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PIRINC has prepared the enclosed report, *It's All Connected: Natural Gas, Electricity, Heating Oil And Gasoline.* This report considers the different complex linkages that contributed to high distillate prices at the onset of the recent heating season and the high prices for gasoline in the spring.

In both cases, natural gas supply problems contributed to the high product prices. The linkages between natural gas and oil product prices were complex, including the impact on oil use by power generators and the impact on supplies of oxygenate for gasoline. Despite the fears, no crisis materialized with respect to either distillate or gasoline. Market forces encouraged the corrective actions that eased first distillate and lately gasoline prices.

Market forces worked, but not without some help. Very expensive help came from the economic slowdown in the US and deteriorating growth prospects elsewhere. Energy policy, both past and prospective, has a major role in determining just how hard market forces have to work to overcome potential supply/demand imbalances.

If you have any questions or comments, please call John Lichtblau, Larry Goldstein, or Ron Gold.

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It's All Connected: Natural Gas, Electricity, Heating Oil And Gasoline

Executive Summary

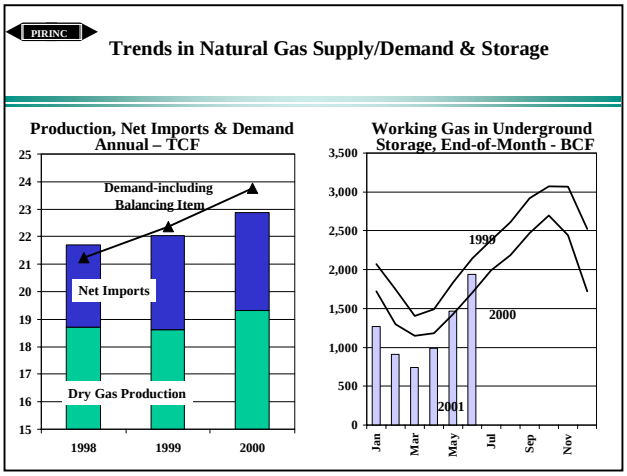
The US public has faced a series of energy supply concerns over the past year. Last fall witnessed extensive concerns over the availability and cost of heating oil for the approaching winter. Early this spring drivers saw sharp increases in the price of gasoline, in what threatened to be a repeat of the price spikes that occurred just about a year ago. Oil customers are not the only ones to face supply concerns and price increases. Natural gas prices have risen sharply as well, in certain cases much more than oil. In California, electricity consumers face both drastic price increases and "rolling blackouts," with some possibility that other parts of the country could be vulnerable to similar developments. Of course crude prices have played a role in the higher costs of oil products but lately the cost of crude has been averaging about $6/barrel below its November 2000 peak and about the same as a year ago. Thus other factors besides crude prices must be considered analyzing product prices.

This report considers the different complex linkages that contributed to high distillate prices at the onset of the recent heating season and the high prices for gasoline in the spring. In both cases, natural gas supply problems contributed to the high product prices. The linkages between natural gas and oil product prices were complex, including the impact on oil use by power generators and the impact on supplies of oxygenate for gasoline. Despite the fears, no crisis materialized with respect to either distillate or gasoline. Market forces encouraged the corrective actions that eased first distillate and lately gasoline prices.

Market forces worked, but not without some help. Very expensive help came from the economic slowdown in the US and deteriorating growth prospects elsewhere. Energy policy, both past and prospective, has a major role in determining just how hard market forces have to work to overcome potential supply/demand imbalances.

It Begins With Natural Gas

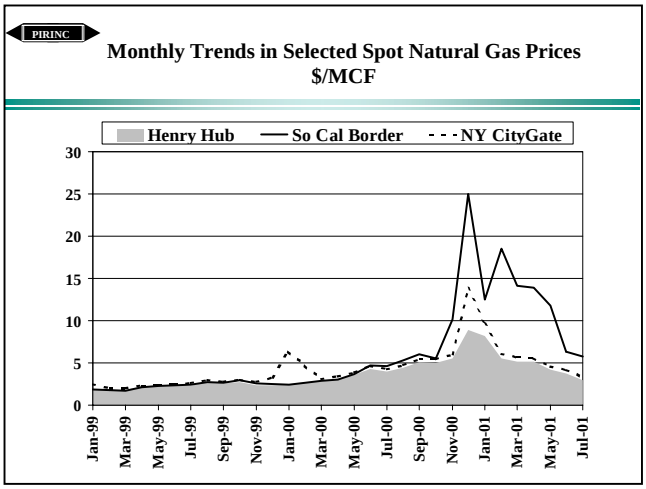
As shown in the left panel of the chart, in recent years, demand for natural gas has risen faster than the amount supplied from domestic production and net imports. From 1998 to 2000, demand (including the Department of Energy's "Balancing Item") rose by about 2.5 TCF while production and net imports rose by only 1.2, with each providing 0.6 TCF of new supply.[1] This divergence between growth in demand and supply from production and net



[1] The "Balancing Item" is generally considered to reflect primarily errors in estimates of consumption. Estimates of consumption by all sectors rose by 1.5 TCF from 1998 to 2000 but the "Balancing Item" grew from near zero in 1998 to about 1 TCF in 2000.

imports was filled by drawdowns from gas in storage. The trends in end-of-month levels of working gas in underground storage from January 1999 through June of this year are shown in the right panel. At the end of 2000, gas in underground storage was down by about 800 BCF from its end-1999 level and over 30% below its average end-of-year level for the decade. For the first three months of 2001, gas in underground storage averaged about 400 BCF below 2000 levels, however the gap narrowed in April and closed completely in May. Preliminary data for end-June show storage moving significantly above last year's level. The rapid improvement in storage has been supported by gains in supplies---with domestic production up 3% so far this year and net imports up 12%---and subdued demand, encouraged by the extraordinarily high gas prices that prevailed until very recently and the economic slowdown.

Gas demand is highly seasonal, given its use as the country's heating fuel of choice, with its peak use thus coming in the winter months.[2] As last year's winter heating season approached, the combination of demand outpacing production and imports plus extraordinarily low levels of gas in storage had predictable, dramatic effects on natural gas prices nationwide, and even more so in particular parts of the country. The next chart shows monthly trends in spot prices for gas at Henry Hub, the New York City Gate, and the Southern California Border.



As a rule, the Henry Hub price has been a good proxy for national price trends. This price had already been moving up since early 1999. The price rose from $1.85/MCF in January 1999 to $2.42 in January 2000 and, at a faster pace, to about $5 in September. Thereafter, the Henry Hub price spiked to nearly $9 in December before falling back as the winter progressed and through the spring to its early July level of about $3. This past winter, movements in the Henry Hub price did not fully reflect price developments in two particular parts of the country, the Northeast and California. Two winters ago, gas prices in the Northeast also moved well beyond the Henry Hub price. In January 2000, an unanticipated cold-snap strained local gas delivery systems in the Northeast. The New York City Gate price that month averaged $6.30/MCF, nearly $4 above the Henry Hub price. But after January, the New York price moved back toward its more normal differential versus Henry Hub. This past winter has seen even sharper differences. In December, the average New York City Gate price reached nearly $14/MCF, $5 above the Henry Hub price but the differential narrowed quickly thereafter. In early July, the New York City Gate price was within 30 cents/MMCF of the Henry Hub price. The New York City Gate price spike pales compared to the average $25/MCF Southern California Border price reached in December.[3] While the Southern California price has come down from its peak, until June it remained in double digits. In June the Southern California price fell back to an average

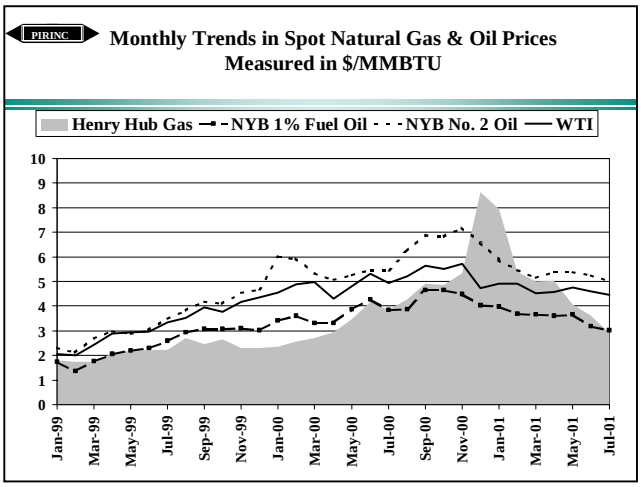
[2] Gas consumption in January 1999, the highest month for gas consumption, was 77% higher than consumption in the lowest month, June. In 2000, January consumption was 65% above the June level.

[3] The extraordinary heights reached by the Southern California Border prices resulted from the interplay of the rapid growth in gas requirements for electricity generation, discussed later in this report, and limited pipeline capacity.

of just under $7 and in early July, to just under $6. While down sharply from its peak, the Southern California price is still significantly higher than the New York City Gate or Henry Hub price.

While the price spikes of late last year seem to follow from the ongoing supply/demand trends, there remains the puzzle as to why gas consumption showed such growth in the first place given the significant escalation in gas prices that took place even before the price spikes. Although the average Henry Hub price for the first 9 months of 2000 was over 60% higher than for the same period in 1999, gas consumption for 2000 was up 4.7% versus 1999 (3.9% ex consumption by the residential and commercial sectors), a higher growth rate than in any year of the 1990s.[4]

A significant part of the answer is that while gas prices were moving up through 1999 and especially over the course of 2000, prices of the most relevant competing fuels, fuel oil and distillate were, until late last year, moving up even faster. The next chart illustrates this point by showing monthly spot price trends for Henry Hub gas, WTI, fuel oil, and distillate. Prices for the two oil products are New York Harbor Barge prices for 1% sulfur fuel oil and No. 2 oil. For comparability, all prices are stated in terms of $/MMBTU.



In early 1999, the fuel oil price was about the same as the Henry Hub gas price. WTI was about 25 cents/MMBTU higher and distillate about 50 cents higher. In March of that year OPEC and other key oil producers agreed to a production cut that underpinned a more-or-less continuous series of increases in world oil prices that did not end until the autumn of 2000. Through May of last year, the rise in crude prices pulled the price of fuel oil significantly above gas prices. Fuel oil prices then moved about in parity with gas prices until November and then fell significantly below as oil prices fell back from peak levels while gas prices spiked. Although differentials narrowed, the average price of fuel oil remained below the gas price until early July. Distillate prices moved up more than crude oil through late 2000 with both well above gas prices through late 2000. In January 1999, the distillate price was 25 cents/MMBTU ($1.50/barrel) higher than the WTI price and 53 cents/MMBTU above the gas price. In January 2000, the differential between crude and New York Harbor distillate reached $1.44/MMBTU ($8.60/barrel) and in November, $1.85/MMBTU ($11/barrel). The large differential in January 2000 between Henry Hub gas and New York Barge distillate reflects the same temporary problems in the Northeast of extreme weather and logistics limits on local gas supplies. Indeed, the price of New York Barge

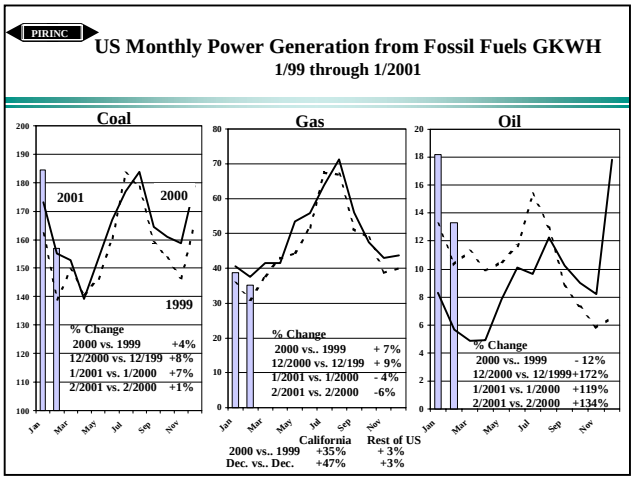
[4] Regarding residential gas consumption, it should be kept in mind that the lags between spot and retail price changes are much longer for gas than for oil. Residential gas customers will therefore react more slowly than oil customers to tighter market conditions in terms of reducing fuel use.

distillate that month was about the same as the price of New York City Gate gas, $5.98 versus $6.12/MMBTU.[5]

In December 2000 and January of this year the New York Barge distillate price was below the Henry Hub price. In February and March, they were about the same. Since then, gas, at Henry Hub, has been clearly cheaper---although this is not the case for New York City Gate gas prices, which remained above the average distillate price through April.

Impact on Electricity Generation

The effects of the price changes show up most dramatically in the sector that makes use of all three fuels, power generation. In particular, while oil's role in power generation has tended to be relatively modest, the extreme increases in natural gas prices has led to a surge in oil use. The chart below summarizes monthly trends in power generation from the three fuels.



Power generation from coal, the most important source of US electricity was up 4% in 2000 versus 1999 with gains in December 2000 and January 2001 reaching 8% and 7% respectively versus the year earlier. In February, the year-on-year gain was 1%.

For the year as a whole, power generation from gas was up in 2000 by 7% versus 1999, but with the gains coming primarily in the first half of the year. December, however, showed a strong gain of 9% versus the year before. These national figures are propped up by developments in California where severe drought has curtailed hydroelectric power and forced the state to rely on increased supplies of fossil fuel power, which in that state comes almost exclusively from gas. Gas-generated power in California expanded by 35% in 2000, with a December gain versus the year earlier of 47%. In the rest of the country, gas generation expanded by only 3% for the year as a whole and in December. So far this year, national totals for gas generation are running below year-earlier levels, down 4% in January and 6% in February. In January, (the latest month available for state data) gas-generated power in California was up 67% versus the year earlier.

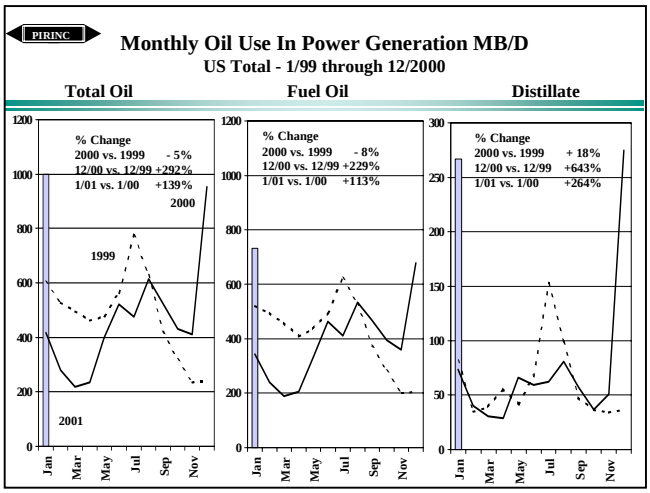
The monthly pattern for oil-fired generation is very different from the other two. Oil-fired generation in 2000 was well below 1999 levels through much of last year. But beginning in late summer, as prices for natural gas moved first above fuel oil prices and later distillate, oil use surged. While for the year as a whole, oil-fired power in 2000 was 12% below its 1999 average, by the end of the year and in early 2001, oil-fired power generation was running at well over double its levels 12 months earlier. Oil accounts for a far more modest share of US electricity

[5] The New York Barge price reflected near term limits on ability to meet a surge in local demand. The January New York spot price exceeded the average Gulf Coast distillate price by 13 cents/gallon versus a 2 cent differential the year before.

generation than either coal or gas, but in December and January, the year-on-year increases in GKWH generated from oil were about the same as the increases from coal and February far greater.[6]

Fuel Oil and Distillate in Power Generation

Typically, oil in power generation means fuel oil. But while fuel oil use indeed rose toward the end of last year, the most dramatic increases came in the use of distillate. The chart below shows monthly oil consumption by the power generation sector with oil split between fuel oil and distillate. Data are shown through January, the latest month available for detailed oil data.



The panel on the left repeats the overall total for oil shown in the previous chart while the middle panel shows the trend for fuel oil. Fuel oil use surged at the turn of the year with December 2000 volume approaching 700 MBD versus only about 200 the year before. In January, fuel oil use reached nearly 750 MBD, up nearly 400 MBD from January 2000.

But the gains for distillate were even greater on a percentage basis and unprecedented in terms of volume. In December 2000, distillate use in power generation reached 275 MBD, as opposed to less than 40 the year earlier. About the same high level was maintained in January of this year versus a prior year January level of about 75 MBD. [7]

The growth in distillate use by power generators had a significant impact on overall national distillate requirements. The table on the right shows distillate use by this sector as a percentage of apparent demand for December 2000 and January 2001 and the same months a year earlier. In December 2000, use by power generators accounted for 7% of total apparent demand, up from 1% the year before. In January of this year, their use accounted for 6% of demand, up from 2% in January

Distillate Use for Power Generation as % of Apparent Demand

Dec 1999	Dec 2000
1%	7%
Jan 2000	**Jan 2001**
2%	6%

[6] The availability of spare oil-fired capacity and the rapid growth in its use helped contain the run-up in gas prices. In areas where spare oil-fired capacity was not available, or its use restricted, with California the most prominent case, local gas prices were less constrained.

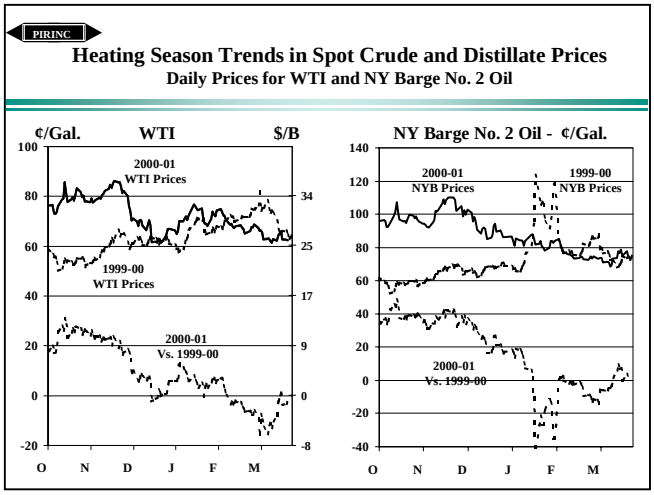
[7] To a limited but critical extent, California is also using more distillate. In December 2000, California generators reported using 9 MB/D of distillate, up from less than 1 MB/D in December 1999. In January 2001, the total moved up to 15.6 MB/D. The Governor has eased restrictions on distillate use for power as part of the emergency measures to improve electricity supply capability. Reported electricity generation from distillate in January 2001 accounted for nearly 1.6% of total State electricity generation, nearly 3 times the January 0.6% share for wind.

2000.

Anticipation of higher demands from this sector, as well as from other industrial gas users, plus a low distillate inventory starting point, helped prop up distillate prices well before the start of last winter's heating season. Nationally, distillate inventories at the end of September 2000, just before the onset of the heating season, were 21% below their year-earlier levels. In the New England and Mid-Atlantic states (PADDs 1X and 1Y), where heating oil use is most concentrated, distillate stocks were down nearly 50%.

Oil Price Developments

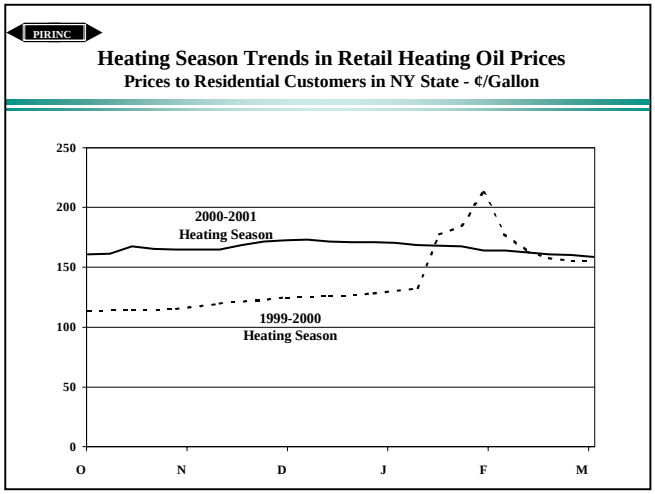
Natural gas was not the only worry at the onset of the 2000-2001 heating season. Crude prices were also extremely high despite rising OPEC production since early March. While high crude prices contributed to high product prices, specific concerns about distillate pushed up its price by far more than the impact of high crude prices. The next chart focuses on trends in spot prices for WTI crude oil and New York Barge No. 2 oil over the past two heating seasons.



The panel on the left shows trends in WTI prices over the past two heating seasons measured in both cents/gallon and $/barrel. In October-November of last year, crude prices averaged about 80 cents/gallon or about $34/barrel. These prices were about 23 cents/gallon, or nearly $10/barrel higher than those prevailing the year earlier. Thereafter, the gap narrowed considerably, averaging about 6 cents/gallon for January 2001 versus the year earlier and only about 1 cent/gallon for February. In March of this year, the crude price fell below the price a year earlier, although toward the end of the month, in response to a new OPEC agreement to cut production, the differences dissipated.

The panel on the right shows the trends in NY Barge prices for No. 2 oil. In October-November of last year, prices were far above those prevailing the year before. The gap, about 40 cents/gallon, was nearly twice as wide as the gap in crude prices. In December, the gap between No. 2 oil prices, was still very wide, nearly 30 cents/gallon on average, despite a narrowing in the crude price differential to an average of about 6 cents/gallon. Over the balance of the heating season, the spot price of NY Barge No. 2 oil drifted steadily downward, both in absolute terms and relative to the price of crude. At the beginning of January, the price of NY Barge No. 2 oil was about 20 cents/gallon above the price of WTI. By the middle of the month, the difference fell to about 10 cents, where it more or less remained. This pattern is in sharp contrast to what happened the year before when, in mid-January, an unanticipated severe cold-wave led to sharp curtailments of interruptible gas supplies in the Northeast, the spike in New York City Gate gas prices discussed earlier, and in turn a surge in demand for the limited supplies of immediately available distillate over and above the increased requirements of residential heating oil customers

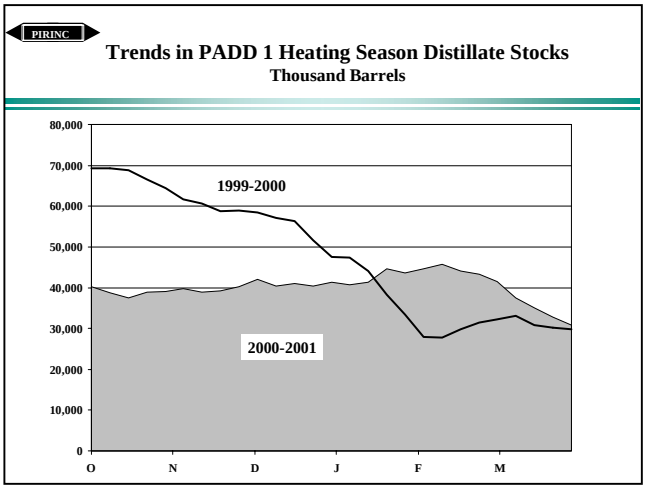
that led to an immediate near-doubling of spot prices. Prices came down sharply in early February when the cold weather eased and substantial volumes of new supply reached the local market.



For residential heating oil customers, developments in the spot market this past heating season translated into high but relatively stable prices. As shown in the chart on the right, the heating season for residential customers in New York State began with prices averaging about $1.60/gallon. Prices rose to about $1.70 in December and then fell back to about $1.60 by early March. Prices through December were significantly higher than the year before, but customers avoided the price surge of mid-January and early February 2000 when the residential price reached a peak of $2.12/gallon before receding to levels similar to those prevailing this year.

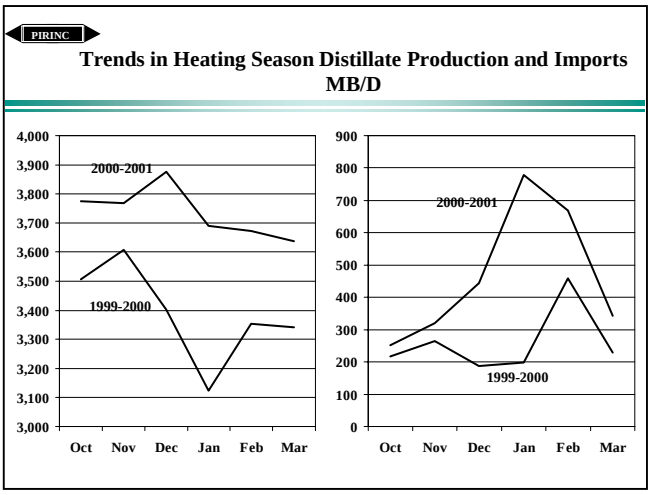
The Winter Crisis that Didn't Happen

In effect, the Northeast in mid-January through early February of 2000 experienced a mini-version of what many feared much of the country would face this past winter. Of course, it didn't happen, primarily because the markets anticipated the potential crisis and suppliers responded to market signals in a timely manner. The most obvious physical sign of potential crisis was the low level of distillate inventories going into the heating season.



As shown in the chart on the right, at the beginning of October 2000, commercial distillate stocks in PADD 1, (the East Coast) where most heating oil is used, stood at about 40 million barrels, nearly 30 million barrels, or 42% below year-earlier levels.[8] However, from October through December of 2000, stocks remained about constant and over the course of January through mid-February, rose about 10%---a very different pattern from the previous heating season when stocks fell sharply to extremely low levels by late January before stabilizing in Mid-February and March. At the beginning of February this year, stocks were 60% above their crisis levels of the year before.

[8] In New England, commercial stocks at the beginning of October 2000 totaled only 5.4 million barrels, far below the 15.6 level the year before. The inventory figures shown exclude the government-owned Northeast Heating Oil Reserve of 2 million barrels (1 million held in Woodbridge, New Jersey and 1 million in New Haven, Connecticut.)

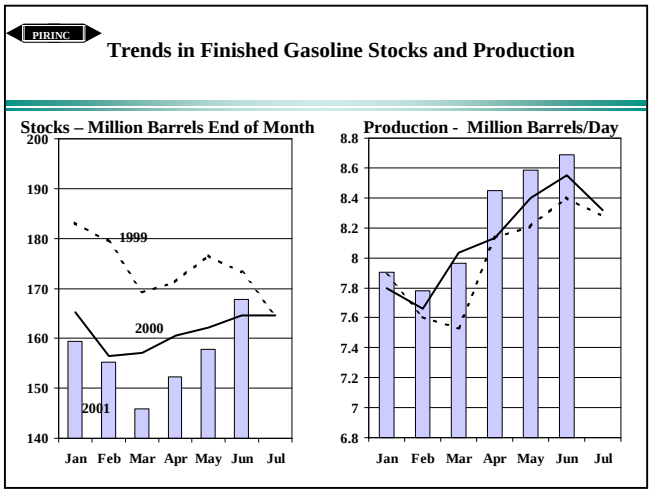


A decline in stocks and a potential crisis were avoided this past season because of timely stepped up production and imports of distillate. As shown in the left panel of the next chart, in each month, production this past season was substantially above year-earlier levels with differences ranging from about 200 MB/D to a peak of over 550 MB/D in January. For the heating season as a whole, distillate production averaged about 10%, or nearly 350 MB/D above year-earlier levels. As shown in the right panel, imports were also consistently above year-earlier levels, especially in peak winter months of December through February.

Overall, total supplies from domestic production and imports in December 2000 were 20% above year-earlier levels while in January and February of this year total supplies were 35% and 14% respectively above year-earlier levels.

From Distillate to Gasoline

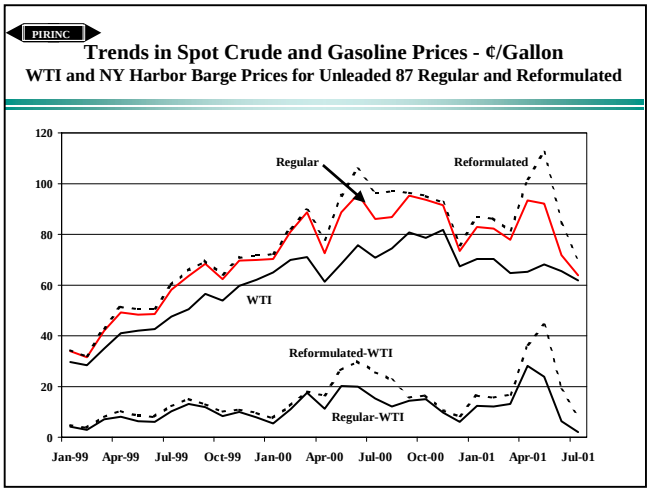
No sooner was it apparent that there would be no winter fuel crisis---thanks to the massive increase in distillate supply---then worries intensified about a possible gasoline supply crisis this driving season. To a certain extent, the actions taken to head off a winter crisis contributed to these fears. To meet the extraordinary demand for distillate, distillate yields at refineries were pushed up in December through March by about 2 percentage points. This gain came in part at the expense of gasoline. The average yield of gasoline at refineries was down by over 1percentage point over the same period. The extreme prices for natural gas had an additional negative impact on gasoline supplies apart from the additional shift to distillate, namely a reduction in supply of the key oxygenate and octane booster, MTBE. MTBE is made from methanol, which in turn is produced with natural gas as the feedstock. Cumulative MTBE production from December 2000 through March of 2001 was about 5 million barrels below prior year levels, barrels that consequently were absent from gasoline inventories at the beginning of the spring.



The next chart looks at trends in stocks and production of gasoline since the beginning of the year and compares them with the comparable periods of 2000 and 1999. As shown on the left, stocks of finished gasoline in the early months of this year fell to a low point at end-March of about 146 million barrels, 11 million below the level of end-March 2000---which itself was exceptionally low. The much higher end-March 1999 level was about in line with

the March average for the decade of the 1990s. Since the end of March, inventories this year have moved up substantially and at end-June, were above year-earlier levels. The gains were achieved primarily because of sharp increases in production after March. In April, production moved up by just over 0.5 million barrels/day. Production rose further in May and June by about 140 and 110 thousand barrels/day respectively. Overall, production in the second quarter exceeded year –earlier levels by about 2.5%. Another potential source of supply, imports, were about unchanged from year-earlier levels.[9] A temporary flattening of demand in the second quarter also contributed.

As in the case of distillate, gasoline supply concerns at the onset of the peak demand season created price signals that encouraged over the course of the spring the corrective actions that as of June, have led to a much more comfortable supply situation---and a decline in prices. The next chart considers trends in monthly average spot crude and gasoline prices. The crude price is represented by WTI. Two spot prices for gasoline are shown, the NY Harbor barge price for 87 octane conventional regular gasoline and the barge price for 87 octane reformulated. The lower part of the chart shows differences between the two gasoline prices and the crude price.



Considering the entire period shown, from January 1999 through July to date, it's clear that the key influence on gasoline prices has been the sharp increase in the price of crude. The price of WTI in the summer and fall of last year was about 50 cents/gallon above its early 1999 level. Currently, the crude price is averaging about 10 cents/gallon below year-earlier levels. The changes in the crude price since early 1999 have been much larger than the normal differentials between crude and gasoline prices. Over the entire period shown, the difference between the spot crude price and the spot price of conventional regular gasoline averaged about 10 cents/gallon. In June of this year, the differential was 6 cents/gallon, far less than the 36 cents/gallon difference between the June 2001 average crude price and the crude price in early 1999. However, there have been periods, both last year and this year when the differences versus crude were much wider, especially in the case of reformulated gasoline. In May and June of last year, the differential between conventional regular gasoline and crude oil reached 20 cents/gallon. The differentials for reformulated gasoline moved even higher, reaching 27 cents in May and 30 cents in June. Last year saw the introduction of the new more stringent Phase 2 reformulated gasoline specifications. Initial problems in producing the new product put upward pressure on

[9] Imports are a less important source of supply for gasoline than for distillate. At their peak earlier this year, distillate imports equaled about 20% of domestic production. Finished gasoline imports are averaging about 5% of domestic production.

gasoline prices and especially on reformulated gasoline prices.[10] After June, prices of reformulated moved back toward the price of regular and the differentials for both versus crude narrowed considerably.

This year, differentials also surged and at their peak were even higher than last year. In April, the average differential between spot conventional regular gasoline and crude reached 28 cents/gallon.[11] The differentials for reformulated gasoline versus crude moved much higher, reaching an average of 38 cents in April and 44 cents at their peak in May. While the exceptionally low end-March level of stocks, and lingering problems of producing the new Phase 2 gasoline, contributed to this year's price movements, the new factor in the early months of the year was the limited supplies of MTBE, the oxygenate in most of the country's supplies of reformulated gasoline. The latest data indicate that in April and May, production of MTBE is running at approximately year-earlier levels.

Surging gasoline production has brought gasoline prices down substantially both in absolute terms and relative to the price of crude. As of early July, spot prices for conventional regular gasoline are averaging about 30 cents/gallon below the April average while crude oil is down about 4 cents. At least through May, the production surge did not apply to MTBE and the spot price of reformulated continued to climb through that month. Since then, the price of reformulated has fallen substantially and in early July, was only 6 cents/gallon above the price of conventional regular gasoline.

What's Next?

Over the past year, the scenarios for distillate and gasoline have been early supply scares accompanied by high prices, and in turn a market response that eases the situation. So far, conditions seem to be falling into place for getting off the supply scare treadmill, at least for the near term.

Natural gas is in much better shape. Although the gains in supply and storage may decelerate with the softening in prices, for now, they support a much more relaxed supply starting point for the coming heating season. World oil markets are calm. Even the recent loss of Iraqi oil exports for nearly a month failed to have a visible impact on prices.

The current markets are also providing incentives to build winter stocks---unlike the situation at this time last year. The left panel of the chart below shows daily spot prices for NY harbor distillate, the dotted line, from June first of this year through the latest date available for July. The solid line shows daily NYMEX prices for 6 month-forward distillate, that is to say, December 2001 and January 2002 delivery contracts.

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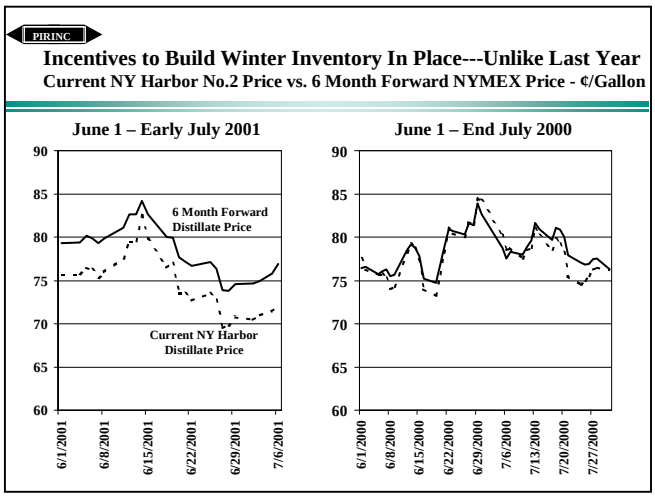
[10] The problems were particularly severe in the Chicago and Milwaukee markets where ethanol is used as the blendstock. In June 2000, spot prices of RBOB, the special gasoline blendstock for use with ethanol that accounts for about 90% of the finished gasoline product, averaged about 28 cents/gallon above the average for NY harbor reformulated. Production problems were aggravated by the UNOCAL patent infringement case. Pipeline supply interruptions in the Mid-West also contributed to the temporary surge in prices in that region last year.

[11] High levels of unscheduled refinery outages in February, March, and April held back potential production and, thereby, also contributed to this year's early run-up in gasoline prices.



So far, daily spot prices have been running consistently below the 6 month-forward prices by an average of about 4 cents/gallon. This pattern of higher prices for the winter, when distillate is most needed, versus prices today when requirements are less, provides an incentive to build and carry stocks into the winter months. Indeed, this price relationship is the expected one under normal market conditions.

The current price relationship is very different from what prevailed at this time last year. As shown in the right panel, in June and July of last year, current prices tended to be about the same as 6 month-forward prices. Indeed occasionally they were higher. This was the period of rising crude prices and near-term supply concerns. In June and July of last year, crude and products were wanted to assure near-term needs and markets gave no support to less immediate concerns such as preparing for the coming winter.

Thus, the return to market normality, and early summer incentives to build distillate stocks, improves the odds of a calm market for consumers this coming winter.

Market Forces and Energy Policy

Looking back over the past year, markets have worked. Supply responses to early price signals avoided price surges in the case of distillate, and reversed them in the case of gasoline. Higher initial prices also helped curb demand, aiding the market stabilizing process.[12] If market forces have done so well, then where, if anywhere, does energy policy fit in?

In considering such a question, it should be acknowledged that markets have had some help. The prime source of "help" is the slowing US economy and its depressing influence on demand for all forms of energy. GDP growth for all of last year averaged a strong 5%. But in the last quarter of the year, and the first quarter of this year, growth slowed to an average annual rate of only 1%. There are strong indications from industrial production and unemployment data that the slowdown is still with us. Slower growth in demand eases potential supply bottlenecks and buys time for their removal.

Economic slowdown is not confined to the US. Growth in Europe and especially Japan has also slowed. Developing country growth has slowed as well. The worldwide slowdown has curtailed world demand for oil. At the beginning of the year, the International Energy Agency forecast

[12] The California electricity crisis would appear to be the exception but this is not the case. The contributions of regulatory rigidities and caps on prices to residential customers to the crisis are well known. A key element in the State's response to the crisis has been a series of emergency measures to ease regulatory bottlenecks to increased supply (including, as noted earlier, increased electricity from distillate) and to allow prices to consumers to rise. So far, these actions, plus voluntary conservation measures and economic slowdown, appear to be containing the crisis.

that world demand for oil this year would grow by nearly 2 million barrels/day. In its latest estimate, released in June, estimated demand growth has been cut to less than 1 million barrels/day. Lower demand growth, given OPEC's supply decisions, has aided the speedy improvement in crude oil inventories that in turn contributed to calmer oil markets this year. Lower demand growth---and higher inventories---meant less urgency to react to the immediate loss of Iraqi exports.[13]

But this kind of market "help" is very expensive in terms of economic well-being and, hopefully, only temporary. Policy measures are another source of help---or hindrance---to market adjustments. For example, in the case of gasoline, the existence of so-called "boutique" fuels, or different product specifications in different parts of the country, limits the market's ability to respond to local supply problems. An emerging concern is the coming phase-out of MTBE over the next few years. It is likely that the phase-out will not be accompanied by any relaxation of the oxygenate requirement for reformulated gasoline. The problem is that current use of MTBE in gasoline is about triple the current use of the alternative oxygenate, ethanol. Unless the situation changes, the need for ethanol as an oxygenate could rise substantially within a few years, potentially outpacing the ability of domestic or foreign sources to meet the demand, thereby creating risks of new, sharp, upward price pressures on gasoline.[14] In the case of distillate, the timetable for new, extremely low sulfur levels for distillate could raise future supply problems for that product.

In the case of supply, policy is extremely important. There is no question that higher prices for gas and oil have stimulated a surge in domestic drilling activity. US gas well completions last year were 45% above their 1999 level and so far this year, gas well completions are up 50% compared to the same period in 2000. Oil drilling has also increased. Oil well completions rose 14% in 2000 and so far this year are up an additional 31%. But all this drilling, in aggregate, has a disproportionately modest impact on output. Gas production was up 2.4% in 2000 and is up about 3% so far this year---important for the current supply/demand balance but very modest compared to the increased drilling activity. Oil production so far this year is still running below levels in the comparable months of 1999.

Much of the major oil and gas producing regions of the US have been intensively explored and developed over the course of many years. This is especially true of the on-shore lower 48 states. Here advances in technology and the incentives from higher prices are mainly helping to slow production declines and produce more oil and gas from existing resources. But there are important exceptions, especially these days in the deep waters of the Gulf of Mexico where technological advances, and access to acreage are leading to strong production gains. The table below summarizes oil and gas production in 1998 and 2000 in the deep-water Gulf of Mexico and production in the rest of the country.

[13] The prompt statements by other OPEC countries, especially Saudi Arabia, that they would raise production to offset disruptive market effects of the Iraqi action was another critical element in dampening any price impact. However, the comfortable inventory position of consumers meant there was no immediate need for offsetting action. They could choose to wait and see.

[14] Ethanol contains about twice the oxygen by weight, as does MTBE so the volumetric increase in ethanol production required would be about one-half the volumetric loss of MTBE. Ethanol is supplied almost entirely from domestic production. A high tariff is levied on ethanol for fuel use, 54 cents/gallon, with limited exemptions for certain Caribbean Basin sources. About one-third of MTBE supplies come from imports.

In the case of gas, the near doubling of production in the deep-water gulf more than offset the small decline elsewhere, leading to a net increase for the country as a whole. In 2000, deep-water gulf production accounted for 5% of total US gas production, up from 3% in 1998 (and 1% in 1995). Oil production in the deep-water gulf rose by 70% or 300 MB/D between 1998 and 2000, offsetting about half of the production decline elsewhere in the country. Oil production from this source last year accounted for 9% of total US production, up from 5% in 1998 (and less than 2% in 1995).

US Oil and Gas Production

	DWGOM	Rest of US	Total
Gas BCF			
1998	560	18,148	18,708
2000	998	18,078	19,076
Change	+437	-69	+368
Oil MB/D			
1998	436	7,956	8,392
2000	740	7,370	8,110
Change	+303	-586	-282

The Federal government had to make the deep-water acreage available through lease sales in order for these gains to occur and lease sales in prospective areas remain an important instrument of US energy policy. The most prospective areas remain the deep-water gulf, where the Administration has just scaled back its planned lease sales in the face of opposition from Florida, and ANWR, the Alaska Northwest Wildlife Reserve, where Administration proposals for leasing face intense opposition in Congress.

Energy policy must take account of other strong national priorities, including particularly environmental concerns. But failure to make reasonable choices in these and other areas of energy policy means at a minimum markets will have to work harder to maintain supply/demand balances. "Harder" in this case means greater price volatility, and greater risks of price spikes.