



2004 Gasoline Price Increases: An Analysis
Summary Prepared by Renewable Fuels Association
March 31, 2004

Overview

On average, the U.S. pump price of gasoline has increased by more than 20 cents a gallon since the beginning of the year. As consumers across the country drive up to gasoline pumps to fill their tanks, they are all asking the same question -- why are prices rising so quickly to such high levels? And as consumers spend more on gasoline, they have less money to spend on other purchases. Higher fuel prices also increase costs for businesses – from airlines to taxis and supermarkets to restaurants. People everywhere want to know what’s causing the price increases and when prices are likely to fall.

To address these questions, the Renewable Fuels Association commissioned a study by Innovation & Information Consultants, Inc., to identify and analyze the factors that have contributed to the run-up in gasoline prices, to compare the current situation with previous years, and to assess the marketplace factors for the summer driving season.

Major Findings

According to the study, the major factors driving up consumer gasoline prices are:

- Historically low petroleum industry gasoline inventories;
- Increased reliance on gasoline imports due to cutbacks in refinery utilization and inadequate domestic refining capacity;
- Higher OPEC-determined crude oil prices; and,
- Rapidly rising gasoline consumption.

Furthermore,

- Higher crude prices account for 43% of retail conventional gasoline price increases while higher refiner gasoline margins account for 50% of the increase. The remaining 7% is due to higher retail margins. Increases for reformulated gasoline were 35%, 47% and 18%, respectively. (Figures are for mid-December to mid-March.)
- Gasoline prices, with the exception of California, rose 19 to 31 cents per gallon by mid-March without regard to geography or type of gasoline.
- Outside of California, prices of reformulated gasoline (RFG), blended with either MTBE or ethanol, have not risen as fast as conventional gasoline.
- California gasoline prices are higher because the isolated market’s overstretched refinery sector cannot absorb common, but unexpected refinery outages.
- While RFG constitutes 33% of the total U.S. gasoline market, current ethanol production capacity could supply a market of 41% RFG.

Minimal Impact of Other Factors

Some have suggested that Clean Air Act requirements for RFG are a root cause of gasoline price increases, particularly in certain markets. However, government data demonstrates:

- RFG production, as a fraction of overall gasoline production, remained constant over the last three months. Therefore, there is no evidence of a unique problem with RFG production.
- Gasoline price increases in areas like New York and Connecticut, which are now using ethanol blended RFG have been lower than in other (even conventional gasoline) areas of the country.
- Refiners in New York and Connecticut are utilizing 10% ethanol blends, not the minimum 5.7% blends required by federal law. This indicates refiners are finding ample supplies of cost-effective ethanol.

Low Stocks/Reliance on Imports Leads to Price Volatility

The current absence of a gasoline stock “cushion” insures rapidly rising prices (sometimes called volatility) when demand picks up and/or refinery or pipeline problems surface. Instead of falling back on stocks, refiners and marketers are forced to turn to imports to fill the widening domestic supply/demand gap. As gasoline demand has grown, refiners have failed to fully utilize existing capacity and to increase new capacity to keep pace. The resulting reliance on foreign components comes at a significantly higher price.

Some observers have raised concerns about the ability of foreign refiners to produce various U.S. summer grade gasolines. However, European refiners have stated unequivocally that they are ready to supply even the most clean-burning gasoline formulations to the U.S. market. According to a March 22 Reuters story:

“Some of Europe's biggest hitters in the gasoline export trade say they can supply the United States with high specification summer fuel, meeting stringent new US regulations, but warn hefty price premiums would be needed to make such flows profitable.”

This implies that foreign supply again will be available to make up for the shortfall in U.S. refinery production and stocks, just as in the last few years.

Prospects for the Summer Driving Season

There is no reason to believe that, based on recent history, prices have yet peaked for the 2004 season. Unless refiners and other gasoline marketers add to gasoline stocks through higher production and imports, consumers might see additional price increases this year. Therefore, the future of this gasoline season probably will be dictated by domestic refiners’ ability to raise gasoline production and maintain the increase throughout the spring and summer months. Any U.S. refinery problems or inability to keep up with rising demand will require additional imports and put further upward pressure on prices.

Innovation and Information Consultants, Inc.

At the request of the Renewable Fuels Association, Innovation and Information Consultants, Inc. (IIC, Inc.), based in Concord, MA, conducted the attached review and analysis of conditions in the U.S. gasoline market. IIC, Inc. is a consulting firm that specializes in financial and economic analysis, asset valuation, and computer modeling related to the energy industries. Robert A. Speir, the report's primary author, was a petroleum analyst at the Department of Energy until 1997, first with the Energy Information Administration, then with the Office of the Assistant Secretary for Policy and International Affairs. Mr. Speir is now a Principal with IIC, Inc.

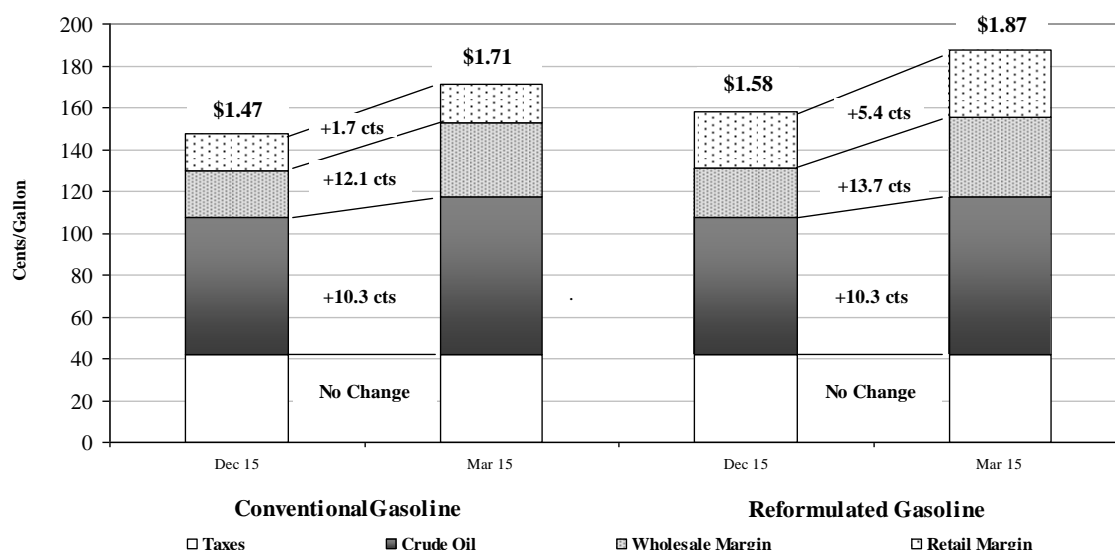
2004 GASOLINE PRICE INCREASES: AN ANALYSIS¹

March 31, 2004

BACKGROUND AND CONCLUSIONS

Between mid-December 2003 and mid-March 2004, U.S. gasoline prices rose to historically high levels. Our review of the events shows that crude oil costs were a factor, but that more than half of the increase was caused by growing wholesale and retail margins (see Figure 1 below and Chart 1 in the Appendix).

Figure 1. Retail Gasoline Price Increases by Component



Crude oil cost increases have resulted from OPEC production restraint in the face of rising worldwide demand—largely in Asia. OPEC’s obstinacy, no doubt, is related to the falling value of the U.S. dollar, which is used to price crude oil worldwide.

Wholesale and retail margins² have increased due to the broad inability of the U.S. refining system to satisfy steadily rising gasoline demand. This situation has been growing in significance for the last decade, creating increasing dependence on imported gasoline and ensuring price instability. Contrary to speculation that reformulated gasoline (RFG) requirements, or the replacement of MTBE in RFG with ethanol, caused higher prices, it is clear that the current problems stem from the failure of the U.S. supply system to cope with higher consumer demand.

¹ This study was conducted by Innovation and Information Consultants, Inc., 72 Junction Square, Concord, Massachusetts 01742.

² The wholesale margin is the difference between crude oil costs and wholesale prices. In this chart, we have used spot prices to represent the wholesale price. The retail margin is the retail pump price minus the wholesale price and federal, state and local taxes.

The sections below amplify these observations and refer to charts in the Appendix where more detail is available.

THE BIG PICTURE—DEMAND IS OVERWHELMING DOMESTIC SUPPLY

Domestic oil companies are no longer building adequate pre-season gasoline inventories. These stocks are needed to augment supply when refineries conduct post-heating season maintenance turnarounds and to reduce supply vulnerability when unforeseen events occur. This was less of a problem in the early 1990s when demand was lower and excess refining capacity³ was available. However, today's very high gasoline consumption, coupled with low pre-season inventories, creates extreme market tightness at the wholesale level just when gasoline marketers are preparing for the driving season.

By the end of the 1990s, refiners had used up much of their extra refining capacity, and still had not kept up with demand (see Charts 2 and 3). In the last four years, refineries have operated at near capacity during the summer, but the supply system has had to depend increasingly on offshore sources of gasoline supply. This has ensured price volatility because much of the offshore supply arrives only 4 to 6 weeks after prices have sharply increased in the U.S.

Chart 4 shows that in the last 4 years, high spreads between crude oil and gasoline prices have been associated with low February gasoline inventories, and vice versa. Chart 5 goes a step farther by examining "days of supply," obtained by dividing end of month stocks by the next month's gasoline consumption. The chart shows the critical months of the buildup to the driving season—December through March. Days of supply fell from 32-33 in the early 1990s to 22.5 this March, as refiners cut back seasonal stock building in the face of rising demand.⁴ The preceding chart shows that, when crude oil prices are taken out of the picture, the three trend-breaking years of 1998, 1999 and 2002 experienced relatively orderly prices.

In addition to being at the lowest levels in recent history, the pre-season pattern has changed. Most years, days of supply for February were above January (2000 is the only exception). In 2004, February was significantly lower than January, and January was lower than December, indicating that the supply situation deteriorated measurably as this winter ended.

Figure 2 (see also Chart 6 in the Appendix) examines in detail stock and wholesale spot margin⁵ movements since January 2001. Price spikes in 2001 and 2003 were related directly to low and falling inventories, while high inventories in 2002 coincided with low gasoline-crude spreads and much less volatility. The genesis of the price increase we are seeing in 2004 was the stock drawdown in late summer of 2003, and the failure to recover in the fall.

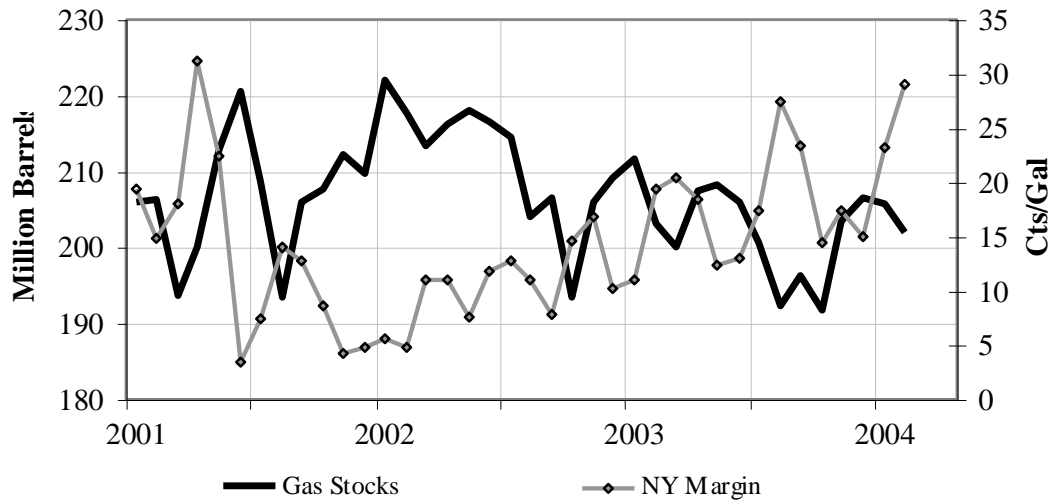
³ Refining capacity is the "front end" refinery input (largely crude oil) processing capability. When refineries do not operate at near this capacity, "excess capacity" is said to exist. Utilization is defined as the percent of refining capacity that is used at any particular point in time.

⁴ The situation is much more precarious than these figures suggest. Since about 180 million barrels of gasoline stocks are required as "working storage" at refineries, pipelines and terminals, March's 199 million barrels represents useable inventories equating to only two days of national gasoline consumption.

⁵ Here we define the wholesale spot margin to be the difference between gasoline spot prices and an appropriate spot crude oil price. Changes in this measure are indicators of recent or impending shifts specific to gasoline supply and demand because they exclude the effects of crude oil price changes.

Each price spike of the past decade, and there have been a number of them, has its own characteristics when examined in detail. Some are precipitated by refinery outages or pipeline problems. Nevertheless, the common theme is that, when one of these events occurs, there is no stock cushion present to mitigate a rapid and substantial increase in prices.

Figure 2. Recent Correlation Between Gasoline Stocks and Wholesale Margins



THE CURRENT SITUATION—LOW STOCKS AND SUPPLY CUTBACKS CAUSED THE MARGIN INCREASES

We can use the spot wholesale margin to make two key observations: first, the part of the price run-up not associated with crude oil costs began in late December; second, it affected RFG and conventional gasoline in the same way—that is, it was not peculiar to RFG (see Charts 7 and 8). Note that spot wholesale margins on the Gulf and East Coasts doubled between December and end-February; in California, they rose by 300 to 400 percent.

The East Coast

The East Coast (PADD I) and Midwest (PADD II) both have a number of refineries, but depend on PADD III (Gulf Coast) refineries for a substantial part of their incremental supply via pipeline. Thus, the three regions are linked tightly under normal conditions. In late December, refineries in the three regions collectively began cutting back refinery utilization,⁶ which, in turn, reduced gasoline supply by more than 700,000 barrels per day. The result was an immediate curtailment of what would have been a comfortable pre-season stock buildup on the East Coast. Margins and prices began to rise immediately (see Charts 9, 10, and 11).⁷

⁶ Refineries in PADD III reduced inputs by more than 1 million barrels per day, while those in PADDs I and II decreased by about 300 and 200 thousand barrels per day, respectively.

⁷ It has also been said that lower gasoline imports this year contributed to the price problems. However EIA data show that imports during December-February were only 21,000 b/d lower this year than two years ago when no serious price problems developed. This year’s imports are only low when compared to the flood that resulted from the August 2003 price spike.

Despite the cutbacks, the RFG percentage of motor gasoline output rose slightly as production fell. Had RFG been at the root of the refineries' problems, we would have seen the percentage drop (see Chart 12). Although there were a few minor refinery problems, the reduction in utilization apparently was due to normal seasonal maintenance actions, the effects of which were magnified by the lack of a stock cushion.

The West Coast

Since California depends much more on direct throughput from refineries than on stock draws, the market is unusually sensitive to any refinery accident or utilization cutback—particularly as the driving season approaches. California Energy Commission (CEC) statistics show that refineries in the State reduced crude oil inputs about 13 percent during mid-December to end February, and cut back gasoline production by 17 percent. Accordingly, gasoline margins skyrocketed (see Charts 13 and 14).

Some refinery problems did occur. In early February, a coker problem at ChevronTexaco's very large El Segundo refinery outside Los Angeles reduced supply. A power outage at Tesoro's San Francisco refinery also reduced operation slightly in mid-February. However, by the time these events took place, the price increases were already well underway.

Due to lack of data, we do not have a recent overall picture of the gasoline stock situation in California; we can only examine stocks of finished gasoline and blendstocks in refineries. We would not expect to see much of a drop in these stocks because refinery stocks can be viewed as largely "working storage." Chart 15 shows very little finished gasoline stock response to production cutbacks at refineries in the State.⁸

During the past two years, California's RFG percentage of motor gasoline output has varied between 85 and 95 percent. Chart 16 shows that it remained in that range during August 2003 to February 2004. California refineries typically supply a substantial amount of the gasoline supply to neighboring Nevada and Arizona. Reformulated gasoline comprised about 92 percent of refiners' wholesale sales in California, Arizona and Nevada combined in 2002. This suggests that an RFG yield in the low 90 percent range, as observed in the chart, is the appropriate level.

REFORMULATED GASOLINE IS NOT THE PROBLEM

The table below (see also Table 1 in the Appendix) shows that, other than in California, pump price increases throughout the nation have been relatively homogenous, rising by 19 to 31 cents per gallon without regard to geography or type of gasoline. In fact, some of the largest increases have been for conventional gasoline, not RFG.

⁸ The CEC includes unfinished ethanol-blendable gasoline with finished gasoline in its statistics and adds 6 percent to represent the ethanol that will ultimately be included.

Recent Retail Gasoline Price Changes in Selected Regions of the United States

U.S. Regional Areas	Reformulated Gasoline Retail Prices On			Conventional Gasoline Retail Prices On		
	3/29/2004	12/29/2003	Increase	3/29/2004	12/29/2003	Increase
New England	\$1.78	\$1.58	\$0.20	\$1.80	\$1.61	\$0.19
Central Atlantic	\$1.80	\$1.60	\$0.20	\$1.82	\$1.58	\$0.24
Lower Atlantic	\$1.74	\$1.47	\$0.27	\$1.76	\$1.50	\$0.26
Midwest	\$1.80	\$1.51	\$0.29	\$1.74	\$1.46	\$0.28
Gulf Coast	\$1.67	\$1.43	\$0.24	\$1.69	\$1.45	\$0.24
Rocky Mountain	NA	NA	NA	\$1.82	\$1.54	\$0.28
West Coast	\$2.11	\$1.64	\$0.47	\$1.90	\$1.61	\$0.29
Selected States and Cities						
<u>Non-Ethanol Areas</u>						
Texas	\$1.67	\$1.43	\$0.24	\$1.66	\$1.43	\$0.23
Florida	NA	NA	NA	\$1.82	\$1.55	\$0.27
Massachusetts	\$1.77	\$1.55	\$0.22	NA	NA	NA
Colorado	NA	NA	NA	\$1.80	\$1.50	\$0.30
Washington	NA	NA	NA	\$1.85	\$1.54	\$0.31
Miami, FL	NA	NA	NA	\$1.87	\$1.57	\$0.30
<u>Ethanol Influenced Areas</u>						
New York	\$1.93	\$1.73	\$0.20	\$1.91	\$1.64	\$0.27
Minnesota	NA	NA	NA	\$1.73	\$1.48	\$0.25
California	\$2.11	\$1.65	\$0.46	NA	NA	NA
Ohio	NA	NA	NA	\$1.77	\$1.47	\$0.30
Chicago, Ill.	\$1.86	\$1.56	\$0.30	NA	NA	NA

Much has been said about how difficult it is to produce today's RFG. It is marginally more expensive, but history shows that, in the last 8 years, refiners and gasoline blenders have substantially increased gasoline production per barrel of crude oil processed. Much of this comes from including MTBE⁹ and ethanol into the gasoline pool in increasing amounts.

MTBE ground water contamination is causing various States to eliminate its use, but ethanol production has been growing rapidly. Ethanol production capacity in the U.S. now is sufficient to bring 41 percent of the nation's gasoline supply up to RFG oxygenate standards. Currently, RFG only constitutes about 33-34 percent of the nation's gasoline consumption. Therefore, ethanol supply seems adequate to meet demand (Table 2).

Another indication of the local adequacy of ethanol supplies on the East Coast is that gasoline marketers are currently blending gasoline with 10 percent ethanol in Connecticut and New York, rather than the 5.8 percent minimum amount necessary to meet the RFG oxygen requirement. It is unlikely the higher blend level would take place if ethanol was in short supply or more costly compared to other suitable gasoline components. Our

⁹ MTBE is made up of methanol, which primarily comes from natural gas, and isobutylene, which can come indirectly from natural gas also, or may be produced in refineries.

conversations with terminal representatives indicate that ethanol supplies seem to be adequate for the terminals' gasoline marketer customers and that their recent transitions to ethanol blending went smoothly.

Supply and demand conditions described earlier are the basis for extreme price volatility in the last five years—long before any concerns developed about banning MTBE. All the facts point to the cause of the price increases seen so far in 2004 as being a continuing fundamental imbalance between supply and demand. That imbalance persists across all gasoline formulations and geographic areas, without regard to whether MTBE is being replaced in a particular area or not.

CAN WE PREDICT WHAT IS IN STORE FOR THE 2004 DRIVING SEASON?

There is no reason to believe that, based on recent history, prices have yet peaked for the 2004 season. Chart 17, which displays the maximum amount prices rose between December of one year and August of the next year, shows that this year's price run-up is not exceptional. For example:

- In the last five years, retail prices¹⁰ have risen between 17 and 32 cents per gallon preceding and during the driving season.
- Prices peaked by March in only three of the last 10 years, and two of those years were when oil market prices fell worldwide as the Asian economy collapsed (in 1998-99).

Unless refiners and other gasoline marketers add to gasoline stocks through higher production and imports, consumers might see additional price increases this year.

Some observers have raised concerns about the ability of foreign refiners to produce various U.S. summer grade gasolines. However, European refiners have stated unequivocally that they are ready to supply even the most clean-burning gasoline formulations to the U.S. market. According to a March 22 Reuters story:

"Some of Europe's biggest hitters in the gasoline export trade say they can supply the United States with high specification summer fuel, meeting stringent new US regulations, but warn hefty price premiums would be needed to make such flows profitable."¹¹

This implies that foreign supply again will be available to make up for the shortfall in U.S. refinery production and stocks, just as in the last few years.

Given the recent price increases, this trend is already being seen. During the first three weeks of March, EIA reported that finished gasoline and blendstock imports had climbed 33 percent to an average of 904 thousand barrels per day from the February average of 681 thousand barrels per day.

¹⁰ Some of the yearly price increases shown in the chart are due to rising crude oil costs. For example, in 2002, 80 percent of the increase was due to crude oil.

¹¹ "Europe ready to meet tough US gasoline specs, at a price," Reuters, March 22, 2004.

Gasoline production also has risen about 400 thousand barrels per day since the mid-January low point, but has remained stable for the last month. Therefore, the future of this gasoline season probably will be dictated by domestic refiners' ability to raise gasoline production and maintain the increase throughout the spring and summer months.

APPENDIX

CHARTS AND DETAILED COMMENTS

Table 1. Recent Retail Gasoline Price Changes in Selected U.S. Regions and States¹²

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OUTSIDE THE WEST COAST, RETAIL PRICES FOR CONVENTIONAL AND REFORMULATED GASOLINE HAVE RISEN ABOUT THE SAME AMOUNT

Price increases outside the West Coast since the December low point have been relatively homogenous and without regard to type of gasoline or whether ethanol or MTBE is used in reformulated gasoline. Specific examples include:

- There is no evidence that New York is suffering higher prices resulting from its decision to replace MTBE with ethanol in RFG (in fact, conventional gasoline rose more than RFG)
- Prices in the upper Northeastern states rose no more than Gulf Coast states; prices in the Southeast, which has very little RFG, rose more than both areas.
- Conventional gasoline prices in Washington State rose higher than eastern and Gulf Coast states' prices for either type of gasoline. This may indicate that supply problems in California spilled over to the Puget Sound refining area.
- Price increases were "normal" in Minnesota, which uses ethanol in all gasoline, even though it is not reformulated.

¹² Source: Energy Information Administration weekly gasoline prices.

Table 2. Potential Ethanol-Blended Gasoline Supply (000 B/D)

Year/Month	Ethanol Production	Potential Ethanol RFG ¹	Total U.S. Gasoline Consumption	Potential Ethanol-Based Percentage
1997	84	1450	8017	18%
1998	91	1561	8253	19%
1999	96	1654	8431	20%
2000	106	1830	8472	22%
2001	115	1986	8610	23%
2002	140	2406	8848	27%
2003	183	3152	8937	35%
January 2004	211	3638	8843 ²	41%

¹ Assuming a 5.8% blend of ethanol by volume to meet the 2% oxygen RFG requirement.

² Average of January-March 2004.

ETHANOL SUPPLY IS ADEQUATE TO SUPPORT U.S. RFG REQUIREMENTS

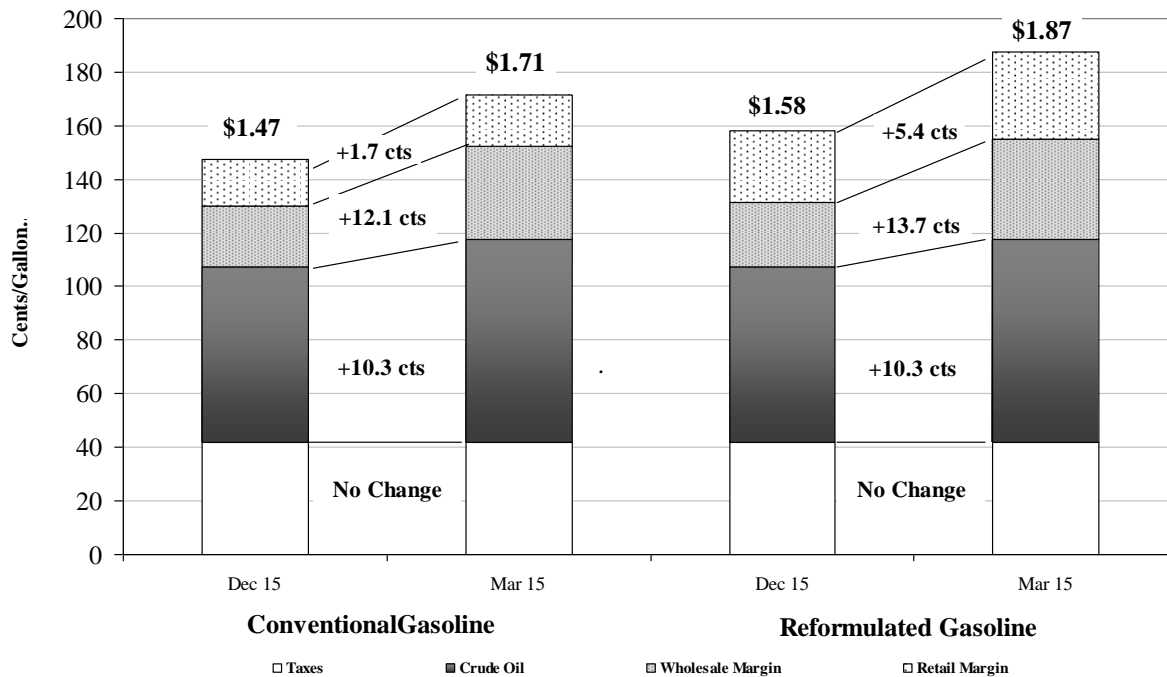
Ethanol production in the United States has almost tripled since 1997, and continues to rise. Based on the January 2004 production level, 41 percent of national motor gasoline consumption could be blended with ethanol at 5.8% by volume, which meets RFG oxygenate requirements.

To put this figure in perspective, currently, 33 to 34 percent of national gasoline consumption is classified as reformulated. That percentage includes all of California and Connecticut consumption and about 57 percent of New York State's gasoline use. Even if marketers elected to replace all of New York State's gasoline with ethanol-blended RFG, it would raise the national RFG percentage by only 1.5 percentage points (to 34-36 percent RFG).

1. Source: EIA statistics.

2. This comparison is for perspective only. A substantial amount of ethanol is used for blending purposes in non-RFG areas, and a significant portion of RFG continues to be blended with MTBE.

Chart 1. Retail Gasoline Price Components—December 15 and March 15



PRINCIPAL CHANGES—BOTH CRUDE OIL COSTS AND WHOLESALE MARGINS ROSE

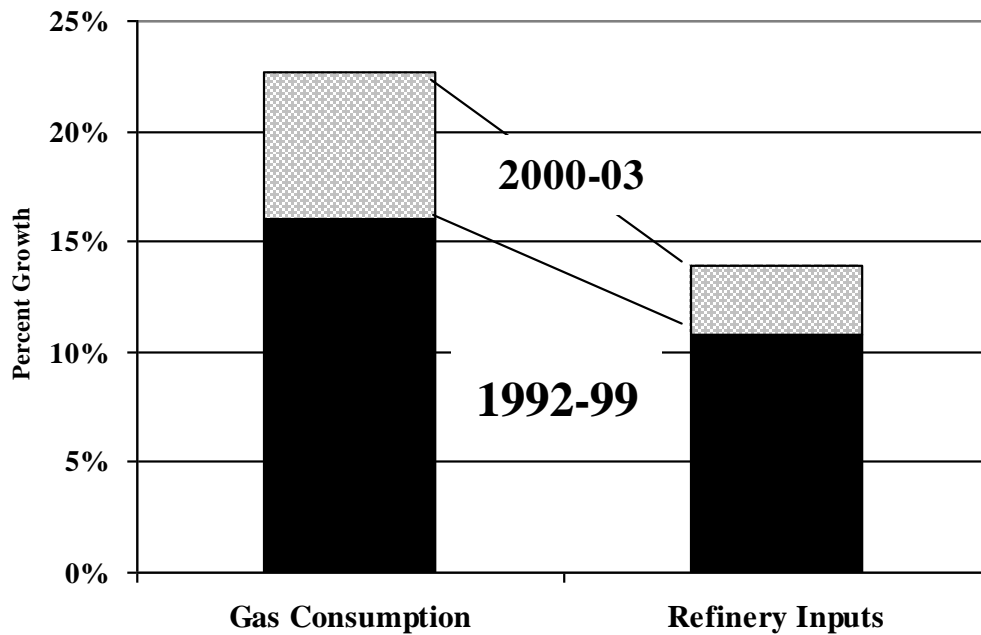
This chart shows changes in the main components of gasoline pump prices since they began to rise in mid-December. Major points are:

- Crude oil costs are up 10 cents per gallon due to OPEC production restraints (possibly influenced by falling value of dollar), terrorism fears, and high Asian demand.
- The spread between spot gasoline and crude oil prices--the gasoline wholesale margin--is up 12 cents for conventional gasoline and almost 14 cents for reformulated gasoline. This is due to volatile spot prices resulting from very low stock levels and temporary refinery operating rate reductions.
- The retail margin--the difference between pump prices (less federal, state and local taxes) and spot gasoline prices--increased less than 2 cents per gallon for conventional gasoline, but 5.4 cents for reformulated gasoline.

Notes:

1. Source: All data are from the Energy Information Administration

Chart 2. Relative Growth in Gasoline Demand and Refinery Inputs



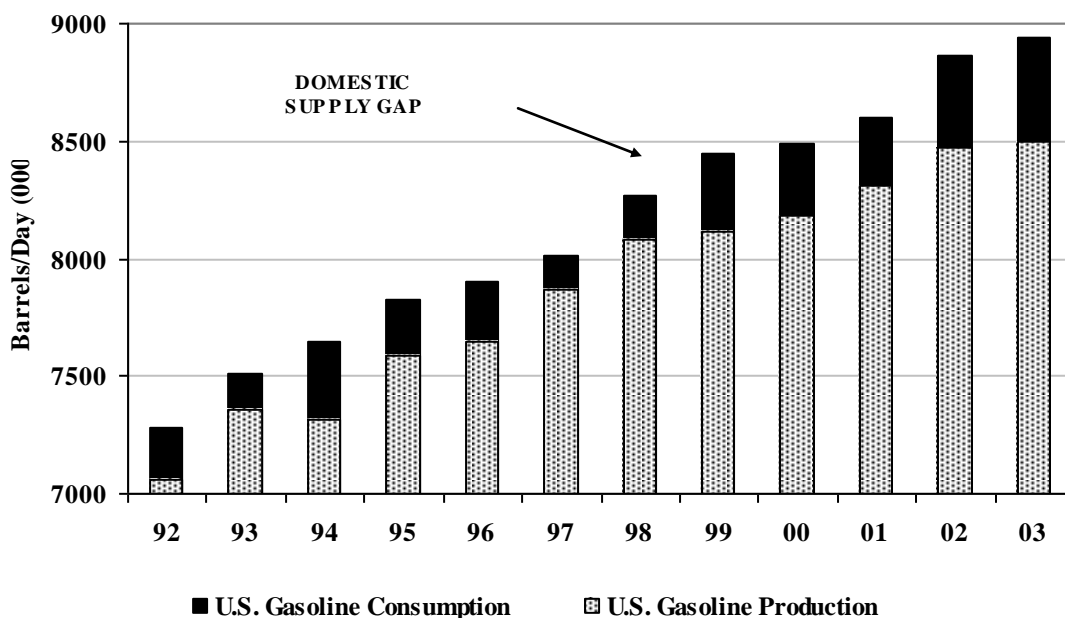
U.S. REFINERY ACTIVITY IS FALLING INCREASINGLY FURTHER BEHIND GASOLINE CONSUMPTION

This chart shows that gasoline demand growth has substantially outstripped the growth in U.S. refinery processing over the last 12-13 years.

The overall capacity of U.S. refineries to process crude oil changed very little over this period, but during the early to mid-1990s, refinery utilization climbed to meet increasing demand. By the end of the decade, the slack capacity was nearing exhaustion, while gasoline demand continued to climb.

Source: EIA statistics.

Chart 3. Annual U.S. Gasoline Consumption and Production



U.S. GASOLINE PRODUCTION IS NO LONGER KEEPING UP WITH GROWING DEMAND

On average, since 1992, U.S. gasoline demand has grown at 1.8 percent per year.

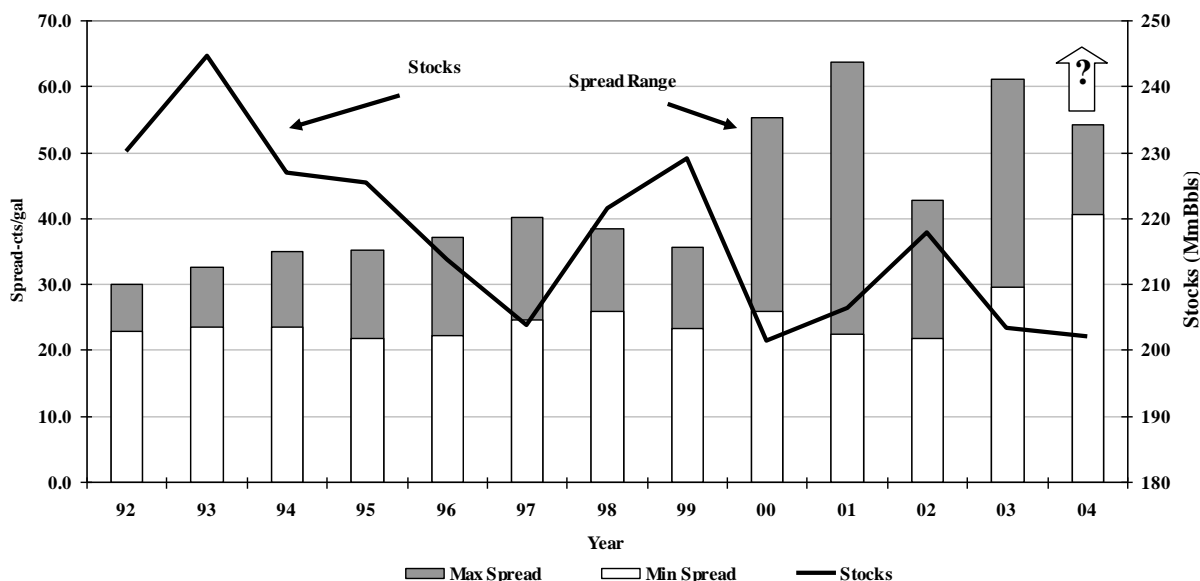
Although both refinery utilization and gasoline yield increased throughout the 1990s, neither was sufficient to prevent the domestic supply gap from widening.

Imports make up the difference between domestic production and consumption. Unfortunately, increased dependence on imports insures price volatility. The reason is that the incremental imported supply usually does not come to U.S. shores until **AFTER** prices have risen here rather sharply.

When supply and demand are out of balance, the inability of the present day U.S. refining system to correct the problem quickly leads to a price run-up. The situation has been complicated by the industry's desire to hold lower cushion stocks levels.

Source: Statistics from the Energy Information Administration (EIA)

Chart 4. Gasoline Price Spreads and Stock Levels



LOW STOCKS INCREASE REVENUES

This chart compares the level of pre-season (end February) stocks of gasoline nationwide over the last 13 years to non-crude oil price trends (see Note 1 below). The grey part of the price spread bars denotes the maximum-minimum price spread range during the year—a measure of the volatility of gasoline prices. The arrow over 2004 reminds the reader that we do not yet know how high this bar might ultimately rise.

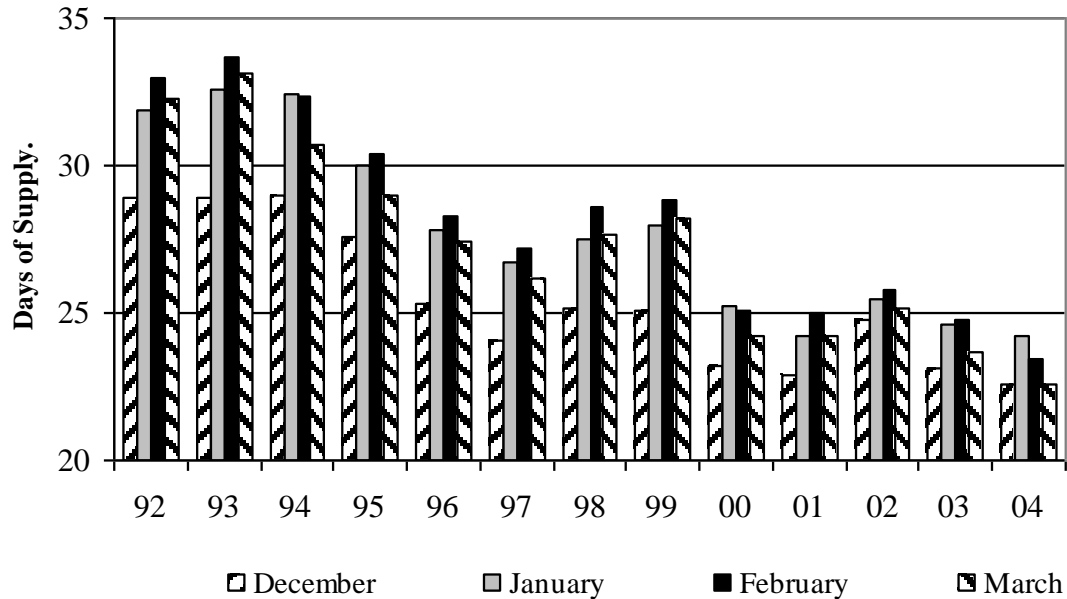
The chart shows that low stocks correlate with higher refined product revenues and more volatility. For example, higher pre-season stocks in 1998, 1999 and 2002 correspond to falling spreads—that is, the gasoline markup over crude oil and taxes is lower.

The price spreads include refinery operating costs, transportation, distribution, storage, and profits at the wholesale and retail levels. Since these cost components are relatively stable, most of the variation is in profits at the wholesale and retail level.

Notes:

1. The gasoline price spread is defined as the difference between gasoline retail prices and the sum of taxes and crude oil costs.
2. 2004 only includes January through mid-March.
3. All prices are for conventional gasoline, not reformulated gasoline.
4. The price spread between retail gasoline and crude oil is somewhat larger here than the sum of the wholesale and retail margins shown in an earlier chart. This is because we have used a market basket of crude oils here that more closely represents what refiners purchase. Other charts in this series employ spot crude oil prices to depict short-term changes.
5. Source: All data are from the Energy Information Administration.

Chart 5. Gasoline Inventory Days of Supply



RISING DEMAND AND FALLING STOCKS HAVE SUBSTANTIALLY REDUCED DAYS OF SUPPLY

“Days of supply,” computed by dividing end of month stock levels by the next month’s consumption, shows how the U.S. gasoline supply system has degraded and the stock “cushion” has evaporated. The measure has fallen by a third from the comfortable levels of 32-33 days in the early 1990s to about 22 this March (see note below). At the same time days of supply fell, price volatility rose. Some term this “just in time” stock management, but clearly it is not in time for the consumer to avoid increases in gasoline pump prices.

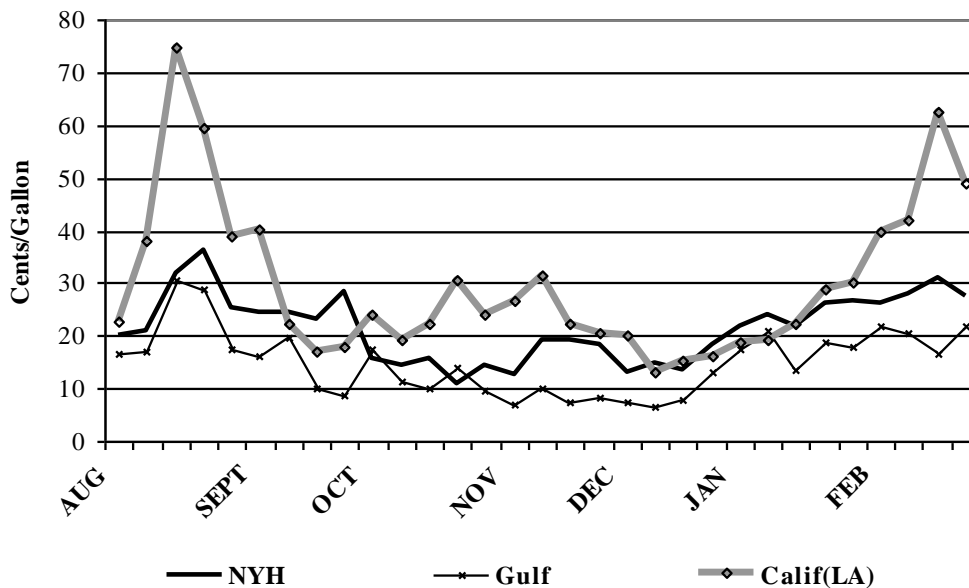
The chart shows that February and March of 2004 are the lowest levels seen in recent history. It is also instructive to note that in most years, days of supply for February were above January (2000 is the only exception). In 2004, February was significantly lower than January, indicating that the supply situation deteriorated measurably as the winter drew to a close.

Finally, note the trend breaks in 1998, 1999, and 2002, which were years that the previous chart shows to have had lower gasoline price spreads (lower markups over crude oil costs).

Note:

In reality, about 180 million barrels of the inventories are in pipeline fill, refinery stocks and terminal bottoms and are not useable. Therefore, the 200 million barrels of gasoline inventory present this March equates to slightly more than two days of national gasoline consumption when unusable “working inventory” is considered.

Chart 7. Gasoline Wholesale Margins (Conventional Spot Gasoline minus Crude Oil Spot Prices)



GASOLINE MARGINS IN CALIFORNIA AND THE U.S. EAST AND GULF COASTS SHOW PRICE PROBLEMS BEGAN IN LATE DECEMBER

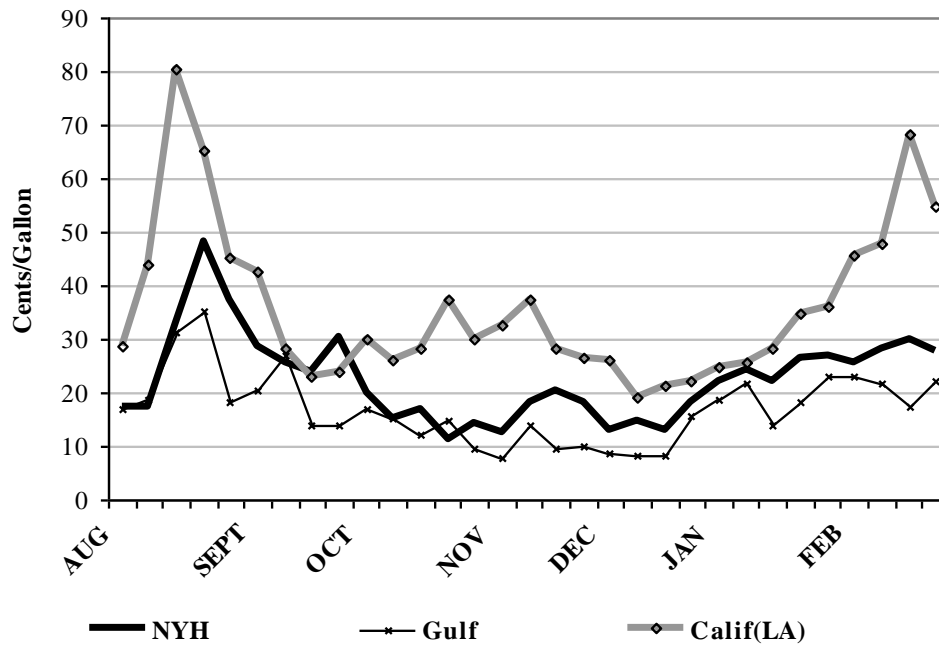
Taking a finer-grained look at the timing of changes in gasoline margins allows us to pinpoint the timing of events that led to the recent price run-up. By subtracting crude oil prices we are focusing on the timing of events that affect gasoline specifically.

The chart shows that margins began to grow in late December and accelerated in January, reflecting a tightening of the supply situation that began in December and persisted. Interestingly, the same timing is apparent in all three areas. While the changes in California stand out due to their magnitude, it should be noted that margins in the Gulf Coast and upper East Coast (as represented by New York) more than doubled.

Note:

Margins here, as in the previous chart, are defined as the spot conventional gasoline prices in the three areas minus an appropriate crude oil price. We used the Alaskan North Slope prices delivered in Los Angeles to compute the California margin, West Texas Intermediate to produce the Gulf Coast margin, and Brent crude (FOB) plus \$1 per barrel (transportation) for the East Coast margin.

Chart 8. Reformulated Gasoline Wholesale Margins (Spot Gasoline minus Crude Oil Prices)



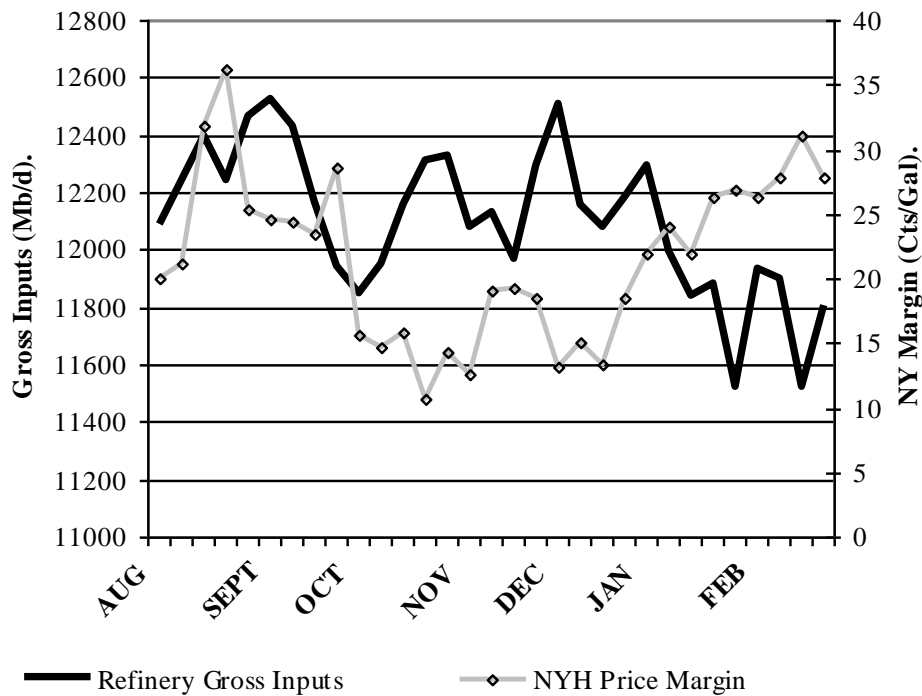
REFORMULATED GASOLINE MARGINS SHOW SAME PATTERN OF INCREASES AS CONVENTIONAL GASOLINE

This chart shows that the pattern for reformulated gasoline is almost identical to that for conventional gasoline. It follows that the December-February price increases were not peculiar to reformulated gasoline in general, or to ethanol blended RFG in particular. That is, all types of gasoline were affected.

Note:

Although the pattern is the same, comparison of the two charts shows that RFG (blended with MTBE) in New York was more seriously affected by the shortages last August and September than was conventional gasoline (i.e., the margins are higher in this chart).

Chart 9. Refinery Gross Inputs for PADD I-III



FALLING GASOLINE PRODUCTION RESULTED FROM A DECREASE IN REFINERY UTILIZATION

From its December peak to mid February, refinery inputs fell by about 900,000 barrels per day. This was the principal cause of the gasoline output reductions.

Refinery reductions in December-February are to be expected and consistent with this magnitude. At this time, refinery operators historically have conducted planned maintenance to ready the plants for high spring and summer gasoline production.

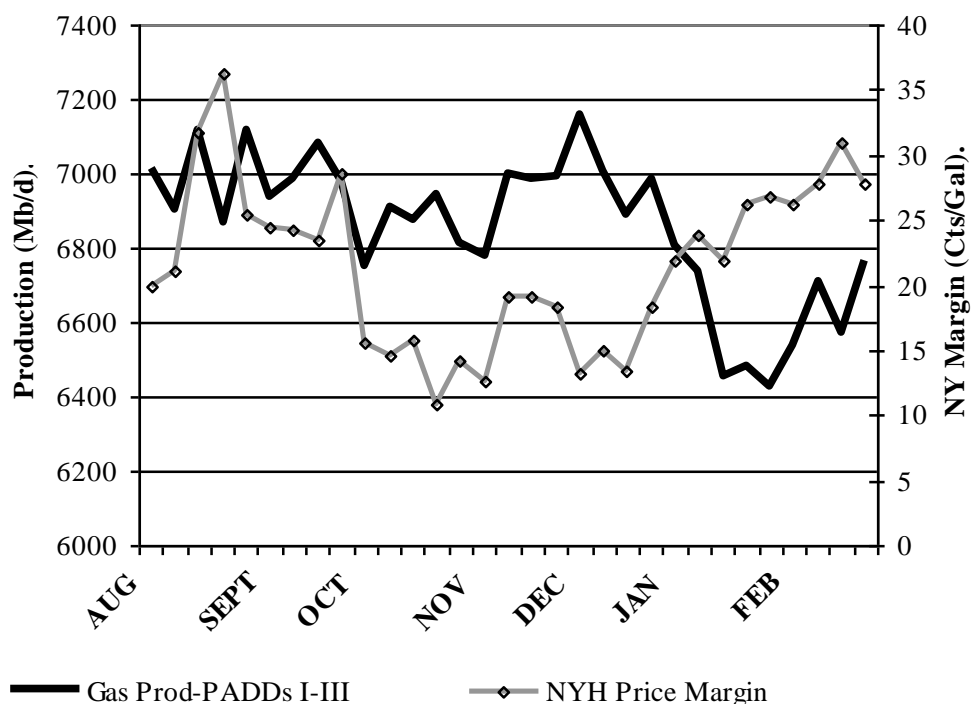
The purpose for the late winter gasoline stock buildup is to provide marginal supplies while this maintenance is carried out. This year, and to a great extent last year, stock levels never were built up to take care of this expected downtime.

At least four refineries had accident problems that were reported in February, but their effects on supply were minimal. Nevertheless, since the market was so short of stocks, the news may have contributed temporarily to the gasoline price run-up.

Notes:

1. Refinery gross inputs are mainly the crude oil refined by a refinery plus a small amount of natural gas liquids and reprocessed heavy oils.
2. Source is EIA weekly statistics

Chart 10. Total Gasoline Production in PADDs I, II, and III



RISING GASOLINE MARGINS IMMEDIATELY FOLLOWED REDUCTIONS IN REFINERY GASOLINE PRODUCTION

Refineries in the southern states (PADD III) supply both the upper Midwest (PADD II) and the East Coast states (PADD I).

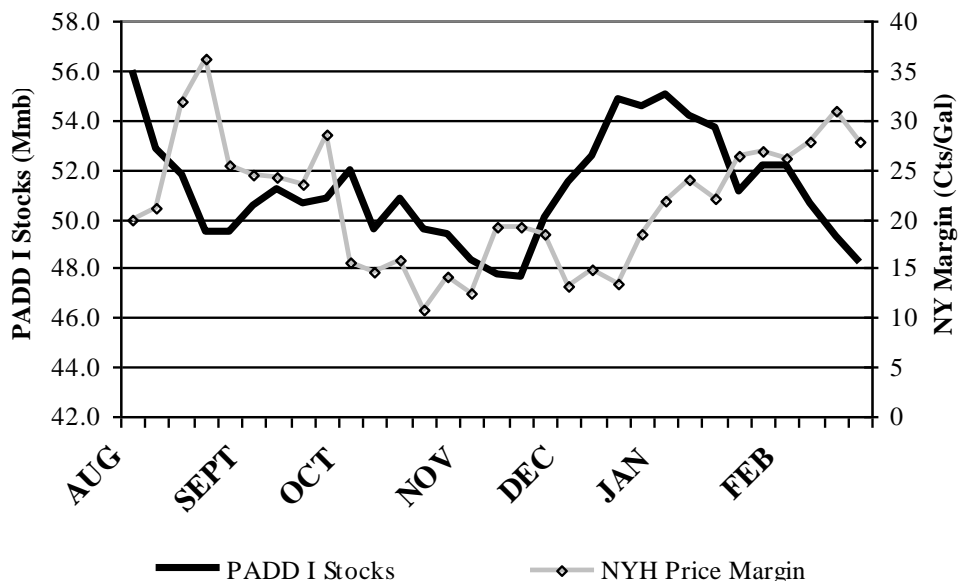
This chart shows that these refineries collectively reduced gasoline production throughout December and January by over 700,000 barrels per day from the early December peak.

The New York spot price margin from the previous chart included here shows that rising prices followed shortly after the cutbacks.

Notes:

1. Total gasoline production is shown, which includes conventional gasoline, RFG, and blendstocks (which, in turn, include the blending stock for ethanol-based RFG).
2. Source is EIA weekly statistics.

Chart 11. East Coast Total Motor Gasoline Stocks

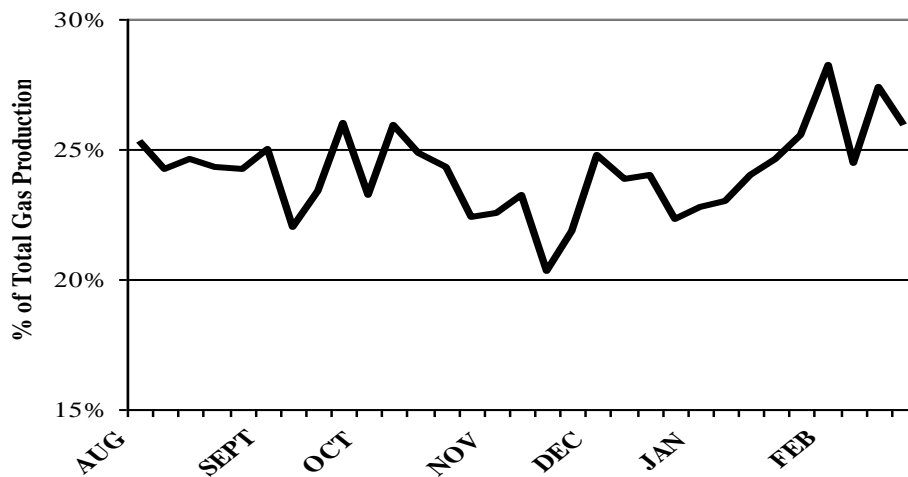


RISING MARGINS COINCIDED WITH GASOLINE STOCK REDUCTIONS ON THE EAST COAST

The effect of refining cutbacks on PADD I gasoline stocks was immediate and sharp. During January and February, stocks fell by 6.8 million barrels (12 percent) and reversed what would otherwise have been a comfortable pre-season buildup.

Source: EIA weekly statistics.

Chart 12. Reformulated Gasoline Production Yield



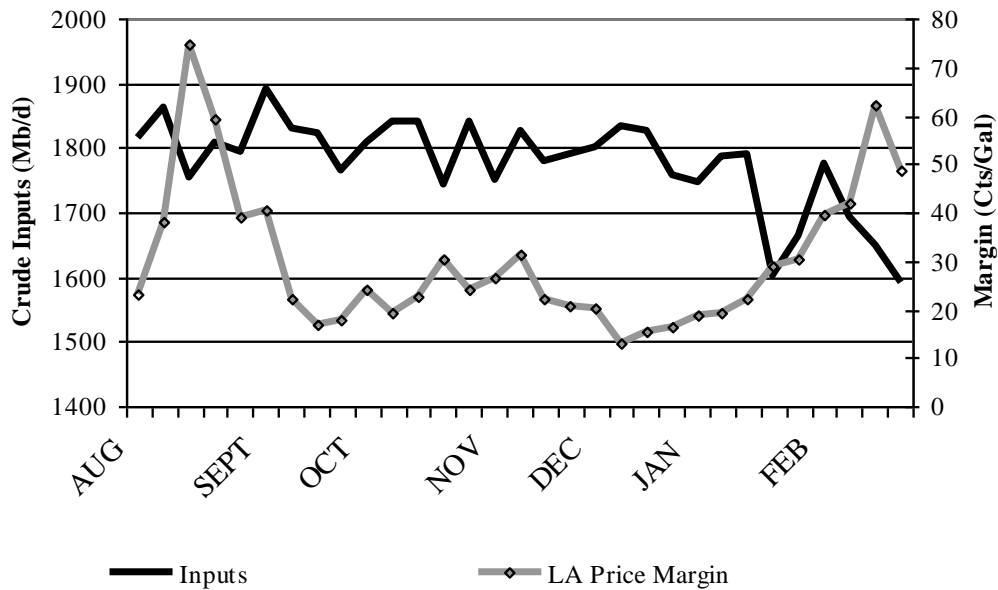
RFG PERCENTAGE ROSE AS GASOLINE OUTPUT FELL

This chart shows RFG production as a percent of total finished gasoline production.

During the critical period when gasoline production and stocks were falling, the RFG percentage actually rose slightly. If producing RFG contributed to the production decrease, the percentage would be expected to decline. However, that is not the case, indicating that the problems were more generally associated with supply-demand balances, not RFG production.

Source: EIA weekly statistics.

Chart 13. California Refinery Crude Oil Inputs



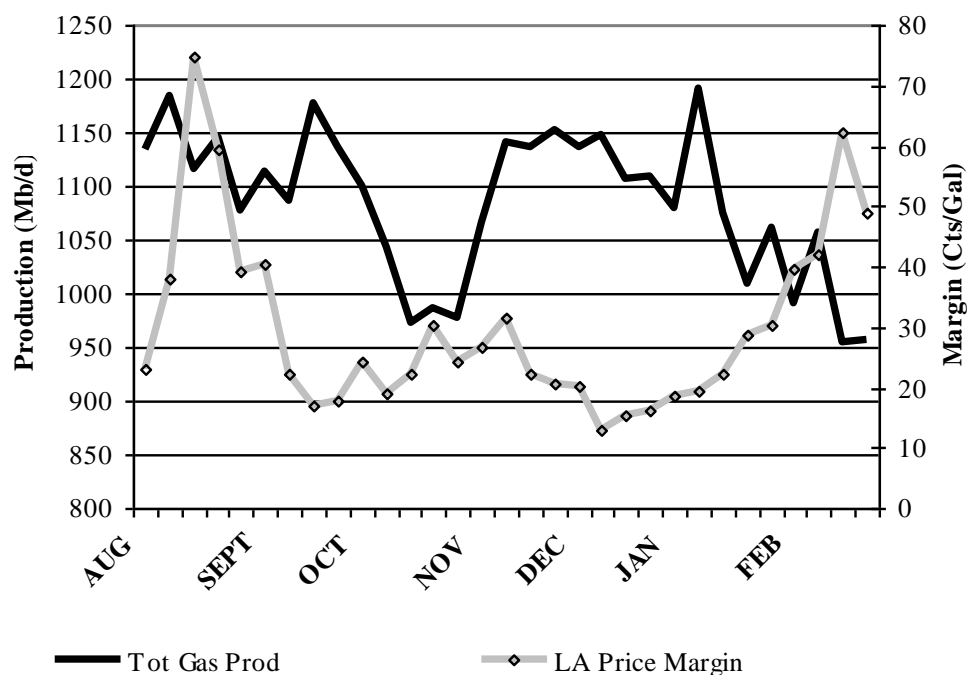
CALIFORNIA’S REFINERY CUTBACKS WERE COMPOUNDED BY REFINERY PROBLEMS

California’s refineries reduced crude oil processing by about 13 percent between mid-December and end-February.

The sharp drop in early February no doubt added to the upward movement that was already underway in California gasoline prices. It seems to be associated with a coker problem at ChevronTexaco’s El Segundo refinery outside Los Angeles. A power outage at Tesoro’s San Francisco refinery also reduced operation slightly in mid-February.

Source: CEC refinery statistics.

Chart 14. California Gasoline Production and Spot Margin



CALIFORNIA MARGIN INCREASE ALSO COINCIDED WITH A GASOLINE PRODUCTION DECREASE

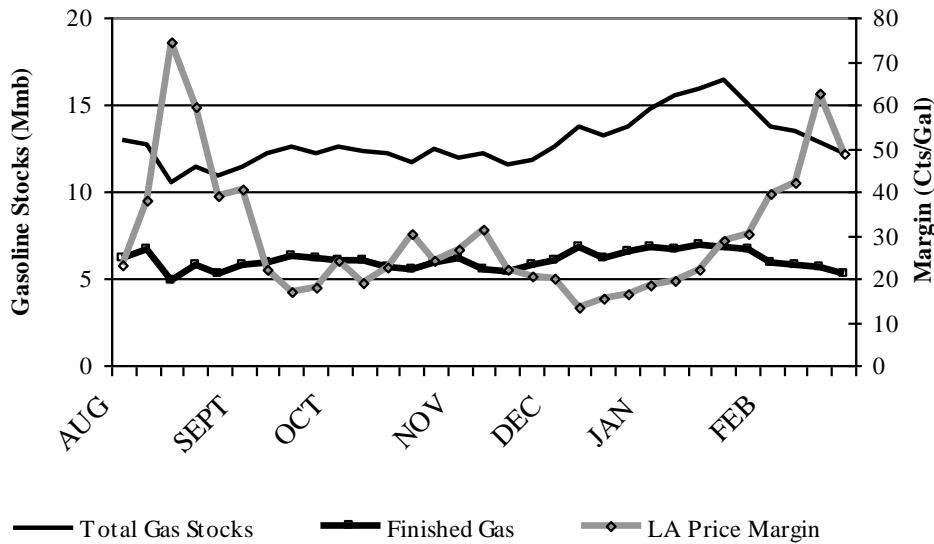
California’s spot margin began to rise as soon as production fell in mid-December. By end-February, gasoline production was down 17 percent. California is very sensitive to refinery production because there is little seasonal buildup in stocks. Timing is important also. For example, the big decrease in gasoline production in October (attributed to unspecified “refinery problems” in California Energy Commission reports) only raised the margin 10-12 cents per gallon. The reduction came shortly after Labor Day and, as the next chart shows, apparently did not shut down refineries. After production resumed, gasoline margins declined.

Note that, even though gasoline production fell in October, crude oil inputs did not. This indicates that the “problems” were internal refinery difficulties. As such, they probably did not attract enough attention to dramatically increase prices in the post-Labor Day period when driving fell off. The following chart substantiates this hypothesis by showing that stocks of gasoline did not fall in the October-November period despite the reduction in gasoline production.

Notes:

1. Source: California Energy Commission (CEC) weekly refinery statistics.
2. CEC refinery reports capture production of finished gasoline and CARBOB which is to be blended with ethanol.

Chart 15. California Refinery Stocks of Gasoline and Blendstocks



CALIFORNIA'S GASOLINE BLENDSTOCKS ROSE AT REFINERIES DESPITE THE PRODUCTION CUTBACKS

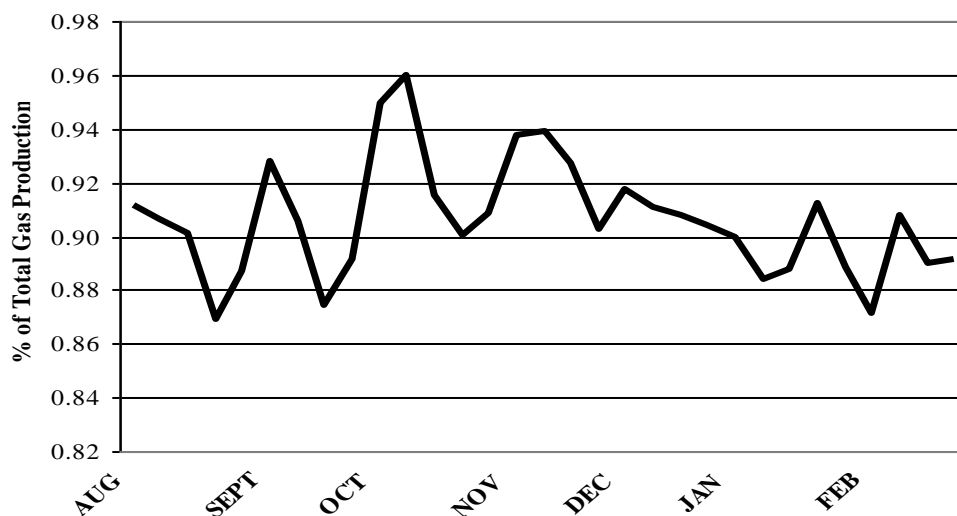
California Energy Commission (CEC) data show that finished gasoline and blending component stocks at refineries grew by over 40 percent (about 5 million barrels) during December–January before falling in February. Increases in blendstocks (the difference between the two stock lines on this chart) made up three-quarters of the growth.

Overall, stocks of finished gasoline are fairly stable. This is to be expected as refinery stocks should be viewed as “working” inventories. Refinery stocks of finished gasoline declined about 2 million barrels during January and February. Unfortunately, available statistics do not permit determination of the composition of the blendstock inventories.

Notes:

1. Source: CEC statistics
2. The state-wide stocks picture for California is unclear due to gaps and incompatibility among the various statistical series. The CEC does not cover terminals outside refineries and EIA's state terminal statistics do not cover blendstocks. Further, at this writing (late March), only December monthly EIA state-level stocks data are available.
3. It is not clear exactly what is being captured as “blendstocks” by either EIA or CEC. It is possible that some of the growth in CEC's California data could be ethanol supplies acquired by refineries.

Chart 16. California Refinery RFG Production Percentage



IN CALIFORNIA, RFG RANGED FROM 87 TO 96 PERCENT OF FINISHED GASOLINE PRODUCTION

Weekly RFG percentage of refinery gasoline production was erratic during the fall, ranging from a low of 87 percent to a high of 96 percent. In December-February, the percentage range was 87 to 92 percent. Over the period, the RFG percentage has moved around 90 percent. During the preceding two years, the RFG percentage varied between 85 and 95 percent, so the August-February period shown above is well within normal range.

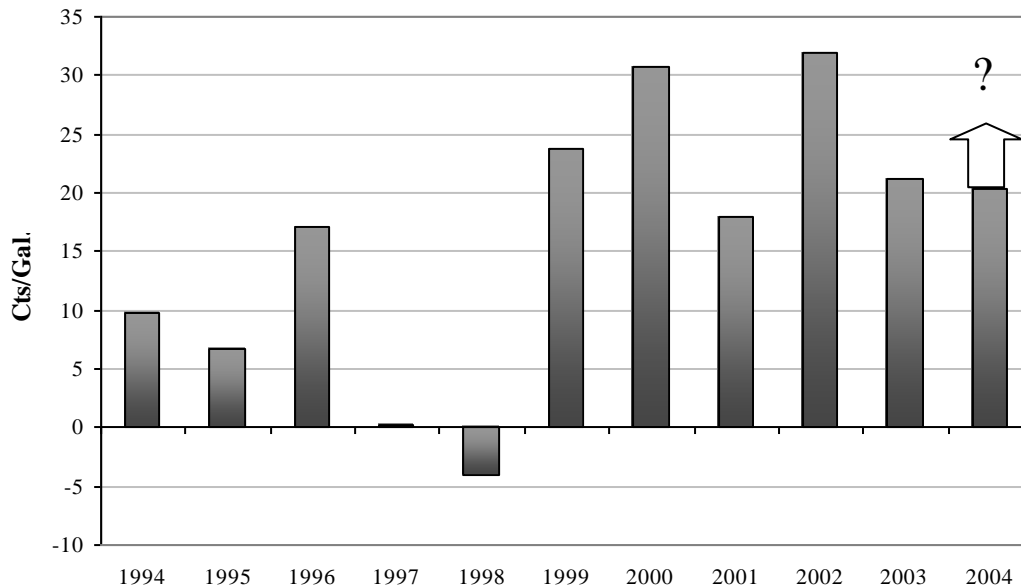
California refineries typically supply a substantial amount of the gasoline supply to neighboring Nevada and Arizona. Reformulated gasoline comprised about 92 percent of refiners' wholesale sales in California, Arizona and Nevada combined in 2002.¹³ That compares favorably with the California refinery output percentages observed in the chart.

Notes:

1. Source is CEC data.
2. This chart is not compatible with a similar earlier chart for the East Coast taken from EIA data. CEC only captures refinery production, while EIA captures blending outside the refinery at terminals.

¹³ 2002 Petroleum Marketing Annual, Table 44, Energy Information Administration.

Chart 17. National Average Spring-Summer Retail Gasoline Price Increases



LARGE PRICE INCREASES ARE NO LONGER UNUSUAL

This chart shows the maximum amount prices have risen between August of each year and the preceding December. The peak month varied from year to year; for example, in 2000, it was July; in 2003 the peak occurred in March. In 1997 and 1998, prices fell throughout the year, so the “peak” after the preceding December was low or negative. A collapse of Asian economies led to this decrease in prices worldwide.

Prices had peaked by March in only 3 of the 11 years shown. Unless refiners and other gasoline marketers increase gasoline stocks through higher production and imports, consumers are likely to see continued price growth through this season.

Finally, it should be noted that the large price increases occurring in the last five years happened when MTBE was the primary RFG gasoline oxygen additive, i.e., before ethanol addition became a factor outside the Midwest.

Notes:

1. Source is EIA weekly retail gasoline prices for the Central Atlantic region. The prices are for all gasoline grades and types. We computed maximum historic price changes by averaging weekly prices in each month.
2. In 1997 and 1998, prices were either stable or fell during the year. If these two years are removed, in all but one other year (1996) prices peaked later than March.