Journal of Electrical Power & Energy Systems, 2018, 2(3), 26-28
http://www.hillpublisher.com/Journals/JEPES/
ISSN Online: 2576-053X
ISSN Print: 2576-0521

Present Situation and Prospects of Bioenergy

Aleksandar Alimi

International Balkan University, Macedonia

How to cite this paper: Alimi, A., (2018) Present Situation and Prospects of Bioenergy. *Journal of Electrical Power & Energy Systems*, **2(3)**, 26-28.

DOI: 10.26855/jepes.2018.12.001

***Corresponding author:** Aleksandar Alimi, International Balkan University, Macedonia.

Abstract

The excessive consumption of fossil resources has triggered the energy and environmental crises. Finding alternatives to non-renewable resources has become a major problem for the survival and development of human society. The bioenergy is environmentally friendly and renewable, has a rich stock, and starts from biology, so obtaining a variety of forms of energy has become a research hotspot and investment hotspot. This paper mainly introduces the raw materials, production technologies and development status of bioenergy including fuel ethanol, biodiesel, biohydrogen and biogas.

Keywords

Bioenergy; Biomass Fuel Ethanol; Biodiesel; Biomass Hydrogen; Methane

1. Introduction

The bioenergy, solar energy, and wind energy are jointly called green energy. The bioenergy is produced by taking the agricultural and forestry waste resources, industrial waste resources, and urban garbage resources as raw materials, and adding the additives such as charcoal powder, adhesive oil, combustion improver, etc. forcompounding.It includesthe biogas, biohydrogen, biodiesel, fuel ethanol, etc. By having the advantages such as renewability, cleanness and pollution-free, etc., it is a useful supplement to conventional petrochemical energy such as coal, oil, natural gas, etc.

According to experts' prediction, according to the current utilization level,the coal can be mined for 100 years, the oil will be exhausted after 100 years, and the natural gas can be mined for up to 50~60 years. However, the bioenergy is recyclable; meanwhile, it is sulfur-free and the carbon cycle is dynamic.As a result, countries are increasingly concerned about the development and research of bioenergy, and have developed the corresponding development strategies. For example, the US "Energy Farm Program" predicts that till the year of 2016 and 2017 the corn consumption for producing thealcohol will exceed more than 30% of total corn production. Soybean oil consumption in biodiesel will account for two-thirds of total soybean oil production, and oil extraction from fiber will gradually enter the energy renewal program. For the Brazil's "Alcohol Energy Program", some lands that were originally planted with grain and oil crops in the southern regions will be replanted with sugar cane, and the lands that originally produced soybeans in the central and western regions will also be replanted with sugar cane. In such way, the total biofuel production will be increased to 92 million gallons in 2016 from the current about 52 million gallons.In addition, there are Japan's "Sunshine Program", India's "Green Energy Project", etc. [1].

At present, the main forms of bioenergy are fuel ethanol, biodiesel, biohydrogen and biogas.

2. Development Status and Development Prospects of Fuel Ethanol

The fuel ethanol refers to the absolute ethanol added in gasoline or diesel according to a certain proportion.It can increase the octane value of gasoline, make it burn completely, and at the same time reduce the emissions of tar, carbon dioxide, nitrogen oxide and other substances in the vehicle exhaust.It is currently the largest bioenergy source.

With the outbreak of two oil crises, countries around the world have been increasingly researching the fuel ethanol.Among them, Brazil is a pioneer in the development of fuel ethanol, mainly using the sugar cane as raw material to produce the fuel ethanol.The US is the world's largest producer by using fuel ethanol from cereals, with an annual production capacity of 5 million tons. In addition, it has formed a complete R&D system for the production of fuel ethanol by degrading cellulose and hemicellulose fertilizers [2].

3. Development Status and Development Prospects of Biodiesel

The biodiesel refers to the high-fat acid methane by taking the aquatic plants such as oil crops, engineering microalgae, etc., animal fats, catering waste oil, etc. as raw materials, and adopting the biological or chemical means so to convert them to high-fat acid methane which can replace the petrochemical diesel. Studies have shown that the vehicles with 20% biodiesel have reduced diesel particulate matter emissions by 14%, total carbon oxide emissions by 13%, and sulfide emissions by more than 70% [3].

At present, the vegetable oil is the main raw material for the production of biodiesel. Among them, Brazil takes the castor oil and genetically modified soybean oil are the main raw materials. US takes genetically modified soybean oil as the raw materials. The countries such as EU and Canada take the double-low rapeseed oil as the raw materials. While Malaysia and Indonesia develop the biodiesel with their abundant palm oil.

At present, Europe uses the most biodiesel, and its share has accounted for 5% of the refined oil market.In 2004, the production of biodiesel in the EU exceeded 200,000 tons.In addition, the US, Canada, Brazil, Japan and other countries are also actively developing the biodiesel.Japan began researching biodiesel in 1995, and currently has had an annual production of 400,000 tons [3].

4. Development Status and Development Prospects of Biohydrogen

The biohydrogen refers to producing hydrogen by taking the carbohydrates as hydrogen donors and using photosynthetic bacteria or anaerobic bacteria.The biohydrogen process not only provides the hydrogen needed for production and life, but also opens up new ways for waste recycling.

The raw materials for biohydrogen are abundant. So far, there have been agricultural solid wastes such as cow dung, refined sugar wastewater, soy product wastewater, dairy wastewater, starch wastewater, brewing wastewater, wheat bran, distiller's grains, corn stover, etc. and kitchen wastes to produce thehydrogen. Thereinto, most studies take the glucose, sewage and cellulose as raw materials, but are all at the laboratory level [4].

As one of the development directions of future energy preparation technologies, the biohydrogen has attracted extensive attention from all countries in the world. In recent years, the US invested the expenses of average several million US dollars in the research on biohydrogen technology each year. Japan invested about five times than that of the US in this research field each year, and formulated the biohydrogen development plans.

5. Development Status and Development Prospects of Biogas

The biogas refers to the flammable gas produced by the fermentation of anaerobic microorganisms under the conditions of certain temperature, humidity, acidity and anoxic status by using human and animal waste, animal and plant remains, industrial and agricultural organic wastes and waste liquids as raw materials. It is composed of methane, carbon dioxide, nitrogen and a small amount of hydrogen, oxygen, hydrogen sulfide and other gases. It is a clean energy with high combustion value and good explosion resistance.

There are multiple types of raw materials for biogas fermentation, such as livestock manure, crop straw, food processing wastes, wastewater, alcohol waste, etc. Their main chemical components are polysaccharides, proteins and lipids, of which polysaccharides are main ingredients for fermentation.

At present, many developed countries and developing countries with energy shortages are actively developing and utilizing the biogas.The City of Chicago has built underground pipelines connecting various garbage pits in the City. A large amount of biogas generated after the decay of garbage is sent to the users' homes through criss-crossing underground pipes.China's biogas use is mainly in rural areas, and the single-household biogas tank can meet the daily energy needs of household heating, cooking, etc [5].

6. Conclusions and Recommendations

At present, the world's research and utilization of bioenergy have achieved gratifying results, but still cannot reach the extent of large-scale production. The main reasons are: the biomasssynthetic fuel ethanol has a problem of “competing with people for food”, the biomass synthetic biodiesel has the disadvantage of large pollution, the biohydrogen has the disadvantages of low hydrogen production efficiency, difficulty in hydrogen collection, etc., the biogas fermentation has the disadvantages of low fermentation efficiency and poor continuous operation ability.

It is recommended that all localities should truly reflect the advantages of greenness and environmental-protection while developing the bioenergy according to local conditions, select appropriate non-grain raw materials to produce fuel ethanol, find more effective biological enzymes to improve the efficiency of hydrogen production and biogas production, and explore more reasonable processes to reduce the environmental pollution for producing the biodiesel.

References

[1] Jiang, M., Wei, P., & Lu D. (2006). Reflections on the development of industrial biotechnology in the post-fossil economy era. *Chemical Progress*, 25(10), 1119-1123.

[2] Wang, C. (2005). The development of fuel ethanol in the United States and Brazil. *International Petroleum Economy*, 13(5), 51

[3] Rong, Q. (2006). Research and utilization sTatus of bioenergy. *Bulletin of Biology*, 41(12), 24-25

[4] Yang, S., & Qu, Y. (2003). Research on biohydrogen production by Photosynthetic bacteria. *Modern Chemical Industry*, 23(9), 17-22

[5] Melis, A. (2002). Green alga hydrogen production: progress, challenges and prospects. *International Journal of Hydrogen Energy*, 27(11), 1217-1228.