

Biofuels Country Attractiveness Indices

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The Ernst & Young Biofuels Country Attractiveness Indices provide scores for national biofuel markets (ethanol and biodiesel). This is the first edition of the Indices.

Overview of Indices

Ernst & Young's first dedicated Biofuels Country Attractiveness Indices ranks the attractiveness of global markets for investment in biologically derived renewable fuels incorporating both ethanol, a petrol substitute, and biodiesel, a substitute for diesel fuel.

The Indices provide scores out of 100 and are updated on a regular basis. The Indices take a generic view and different sponsor/financier requirements will clearly affect how countries are rated. Ernst & Young's Renewable Energy Group can provide tailor-made studies to meet specific corporate objectives. It is important that readers refer to the guidance notes set out on page 6 when referring to the Indices.

Global highlights

In the past 18 months high oil prices, fears over fuel security and global warming concerns have resulted in rapid growth for the biofuels industry. In his State of the Union speech in January 2007, US President Bush spoke of the "20 in 10" promise (20% of fuel from renewable sources in 10 years), and in February 2007 the EU committed to a mandatory target of 10% renewable fuels in road transport by 2020. Growing optimism in the sector has not been lost on investors who are showing an appetite to take advantage of the growth potential and capital requirement of the market with over US\$400m invested in 2006 and analysts predicting a compound annual growth rate for the industry of 30% in the medium term.

Recently, biofuels producers have seen their margins squeezed by crude oil prices falling from their 2006 highs, and rising feedstock prices. Corporate and social responsibility issues are also placing pressure on the nascent industry, with concerns around energy's role in food crop price volatility and the economic pressures to convert rainforest to agricultural land.

M&A, PE and IPO activity is likely to remain intense in the sector, but will not be without risk.

Market activity, Q1 2007

In late April Babcock & Brown made their fourth US ethanol investment with the purchase of Iroquois Bio-Energy's 151mLpa facility in Indiana, for an undisclosed amount.

In mid-February, Diversa Corp acquired Celunol Corp for US\$154.7m in a stock-for-stock transaction, plus up to US\$20m in debt financing. Subsequently, at the end of March, Diversa Corp closed a US\$100m offering of 5.5% convertible senior notes due 2027, in a private offering to qualified institutional buyers.

US biofuel producer AgriFuel acquired 45% of United Biofuels and 52.5% of Buffalo Biodiesel in March, both for an undisclosed price. Biofuels International

announced they had secured US\$180m funding for their 379 million liters per annum (mLpa) ethanol plant in Spencer County, Indiana.

Siam Renewable Energy Group acquired a 55% stake in Canadian ethanol and plastics technology developer Alcar Chemicals for US\$282m in March.

Brazilian sugar and ethanol producer São Martinho's IPO in February 2007 benefited from current high levels of appetite for investment in Brazilian ethanol.

AIM listed fund Clean Energy Brazil took a 49% stake in Usaciga Açúcar, Alcool e Energia Elétrica S.A. in late March for approximately US\$130m.

Brasbiofuel financed their first biodiesel plant in March securing c.US\$240m for their 360mLpa Parana facility.

In April, GEA Group sold Italian biofuels plant engineering subsidiary Lurgi to Air Liquide for an enterprise value of €200m, valuing the company at around €550m, and broadening the French gas company's access to the clean-fuels market.

The Carlyle Group announced an investment in Ensus, the ethanol company currently developing a biofuel production facility in Teesside, Northern England. Output is expected to be 400mLpa once operations begin in 2009.

China Agri-Industries Holdings raised US\$413m (HK\$3.2bn) from its initial public offering on the Hong Kong Stock Exchange and started trading on 21 March 2007.

Virgin announced a collaboration with Boeing and GE for an inaugural test flight of one of their Boeing 747s on a biofuels mix some time during 2008 providing the prospect of aviation creating a whole new market for biofuels.

All Biofuels Index at Q1 2007

Ranking	Country	All biofuels	Ethanol	Biodiesel	Infrastructure
1	US	73	78	68	87
2	Brazil	72	78	66	92
3	Germany	71	69	73	81
4	France	67	65	68	73
5	Spain	61	60	62	60
6	UK	58	59	58	61
6	Sweden	58	60	56	76
8	Canada	57	65	49	66
9	Italy	53	51	55	47
10	Australia	52	57	47	64
10	Thailand	52	52	52	44
12	China	51	54	49	50
13	India	50	52	48	47
14	Belgium	49	51	46	56
15	Indonesia	48	48	48	45

Source: Ernst & Young LLP

The **United States** sits at the top of the All Biofuels Index as a result of its recent strength and scale of biofuels development, its high gasoline and diesel consumption and the sophisticated financial markets in the country. **Brazil's** high ethanol score and large agricultural economy capable of growing high yield feedstocks place them second in the Index.

Germany in third place leads **France, Spain** and the **UK**, the four largest oil consumers in the EU, who all benefit from a 10% mandated EU blend by 2020 and a relatively high installed biodiesel capacity. Membership of the EU also allows these markets to benefit from the free trade of fuel, feedstocks and, to a lesser extent, capital.

Sweden comes behind these big four EU countries mainly as a result of little arable land and relatively small oil consumption. Its high position overall is achieved due to aggressive regulatory targets and incentive mechanisms. **Italy** has recently improved its mandated targets in the 2007 budget.

Canada ranks highly as a result of its high gasoline consumption, good agricultural land availability and the proximity and links it enjoys with the United States.

Thailand and **Indonesia** benefit from the availability of high yielding feedstocks and proximity to the **Chinese** and **Indian** fuel markets which are beginning to use biofuels to satisfy rising domestic energy demand. However, regulatory support has not been as stable as in the West and tariffs are levied on this region's exports. In addition, ethical and fuel quality standards continue to be questioned. Interestingly Japan and South Korea, who do not appear in the Index, are pursuing a strategy of investment in the region, as opposed to in their own markets where their natural resource is constrained, to satisfy future demand for biofuels.

Ethanol Index at Q1 2007

Ranking	Country	Ethanol
1	Brazil	78
1	US	78
3	Germany	69
4	France	65
4	Canada	65
6	Spain	60
6	Sweden	60
8	UK	59
9	Australia	57
10	China	54
11	Thailand	52
11	India	52
13	Italy	51
13	Belgium	51
15	Philippines	48

Source: Ernst & Young LLP

Brazil and the **US** are joint top of the Ethanol Index.

Brazil enjoys a high yielding feedstock, sugar cane, high blending targets, various tax incentives, and a large production capacity. This is attracting foreign investment such as from AIM listed vehicles Infinity Bio-energy and Clean Energy Brazil.

The US produced more ethanol than Brazil for the first time during 2006. Investment in the US is flowing from developers such as NYSE listed Aventine Renewables as well as through global corporations entering the business such as Virgin Fuels with their investment in Cilion and joint venture with NTR's Bioverda. In addition, the Federal grants for second generation, or cellulosic, ethanol have encouraged the market. High corn prices are expected to soften following record levels of planting this season by US farmers.

Europe continues to be a relatively modest producer of ethanol with its largest producer, **Germany**, producing just a fraction of the United States' production during 2006.

Belgium's score suffers due to its low gasoline consumption and **Italy's** as a result of its low installed capacity. Q1 2007 alone has seen the financial close of the 400mLpa Ensus plant in the **UK**, Raffinerie Tirlemontoise's 300mLpa plant in Belgium and Abengoa's 200mLpa **French** facility.

Australia sit in the top ten thanks to some state level mandatory blending legislation and availability of the high yielding feedstock sugarcane.

China too is piloting cellulosic technology due to a lack of grain. Investment today is at both ends of the value chain from state-owned grain trader COFCO and the nation's largest oil producer CNPC. **India** produces significant levels of ethanol and will need to satisfy high future oil demands. Other South East Asian economies, such as **Thailand** and the **Philippines**, are implementing blending targets and should benefit from their proximity to China, India, South Korea and Japan for export purposes.

Biodiesel Index at Q1 2007

Ranking	Country	Biodiesel
1	Germany	73
2	France	68
2	US	68
4	Brazil	65
5	Spain	62
6	UK	58
7	Sweden	56
8	Italy	55
9	Thailand	52
10	Austria	50
11	Canada	49
11	China	49
13	Indonesia	48
13	India	48
15	Malaysia	47

Source: Ernst & Young LLP

Germany tops the Biodiesel Index with a long history of governmental and financial support for the industry but its score would have been higher were it not for last year's reduction in excise tax incentives, in favour of blending targets, leading to concerns that the market is reaching overcapacity. **France** is in second place with an established biodiesel industry currently supported by excise tax exemptions, but with EU blending targets to be met in the future. For example, Diester has announced an expansion programme for four plants ranging from 100k to 250k tonnes per annum (ktpa) by 2008.

The **United States** and **Brazil** both benefit from high diesel demand and the necessary arable land to grow feedstocks such as soy.

EU markets that are large fossil fuel consumers such as **Spain**, where Grupo Natura have just inaugurated a 105ktpa plant and the **UK** with AIM listed producers D1 Oils and Biofuels Corporation, benefit most in the Index. Below them are the smaller economies – **Sweden** with its attractive offtake regimes; **Italy** with established biodiesel production and **Austria** whose industry grew up very much in line with Germany's.

Canada has some regulatory support and is located next to the large US market.

Biodiesel demand in **China** is expected to rise significantly in the future and ChinaAgri, who floated on the Hong Kong Stock Exchange this quarter, and CNOOC are both investing in capacity. However, regulatory support has been inconsistent and relatively little foreign investment has been attracted.

Thailand, Malaysia and **Indonesia** have strong listed plantation investors such as Golden Hope and PTAsianAgri who produce biodiesel, and the regulatory regimes are now recognising this potential. Ethical concerns continue over agronomy practises in the region however.

India has the potential to grow the high yielding feedstock jatropha and a large domestic fuel market but little biodiesel production at present.

Commentary – Guidance Notes

All Biofuels Index

The All Biofuels Index provides an assessment of the attractiveness of a number of different markets for investing in biofuels, comprising ethanol and biodiesel fuels.

The individual Ethanol and Biodiesel Indices combine in equally weighted proportions to generate the All Biofuels Index, which is made up as follows:

- Biofuels Infrastructure Index – 35%
- Ethanol Index – 32.5%
- Biodiesel Index – 32.5%

Biofuels Infrastructure Index

The Biofuels Infrastructure Index is an assessment by country of the general regulatory infrastructure for biofuels. On a weighted basis, the index considers:

- Market regulatory risk – 29%: The score in this category depends on how strongly the general regulatory, political and economic environment in the respective market encourages the production, distribution and use of biofuels
- Supporting infrastructure – 42%: A market with sufficient arable land available to cultivate, an established and widespread distribution network and R&D activity will score well
- Access to finance – 29%: Markets with a sound financial industry, proven financial track record of financing biofuels projects, listed companies operating in the biofuels sector and strong appetite by foreign and domestic investors score highly

Fuel Specific Indices

This comprises two indices providing fuel specific assessments for each country, namely:

- Ethanol
- Biodiesel

Some markets may appear in one of these Fuel Specific Indices but not in the All Biofuels Index since certain markets have a particular bias toward one fuel type but not the other (hence the combined score is reduced).

Each of the indices consider, on a weighted basis, the following:

- Offtake incentives – 25%: This includes the level of mandatory blending targets, tax breaks on fuel excise duty and tax credits awarded to biofuels producers
- Tax climate – 8%: Countries that create a favourable tax climate such as enhanced capital allowances or corporation tax holidays will score highly
- Grants and soft loans – 8%: Comprises grants and soft loans for investment in biofuels production
- Current installed base – 11%: Existing production capacity installed in a country
- Domestic market growth potential – 15%: Gasoline/ petrol or diesel consumption of a country is used to determine the ultimate growth potential for alternative fuels
- Export potential – 15%: A market's score is determined by its geographical location and any free trade agreements it is a party to
- Feedstock – 10%: Takes into account the energy yield, sustainability and price volatility of a country's main biofuels feedstocks
- Project size – 8%: Large projects provide economies of scale which facilitates project development

Readers' Notes



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- Finance raising
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- M&A
- Market entry strategy
- Procurement strategy
- PPA tendering
- Feedstock strategy
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- IPO advice
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