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## Why Gasoline Prices are Rising and How the Market is Addressing Them

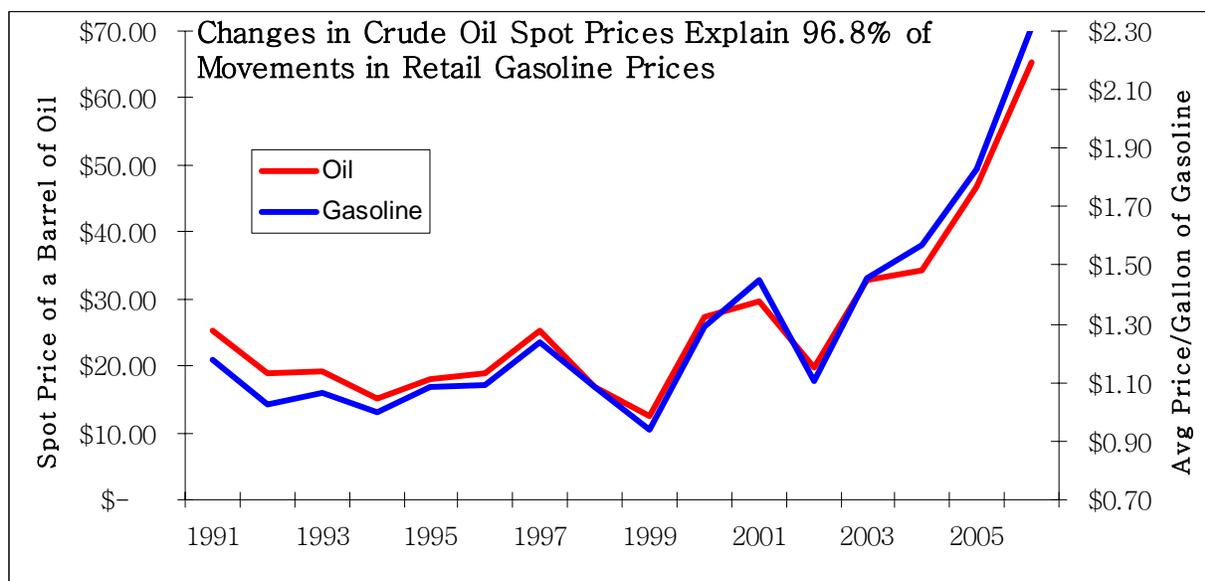
- Rising gasoline prices are due to geopolitical events, recent natural disasters, and federal regulatory requirements and other legal issues.
- Changes in the price of crude oil account for nearly all changes in the price of gasoline – more than 95 percent – and so international events exert substantial influence on U.S. gasoline prices.
- The Iranian nuclear crisis, supply disruptions in Norway and Nigeria, political uncertainty in Venezuela, and rising global demand for oil, spurred in part by economic growth in China and India, are pushing up global crude oil prices.
- The effects of hurricanes Katrina and Rita are still affecting domestic gasoline markets.
- Heavily hurricane-damaged Gulf Coast refineries, representing nearly 5 percent of U.S. refining capacity, are still undergoing repair, although they are likely to resume production this month.
- This year, 2006, is the culmination year for numerous fuel changes spurred by legal and regulatory federal actions.
- Two major changes in federal fuel specifications that are placing stress on the U.S. fuel system are the ultra-low sulfur requirements for diesel fuel (ULSD) and the rapid phase-out of MTBE as a motor fuel additive.
- The good news is that the market is responding to address these issues. The oil industry is investing many billions of dollars to increase supplies of crude oil and gasoline by increasing exploration and production and by expanding refining and distribution capacity.
- It has been projected that the global barrel-per-day output of crude oil will increase by 2.2 million this year. That increase is expected to outpace the increase in demand (projected to rise by 1.8 million barrels per day).

## Introduction

Gasoline prices began rising precipitously around the end of February, causing considerable consternation among consumers. The predictable suggestions of price gouging and market manipulation have been made, but a careful examination of the markets for crude oil and gasoline reveals a different picture of why gasoline prices are up. Geopolitical events, supply and demand dynamics, federal regulatory mandates, and other legal issues have all converged to create the perfect spring storm for gasoline prices. This paper will discuss the various aspects of this situation and describe how the market is responding to address the issue.

## Pricing Basics of World Oil Market and U.S. Refining Market

The single most important component in the retail price of gasoline is the cost of crude oil. Indeed, the cost of crude oil accounts for 55 percent of the price of a gallon of gasoline. The other components are refining costs (22 percent), marketing and distribution costs (4 percent), and taxes (19 percent).<sup>1</sup> Moreover, changes in the price of retail gasoline are almost entirely explained by changes in crude oil prices. As shown in the graphic below, *over the last 15 years, changes in the world price of crude oil have accounted for more than 95 percent of the changes in gasoline prices.*<sup>2</sup> It is important to remember that the price of crude oil is determined on the world markets and is subject to world supply and world demand. Indeed, the market is so competitive that there is only a single world market price.



Source: EIA and RPC

<sup>1</sup>Energy Information Administration (EIA), "Gasoline and Diesel Fuel Update," April 17, 2006 – <http://tonto.eia.doe.gov/oog/info/gdu/gasdiesel.asp>. Each component, except taxes, is calculated at the point of sell, so that profits are included within each component.

<sup>2</sup>Data for the graphic is available at <http://eia.doe.gov>. The correlation was run by the RPC.

So, why the recent spike in the price of crude oil? The largest reason is nuclear saber-rattling from Iran. Iran produces about 4 million barrels of oil per day, or about 5 percent of world supply. Moreover, it also controls half of the Strait of Hormuz, through which about 17 million barrels of Middle East oil pass each day.<sup>3</sup> Some experts believe that concern about the Iranian nuclear crisis has added \$10 per barrel to the price of crude oil since the start of the year.<sup>4</sup> Supply disruptions in Norway and Nigeria, as well as the political machinations of Venezuelan strongman Hugo Chavez, are also adversely affecting world oil prices.<sup>5</sup>

In addition to these supply-side effects, rising global demand, spurred by economic growth in China, India, and other developing countries, continues to put upward pressure on world oil prices, which affects the U.S. gasoline market.

U.S. domestic troubles are also contributing to higher gasoline prices, as the nation's energy markets are still recovering from the effects of hurricanes Katrina and Rita. The U.S. Minerals Management Service has reported that over 334,000 barrels per day of crude oil production in the Gulf Coast are still "shut-in," i.e., unrecovered.<sup>6</sup> More importantly, some heavily hurricane-damaged Gulf Coast refineries, representing nearly 5 percent of U.S. refining capacity, are still undergoing repair, although they are likely to resume production this month.<sup>7</sup>

Another hurricane-related supply problem includes a significant refinery maintenance backlog. Because 10 to 15 percent of the nation's refining capacity was shut down by the hurricanes for much of the rest of 2005, the government asked the remaining functioning refineries to forgo their regularly scheduled fall maintenance to keep supplies of gasoline from dropping even further. The refiners complied, even though they were concerned about the possible safety and reliability problems arising from deferred maintenance.<sup>8</sup> After months of heavier-than-normal usage, refinery operators have begun long-overdue maintenance this spring. Regular maintenance is critical to maintaining refinery safety and reliability, and further delays would have compromised both.<sup>9</sup>

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<sup>3</sup>Peter Tertzakian, "Will Iran tighten the reins on the global petro supply?" *Energy Bulletin*, April 22, 2006 – <http://www.energybulletin.net/15222.html>.

<sup>4</sup>*Oil & Gas Journal*, "Crude futures prices scramble to new highs," April 20, 2006.

<sup>5</sup>*Oil & Gas Journal*, April 20, 2006, and *Wall Street Journal*, "Chavez Plans to Take More Control of Oil Away from Foreign Firms," April 24, 2006.

<sup>6</sup>*Oil & Gas Journal*, April 20, 2006.

<sup>7</sup>BP's Texas City oil refinery began a phased recommissioning at the end of March (<http://www.bp.com/extendedgenericarticle.do?categoryId=2012968&contentId=7016767>). Recommissioning is a multistep process that can take several weeks. A Murphy Oil Corporation refinery in Meraux, Louisiana, will commence recommissioning and startup at the beginning of May, and is anticipated to take several weeks (<http://www.murphyoilcorp.com/feature/>).

<sup>8</sup>Brown, Stephen P.A., Mine Yücel, and Robert W. Gilmer, "Two Hurricanes Too Many," Federal Reserve Bank of Dallas *Expand Your Insight*, October 20, 2005: <http://www.dallasfed.org/eyi/usecon/0510hurricane.html>.

<sup>9</sup>Lack of maintenance has been cited as one of the reasons for a refinery explosion at a Texas City refinery. See, *Houston Chronicle*, "BP blast sparks criminal probe," April 28, 2006.

Finally, as occurs every spring, refiners, in compliance with federal fuel regulations, must switch from the wintertime fuel blend to the summertime fuel blend. This entails completely drawing down supplies of the wintertime fuel blend and replacing it with the summertime blend. And so, currently, as with every spring, this process is causing a short-term supply disruption and adding to the price spike.

## **Self-Inflicted Wounds: Past Congressional Action Has Pushed Prices Up**

In addition to these problems, 2006 is the culmination year for numerous fuel changes resulting from actions by the federal government. Two major changes in federal fuel specifications that are contributing to the stress on the U.S. fuel system are the ultra-low sulfur requirements for diesel fuel (ULSD), mandated by the Clean Air Act Amendments of 1990, and the rapid phase-out of MTBE as a motor fuel additive, which is due to Congress's inability to provide manufacturers product liability protection. Other changes in specifications, though not significant individually (and so not detailed in this paper), are putting additional pressure on an already tight market. These include the Tier 2 low-sulfur gasoline requirements under the Clean Air Act Amendments of 1990, the establishment of a renewable fuels standard in the Energy Policy Act of 2005, and the standardizing of volatile organic compound requirements for both northern and southern regions in the Energy Policy Act.

### **MTBE Phase-out**

The Energy Information Administration (EIA) has alerted the country to the fact that U.S. companies are quickly moving to eliminate methyl tertiary-butyl ether (MTBE), a fuel additive, from gasoline in 2006.<sup>10</sup> That process is affecting gasoline supplies in the United States and putting upward pressure on gasoline prices. Industry is not making this change on a lark, but is responding to changes in the law.

The MTBE issue was one of most controversial issues surrounding the energy debate over the last several years. MTBE came into widespread use as a fuel additive due the oxygenate mandate in the Clean Air Act Amendments of 1990. The problem is that the additive has been found in drinking water supplies in a number of states – due to leaking underground storage tanks – which affected the taste and smell of the drinking water.<sup>11</sup> Although the law did not specifically mandate the use of MTBE, it became the additive of choice due to ease of transport and lower cost. As noted by the Congressional Research Service, “For technical and cost reasons, MTBE’s present use was, in part, precipitated by the requirements of the Clean Air

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<sup>10</sup>Energy Information Administration (EIA), *Eliminating MTBE in Gasoline in 2006*, February 22, 2006.

<sup>11</sup>It should be noted that though MTBE affects the taste and smell of drinking water, the EPA has found that at levels found in drinking water, it poses no health risks. See U.S. Environmental Protection Agency, *Achieving Clean Air and Clean Water: The Report of the Blue Ribbon Panel on Oxygenates in Gasoline*, September 1999.

Act Amendments and their requirements that reformulated gasoline contain at least 2 percent oxygen.”<sup>12</sup>

After being encouraged to use MTBE by the federal government, the MTBE industry is now facing numerous “defective product” lawsuits throughout the country. These lawsuits are frivolous to the extent that they are attempting to assign liability to the MTBE industry for simply making MTBE, rather than assigning liability to the parties responsible for its presence in groundwater. Underscoring this point on the Senate floor during debate on the energy bill, Senator Sessions noted that there is no “legitimate basis” for these lawsuits. He said: “Would somebody say Folgers should be responsible if a Folgers brand of hot coffee burned somebody in a McDonald’s restaurant, or that McDonald’s should be liable? If somebody takes a can of Campbell’s soup and smashes a guy on the head with it, is the maker of the can of soup liable? Certainly not.”<sup>13</sup>

He also explained, “It is legitimate, fair, legal theory that if a manufacturer of MTBE allowed its pipeline to leak or allowed the storage tanks to leak and the chemical got into the water system, then you can sue him. That is what we ought to be doing.”<sup>14</sup> In other words, whoever is responsible for allowing MTBE to enter into a water system should be liable, not those who merely produce MTBE.

Early iterations of the energy bill contained a “safe-harbor” provision, which would have exempted potential defendants from liability associated with ‘defective product’ claims for MTBE and other fuel additives. The provision would not have insulated responsible parties from liabilities, such as environmental cleanup.<sup>15</sup> This provision was the primary justification cited for a Democrat-led filibuster that brought down the entire energy bill in 2003.<sup>16</sup> Continued intransigence from opponents to the safe-harbor provision resulted in passage of the energy bill in 2005 without any liability protection.

That same bill also effectively removed the rationale for the use of MTBE in reformulated gasoline (i.e., the oxygen content requirement). As a result, MTBE manufacturers believe that whatever protection was provided by the oxygen content requirement is now gone, thereby increasing their liability exposure even further. And so, fearing lawsuits, manufacturers are now rapidly phasing out MTBE production.<sup>17</sup>

To replace the octane-boosting characteristics of MTBE, gasoline providers are turning to ethanol. The EIA has noted that the switch from MTBE to ethanol has affected gasoline supply and prices in several ways. One is an estimated loss of production capability of about 5 to 6

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<sup>12</sup>Congressional Research Service (CRS), “The Safe-Harbor Provision for Methyl Tertiary Butyl Ether (MTBE), June 4, 2004.

<sup>13</sup>Statement of Sen. Sessions, *149 Congressional Record*, S15175, November 15, 2003.

<sup>14</sup>Sen. Sessions, November 15, 2003.

<sup>15</sup>CRS, June 4, 2004.

<sup>16</sup>*New York Times*, “A Final Push in Congress: Even with Bush’s Support, Wide-Ranging Legislation May Have Been Sunk by Excess,” November 26, 2003.

<sup>17</sup>EIA, *This Week in Petroleum*, January 5, 2006.

percent “due to changes necessary to accommodate ethanol’s higher evaporative properties ... to counter ethanol-blended gasoline’s higher toxic emissions and distillation characteristics.”<sup>18</sup> Another is a loss of gasoline imports from suppliers that cannot deliver MTBE-free gasoline, or that cannot produce the high-quality reformulated gasoline blendstock needed to combine with ethanol.<sup>19</sup>

The third impact is the transportation problem. Because ethanol-blended gasoline cannot be transported in pipelines, ethanol and the reformulated gasoline blendstock must be transported and stored separately and blended at terminals near the retail sites. Currently, much of the distribution system cannot handle the additional products, and investment in infrastructure is needed. Finally, EIA estimates that an additional 130,000 barrels per day of ethanol may be needed to replace MTBE, and ethanol production in the United States is running near capacity and may not be adequate to replace MTBE. As a result, the price of ethanol has also risen substantially. “Both capacity and transportation issues imply a very tight ethanol market for at least the first part of the year,” said EIA.<sup>20</sup>

This increased demand for ethanol, as well as the higher cost of ethanol, is contributing to the price increase Americans are paying at the pump for their gasoline. The effect is most acute in much of the East Coast and Texas. In fact, Texas and parts of the Northeast have experienced minor fuel shortages as a result of the change.<sup>21</sup> The Midwest is feeling some pain due to the need to divert increased volumes of ethanol to Texas and the East Coast.<sup>22</sup>

### **Ultra-low Sulfur Diesel**

The Clean Air Act Amendments of 1990 are also partially responsible for the current rise in gasoline prices. By June 1, 2006, at least 80 percent of on-highway diesel fuel being shipped must have no more than 15 ppm sulfur content (from 500 ppm) at retail. Also, as of January 1, 2006, 100 percent of gasoline being shipped must have a sulfur content of 30 ppm or less. These regulations are affecting fuel prices. As one example of the effect, the extra processing needed to reduce the sulfur content to the required levels is reducing the supply of fuel. It has been estimated that approximately 12 percent of the diesel supply and 1.5 percent of the gasoline supply will be lost through the sulfur-removal process.<sup>23</sup>

The ultra-low sulfur diesel regulation is posing particularly difficult challenges for refineries. As one example, the raw materials used to produce diesel fuel have a much higher

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<sup>18</sup>EIA, February 22, 2006.

<sup>19</sup>EIA, January 5, 2006.

<sup>20</sup>EIA, February 22, 2006.

<sup>21</sup>*Investor’s Business Daily*, “Ethanol Output, Transport Kinks Pump Up Retail Gasoline Prices; Rapid shift from MTBE drives into bottlenecks; is ethanol really so hot?” April 26, 2006; and *CNNMoney.com*, “Gas stations in Texas go dry,” April 28, 2006 - [http://money.cnn.com/2006/04/28/news/economy/gas\\_dry.reut/](http://money.cnn.com/2006/04/28/news/economy/gas_dry.reut/)

<sup>22</sup>EIA, February 22, 2006.

<sup>23</sup>John C. Meloy and Jeff Dietert, “Impacts of Tier II Implementation on the Supply and Deliverability of Gasoline and Diesel Fuel,” *Energy Industry Research*, February 25, 2003.

sulfur content than that for gasoline, requiring more processing. The successful delivery of ultra-low sulfur diesel (ULSD) also poses significant challenges. The U.S. pipeline system is used to transport multiple fuels, including high-sulfur fuels such as jet fuel (3000 ppm).<sup>24</sup> And so, ultra-low sulfur diesel can easily be contaminated with residuals from higher-sulfur fuels that used the same pipeline. This means that refineries have to “overshoot,” reducing diesel sulfur content to about 7 ppm so that when it arrives at its destination, it is still in compliance.

## The Good News About Gasoline Prices

There is a silver lining to the relatively gloomy outlook for summer gasoline prices: much of the effort to comply with new fuel specification requirements should be completed by the end of the summer, and so the domestic gasoline market should return to a more normal footing after that.

Meanwhile, with crude oil and gasoline prices as high as they are, there are strong incentives for the oil industry to invest heavily in oil exploration and production, in additional refining capacity, and in distribution infrastructure. The U.S. oil industry has not been idle in working to increase supplies. According to one report, the industry invested nearly \$109 billion in 2004. The full numbers aren't in yet for 2005, but for the first three quarters of 2005, investment spending was 28 percent higher than the first three quarters of the previous year, and it is projected that investment for 2006 will grow by double digits once again.<sup>25</sup> It has been projected that the global barrel-per-day output of crude oil will increase by 2.2 million this year, outpacing demand that is expected to rise by just 1.8 million barrels per day.<sup>26</sup>

Numerous companies have announced investments in refinery expansions. For example, ConocoPhillips has announced that it will invest between \$4 billion and \$5 billion by 2011 for expansion and upgrade projects in nine refineries, increasing overall capacity by 230,000 barrels per day.<sup>27</sup> Marathon Petroleum Company has announced plans to invest \$2.2 billion to expand its Garyville, Louisiana, refinery by 245,000 barrels per day.<sup>28</sup> Sunoco will invest \$1.8 billion to increase capacity by 11 percent;<sup>29</sup> Valero will invest \$5 billion to increase capacity by 400,000 barrels;<sup>30</sup> Motiva is also considering refinery expansions of up to 325,000 barrels per day.<sup>31</sup>

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<sup>24</sup>EIA, January 5, 2006.

<sup>25</sup>Ernst & Young LLP, *Investment and Other Uses of Cash Flow By the Oil Industry*, February 3, 2006.

<sup>26</sup>Bloomberg.com, “Oil Drops to 6-Week Low on Report of Rising Production Capacity,” February 10, 2006.

<sup>27</sup>“ConocoPhillips Investing for Growth,” November 16, 2005 - [http://www.conocophillips.com/newsroom/news\\_releases/2005+News+Releases/111605\\_COP\\_Investing\\_For\\_Growth.htm](http://www.conocophillips.com/newsroom/news_releases/2005+News+Releases/111605_COP_Investing_For_Growth.htm).

<sup>28</sup>“Marathon Announces Plans to Increase Garyville Refinery Capacity,” October 27, 2005 - [http://www.marathonpetroleum.com/news/news\\_2005/garyville\\_upgrade.htm](http://www.marathonpetroleum.com/news/news_2005/garyville_upgrade.htm).

<sup>29</sup>*Philadelphia Inquirer*, “Sunoco Pledges \$1.8 billion for oil refineries,” November 3, 2005.

<sup>30</sup>*San Antonio Business Journal*, “Valero to up refining capacity by 400,000 barrels per day,” November 11, 2005.

<sup>31</sup>“Motive Planning Refinery Expansion,” September 21, 2005 - <http://www.motivaenterprises.com/index.cfm>.

Other refinery expansion projects are on the drawing board, but have not yet been publicly announced.

It is too early to determine the extent to which these actions will ameliorate gasoline prices, but they do show that the industry is responding appropriately to the incentives provided by high oil prices. On the other hand, consumers are slowing their rate of gasoline consumption, but the response has been weaker than one would expect. Demand continues to rise, but its growth has nearly leveled off.<sup>32</sup>

## **Conclusion**

Why gasoline prices are rising is no mystery. Since the price of crude oil is a major determinant of the price of gasoline, international events exert substantial influence on U.S. gasoline prices. The Iranian nuclear crisis, supply disruptions in Norway and Nigeria, and political uncertainty in Venezuela are being felt at the pump. Rising global demand for oil, spurred in part by economic growth China and India, are also pushing up prices.

Domestically, continued recovery from hurricane damage, the culmination of several federally mandated changes to fuel specifications, and other legal difficulties originating from Washington, D.C., have stressed already tight fuel markets.

However, the market is responding to rising gasoline prices. The oil industry is investing many billions of dollars to increase supplies of crude oil and gasoline by increasing exploration and production and by expanding refining and distribution capacity. Consumer demand has leveled off somewhat, though not as much as one would expect. Moreover, the transition period brought about by federally mandated changes in fuel specifications should be largely completed by fall, and the remaining hurricane-damaged refineries will be back online soon. All of these factors will serve to reduce stress on gasoline markets and reduce price.

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<sup>32</sup>*Associated Press*, "Crude futures fall for third straight day as gasoline demand shows weakness," April 26, 2006.