2007 Year in Review May 2008

U.S. ETHANOL Industry:

THE NEXT INFLECTION POINT

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BCurtis
Energies & Resource Group

ABOUT THIS REPORT

This report was prepared by Brian Curtis as an independent consultant to the U.S. Department of Energy. It is intended to provide an objective view of the evolving ethanol industry and many of its key participants. It is the first effort to establish an annual "Year in Review," report for use by industry, investors, policy makers and regulators. This report covers the period Jan 2007 – Feb 2008.

FUNDED BY THE OFFICE OF THE BIOMASS PROGRAM

The Office of Energy Efficiency and Renewable Energy's Biomass Program works with industry, academia and national laboratory partners on a balanced approach to advance biomass as a significant and sustainable energy source for the 21st century. Through research, development and demonstration efforts geared towards establishing the integrated biorefinery model, the Biomass Program is helping transform the nation's renewable and abundant biomass resources into cost competitive high performance biofuels, bioproducts and biopower.

In his 2007 State of the Union address, the President established aggressive goals to reduce gasoline consumption through efficiency and adoption of alternative fuels, resulting in the December 2007 passage of the Energy Independence and Security Act of 2007. Consequently, the Biomass Program is focusing its efforts to ensure that advanced biofuels are cost competitive by 2012. Another major effort of the Program is to further develop infrastructure and opportunities for market penetration of biobased fuels and products.

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Disclaimer

This report was prepared according to high professional standards and is believed to be a fair and objective representation of the industry and companies. Industry and company data contained herein is based on primary and secondary sources believed to be reliable and noted where possible. While this report has been peer reviewed, these sources have not been independently verified and are, therefore, not guaranteed for accuracy. Statements made and opinions expressed are strictly those of the author and not necessarily those of the U.S. Department of Energy.

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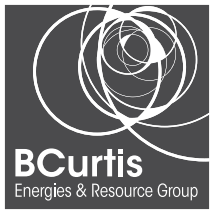

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EXECUTIVE SUMMARY

The fuel ethanol industry in the U.S. witnessed a significant inflection point in the 2006-2007 timeframe where capacity was added quickly and the industry out-paced policy measures by over 35 percent This growth was the result of capital investment decisions made beginning mid-2004 due to the anticipated 2005 Energy Bill and already rising gasoline prices. Transportation capacity and terminal throughput for ethanol were increased over the same period, but struggled to keep up with the new production.

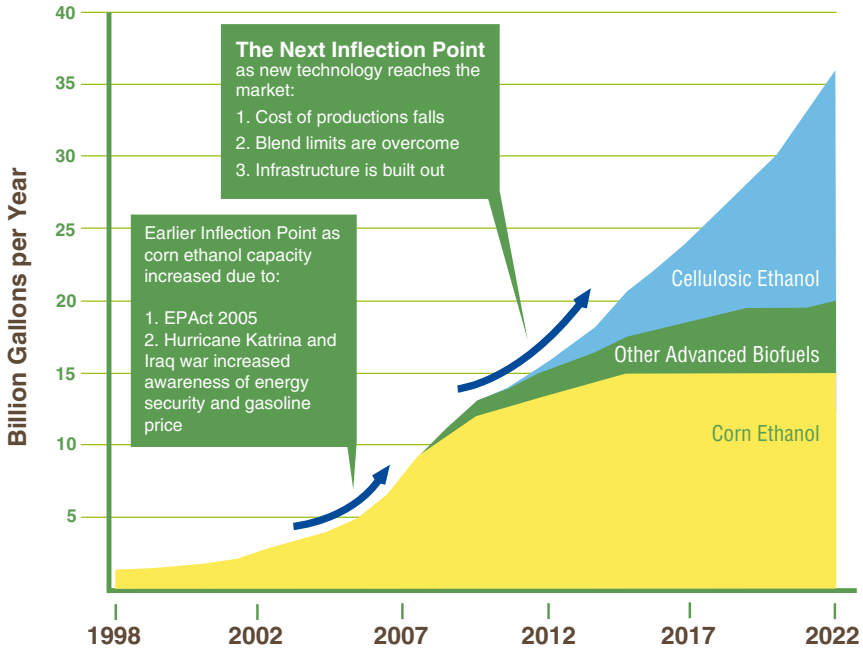
Currently, capacity additions continue but at a more measured pace as the industry takes time to rationalize feedstock supply, logistics challenges and shifting pricing mechanisms. The second half of 2007 showed signs of stress in the overall system as corn prices rose, and the industry experienced supply-demand imbalances at both the local and macro level. These factors, plus the move past the 6 billion gallons per year *(bgpy)* MTBE replacement mark have led the industry away from long-term product contracts and towards ethanol spot market pricing, with increasing pressure on ethanol producer economics. Meanwhile, the benefits of corn ethanol have come under scrutiny in the popular press for competing with food supplies, contributing to increased commodity prices, high water use and marginal energy balance improvements. Further, some commentators question the cost-benefit impact on energy security and the environment of an industry that currently displaces only 5 percent of the gasoline consumption.

THE NEXT INFLECTION POINT

Line by line, these challenges are being addressed by both industry and government. As a result, the coming years are poised to see the next inflection point in fuel ethanol capacity. Corn ethanol will experience some normalization as it matures but the fundamentals suggest that it will stand strong as a foundation for the industry with capacity leveling out at 15 bgpy, more than doubling over the next few years as

Figure 0.1 **Corn Ethanol Levels Out and Cellulosic Takes Off**

2007 Renewable Fuel Standard sets targets through 2022



approved plants secure financing and are built. Current projects on the books will take the industry to approximately 14 bgpy with fairly good visibility. Advanced biofuels, including cellulosic ethanol, are currently under development, but are expected to begin showing results in the next several years as well.

This first annual "Year in Review," written for the U.S. Department of Energy's Office of the Biomass Program examines the issues facing the ethanol industry as it strives to move to and through the coming inflection point. With a focus on enabling the private sector and financial community, it also serves to highlight areas for system improvements where legislation and government policies and programs can assist existing players and new entrants.

PROMISE AND PERIL OF INDUSTRY GROWTH

As the ethanol industry continues along its long term development path, there are strengths to be built upon and problems that need to be solved.

The ethanol industry is showing strength in several areas:

- Corn ethanol has been solidly established as a foundation for the industry and will continue to grow and mature.
- Technology and innovation is being developed and applied across much of the value chain for both conventional and advanced biofuels.
- Feedstock supply is improving, as planting patterns shift, new technologies enhance existing agricultural practices and new biomass sources are developed .
- Logistical bottlenecks are being worked out as infrastructure catches up with rapid production capacity increases.
- New feedstock sources are more geographically disperse, providing better transport economics and balancing infrastructure loads.

Table 0.1 **2007 Renewable Fuel Standard**
[billion gallons per year]

			2007 RFS		
Year	Total RFS, All Fuels	Actual Corn Ethanol	Corn Ethanol	Other Advanced Biofuels	Cellulosic Ethanol
1998		1.40			
1999		1.47			
2000		1.63			
2001		1.77			
2002		2.13			
2003		2.80			
2004		3.40			
2005		3.90			
2006	4.00	4.86			
2007	4.70	6.45			
2008	9.00		9.0		
2009	11.10		10.5	0.6	
2010	12.95		12.0	0.85	0.10
2011	13.95		12.6	1.1	0.25
2012	15.20		13.2	1.5	0.50
2013	16.55		13.8	1.75	1.00
2014	18.15		14.4	2.0	1.75
2015	20.50		15.0	2.5	3.00
2016	22.25		15.0	3.0	4.25
2017	24.0		15.0	3.5	5.5
2018	26.0		15.0	4.0	7.0
2019	28.0		15.0	4.5	8.5
2020	30.0		15.0	4.5	10.5
2021	33.0		15.0	4.5	13.5
2022	36.0		15.0	5.0	16.0

- There is a long term legislative trend and programmatic support:
  1. The Energy Independence and Security Act of 2007 provides an aggressive RFS reaching out to 2022.
  2. The DOE's Biomass Program is actively supporting industry development and technology commercialization.
  3. The United States Department of Agriculture has a wide range of supporting activities, including programs for feedstock development, small scale production and farm-based use.

Of course, there are challenges:

- A blending limit exists as production volumes approach the E10 level across the country in the next 5 years.
- Feedstock pricing – for both grain and non-grain biomass sources – will face upward pressure as the industry achieves greater scale.
- Blending terminals and rail capacity are already under stress.
- Technologies to produce advanced biofuels, in particular cellulosic ethanol, have yet to be proven at commercial scale.
- Many potential financing sources do not have the expertise to assess investment risk across the several stages of company development, including venture, growth, project and expansion.
- The investment risk profile is too aggressive or complex for many potential financing sources.
- The VEETC benefits are not flowing through value chain in a predictable manor.

$1 BILLION COMMITTED SINCE JAN07

In order to facilitate industry development and mitigate some technical and demonstration phase risks, the U.S. Department of Energy has committed over $1 billion across several programs since January 2007. The goal is to expedite the development and commercialization process for advanced biofuel technologies.

This federal funding is spread across The Office of the Biomass Program, the BioEnergy Research Centers, research grants and several private sector demonstration project solicitations. *(see Table 0.2)*

Enabling The Private Sector

While the ethanol industry has certainly benefited from government programs to reach its current state in the U.S., its development has not been without great private

Table 0.2 **Federal Funding Committed for Cellulosic Biofuels, 2007-Present** [million $]

Announced Programs and Solicitations:		Amount	Period
Integrated Cellulosic Biorefineries	Feb 2007	**$385**	**4yrs**
Ethanologen Projects	Mar 2007	**$23.3**	**4yrs**
BioEnergy Research Centers *	Jun 2007	**$375**	**5yrs**
Thermochemical Solicitation	Dec 2007	**$9.7**	**3yrs**
Small Scale Cellulosic Biorefineries	Jan /Apr 2008	**$200.3**	**4yrs**
Enzyme Systems Solicitation	Feb 2008	**$33.8**	**4yrs**
Open Solicitations:			
Biomass Pyrolysis Research	Due May 2008	**$7.0**	**2yrs**
University Research	Due Jun 2008	**$4.0**	**1yr**
TOTAL		**$1,038.1**	

* *Funded by DOE Office of Science*
Note: Actual funds deployed will depend on successful completion of solicitation processes.

sector effort. As the industry continues to progress, business opportunities will continue to become available for knowledgeable market participants. Further, the technology innovation required and high growth necessary to reach our collective goals will provide great opportunity for new entrants, some of which may come from outside the immediate industry.

Policy Adjustments Will Speed Industry Development

Through legislation, regulation, commercialization programs, tax breaks and – some would be quick to add – trade protection, the government continues to provide support to enable a strong private sector. However, despite the continued government efforts, the industry must succeed on its own economic merits if it is to receive the capital market and investment support needed to fulfill its promise. To this end, the most urgent government programs are those that take investment risk out of the system at the outset and provide a transition to a free market at minimal cost to taxpayers.

As the ethanol industry in the U.S. increases its emphasis on cellulosic feedstocks and non-food energy crops public policy measures must be adjusted to fit the coming challenges. This report weighs the factors surrounding the following possible policy and program changes:

- Reform or elimination of the Volumetric Ethanol Excise Tax Credit (VEETC)
- Increased grant funding for the further mitigation of technology and adoption risk
- Strengthened loan guarantee programs

In This Report

Chapters 1 and 2 address in more detail the current state of the industry and the coming rise of advanced biofuels.

Chapter 3 discusses how the U.S. government is acting as a catalyst for industry growth while encouraging healthy industry fundamentals, helping the industry move through the next inflection point

Chapter 4 presents Public Policy Considerations based on the analysis presented. Finally, Chapter 5 provides profiles for 30 significant private sector participants across six categories:

1. Ag/Bio/Chem
2. Producer/Marketer
3. Growth Stage
4. Integrated Energy
5. Services
6. Finance

CURRENT STATE OF THE INDUSTRY

The U.S. ethanol industry can currently be characterized as a maturing corn ethanol industry with technology development well funded to accommodate cellulosic feedstocks in the near future. With ethanol established as a fungible commodity, whether it is derived from corn, cellulose or other raw materials, the infrastructure and market adoption issues apply to all production.

This chapter addresses the current state of corn ethanol production and issues of getting that product to market. It also covers the financial state of the existing industry. The following chapter discusses future advancements and funding for new technologies as the industry approaches the next inflection point.

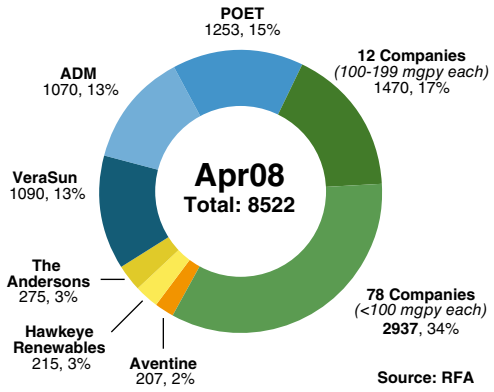
For the purposes of this study, the industry has been divided into 3 major segments:

1. Agriculture and Biomass Production
2. Conversion and Production
3. Blending, Retail and Marketing

Figure 1.1

US Ethanol Capacity, by company

million gallons per year, market share



Suppliers to these segments, including transportation and logistics, are handled separately as they are generally priced into the product along the way.

CORN ETHANOL AS INDUSTRY FOUNDATION

After a period of heady growth followed by growing pains, the corn ethanol industry has formed an industry foundation with the potential to move into a period of greater stability and continued growth.

Figure 1.2

Industry Characteristics

2007	Agriculture, Biomass Source	Conversion, Production	Blending, Retail, Marketing
Market Size	$8.7 billion	$13.0 billion	$18.3 billion
Operating Cash Margin	$2.7b, 46.7%	$2.14b, 16.4%	$5.3b, 29%
Concentrated	O	o	O
Technology Innovations	O	O	o
Farm Subsidies	O	o	o
VEETC	o	O	O
Federal Grants	o	O	o
Venture Funding	O	O	o
Capital Markets	o	O	O

Legend: More (O) … Less (o)

As reflected in the 2007 RFS, corn ethanol capacity is expected to level off around 15 bgpy in 2015. However, depending on many factors, not the least of which is the pace of roll out for cellulosic ethanol technologies, the actual long term corn ethanol capacity could level off somewhere between 12 and 15 bgpy.

Beyond 2015, the corn ethanol segment will settle into a long range pattern with limited capacity growth but continuous process improvement. Most further site development during this period will likely come from addition of co-located cellulosic ethanol capacity and/or transition to more sophisticated biorefining capabilities

Corn ethanol producers

Three tiers of corn ethanol producers have emerged with a capacity distribution curve showing a long, fat tail. More than 50 percent of the capacity comes from small to medium size producers. Local and farmer-owned entities dominate this Third Tier.

The Second Tier is made up of medium size players that operate a small number of plants, but likely have the goals and means to expand to additional sites.

The First Tier comprises six large players that produce over 200 mgpy, across many sites. Business models and competitive advantage vary – sometimes dramatically – across this tier.

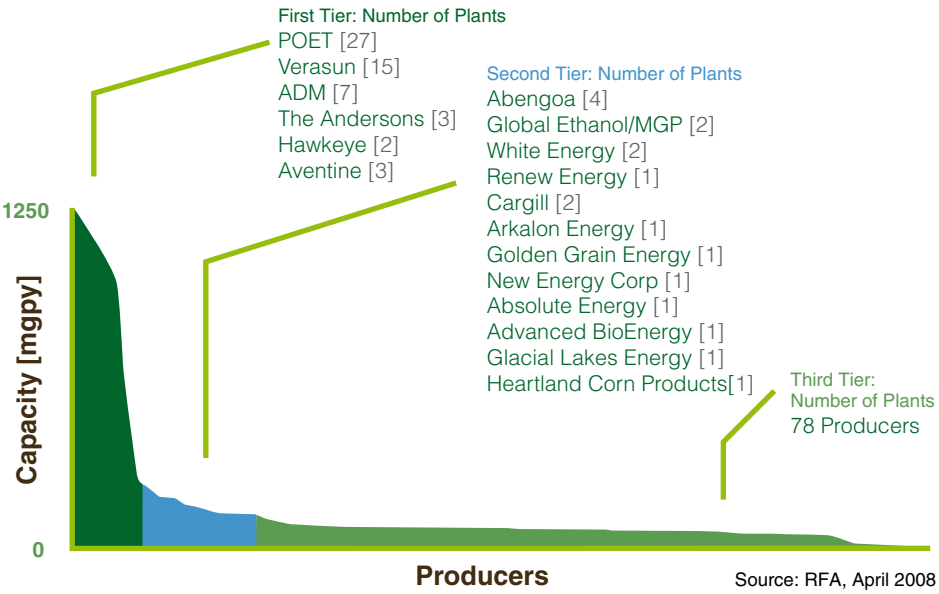
ADM comes at the industry from a Big AgriBiz perspective, but it must also be kept in mind that ADM CEO, Patricia Woertz, came to the company from the Chevron where she was VP of the downstream products company.

POET works closely with the local farming community to enable rural development and provide market access. Hawkeye takes a similar approach but at a smaller scale.

VeraSun, in many ways, is approaching the market from a Wall Street angle as demonstrated in the two recent acquisitions of U.S. Bioenergy and AS Alliances.

Aventine has a developed strategic capabilities in ethanol commodity trading,

Figure 1.3 **Ethanol's Long, Fat Tail**



Source: RFA, April 2008

Figure 1.4

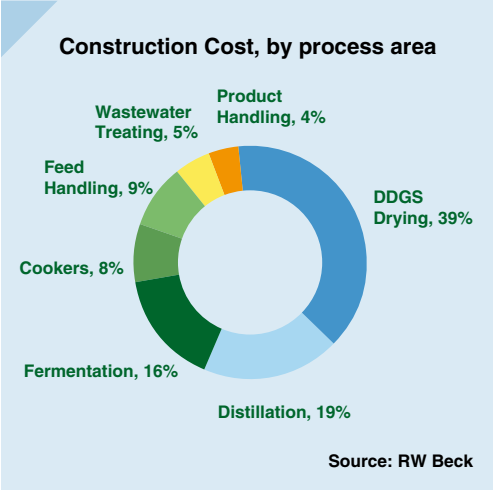
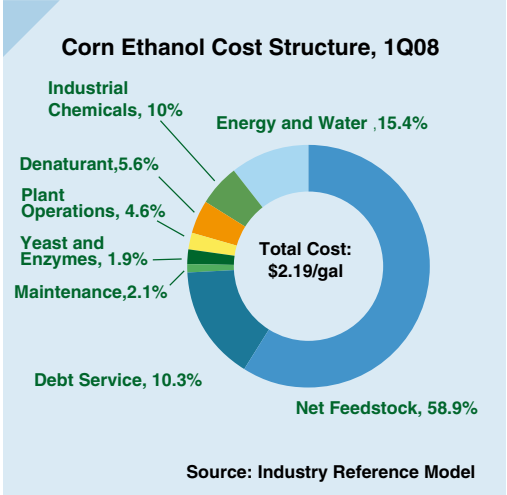


Figure 1.5



allowing the company a better position in the market for their production facilities.

As described above, the corn ethanol industry is not concentrated. While it has begun to experience some consolidation, the local ownership and rural economic aspects to the industry suggest that extreme consolidation is a long way off.

Corn ethanol cost structure

Corn ethanol technology is a well-established process. As such, cost structure – for both construction as well as operations – varies mostly with commodity trends and local supply and demand dynamics. For example, construction costs will vary with steel costs or equipment availability. Engineering and labor can also be impacted in high demand periods.

Corn ethanol operating economics must consider the broad supply chain, including primary and secondary suppliers as well as sources of innovation that may shift the landscape over time.

The largest cost category by far is corn feedstock. In recent years, corn prices rose dramatically with a significant impact on producer margins. Despite the common misconception that ethanol has been the primary driver in the rising cost of corn, closer analysis suggests that

Figure 1.6

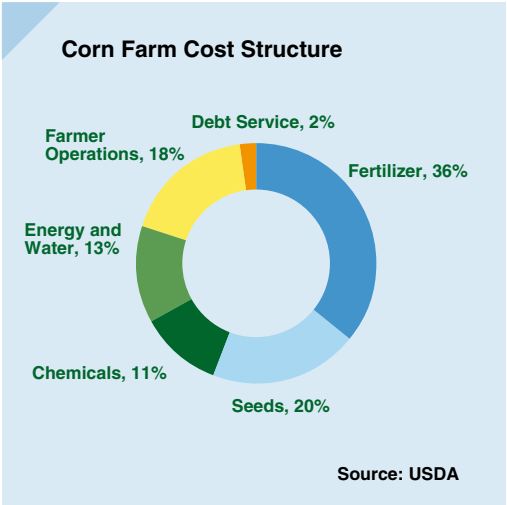


Table 1.1

Top 3 U.S. Corn Seed Sales, 2006

	MONSANTO	DUPONT	SYNGENTA
Seed Revenue	**$4,028**	**$2,781**	**$1,743**
Seed as percent of sales	**55%**	**10%**	**22%**
Total Revenue	**$7,294**	**$28,982**	**$8,046**
Total Net Income	**$689**	**$3,148**	**$504**
Net Margin	**9.4%**	**10.9%**	**6.3%**

Source: Company Reports

other external factors such as rising oil prices and an overall commodity boom have had greater influence.

Corn farm economics are mostly decoupled from corn prices due to commodity markets and subsidies. But, it is useful to analyze to assess the overall health of the industry.

Fertilizer makes up the largest cost category for corn farmers, accounting for approximately 36 percent of their costs. Considering that feedstock made up 56 percent of ethanol costs in 2007, that means fertilizer contributed roughly 20 percent of the cost of ethanol. Derived largely from natural gas, fertilizer should not only be considered a cost contributor, but must also be considered in energy balance calculations.

The second largest cost category for farmers is seeds, which can have a dramatic affect on crop yields and is therefore an area of technology development that is quite relevant to the trajectory of the corn ethanol industry. Monsanto, the largest producer of corn seeds in the U.S., is claiming that corn yields will increase from today's average of 145-165 bushels per acre up to 300 by 2030.

These gains are coming from advances in molecular breeding and biotechnology to improve stress tolerance. Specifically, the advanced seeds allow for greater drought, herbicide and insect resistance.

Overall, industry experience suggests that corn is a viable feedstock to support the 15 bgpy target laid out by the RFS without disrupting other uses for corn. Farmers have been shifting their planting patterns to accommodate the ethanol industry without negative impact on corn volume to food (for people), feed (for livestock), high fructose corn syrup (for food manufacturing) or for export. In fact, since 2003, corn volume to each of these markets – with the exception of corn syrup, which dropped by approximately 1 percent – has increased.

Table 1.2

Corn Ethanol Cost Detail, 2005-2007

$/gal

	2005	2006	2007
Net Feedstock	0.53	0.67	0.95
Energy and Water	0.28	0.26	0.26
Industrial Chemicals	0.14	0.16	0.17
Yeast and Enzymes	0.04	0.04	0.04
Maintenance	0.04	0.04	0.04
Plant Operations	0.10	0.10	0.10
Debt Service	0.12	0.12	0.12
TOTAL COST TO PRODUCE	**1.25**	**1.39**	**1.69**

Source: Industry Reference Model

Figure 1.7

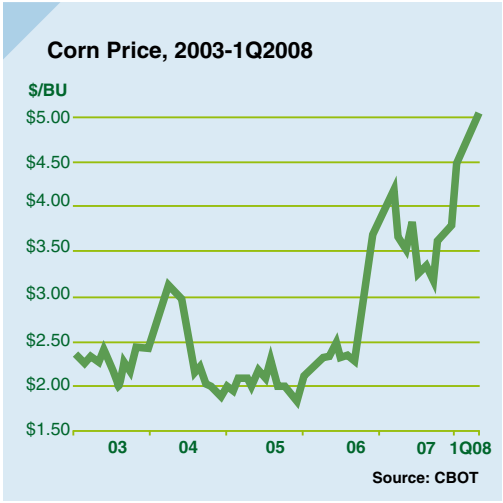
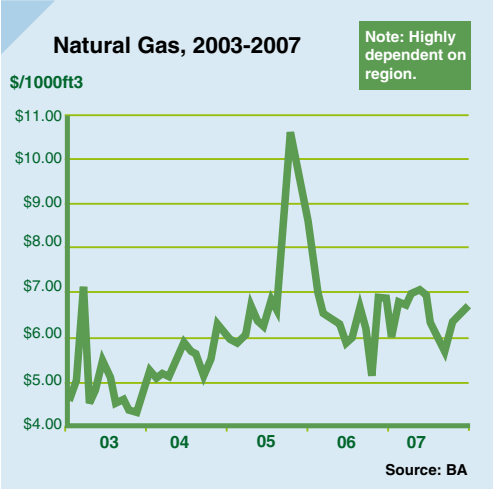


Figure 1.8

In order to support further growth in corn ethanol production, additional crop shifting will need to occur as well as increased crop yields through advancements in seeds and farm management practice, all of which appears to be feasible based on past experience.

Figure 1.9



Ethanol Pricing Factors

Ethanol pricing is driven by many competing forces at any one time, including fundamental supply and demand, contract dynamics and federal tax credits. As a commodity, ethanol is more volatile than the product it is replacing in the marketplace, namely gasoline, which itself has complicated trading patterns.

This report takes a two-pronged approach to the topic. First, by analyzing the impact pricing has on the overall industry and second, by considering examples that illustrate different pricing mechanisms. The conclusion is that the high volatility for ethanol pricing is due to the fact that the marketplace can – and often does – switch back and forth between different pricing mechanisms.

2007 was an interesting year that points out some of the challenges to players as the price spread between ethanol and gasoline flipped mid year, going from a period in the beginning of the year where ethanol prices were higher than gasoline to a period in the fall where it was the opposite.

Ethanol pricing is a complex issue affecting the industry in many important ways:

- Ethanol revenue levels
- Industry profit sharing
- VEETC benefits
- Signals to supply and demand dynamics at macro and micro levels

Figure 1.10

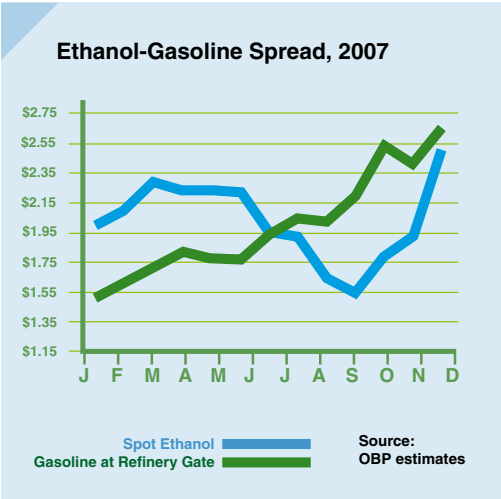
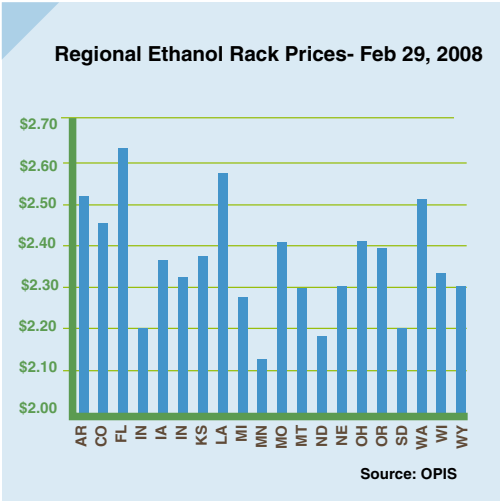


Figure 1.11



2008 Food Price Factors

1. Increased cost of petroleum inputs
2. Increased global food demand
3. Global crop failures in 2007
4. Weak dollar and resultant commodity hedging
5. Increased corn ethanol production

Example 1.1

Ethanol Pricing Example 1: Ethanol Spot Price

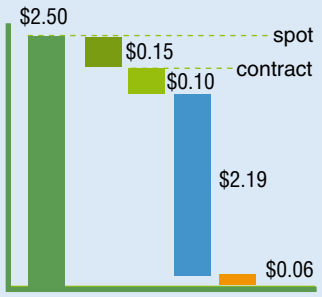
Ethanol spot price is the price of a marginal gallon of ethanol on the open market after all contracts are executed. The spot market volume as a percentage of the overall market is highly dependent on public policy.

If regulations require a certain blend of ethanol, as with the RFS or oxygenate requirements, blenders will sign contracts to cover their requirements. Conversely, if the market has fulfilled requirements, blenders are likely to allow contracts to expire and utilize the spot markets. As a result, spot market prices are often quite different than contract prices and can swing above or below, depending on market conditions.

Source: OPIS

Example 1.2

Ethanol Pricing Example 2: Ethanol Contract Dynamics



An example of a market where contract prices are lower than spot, similar to the second half of 2007:

A small to medium sized producer may contract with to a larger distributor who, in turn, contracts with a blender. In this example, the spot price may be $2.50/gal. The distributor contracts at a discount for $2.35/gal and charges a 10¢/gal fee. The actual producer sees a price of $2.25/gal, illustrating why spot price is not necessarily a good estimate of overall industry prices.

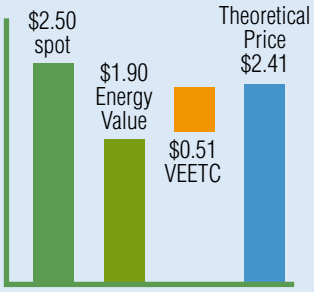
Given a cost to produce of $2.19 in 1Q08, that leaves a $0.06/gal (<3%) gross margin for the producer.

Example 1.3

Ethanol Pricing Example 3: Theoretical Pricing

Underlying all pricing calculations is the market value of ethanol as part of the blend mix. There are several possible ways to come up with a figure:

1. Volume – direct replacement
2. Volume – energy content
3. Oxygen
4. Octane



The chart to the right shows a sample calculation based on volume, energy content and the current VEETC. This example uses the spot price as a basis, although a contract price can also be used as a starting point. The existence of multiple competing theoretical pricing formulas helps explain the high volatility and variability in ethanol pricing.

GETTING PRODUCT TO MARKET

Ethanol infrastructure is a complex system comprised of local transport for feedstock and regional consumption (largely trucks), long haul transport to distant markets (mostly rail) and storage and blending facilities (collectively known as terminals). To date, shipping ethanol via pipeline has been impractical due to its miscibility with water and corrosion issues, although effort is underway to address these.

The ability of a producer to get its product to market effects not only the basic viability of the business, but – as discussed above – also affects the market pricing more generally.

Looking ahead as production levels continue to rise, the level at which ethanol can be blended into gasoline becomes a limiting factor. With gasoline consumption in the 150 bgpy range, E10 reaches a blend limit less than half way to the 2007 RFS targets.

Transportation and blending logistics

The U.S. Transportation system for bulk chemicals and liquid fuels has been established since the early days of our industrial revolution and is robust.

Having said that, the system has needed to make some adjustments to accommodate

Figure 1.12

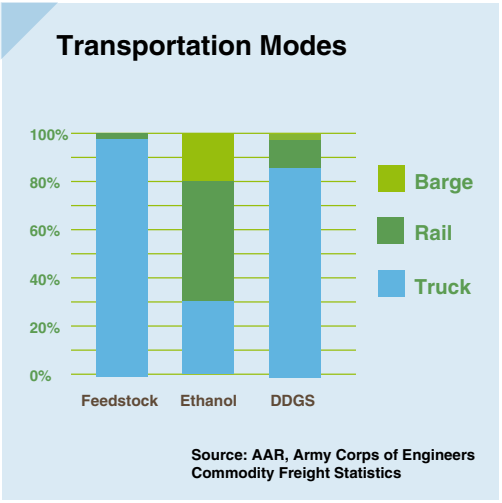
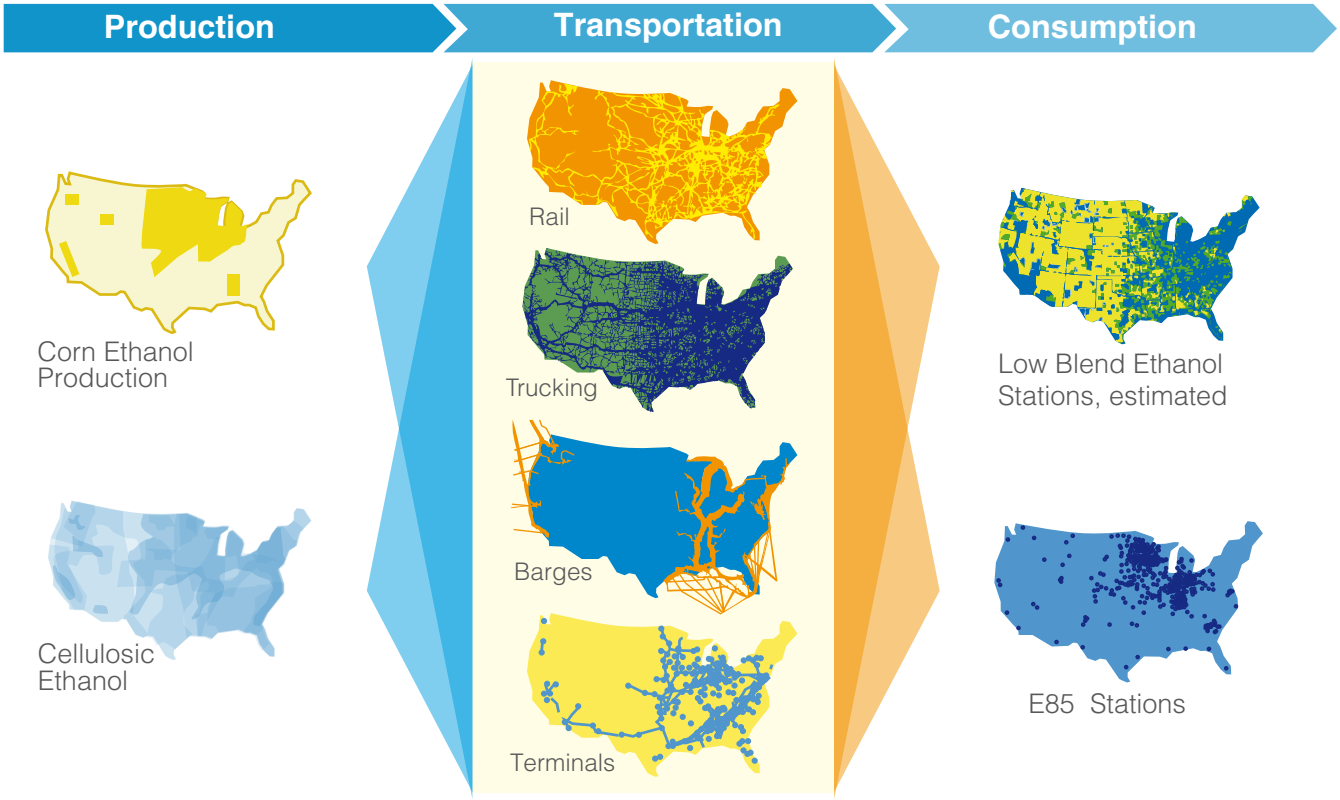


Figure 1.13

Ethanol Industry Landscape



a rapidly growing ethanol industry. This means development at the local level to handle input and output at new process plants as well as at the systems level to receive that output.

Areas of stress in 2007 include:

- Blending terminals
- Unit train destinations
- Tank car manufacturing

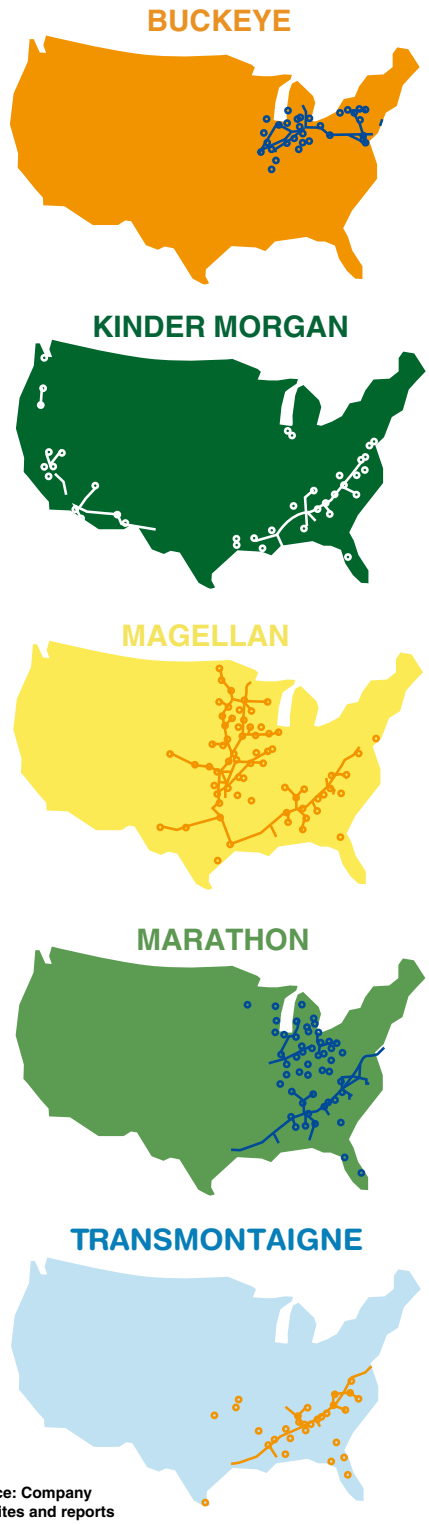
Midstream product distribution assets including storage tanks, blending terminals and pipelines, have been divested from the otherwise vertically integrated oil majors. Enabled by the Master Limited Partnership (MLP) structure to tap into public market financing, this segment has experienced some level of consolidation. As it relates to ethanol, this represents the main point of contact with its end use market. The companies in this space have been investing in equipment and capacity to handle higher ethanol volume but have not always kept up with the growth of the ethanol production capacity. The result is that there have been bottlenecks at the local level despite sufficient macro-level supply and demand.

In order to get ethanol to the blending terminals most cost effectively and efficiently, unit trains (that is, units of 80-100 cars that travel as a single unit) are the preference. Unfortunately, there is a limited number of terminals that have the capacity to handle unit trains *(see Figure 1.15)*. Additional capacity is being built now and will continue to expand to meet ethanol industry needs.

While ethanol is still a small portion of rail volume today, it will increase substantially in the coming years. However, even as ethanol breaks into the top 10 products shipped by rail, it will only account for approximately 5 percent of total rail traffic in 2022. This suggests that the rail infrastructure in the U.S. will not be a major bottleneck to the industry in the long run.

Figure 1.14

Selected Terminal and Pipeline Operators



Source: Company websites and reports

Figure 1.15

Unit Train Destinations

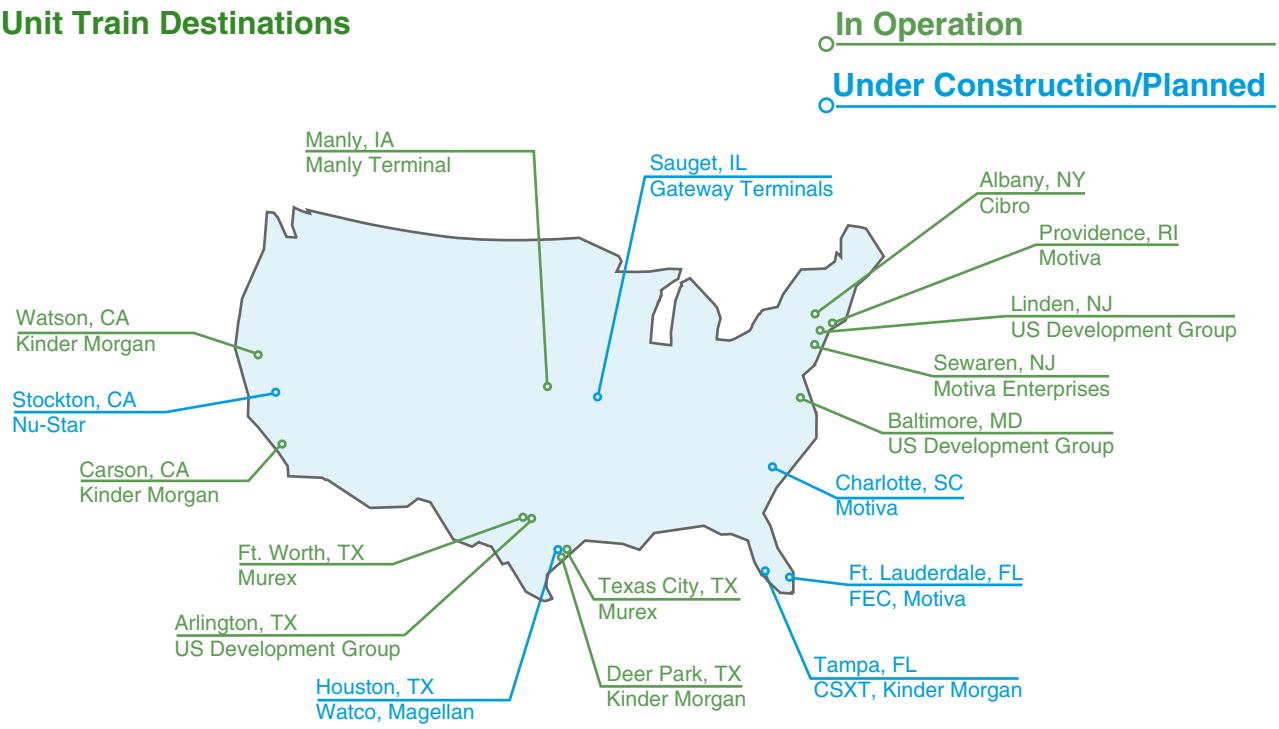
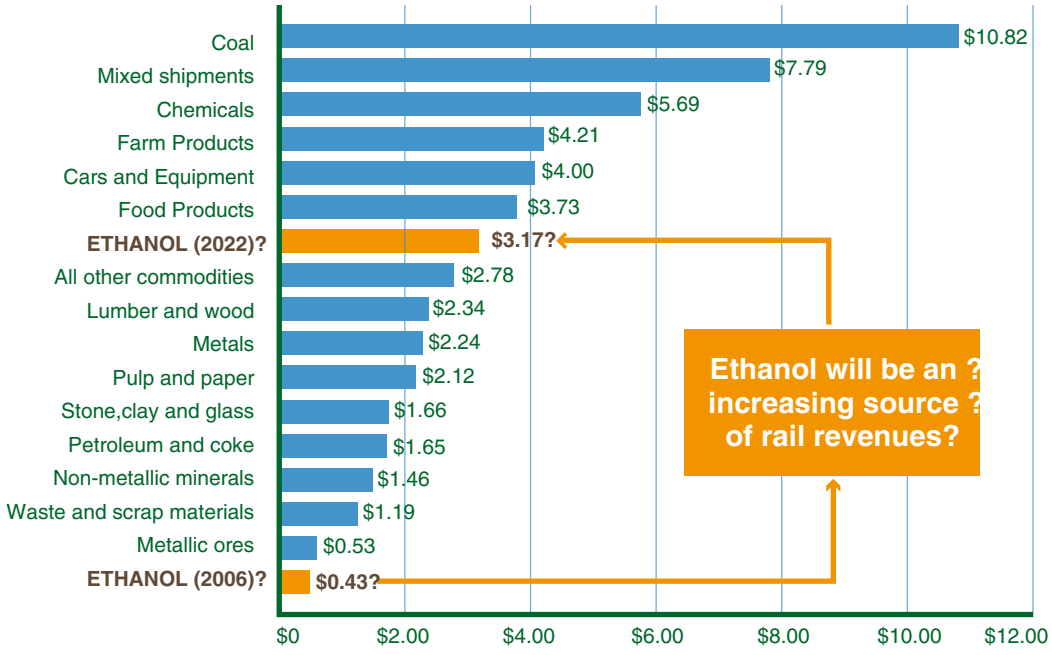


Figure 1.16

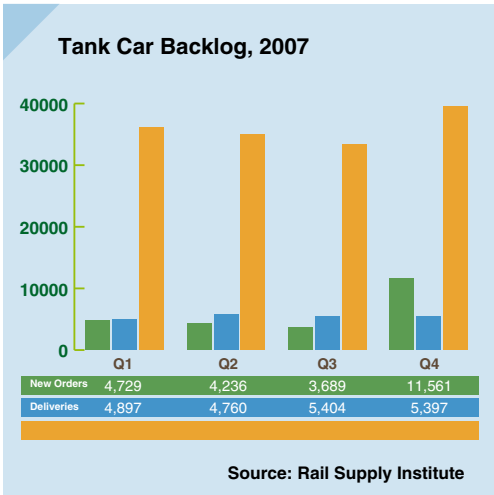
Where would ethanol rank if the 2022 RFS were achieved today?

Rail Revenues by Sector, 2006 (billion $)



Source: Association of American Railroads (Jan 2008); estimates

Figure 1.17



Only 3 tank car manufacturers in the U.S.:

1. American Railcar Industries
2. Trinity Industries
3. Union Tank Car Company

The top five rail players:

1. BNSF
2. CSX
3. Kansas City Southern
4. Norfolk Southern
5. Union Pacific

Besides the short term bottlenecks associated with unit train destinations, the industry is currently experiencing a two year backlog for chemical tank cars.

In addition to investments in blending facilities, some companies have begun to pursue dedicated ethanol pipelines. Historically, it has been impossible to move ethanol by pipeline for several reasons:

- Unlike refined petroleum products, ethanol is miscible with water and, as a result, will pick up any water and contaminants anywhere along the way in a fungible product pipeline.
- Ethanol is a good solvent, meaning that introduction of ethanol into a pipeline will cause years of build up to loosen up and contaminate the pipeline.
- Ethanol has materials compatibility issues with steels and elastomers. In particular, it is known to cause stress corrosion cracking.

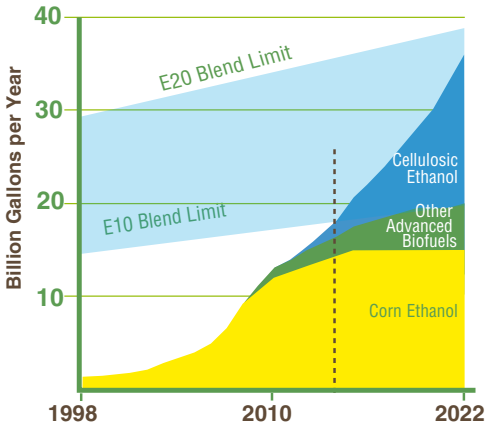
Magellan and Buckeye are leading the way in this arena and announced in February 2008 that they were launching an effort to assess the feasibility of building a dedicated pipeline from the corn ethanol production region in the Midwest to the largest consumer market along the eastern seaboard. A preliminary cost estimate has been quoted at roughly $3 billion. The pipeline would be about 1,700 miles long and would take several years to build.

Blend limits and Vehicle Technology

The currently accepted ethanol blends are E10 and E85 with 10 percent and 85 percent ethanol, respectively, blended with gasoline. With limited roll out to date of E85 fuelling stations in the U.S. (about 1,400 out of 170,000 stations offer E85) and an equally limited roll out of flex fuel vehicles (about 6 million out of 250 million cars), the E10 blend poses a limit to growth in the ethanol industry that may be reached in the four to five year time frame. Testing is currently under way that suggests higher blends such as E15 are feasible and safe in today's auto fleet. A major hurdle for wide acceptance of blends above E10 is the potential cost to auto manufacturers that have large warranty liabilities to consider. Once this is overcome, the blend limit can extend the time required to turn over the vehicle fleet and bring more flex fuel vehicles to market as needed.

In the long run, a popular scenario to consider is that of mid-level blends such as E15 or E20 across the country with specific markets such as the Midwest that will deploy E85 on a larger scale, thus bringing the national average blend up to a higher rate.

Figure 1.18
Blend Limits



FINANCIAL HEALTH OF THE INDUSTRY

2007 was a difficult year for the corn ethanol industry. Some of the difficulties were a function of industry growing pains and balancing of profit distribution while other difficulties were a result of broader economic conditions including rising global commodity prices, lending market crises and an overall economic downturn in the Us. As a result, ethanol stocks were hit hard and new construction came to a halt in the second half of 2007. Some ethanol plants were shut down to weather the current economic conditions.

Theoretical industry models suggest that the fundamental economics for corn ethanol are still sound, but this is of little comfort to some of the operators trying to navigate the current market. In the long term, the market will likely recover and resume growth to meet the RFS targets.

Revenue And Profit Distribution

The primary model considered in this report is based on average industry prices for gasoline and spot prices for ethanol over time. Each segment of the supply chain is considered with industry average margins for that particular sector. For the purpose of analysis, operating cash flow is the focus so that it can be more easily demonstrated how cash flows through the industry. Also, capital structure can vary greatly amongst industry players, which can be considered separately. The resulting revenue and profit distribution figures highlight the industry's struggle to find a market equilibrium as it grows.

As shown in Figure 1.20, the industry revenues are highly dependent on product

Figure 1.19

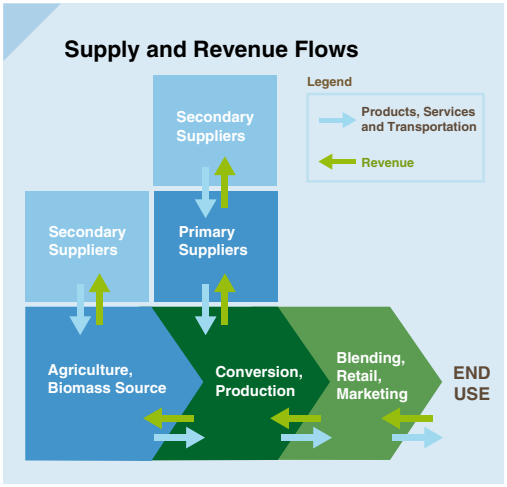


Figure 1.20 **Total Industry Revenues, 2007-2012**

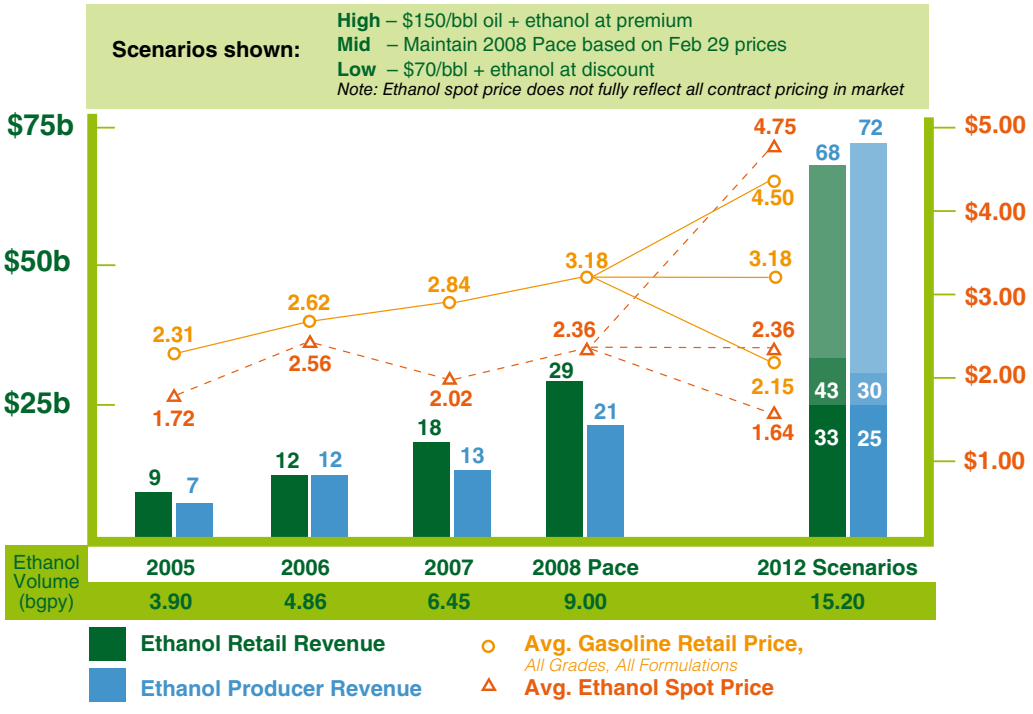
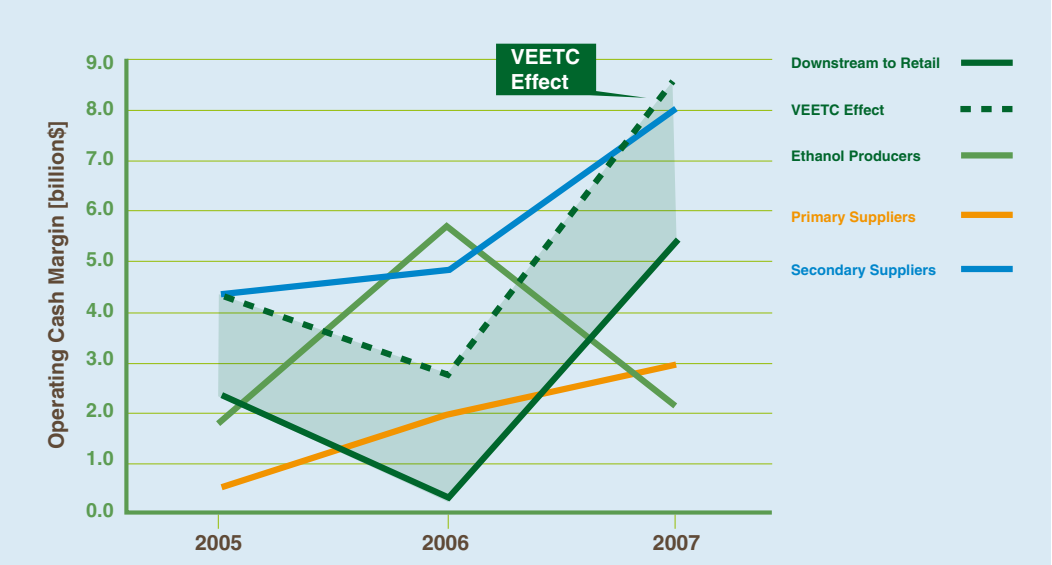


Figure 1.21 **Corn Ethanol Industry Profit Distribution, 2005-2007**



Note: See Appendix on page 42 for Industry Reference Model used for revenue and profit analysis, 2005-2007

pricing. Likewise, profit distribution is highly dependent on the price spread between gasoline and ethanol. While this model is only theoretical and based on industry averages, Figure 1.21 is illustrative of the dramatically different profit scenarios in 2006 and 2007. It also shows that the industry structure allows for much of the profits to flow upstream to primary and secondary suppliers, where primary suppliers are defined as those firms supplying directly to the ethanol producers *(for example, corn farmers)* and secondary suppliers are suppliers to them *(such as seed producers).*

The nature of profit distribution impacts the industry in several important ways:

- Contract negotiations and pricing dynamics
- Ability to raise capital, often reflected in stock prices
- Tax subsidy benefits
    1. VEETC Sharing
    2. Future public policy
    3. Contract pricing impact

As outlined on page 6 ethanol pricing dynamics is a complex topic. One of the many factors playing into this is profit distribution across the supply chain. Each contact point along the supply chain represents a contract and pricing relationship. Over the long term, the only way for an industry to survive is if there is a relatively fair profit distribution. Otherwise, chronically under-rewarded segments would become unattractive for investors and operators, thus causing industry breakdown or restructuring.

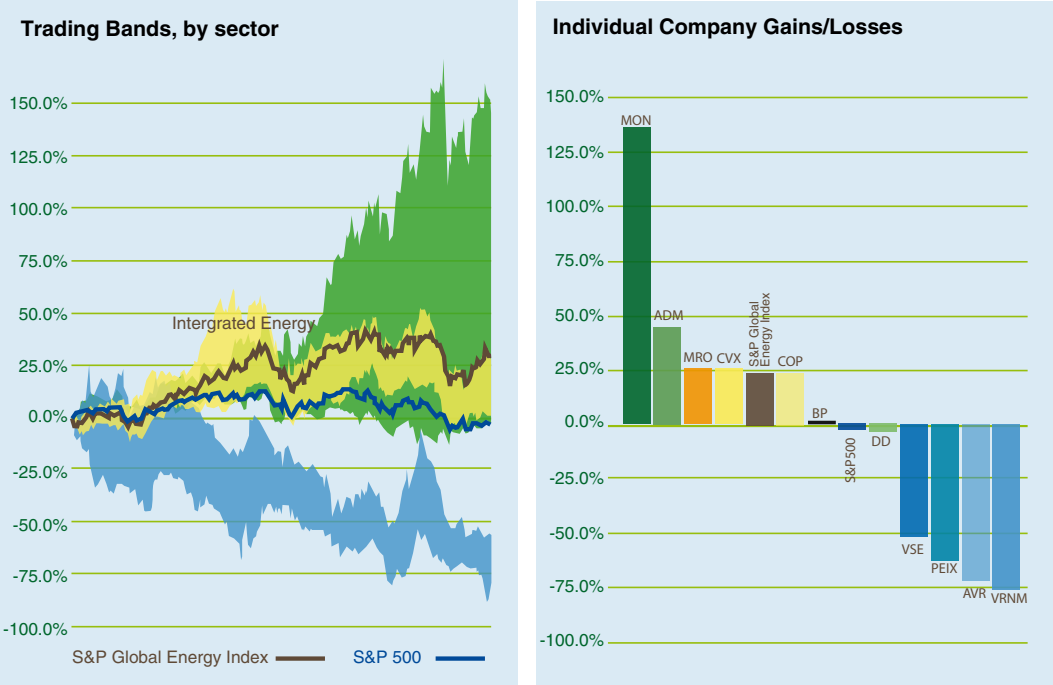
Stock Performance

2007 was an overall good year for energy stocks with the S&P Global Energy Index outperforming the S&P 500 roughly 25 to 30 percent for the period of January 2007 to Feb 2008. Ethanol stocks, however, were a notable exception. With major losses by pure play ethanol companies, the sector experienced a serious correction.

There are several explanations for this dramatic downturn. First, stocks were overvalued at the time of IPO due in part to valuations based on an irrational profit split in the 2006 timeframe when many of the ethanol companies went to market. So, when the profit sharing scenario flipped over in 2007, ethanol stocks were valued on earnings in a different profit split paradigm.

In the medium to long term, ethanol funding

Figure 1.22 **Relative Stock Performance,** Jan 2007- Feb 2008



through public markets will see a recovery. Analysts will be smarter about the industry and will be able to identify good opportunities as corn ethanol continues to grow.

Secondary suppliers, especially the agribiz companies have done very well for the period with Monsanto as a stand-out stock gaining more than 125 percent since January 2007. More than 50 percent of their revenues are derived from seed sales. Another interesting stock to watch is ADM, which has benefited from its broad agricultural businesses but is one of the First Tier ethanol producers.

Advanced biofuel stocks will likely be valued as a different segment due to differentiated economic and risk profiles.

Funding sources and project finance

Along with, or perhaps as a result of, poor public stock performance, financing for corn ethanol project development dried up in 2007, resulting in the freezing of almost all new construction.

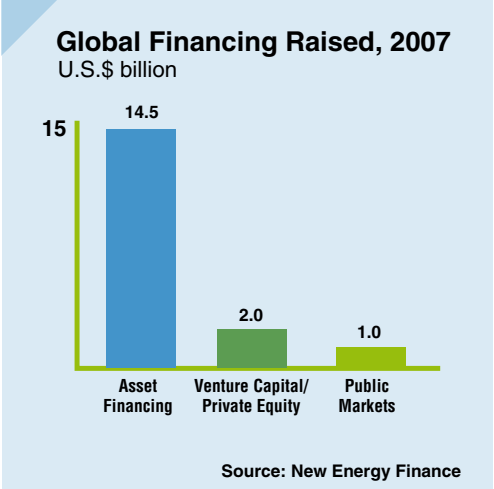
Project finance for ethanol can be broken down into 2 categories: project equity and project debt.

On the equity side, there are public markets and private equity, which may prove to be counter cyclical as the industry has its ups and downs.

Corn ethanol received a fair amount of venture capital in the past few years, but will likely not produce any further venture financing. Future biofuels venture investments will likely be focused on technology risks as discussed in Chapter 2.

On the debt side, there may be some disruption as debt sources move from the traditional agricultural banks towards financial institutions. The farm banking system is showing signs that its portfolio allocation for ethanol project debt is reaching its limit, implying that the farm banking sector is not large enough to absorb the continued industry growth. There will be some lag time as new sources of debt warm up to the industry and let the current wave of

Figure 1.23



Top Ag Banks:

1. Agstar
2. CoBank
3. Farm Credit Services
4. First National Bank of Omaha
5. Home Federal
6. Stern Brothers
7. West LB

difficulties ride through. Additionally, the fall-out from the sub-prime mortgage crisis is broadly affecting debt markets and may continue for some time.

Project financing will likely require some additional safeguards and assurances in order to rebound. This can be achieved in several ways:

- Insurance
- Hedging and risk management
- Federal loan guarantees

Tax Subsidy Benefits

Tax subsidies flow into the ethanol industry as a blenders credit and are shared across the supply chain as a function of midstream pricing.

In 2007, the $0.51 per gallon credit was applied to 6.45 billion gallons for a total value of $3.29 billion. Due to a shifting price delta between ethanol and gasoline (ethanol price was higher first half of the year and lower in the second half), the tax credit benefit shifted from the producers to the blenders over the course of the year.

See Chapter 4 and Figure 4.1 (page 21) for further discussion.

THE COMING RISE OF ADVANCED BIOFUELS

The idea of making liquid fuels from cellulosic biomass is not new. What is new is being able to do it at low cost and on a large scale. Over the past several years, technologies have been in development to address these core issues and drive the biofuel industry to and through the next inflection point.

This chapter discusses the topics of timing, technology, feedstock and financing to support the next generation of biofuels.

GEARING UP FOR TAKE-OFF

After years of research, several critical factors have come into alignment to enable the take-off of cellulosic ethanol.

First, cellulosic conversion technology is coming of age as costs continue to fall and commercial-scale demonstration projects break ground. As discussed in the following section, there are many technologies being developed in parallel with many potential winners. While it implies tough competition among technology start-up companies, this dynamic technology environment bodes well for the industry as a whole.

Second, rural development has been a major driver in the adoption of favourable local policy and incentives that are encouraging industry development. Compared to corn as a feedstock source, cellulosic biomass has a much wider footprint across the U.S., allowing for communities to build local industry in ways that were previously unavailable.

Third, the infrastructure for ethanol has been pushed forward by the existing corn ethanol industry, which will allow for rapid deployment of technology as it proven at demonstration and commercial scale.

Fourth, there is significant legislative and political will to advance renewable energy. With respect to biofuels, this was manifested in the new RFS signed into law in December 2007 laying out targets to reach 16 bgpy of cellulosic ethanol by 2022, which is more than twice the current corn ethanol capacity in the U.S.. The commitment is also made clear through the $1 billion in federal funding made available to advanced biomass programs.

Figure 2.1 **Ethanol Technology Evolves: The Next Inflection Point**

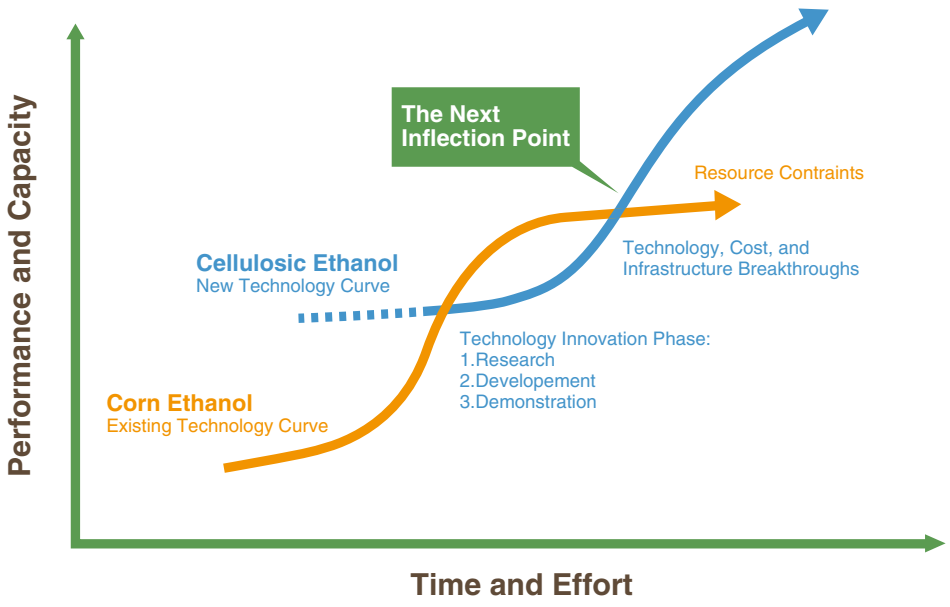
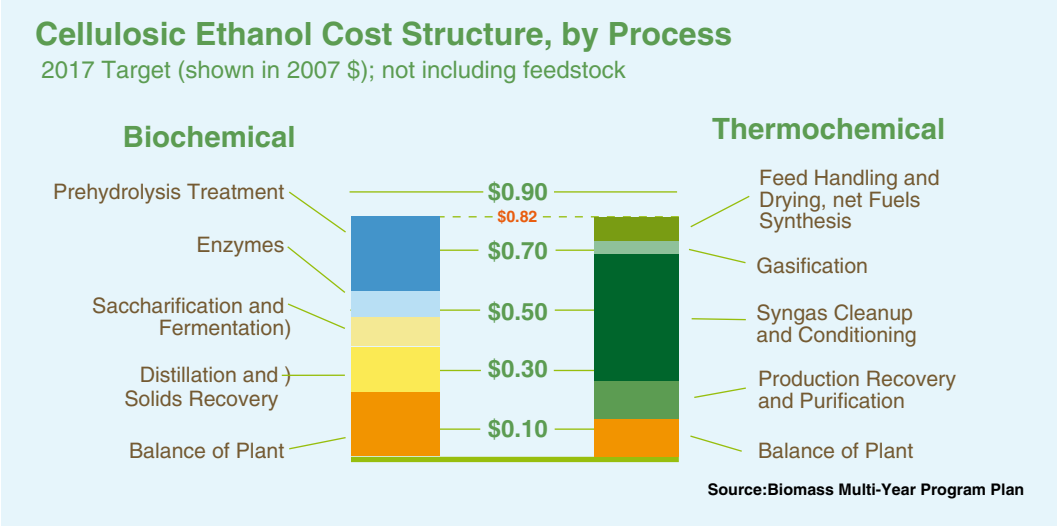


Figure 2.2



Lastly, financing – largely in the form of venture capital – has been available to back advanced biofuels commercial development.

As each of these factors begins to reach a critical point, the net result is a multiplier effect that will likely lead to a steep inflection point in the next 3-5 year timeframe.

Cellulosic ethanol conversion technologies

Cellulosic ethanol technologies can be broken down into 2 main categories : biochemical and thermochemical. Much effort has been given to the technical assessments of these technologies, so this report will not attempt to cover the technical details. For the purposes here, each of these pathways will be considered in terms of technology adoption and how that may transform the industry landscape over time.

The primary driver for any technology in a commodity market is cost, which can be broken down to include capital cost to build a plant and operating cost to run the plant. As illustrated in Figure 2.2, the biochemical and thermochemical pathways require different equipment and operating cost categories.

Cost curves

In contrast to corn ethanol processing technologies which are in the phase of making continuous incremental improvements, cellulosic ethanol conversion technologies are making dramatic cost improvements as they move from the lab to demonstration and, ultimately, to full commercial scale. Figure 2.2 shows the Department of Energy's cost structure targets for best of class technology for both biochemical and thermochemical processes. The $0.82/gal shown here is based on advanced technology that has not yet been deployed at full scale and does not include feedstock. Actual technologies may take several years to reach these cost points in a production environment.

Figures 2.3 and 2.4 show the current costs by process and their anticipated downward trajectory over the next five years. Biochemical processes have seen dramatic improvements in enzyme costs over the past several years and are turning now to overall systems improvements. Thermochemical processes are often engineered with capital vs operating cost trade-offs in mind. Overall, it is difficult to assess technology cost curves on an aggregate basis as each technology has different advantages to be proven/disproven at large scale.

Figure 2.3

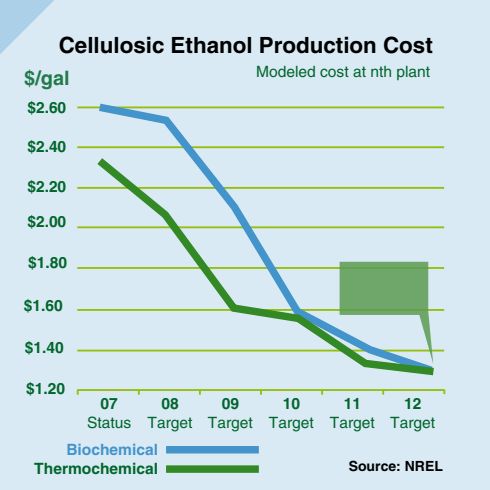
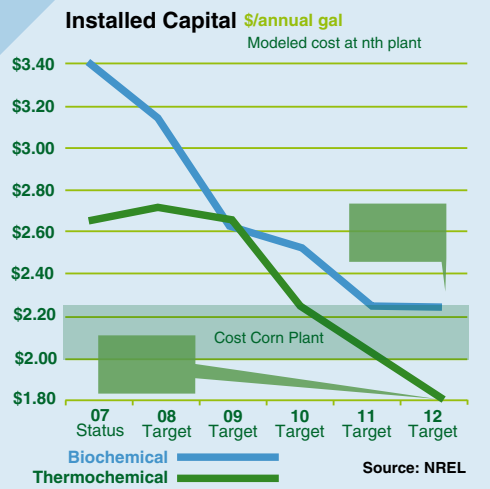


Figure 2.4



Full Scale Cellulosic Projects DOE Grant Selectees:

1. Abengoa
2. ALICO
3. Bluefire Ethanol
4. POET
5. Iogen
6. Range Fuels
7. West LB

Early Stage Companies Working On Next Generation Fuels:

1. Amyris Biotechnologies
2. Gevo
3. LS9

As a point of reference, the average cost to produce corn ethanol in 2007 was $1.69/gal (see Table 1.1 above) and has climbed above $2.00 in early 2008. If the net feedstock cost is subtracted out of the cost to produce corn ethanol, the cost is about $0.74/gal, which is cheaper than the target $0.82/gal for cellulosic technologies. However, when feedstock costs are considered, projections for cellulosic costs are much lower at $1.33/gal in 2012. Of course, this is a theoretical target and subject to many external factors as the cellulosic feedstock industries evolve. The good news is that, unlike corn, cellulosic biomass is not (yet) highly subject to commodity swings and external factors. This comparison, though, does highlight the importance of how the cellulosic feedstock market develops, which is discussed in more detail on the following page.

Next Generation Fuels

Several examples exist of advanced biofuels being developed that have the potential to complement or even replace ethanol as the dominant biofuel in the U.S. While still in early stage development, these fuels are being created in order to improve fuel properties and/or circumvent bottlenecks in getting product to market. Examples include technologies used to produce alternative alcohols to be blended with gasoline. BP and DuPont have been working together on butanol. And, start-ups such as Amyris Biotechnologies are working with synthetic biology to produce alternative fuels.

Important fuel properties to consider are:

- Energy density
- Octane
- Vapor pressure
- Miscibility with water (ie, ability to transport via pipeline)

Other companies are working on non-alcohols that can be introduced into the supply chain in different ways than ethanol. For example, ADM and ConocoPhillips are working together on the development of biocrude from cellulosic feedstock sources that can be introduced at the oil refinery level. Another example is start-up LS9, which is producing “renewable petroleum” that can be distributed through traditional pipelines.

CELLULOSIC FEEDSTOCK SOURCES

With the publishing of the “Billion Ton Study” by the USDA and DOE in 2005, it has been well accepted that there is sufficient cellulosic biomass feedstock available in the U.S. to support a significant biofuels industry. While some would argue the validity of the outside estimates, even a conservative reading

Among the systems to be developed are:

1. Harvesting
2. Handling
3. Pre-processing
4. Shipping
5. Storage
6. Market mechanisms

of the data gets the U.S. a long ways towards energy independence for consumer transportation.

However, the systems required to bring this biomass to into useful production will take years, probably decades, to develop. The Office of the Biomass Program predicts that approximately 250 million dry tons will be accessible by 2017, ramping up along side the cellulosic ethanol Industry as it pushes through the next inflection point.

It is important to note the diversity of cellulosic feedstocks available. The 2 largest sources of cellulosic feedstock are forestry resources and corn stover. In both cases, these sources can leverage existing markets and infrastructure (paper/pulp and corn grain industries, respectively).

New dedicated energy crops such as switch grass and perennial trees will take longer to develop. Aside from the systems mentioned above, these crops are being developed from the ground up beginning with seeds and crop engineering. Companies today are working on these aspects but the timing of large scale roll-out is necessarily dependent on the development of feasible cellulosic conversion technologies. Feedstock producers will not have the incentive to plant large areas until they can be guaranteed that there will be a market pull for their output.

Lastly, the diversity of cellulosic feedstocks also leads to geographic diversity of cellulosic ethanol production facilities. This is significant in the development of transportation system to get ethanol to market. In the long range, infrastructure will be further developed from the traditional Midwest sources, but also from new regions such as the Southeast where there is large potential for cellulosic development.

Figure 2.5

Major Cellulosic Feedstock Sources, Long Range Outlook

Rounded estimates based on 2005 Billion Ton Study, Scenario 3: Technology change with perennial crops and land use change

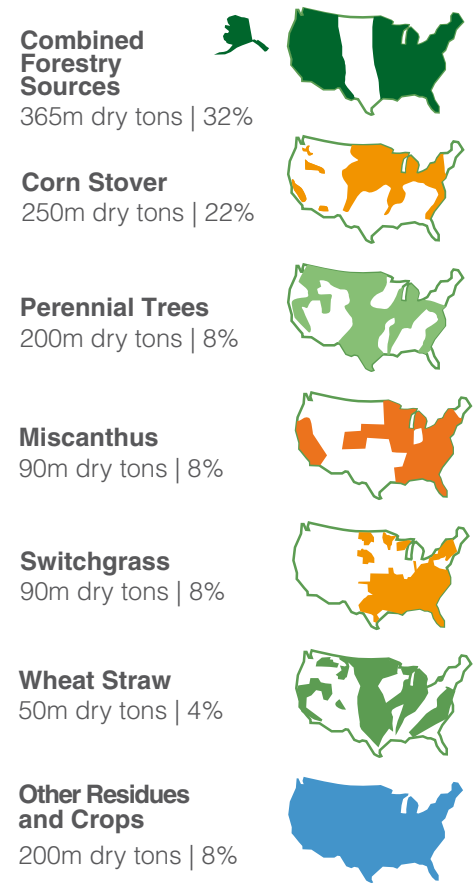
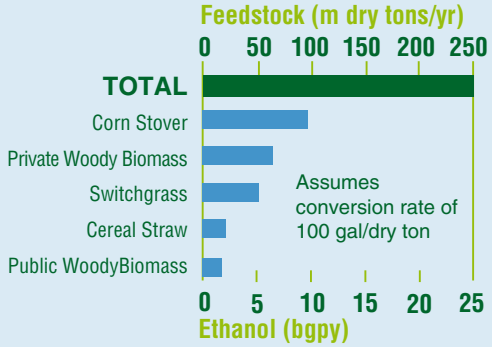


Figure 2.6

Major Cellulosic Feedstock Sources, 2017

Estimates based on Biomass Program MYPP at target feedstock prices



VENTURE CAPITAL TRENDS IN BIOFUELS

Venture capital has been a significant driving force in the development of conventional and advanced biofuels with over $650 million invested in the U.S. from the beginning of 2007 through first quarter 2008. As a whole, the venture community has a broad investment mandate ranging from early stage seed investments to pre-IPO rounds. However, most firms tend to specialize in certain categories. The early stage investments tend to be smaller and focus on technology risks whereas later stage deals emphasize growth and execution.

2007 was fairly evenly split between early stage and late stage deals, with 15 and 19 deals, respectively. However, the trend in 1Q08 is towards fewer later stage deals. This trend is likely due to 2 main factors: 1) momentum of deals that were first funded in 2007, and, 2) early stage venture firms taking a "wait and see" approach to watch development of technologies, exit performance of late stage deals and outcome of current public policy debate.

Interestingly, the location of venture investments is skewed towards regions that have long history of venture capital and technology innovation, namely the west coast and the northeast, rather than the location of production facilities and feedstock sources. This is an indication of what the industry structure may look like down the road with technology innovation taking place separate from production.

Lastly, it is notable that of the 50 plus venture capital firms that have been active in biofuels, very few seem to have a keen focus on the sector. Khosla Ventures of Menlo Park, CA is a stand out with 10 investments over the period. This is mostly due to the fact that most venture firms consider biofuels a subsector of a larger investment category looking at clean energy and environmental protection. Each firm defines the category differently based on their own analysis and market theses.

Table 2.1

Biofuels Venture Deals *million $*

	2007		1Q08	
	# of Deals	Capital Raised	# of Deals	Capital Raised
West Coast	13	$182.02	1	$3.00
Northeast	6	$64.22	2	$32.50
Southwest	5	$53.85		
Midwest	4	$33.25	2	$19.50
Northwest	3	$76.25		
Rockies/Plains	2	$48.23	1	$100.00
Alaska/Hawaii	1	undiscl		
Southeast			1	$42.00
	34	$457.82	7	$197.00

Notes: Includes ethanol, biodiesel and waste to energy; 2007 and 1Q08 had 5 deals and 1 deal, respectively, of undisclosed amount

Figure 2.7

Number of Venture Deals, By Region 2007 - 1Q08

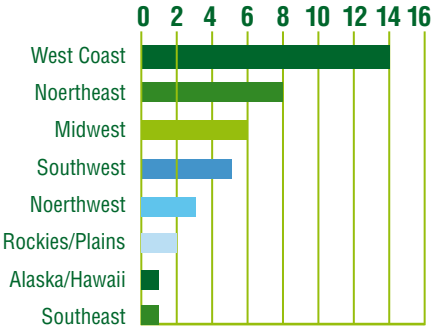


Table 2.2

Other Biofuels Venture Statistics

# of Deals	2007	1Q08
Investment Size Range	$250,000 - $70m	$2.5m - $100m
Mean	$15.8m	$32.8m
Median	$7.1m	$30m
# of Active Firms	43+	16
Stage		
Seed/First Round	19	1
Follow-on	15	6
Firms with more than 1 deal		
Khosla Ventures	7	3
Nth Power	3	
Mohr Davidow	3	
@ Ventures	2	
Capricorn	2	
Pinnacle		2
General Motors		2

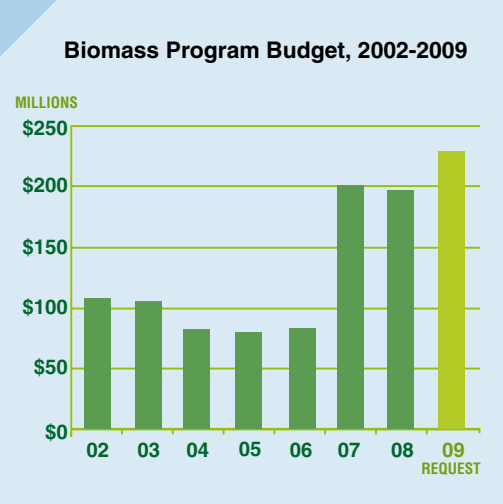
Source above: Cleantech Network LLC

THE U.S. GOVERNMENT AS VENTURE CATALYST

The U.S. Department of Energy has been playing a central role in the development of a large scale biofuels industry in the U.S.. With a broad scope of activities ranging from fundamental research to deployment and commercialization, the programs have served as a catalyst in forming viable private sector ventures.

Major funding for biofuels industry development flows primarily through two DOE program offices: The Office of the Biomass Program and The Office of Science. As shown in Figure 3.1, over $1 billion of funding has been allocated since the beginning of 2007, over $650 million of which comes out of the annual Biomass Program budget to support commercialization of biofuel technology and private sector efforts. $375 million was committed by the Office of Science to support three new Bioenergy Research Centers to accelerate basic research.

Figure 3.1



The following breakouts provide excerpts from the DOE websites and describe each of the funding programs underway now. Further information can be found at the following websites:

1. Office of the Biomass Program: *www.eere.energy.gov/biomass*
2. Office of Science: *www.er.doe.gov*

Integrated Cellulosic Biorefineries

On February 28, 2007, DOE selected six biorefinery projects to develop commercial-scale integrated biorefineries demonstrating the use of a wide variety of cellulosic feedstocks such as corn fiber, wood wastes, agriculture residues, municipal solid wastes and potential energy crops. The goal is to demonstrate that integrated biorefineries can operate profitably once their construction costs are covered and can be replicated. DOE will invest up to $385 million in the six projects over the next four years. When fully operational, these facilities will be capable of producing more than 130 million gallons of ethanol per year.

Ethanologen Projects - Development of Fermentative Organisms

In March 2007, DOE selected five projects focused on developing highly efficient fermentative organisms to convert biomass material to ethanol. Commercialization of fermentative organisms, capable of fermenting both hexose and pentose sugars, is crucial to the success of biochemical based integrated biorefineries. Over $23 million in federal funding will be available. When combined with industry cost share contributions, more than $37 million could ultimately be invested in the five projects.

Thermochemical Solicitation

On December 4, 2007, DOE announced that four cellulosic biofuel projects will receive up to $7.7 million in funding over the next three years. When combined with the industry cost share, more than $15.7 million will be invested in the four projects from fiscal year 2008 to fiscal year 2010. The projects will demonstrate the thermochemical conversion process of turning switchgrass, corn stover, wood, and the non-edible parts of other organic materials into biofuel. The five projects will validate technologies for removing contaminants from biomass-derived synthesis gas to very low levels. After verifying the proposed cleanup technology can achieve the required low contaminant level, the projects will advance to the second phase where a fuel synthesis train will be coupled to the gas cleanup system. The fuel synthesis train will use catalysts to convert the cleaned synthesis gas to Fischer Tropsch hydrocarbons and/or mixed alcohols.

Small-Scale Cellulosic Biorefineries ("10% Validation")

On January 29, 2008, the Department of Energy (DOE) announced it will provide up to $114 million, over four years, to support the development of small-scale cellulosic biorefineries. The projects will develop biorefineries at 10% of commercial scale that produce liquid transportation fuels as well as biobased chemicals and bioproducts used in industrial applications. Combined with industry cost share, more than $331 million will be invested in these four projects. On April 18, 2008, DOE announced an additional $86 million over the next 4 years in three new small-scale biorefineries will produce ethanol from non-edible cellulosic biomass sources, such as corncobs, wood chips, and switchgrass.

Enzyme Systems Solicitation

In February 2008, DOE announced its investment of up to $33.8 million over four years (Fiscal Years 2008-2011) in four projects that will focus on developing improved enzyme systems to convert cellulosic material into sugars suitable for production of biofuels. These four projects seek to more cost-effectively and efficiently break down processed biomass into fermentable sugars, a significant challenge in converting biomass into fuels. Projects were selected based on their demonstrated ability to reduce the cost of enzymes-per-gallon of ethanol by improving an enzyme's performance.

Bioenergy Research Centers

In June 2007, DOE Office of Science announced the establishment of three new Bioenergy Research Centers to accelerate basic research in the development of cellulosic ethanol and other biofuels. The Centers will bring together diverse teams of researchers from 18 of the nation's leading universities, seven DOE national laboratories, at least one nonprofit organization, and a range of private companies. The Department's three Bioenergy Research Centers include:

- The DOE BioEnergy Science Center led by the DOE's Oak Ridge National Laboratory in Oak Ridge, TN
- The DOE Great Lakes Bioenergy Research Center will be led by the University of Wisconsin in Madison, WI.
- The DOE Joint BioEnergy Institute will be led by DOE's Lawrence Berkeley National Laboratory in Berkeley, CA.

The centers are expected to begin work in 2008 and will be fully operational by 2009.

Energy Efficiency Loan Guarantees

On April 11, 2008, DOE announced that it will issue solicitations in June, offering up to $10 billion in loan guarantees for energy efficiency, renewable energy, and electric transmission projects. The $10 billion will be part of a larger $38.5 billion loan guarantee package that will support a variety of energy technologies. Selection criteria for the clean energy projects will focus on the avoidance of emissions of greenhouse gas emissions and other air pollutants; the speed at which technologies can be commercialized; the cost-saving potential for consumers; the prospect of loan repayment; and the potential for long-lasting success of these technologies in the marketplace.

Table 3.1 **CELLULOSIC ETHANOL GRANT SELECTEES**

Program	Announced	Recipients	Amount
Integrated Cellulosic Biorefineries	Feb 2007	Abengoa	**$76**
		ALICO *	**$33**
		BlueFire Ethanol	**$40**
		POET	**$80**
		Iogen *	**$80**
		Range Fuels	**$76**
		subtotal	**$385**
Ethanologen Projects	Mar 2007	Cargill	**$4.4**
		Verenium	**$5.3**
		DuPont	**$3.7**
		Mascoma	**$4.9**
		Purdue University	**$5.0**
		subtotal	**$23.3**
BioEnergy Research Centers	Jun 2007	Oak Ridge National Lab	**$125**
* funded by DOE Office of Science		University of Wisconsin	**$125**
		Lawrence Berkeley National Lab	**$125**
		subtotal	**$375**
Thermochemical Solicitation	Dec 2007	Emergy Energy	**$1.7**
		Iowa State University	**$2.0**
		Research Triangle Institute	**$2.0**
		Southern Research Institute	**$2.0**
		Gas Technology Institute	**$2.0**
		subtotal	**$9.7**
Small Scale Cellulosic Biorefineries	Jan/Apr 2008	ICM	**$30.0**
		Lignol Innovations	**$30.0**
"10 percent Validation"		Pacific Ethanol	**$24.3**
		NewPage Stora Enso	**$30.0**
		Mascoma	**$26.0**
		RSE Pulp & Chemical	**$30.0**
		Ecofin	**$30.0**
		subtotal	**$200.3**
Enzyme Systems Solicitation	Feb 2008	DSM	**TBD**
		Genencor	**TBD**
		Novozymes	**TBD**
		Verenium	**TBD**
		subtotal	**$33.8**
TOTAL			**$1,027.1**

***** The company has since announced its intention to withdraw from the solicitation.

PUBLIC POLICY CONSIDERATIONS

While the ethanol industry is most easily considered within the context of energy policy, it is fundamentally as much a matter of national resources and economic development. Any sound public policy choices must be made within this greater context and taken holistically to include such topics as energy security/independence, rural revitalization, agricultural production, foreign trade, food security, environmental protection and strategic technology innovation.

And, while corn ethanol technology is relatively mature, the ethanol industry as a whole is still in its emergent stage vis a vis the oil industry in terms of both capacity and technology. As such, industry development outcomes are decidedly path dependent. Without a solid corn ethanol industry, cellulosic conversion technologies would not have a platform from which to launch. As a result, public policy measures that affect the corn ethanol industry also affect the nation's ability to tap into the large renewable biomass resources available in the U.S. today.

CURRENT POLICY SITUATION

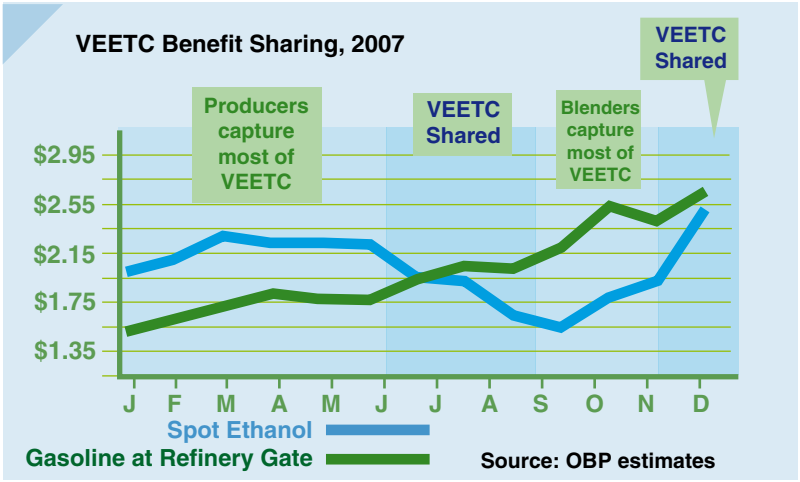
Congress passed the Energy Independence and Security Act ("EISA") in December 2007, included in which is a new and fairly aggressive Renewable Fuel Standard ("RFS"; see Figure 0.1). However, to date, exact regulations and enforcement mechanisms have yet to be rolled out.

Meanwhile, two important economic tools are reaching their end of life, with a notable timing gap of 2 years. Namely, the ethanol import tariff of $0.54 expires in December 2008 and the Volumetric Ethanol Excise Tax Credit ("VEETC" or "Blender's Credit") of $0.51 expires in December in 2010. These measures are closely linked due in part to the fact that the import tariff must be set at least at the level of the VEETC in order that U.S. taxpayers are not subsidizing offshore growers and producers.

Various options for VEETC reform have been discussed, including reduction of the credit, complete elimination of the credit or a change to a variable credit based on commodity indices (ie, oil and corn). It has also been discussed to move the entry point of the credit from blenders to producers. The logic in making this move is that the credit can flow more reliably across the industry while allowing for elimination of the import tariff. Product pricing and the price spreads are the primary mechanisms for tax credit sharing across the supply chain (see Figure 4.1).

Other important economic factors to consider in public policy decisions are long range oil prices as well as the potential for long range food inflation (see side bar on page 6).

Figure 4.1

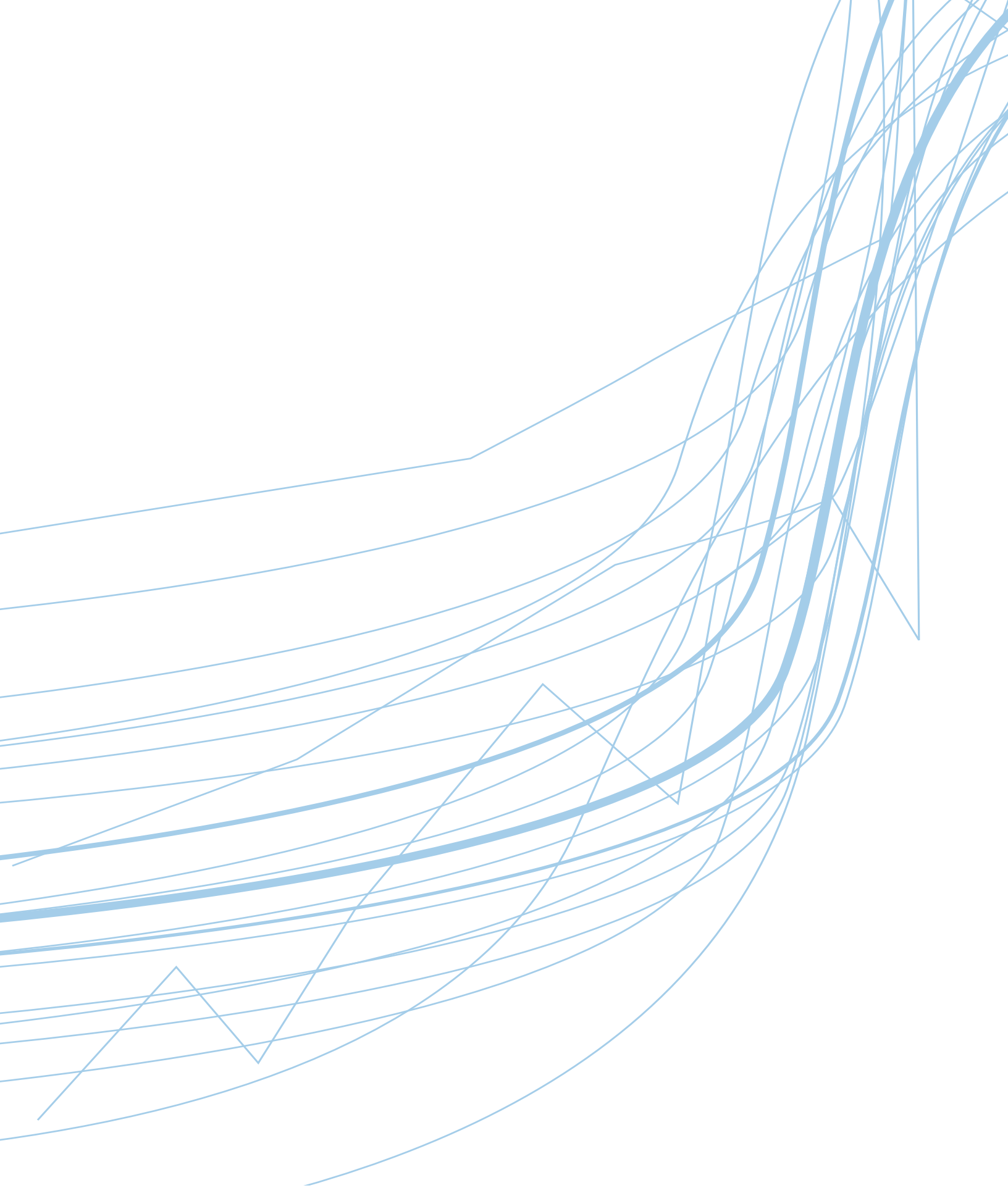


Further Policy Study

Any new policy measures should be vetted and modelled in detail to fully understand intended and unintended consequences. The following market impacts should be assessed:

1. Production/Consumption
2. Supply/Demand
3. Treasury impact
4. Capital investment impact
5. Production
   Infrastructure
   Technology development investment

Further, the economic models should take into account several possible long rage market scenarios.



Industry Report May 2008

U.S. ETHANOL Industry:
30 COMPANY PROFILES

	Company	Category	Ownership
1	Archer Daniels Midland	Ag/Bio/Chem	Public
2	Danisco	Ag/Bio/Chem	Public
3	DuPont	Ag/Bio/Chem	Public
4	Monsanto	Ag/Bio/Chem	Public
5	NewPage	Ag/Bio/Chem	Public
6	Novozymes	Ag/Bio/Chem	Public
7	Abengoa Bioenergy	Producer/Marketer	Public
8	Aventine Renewable Energy	Producer/Marketer	Public
9	POET	Producer/Marketer	Private
10	VeraSun Energy	Producer/Marketer	Public
11	Alico	Growth Stage	Public
12	BlueFire Ethanol	Growth Stage	Public
13	Iogen	Growth Stage	Private
14	Lignol Innovations	Growth Stage	Private
15	Mascoma	Growth Stage	Public
16	Pacific Ethanol	Growth Stage	Public
17	Range Fuels	Growth Stage	Private
18	Verenium	Growth Stage	Public
19	BP	Integrated Energy	Public
20	Chevron	Integrated Energy	Public
21	ConocoPhilips	Integrated Energy	Public
22	Marathon Oil	Integrated Energy	Public
23	Bateman Litwin	Services	Public
24	CH2M HILL	Services	Private
25	Fagen	Services	Private
26	ICM	Services	Private
27	Goldman Sachs	Finance	Public
28	Morgan Stanley	Finance	Public
29	CoBank	Finance	Private
30	Khosla Ventures	Finance	Private

Sources: Company reports, websites, press releases, stock price data and other publicly available information.

Companies highlighted in green were DOE grant selectees. Due to timing of announcements and scope of initial coverage, not all selectees are profiled in this report.

ARCHER DANIELS MIDLAND

Archer Daniels Midland Company, "ADM", is engaged in logistics, processing, and merchandising agricultural commodities and products. The company is one of the top three largest ethanol producers.

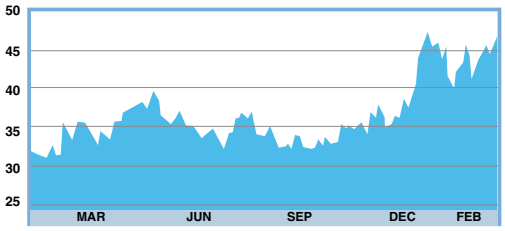
Segment: Conversion
Location: Decatur,IL
Ownership: Public

Key Financial Metrics:
Revenue: $44.0 b
Net Earnings: $2.2 b
Net Margin: 4.9 %
Market Cap: $24.9b

ADM's strategy is to leverage its supply, technical and financial strength advantages to enjoy economies of scale for production. The company also maintains a national transportation system including rail, trucks, barges and storage facilities.

Ethanol is a significant contributor to corporate profits. 19% of ADM profits are derived from bioproducts while the product segment makes up only 7% of revenue.

NYSE: ADM | Jan 2007- Feb 2008



Selected Headlines:

- ADM is partnering with Purdue University to study cellulosic ethanol technologies, focusing on biological processes.
- ConocoPhillipsand ADM form alliance to develop next-generation biofuels including the production and refining of biocrude.

DANISCO

Genencor, a Division of Danisco, USA, Inc., discovers, develops, and sells enzymes to the agricultural processing, industrial processing, and consumer products industry.

Segment: Enzymes
Location: Palo Alto, CA
Ownership: Public

Key Financial Metrics:
Revenue: $90.7 m (est)

DOE Grant Selectee:
Enzyme Systems, amount TBD
This project plans to reduce the enzyme-dose level required for biomass saccharification by improving the specific performance of the Trichoderma Reesei mix of fungal-based cellulases to facilitate production of cellulosic ethanol from sugars produced by the saccharification process.

Genencor is the second largest supplier of enzymes to the ethanol industry with R&D programs in place to further advance the biological pathway for biofuel production. Genecor was acquired by Danish food ingredient company, Danisco, in 2005.

CPH:DCO | Jan 2007- Feb 2008

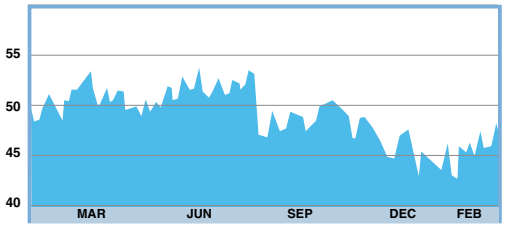
Selected Headlines:

- In October 2007, Genecor announced the release of the first commercially available enzyme to break down cellulosic biomass in to fermentable sugars.
- In June 2007, the company released a new enzyme product for corn ethanol production that increases the value of DDG by-products.
- In May 2008, DuPont and Genencor, a division of Danisco, announced a 50/50 joint venture, DuPont Danisco Cellulosic Ethanol LLC to develop cellulosic ethanol technologies.

DUPONT

DuPont is a diversified materials and products company with activities in agriculture and bio-based materials. DuPont owns leading corn seed producer Pioneer Hi-Bred.

NYSE:DD | Jan 2007- Feb 2008



Segment: Seeds, Conversion
Location: Wilmington, DE
Ownership: Public

Key Financial Metrics:

Revenue:	$29.0b
Net Earnings:	$3.1b
Net Margin:	10.8%
Market Cap:	$38.8b

DOE Grant Selectee:
Ethanologen Project, up to $3.7m

DuPont approaches the biofuels market as a supplier as well as a potential future producer. The company is a market leader in differentiated seed products and crop protection chemicals.DuPont is pursuing cellulosic ethanol technologies together with POET and biobutanol as a next generation biofuel together with BP.

Selected Headlines:

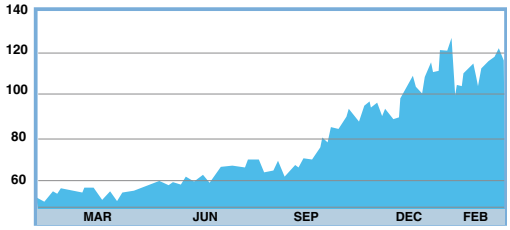
- In June 2007, DuPont announced it will invest $58 million in biofuel production assets at two facilities as part of a partnership with BP and British Sugar.
- In May 2008, DuPont and Genencor, a division of Danisco, announced a 50/50 joint venture, DuPont Danisco Cellulosic Ethanol LLC to develop cellulosic ethanol technologies.

Ag/Bio/Chem

MONSANTO

Monsanto has 2 business units covering: 1) seeds and genomics using modern biology, and 2) agricultural productivity, including crop protection products.

NYSE:MON | Jan 2007- Feb 2008



Segment: Seeds, Ag Inputs
Location: St Louis, MO
Ownership: Public

Key Financial Metrics:

Revenue:	$8.6b
Net Earnings:	$993m
Net Margin:	10.9 %
Market Cap:	$56.8b

Monsanto is developing new strains of corn seed to increase crop yields up to 300 bu/acre from today's ~150 bu/acre average. The company has also invested in Mendel Biotechnology to support the development of energy crops and seeds to support the cellulosic biofuels industry.

Selected Headlines:

- Released in December 2007, harvest data from across the United States showed that farmers who used proprietary Monsanto seeds saw double-digit yield advantage over competing seed corn brands and technologies in 2007.
- In March 2007, Monsanto and BASF announced $1.5 billion JV to develop GMO crops to meet growing demand for vegetable based fuels marks the continued progress of the biobutanol initiative first announced in June 2006.

NEWPAGE

NewPage Corporation is the largest printing paper manufacturer in North America, based on production capacity.

Segment: Conversion
Location: Miamisburg, OH
Ownership: Private

Key Financial Metrics:

Revenue:	$4.8 b
Net Earnings:	$28m
Net Margin:	2.3 %

Note: Financial metrics are annualized based on 1Q08 due to recent rapid improvement in operating performance.

DOE Grant Selectee:
Small Scale Cellulosic Biorefinery, up to $30m

The proposed plant will be located in Wisconsin Rapids, Wisconsin, and proposes to take wood wastes and convert it to Fischer-Tropsch diesel fuel.

NewPage is entering the biofuels market with supply side knowledge and expertise for cellulosic sources developed through its paper and pulp operations. Further, the company already produces 50% of its energy needs through utilization of steam produced during the pulp manufacturing process. The biofuels activities will further drive energy efficiency in the paper industry.

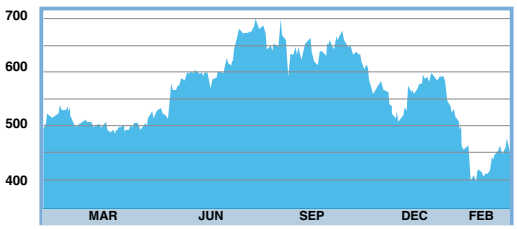
Selected Headlines:

- In early May 2008, NewPage Group filed documents in preparation for an IPO.
- In May 2008, NewPage announced financial results including the first full quarter since the acquisition of Stora Enso North America. Net income was $7 million in the first quarter compared to a net loss of $20 million in the first quarter of 2007.

NOVOZYMES

Novozymes is a leader in enzymes and microorganisms, producing over 600 products that are used in the production of thousands of industrial processes.

Copenhagen: NZYM.CO
Jan 2007- Feb 2008



Segment: Enzymes
Location: Bagsvaerd. DNK
Ownership: Public

Key Financial Metrics:

Revenue:	$1.56 b
Net Earnings:	$219m
Net Margin:	14 %

DOE Grant Selectee:
Enzyme Systems, amount TBD

This project aims to improve performance of Novozymes' most advanced enzyme system by decreasing the dosage of enzyme required to hydrolyze biomass into fermentable sugars suitable for cellulosic ethanol production.

Novozymes is the largest supplier of enzymes to the fuel ethanol industry. The company utilizes gene sequencing technology and bioinformatics to advance its product performance.

Selected Headlines:

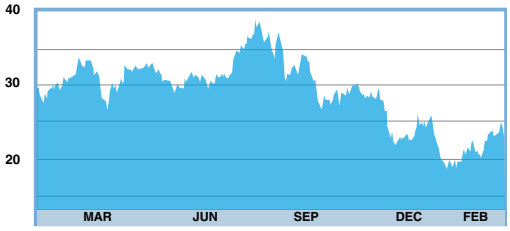
- In September 2007, Novozymes concluded a development agreement with CTC, the Brazilian sugar cane industry's technical center, and will contribute enzyme technology for developing bioethanol from bagasse.
- In June 2007, Novozymes and fellow Danish company Xergi announced an agreement to develop microorganisms and environmental technologies for the optimal harvest of energy from manure products.

Producer/Marketer

ABENGOA BIOENERGY

Abengoa Bio Energy is a Spanish technology company addressing sustainable development in the infrastructure, environment and energy sectors.

MCE:ABG | Jan 2007- Feb 2008



Segment: Conversion
Location:HQ:Madrid, Spain
U.S: Chesterfield, MO
Ownership:Public

Key Financial Metrics:

Revenue:	$3.9 b
Net Earnings:	$318 m
Net Margin:	8.1 percent
Market Cap:	$2.3 b

DOE Grant Selectee:
Integrated Cellulosic Biorefinery, up to $76m
The proposed Kansas plant will produce 11.4 million gallons of ethanol annually and enough energy to power the facility, with any excess energy being used to power the adjacent corn dry grind mill.

Abengoa owns and operates six ethanol plants (4 in operation, 2 under construction) and three "new technology plants" in the U.S.. The company has committed $500 million in the next five years to commercialize cellulosic ethanol. Abengoa also provides ethanol trading services including a mix of short and long term contracts and differential pricing structures.

Selected Headlines:

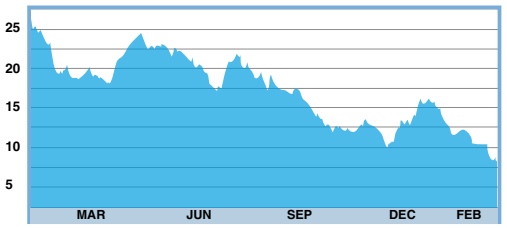
- In October 2007, Abengoa opened a pilot plant for the conversion of biomass in Nebraska. The plant, which involves an investment of $35 million, is dedicated to R&D for lignocellulosic biomass part of a 2003 DOE agreement.

Producer/Marketer

AVENTINE RENEWABLE ENERGY

Aventine Renewable Energy Holdings, Inc. is a producer, marketer and end-to-end distributor of ethanol to energy companies in the United States. Aventine is also a marketer and distributor of related by-products as well as biodiesel.

NYSE:AVR | Jan 2007- Feb 2008



Segment: Conversion
Location: Pekin, IL
Ownership: Public

Key Financial Metrics:

Revenue:	$1.6b
Net Earnings:	$54.9m
Net Margin:	3.5 %
Market Cap:	$502m

Aventine's business model includes production of ethanol, marketing alliances with other ethanol producers and purchase/resale operations.

Aventine markets and distributes nearly four times as much ethanol as it produces. However, the majority of profits come from ethanol production. Additional marketing activities are high volume/low profit, but are considered a high value strategic activity.

Selected Headlines:

- Aventine announced in June 2007 that it had finalized the engineering, procurement and construction ("EPC") contracts for its planned capacity expansions at Mt. Vernon, Indiana and Aurora, Nebraska.

Producer/Marketer

POET

POET has 21 plants in six states producing over 1 bgpy of ethanol. Activities include development, design, engineering, construction, management and marketing.

Segment: Conversion
Location: Sioux Fall, SD
Ownership: Private

DOE Grant Selectee:
Integrated Cellulosic Biorefinery, up to $80m
The plant is in Emmetsburg, IA, and will produce 125 million gallons of ethanol per year, of which roughly 25 percent will be cellulosic ethanol. The cellulosic feedstock will include corn fiber, cobs, and stalks.

POET is an integrated ethanol producer and one of the top three largest in the U.S. The business model relies on local ownership/investors, local employees and local corn supply. The company's "Project Liberty" is pursuing cellulosic conversion of corn cobs, largely to be co-located at existing plants. POET is concentrated in the Midwest region but is beginning to expand outwards through services.

Selected Headlines:

- Despite a construction slow down beginning in second half of 2007, POET has continued to break ground and open new plants. Plant projects since 2H07:
  - Apr 2008,Alexandria, IN – opened
  - Jan 2008,Leipsic, OH – opened
  - Sep 2007,Portland, IN – opened
  - Aug 2007,Fostoria, OH – broke ground

Producer/Marketer

VERASUN ENERGY

VeraSun Energy Corporation is a producer of renewable fuel and marketer of E85 nationwide. VeraSun acquired AS Alliances and U.S. BioEnergy in 2007-2008 to become one of the top three ethanol producers in the U.S..

Segment: Conversion
Location: Brookings, SD
Ownership: Public

Key Financial Metrics:

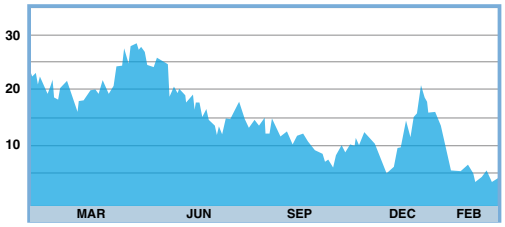
Revenue:	$559m
Net Earnings:	$75.7m
Net Margin:	13.6 %
Market Cap:	$1.2b

VeraSun Energy leverages large economies of scale in production, marketing and transportation. The company has approximately 150 branded E85 retail locations under contract in more than fifteen states and Washington, D.C. VeraSun is developing at its Aurora facility a process to extract oil from dried distillers grains, a co-product of the ethanol process, for use in biodiesel production.

Selected Headlines:

- VeraSun announced the opening of 20 VE85' fueling locations at existing E85 Kroger convenience stores in Texas.
- In August 2007, VeraSun announced it has made a minority investment in SunEthanol, a Massachusetts-based company working to commercialize proprietary cellulosic ethanol production technology.

NYSE: VSE | Jan 2007- Feb 2008



Growth Stage

ALICO

Alico, Inc., is an agribusiness and land management company, primarily engaged in the production of citrus, sugarcane, cattle, sod and forest products.

Segment: Conversion
Location: La Belle, FL
Ownership: Public

Key Financial Metrics:

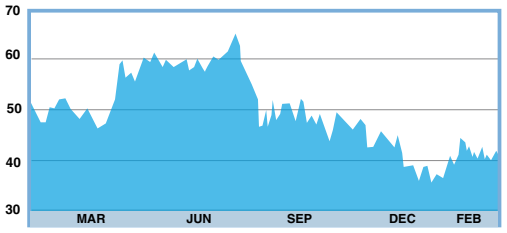
Revenue:	$134.8 m
Net Earnings:	$(13.8) m
Net Margin:	(10.3) %
Market Cap:	$266m

DOE Grant Recipient:
Integrated Cellulosic Biorefinery, up to $33m
The proposed plant will be in LaBelle, FL. The plant will produce 13.9 million gallons of ethanol a year and 6,255 kilowatts of electric power, as well as 8.8 tons of hydrogen and 50 tons of ammonia per day. For feedstock, the plant will use 770 tons per day of yard, wood, and vegetative wastes and eventually energycane.

Alico is traditionally a land management company that has expanded into agribusiness and crops with potential use for bioenergy applications, including sugarcane and, in the future, energycane. Ethanol activities have centered on possible roll out of the gasification/fermentation technology developed by Bioengineering Resources Inc. (BRI) of Fayetteville, AK.

Note: The company has since announced its intention to withdraw from the solicitation.

NASDAQ:ALCO | Jan 2007- Feb 2008



Growth Stage

BLUE FIRE ETHANOL

Blue Fire Ethanol plans to produce ethanol from opportunistic sources of cellulose using advanced biological pathways

Segment: Conversion
Location: Irvine, CA
Ownership: Public

Key Financial Metrics:

Revenue:	pre-revenue
Market Cap:	$81.0m

DOE Grant Selectee:
Integrated Cellulosic Biorefinery, up to $40m

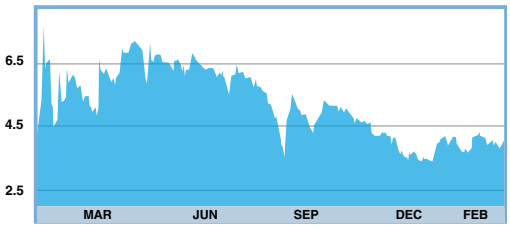
The proposed plant will be in Southern California. The plant will be sited on an existing landfill and produce about 19 million gallons of ethanol a year. As feedstock, the plant would use 700 tons per day of sorted green waste and wood waste from landfills.

BlueFire uses an improved concentrated acid hydrolysis process to convert cellulose to ethanol from wood wastes, urban trash (post-sorted MSW), rice and wheat straws and other agricultural residues. The company has operated a pilot plant near its Southern California offices for roughly five years. Since 2003, the technology has also been successfully used by an unrelated, independent company in Japan to produce fuel ethanol for the local market.

Selected Headlines:

- In May 2007, Bluefire announced the location for a 3 million gallon per year cellulosic ethanol facility in Northern Los Angeles County. Final design and construction was announced in April 2008.

OTC:BFRE | Jan 2007- Feb 2008



Growth Stage

IOGEN

Iogen corporation develops cellulosic ethanol from plant waste and manufactures enzymes used by the animal feed, paper, pulp, and textile industries.

Segment: Conversion/ Enzymes
Location: Ottawa, CAN
Ownership: Private

DOE Grant Selectee:
Integrated Cellulosic Biorefinery, up to $80m

The proposed plant will be built in Shelley, ID and will produce 18 million gallons of ethanol annually. The plant will use 700 tons per day of agricultural residues including wheat straw, barley straw, corn stover, switchgrass, and rice straw as feedstocks.

Note: The company has since announced its intention to withdraw from the solicitation.

Iogen is a developer and manufacturer of enzymes for various industries including its own advanced biofuels activities. The company has also developed a cellulosic ethanol process combining innovations in pre-treatment, enzyme technology, and advanced fermentation technology. Iogen operates a pre-commercial demonstration plant in Ottowa producing 185,000 gpy of cellulosic ethanol from various feedstocks.

Selected Headlines:

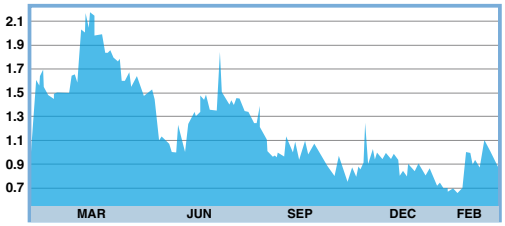
- In February 2007, the Canadian government announced it would contribute $7.7 million towards the upgrade of Iogen's demonstration plant. The money would come from Technology Partnerships Canada.

Growth Stage

LIGNOL INNOVATIONS INC.

Lignol Energy Group is engaged in the development of biorefineries for the production of fuel-grade ethanol and other biochemical co-products from cellulosic biomass feedstocks.

TSX-V | Jan 2007- Feb 2008



Segment: Conversion,
Location: Vancouver, BC
Ownership: Public

Key Financial Metrics:

Revenue:	$0
Net Earnings:	$-1.22 m
Market Cap:	$33.74 m

DOE Grant Selectee:
Small Scale Cellulosic Biorefinery, up to $30m

This project will design, construct and operate a demonstration plant to produce ethanol, lignin and furfural from cellulosic feedstock, including hard and softwood residues. The proposed plant, co-located with a petroleum refinery, will be located in Commerce City, CO.

Lignol is commercializing cellulose to ethanol process technology from renewable and readily available biomass. The technology is based on original 'Alcell' biorefining technology that was developed by General Electric and Repap Enterprises and uses proprietary solvent pretreatment process integrated with saccharification, fermentation and product recovery processes. The company has established a Cellulosic Ethanol Development Centre in Vancouver which consists of a pilot plant and a state of the art enzyme development laboratory.

Selected Headlines:

- In March 2007, Lignol signed an MOU with Suncor to develop cellulosic ethanol plants in Canada.

Growth Stage

MASCOMA

Mascoma developes advanced cellulosic ethanol technologies across a range of cellulosic feedstocks. Mascoma's single-step cellulose-to-ethanol method, called Consolidated Bioprocessing, uses proprietary microbes and enzymes.

Segment: Conversion
Location: Boston, MA
Ownership: Private

Key Financial Metrics:
Revenue: not available

DOE Grant Selectee:
Ethanologen Project, up to $4.9m

Small Scale Cellulosic Biorefinery, up to $26m

Mascoma is pursuing a strategy of technology discovery, development and deployment while building a broad intellectual property portfolio and network of research and commercial partners.

Selected Headlines:

- In September 2007, the executive committee of the University of Tennessee Board of Trustees approved a business partnership between the university and Mascoma Corporation to produce cellulosic ethanol.
- Mascoma announced in July 2007 that it would build a cellulosic ethanol plant in Michigan using wood chips and other non-food agricultural crops.

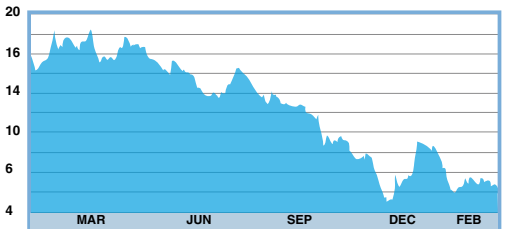
Investors:
Flagship Ventures
Khosla Ventures
Atlas Venture
General Catalyst Partners
Kleiner Perkins Caufield & Byers
Pinnacle Ventures
VantagePoint Venture Partners
Marathon Oil Corporation
General Motors

Growth Stage

PACIFIC ETHANOL

Pacific Ethanol, Inc.produces and sells ethanol and its co-products and provides transportation, storage and delivery of ethanol through third-party service providers in the Western United States.

NASDQ:PEIX | Jan 2007- Feb 2008



Segment: Conversion, Marketing
Location: Sacramento, CA
Ownership: Public

Key Financial Metrics:

Revenue:	$226.4 m
Net Earnings:	$(0.1) m
Net Margin:	(0.1) %
Market Cap:	$371 m

DOE Grant Selectee:
Small Scale Cellulosic Biorefinery, up to $24.3
The project will be co-located with Pacific Ethanol's existing ethanol plant in Boardman, Oregon and use the company's proprietary BioGasol conversion process. Feedstocks include wheat straw, corn stover and poplar residuals, all derived from within a 50-mile radius of the plant.

Pacific Ethanol employs a destination business model that ships corn feedstocks to Pacific states and serves local markets for fuel and feed. The company currently has four plants in operation, one under construction and one with construction on hold. Kinergy Marketing is the ethanol sales and distribution arm of Pacific Ethanol with a customer base of major and unbranded oil companies.

Selected Headlines:

- Pacific Ethanol announced in April 2008 the start-up of its Magic Valley production facility in Burley, Idaho.
- In September 2007, Pacific Ethanol announced commercial operation for Oregon's first major transport fuel refinery. The plant produces 40 million gallons per year of ethanol.

Growth Stage

RANGE FUELS

Range Fuels is an early stage biofuels company utilizing a thermochemical process to convert multiple cellulosic biomass sources to fuel-grade ethanol.

Segment: Conversion
Location: Broomfield, CO
Ownership: VC-backed

Key Financial Metrics:
Revenue: Pre-revenue
Capital Raised:
$3m (venture)
$76m (DOE grant)

DOE Grant Recipient:
Integrated Cellulosic Biorefinery, up to $76 million
The proposed plant will be constructed in Soperton, GA. The plant will produce about 40 million gallons of ethanol per year and 9 million gallons per year of methanol. As feedstock, the plant will use 1,200 tons per day of wood residues.

Range Fuels uses a highly efficient thermochemical process that allows it to produce more ethanol for a given amount of energy expended than is possible with other competing processes. The process is able to handle a wide range of carbon-containing feedstocks including woody biomass, agricultural residues and municipal solid wastes.

Selected Headlines:

- On November 6, 2007 Range Fuels, Inc. broke ground on the nation's first commercial cellulosic ethanol plant located in Treutlen County, Georgia, near the town of Soperton.

Investors:
Khosla Ventures
Passport Capital
PCG Clean Energy and Technology Fund
Blue Mountain Venture Capital
Leaf Clean Energy
Pacific Capital Group
Morgan Stanley Capital Group

Growth Stage

VERENIUM

Verenium Corporation is developing and commercializing next-generation cellulosic ethanol. Verenium was formed in June 2007 through the merger of Diversa, a developer of enzyme technology, and Celunol, a developer of cellulosic ethanol process technologies.

Segment: Enzymes, Conversion
Location: San Diego, CA
Ownership: Public

Key Financial Metrics:

Revenue:	$49.2mNet
Earnings:	($39.3)Net
Margin:	(79.8%)
Market Cap:	$250m

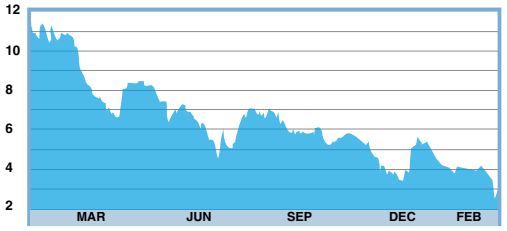
DOE Grant Selectee:
Ethanologen Project, up to $5.3m
Enzyme Systems, amount TBD

Verenium has its roots in drug discovery and has partnered extensively in order to move into the biofuels market. The company operates a pilot cellulosic ethanol facility located in Jennings, LA. The company continues to develop enzymes for food-related and other industries.

Selected Headlines:

- In January 2008, Verenium and Bunge announced an agreement to develop enzyme processes for the enhanced production of edible oils.
- In September 2007, Verenium announced technical milestones in its work with Cargill applying enzyme discovery and optimization technologies to develop several new custom enzymes for food-related products.

NADAQ:VRNM | Jan 2007- Feb 2008



BP

BP is a global integrated energy company with three business segments: Exploration and Production, Refining and Marketing and Gas, Power and Renewables.

Segment: Conversion
Location: London, UK
Ownership: Public

Key Financial Metrics:

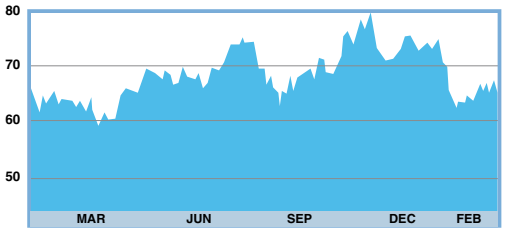
Revenue:	$274 b
Net Earnings:	$21.1 b
Margin:	8.3 percent
Market Cap:	$229 b

BP is actively involved in the development of renewable energy and has funded multiple R&D and commercialization activities. The company has pledged $500 million to U.C. Berkeley and another $50 million to MIT to study biological and thermochemical pathways, respectively. BP has placed an emphasis on biobutanol and its partnership with DuPont

Selected Headlines:

- In April 2008, BP announced that it intends to take a 50 percent stake in Tropical BioEnergia SA, a Brazilian JV, which is constructing a 115 mgpy ethanol plant.
- In June 2007, BP announced plans for construction of a world scale ethanol plant in the UK together with British Sugar and DuPont. The investment will top $400 million.

NYSE:BP | Jan 2007- Feb 2008



CHEVRON

Chevron Corp.engages in fully integrated petroleum operations, chemicals operations, mining operations of coal and other minerals, power generation and energy services.

Segment: Conversion
Location: San Ramon, CA
Ownership: Public

Key Financial Metrics:

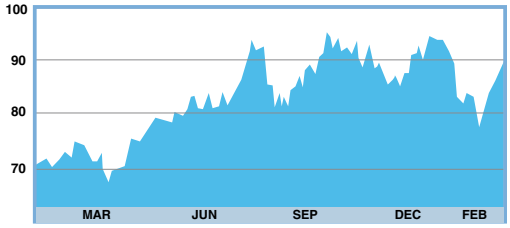
Revenue:	$210 b
Net Earnings:	$17.1 b
Net Margin:	8.16%
Market Cap:	$191 b

Chevron has invested approximately $2 billion in developing renewable energy and energy efficiency since 2002, and the company expects to spend more than $2.5 billion between 2007 and 2009. Chevron is proactively pursuing biofuels activities through its biofuels business unit as well as its venture arm, Chevron Technology Ventures.

Selected Headlines:

- In February 2008, Chevron and Weyerhaeuser announced the creation of a 50-50 joint venture, Catchlight Energy, focused on developing cellulosic ethanol.
- In May 2007, Chevron and the Texas A&M BioEnergy Alliance announced a program to accelerate the production and conversion of crops for cellulosic ethanol.that they have entered into a strategic research agreement to accelerate the production and conversion of crops for manufacturing ethanol and other biofuels from cellulose.

NYSE:CVX | Jan 2007- Feb 2008



CONOCOPHILLIPS

ConocoPhillipsis an international, integrated energy company organized into six segments; Exploration and Production, Midstream, Refining and Marketing, LUKOIL Investment, Chemicals, and Emerging Businesses.

Segment: Conversion
Location: Houston, TX
Ownership: Public

Key Financial Metrics:

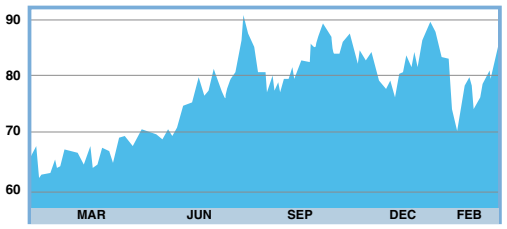
Revenue:	$188.5 m
Net Earnings:	$15.6 m
Net Margin:	8.25%
Market Cap:	$134.7b

ConocoPhillips is supporting the development of future fuels technology through university research and partnerships. The company has emphasized biocrude as a means to convert biomass to energy. ConocoPhillips has rolled out an E85 distribution effort that includes 1300+ fuel pumps in five states.

Selected Headlines:

- In September 2007, ConocoPhillips and ADM announced that they would cooperate to develop and deploy technology to create biocrude from cellulosic biomass.
- In April 2007, ConocoPhillips and Tyson Foods revealed plans to produce and market next generation renewable diesel fuel.

NYSE:COP | Jan 2007- Feb 2008



Integrated Energy

MARATHON

Marathon Oil Corporation is an integrated energy company engaged in exploration, production and marketing of crude oil, refined products and natural gas worldwide.

Segment: Conversion, Distribution
Location: Houston, TX
Ownership: Public

Key Financial Metrics:

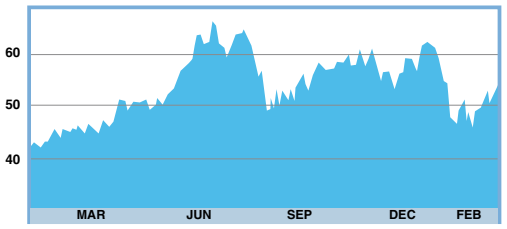
Revenue:	$65.5 b
Net Earnings:	$5.2
Net Margin:	7.6%
Market Cap:	$41.6 b

Marathon Oil is pursuing a two pronged approach to the ethanol market with development of ethanol plants together with blending and transport infrastructure. Through its E10 Ethanol Infrastructure Program and terminal assets, Marathon is currently a leading blender of ethanol in the U.S..

Selected Headlines:

- In May 2008, Marathon invested $10 million into Mascoma as part of a $61 million round of financing. Use of funds include new plant construction and further development of biological processes for conversion of wood chips and agricultural waste into ethanol.
- In October 2007, Marathon acquired a 35.09 percent interest in The Andersons Clymers Ethanol LLC, with operations located in Clymers, IN.

NYSE:MRO | Jan 2007- Feb 2008



BATEMAN LITWIN

Delta-T Corporation, a division of Bateman Litwin, is a designer of high-tech bioethanol plants and refining systems that focus on low cost production, minimal environmental footprint and customized plant designs.

Segment: EPC
Locations:
U.S.: Williamsburg,VA
HQ: Amsterdam
Ownership: Public

Key Financial Metrics:

Revenue:	$213m
Net Earnings:	$6.4m

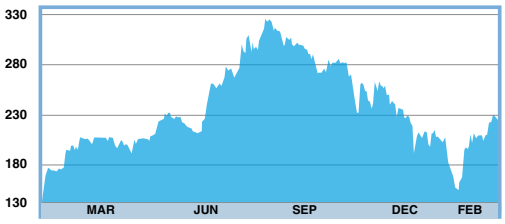
Note: Bateman press releases report that Delta T is expecting operational losses for fiscal year 2007.

Delta-T is an engineering, procurement and construction ("EPC") firm that has designed a large portion of the U.S. ethanol plants. The company has developed several technology advantages including low fresh water consumption, no process wastewater and high-efficiency drying systems. Delta-T also provides efficiency upgrades to existing corn ethanol plants.

Selected Headlines:

- In July 2007, Delta-T was acquired by Dutch oil, gas and power EPC contractor Bateman Litwin as part of an effort for them to grow in the U.S. market for renewable energy projects.

LSE:BNLN | Jan 2007- Feb 2008



CH2M HILL

CH2M HILLis a professional engineering services firm providing engineering, construction, operations, project management and related technical services.

Segment: EPC
Location: Englewood, CO
Ownership Employee owned

Key Financial Metrics:

Revenue:	$4.38b
Net Earnings:	$66m
Net Margin:	1.5%
Employees:	24,400

With an international portfolio of advanced renewable energy projects, CH2M HILL provides engineering, procurement and construction ("EPC") services to a variety of energy projects, including bioenergy, solar, wind, hydro, and geothermal resources.

The company has been an active player in the growth of the U.S. ethanol industry and operates with a broad base of business covering most types of infrastructure and industry with offices worldwide.

Note: CH2M HILL maintains an internal stock market to allow employee shareholders some degree of liquidity. Shares are not traded publicly. Common stock price is reviewed quarterly.

Services

FAGEN INC.

Fagen Inc.is the largest green energy design-build firm in the U.S, including in-house civil, structural, mechanical, and electrical engineering.

Segment: Design-Build
Location: Granite Falls, MN
Ownership: Family

Fagen has built approximately two thirds of the ethanol plants in the U.S. with a strategic focus on working with farmer owned facilities. The company has ability to take projects from conception to operation. With the addition of Fagen Engineering, the company also provides civil, structural, mechanical, and electrical design.

Fagen is currently involved in the build out of the remaining corn ethanol capacity in the U.S. and is mobilizing to address growth in advanced biofuels. The company is also engaged in a wide range of other infrastructure and process industries.

Selected Headlines:

- Announced in May 2008, Fagen is partnering with BBI International to form a cellulosic ethanol operating and R&D business, BBI BioVentures LLC. The company will employ a multi-plant strategy to build and operate "niche" feedstock cellulosic ethanol plants in the near term rather than embark upon a long R&D road to commercializing cellulosic technology.

Services

ICM

ICM Inc. is an industry leader for the design, construction, and support of ethanol plants. The company's process technologies support more than half the U.S. ethanol capacity today.

Segment: Conversion
Location: Colwich, KS
Ownership: Private

DOE Grant Selectee:
Small Scale Cellulosic Biorefinery, up to $30m
The ICM project will utilize various cellulosic feedstocks integrating biochemical processing and demonstrating energy recycling within the biorefinery. ICM's proposed plant location is St. Joseph, MO, and will be co-located with an existing dry mill ethanol plant.

ICM is focused on sustaining agriculture through innovation and has contributed to the engineering advancements of today's corn ethanol dry mill process. The company is working with academia, government and private sector partners to develop cellulosic ethanol plant designs.

GOLDMAN SACHS

Goldman Sachs Group Inc. is a global investment banking, securities and investment management firm. Activities are divided into three segments: Investment Banking; Trading and Principal Investments; and, Asset Management and Securities Services.

Segment: Finance
Location: New York, NY
Ownership: Public

Key Financial Metrics:

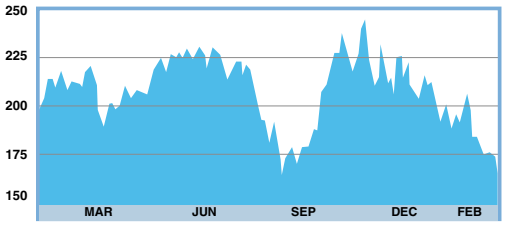
Revenue:	$69.4 b
Net Earnings:	$9.5 b
Net Margin:	13.75 %
Market Cap:	$80.1 b

Goldman Sachs supports the renewable energy industry by enabling a wide variety of financings and making investments off its own balance sheet. The firm was an early investor in cellulosic ethanol through its 2006 investment in logen.

Selected Headlines:

- In May 2008, Goldman Sachs analysts increased the possible range for oil prices to $150-200 per barrel through 2010. This is up from their original "oil super spike" predictions of $105 per barrel first mentioned in 2005.

NYSE: GS | Jan 2007- Feb 2008



MORGAN STANLEY

Morgan Stanley is a global financial services firm providing a wide range of investment banking, securities, investment management and wealth management services.

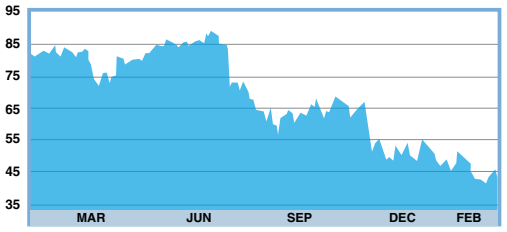
Segment: Finance
Location: New York, NY
Ownership: Public

Key Financial Metrics:

Revenue:	$
Net Earnings:	$14.4 b
Net Margin:	22.22 %
Market Cap:	$147 b

Morgan Stanley has been involved in biofuels through its underwriting, advisory and research services as well as through principal investing. The firm was an early mover in the ethanol industry with its 2003 buyout of Williams Bio-Energy, which was later renamed Aventine

NASDQ:JPM | Jan 2007- Feb 2008



KHOSLA VENTURES

Khosla Ventures is a privately-funded venture firm based in the Silicon Valley with a broad portfolio of clean energy technology companies, including 13+ top biofuels start-ups.

Segment: Venture Capital
Location: Menlo Park, CA
Ownership: Partnership

DOE Grant Selectees in Portfolio:

1. Mascoma
2. Range Fuels
3. Verenium

Founder Vinod Khosla has taken an aggressive portfolio approach to early stage investing in biofuels, making 13+ investments in less than 3 years. The firm has been actively engaged in public policy and awareness campaigns to promote biofuels, specifically ethanol. Khosla Ventures has also built a broader clean energy portfolio including other renewables, water, energy efficiency and materials start-ups.

Biofuels Portfolio:

1. AltraBioFuels
2. Amyris Biotechnologies
3. Cilion
4. Coskata
5. Ethos
6. Gevo
7. Hawaii BioEnergy
8. KiOR Inc.
9. Lanza
10. LS9
11. Mascoma
12. Range Fuels
13. Verenium

COBANK

CoBank is an agricultural credit bank and part of the U.S. Farm Credit System, the oldest and largest single lender to U.S. agriculture and rural America. CoBank provides loans, leases and other financial services to farmer-owned ethanol businesses.

Segment: Venture Capital
Location: Greenwood Village, CO
Ownership: Partnership

CoBank has been actively lending to the ethanol industry, including 45 ethanol facilities in production and under construction. Combined, these ethanol plants represent more than 20 percent of current and forecast industry capacity.

Selected Headlines:

- In April 2007, CoBank Executive Vice President Mary E. McBride was named to serve on the USDA/DOE Biomass Research and Development Technical Advisory Committee.

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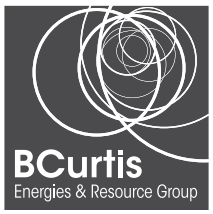
OPERATING CASH FLOW ANALYSIS, 2005-2007

Corn Ethanol Producers, Total Industry

ASSUMPTIONS	2005	2006	2007
Production (bgpy)	3.90	4.86	6.45
Major Cost Varaibles			
Ave Ethanol spot ($/gal)*, *Source: OPIS*	1.72	2.56	2.02
Ave Corn Price ($/bu), *Source: CBOT*	2.09	2.69	3.78
Ave DDGS Price ($/ton), *Source: USDA*	67	89	122
Ave Natural Gas Price ($/1000ft3), *Source: EIA*	7.32	6.40	6.39
Electricity *Source: EIA, OBP Estimates*	0.0375	0.0403	0.0416
Denaturant *Source: EIA, OBP Estimates*	0.1150	0.1346	0.1495
Cost Constants ($/gal), *Source: OBP Estimates*			
Other Chemicals Source:	0.0230		
Yeast and Enzymes	0.0408		
Water and Waste Mgmt	0.0108		
Maintenance	0.0400		
Labor and Ovhd	0.1035		
Debt Service	0.1200		
Other Constants			
Conversion bu : gal	2.8		
DDGS ton : gal	308.7		
NG 1000ft3 : gal	31.25		

CALCULATIONS *($ billion)*			
Industry TOTAL REVENUE	**$6.72**	**$12.44**	**$13.03**
Operating Costs			
Feedstock	2.91	4.67	8.71
DDGS credit	0.85	1.40	2.55
Net Feedstock	2.06	3.27	6.16
Fuels	0.914	0.995	1.319
Electricity	0.146	0.196	0.268
Denaturant	0.449	0.654	0.964
Other Chemicals	0.090	0.112	0.148
Yeast and Enzymes	0.159	0.198	0.263
Water and Waste Managemant	0.042	0.052	0.070
Maintenance	0.156	0.194	0.258
Labor and Overhead	0.404	0.503	0.668
Debt Service	0.468	0.583	0.774
Industry TOTAL COST	**$4.89**	**$6.76**	**$10.89**
Industry TOTAL CASH FLOW	**$1.83**	**$5.69**	**$2.14**
Operating Cash Margin	27.2 %	45.7 %	16.4 %

**See pricing discussion on pages 5-6 for detail on inaccuracies of using spot price as an assumption*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