

# China Fuels Ethanol Industry with Yams, Sweet Potatoes and Cassava

by [Lou Schwartz, China Strategies](#)

Beijing, China [[RenewableEnergyWorld.com](#)]

In 2006, China imported 145 million tons of crude oil, accounting for 44% of its consumption of oil. With the rapid growth in vehicle sales in China, consumption of fuel oil for vehicles accounted for 35% of oil consumption in 2006. And demand for fuel oil in China continues to grow at the rate of 15-16% per year. To satisfy domestic demand for vehicle fuel, control its dependence on foreign sources of oil and attempt to moderate fuel costs, China has embarked on a robust effort to ramp up fuel ethanol development.

Beginning in 2002, China experienced a spurt of grain-based ethanol refinery development. At that time, with the price of oil rising and China experiencing bumper grain yields, Chinese decision-makers encouraged the development of grain-based ethanol as a substitute for oil. By 2006, however, Beijing recognized that the use of grains for ethanol production was putting a strain on food supplies and causing worrisome increases in food prices. (In 2006, China's ethanol production was about 3.5 million tons, of which fuel ethanol output was 1.3 million tons, the third largest in the world.)

Consequently, the Chinese imposed a moratorium on further development of ethanol plants on December 18, 2006 when the [National Development and Reform Commission \(NDRC\)](#) and the [Ministry of Finance](#) jointly issued the *{Notice Concerning Strengthening the Management of Bio-fuel Ethanol Projects and Promoting the Healthy Development of the Industry}*. In the year and a half since the *Notice* was issued, while the examination and approval of new fuel ethanol projects was put on hold, Beijing did not specifically encourage the development of non-grain based ethanol plant development. Since then, China has stabilized its grain supply and now boasts grain reserves of nearly ½ of China's yearly grain consumption (250 million MT).

Now that Beijing appears to have successfully steered ethanol development away from grain-based feedstock, there are signs that China is poised for scale development of non-grain based ethanol. Though China's population is large and its land mass inadequate for such a large population, there are approximately 212 million hectares (525 million acres) of wasteland in China, which, if cultivated properly with appropriate energy-producing plants, could produce the equivalent of 45 million tons per year (TPY) of oil for every 10 million hectares of land used.

[COFCO](#), the Fortune 500 Chinese diversified agribusiness, food and bioenergy company, China Grain Oils Joint Stock Co., Ltd. (Zhongguo Liangyou), [Sinopec](#) and [PetroChina](#) are among the largest companies in this space that are building non-grain biofuel plants in various locations throughout China. There are also dozens of smaller privately run companies, like the Shandong Jinyimeng Group, engaged in non-grain ethanol biofuel development. Though there are projects using a variety of other non-grain feedstock, including waste oils, palm oil, the jatropha plant and the tung oil tree, etc., China's focus now appears to be on the development of non-grain ethanol based largely on yam/cassava/sweet potato as the feedstock.

In early April 2008 the China International Project Consultancy Corp., under the direction of the NDRC, completed an evaluation of five provinces and city with respect to their suitability for non-grain ethanol projects. The report concluded that developing ethanol refining capacity based on yam/cassava/sweet potato in those five provinces and city — Hubei, Hebei, Jiangsu, Jiangxi and Chongqing — would be in keeping with the

government's policy of substituting non-grain ethanol for grain ethanol and would not compete with food requirements.

With respect to the five provinces/cities that the NDRC has targeted for construction of yam/sweet potato/cassava fuel ethanol bases, the China International Project Consultancy Corp.'s analysis notes that Hubei Province has a long history of cultivation of sweet potatoes and Hebei province has a large amount of marginal lands that are appropriate for the cultivation of such non-grain feedstock.

Likewise in Jiangxi province, there is a relatively large amount of wasteland, which can be cultivated for fuel crops; Jiangxi farmers are accustomed to cultivating sweet potatoes and also have had a positive experience with test cultivation of cassava. According to the report, Jiangsu Province and the city of Chongqing also have good conditions for the development of a non-grain ethanol industry. These five provinces/city already have begun work on commercializing their non-grain biofuel ethanol industries.

The first of the non-grain ethanol projects slated for this group of five provinces and city is being developed by the Chongqing-based World Petroleum Company using sweet potatoes as the feedstock; this project will produce 100,000 TPY of ethanol. On April 1, 2008 Hong Kong Development, a publicly traded Hong Kong company, announced that it would purchase a 71% interest in World Petroleum Company for 163.4 million Yuan [US \$23.4 million]. In addition to the Chongqing World Petroleum Company, there are four other Chongqing companies that are investing or plan to invest in ethanol projects. Chongqing is China's third largest producer of sweet potatoes with output of ~20 million TPY; there are two areas within Chongqing that have emerged as centers of fuel ethanol refining: Changshou and Wanzhou.

The experience, however, of China's first non-grain biofuel ethanol project — the Guangxi Beihai (Northern Sea) project, a development of the Guangxi Zhongliang Bio-energy Co., Ltd., which in turn is a subsidiary of the China Grain Oils Joint Stock Co., Ltd. (Zhongguo Liangyou) — is reason for caution. The first stage of the Beihai project, which cost approximately 757 million Yuan [US \$108 million], produces 200,000 TPY of ethanol fuel. According to the Guangxi Development and Reform Commission, fourteen cities in Guangxi Province began selling and using ethanol for vehicles starting April 1, 2008. As of April 15, 2008, however, with the exception of military, state and special ethanol reserves, Guangxi stopped supplying ethanol for vehicles because the rapid increase in the cost of the feedstock has made the project unprofitable.

The feedstock for the Guangxi Province Beihai fuel ethanol project is cassava plants. In previous years the price of fresh cassava was 400 Yuan per Metric Ton (MT), yet since the Guangxi Beihai project began operations in the first quarter of 2008, the price of cassava already has increased to 600-700 Yuan/MT. Though Guangxi Province produces more cassava than any other location in China (estimated to be 7.8 million TPY), the amount of cassava that this one fuel ethanol plant requires (each MT of fuel ethanol requires 7 MT of cassava) is equal to 20% of the total output of cassava in Guangxi Province or 1.4 million MT of cassava. In April 2006 when the NDRC planned the development of yam/sweet potato/cassava-based fuel ethanol production at Guangxi Beihai, the price of cassava was only 300 Yuan/MT.

Another cautionary tale is of the 1.3 billion Yuan, 300,000 TPY fuel ethanol refinery project that also is being developed by the China Grain Oils Joint Stock Co., Ltd. (Zhongguo Liangyou). This Guangxi Province non-grain bio-ethanol project will require 900,000 TPY of sweet potatoes as feedstock. The region where the fuel ethanol refinery is to be located, however, produces 1.2 million TPY of sweet potatoes and consequently this one fuel ethanol refinery would consume  $\frac{3}{4}$  of the total output of sweet potatoes in that region. Perhaps recognizing that it will take a period of time for domestic yields of

the yam/sweet potato/cassava feedstock to ramp up to meet growing demands from the Chinese ethanol industry, China is importing large quantities of cassava primarily from Thailand.

It's important to note that the reason the economics of fuel ethanol production are so difficult in China is because Beijing has not permitted the price of oil, gas and electricity to rise to market levels. The price of oil in China is approximately 40% lower than the international price. At \$100/barrel, Sinopec is losing approximately 2000 Yuan [US \$286] on every MT of oil that it refines. Based on the amount of oil that Sinopec refined in the first quarter of 2008 (approximately 27 million MT) Sinopec's losses are in the neighborhood of 14-18 billion Yuan [US \$2 billion to \$2.5 billion]. In the first half of 2008 Sinopec received a subsidy of 7.6 billion Yuan [US \$1.1 billion] from Beijing and those subsidies are likely to continue.

For the time being, subsidies are integral to the further development of the biofuel non-grain ethanol industry in China. Since 2002, fuel ethanol producers have enjoyed tax reductions or exemptions (of VAT and import duties) totaling 190 million Yuan [US \$27 million] and have received from the Ministry of Finance subsidies of 2 billion Yuan [US \$286 million] to cover their losses.

In 2006 the subsidy in China was 1373 Yuan/MT [US \$196/MT] of fuel ethanol. One industry insider remarked, "The reason why companies in this industry remain positive is because of the financial subsidies."

With these economic realities as a backdrop, the non-grain fuel ethanol industry is achieving lift-off. With prices of yam/sweet potato/cassava feedstock rising, one would expect that market forces should work to increase supply allowing the non-grain fuel ethanol industry in China to flourish.

*Lou Schwartz is president of [China Strategies LLC](#), and publisher of the [China Renewable Energy and Sustainable Development Report](#) and the [China Aluminum Industry Report](#). He has degrees in East Asian Studies from the University of Michigan and Harvard University where he studied Chinese language and literature, economics and law, among other disciplines. Lou also earned a J.D. from George Washington University Law School.*