



## Gasoline Prices Part II: Long-Term Factors

Posted by [Robert Rapier](#) on June 13, 2007 - 11:00am

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### Introduction

In Part I, [I discussed the short term factors](#) that have resulted in the recent, rapid increase in the price of gasoline. But there are a number of underlying, long-term issues that have been major contributors. I will attempt to address them and answer a number of related questions, such as: Why have no new refineries been built in the past 30 years? Are U.S. refineries breaking down more than normal? Are oil companies purposely withholding supplies to keep prices high? Have environmental regulations played a role? Does the use of ethanol influence gasoline demand growth? The answers to some of these questions may surprise you.

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Please note that my essays should not be confused with financial advice. Following Part I, I received a number of e-mails requesting financial advice. While there are often potential financial implications, I am not a financial planner. If you choose to make investment decisions based on what you read here, you are on your own.

Further note that it is not my contention that refiners are not benefiting from higher prices. They are. But my contention is that prices aren't higher **because** they have increased margins. Margins have increased because prices are higher.

### U.S. Refinery Capacity

The problem, I have read on many occasions, is that we aren't building any new refineries, and that "[limiting refinery capacity seems to make more money for oil companies than expanding it.](#)" Claims [like the following](#) from the [Foundation for Consumer and Taxpayer Rights](#) - are quite common:

America's big oil companies figured out long ago that they could make more money by making less gasoline. That's why the industry hasn't built a new refinery in 30 years. Since deregulation of the refinery business in 1982, oil consumption has increased 33% but oil companies have kept refining capacity near what it was 25 years ago. Why not? They know that the scarcer the product, the bigger the profit.

Even members of the [Senate Committee on Energy and Natural Resources](#) seem to believe this, with New Jersey [Senator Robert Menendez](#) recently commenting in a [Senate hearing on gas prices](#):

**Senator Menendez:** Isn't there a reality that we are paying for some industry decisions that actually reduced refining capacity in this country? I mean there was a time that we had greater refining capacity, and the industry reduced that refining capacity, and as a result of making that decision, consumers today find themselves with exactly the consequences that you have described in your testimony before.

There are elements of fact and elements of fiction in the preceding statements. So, what's the scoop? Are oil companies cutting refinery capacity in order to boost profits?

In the past 10 years, [refining capacity in the U.S. has increased by about 2 million barrels per day](#), which is equivalent to about 10 good-sized refineries. Capacity expansions equivalent to 8 more new refineries [have been announced](#) for the next 4 years (although some refiners have recently suggested that some expansions may be put on hold [as a result of the stated goal of reducing gasoline consumption by 20% in 10 years](#) - in order to avoid an oversupply situation). So while it is true that new refineries aren't being built, it is certainly not true that capacity is stagnant. There are several reasons for expanding existing refineries as opposed to building new ones.

First, it is less expensive per barrel to expand an existing refinery than to build a new one. The estimates I have seen suggest that existing refineries can be expanded at 60% of the per barrel cost of building a new refinery. Second, the permitting process for building a new refinery is onerous. A group in Arizona has been trying to build a new refinery, and [it took them 7 years just to get the permit](#). If they proceed and build the refinery, it will have taken 13 years from the time they started the process. (Even as I was working on this essay, [they have announced a further 1 year delay](#)). Finally, while everyone seems to want more refining capacity, nobody seems to want a refinery in their community. This makes building a new refinery next to impossible. As Investor's Business Daily [recently asked Senator Chuck Schumer](#): "*Just where in New York state would you like a new refinery to be built...?*"

However, the critics are correct on one point. Starting in the early 80's, U.S. refining capacity did drop significantly, before beginning to climb back up in the 90's. The reason for this is quite simple: There was far more refining capacity than was warranted by the demand. The result was that gasoline was \$1.00 a gallon, and many oil companies were losing money. Many refineries shut down. Some oil companies went out of business. Property values in "oil towns" like Houston plummeted. Yet many view oil companies as if they are public utilities. But the majority are owned by shareholders, who expect a return on their investment. Billions of dollars of capital are risked in this business, and if the rewards are poor (or negative), the risks won't be taken.

No industry can be expected to maintain high production levels in the face of poor or even negative margins. If milk producers make too much milk, prices fall and some producers go out of business. When that happens, supply is reduced and prices go up. The same is true for any other business. Yet people don't accept this very well in the case of oil companies, because many have come to view cheap gas as an entitlement.

U.S. Senator Ron Wyden has spent quite a bit of time investigating these issues, and his view is probably typical with respect to the evolution of refining capacity:

[The Oil Industry. Gas Supply and Refinery Capacity: More Than Meets the Eye](#)

In this report, Senator Wyden presents a number of "smoking guns", such as this internal Texaco document from 1996:

“As observed over the last few years and as projected well into the future, the most critical factor facing the refining industry on the West Coast is the surplus refining capacity, and the surplus gasoline production capacity. The same situation exists for the entire U.S. refining industry. Supply significantly exceeds demand year-round. **This results in very poor refinery margins, and very poor refinery financial results.** Significant events need to occur to assist in reducing supplies and/or increasing the demand for gasoline.”

Senator Wyden skipped right past the part about poor margins and poor financial results, and focused on the "smoking gun", that either supplies needed to be reduced or demand for gasoline increased. He then gives a list of the refineries that have closed since the mid-90's, apparently failing to connect these events with "poor refining margins." Here are the refineries he lists that closed in 1995:

Indian Refining Lawrenceville, IL  
Cyril Petrochemical Corp. Cyril, OK  
Powerine Oil Co. Sante Fe Springs, CA  
Sunland Refining Corp. Bakersfield, CA  
Caribbean Petroleum Corp. San Juan, Puerto Rico

Do you recognize any of those names? Probably not, because most of the companies that shut down did so **because they went out of business**. Margins were too poor to remain in business for some. For others, it was failure to comply with environmental regulations (some of the closed refineries are now [Superfund](#) sites). Yet Senator Wyden presents a picture in which it was a systematic and cooperative effort between oil companies to reduce refining capacity - and that refinery capacity should have been maintained at any cost (as long as oil company shareholders are the ones to bear those costs). Somehow "the industry" is culpable for the closure of a number of marginal producers - many of whom went completely out of business. But it was years of poor returns in this cyclical business that drove down refining capacity.

Even in the past 10 years, refinery margins have turned negative on numerous occasions. The problem is that many people take a snapshot of the current view and believe this is normal. [See the data that the IEA has accumulated](#) (XLS download warning). Shall we expect that those who are calling for measures to be taken to address the current refinery margin situation will be calling for the government to extend a helping hand the next time margins go negative? Somehow, I doubt it. (Incidentally, for those who think oil companies have boosted their margins by raising prices, how do you explain the incredible variability from month to month? How do you explain negative margins?)

Paul Sankey, an analyst with Deutsche Bank, [testified on May 15th before the Senate Committee on Energy and Natural Resources](#). He pointed out the long-term factors that have resulted in the refinery capacity we have today:

The reason for the massive recent run up in prices can be traced back to the last significant period of high prices, in the late 1970s, which forced lower gasoline demand, then more efficient cars, which led to excess refining capacity, which led to years of poor returns in refining (and cheap gasoline prices), which disincentivised investment in refining and encouraged demand, and which has ultimately led to today's intense market tightness.

The bottom line on the refinery capacity issue is that yes, refining capacity has been reduced at times. And there were perfectly valid reasons that this happened. It is also true that capacity is short at the moment - if the objective is to maintain sub-\$3 gasoline prices. But, reduced investment in refining capacity is indeed a key factor behind the current gasoline price spike. If some want to level the charge that refiners failed to accurately anticipate demand growth, then that charge is accurate. But like the rest of us, refiners don't have crystal balls.

### **Are Oil Companies Purposely Withholding Supplies?**

This charge has been repeated quite a bit lately. Oil companies are either accused of withholding supplies ala OPEC, or they are accused of stretching out their maintenance in order to keep supplies low. Let's address that.

In a very tight market, events that take supply off of the market are likely to drive prices higher. In light of that, would it be a wise business practice if BP, for instance, purposely slowed down the maintenance at their Whiting, Indiana refinery that is partially closed due to a fire? Not a chance. When BP has supply off the market, it benefits everyone BUT BP. They are foregoing money every day they have that capacity offline. The refinery manager at Whiting will have part of his performance graded based on the financial returns of his refinery. The longer the supply is offline, the worse that grade will be.

Consider a couple of examples. Say that you operate a 200,000 barrel a day refinery. Margins are quite good right now - let's say in your area they are \$20 a barrel. So, when the refinery is running normally, you are grossing \$4 million a day. Would it make good business sense to cut your capacity in half - to 100,000 barrels a day? While such action would probably cause the overall price of gasoline to rise, it is going to have a disproportionate effect on your refinery. If margins go up to \$30 a barrel (although there is no way taking 100,000 barrels off the market would impact margins to that degree), you are still \$1 million a day worse off than you were. You have given up \$365 million a year in order to reduce your capacity. You would have made an incredibly stupid business decision. In fact, you would be much better off if you could boost capacity by 100,000 barrels a day. Sure, prices might slightly drop, but your overall profits will be higher, especially in such a tight market.

Furthermore, you don't know if Shell down the street might be able to make up the production shortfall, pocketing the money that would have been made by your refinery. (Contrary to popular opinion, oil companies do not consult each other on such issues). You also don't know if exporters from Europe will respond. If they respond by boosting exports to the U.S., now they are pocketing the money that your refinery is losing. In summary, this is not a rational way to conduct business - unless your margins are negative. You would be making a decision that will certainly cut the returns at your refinery, while not knowing how your competitors will respond to the supply shortfall.

For another example that many can relate to, consider that you wish to put your house on the

market. Housing prices in your area have been outstanding, and you want to capitalize. However, you are afraid that by putting your house on the market, you may boost the supply in your area and cause prices to fall. So, you decide to be a charitable neighbor and keep your house off of the market in order to maintain prices for everyone else. You will sell some other time, even though the market may not be as good. If your primary objective is to capitalize on the good housing market, have you made a rational business decision? Of course not. The same is true regarding the charge that oil companies are deliberately prolonging maintenance. It just wouldn't make good business sense in this market.

### **Are Refineries Breaking Down More Than Normal?**

It certainly seems each week brings several new refinery outages. While refineries still have not reached pre-Hurricane Katrina production levels, most of the outages that you read about are the kinds of things that happen every year. Practically all refineries have one or more unplanned outages each year. Most years, when the market is amply supplied, these sorts of events don't make the news. But this year, as we have seen, is very different.

As the afore-mentioned Paul Sankey testified:

The poor returns of the 1980s and 1990s have indirectly caused some additional external events that have played into the problems. The years of losing money caused companies to neglect refining investment, culminating in BP's Texas City disaster. Texas City has now rightly caused other refiners to operate more cautiously – and so less capacity is available.

A second impact of years of reduced investment has been a lack of qualified engineering, procurement and construction staff. One vital issue here is that the tightness of US refining capacity at this time is not because companies are unwilling to invest in more capacity, it is that they are unable.

Refineries are complex. Heat is being added to flammable materials, and the entire chain of events depends on a steady supply of raw materials, equipment, and qualified people to keep things running smoothly. Equipment is going to break down. A refinery is much more complex than your car. Yet you would not be surprised if your 30-year old car had annual maintenance problems.

While this year's outages may be somewhat above average, similar outages happen every year. The only difference is that most years there is enough spare capacity that the outages go unnoticed by the media.

### **The Impact of Environmental Regulations**

Let me make it clear that I am in favor of the environmental regulations we have in place. They have made our air and water cleaner. But there is a price to be paid for those regulations, and consumers should understand that, as they are the ones who will ultimately bear those costs.

There are several things that can happen when a new regulation is implemented. First, new regulations may redirect capital that might have gone into expanding refining facilities. Second, they may increase the costs of producing the fuel. Third, additional processing, as in the case of [ultra-low sulfur diesel](#) (ULSD) and gasoline - can reduce the overall product yield. Fourth, and

perhaps of greatest importance, additional equipment will increase the complexity of the refinery.

Those are the consequences. The more complex the refineries are, the more unreliable they are going to be. With each additional complexity that is added, there are more ways for them to break down. There is more danger as the inventory of hazardous materials increases. Politicians who are quick to point fingers should understand that they make their own contribution to supply shortages. If they are going to hold hearings on gas prices, they needn't ponder "Gosh, I wonder why prices are going up?" Stricter environmental regulations - necessary as they may be - are one more piece of the puzzle. They have helped crimp supplies and add to costs.

Investor's Business Daily [recently touched on this](#):

Our refineries are doing more than ever, but their numbers are dwindling and no new ones are being built. The reason is not greed, but cost and regulations. From 1994 to 2003, the refining industry spent \$47.4 billion, not to build new refineries, but to bring existing ones into compliance with ever new and stringent environmental rules. That's where those allegedly excessive profits go.

I think most people are willing to pay higher prices for a cleaner environment, but it is important that they understand that this is a component of fuel prices.

## The Ethanol Factor

It is a fact that ethanol only contains about 65% of the energy content of gasoline on a volumetric basis. Therefore, to displace the gross energy content of 1 gallon of gasoline requires  $1/0.65$ , or 1.5 gallons of ethanol. What this means is that as ethanol is put into the gasoline pool, demand will go up simply because the pool now contains less energy. Is this enough to explain why motor gasoline demand (which includes blended ethanol) is at a record high?

In March of 2007, [ethanol contributed 539 million gallons to the gasoline pool](#), according to the Renewable Fuels Association (RFA). This is almost 50% greater than the 365 million gallon ethanol demand in March of 2006. Gasoline demand in March, according to the Energy Information Administration, averaged 9.266 million barrels per day (up from 9.076 a year earlier). Total gasoline demand in March was then  $9.266 \text{ million} * 31 \text{ days} * 42 \text{ gallons/bbl}$ , or 12.06 billion gallons. The breakdown would have then been 11.52 billion gallons of gasoline and 0.54 billion gallons of ethanol. (Ethanol imports have been omitted as their impact would have been pretty small).

The energy content, however, of the 12.1 billion gallons would have been equivalent to 11.52 gallons of gasoline plus  $0.54 \text{ billion gallons of ethanol} * 0.65$  (factoring the lower energy content), or 11.87 billion gallons of gasoline equivalent fuel. Therefore, our perceived gasoline demand is 1.9% ( $12.06/11.87$ ) higher than it would be without ethanol in the pool.

In other words, part of the record high gasoline demand we are currently experiencing is due to the fact that ethanol is scaling up rapidly, and it is being counted in the finished motor gasoline pool. Even if demand was constant on a BTU basis, increasing the fraction of ethanol in the pool will increase the volume demand.

## Conclusions

While the immediate cause of skyrocketing gas prices is a combination of record demand and low gasoline inventories in the U.S., several longer-term factors have contributed. Following years of poor returns and expensive new environmental regulations, investments into expanding existing refineries dried up. Many refineries closed their doors permanently, as a number of smaller producers went completely out of business in the 80's and 90's. The cumulative effect was that refining capacity fell starting in the early 80's, but has recently been climbing back as margins have improved. Just as we were in an oversupply situation in the 80's, we are now in an undersupply situation if the goal is to keep gasoline below \$3.00/gallon. However, refining capacity has increased significantly in the past 10 years, and looks to continue this trend in the foreseeable future. But demand growth has remained robust in the face of higher prices, so an oversupply situation in which gasoline returns to \$2/gal does not appear likely in the foreseeable future.



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