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Strategy Comment

Region
Global

Biofuels industry overview

This note is from a paper we prepared for the London Accord, a project whose objective is to raise awareness of investment opportunities in the renewable energy space. Our objective is to provide investors an overview of the current issues and opportunities in UK biofuels. This year has been a difficult one for investors in UK biofuels stocks. However, a new generation of feedstocks and technology offer hope for the future.

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UK Small/Mid Cap Analysis

Biofuel production must increase rapidly to meet targets

The EU has set a target of 5.75% biofuel use by 2010. The UK's target, at 5%, is less ambitious but could be a struggle to achieve. Against this background of government targets and shortages of supply, one might suppose that biofuels represent attractive investment opportunities. However, rising feedstock prices, misplaced incentives and short regulatory periods mean biodiesel producers are under pressure from both suppliers and customers.

2007 – *annus horribilis* for UK biofuels stocks

Rising prices for virgin vegetable oils, which comprise the bulk of feedstock, have been a real problem for UK-listed biodiesel producers. In addition, the absence of a government mandatory biofuels target until 2008 has suppressed the price of biodiesel. This means listed stocks have not been able to achieve acceptable spreads for their product and have not moved to full production. One, Biofuels Corporation, succumbed to its financial plight and de-listed from the market in August 2007. Although profitable in some cases, bioethanol producers have also underperformed the market in 2007.

We think new investment opportunities will emerge

We strongly believe that very good investment opportunities will emerge in biofuels. For example, waste products offer hope that all is not lost for conventional biofuel processing. In particular, Argent Energy has proved tallow and used cooking oil are commercially viable and could offer lower-cost alternatives to conventional feedstocks. Further out, new technology is emerging from the biotechnology area that could radically increase the range of feedstocks available for biofuel production. In our view, these approaches will likely emerge as winners in the long term.

Investing in biofuels

What should investors look for in biofuel investment opportunities?

Key indicators

Table 1 : Our view of the key factors involved in biofuels investments

Driver	Issue
Feedstocks	• Competition with food and personal care industries has increased prices, damaging the profitability of biofuel production. • Waste materials and feedstocks developed for biofuel production may offer better prospects.
Technology	• What proprietary technology is involved? • Has the technology been adequately protected? • Has the technology been proven? • What is the track record of any bought-in technology?
Supply agreements	• Does the company have supply agreements for feedstock purchases and biofuel sales? • What is the quality of the counterparties?
Track record	• Is there a track record of profitable production? • What is the profile of the management team?
Implications under future regulatory regimes	• Is there anything in the business plan that could be affected by future changes in regulatory support (eg, reliance upon specific feedstocks; reliance upon imported biofuel)?

Source: ABN AMRO

We discuss these issues in more detail below.

Producers using waste or biofuel exclusive materials as feedstocks

As traditional feedstocks have risen in price, the profitability of producing biofuels has declined. Additionally, the price of biodiesel has to date not reflected the price of the input materials (unlike the relationship between the price of mineral diesel and crude oil), meaning biodiesel producers have faced a very challenging commercial environment. The prices of most mainstream biofuel feedstocks have risen sharply over the past two years. This is partly because many feedstocks also find uses in other areas, notably food (eg, oilseed rape, soya oil, corn and wheat). One solution is to seek out producers using waste materials as feedstocks, where there is less competition for the material. Tallow and used cooking oil are good examples of waste products that can be processed into biodiesel. Argent Energy, a UK biodiesel producer, has demonstrated the commercial viability of these materials. These feedstocks also have the benefit of low carbon footprints, which may become more important as regulatory frameworks are refined. Jatropha is an example of a material identified as having potential as a biodiesel feedstock. Its appeal lies in its prolific growth in suitable climates and the fact that its toxicity rules it out as a potential food or personal care ingredient.

Technology edge

Rather than capital-intensive production plants, future investment opportunities may come from 'capital-light' investments where new patented technology is brought to the biofuels market. In particular, there is a significant amount of research and development under way within the biochemistry area, applying pharmaceutical learning to the problems of biofuel production.

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Good-quality supply agreements

Forward purchases and sales should help mitigate risk for biofuels producers, especially when the correlation between feedstock and output prices is low. Therefore, supply agreements with good-quality counterparties should be helpful in supporting an investment case. We believe it is important to emphasise the quality

Forward purchases and sales can help mitigate risk for biofuels producers

of the counterparties in these arrangements. The case of one UK-listed company, Renewable Power & Light, shows the effect of a less-than-optimum supply agreement. When RPL's supplier of palm oil defaulted on its contract, RPL was left with a shortfall of attractively priced palm oil, and the company now faces an uncertain future.

Track record of profitable production

The majority of the biofuel companies that have listed in London came to the market without a track record of profitable operation. Biofuels Corporation was one example. The company de-listed in August 2007, following a difficult period as a public company. The shares of a second, Renewable Power & Light, suffered from a profits warning in June 2007. Both companies came to the market as 'concept stocks', raising significant amounts of capital to build or acquire operations.

The majority of the biofuel companies that have listed in London came to the market without a track record of profitable operation

Regulatory framework

Because biofuels markets currently require regulatory support (and may do so for some time to come), we believe it is important for investors to consider the existing regulatory framework as well as any future changes that may be under consideration. For example, we believe the following are important: the level and type of financial support available, the duration of existing regulations, and how the regulations apply to feedstocks or the overall carbon footprint of the end product.

What needs to change to improve the investment climate for biofuels?

Improved regulatory framework

Current regulatory frameworks, especially in Europe, are not fit for purpose and confusing. These issues must be addressed if the EU is to meet its target of 20% biofuel use by 2020. In terms of adequacy, biofuels targets need to be binding (as opposed to optional, which appears to be the case throughout most of the EU). For example, under the UK's biofuel arrangements, downstream players will effectively be able to buy their way out of biofuel obligations by paying 15 pence per litre. The UK's regulatory framework is a good example of a confusing set of rules for biofuels. For 2008-2011, the UK will offer a combination of stick and carrot for biofuel use, in the form of tax breaks, targets and penalties for non-compliance. The problem with the system is that none of the benefits of biofuel production accrue directly to biofuel producers, which are often small companies attempting to transact with much larger organisations who probably wield significant pricing power. Instead, the benefits (tax breaks) go to downstream operators (where the compliance obligation also falls), in our view, significantly increasing the complexity of market dynamics. The UK appears likely to reform its regulatory framework, instituting a review in June 2007 and it is possible that, from 2011, the UK will reward biofuels that produce the greatest saving in greenhouse gas (GHG) emissions. The UK already has a working system for renewable energy in the form of Renewable Obligation Certificates (ROCs), and this could form the basis of new support mechanism for the biofuels market.

From 2011, the UK could reward biofuels that produce the greatest saving in greenhouse gas (GHG) emissions

The effect of government policy on a biofuels market was seen in Germany in 2005. With crude oil prices rising, biodiesel (before feedstock price increases) became a very attractive alternative to mineral diesel, because of the government's tax incentives on biofuels. The German treasury, realising it was losing significant tax revenues due to lower mineral diesel consumption, altered the regulatory framework to reduce the tax break on biofuels. The result has been a decline in biodiesel consumption in Germany.

Longer regulatory periods

Longer regulatory periods for biofuels would provide more certainty

Short regulatory periods for biofuels, such as the current period, create uncertainty and raise risks for investors. In the UK, the current regulatory period ends in 2011, with only three years fully covered by the regulations. For investors, making assumptions about regulatory regimes beyond the existing framework is an uncertain process. The UK government is in the process of extending its Renewable Energy legislation to at least 2020, a much more satisfactory period over which to view investments.

'How green is your fuel?'

We believe the regulatory approach will change to one of accounting for a product's carbon footprint

Current legislation requires that certain levels of biofuel be used in transport fuels from 2008 to 2011. Regulations currently treat all biofuels equally in terms of their environmental benefit. We believe this mindset will change to one of accounting for a product's carbon footprint. In other words, the issue will change from 'Is your fuel green?' to 'How green is your fuel?' *The Economist* recently published an article endorsing the argument that the production of some biofuels could be greenhouse-gas-intensive, citing the amount of (mostly fossil-derived) electricity used to produce bioethanol and fertiliser (which uses natural gas in its production) to grow rapeseed.

Life cycle analysis

UK government has published detailed life cycle analyses for biofuels sourced from a range of feedstocks

As part of its consultations for biofuel regulations after 2011, the UK government has published detailed life cycle analyses for biofuels sourced from a range of feedstocks and demonstrates in quantitative terms that some biofuels are not particularly 'green'. It remains to be seen whether this analysis will lead to regulatory support being allocated in proportion to environmental benefit. However, we think it shows that the debate is moving to a deeper level of understanding of the issues.

When examining the life cycle analysis of biofuel production, several factors are considered, including greenhouse gas emissions from crop production, drying and storage, transport and chemical processes to create the final product. The next table shows the life cycle analysis for the conversion of oilseed rape to biodiesel.

Table 2 : Carbon intensity of biodiesel from oilseed rape (kg CO_2/t biodiesel)

Source country	Australia	Canada	France	Germany	Poland	UK
Crop production	2,139	2,058	1,802	1,809	1,667	2,185
Drying & storage	0	311	302	328	339	327
Feedstock transport	24	120	96	96	96	32
Crushing processes	-162	-225	-239	-198	-182	-201
Feedstock transport	400	95	8	12	27	0
Esterification process	519	519	519	519	519	519
Liquid fuel transport & storage	0	0	0	0	0	0
Total	2,920	2,878	2,488	2,566	2,466	2,862
Crop production as a proportion of total	73%	72%	72%	70%	68%	76%

Source: UK Dept for Transport consultation document, June 2007

By far, the most important factor in the production of biodiesel from oilseed rape is the GHG emissions from crop production, accounting for about 70-75% of the total carbon footprint. Underlying this are nitrous oxide (N_20) emissions from fertiliser production. N_2O is a particularly potent greenhouse gas, with a global warming potential of more than 250 times that of CO_2, the most common greenhouse gas. This explains why biofuel derived from waste sources (eg, used cooking oil and animal fats) displays as a lower carbon footprint than that of virgin oils. The carbon intensity of biodiesel from tallow and UCO is 526 kg CO_2/tonne biodiesel, with

contributions coming from transport of feedstock (8 kg CO_2) and esterification (519 kg CO_2).

For bioethanol, the picture is slightly different in terms of contributing factors, although the overall result is scarcely better.

Table 3 : Carbon intensity of bioethanol from corn (kg CO_2/t ethanol)

	US	France
Crop production	941	1,106
Drying & storage	179	55
Feedstock transport	30	30
Conversion	2,064	476
Liquid fuel transport	27	8
Liquid fuel transport	122	
Total	3,363	1,675

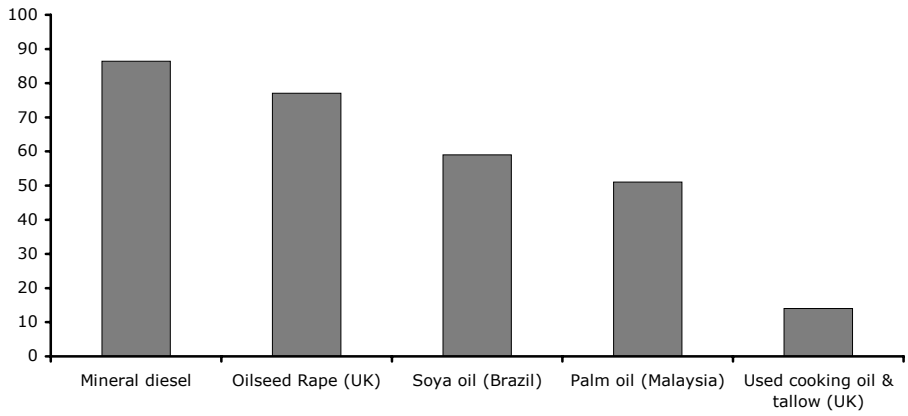
Source: UK Dept for Transport consultation document, June 2007

In the case of corn-derived bioethanol, the emphasis shifts from crop production to the conversion of feedstock to the finished product via a distillation process, which is energy-intensive. The US product performs poorly compared with product from France because of the heavy use of coal as an energy source in the US compared with the more prevalent (and cleaner) natural gas in France.

Biodiesel

Chart 1 shows the carbon footprint of some transport biodiesels from their respective feedstocks. On this data, biodiesel from recycled vegetable oil feedstock has less than one-third the carbon footprint of biodiesel sourced from rapeseed oil.

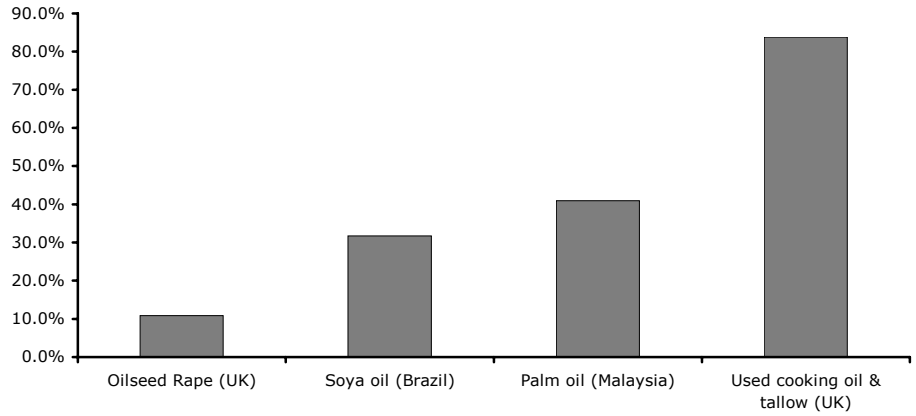
Chart 1 : Carbon footprint of biodiesel feedstock materials (g CO_2 per MJ)



MJ = megajoules
Source: UK Dept for Transport consultation document, June 2007

The situation looks even worse when examining the greenhouse gas saving vs mineral diesel.

Chart 2 : GHG saving from biodiesel feedstocks compared with mineral diesel



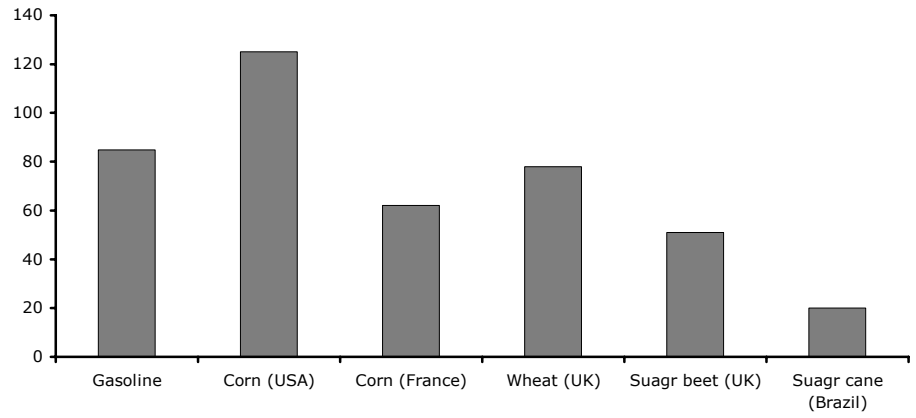
Source : UK Dept for Transport consultation document, June 2007

Of particular note is the fact that rapeseed oil, the most prevalent biodiesel feedstock, offers very small savings in greenhouse gas emissions compared with mineral diesel. Palm and soya oil, which provide greater greenhouse gas savings, come with questions regarding sustainability of the feedstocks. Among current commercial biodiesel feedstocks, used cooking oil and tallow offer the greatest saving in greenhouse gas emissions.

Among current commercial biodiesel feedstocks, used cooking oil and tallow offer the greatest GHG savings

Bioethanol – a better and worse story

Chart 3 : Carbon footprint for bioethanol feedstocks (g CO_2 per MJ)



Source : UK Dept for Transport consultation document, June 2007

In the context of greenhouse gas savings, American corn, in particular, is a poor feedstock for biofuel. The high carbon footprint of American bioethanol from corn is most likely due to the widespread use of coal-fired energy in the US to convert the corn to bioethanol. French corn is assumed to undergo a conversion in a process fired by natural gas (a fuel with much lower carbon intensity than coal) and so earns a lower carbon footprint than American corn. Brazilian sugar cane produces a very low carbon footprint due to the high yield of ethanol produced per hectare and the recycling of waste material to produce power for the manufacturing process.

Within the context of GHG savings, American corn, in particular, is a very poor feedstock for biofuel

Chart 4 : GHG savings for key bioethanol feedstocks

Source : UK Dept for Transport consultation document, June 2007

Feedstock considerations

Feedstock selection is a key element of any biofuels investment. In the past, issues such as cost and ease of processing were paramount. Increasingly, however, sustainability of feedstocks is becoming important.

Table 4 : Key biofuels feedstocks and characteristics

Feedstock	Product	Other uses	Issues
Oilseed rape	Biodiesel	Cooking oil	Competition for supply has driven price up significantly, making profitable biofuel production difficult. Only limited GHG emission reductions due to high fertiliser requirements.
Soy	Biodiesel	Food	Competition for supply has driven price up significantly, making profitable biofuel production difficult. Questions surround the sustainability of supply.
Palm	Biodiesel	Food and personal care	Competition for supply has driven price up significantly, making profitable biofuel production difficult. Questions surround the sustainability of supply, especially forest destruction in parts of Asia.
Used cooking oil (UCO)/tallow	Biodiesel	Use restricted in Europe to some animal feed and boiler feedstock	Relatively low volumes of tallow availability mean it is unlikely that it could carry the entire biofuels load. Biodiesel made from tallow and UCO has a very low carbon footprint
Jatropha	Biodiesel	None identified	Commercially unproven in terms of processing and cost of delivery
Corn	Bioethanol	Food	Competition for supply has driven price up significantly, making profitable biofuel production difficult. There are only limited GHG emission reductions due to high fertiliser requirements.
Wheat	Bioethanol	Food	Competition for supply has driven price up significantly, making profitable biofuel production difficult. There are only limited GHG emission reductions due to high energy requirements.
Sugar cane	Bioethanol	Food	May be subject to high import tariffs in US and Europe depending upon source of product. Bioethanol sourced from Brazilian sugar cane has a very low carbon footprint.

Source: ABN AMRO

Case study: UK biofuels market

Investment view

In theory, the UK biofuel market should be good for investment: forecast high demand for biofuels over the next three years, supply constraints from local production and high crude oil prices should provide catalysts. However, weak and confusing regulations, high feedstock costs, poor performance by some listed companies and a hard-nosed commercial approach from downstream players has created nervousness in the sector.

In theory, the UK biofuel market should be good for investment, but there are reasons for nervousness in the sector

Background

In 2003, the UK introduced a 20 pence per litre tax exemption for biodiesel. In response to the EU Biofuels Directive, the UK government announced in November 2005 that it would introduce a renewable transport fuel obligation (RTFO) as a mechanism requiring transport fuel suppliers to ensure a set percentage of their sales from a renewable source. The RTFO will be introduced in 2008/09. The obligation levels are summarised in Table 5.

RTFO is a mechanism requiring transport fuel suppliers to ensure a set percentage of their sales from a renewable source

Table 5 : UK renewable transport fuel obligation

Year	Obligation (%)	Tax break (pence per litre)	Buyout price (pence per litre)
2007/08	n/a	20	0
2008/09	2.50%	20	15
2009/10	3.75%	20	15
2010/11	5.00%	20	10

Source: UK government

Under the RTFO, a 15 pence per litre 'buyout price' was introduced as a penalty for any fuel retailer not meeting the government's biodiesel targets. Therefore, UK biodiesel subsidies could rise as high as 35 pence per litre. As we discussed earlier, the carrot and stick approach to this regulation is confusing and it is difficult to correctly determine the split of the regulatory support between biofuel producer and retailer. In theory a retailer should be indifferent between supplying mineral fuel and biofuel as long as costs are the same for both. This implies that the price of biofuel ought to be the same as the mineral fuel price plus the value of the incentives and penalties – ie up to a 35p per litre premium. In practice, we believe it is unlikely that biofuel producers will be able to capture the full value of the biofuel support.

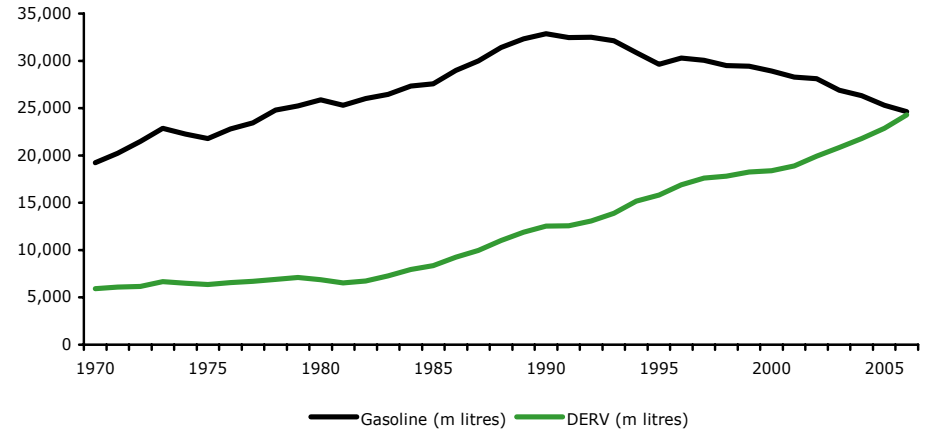
Supply and demand in UK biodiesel

Mineral diesel consumption

In recent years, there has been a convergence in the consumption of gasoline (petrol) and diesel in the UK.

Has been a convergence in the consumption of gasoline (petrol) and diesel in the UK

Chart 5 : UK consumption of gasoline and diesel (1970-2006)



Source: Digest of UK Energy Statistics

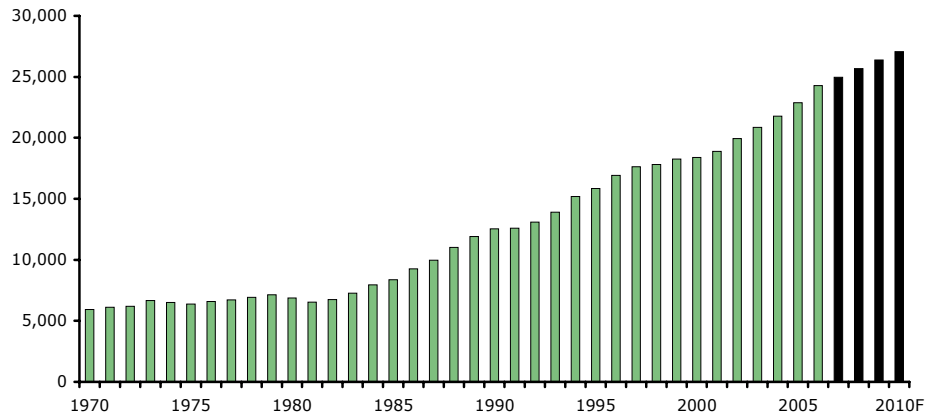
Biodiesel demand will be directly linked to the requirement for diesel through the RTFO. Diesel consumption has risen steadily since the 1980s. The reason for this is the improvement in the performance of diesel engines, with lower running costs and a decrease in prices of diesel vehicles.

Biodiesel demand will be directly linked to the requirement for diesel through the RTFO

Diesel consumption has been growing by about 695m litres annually in the UK within the past 21 years. If this trend continues on a linear projection, the UK's consumption of diesel would reach nearly 27bn litres by 2010.

Biodiesel demand will be directly linked to the requirement for diesel through the RTFO

Chart 6 : UK diesel consumption 1970-2010F (million litres)



Source: UK Digest of Energy Statistics, ABN AMRO forecasts

In the absence of mandatory targets for use, consumption of biodiesel in the UK has been extremely low to date. UK biodiesel supply has mirrored demand, but will require a significant ramping up in production to meet the increased demand.

Table 6 : Proportion of biodiesel in UK diesel mix, 2002-06

Year	Diesel consumption (m litres)	Biodiesel consumption (m litres)	Proportion of biodiesel in diesel mix (%)
2002	19,918	3	0.02%
2003	20,835	19	0.09%
2004	21,776	21	0.10%
2005	22,871	33	0.14%
2006	24,282	168	0.69%

Source: HM Revenue Hydrocarbon Oils Bulletin, Jan 2007

UK biodiesel demand forecasts

Our forecasts for the demand for biodiesel in the UK in 2010F suggest biodiesel demand will be in the range 1,470m-1,479m litres

We review two forecasts for the demand for biodiesel in the UK in 2010, when the 5% RTFO will be in place. First, we simply use historical growth in UK fossil diesel consumption and project on a linear basis to 2010 and estimate biodiesel demand from this total. Second, we extract a biodiesel demand figure from the Department for Trade and Industry's (DTI) most recent *Energy Paper, Number 68*. These forecasts produce a forecast demand for biodiesel in 2010 of 1,470m-1,479m litres in 2010F, compared to 2006 biodiesel consumption of 168m litres.

Forecast 1 – On the basis of the preceding fossil diesel projections and using the UK government's RTFO targets, we forecast demand for biodiesel in 2008-10 as follows.

Table 7 : Forecast UK demand for diesel and biodiesel to 2010

Year	Diesel consumption (m litres)	UK biofuels obligation (energy basis)	Biodiesel required (m litres)
2008F	25,673	2.50%	702
2009F	26,368	3.75%	1,081
2010F	27,064	5.00%	1,479

Source: ABN AMRO forecasts

Forecast 2 – Alternatively, the DTI's Energy Paper 68 forecasts diesel to command a 35% share of 66.6m tonnes oil equivalent transport fuel usage in 2010. This translates into overall diesel usage of 25,294m litres. At a 5% obligation for biofuels, this implies a biodiesel demand of 1,470m litres.

UK biodiesel supply

In Table 9 we highlight existing and planned biodiesel production in the UK. We estimate current UK nameplate capacity at 521.3m litres per annum.

Table 8 : Major UK biodiesel production current and planned

Status	Supplier	Nameplate capacity (tonnes per annum)	Nameplate capacity (millions litres per annum)
In production	Argent Energy	45,000	51.1
In production	BIP/Greenergy	16,800	19.1
In production	ESL Biofuels	15,000	17.0
In production	Greenergy	100,000	113.6
In production	Biofuels Corp	250,000	284.1
In production	D1 Oils	32,000	36.4
Planned/under construction			
2007	D1 Oils	50,000	56.9
2007	Greenergy	100,000	113.7
2007	BioWales	25,500	28.9
2008	D1 Oils	288,000	327.2
2008	Ineos	500,000	568.2
2008	DMF Biodiesel	250,000	284.1
2008	Irish Food Processors	93,500	106.3
TBC	PDM Group	40,000	45.0

Source: ABN AMRO, Reuters

Announced plants would, if built, add about 1,530m litres per annum to UK supply. Most of the announced plants plan to use virgin vegetable oils as feedstock. However, we believe this capacity is unlikely to come fully on stream because rising vegetable oil prices and technical difficulties in starting up refineries could act as deterrents to new entrants in building the announced plants.

Announced plants would, if built, add about 1,530m litres per annum to UK supply

On these data it is possible that the UK biodiesel market could be significantly in deficit in 2008-10, when the current RTFO period is due to be in force. However, as D1 Oils highlighted in their 1H07 interim results, additional supply to the UK biodiesel market comes in the form of subsidised product imported from the US. This product (so-called "B-99" because it contains 99% biodiesel and 1% mineral diesel) attracts a US$1 per gallon (about 11p per litre) subsidy in the US as well as further subsidies in EU markets. This product is setting market prices in Europe, impacting on biodiesel refining margins in the EU.

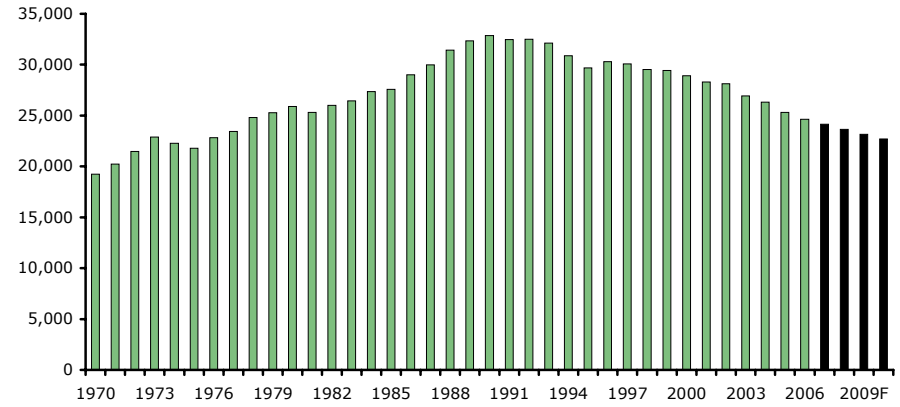
UK bioethanol supply and demand

Bioethanol demand

UK gasoline usage has been declining since the early 1990s, in the wake of competition from improved diesel engines. We estimate UK gasoline consumption has been declining at 485m litres per annum over the past 15 years. In our forecasts that follow, we extrapolate this decline over 2007-10.

We estimate UK gasoline consumption has been declining at 485m litres per annum over the past 15 years

Chart 7 : UK gasoline consumption 1970-2010F m litres?



Source: UK Digest of Energy Statistics, ABN AMRO forecasts

Forecast 1 – Using the trend in UK gasoline consumption and extrapolating linearly, we forecast 22.7bn litres of gasoline consumption in 2010. With a 5% target on an energy basis, this implies bioethanol consumption of 1,697m litres for 2010.

Table 9 : Forecast UK demand for gasoline and bioethanol to 2010

Year	Gasoline consumption (m litres)	UK biofuels obligation (energy basis)	Bioethanol required (m litres)
2008F	23,655	2.50%	885
2009F	23,171	3.75%	1,300
2010F	22,687	5.00%	1,697

Source: ABN AMRO forecasts

Forecast 2 – Alternatively, the DTI's *Energy Paper 68* forecasts gasoline to command a 38% share of 66.6m tonnes oil equivalent transport fuel usage in 2010. This translates into overall petrol usage of 30,370m litres. At a 5% obligation for biofuels, this implies a bioethanol demand of 2,300m litres.

UK ethanol supply

UK bioethanol production is very small

Currently, UK bioethanol production is very small. Even announced capacity reaches only 1,717m litres per annum by the end of 2009, implying a tight market for locally produced bioethanol in 2010.

Table 10 : Major UK biodiesel production current and planned

Status	Supplier	Nameplate capacity (tonnes per annum)	Nameplate capacity (million litres per annum)
Completion 2009	Abengoa	400,000	541
Completion 2008	Bioethanol Limited	100,000	135
Operational Q2/3 07	British Sugar	50,000	68
Completion 2009	Ensus	315,000	426
Completion 2008	Green Spirit Fuels	105,000	142
Completion 2009	Green Spirit Fuels	200,000	270
Completion 2008	Losonoco	100,000	135
Total			**1,717**

Source: Reuters

Share performance

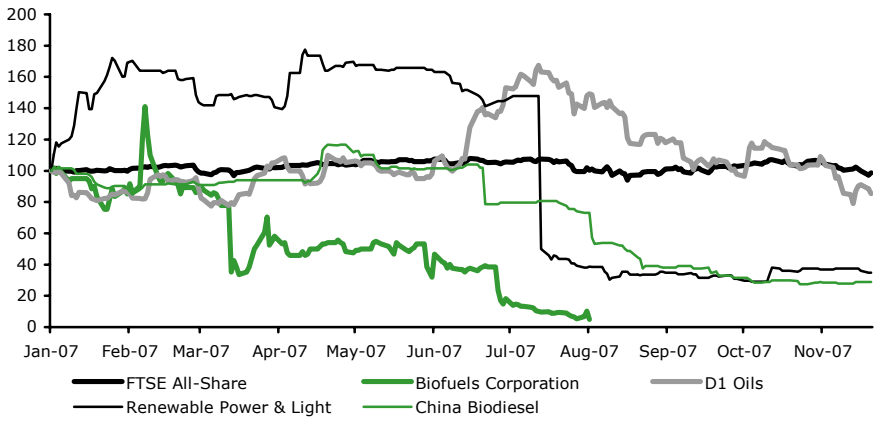
2007 – a difficult year for biofuels stocks

It has been a difficult year for investors in UK biofuels stocks

It has been a difficult year for investors in UK biofuels stocks. From rising feedstock prices to defaults on supply contracts and fatal hedging instruments, virtually

everything that could go wrong has done so. This is reflected in the performance of UK-listed biodiesel stock, all of which have underperformed the FTSE All-Share index. We examine the causes of the poor performance next.

Chart 8 : UK biodiesel stock performance, 2007



Source: Datastream

Biofuels Corporation

Biofuels Corporation, a UK-based biodiesel producer succumbed to high levels of debt and unattractive market conditions and de-listed from AIM in August 2007. The delisting resulted from a large debt-for-equity swap that significantly diluted shareholders. The high debt level was caused by a hedging instrument that moved against the company and left it facing excessive losses. The company bought out the hedge using bank debt, which it was never able to service. In addition, the company struggled to commission its 250,000 tonnes per annum refinery in Northeast England (the largest in the UK). Finally, high feedstock prices caused the company to be unable to produce biodiesel profitably. The company listed in mid-2005 as a concept stock, presumably amid the euphoria of the prospect a vibrant biofuels industry.

Biofuels Corporation succumbed to high levels of debt and unattractive market conditions and de-listed from AIM in August 2007

D1 Oils

Another concept stock when it listed in 2005, D1 Oils has had the most successful year to date in 2007, only slightly underperforming the FTSE All-Share index. The performance is due to a significant improvement in the value of the company's shares in response to a strategic partnership with BP announced in June 2007. Increasingly, D1 looks like a play on its ability to deliver low-cost jatropha oil to the market. However, the exact cost of jatrpoha at commercial scale has still to be determined. Due to unfavourable feedstock and biodiesel pricing, the company's refinery has been operating at a low capacity, effectively producing only for an existing supply contract. According to Reuters' consensus estimates, D1 Oils is forecast to become profitable in 2009, four years after listing on the market.

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Renewable Power & Light

Renewable Power & Light (RPL) is a US-based power generator whose business model was to generate power from biofuels, gaining revenues from power sales and environmental credits. In July 2007, the company announced that its supplier of palm oil had defaulted on its agreement. Given the increase in palm oil prices within the past 12 months, it appears RPL will not be able to meet profit forecasts. The company is also currently embroiled in a dispute with its former chief executive, who left the company in September 2007.

A broken soya oil supply contract has created problems for RPL

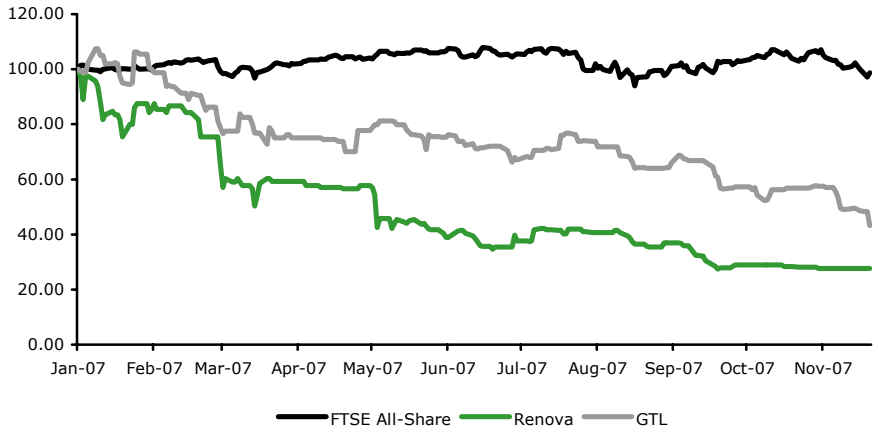
China Biodiesel

China Biodiesel has issued two profit warnings to date in 2007: in June and August, The company has blamed rising feedstock prices for the erosion of margins.

China Biodiesel has issued two profit warnings to date in 2007

Bioethanol stock performance

Chart 9 : UK Bioethanol stock performance, 2007



Source: Datastream

Bioethanol stock performance has scarcely been better than that of the biodiesel stocks. Both of the stocks listed above have operations in the US and report figures in the weakening US dollar. However, despite reporting profits in 2007, bioethanol producers are exposed to corn prices, which have been rising.

Industry analysis

The biofuel industry encompasses small producers attempting to develop processes and sell product to much larger companies that blend and retail the product, producing a difficult environment for biofuel producers.

Barriers to entry

We view barriers to entry into successful biodiesel refining as high. It is clear from the experience of listed UK biodiesel producers that creating a controlled process requires significant technical expertise. In addition, significant capital expenditure is required to build a commercial-scale plant. However, the chemistry of the transesterification reaction, which occurs to create biodiesel, has been well-understood for many years.

Power of suppliers

With quoted market prices available for most common feedstocks such as oilseed rape and corn, biodiesel producers find themselves at a disadvantage in securing attractively priced feedstock. As we note elsewhere, there is often a mismatch between feedstock prices and biofuel prices, making margins volatile.

Power of customers

Buyers of biofuels are mostly large, well-capitalised companies who will blend the material into a 90% or 95% mixture with mineral diesel. The history of biofuel production in the UK suggests biofuel producers are smaller companies who may have to accept less than optimal terms for their product. In addition, with weak regulations accompanying biofuel targets, blenders effectively have the option as to whether to comply with the rules. In addition, we think the presence of imported B-99 biodiesel increases the power of customers.

Rivalry among biodiesel suppliers

Currently, where UK demand for biodiesel appears to outstrip supply, we believe rivalry among producers is likely to be low. If the market moves to oversupply, we expect rivalry would increase. However, prospects for oversupply within the next two to three years appear remote, in our view. Currently, most biodiesel refiners are having difficulty running their plants at near full capacity due to either technical or commercial issues.

Threat of substitute products

The next generation of biofuels feedstocks appears some way off, so we believe that in the short term traditional feedstocks will continue to represent the majority of biodiesel production in the market. In the medium and longer term, we expect a new generation of technology to emerge, possibly from the biotech sector.

Industry background

The EU is driving changes in the European road fuel market, including the mandatory use of 5.75% biofuels by 2010 and 10% by 2020. We believe UK demand will outstrip supply, ensuring a strong market for biodiesel.

Biofuels background

Biofuels come in two forms: bioethanol (produced from crops containing sugar and starch such as cane sugar and wheat), and biodiesel (using oil-based products such as rapeseeds, soybean seeds and animal fats). Bioethanol is used in petrol, biodiesel in diesel, and both can be used either as additives to petrol or diesel or as direct substitutes.

In addition, biodiesel provides additional lubrication in engines and provides a virtually sulphur-free alternative to mineral (fossil fuel) diesel.

Biodiesel can either be used as a blend with mineral diesel or as a straight substitute for diesel. Currently, the EU hosts most of the world's biodiesel production. Global bioethanol production continues to be dominated by Brazil, with its plentiful sources of cheap feedstocks (particularly sugar cane) and the US with its attractive subsidies.

The EU dominates world biodiesel production, while Brazil and the US, two large biofuels markets, produce mostly bioethanol

Within the biodiesel market, rapeseed oil is currently the most widely used feedstock in Europe, largely because of its availability and the physical characteristics of the resulting biodiesel. Other biodiesel fuels include palm oil, soy oil, animal fats and used cooking oils.

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Incentives and regulation

EU directive

In 2003, the EU issued a directive (2003/30/EC or the 'Biofuels Directive') that was part of a wide range of measures to promote sustainable development and particularly to tackle rising greenhouse gas emissions from transport. The main objectives of the directive are to:

- reduce life-cycle emissions of carbon dioxide from transport across Europe; and
- to reduce the EU's future reliance upon external energy sources.

Directive 2003/30/EC aims to promote the use of biofuels or other renewable fuels as a substitute for petrol or diesel in the transport sector. The directive effectively makes it mandatory for all member states to conform to a significant increase in the use of biofuels over 2005-10. The EU wants the proportion of biofuels used in petrol and diesel transport fuels to rise from 2% at the end of 2005, to 5.75% by the end of 2010, with the likelihood of further increases thereafter. A summary of the directive and its implications for intended biofuels usage is set out in the next table.

Directive 2003/30/EC aims to promote the use of biofuels or other renewable fuels as a substitute for petrol or diesel in the transport sector

Table 11 : EU requirements for biofuels in diesel and petrol

Year ending	% of biofuel required for petrol or diesel
2005	2.00%
2010	5.75%
2020	10.0%

Source: European Union

Biofuel pricing

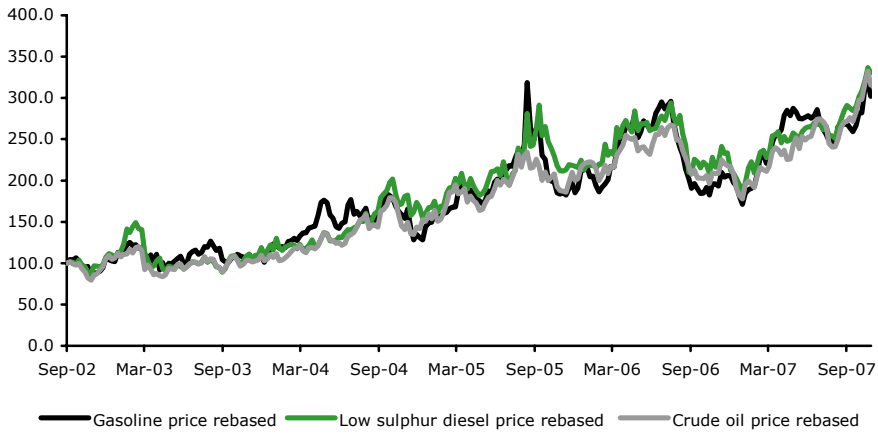
How should biofuels be priced?

In our view, the price of biofuel should be the price of the mineral fuel it replaces adjusted for the level of subsidy in place

Since biofuels are a substitute for mineral fuels (gasoline and low-sulphur diesel), it would be reasonable to expect the price of biofuels to be linked to the price of the products they replace. In our view, the price of biofuel should be the price of the mineral fuel it replaces adjusted for the level of subsidy in place. For example, in the UK in 2008, subsidies will take the form of 20p per litre tax break on biofuel sales and a 15 per litre buyout for non-compliance. Therefore, in the UK in 2008, a fuel retailer should be indifferent between buying mineral fuel or biofuel at a 35p per litre premium. In reality, the price of biofuel in the UK looks like it will be somewhat short of the 35p per litre premium as retailers negotiate away a portion of the regulatory support and are able to do so as a result of their market power. Cheap imports of "B-99" from the US have also been blamed for lowering the market price of biodiesel in Europe.

Pricing of mineral fuels (petrol and diesel) is closely related to the price of crude oil. The next chart shows the correlation between gasoline, low-sulphur diesel and crude oil prices over the past five years. The correlation coefficients between the prices of gasoline and diesel with respect to crude oil are very high – exceeding 95% in each case. This means the risks to producers of petrol and diesel are reduced because they can price their product directly off the price of their input.

Chart 10 : Gasoline, diesel and crude oil prices



Source: Datastream

Table 12 : Correlation coefficient between crude oil prices and gasoline and diesel prices

	Gasoline price	Low-sulphur diesel price
Crude oil price	97%	99%

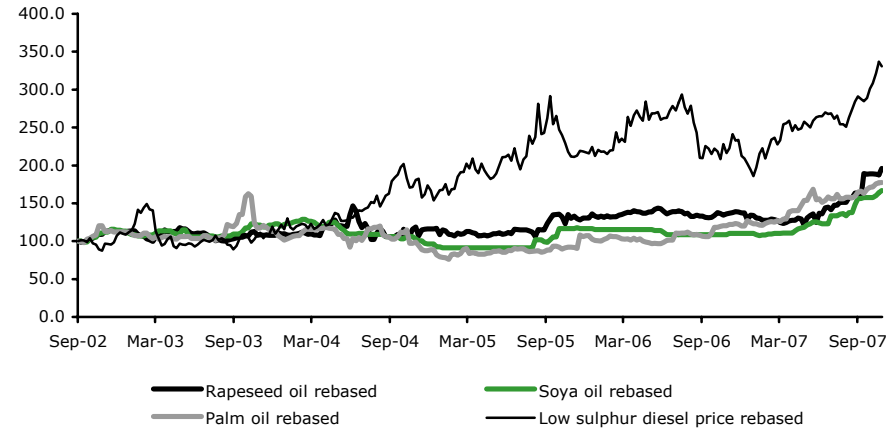
Source: Datastream, ABN AMRO

The correlation between biofuel feedstocks and crude oil prices has been (unsurprisingly) low over the past five years

On the other hand, the correlation between biofuel feedstocks and crude oil prices has been low over the past five years. With other uses for key feedstocks such as oilseed rape and corn (both food products), there is no reason for a strong correlation between the prices of these products and crude oil. This seems to present biofuel producers with a problem, especially since their inputs have risen in price substantially over the past five years.

Chart 11 shows the prices of biodiesel feedstocks and low-sulphur diesel over the past five years.

Chart 11 : Low sulphur diesel and biodiesel feedstock prices



Source: Datastream

Table 13 : Correlation coefficient between low-sulphur diesel and biodiesel feedstock prices

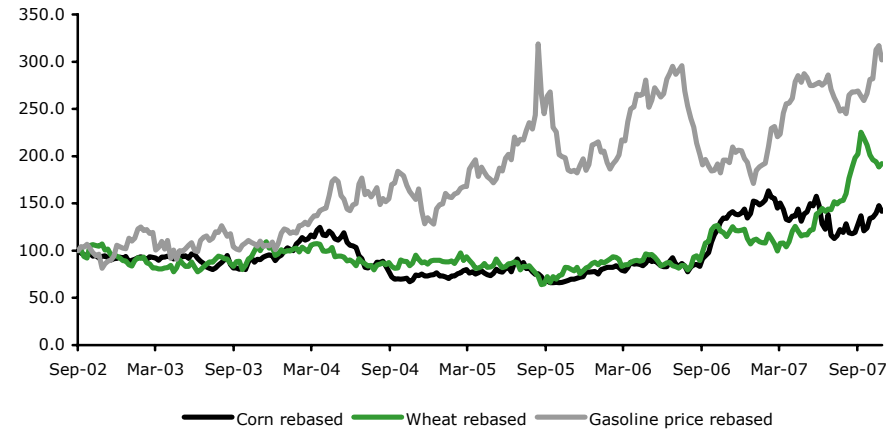
	Rapeseed oil	Soya oil	Palm oil
Low-sulphur diesel price	76%	25%	27%

Source: Datastream, ABN AMRO

Although the correlation between rapeseed oil and low sulphur diesel prices is substantially higher than for other feedstocks, it is still well below the correlation between mineral diesel and crude oil prices.

Finally, Chart 12 shows the correlation between bioethanol feedstocks and gasoline prices over the past five years.

Chart 12 : Gasoline and bioethanol feedstock prices



Source: Datastream

Table 14 : Correlation coefficient between gasoline and bioethanol feedstock prices

	Corn price	Wheat price
Gasoline price	29%	40%

Source: Datastream, ABN AMRO

These correlations present a problem for biofuel producers using multi-use feedstocks. At these correlation levels, margins are hard to predict with confidence increasing production risks. Creating a predictable spread between input costs and output prices is desirable for a refining operation, which means a high correlation is required between input and output prices.

Feedstocks with a broad range of uses, such as rapeseed oil and corn, may never exhibit this characteristic because other industries such as food or personal care may set the price for the commodity.

Of the current range of feedstocks, we believe waste products such as tallow and used cooking oil or biofuel offer the best opportunity for refiners to lock in a spread because the price of the input could, in the long term, correlate well with the output (biodiesel). In the future, feedstocks developed exclusively for biofuel use, such as jatropha oil, could also offer potentially high input/ output correlations.

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Add	24 (63)	24 (63)
Hold	26 (31)	26 (31)
Reduce	2 (0)	2 (0)
Sell	2 (50)	2 (50)
Total (IB%)	**127 (51)**	**127 (51)**

Valuation and risks to target price

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Regulatory disclosures

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