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Research Article

Implications Of Transportation For Sustainable Energy Through Liquid Biofuels: A China-Based Research

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ABSTRACT

Multiple national administrations have lately committed to funding and promoting the broad commercialization of fuel-grade ethanol and biodiesel, two examples of liquid biofuels. It breaks out the several ways the Chinese government is investing in biofuels and how much it's spending. As the Chinese economy continues to develop, the government has made securing a reliable and secure energy supply one of its top priorities. A local biofuels business was evaluated by Beijing as a potential answer to the country's increasing oil imports, private automobile usage, and smog-related expenses." This would not only lead to increased wages and employment opportunities in rural areas of the nation, but it would also provide alternate markets for grain. Renewable energy sources for transport have lately received a lot of support and encouragement in China. Based on official figures produced by the GSI, China supported biofuel production in 2006 to the tune of RMB 780 million, which is equivalent to US$ 115 million, or about US$ 0.40 per litre. The five licenced producers were offered a variety of incentives, including tax rebates, low-interest financing for capital investments, and direct payments connected to their production. Also, drivers must utilise petroleum blended with ethanol (E10), a 10% petrol mix, in ten districts.

KEYWORDS: Transportation, Sustainable, Energy, Liquid Biofuels.

1. INTRODUCTION:

This study looks at the biofuels industry in China, specifically at the regulations put in place by the government to boost production and use. Government subsidies for biofuel production, distribution, and consumption, as well as vital commodities like maize and ethanol, are being investigated by the Global Subsidies Initiative (GSI) across many countries.

The data and information used in this study were given by the National Development and Reform Commission (NDRC) of the Chinese government. In certain cases, additional material has been sourced from other sources, such as the Foreign Agricultural Service (FAS) of the USDA, academic journals, news outlets, and other similar organisations. "Unless a more recent source that could be verified" becomes available, data from the NDRC will be used in most cases **(Arntzen, 2007).**

2. BACKGROUND OF THE STUDY:

According to a recent report by the Intergovernmental Panel on Climate Change (IPCC), renewable energy might account for as much as 80% of global energy consumption by the year 2050. Sustainable energy sources can stabilise the climate and increase human well-being. As stated in the work of Edelnhofer, Pichs-Madruga, and Sokona (2011) Renewable energy sources will get expenditures ranging from $1.4–5.1 trillion in the next decade, and an additional $1.5–7.2 trillion from 2021–2030, according to the IPCC. As the world's energy needs continue to grow, biofuels may play an increasingly important role in meeting those demands (Fontes, 2010). The general population's curiosity on biofuels has grown in recent years. Some see biofuels as a technologically advanced solution to the issue of climate change. But there are those who think they pose a

"threat" to food security and divert attention away from initiatives to reduce greenhouse gas emissions. The growing popularity of biofuels throughout the world has sparked heated debate.
Numerous considerations, such as monetary, social, and ecological ones, point to the versatility of biofuels. Biofuels must satisfy global demands for efficiency and sustainability without harming the food chain or leaving "negative carbon" footprints **(Beebe, 2001).**

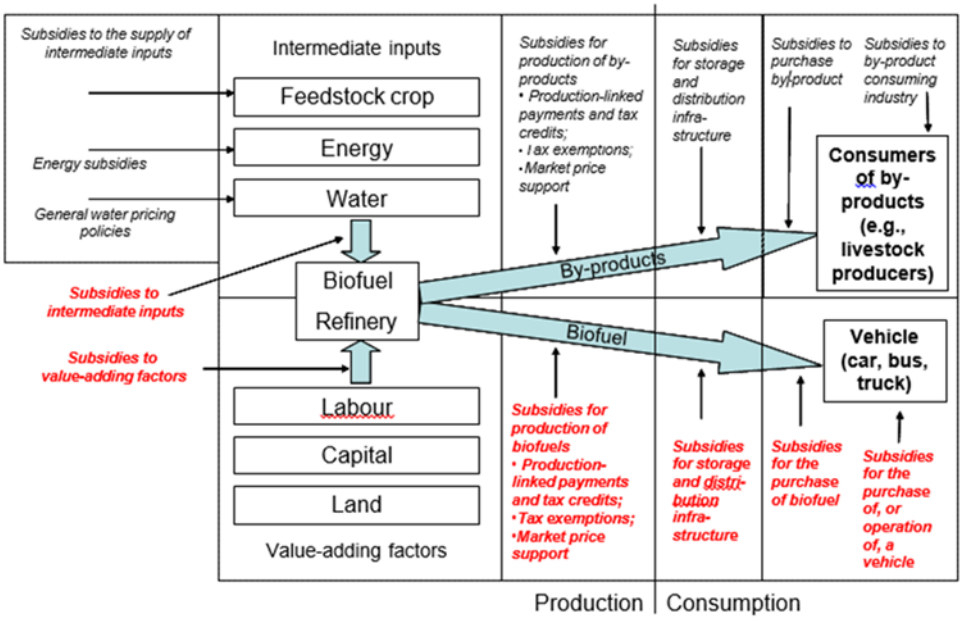
3. RESEARCH OBJECTIVES:

1. To analyze "consumer perception of biofuels with high attention on the complexity of consumer awareness, within the aspect of the societal" awareness.

4. LITERATURE REVIEW:

Due to the country's booming economy, China's energy consumption has increased dramatically throughout the last 20 years. The energy sector in China is expanding at a rate no other country can match. An increasing portion of China's skyrocketing energy consumption will come from transportation and residential usage as the country's population and standard of living continue to grow. Environmental worries regarding China's increasing energy consumption (and coal's disproportionate share of that demand) are a major policy consideration. China is responding to these demands by increasing the efficiency of its energy production and embracing cleaner, alternative energy sources that are produced domestically. Biodiesel has helped achieve some of these aims. Despite the widespread participation as a result of liberalisation, the state continues to exert great control over the energy industry due to its strategic importance. There is a lot of tension around energy prices since the government has a significant say in determining the ultimate prices paid by consumers. The government has acknowledged the need to liberalise energy pricing in the future, despite price limits not helping them accomplish their energy efficiency goals. On the other hand, it has promised to take its time. The Chinese government transferred energy policy responsibilities to other agencies after dissolving the Ministry of Energy in 1993. The Energy Department and the Leading Group of the NDRC were combined to become the National Energy Administration (NEA) in 2008. The NEA is subordinate to the NDRC in China's administrative hierarchy. All of China's energy policy, big energy infrastructure projects, and strategic oil reserves are overseen by the NEA **(Davis, 2019).**

5. CONCEPTUAL FRAMEWORK:



6. METHODOLOGY:

A number of options have been proposed by China's Action Plan for the prevention of carbon dioxide Peaking before 2030, including sustainable aviation fuel, advanced biofuels, and others. The biofuels business is putting its money into developing synthetic ethanol. Cellulosic biofuel and ethanol made from non-food grain starting materials are considered advanced biofuels in China. In 2021, a 240,000-ton-per-year biomass factory that produces ethanol via enzymatic processing and fermentation became live. In addition, there are ongoing efforts in China to create synthetic ethanol.

Sustainable aviation fuel (SAF) is a liquid fuel for commercial aircraft that has been the subject of much discussion due to its potential role in the decarbonization of the industry. A strategy to increase commercial SAF usage was presented in 2022 by the Chinese Civil Aviation Administration. The proposal aims to achieve 20,000 tons of consumption in 2025 and 50,000 tons during the "14th Five-Year Plan" timeframe. Two institutes associated with the Chinese Academy of Sciences are investigating the most efficient methods for producing SAF from wood and agricultural waste.

7. RESULT:

A number of options have been proposed by China's Action Plan for the mitigation of carbon dioxide Peaking before 2030, including sustainable aviation fuel, advanced biofuels, and others. Cellulosic biofuel and ethanol made from non-food grain feedstocks are considered advanced biofuels in China. In 2021, a 240,000-ton-per-year biomass factory that produces ethanol via enzymatic processing and fermentation became live. In addition, there are ongoing efforts in China to create synthetic ethanol using coal and industrial waste gas. Sustainable aviation fuel (SAF) is a liquid fuel for commercial aircraft that has been the subject of much discussion due to its potential role in the decarbonization of industry. A strategy to increase commercial SAF usage was presented in 2022 by the Chinese Civil Aviation Administration. Two institutes associated with the Chinese Academy of Sciences are investigating the most efficient methods for producing SAF from wood and agricultural waste. There is currently no other economically feasible low-carbon fuel source available to the marine industry but green methanol. China intends to manufacture 50,000 metric tons of methanol annually by 2024 by biomass gasification, an environmentally friendly process with maritime uses. To achieve its goal of manufacturing 110,000 tons of methanol, the nation will initiate a second project in 2023.

Table 1: Direct subsidies to compensate for losses paid to licensed ethanol plants 2005–2007"

(RMB and US$ per tonne)

Company name	2005	2006	2007
Jilin Fuel Ethanol Co	2395 (US$ 350)	2055 (US$ 300)	1375 (US$ 200)
Henan Tianguan Group	1720 (US$ 251)	1375 (US$ 200)	1375 (US$ 200)
Anhui Fengyuan BiochemicalCo.	1885 (US$ 275)	1630 (US$ 238)	1375 (US$ 200)
Heilongjiang Huarun AlcoholCo. Ltd	2395 (US$ 350)	2055 (US$ 300)	1375 (US$ 200)
Average subsidy	**2100 (US$ 306)**	**1775 (US$ 249)**	**1375 (US$ 200)**

Note: Numbers have been rounded.

Source: NDRC, 2008

The five ethanol manufacturers that have obtained licenses are also free from the 17% value-added tax and the 5% consumption tax. Table 2 shows the total amount of these subsidies as calculated by the NDRC from 2004 to 2006.

Table 2 Total subsidies for ethanol development in China" (million RMB)

Subsidy	2004	2005	2006
Exemption of 5% consumption tax	255 (US$ 37)	300 (US$ 44)	350 (US$ 51)
VAT reduction for ethanol mixed withgasoline	205 (US$ 28)	240 (US$ 35)	280 (US$ 41)
Direct subsidy for loss	215 (US$ 31)	180 (US$ 26)	140 (US$ 19)
Total subsidies	**675 (US$ 98)**	**720 (US$ 105)**	**770 (US$ 112)**

Note: Numbers have been rounded.

Source: NDRC (2008)

8. PURPOSE OF THE RESEARCH

Producing and researching biofuels with the intention of creating "sustainable biofuels" is the main objective. This concept serves as the basis for all environmental, social, and economic concerns. Sustainable energy implies meeting the energy needs of the present without compromising the capacity of future generations to do the same. The common consensus is that renewable energy sources, including biofuels, are the most environmentally friendly option.

Sustainability in the natural world defines the other "way to cut down on emissions of greenhouse gases. If the economy is sustainable, then biofuels can be generated in a sustainable way for transportation. According to Fontes (2010), this section delves into the socioeconomic consequences of producing and using biofuels.

There are four "generations" of "biofuel based on the raw material and technique utilised to make" them: For the initial generation of biodiesel, plant and animal fats were the main ingredients. Biofuels made using conventional techniques from crop residues such as sugar cane, corn, sunflower, or animal fats. Raw resources for the second generation come from sources other than food, including cellulose conversion, agricultural and municipal waste, and non-food raw materials. Biomass may be extracted from a wide range of plant and animal sources, such as trees, grass, wheat, and specialty crops cultivated for energy or biomass. One kind of biomass-to-liquid technology used in "second-generation" biofuels is the production of cellulosic biofuels from non-food crops.

The third generation starts with a substance that has undergone transformations during the cultivation process. For instance, further research and development are required before perennial grasses, fast-growing trees, and algae may be commercialised. To emphasise their exclusive purpose, these plants are called "energy crops" because of their potential to produce fuels.

9. DISCUSSION

Given the potentially significant environmental, and economic producing biofuels in China the minimal benefits it seems unjustifiable for the Chinese government to continue supporting biofuels in the current form. According to the authors, there should be no direct subsidies for biodiesel or fuel ethanol production, and the government should only fund demonstrable biofuels projects. This would prevent these projects from competing with food or feed production and would encourage more research into non-food biofuels feedstock sources, such as lingo-cell biomass. It is imperative that China expedite the deregulation of its transport petrol tariffs. In China, the government is trying to develop the energy sector, but the current pricing restrictions are making it difficult. When it comes to energy security and reducing urban pollution, the best course of action for China would be to boost the price of domestic petrol to levels seen on foreign markets. Other measures that should be considered include laws to enhance vehicle efficiency and limit the increase in automobile ownership.

10. CONCLUSION:

To reduce pollution, provide economic opportunities in rural regions, and better ensure its energy supply were the initial motivations for China's interest in biofuels.
The extent to which China's biofuels initiatives have advanced these aims is an open question.
With its fast economic growth and large oil imports, China's energy security has not been enhanced by policies that promote ethanol usage, particularly E10 standards, by offering a reliable alternative source. Due to geographical limits, China would still have to import most of the feedstock, even if production were to expand to a level where ethanol use drastically decreased dependence on foreign oil imports. American biofuel production would be rendered useless under such a plan.
Alternative fuels such as ethanol and biodiesel have been the subject of debate in the scientific community about whether or not they mitigate the emission of harmful air pollutants. It is possible that generating and consuming biofuels might result in greater greenhouse gas emissions than using fossil fuels, according to NDRC study, when land use change is taken into consideration. There could be unforeseen environmental effects from China's increasing need for biodiesel. Wildlife populations may fall, soil erosion can rise, and water sources can be damaged when environmentally sensitive marginal land is removed from conservation set-aside measures and put to agricultural use. Because of this, illicit logging can become even more profitable.

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