Feedstock trends: jatropha

Non-food feedstocks are playing a vital role in the biodiesel market, both for economic and environmental reasons

The period from 2005 until now has experienced unprecedented growth in global biodiesel demand, production, and production capacity. During this time, the increasing demand for traditional feedstocks (rapeseed and soy), and the rise in imports of palm oil from southeast Asia have contributed to a host of new challenges for biodiesel producers. These include sustained high prices for feedstocks; rising demands for alternative, lower cost feedstocks and increased scrutiny from political and consumer groups.

Despite these challenges, the growth of the biodiesel industry in Europe, the US, Asia and Latin America have continued on a rapid pace, and has spawned a variety of new opportunities for developers to meet growing demands for lower cost, non-food, non-rainforest-based feed stocks for biodiesel. These demands are producing new opportunities and stimulating fresh investment in the production of lower cost, alternative feedstocks such as renewable diesel (used vegetable oil, tallow), and high-yield feedstocks such as algae, and jatropha.

While the industry waits for algae and other feedstock contenders to commercialise and address rising demands for biodiesel production, a dramatic increase in the planting of jatropha has been seen in Asia, Africa and Latin America. Jatropha is a large perennial shrub/tree, which produces non-edible seeds that contain 30-40% oil ideal for biodiesel production. One hectare of jatropha can produce between 1.5 – 2.5 tonnes of seed oil.

Since jatropha plants are non-edible and grown in marginal, non-agricultural areas, the growers can produce volumes of plants that are not affected by rising food prices, require little water for cultivation, and do not compete with existing agricultural resources. Jatropha is now emerging as one of the prime contenders for biodiesel feedstock supply in the years ahead.

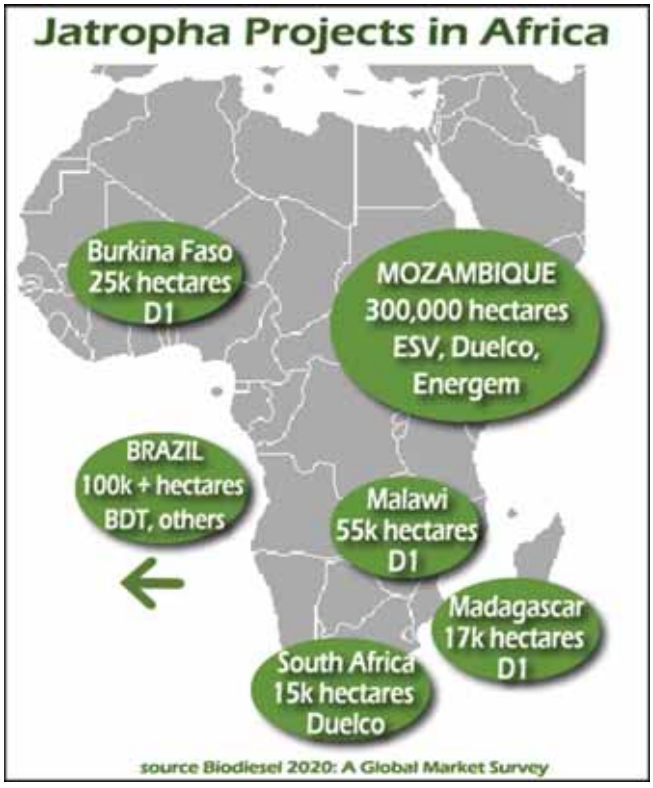
Biodiesel 2020: A Global Market Survey observes three key trends in the jatropha feedstock markets. The first is the expansion of commercial-scale jatropha production from India into Africa, southeast Asia and Latin America. This expansion includes pilot programmes and larger-scale ventures now underway in China, central Asia, south/central America, and southern parts of the US.

The second trend observed is the participation by governments and energy majors in the cultivation and production of jatropha. The governments of India, Indonesia, Mozambique, Malawi and Brazil have announced major initiatives around large scale jatropha production. An increasing number of private companies such as UK-based BP are establishing partnerships to invest significant capital in medium and large-scale commercial plantations capable of delivering high oil seed yields for biodiesel markets.

The third key trend identified is that jatropha-based projects are being developed as dual purpose entities – one for government programmes, and another for addressing rising global biofuels demands. In the case of government projects, jatropha offers nations the prospect of decreasing petroleum import dependency, while establishing a means for sustainable economic development in rural areas.

In many cases, government projects are supported by larger industry interests for the export of the crop, as a means of economic development within countries, and to alleviate concerns among larger biodiesel consumers worldwide related to elevated feedstock and food prices. Jatropha production is quickly expanding its scope from its nascent stage of community development projects to a larger scope that includes multiple, large-scale commercial projects.

Biodiesel 2020 finds clear signs of progress and intentions to expand hectare production on a global scale. The governments in south Asia and Africa have identified between 20-50 million hectares of suitable land for jatropha cultivation. Since 2005 India has announced plans to develop large scale plantations totalling over 350,000 hectares. During that same time period nearly 300,000 hectares of planned



production projects were established in more than four African nations. More recently, more than 200,000 hectares of projects were announced in southeast Asia – primarily in Indonesia, Malaysia and the Philippines. India has leveraged its early mover advantage by establishing public-private partnerships and is currently developing large scale plantations with financial commitments to develop over 350,000 hectares. High estimate plans include the cultivation of nearly 2,000,000 hectares by 2012. And India's vision is much larger – various reports have identified over 60 million hectares classified as agricultural wastelands that are suitable for jatropha cultivation.

The entry of energy industry participants and investment in India is helping to provide the investment and technology to enable larger-scale production. Between 2004- 2007 UK-based D1 Oils announced major joint ventures with Mohan Bio Oils, and Williamson Magor, which is one of India's largest tea plantation companies. In July 2007 D1 Oils announced a joint venture with BP and will now begin heavy investments in India-based jatropha production. These partnerships alone could lead to the cultivation of nearly 1,000,000 hectares of jatropha in India by 2012. India has received additional investments from Australia-based Mission Biofuels to serve and its partnership with Agro Diesel to manage a 100,000 hectare plantation. Some of this biofuel will likely be used by Mission to serve its Malaysian and Chinese markets.

Outside of India, Africa is now the second largest area of jatropha cultivation, with several commercial-scale plantations under development. Since 2005 several African nations have used private sector investment strategies and are now benefiting from the establishment of larger scale jatropha plantations. The most promising cultivation regions are based in Mozambique, Ghana, Malawi, Tanzania, and Zimbabwe. Mozambique is widely seen as having the largest potential for jatropha production. The International Energy Agency estimated that Mozambique could produce nearly 3 million barrels of oil a day of liquid biofuels from non-food crop resources such as jatropha.

In Mozambique, three significant projects were announced during 2006-2007. Canadian-based Energem Resources has invested $5.5 million (€ 4 million) on its first small plantation with near future commitments to cultivate 60,000 hectares. South African-based Duelco Renewable Energy has established Mozambique partnerships around a 60,000 hectare plantation and ESV-Bio Africa is currently managing an 11,000 hectare plantation with plans for 100,000 hectares.

Ghana is now planning a 12,000 hectare project with South Africa-based BD-1 Group. Ghana has also received interest in jatropha production from Petrobras, Eni Italy-based SpA, Entaban and Juanx Spain-based Lioret. In Tanzania, UK-based Sun Biofuels has committed nearly $20 million to jatropha production and a biodiesel processing plant. There are plans for expansion in other African countries as well, including Malawi, Burkina Faso, and Madagascar. Given the increasing support from private sector stakeholders, lower costs of production, and the ideal growing climate, Biodiesel 2020 forecasts long-term, sustained investments and growth in Africa-based jatropha production.

Southeast Asian nations are now working on large-scale jatropha plantations, including Indonesia, Malaysia and the Philippines. Indonesia has identified nearly 23 million hectares of jatropha land potential. Private companies are now investing, including Swedish BioEnergy's $143 million investment in a 100,000 hectare plantation in Indonesia. BP also plans to develop a 100,000 hectare area in Indonesia. Mission Biofuels has also made a significant investment in Malaysia – both in processing plants and jatropha crops. D1 Oils has an operations centre based in the Philippines and state-owned Philippine National Oil Company has announced plans to construct two biofuel processing facilities with UK-based NRG Chemical. These plans could include cultivation of over 1,000,000 hectares of jatropha.

Apart from the Indian, African, and southeast Asian jatropha projects, the trend in pilot and small scale projects is being initiated in new countries, including China where 650,000 hectares of plantations have been announced for the Yunnan Province. In the US, Florida-based Xenerga will soon begin a pilot project on 5,000 hectares of its patented high octane jatropha line. In Mexico, California-based SE Technology is currently testing a small jatropha pilot project that includes a low-cost mechanical harvest technology intended for cultivation in Mexico and southwest America. Brazil has announced plans for multiple jatropha projects in the excess of 100,000 hectares and remains closely involved in supporting projects in Africa.

Jatropha production for biodiesel is likely to enter the mainstream at the beginning of 2008, and will grow in greater volumes from 2010 and beyond. Initial production volumes will start with India, then African and southeast Asian nations, and eventually arrive from Latin American exports. As this occurs, investment and interest will continue from major biofuels investors such as BP, D1 Oils, Duelco, and Mission biofuels, as a long-term commitment to producing lower cost, non-food based crops.

Jatropha projects will serve three key roles – first, to continue as energy crops for local and community projects; second, to contribute a larger role in the national petrol independence programmes of dedicated countries; and finally to supply larger, commercial-scale projects in an effort to supplement the expansion of biodiesel programmes from native countries and growing global biodiesel demands from Europe, the US and Asia.

This article was written by William Thurmond, Emerging Markets Online. The information provided is a series of excerpts from Biodiesel 2020: A Global Market Survey, volume two www.emerging-markets.com email info@emerging-markets.com

Fast growth in the inter-Americas biofuels trade is being driven by sugar-based ethanol from the Caribbean, Central America and South America

Feedstock price trends

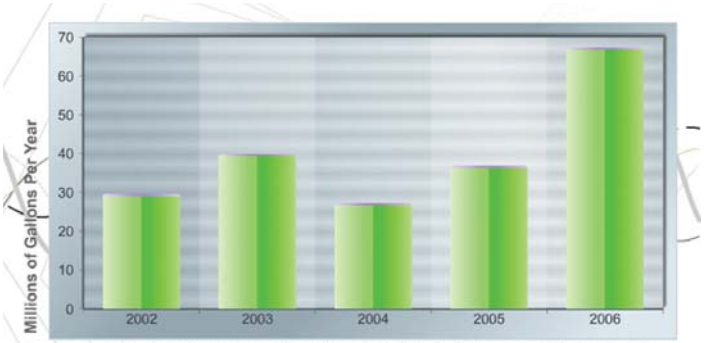
The markets for ethanol trade in different parts of America are growing at impressive rates. Although most news and analyses concerning ethanol in the Americas have focused on rising feedstock price concerns and the food versus fuel debate, another key trend has been largely overlooked in the media – emerging import and export growth.

Although Brazil represents the largest volume of ethanol exports to the US, some of the fastest growth is coming from the Caribbean and Central American countries. These growth trends are largely due to competitively priced ethanol from sugar-based feedstocks. Another key driver is the revision of US government mandate targets to replace 20% of transportation fuels over the next 10 years with biofuels.

The recent formation of the Inter-Americas Ethanol Commission will eventually contribute to these growth trends by promoting regional trade, inter-governmental cooperation, and addressing growing regional and US demand. Over the next 10 years, lower cost ethanol from sugarcane from Central America and the Caribbean (along with Brazil) will make a major contribution to help meet ambitious US targets. From an investment perspective, if these trends continue the outlook for ethanol trade in the Americas is likely to remain favourable for the foreseeable future.

Jamaican ethanol exports to the US

Market growth and trends in import-export 2002 to 2006

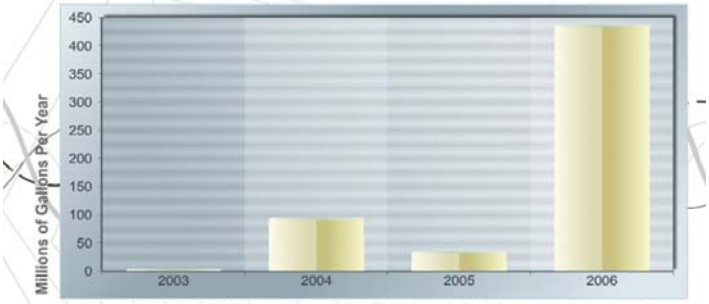


Source: Emerging Markets Online, Ethanol 2020: A Global Market Survey, RFA

Traditionally, Jamaica's best known exports are bauxite, reggae music and rum. Biofuels growth and exports from Jamaica to the U.S. are on the rise and are expected to accelerate based on recently revised trade accords, and increasing demand for ethanol from the U.S.

Brazilian ethanol exports to the US

Market growth and import-export trends 2003 to 2006

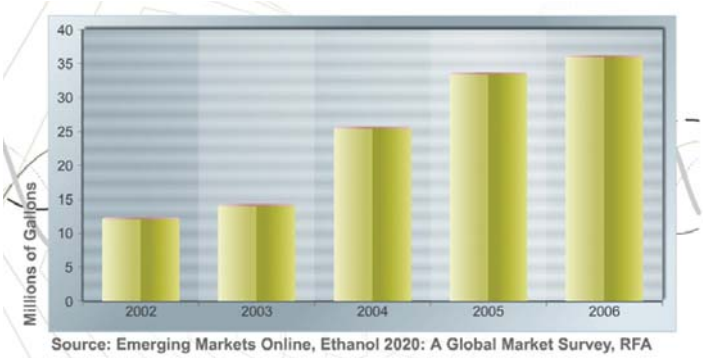


Source: Emerging Markets Online, Ethanol 2020: A Global Market Survey, RFA

Brazil's ethanol markets are legendary in terms of growth, feedstock price competition and technology. Despite U.S. import duties on Brazilian ethanol, import volumes are rising. The U.S. imported approximately 450 million gallons in 2006, nearly 10% of all ethanol consumed in the U.S. in the same year. Brazil's lower feedstock prices are driving U.S. import growth.

Costa Rican ethanol exports to the US

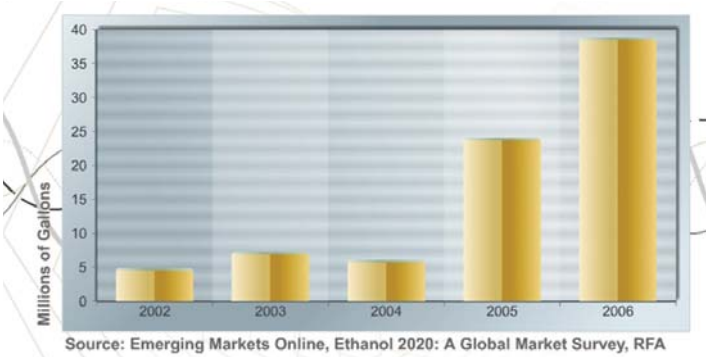
Market growth and import-export trends 2002 to 2006



Source: Emerging Markets Online, Ethanol 2020: A Global Market Survey, RFA

El Salvador ethanol exports to the US

Market growth and import-export trends 2002 to 2006



Source: Emerging Markets Online, Ethanol 2020: A Global Market Survey, RFA

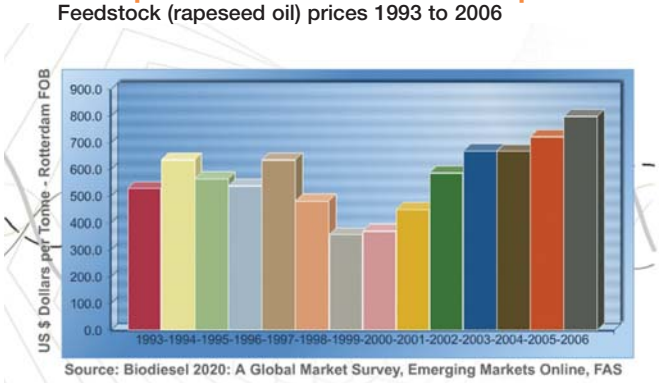
by William Thurmond, author of Ethanol 2020: A Global Market Survey from energy consultancy Emerging Markets Online www.emerging-markets.com

The rising cost of feedstocks worldwide in the last year has prompted increasing concerns for ethanol and biodiesel producers, government planners, environmentalists, policy analysts, academia, agribusiness, and commodity analysts. In the case of biofuels producers, the rising costs of corn, wheat, sugar beets, soybeans, canola oil and palm oil could have a significant impact on the continued rate of investment in biofuels production facilities. Presently, rising feedstock costs and higher oil prices prompted greater biofuels investment and production

Biofuel feedstock price trends

Europe biodiesel feedstock prices

Feedstock (rapeseed oil) prices 1993 to 2006

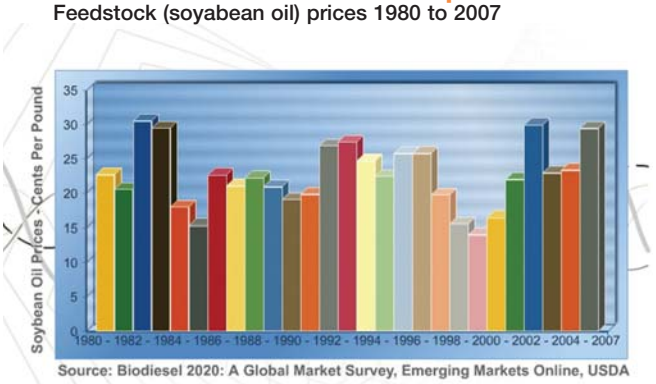


Source: Biodiesel 2020: A Global Market Survey, Emerging Markets Online, FAS

For 12+ years, rapeseed oil prices FOB in Rotterdam averaged $615/t. Before 2000, the average price was $575/t Peak prices were $669.00 in 2004, $723 in 2005 and $800 in 2006. The 1999-2006 trend demonstrates long term sustained price increases.

US biodiesel feedstock prices

Feedstock (soyabean oil) prices 1980 to 2007

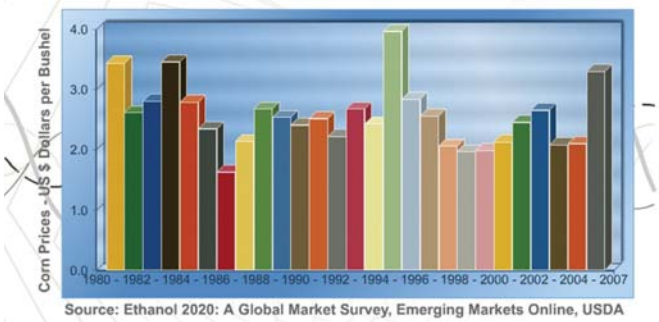


Source: Biodiesel 2020: A Global Market Survey, Emerging Markets Online, USDA

The graph illustrates 27 years of U.S.soybean oil prices as feedstock for biodiesel. Notably, the price has fluctuated year to year ranging from an annual change of 5% to over 40%. The trend from 2000-2007 illustrates the increasing cost of soybean oil as a feedstock.

US ethanol feedstock prices

Feedstock (corn) prices 1980 to 2007

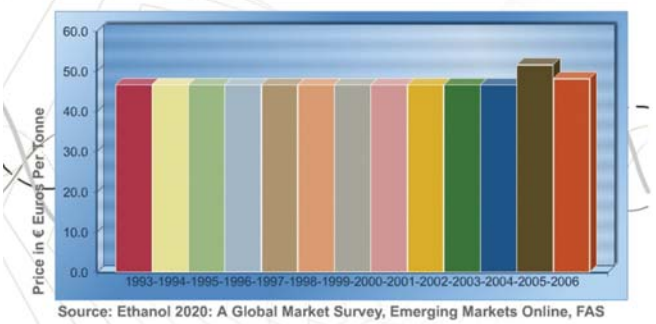


Source: Ethanol 2020: A Global Market Survey, Emerging Markets Online, USDA

The graph illustrates 27 years of corn prices in US $ per bushel. For 25 years, prices have varied, with the average annual price of $2.60 per bushel. Peak prices were $4 in 1996 and $4 again in the first quarter of 2007. The 2004-2007 trend demonstrates price increases.

Europe ethanol feedstock prices

Feedstock (sugar beet) prices 1993 to 2006 (quotas*)



Source: Ethanol 2020: A Global Market Survey, Emerging Markets Online, FAS

*** Sugar beets represent over 50% of feedstock used in EU bioethanol production. Sugar beet prices are regulated by the EU under quota at a mininum buy price. Sugar beet prices are unchanged since the 1993/94 marketing year, and remained in force until 2005/2006**

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