Development of Biofuels in China and Related Policies and Measures

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Sufficient, safe and clean energy supply is a fundamental guarantee of social and economic development. Entering the 21st Century, substantial increase of energy consumption, depleting oil resources and deteriorating environment have posed severe threat to the sustainable development of human society. How to address above issues has become a major strategic problem concerned by the international society.
Development and use of renewable energy represented by biofuels has become a strategic choice and development path of many countries. Currently, liquid bio energy mainly includes biological fuel ethanol and bio-diesel.
Fuel ethanol is internationally recognized as a clean renewable fuel, which can replace MTBE that causes underground water pollution, reduce greenhouse gas emission, and is a priority of the global renewable energy development.

- **Year 2000**
  - Global: 13.9 million tons

- **Year 2006**
  - US: 16.4 mt
  - Brazil: 13.5 mt
  - China: 1.54 mt
  - Global: 40.50 million tons

In 2000, the global fuel ethanol output totaled 13.9 million tons. In 2006, the output increased to 40.5 million tons, of which the US produced 16.4 mt, Brazil 13.5 mt and China 1.54 mt.
Introduction

- bio-diesel is an important component of bio energy, which can replace current petroleum diesel, or can be mixed with petroleum diesel as an additive, and has attracted attention of international community.

- EU, US, China, Canada, South Korea, Brazil, Japan, Thailand, India and Malaysia choose to produce bio-diesel from different feedstock according to their specific situation. Major feedstock include rapeseed, soybean, palm oil, small tung tree, and waste grease. The governments support the industry with favorable tax policies and financial subsidies.
China’s energy mix is characterized as rich in coal, and lack of oil and gas. What lacks most is oil. In 2006, China’s oil consumption totaled 323 million tons, among which 145 millions are imported. It is expected that by 2010, China’s oil consumption will reach 370 million tons, and only 200 million tons are domestically produced, which indicates that China’s oil dependency is relatively high.

Finding oil replacement is one of the most urgent task to address current energy challenge.
As alternative energy, biofuels have received great attention from the Chinese government. In the “10th Five-Year Plan” period, in order to properly handle overstocked stale grain to stabilize agricultural production, as well as to explore alternative energy, reduce tail gas pollution and improve air quality, several pilot projects on promoting the use of motor gasohol were carried out in certain regions, which have laid a basis for the development of China’s biofuels industry.
During the “10th Five-Year Plan" period, 4 fuel ethanol production pilot projects were implemented, which use grain as major feedstock and have developed an annual production capacity of 1.02 million tons.

<table>
<thead>
<tr>
<th>Production Capacity</th>
<th>Feedstock</th>
<th>Time of Operation</th>
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<tbody>
<tr>
<td>Jilin Fuel Ethanol Co., Ltd.</td>
<td>30</td>
<td>Corn</td>
</tr>
<tr>
<td>Henan Tianguan Group</td>
<td>30</td>
<td>Wheat, Corn and Sweet Potato</td>
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<tr>
<td>Anhui Fengyuan BioChemicals Co., Ltd.</td>
<td>32</td>
<td>Corn</td>
</tr>
<tr>
<td>Heilongjiang Huarun Ethanol Co., Ltd.</td>
<td>10</td>
<td>Corn</td>
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Jilin Fuel Ethanol Co., Ltd.
300 thousand tons/y
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Henan Tianguan Group

300 thousand tons/ y
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Anhui Fengyuan BioChemicals Co., Ltd.  
320 thousand tons/ y
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Heilongjiang Huarun Ethanol Co., Ltd.
100 thousand tons/y
Developed an annual gasohol mixing and distributing capacity of 10.20 million tons. In pilot regions, the market share of gasohol reaches over 90%, and consumption accounts for 29.4% of national total. PetroChina and Sinopec’s Mix and Distribution Center and Gas Stationz have promoted the use of gasohol in five provinces and in 27 cities in 4 provinces and municipalities.
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Distribution Capacity 10.20 mt
Sales of gasohol in 2006 15.44 mt
I. Provide favorable consumption tax and value-added tax policies for fuel ethanol production as well as distribution and sale of gasohol.

II. Develop pricing mechanism. According to the principle of same quality, same price, the market retail price of gasohol which shares same code with common gasoline is priced equally, and will adjust accordingly along with the common gasoline.
Promotion of gasohol in China in applicable in terms of technology

Profitable in current policy environment

The three strategies specified at the beginning of the pilot projects, i.e. to stimulate agriculture, protect environment and develop alternative energy have been proven to be effective and has brought remarkable social benefits
As one of the ten key projects of the National Tenth Five-year Plan, China’s bio-energy industry, which are represented by fuel ethanol has made periodical progress. It only took 5 years for China to become the third largest country of fuel ethanol production and consumption after USA and Brazil.
At the preparation meeting of “the World fuel ethanol Forum”, China put forward that biomass industry should become a new industry which will be advanced by the joint efforts of the world.

The preparation meeting of “the World fuel ethanol Forum” was held at Brasilia on September 5th, 2006, which was initiated by the president of Brazil, Lula and participated by China, Brazil, India, South Africa, USA and EU.

It was agreed to develop an international trade market for fuel ethanol, in order to accelerate the biofuels industry, to make up for the shortage of petroleum and to drive the development of world economy.
The International Conference on biofuels which was sponsored by EU, was held in Brussels, Belgian on July 5th, 2007.

The conference aimed to enhance the international cooperation between EU and main energy partners on biofuels. Participants exchanged information about the present situation, supporting policy, international trade, positive and negative aspects of large scale usage, technical line and development trend of biofuels in detail.

We put forward at the conference that every country should give serious consideration on the food security issue during the development of biofuels industry!
Based on the fundamental national conditions that China has a large population with insufficient arable land, and its population is growing with arable land shrinking, China’s overall guideline for fuel ethanol development is that, we must adhere to the People-Oriented principle, conservation of environment and ecology, harmonious utilization and sustainable development. Meanwhile, we must ensure that fuel ethanol development must not:

- compete for arable land with grain,
- use grain as major feedstock,
- destroy ecological environment.

The feedstock supply chain must be designed in a scientific way. We will actively develop alternative non-grain feedstock such as cassava, sweet potato, sweet sorghum and even stalks, which will not threaten the food security nor occupy the land that could cultivate grain. Especially for the existing fuel-ethanol producers, they are encouraged to increase the proportion of non-grain feedstock so as to enhance diversification of feedstock and flexibility of production.
With the fast expansion of fuel ethanol production around the world, food security has gained more and more attention. Especially last year, the price of grain soared, such as corn, which led to the price hike of meat. Grain ethanol has put pressure on the price stability of many countries especially the ones with underdeveloped economy. The price of agriculture products in China also soared in recent years. The development of the industry is facing crucial challenges.

- Strictly control the production of fuel-ethanol from grain,
- Choose regions with good condition and abundant non-grain resources to carry out pilot project on non-grain fuel ethanol,
- Provide financial policy supports.

Corn ➔ meat, eggs, grain and oil by-products
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About Bio-diesel

China is a major diesel consumer with a consumption of more than 100 million tons last year. Bio-diesel is on its early development stage in China. Based on the fundamental national conditions of a large population with insufficient arable land, the development direction of bio-diesel is that, on the premise that it does not compete with grain plantation for land nor compete with people for food oil, we will actively develop other feedstock such as woody oil plants, including Barbadosnut (Jatropha curcas), Chinese pistache (Pistacia Chinensis), Chinese Tallowtree (Sapium sebiferum), etc.
The resource of Barbadosnut is abundant at Southwestern China (such as Sichuan, Yunnan, Guizhou, etc.) with potential for planting in large scale and good economic, social and ecological benefits, and can be a favorable feedstock for bio-diesel. At present, local governments and relative enterprises are promoting the development of bio-diesel industry in the above region.
I. Development of alternative energy in China should achieve wide-range energy-efficient substitution as well as diversified substitution

The development of biofuels as an important alternative energy for oil fuel, should take the following factors into consideration: resources endowment, technology level, energy efficiency in full life cycle, environment influence, production cost etc. Improve industry economy through extended industrial chain, high added value, full use and comprehensive utilization.
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- extend industrial chain
- increase added value
- full use
- comprehensive utilization

CO₂ to produce degradable plastics
Biogas Production
Feed Production
Development of biofuels must not threaten food security.

As the fundamental food source, grain is the important guarantee for every country’s economic and social harmonious and sustainable development, and must be supplied in a regularly and stable way. Bio-diesel industry development must be at the premise of food security and social stability with a feedstock supply system that can guarantee sustainable development of economy and society.
III. Development of biofuels must take the path of non-grain feedstock

Properly develop and utilize the saline-alkali land and wasteland that are suitable for growth of non-grain plant, adopt new technology and specialized planting pattern, construct planting base of cassava, sweet potato and sweet sorghum, develop specific, high yield, high starch (sugar) content grain varieties, improving per unit area yield, and create favorable condition for the feedstock diversification of fuel-ethanol.
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Direction for feedstock development

- consideration of local condition and focus on non-grain feedstock

Structure of feedstock

- Sweet potato and cassava as major source
- Sweet sorghum as a new source of feedstock
- Research on cellulosic ethanol and achieve commercialization
- grain (such as corn) as a complementary source
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Diversification of feedstock

sweet sorghum

Cassava
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Diversification of feedstock

sweet potato

Jerusalem Artichoke (Helianthus tuberosus)
In the long term, plant cellulose is promising to be a strategic source for ethanol production. The research on cellulosic ethanol has achieved initial success in China, which is close to the international level. Accelerating cellulosic ethanol development is significant to completely address energy and environment restriction, promote development and prosperity of the rural economy and achieve sustainable development of economy and society.
Recently, China has approved the first non-grain fuel ethanol project at Guangxi sponsored by COFCO, which use the local abundant cassava resource as feedstock and will produce 200,000 tons of fuel ethanol per year at southwestern China when in operation.
The secured supply and economy of biomass feedstock are the keys to the steady development of biofuels industry, especially the biofuels—ethanol industry that uses starch as the feedstock, whose industrial correlation effect is significant and is likely to have strong impact on grain production and its processing industries. So, every country should give enough attention to the food security during the industrial development.

Two Suggestions

Further strengthen international exchanges and cooperation in biofuels development

Make full use of all the favorable conditions provided by economic globalization and regional cooperation, enhance technology exchange and communication, explore different ways of collaboration, try to achieve mutual benefit, cooperation and all-win, to better promote the development of alternative energy industry.

Explore and practice the development path of biofuels industry according to respect local situation

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Thanks !