandates, sustained high oil prices, and energy security concerns. Biofuel demands in many developing countries will also grow, driven by similar factors. Opportunities for trade in biofuels or biofuel feedstocks will be expanding [The technologies described in this publication imply a number of issues relating

Disadvantages

1) At present, Biodiesel fuel is bout one and a half times more expensive than petroleum diesel fuel.

2) It requires energy to produce biodiesel fuel from soy crops, plaus there is the energy of sowing, fertilizing and harvesting.

3) Another biodiesel fuel disadvantage is that it can harm rubber hoses in some engines.

4) As Biodiesel cleans the dirt from the engine, this dirt can then get collected in the fuel filter, thus clogging it. So, filters have to be changed after the first several hours of biodiesel use.

5) Biodiesel fuel distribution infrastructure needs improvement, which is another of the biodiesel fuel disadvantages.

6) We hope you found the above article on biodiesel fuel advantages and disadvantages both informative and useful.

7) Energy output: Biofuels have a lower energy output than traditional fuels and therefore require greater quantities to be consumed in order to produce the same energy level. This has led some noted energy analysts to believe that biofuels are not worth the work

8) Production carbon emissions: Several studies have been conducted to analyze the carbon footprint of biofuels, and while they may be cleaner to burn, there are strong indications that the process to produce the fuel - including the machinery necessary to cultivate the crops and the plants to produce the fuel - has hefty carbon emissions.

9)High cost: To refine biofuels to more efficient energy outputs, and to build the necessary manufacturing plants to increase biofuel quantities, a high initial investment is often required.

10)Food prices: As demand for food crops such as corn grows for biofuel production, it could also raise prices for necessary staple food crops.

11)Food shortages: There is concern that using valuable cropland to grow fuel crops could have an impact on the cost of food and could possibly lead to food shortages.

12) Water use: Massive quantities of water are required for proper irrigation of biofuel crops as well as to manufacture the fuel, which could strain local and regional water resources

13) Does not have a net reduction in greenhouse gas emissions when made from major crops due to petroleum used in the conversion of crops to fuel.

14) Putting significant energy into producing fuel from crop production results in getting a small net amount from fuel burning.

15)Ethanol has a 1 unit input for 1.3 unit output.

16) Significant concern comes from the increased agricultural land that is directed away from food crops and the removal of forested lands for increased agriculture land for fuel crops

17)Agricultural crop use towards energy generation

18) Competition for food

19)Upgrading requirements to the grid

20) Reliance on waste stream and increase animal use

21)natural gas consumption

22) Currently more expensive than fossil diesel fuel

23) Mainly produced from edible oil, which could cause shortages of food supply and increased prices

24) Reduction of fuel economy

25) Conflicts with food supply

26) Less suitable for use in low Temperatures

27) It can only be used in dieselpowered Engines

28) More likely than fossil diesel to attract moisture

29) Caused increases in NOx

Applications

1) Cogeneration gas engines

2) Compressed natural gas to fuel combustion engines and fuel cells

3) Upgraded to biomethane for introduction into local natural gas grid

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