

Food or Fuel? Biofuels

“Our destiny is not dependent merely on what we do to ourselves but also on what we do for the Earth as a whole. If we endanger her, she will dispense with us in the interest of a higher value – life itself.”

– President Vaclav Havel.



Fossil fuels have allowed for much technological growth, but at what expense?

More than 200 years after its first commercial use, fossil fuels fast-tracked the progress of mankind to what we enjoy today. This, however, came at the expense of the climate and environment; the burning of fossil fuels released greenhouse gases such as carbon dioxide, methane, nitrous oxide, and ozone which trapped heat in the atmosphere, leading to global warming. This, in turn, placed in peril the food and

water supply available for the now 7.4 billion people inhabiting the planet. Driven by this need to find sustainable “greener” forms of energy, science has turned back to nature; taking from the sun, the wind, and the Earth the energy to meet the demand of the growing population. Solar panels and wind turbines continue to improve their efficiency and cost-effectiveness but must still overcome major impediments for large scale industrial use. Viable energy storage technologies are still yet to be developed in order to meet the demand round the clock. Modern engineering hasn’t yet found a means to capture and harness the energy produced by nature in a manner that is as effective as the means by which plants and algae have been doing it for millennia.



We are turning to renewable energy to slow the tide of greenhouse gas emissions.

Development of renewable energy aims to alleviate the dependency of our industries on fossil fuel - be it in power generation (electricity), temperature control (heating/cooling/air conditioning), or transportation - with the hopes of slowing climate change and easing away from economic dependency on oil. Biofuels continue to be the dominant form of renewable energy used, particularly in transportation. This is because they are compatible with the existing technologies that already drive a majority of the machines in current use.

Reading Sample



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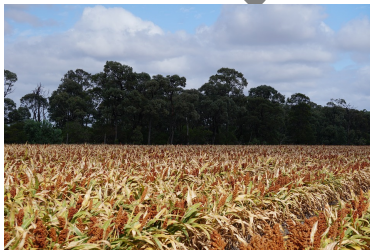
GENERATIONS

Among biofuels, ethanol and biodiesel have seen the most growth and development, especially in their use in the transport industry. There are **first-generation** biofuels, or conventional biofuels, derived from food products. **Second-generation** biofuels are derived from non-edible parts of food crops or recycled cooking fats and oils. **Third-generation** biofuels are those that are derived from algae and feedstocks that have been designed as energy crops – they have been modified to provide higher energy yields as compared to non-modified feedstocks. Lastly, **fourth-generation** biofuels are derived from feedstocks that supposedly provide the best energy yield; however, this technology is still in the research phase and is currently impractical for commercial use.



Ethanol is a first-generation biofuel.

ETHANOL



Sorghum is one of the crops used to make ethanol.

Ethanol is produced from the fermentation of sugars derived from sugary or starchy crops such as sugar cane, corn, wheat, sorghum, and cassava. Alone, it is not suitable for use as transportation fuel for everyday vehicles. For this reason, it is combined with petrol (fossil fuels) to improve combustion and to reduce greenhouse gas emissions, such as sulfur oxide.

Major producers and users of ethanol include the US and Brazil, which utilize corn and sugarcane, respectively.

BIODIESEL

Biodiesel is produced from vegetable or animal fat, most commonly from rapeseed, soybean, palm, or coconut oil. It is then combined with an alcohol in a process called transesterification. By-products of this process can then be used as animal feed. It has been found that due to a more effective combustion, biodiesel releases lower



Soybean oil is one of the oils used to make biodiesel.

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CONTROVERSY



Increased land use can lead to further greenhouse gas emissions.

Despite these developments and the promise they hold, issues have been raised regarding the effects of further utilization of land to produce these high-energy crops. Increased land use can lead to further emissions. Biofuel use creates income and employment, but also generates competition for natural resources, land, and water.

THE FUTURE

The technology is imperfect, but it is the first of many leading towards a greener, more sustainable future. Biofuels are still poised to become major players in the energy market, providing employment and renewable energy.

Reading Comprehension Questions

1. What
2. What are biofuels?
3. Describe
4. Differentiate the generations of biofuels.
5. How
6. How is ethanol made?
7. How

Extension Question

8. What are
9. Choose a biofuel not covered in this reading. From what is it derived? How efficient is it? What stage of development has it reached? In what parts of the world is it used?
10. Compare
11. Create an

Reading Sample



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TWFSAM

References

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