Summer 1995 Gasoline Assessment

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Summary

Fundamental changes to U.S. gasoline markets in recent years add complexity and uncertainty to the summer assessment. Growing demand, without corresponding increases in production capacity, has increased both domestic refinery capacity utilization and dependence on imports. At the same time, expanding product slates, driven by clean air concerns, have reduced flexibility in refinery, transportation, and storage operations. Additionally, regulatory uncertainties affecting demand and specifications for cleaner fuels have complicated suppliers' planning for both short- and long-term product availability.

Summer[2] gasoline demand is forecast to reach record high levels in 1995, driven by continuing economic growth. In the Mid World Oil Price Case of the Energy Information Administration's (EIA) *Short Term Energy Outlook (STEO)*, summer demand is expected to average 7.89 million barrels per day (MMBD), 1.8 percent higher than summer demand last year (Table FE1). Refinery production to serve this demand is forecast to increase 1.9 percent to 7.36 MMBD. Non-refinery gasoline blending is expected to add another 150 thousand barrels per day (MBD). Net imports are estimated to remain at about the same level as last year, which was slightly higher than the average for 1989-1993. Estimated stock levels begin slightly lower, but end higher than last year's levels.

This will be the first driving season in which reformulated gasoline (RFG) is used. RFG is expected to account for about 30 percent of total demand this summer, peaking at 2.4 MMBD in July and August. Stocks of RFG have been running lower than conventional gasoline on a days supply basis, and there is no reason to expect this pattern to change over the summer under the Mid Case forecast. This would imply that RFG stocks will not provide a significant source of incremental supplies, and RFG imports will have to make up the difference between production and demand. If RFG production does not go higher than 2.2 MMBD, imports of 200 to 300 MBD of RFG may occur; however, much uncertainty exists around the mix of production and imports that will actually occur. Supplies of oxygenate for RFG are expected to be adequate.

The Mid Case world oil price is roughly constant at $16.75 per barrel, $0.50 per barrel (about 1.2 cents per gallon) higher than last year. Wholesale gasoline spreads over crude price average over 3 cents per gallon higher than last year's average wholesale spread, due to increased costs of producing RFG and to refiners and wholesalers recovering slightly from the low spreads in 1994. This would imply at least a 4-cent per gallon increase in costs to retailers, which is reflected in the wholesale prices shown in Table FE1. The retail price is forecast to increase about 5 cents per gallon over 1994, to average $1.24 for the 1995 summer driving season.

If the market returns to a situation similar to that of 1994, with lower wholesale price spreads over crude, retail prices will likely be 1 to 2 cents per gallon lower than the forecast. However, if world markets experience strong gasoline demand growth and lower incentive to export to the United States, import levels may be lower than forecast, potentially driving stocks lower than forecast. This would tend to push prices higher.

[1] Michael Burdette, Joanne Shore, and John Hackworth, industry analysts on contract to EIA, also contributed to this article.

[2] "Summer" and "driving season" are used throughout this article to refer to the period including the second and third quarters of the calendar year, i.e., April through September.

Unless otherwise referenced, data in this article are taken from the following: *Weekly Petroleum Status Report*, DOE/EIA-0208, April 21 (95-17) and prececessor reports; *Petroleum Supply Monthly*, April 1995, DOE/EIA-0109(95/04); *Petroleum Supply Annual* 1993, DOE/EIA-0340, Volume 1 and prececessor reports; *Petroleum Marketing Monthly*, March 1995, DOE/EIA-0380(95/03); *Short-Term Energy Outlook*, DOE/EIA-0202(94/1Q) and predecessor reports. All data through 1993 are considered final and are not subject to further revision.

Table FE1. Motor Gasoline Demand and Supply Factors, Summers (April 1 - September 30) 1992 - 1995

Factor	History			STEO Mid Case
	Summer 1992	Summer 1993	Summer 1994	Summer 1995
Gross Domestic Product Growth Rate (percent)	2.3	3.1	4.2	2.9
Disposable Personal Income (billions of $ 1987)	$3,630	$3,705	$3,826	$3,963
Vehicle Miles Traveled (million miles per year)	6437	6603	6756	6947
Vehicle Fuel Efficiency (miles per gallon)	20.71	20.54	20.78	20.97
Summer Demand (millions of barrels per day)	7.51	7.66	7.75	7.89
Refinery Production (millions of barrels per day)	7.05	7.30	7.22	7.36
Field Production (millions of barrels per day)	0.12	0.07	0.13	0.15
Net Imports (millions of barrels per day)	0.27	0.19	0.37	0.37
Stock Change (millions of barrels per day)	-0.07	-0.11	-0.05	-0.02
Stock Levels, begin/end (millions of barrels)	220/206	230/208	214/205	212/209
Refinery Operable Utilization Rate (percent)	89.8	93.3	95.0	94.3
Price of Imported Crude Oil (average per barrel)	$19.04	$16.63	$16.25	$16.75
Wholesale Gasoline Price (average per gallon)	$0.71	$0.65	$0.62	$0.66
Federal Tax Rate (average per gallon)	$0.14	$0.14	$0.18	$0.18
Retail Gasoline Price (average per gallon)	$1.21	$1.18	$1.19	$1.24

Source: *Short-Term Energy Outlook*, *Petroleum Supply Monthly/Annual*, and *Petroleum Marketing Monthly/Annual*.

The Mid World Oil Price Case is the basis for the summer driving season forecast described in this article. The STEO case was developed using the Short-Term Integrated Forecasting System, driven principally by three sets of inputs pertaining to key macroeconomic variables, world oil prices, and the weather. Table FE1 compares the major STEO demand drivers (Gross Domestic Product Growth Rate, Disposable Personal Income, Vehicle Miles Traveled, and Vehicle Fuel Efficiency Index), price drivers (the Price of Imported Crude Oil and the Federal Tax Rate), and the model results for demand, supply components, and prices.

Introduction

As the summer 1995 driving season approaches, gasoline supply and market conditions are somewhat different from past years. Expected record demands this summer, if realized, will push refinery utilization to very high levels. In addition, this is the first summer driving season using RFG. The RFG program, which started in December 1994 at the wholesale level and in January 1995 at retail, impacts the overall gasoline market in a variety of ways.

Gasoline today encompasses many different formulations, grades and volatility classes. Prior to the Clean Air Act Amendments of 1990 (CAAA), gasolines were mainly distinguished by grade (octane rating) and by Reid Vapor Pressure (RVP). The CAAA added oxygenated gasoline for carbon monoxide control, and most recently RFG, designed to reduce ground-level ozone pollution. Products vary by season and by geographic location. For example, oxygenated fuels (both oxygenated gasoline and oxygenated reformulated gasoline) are only required during the winter months and in limited geographic areas. The RFG program was the most complex new product program implemented by the industry to date, requiring major refinery changes. In addition, RFG must be kept segregated from other gasolines and tracked from refinery to outlet. The addition of RFG to the gasoline pool increases the demand for oxygenates during this summer over previous summers, and presents a new set of uncertainties for refiners and marketers.

This article provides an overview of the gasoline market as it stands facing the 1995 driving season, followed by a discussion of the assessment for gasoline supply, demand, and prices this summer.

Overview of the Motor Gasoline Market

The 1995 summer driving season is expected to create record high demands for gasoline. Preliminary estimates show first quarter 1995 demand as high as 4.1 percent over first quarter 1994. Total production and net imports were 7.4 MMBD, or 5.0 percent higher in the first quarter 1995 than first quarter 1994. Primary in-

Introduction of Reformulated Gasoline (RFG)

Throughout 1994, the petroleum industry prepared for the introduction of reformulated gasoline (RFG), required year-round in almost a third of the U.S. gasoline market by the Clean Air Act Amendments of 1990 (CAAA). As the latest in a series of regulatory initiatives designed to improve the environmental quality of motor fuels, the CAAA necessitated a proliferation of reformulated and other clean products in the gasoline market by the end of 1994. Transition to the RFG program progressed without significant supply shortfalls or price runups, in contrast to the start-up of the low sulfur diesel program when a combination of infrastructure problems and low stocks led to price spikes in some regions.

Prior to the start of the program, RFG use was expected in 9 mandated areas and various others that had "opted-in", which combined constituted about 35 percent of U.S. gasoline consumption. The original forecasts for RFG demand of about 2.5 MMBD in December 1994 and January 1995[3] never materialized, mainly because some areas elected to opt out of the program. These areas, which combined represented about 200 MBD of RFG demand, were among the most distant from supply facilities. Their exit reduced the risk of localized outages.

RFG production began in September, then accelerated as refiners built stocks before the program startup. RFG production was expected to reach peak levels earlier than it did. One of the reasons for the delay was the Colonial Pipeline break in October, which, by raising conventional gasoline prices relative to RFG, discouraged an early switch to RFG production. Once the break was repaired and market concern over conventional supplies eased, the differential returned, and RFG production surged.

The peak production level of 2.2 MMBD was reached in the first 3 weeks of December, prior to the realization of downward, opt-out related pressures. Although production never reached forecast levels, refiners began to cut output in late December, in response to lower demand, reduced financial incentives, and increased uncertainty as to what gasolines would eventually be required in many areas.

RFG stocks built fairly quickly once production began, and hit 40 MMB by the end of November, when RFG supply from terminals was required. Stocks peaked at about 44 MMB in mid-December, or about 23 days of supply at estimated January demand levels. After that, RFG stocks gradually declined, as falling demand was more than offset by production cuts. RFG stocks in late February stabilized around 40 MMB, or 21 days supply, low by historical standards, and have since fluctuated between 40 and 45 MMB.

Despite the relatively smooth startup of the RFG program, and minimal price impacts on consumers, several issues emerged which cloud the outlook. Following the opting-out of various counties in Pennsylvania, New York, and Maine, and an early adjustment to lower oxygen content in northern New Jersey, the State of Wisconsin requested the suspension of RFG requirements for the remainder of the winter. The request, ultimately denied by EPA, was based on consumer complaints of high cost, health hazards (nausea and dizziness), and engine damage, all attributed to RFG. Particular complaints were lodged against MTBE as the source of noxious vapors, especially during cold weather. A unique aspect of the State's request was that the Milwaukee area, unlike the earlier opt-out areas in the East, was one of the nine severe ozone non-attainment areas mandated to participate in the program. Wisconsin has since rescinded its late opt-in of three other counties, and its state legislature has continued to seek legal means to exit the program, or at least to outlaw the use of MTBE in the State. Other jurisdictions are reported to be following the Wisconsin situation with great interest.

[3] EIA, *The Energy Information Administration's Assessment of Reformulated Gasoline* (October 1994) and *The Energy Information Administration's Assessment of Reformulated Gasoline: An Update (December 1994).*

ventories (stocks) ended March at 212 million barrels (MMB), which is quite low, but not the lowest March ever. Finished gasoline stocks ended the quarter at about 22 days supply (based on the demand forecast for April), much lower than the 5-year average of 25 days. Prices are significantly above last year's pre-season levels, partly due to higher crude oil costs, and have begun their usual seasonal increase.

The addition of RFG to the gasoline pool this year has significantly affected gasoline markets (see box above, "Introduction of Reformulated Gasoline"). The low stock levels experienced through the first quarter were in large part due to low RFG stocks. Uncertainties surrounding opt-outs, i.e., the unexpected withdrawal of voluntarily participating areas, and weak RFG prices relative to conventional fuels, constrained RFG production and imports, thereby keeping stocks from growing much beyond their initial levels when the program began last December. After strengthening somewhat through late January, the price differential narrowed in February and March, as oxygenate costs eased and conventional gasoline prices began their seasonal climb.

Table FE2. Finished Gasoline Demand
(Thousands of Barrels per Day)

Years	Quarter 1	Quarter 2	Quarter 3	Quarter 4	Annual	Annual Growth
1992	7,072	7,436	7,583	7,409	7,376	1.1%[1]
1993	7,044	7,573	7,754	7,525	7,476	1.4%
1994	7,186	7,682	7,826	7,644	7,587	1.5%
1995	7,484					

[1]This percentage was calculated from 1991 to 1992 using 1992 data not adjusted for blending components, since only unadjusted 1991 data is available.

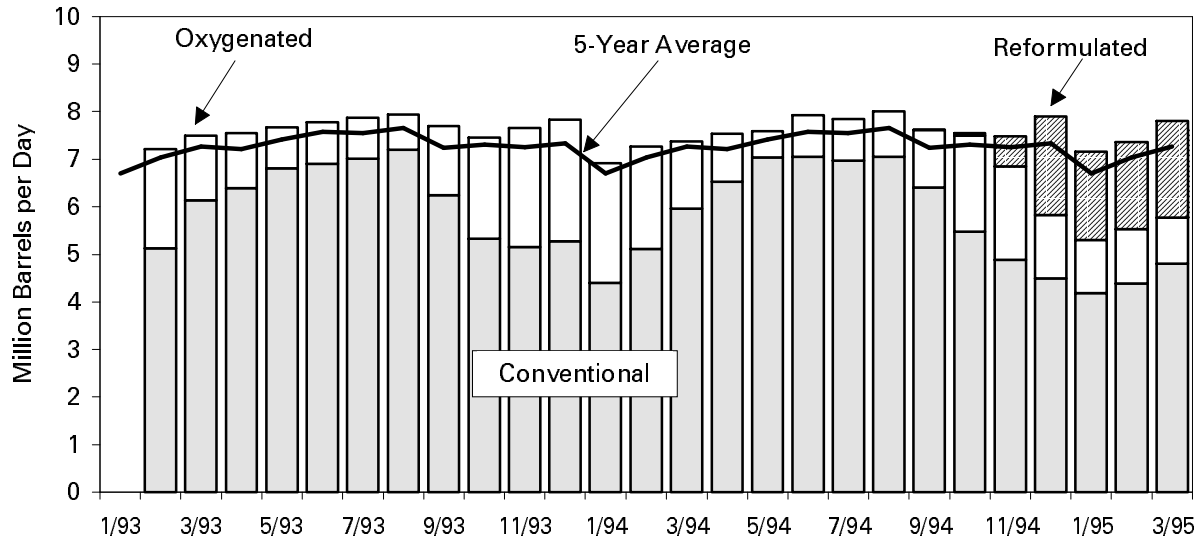
Source: *Petroleum Supply Monthly/Annual*.

Demand

Motor gasoline demand has shown strong growth for the past several years. Gasoline demand was influenced by a recession that began in the last half of 1990 and lasted through the first half of 1992. With the rebound in the economy, the need for motor gasoline increased in 1992 and 1993 (Table FE2). Gasoline demand continued a strong growth pattern in 1994 as the economy continued to improve. Real disposable personal income increased at a rate of 3.5 percent, compared with 1.5 percent in 1993. Gross Domestic Product rose by a robust 4.0 percent (in constant dollars), contrasted to 3.1 percent in 1993.[4] This led to continued growth of the vehicle fleet and an increase in the average number of miles driven per vehicle, both of which boost gasoline consumption. Since the late 1970's, improvements in fuel efficiency, measured by miles per gallon, tended to slow demand growth; however, fuel efficiency in 1992 and 1993 began to fall slightly, removing the moderating effect it had on consumption historically.[5]

In 1994, gasoline demand, as measured by product supplied, set a record of almost 7.6 MMBD. This represented a rise of 1.5 percent from 1993's record of 7.5

Figure FE1. U.S. Motor Gasoline Product Supplied



Source: *Petroleum Supply Annual*.

[4]*Short-Term Energy Outlook*.
[5]Energy Information Administration, *Monthly Energy Review*, March 1995, DOE/EIA-0035(95/03).

Table FE3. Finished Gasoline Production
(Thousands of Barrels per Day)

Years	Quarter 1	Quarter 2	Quarter 3	Quarter 4	Annual	Annual Growth
1992	6,809	7,081	7,027	7,311	7,058	1.2%
1993	7,091	7,340	7,413	7,590	7,360	4.3%[1]
1994	6,876	7,300	7,347	7,617	7,300	-0.8%
1995	7,279					

[1]Field blended gasoline was not available until the end of 1992. Thus, the growth shown from 1992 to 1993 is slightly over-stated; however, refinery production alone grew 3.5 percent between 1992 and 1993.

Source: *Petroleum Supply Monthly/Annual*.

MMBD. Concurrently, distillate and jet fuels were also in high demand.

Overall, gasoline demand has continued its relatively strong upward trend in 1995 to date (Figure FE1), averaging 7.5 MMBD through the first quarter compared to 7.2 MMBD for the first quarter 1994. RFG demand averaged 1.9 MMBD for the first quarter for 1995 or 26 percent of gasoline demand. However, RFG demand has not reached the levels anticipated by the Energy Information Administration (EIA) last fall,[6] mainly because some areas elected to opt out of the program. These areas represented about 200,000 barrels per day, roughly 10 percent of first quarter average RFG demand.

Production

To meet higher demand, gasoline production increased in 1992 and 1993, but dropped slightly in 1994, as imports returned to more typical levels in satisfying incremental requirements (Table FE3). Total gasoline production for the first quarter 1995 was 7.3 MMBD, up 5.9 percent over the 1994 first quarter production of 6.9 MMBD. RFG represented 25 percent of the first quarter's total gasoline production. The typical dip in spring production for refinery turnarounds did not occur in 1995, possibly due to the recent refinery upgrades completed in preparation for RFG production. Last year, for example, total gasoline production averaged 6.7 MMBD in March, but this year, March production averaged 7.3 MMBD.

A stronger economy also generated demand growth in other petroleum products. As a result, total refinery utilization, measured as gross inputs divided by operable distillation capacity, grew from 91.4 percent in 1993 to 92.6 percent in 1994. (Operable capacity remained essentially the same during these two years.) As the 1995 gasoline season is about to begin, utilization was 89.4 percent in March, higher than last year's March utilization of 87.4 percent, and high utilizations are expected this summer to meet strong demand projections.

As a result of the RFG program, oxygenates will play a more important role this summer than previously. Prior to the RFG program, increased oxygenates were only required during the winter. RFG contains increased oxygenates throughout the year, so oxygenate supply is of interest this summer. Methyl tertiary butyl ether (MTBE), one of the primary oxygenates in RFG, is used in conventional gasoline, as well as RFG, to enhance octane levels. MTBE demand peaked during the winter when both oxygenated gasoline and RFG were required (see box on "Oxygenates"). The industry increased capacity and production in anticipation of the RFG program startup. However, methanol[7] production plant problems caused concerns this past winter over adequacy of MTBE supplies, driving MTBE prices to record highs. Prices receded during the winter due to opt-outs, the end of the oxygenated gasoline season and resolution of methanol plant problems, but have recently strengthened. MTBE production levels are expected to be adequate to meet demand.

Imports and Exports

In 1994, high domestic demand and sufficient price differentials with Europe stimulated imports, which represented 5 percent of total gasoline supplied during the year, the highest level since 1990 (Figure FE2). However, as expected, in November and December, imports fell off as the RFG program began. During 1994, over 40 percent of U.S. gasoline imports came from the

[6]Energy Information Administration, *The Energy Information Administration's Assessment of Reformulated Gasoline*, Volumes 1&2, SR/OOG/94-02, Washington, DC, October 1994, and *The Energy Information Administration's Assessment of Reformulated Gasoline: An Update*, SR/OOG/94-03, Washington, DC, December 1994.

[7]Methanol is a key input to MTBE production.

Caribbean region, while Canada provided 13 percent. Brazil and the United Kingdom provided less than 7 percent each. For the first quarter of 1995, total gasoline imports have been modest, averaging 263 MBD compared to 302 MBD for the first quarter 1994. Through February, RFG represented 42 percent of the imports of which 31 percent came from Canada, and 34 percent each from both the Virgin Islands and from Venezuela. The first RFG imports from Europe were registered in February 1995.

Average total gasoline exports for 1994 were 103 MBD, about the same level as in 1993 and 1992. Over 60 percent of the exports went to Mexico. It is possible that the RFG program may result in increased exports as companies seek new markets for gasoline that does not comply with U.S. specifications. As the RFG program began in December 1994, exports jumped to 248 MBD compared to 171 MBD in December 1993. This marked the highest single month for gasoline exports since 1964, when export statistics were initiated. However, they retreated to an average of 103 MBD in the first quarter of 1995. It is still too early to tell if exports will increase substantially in 1995.

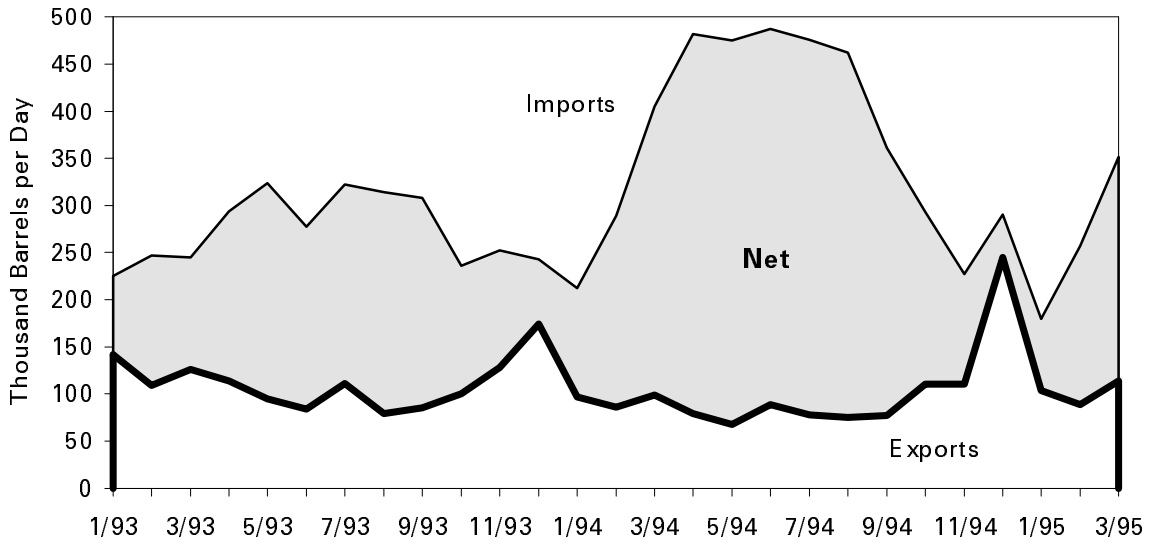
In spite of 1995's high gasoline demand, net imports for the first quarter declined from last year, averaging 160 MBD, compared to 208 MBD in 1994 and 113 MBD in 1993.

Stocks

Gasoline stocks at the primary level remained lower than average from March through October 1994 (see "Expectations for the Summer Driving Season," Figure FE7). In October, conventional stocks dropped as tanks were drawn down to make room for oxygenated and reformulated gasolines. By the end of November, finished gasoline stocks had recovered to average levels of 24 days of supply, while, as expected, RFG inventories covered only 19 days of supply.[8] During December, oxygenated stocks dropped, while conventional and RFG increased slightly, but not enough to keep total stocks from returning to below average levels.

Normally, total gasoline stocks build in January as gasoline demand falls off and refinery production stays strong to produce seasonally higher distillate volumes for heating fuel. The typical seasonal build did not occur in early 1995. Oxygenated gasoline stocks began to fall as expected, since the oxygenate season was nearing its end in many regions in February. Conventional stocks increased somewhat, but RFG stocks fell, as growing uncertainty over actual requirements in the face of

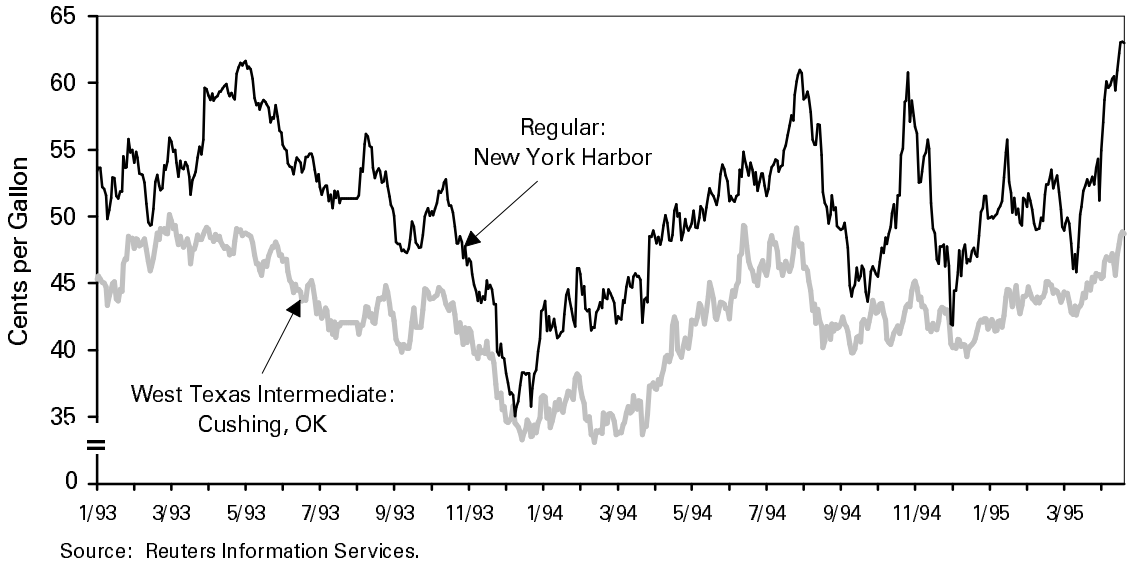
Figure FE2. U.S. Total Motor Gasoline Imports and Exports



Source: *Petroleum Supply Annual.*

[8]RFG stocks were expected to begin low, which is typical of new product introduction; however, once equilibrium was reached, RFG stock levels (on a days supply basis) were expected to be more typical of conventional stock levels.

Figure FE3. Spot Crude Oil and Gasoline Prices



Source: Reuters Information Services.

mounting opt-out pressure coupled with weakening relative prices discouraged production.

Stock levels did not change much in February, but fell seasonally in March. The quarter ended with U.S. finished gasoline stocks at about 22 days of supply, compared to the 5-year average of 25 days of supply.

Prices

Motor gasoline prices in the spring of 1995 have averaged significantly higher than those a year ago, partly because of higher crude oil prices. As of April 21, spot prices for conventional unleaded regular gasoline at New York Harbor stood at 63.0 cents per gallon, 14.4 cents above the same date in 1994 (Figure FE3). West Texas Intermediate (WTI) crude oil prices were up $2.90 per barrel, or 6.9 cents per gallon, in the same period. U.S. average retail prices stood 8.4 cents above the same point in 1994.

On a year-to-year basis, except during unusual market situations, crude oil prices tend to be the most significant determinant of gasoline price levels. Pre-season (spring) gasoline prices were significantly lower in 1994 than the previous year, due to a sustained decline in crude oil prices during most of 1993. However, rising world oil demand and relatively stable production levels brought on a crude oil price recovery in the first half of 1994, only partially offset by a more moderate decline in late summer. Crude oil prices stabilized in the $17 to $19-per-barrel (WTI) range in the fall of 1994, and remained there until recently, when tightening spring gasoline markets pulled WTI prices above $20 per barrel. Conventional gasoline prices generally followed those for crude oil in the fall and winter, although with seasonal influences and significant volatility due to unusual situations, including the introduction of RFG.

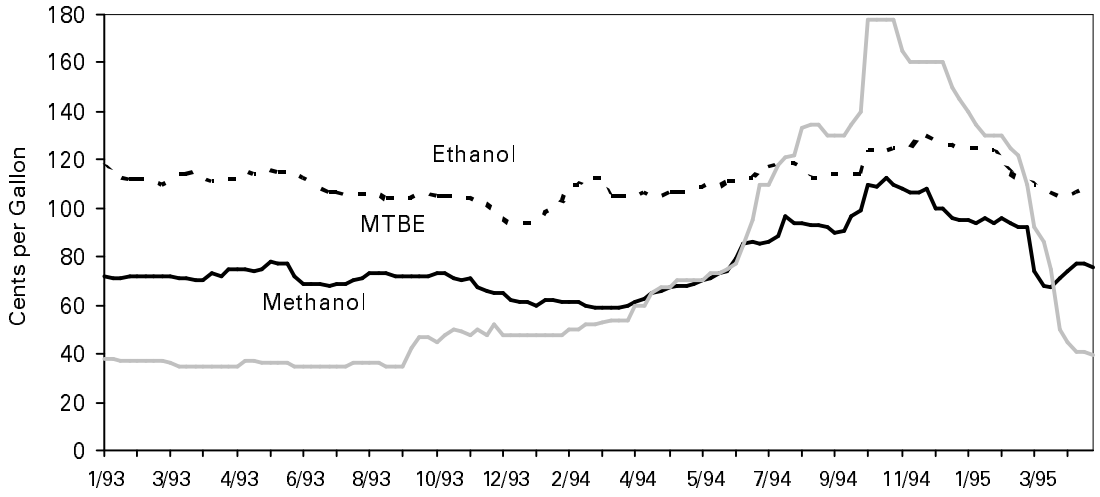
After a sharp decline in August and September 1994, wholesale gasoline prices were briefly but dramatically affected by the Colonial Pipeline rupture near Houston on October 20. Because the Colonial is the major supply route to the East Coast, New York Harbor prices jumped 9 cents in a week, only to fall back nearly as quickly once temporary repairs were accomplished. The introduction of RFG then reduced demand for conventional grades, briefly pulling down prices to near-parity with crude oil. Since December, conventional gasoline prices have maintained a more typical seasonal relationship to those for crude oil, with some fluctuation caused by demand uncertainties related to potential and actual opt-outs from the RFG and oxygenated gasoline programs.

While conventional gasoline prices are often measured against crude oil prices, those for oxygenated gasoline and, more recently, RFG, are measured by their differential to conventional gasoline. Oxygenated gasoline, recently completing its third season, normally trades at a differential to conventional gasoline almost solely determined by the cost of the oxygenate needed. Higher oxygenate demand due to RFG and methanol supply problems (see "Oxygenates" sidebar) resulted in somewhat higher differentials during the past winter than in prior years. While RFG costs entail a number of other

Oxygenates

Oxygenate additives are a key component in reformulated gasoline costs. MTBE, one of the primary oxygenates in RFG, is used in conventional gasoline, as well, to improve the octane rating. Therefore, MTBE demand was expected to reach new peaks in late 1994 due to RFG and oxygenated gasoline sales this winter. Spot MTBE prices had been climbing to over $1 per gallon, double what they were the previous year, as shown in Figure FE4. Ethanol prices were also on the increase in the fall.

Figure FE4. Oxygenate Prices



Source: *Octane Week*, various issues.

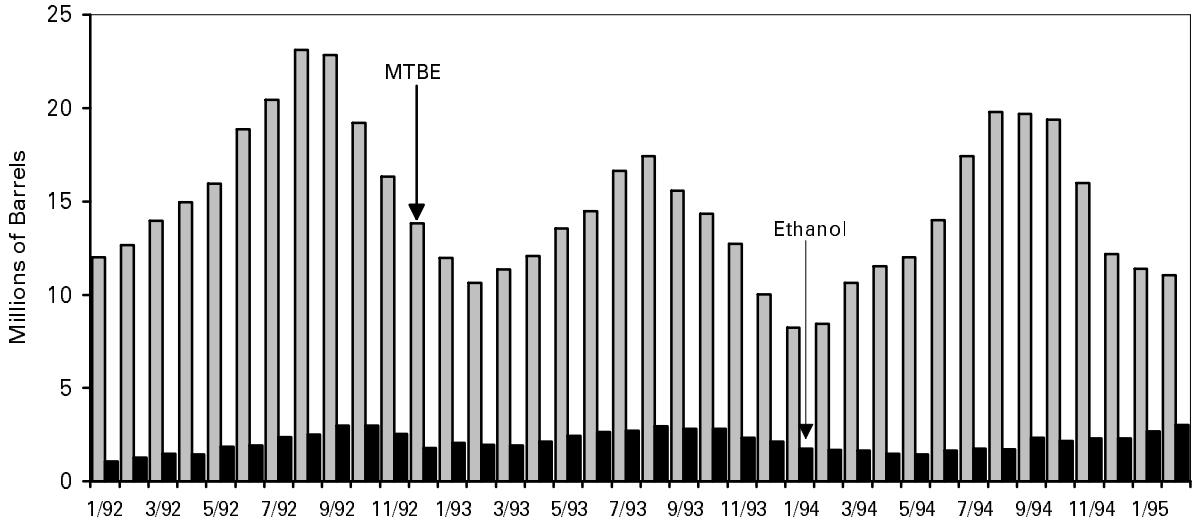
Methanol, a major feedstock for MTBE production, was in tight supply last summer and was driving the increases in MTBE prices. Methanol prices increased sharply in June, rising from about 75 cents per gallon to about $1.20 by the beginning of August, triple what they were the previous year. When the Channelview, Texas plant closed for maintenance in August, prices rose further to $1.35. Prices then declined slightly, but subsequently shot up to $1.78 following a fire in October at an Enron facility in Pasadena, Texas, accounting for about 8 percent of U.S. methanol supply. Prices began to ease in November, then plummeted starting in late December in reaction to falling MTBE demand due to opt-outs from the RFG program. MTBE followed the rise and fall of methanol prices, although less dramatically, but began to recover in late March as its blending value increased with rising gasoline prices.

The annual demand for MTBE-equivalent oxygenates was 320 MBD in 1993 and 327 MBD in 1994, and will be an estimated 440 MBD in 1995. Ethanol provided about half the MTBE-equivalent oxygenate volume consumed in 1993 and 1994, but that percentage will fall to about 40 percent in 1995 (a possible exception is adoption of a renewable oxygenate standard -- see next page).

The demand for MTBE alone is projected to rise from an annual average of 158 MBD in 1994 to 255 MBD in 1995, the difference being attributable to RFG demand. Net imports of MTBE are projected to average 45 MBD in 1995, much higher than the 24 MBD level of 1994.

Oxygenate stocking patterns are shown in Figure FE5. MTBE exhibits the strong seasonal pattern that has occurred since the first oxygenated gasoline season in the winter of 1992-1993. Stocks of MTBE were generally lower the next winter, as increased production capacity came on stream. MTBE stocks this past winter did not reach their peaks of 2 years before, when uncertainties about potential demand and potential supply shortages abounded. MTBE stocks fell to 11 MMB at the end of March 1995, which combined with the 3 MMB of ethanol stock assured an adequate supply of oxygenates for the foreseeable future.

Figure FE5. U.S. Oxygenate Stocks



Source: *Petroleum Supply Monthly* and *Petroleum Supply Annual*.

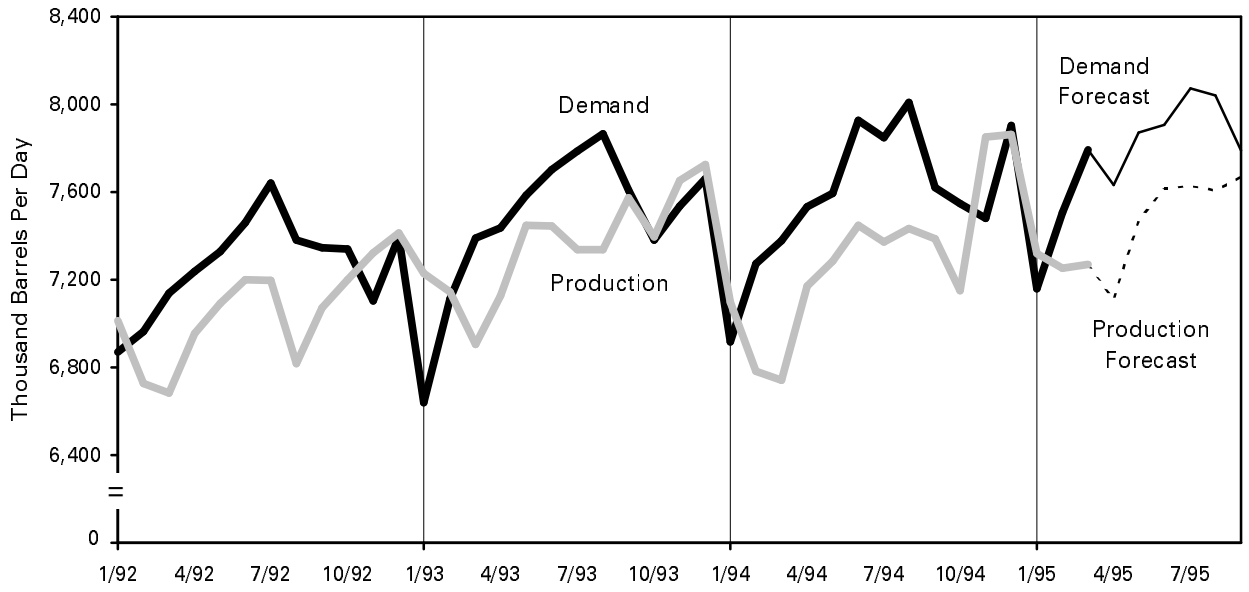
The Renewable Oxygenate Standard

On June 30, 1994, EPA issued the final rule requiring the use of renewable oxygenates in reformulated gasoline. The rule was to be implemented in two phases. The first phase was effective for all of 1995 and required that at least 15 percent of the oxygen content of reformulated gasoline come from renewable sources. The second phase required that, beginning in 1996, 30 percent of the oxygen in reformulated gasoline come from renewable sources. At present, ethanol and its derivatives are essentially the only renewable oxygenates that are commercially available.

On July 13, 1994, a legal challenge to the renewable oxygenate standard (ROS) for reformulated gasoline was filed in the U.S. Court of Appeals for the District of Columbia. The challenge was filed jointly by the American Petroleum Institute and the National Petroleum Refiners Association. The groups argued that EPA exceeded its authority in issuing the ROS. Later, the American Methanol Institute and the Oxygenated Fuels Association also joined the legal challenge.

On September 13, 1994, the U.S. Court of Appeals issued a delay in the implementation of ROS until the case was decided. On February 16, 1995, oral arguments were presented before the court's three-judge panel. The court ruled on April 28, 1995, that EPA lacked the authority to mandate the use of renewable oxygenates in motor gasoline.

Figure FE6. Gasoline Production and Demand



Sources: *Petroleum Supply Monthly, Petroleum Supply Annual*, and *Short-Term Energy Outlook*.

components relative to conventional gasoline cost, oxygenate cost is the most significant, similarly inflating RFG prices during its introduction. Since its introduction, the RFG price differential over conventional gasoline has been similar to that for oxygenated gasoline. As a result, after peaking in late January, RFG price differentials have declined during the spring along with oxygenate prices, to current levels of only 0 to 2 cents per gallon.

Retail gasoline price changes typically lag somewhat those on wholesale markets, resulting in less volatility and occasional differences in direction. After declining seasonally throughout the fall, U.S. average cash self-serve regular gasoline prices ended 1994 at 107.8 cents per gallon. Prices rose slightly around the introduction of RFG at the retail level in early January, then declined to an 8-month low of 106.7 cents per gallon in late February. Recently, prices have begun a seasonal rise toward the peak driving season, standing at 111.7 cents per gallon as of April 17, about 8 cents above the same point in 1994.

Expectations for the Summer Driving Season

As of the end of March, the United States had 22 days worth of finished gasoline stocks, compared to 23 days supply at the same time last year. As the summer driving season begins, **demand is expected to surge, reaching 8.1 MMBD at the season's peak. However, supplies through the driving season appear adequate, based on stock levels, production capability and prospective imports.** According to the STEO forecasts, much of the increase in summer demand is to be met by growth in refinery production, an increase in oxygenate blending, and an uptick in net imports. Stock withdrawals during the summer driving season, averaging 20 MBD, will be less than half last year's value.

Overall gasoline prices are expected to reflect the typical summer pattern, rising on average by about 8 cents per gallon. RFG prices are anticipated to follow the same pattern.

Demand

Demand for 1995 is projected to continue the upward growth pattern that has been experienced for the past several years. This summer, demand is expected to be 1.8 percent higher than in summer 1994 (Figure FE6). Continuing economic growth is predicted to result in a 2.8 percent increase in total miles traveled, driving the increase in gasoline consumption. Total miles traveled is influenced by both number of vehicles and miles traveled per vehicle. In a growing economy, both of these factors frequently increase. Fuel efficiency over the summer months, as measured in miles per gallon, is

Table FE4. PAD District Total Demand
(Millions of Barrels per Day)

Area	Type	April	May	June	July	August	September	Driving Season Average
PAD District 1	RFG	1.189	1.237	1.255	1.266	1.271	1.249	1.245
	CONV.	1.642	1.552	1.568	1.589	1.574	1.562	1.565
PAD District Total		2.732	2.789	2.822	2.855	2.845	2.812	2.809
PAD District 2	RFG	0.347	0.368	0.367	0.375	0.374	0.356	0.385
	CONV.	1.880	1.990	1.986	2.032	2.030	1.924	1.974
PAD District Total		2.228	2.357	2.353	2.407	2.404	2.280	2.339
PAD District 3	RFG	0.267	0.272	0.266	0.276	0.266	0.259	0.268
	CONV.	0.847	0.865	0.846	0.876	0.847	0.824	0.851
PAD District Total		1.114	1.137	1.112	1.152	1.113	1.083	1.119
PAD District 4	RFG	0.000	0.000	0.000	0.000	0.000	0.000	0.000
	CONV.	0.228	0.244	0.261	0.272	0.276	0.257	0.256
PAD District Total		0.228	0.244	0.261	0.272	0.276	0.257	0.256
PAD District 5	RFG	0.521	0.516	0.523	0.529	0.537	0.520	0.524
	CONV.	0.809	0.825	0.837	0.857	0.866	0.839	0.839
PAD District Total		1.331	1.342	1.360	1.386	1.403	1.359	1.363
U.S. Total	RFG	2.325	2.392	2.410	2.447	2.449	2.383	2.401
	CONV.	5.307	5.477	5.496	5.625	5.593	5.407	5.486
US Total		7.632	7.869	7.906	8.072	8.042	7.790	7.887

Source: *Short-Term Energy Outlook*.

expected to grow slightly compared to the summer of 1994. This increase moderates demand growth; but nevertheless, strong overall growth is anticipated.

Gasoline demand typically peaks in July or August. This year's forecast shows the peak in July, at 8.1 MMBD. Last year's peak month was August, at 8.0 MMBD.

RFG demand is projected to follow total gasoline demand patterns (Table FE4). For the summer season, RFG is forecast to represent 30 percent of total U.S. gasoline demand, 44 percent of demand in PADD I (East Coast) and 38 percent in PADD V (West Coast). At its peak, RFG demand is forecast to rise as high as 2.4 MMBD, about 200 MBD higher than initial levels seen in mid-December, with higher production and import levels expected to satisfy the bulk of incremental requirements.

Production

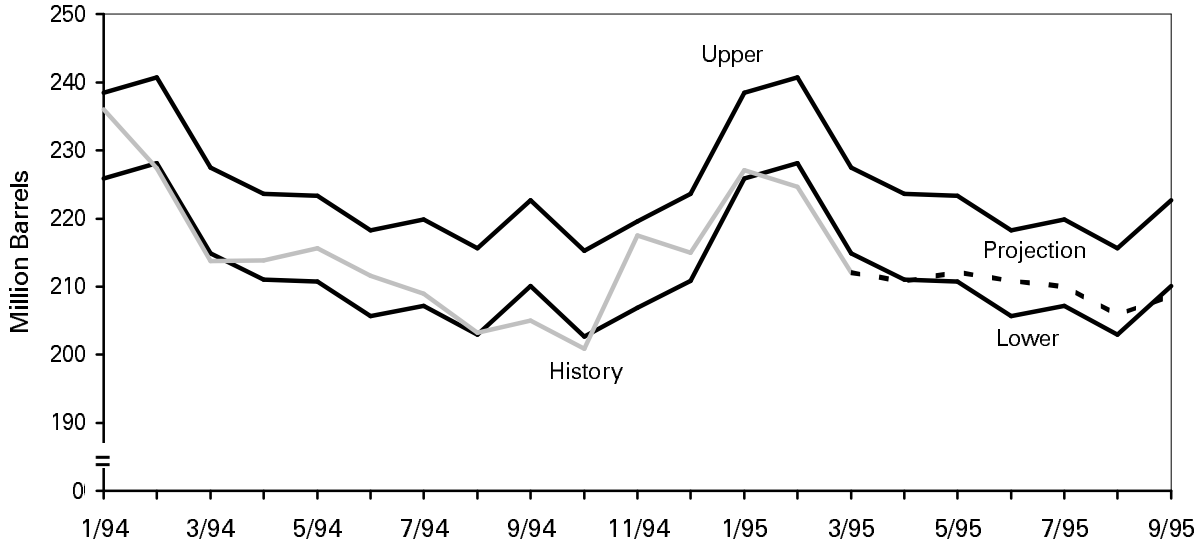
Throughout the driving season, refinery gasoline production is expected to average 1.9 percent higher than last year (Figure FE6). Utilization of operable refinery capacity is expected to average 94.3 percent, slightly lower than last summer's utilization due to capacity additions and lower distillate production. As previously noted, the continued high production rates through March indicate few refinery turn-arounds through the first part of the spring, possibly due to modifications in advance of the start of the RFG program.

The RFG program mandates a minimum oxygen content during the summer for the first time, thereby making oxygenates an important supply source. The additional oxygenates decrease the need for crude oil inputs to refineries to meet gasoline demand. The reduction in crude input, in turn, can reduce refinery utilization (as measured at the distillation unit) below that which would occur producing only conventional gasoline. Countering this effect is the lower efficiency of RFG (which means more gallons of RFG are needed to travel the same number of miles), and the need to reduce butane content in gasoline in order for RFG to meet its low RVP specifications. The increased volume of oxygenates alone is estimated to reduce crude input by about 2 percent. However, the countering effects of energy efficiency and lower butane each increase the need for crude by about 0.5 percent. The net impact on crude runs this summer due to RFG might be to lower the utilization close to 1 percent from that which would have been required producing conventional gasoline alone.

Imports and Exports

Strong domestic gasoline demand is anticipated to result in net import levels similar to last summer's, about 370

Figure FE7. Total Gasoline Stocks



Sources: *Petroleum Supply Monthly* and *Short-Term Energy Outlook*.

MBD. Imports from the Virgin Islands, Canada, and Venezuela are expected to dominate. Because imports of gasoline flow mainly to the Northeast, a major RFG area, much of the summer imports will be in the form of RFG or reformulated blendstocks for oxygenate blending (RBOB). Based on the assumption that low RFG stock levels will prevent drawing down RFG stocks significantly, the gap between demand and production of RFG will have to be filled with imports. With RFG demand forecast to average 2.4 MMBD, and production running no higher than 2.2 MMBD (the highest weekly average seen to date), imports of RFG might run 200-300 MBD.

Gasoline exports are estimated to continue through the summer at an average level of 127 MBD, compared to 74 MBD on average during the 1994 driving season. Refiners are apt to sell conventional gasoline that does not meet U.S. standards, but is valuable in international markets.

Stocks

Total gasoline stocks (not including oxygenates) are beginning the 1995 summer driving season lower than last year at 212 MMB versus 214 MMB in 1994 (Figure FE7). Although production is forecast to be higher than in 1994 and net imports are expected to be about the same, strong demand will keep stock levels lower than last year for the first half of the summer. In 1995, stock levels are not forecast to decline as fast as last year's stocks during the summer due to better wholesale margins in 1995 keeping production up. Thus, 1995 stocks eventually exceed 1994 stocks in the second half of the summer. Throughout the summer, though, stocks hover around the lower bound of the historical average range. The lower stocks in 1995 are partially due to the RFG stocks, which are expected to remain about 45 MMB throughout the summer, consistent with their pattern to date. RFG stocks are not forecast separately, but if they average about 20 days of supply, which is about where RFG is starting the summer, stocks might approach 50 MMB prior to RFG's peak demand of 2.4 MMBD. However, stocks generally don't increase during the summer months. Thus, we might expect RFG stocks to fluctuate around 45 MMB this summer.

Finished gasoline stocks begin the season at 22 days of supply in March, drop to 21 days during July, but recover to 22 days in August as demand falls off and stocks begin rebuilding. Last year, finished gasoline stocks averaged about 1 day supply higher than the 1995 forecast.

Prices

Excluding unusual changes in crude oil prices or gasoline supply disruptions, gasoline prices normally exhibit a demand-driven seasonal pattern, rising in the spring to a peak in the June-August period, and declining through the fall to a low between December and February.

Crude oil prices seldom change this overall pattern, but often impact the magnitude of seasonal change. STEO estimates that the average world crude oil price will remain relatively flat through the second and third quarters of 1995, at about $16.75 per barrel, rising slightly in the fourth quarter to $17.00. This forecast assumes stable to slightly rising world crude oil production offsetting similar increases in demand, as OPEC and other sources compensate for declining output in the United States and the former Soviet Union. Therefore, gasoline prices are expected to be primarily dependent on product-specific factors, i.e. the gasoline supply/demand balance, throughout the summer driving season. This forecast, of course, does not attempt to anticipate crude oil or petroleum product market disruptions, international political developments, or any of the other unforeseeable events that often are significant price determinants in petroleum markets.

Based on expectations for world crude oil prices and the various supply and demand factors outlined above, STEO forecasts gasoline prices to follow a fairly typical seasonal pattern this summer. Unlike 1994, which saw an unusually sharp price rise due to tightening of world crude oil markets, wholesale gasoline prices are expected to rise about 8 cents on average over the 3-month period ending June 1995. Retail prices, exhibiting a typical lag relationship to wholesale, are expected to increase more gradually, but over a longer period, gaining about 8 cents on average from their winter low through a late-summer peak. Prices at both levels are then expected to gradually decline through the remainder of the year.

Uncertainties and Sensitivities

The main concerns for this summer are centered around high demand, high refinery utilization, low stocks and RFG's first summer driving season. The high utilization and low stocks affect marginal costs to provide more gasoline, and thus influence the mix of production and imports. RFG adds to uncertainties surrounding imports and forces oxygenates into the picture as an important supply component for the summer months. In addition, high utilization, low stocks, and delivery of the new RFG reduce the flexibility of the system. Prices will be influenced by how these factors come together this summer. The Mid World Oil Price Case (Mid Case) assumes gasoline spreads (gasoline price over crude price) are typical of spreads seen in 1992 and 1993. These spreads (and therefore price) may vary from this assumption due to variation in the factors discussed below.

In the STEO Mid Case described above, demand is high, requiring high refinery utilizations. As demand increases over the summer season, three sources of supply are available to meet this increase: domestic production, withdrawals from stocks, and imports. The mix of these sources of supply affects prices. In the past, when utilizations were lower, increases in demand over the summer season were met mainly by U.S. refiners increasing their throughput and by stockdraws. This year's high utilizations entering the summer season present a different economic situation for refiners. At high utilizations, it is more expensive to produce additional gasoline than at lower utilizations. Thus, even if gasoline prices are rising (with crude price fixed), costs to produce additional gasoline will also be rising. As a result, refiners who increase production may not gain much increase in their margins in spite of the price increase. This situation tends to put upward pressure on gasoline prices.

In addition, refiners co-produce distillate with gasoline. During the summer, distillate prices are usually weak, and if too many refiners produce more distillate than is needed, prices will weaken even more. Thus, refiners must consider the tradeoffs among increasing gasoline prices, rising marginal costs to produce gasoline, and potentially having to "dump" distillate co-produced with gasoline in the face of deteriorating distillate margins.

At the same time U.S. refiners are making their decisions, foreign refiners are watching U.S. prices. Foreign refiners may be operating at lower utilizations and thus have lower marginal costs than U.S. refiners, and they may have better markets close at hand for their distillate. (Europe uses a much larger percent of distillate than does the United States.) Depending on gasoline prices in their own markets relative to the United States, foreign refiners may find it attractive to bring product to the United States. Under these circumstances, prices would tend to hold steady or experience downward pressure. That is, at some point, the supply-demand balance and price situation can become more attractive for importers than for domestic refiners to provide the additional gasoline to the United States. The relationship between imports and domestic production is dynamic, being driven by marginal costs and price differentials between world markets, which are not static. A large degree of uncertainty exists around the ultimate mix that will occur between imports and domestic production.

On the other hand, if foreign markets are tight this summer and foreign gasoline markets are more attractive to foreign producers than the U.S. market, U.S. gasoline stocks may move lower than those shown in the base case, driving prices higher before additional domestic production or imports pick up the slack.

While the uncertainties discussed above would tend to push prices higher over the summer, depressed light-heavy crude price differences are keeping prices down.

For the past few years, the Atlantic basin has experienced a glut of light crudes (crudes that produce high gasoline yields). Mainly as a result of the light-crude surplus, the price difference between the light and heavy crudes is smaller than normal. This results in refiners being able to produce increases in gasoline at lower cost than when premium crude prices are high. Since all refiners can benefit in varying degrees from the low light crude prices, the low differential tends to keep all gasoline prices down.

In the event that production and imports are not as high as indicated in the Mid Case, stocks will be drawn down to lower levels than those shown in Figure FE7, putting upward pressure on prices. This might occur if prices are not attractive enough initially to draw imports at the forecast levels. For example, if production plus imports fall 200 MBD lower in May than predicted, stocks will also fall, pushing prices about 1 to 2 cents per gallon higher than the Mid Case on average over the summer driving season. However, if these low stocks drop below local working levels, prices will go even higher. Note that higher prices, in turn, provide incentive for increases in both production and imports.

If, instead, gasoline spreads over crude are similar to those experienced in 1994, prices will be lower than in the STEO forecast. In 1994, the average spread of gasoline price over crude during the summer was about 3 cents per gallon lower than forecast in the Mid Case. Assuming some of this difference in spread is due to increased costs to produce RFG in 1995, retail prices under this scenario may only average $1.22 per gallon this summer.

RFG complicates this picture even more. As described earlier, a large portion of gasoline imports are expected to be RFG. The highest monthly imports of RFG received to date were 125 MBD in December. The import balances shown in the Mid Case imply RFG imports might go as high as 200-300 MBD. Where the additional imports are likely to come from and the price needed to attract them is not known at this time.

Finally, refiners and marketers are dealing with regulatory uncertainties on top of market uncertainties this summer. The largest uncertainty is for RFG demand. Will other areas opt out and when? Several factors are affecting areas' decisions to opt out. RFG is more expensive than conventional fuel, and has slightly lower fuel efficiency. In addition, health concerns over MTBE have been raised. The uncertainty in RFG demand will tend to keep RFG stocks low, since no company wants to have this expensive product caught in an area that opts out, potentially having to sell it at a loss as prices move down to conventional gasoline levels following the opt-out.

While no problems are foreseen this summer, the gasoline markets are fraught with uncertainty. While prices to consumers will be higher than last year due to higher costs to produce gasoline, margins for refiners may not be much better than in 1994.