



## **You may be interested.**

**PIRINC has prepared the enclosed report, *Oil Industry Developments: Stresses and Responses*, based on a presentation given at the annual meeting of the National Research Council Transportation Research Board on January 9. The report reviews different aspects of the industry response to the market developments of past year and discusses implications for the future.**

**In 1998 through early 1999, the industry suffered from extremely depressed prices. The ensuing financial problems encouraged cutbacks in investment and employment, as well as an unprecedented level of industry mergers. Last year, however, tight world oil supplies, low inventories of oil---and in the US, low gas storage---in the face of strong demand combined to produce sharply higher crude and product prices. Just as depressed prices forced cutbacks, high prices encourage efforts to raise production and to ease any downstream bottlenecks in the supply of products to the market. With respect to the upstream, the high price incentives appear to be working but the downstream response has been far more muted, due almost entirely to regulatory developments. In particular, problems associated with the requirements for Phase II reformulated gasoline held back both production and especially imports. On the other hand, distillate production and imports, which did not face any immediate, new regulatory hurdles has responded strongly to market incentives.**

**If you have any questions or comments, please call Ron Gold**

**January 2001**

---

**Petroleum Industry Research Foundation, Inc.**

3 Park Avenue • 26<sup>th</sup> Floor • New York, NY 10016-5989

Tel.: (212) 686-6470 • Fax: (212) 686-6558

## Oil Industry Developments: Stresses and Responses

### SUMMARY

Over the past few years, the oil industry has been under severe stress but the sources of stress have changed dramatically. In 1998 through early 1999, the industry suffered from extremely depressed prices. The ensuing financial problems encouraged cutbacks in investment and employment, as well as an unprecedented level of industry mergers. Last year, however, the stresses were very different as tight world oil supplies, low inventories of oil---and in the US, low gas storage---in the face of strong demand combined to produce sharply higher prices. As a result of regulatory and logistical problems, certain regions witnessed price spikes well in excess of overall higher price levels.<sup>1</sup>

Of course, higher prices for crude oil and natural gas, as well as higher product margins produced substantial gains in upstream and downstream profitability last year. Just as depressed prices forced cutbacks, high prices encourage efforts to raise current and future levels of production and to ease any downstream bottlenecks in the supply of products to the market. With respect to the upstream, the high price incentives appear to be working but the downstream remains far more problematic.

This report reviews different aspects of the industry response to the market developments of past year. At the global level, the supply situation has eased considerably. Although the most immediate factor has been higher OPEC production, a strong, worldwide recovery in drilling activity is underway which supports longer-term relief.<sup>2</sup> The US recovery has been particularly strong, although oriented particularly in its early stages toward gas. On the other hand, US refinery runs rose only modestly last year while product imports were flat. Indeed imports of gasoline were down significantly despite clear market signals for more supply. There is no sign of any significant upturn in refinery investment, partly due to understandable industry caution in a sector infamous for its low returns but also due to the regulatory environment. Land use and air quality concerns discourage the building of a new refinery, or the significant expansion of an old one, in many parts of the country. Product quality regulations continue to create barriers to the free movement of product and thereby continue to leave local markets vulnerable to disruption.

### TRENDS IN DOMESTIC INDUSTRY EMPLOYMENT AND RETURNS ON INVESTMENT

The chart on the next page considers trends in domestic employment and returns on investment for the upstream and downstream segments of the industry. Industry employment trends, as

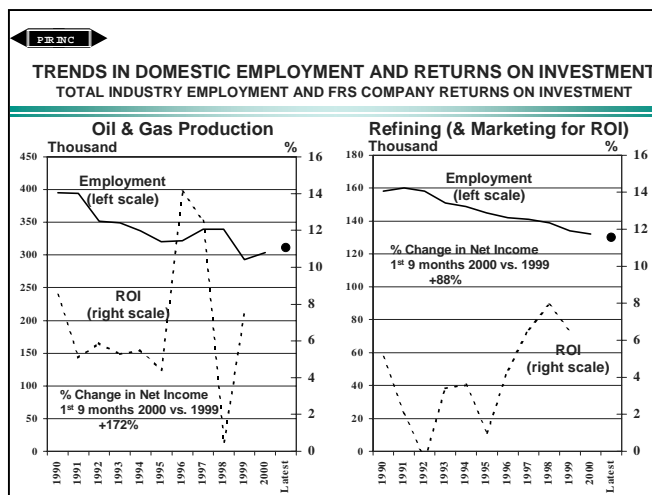
---

<sup>1</sup> To a certain extent, the tight supply situation last year was the result of actions taken to cope with the earlier depressed prices, including the series of OPEC production cuts that began in early 1999 and were not reversed until March of last year.

<sup>2</sup> Until the recent cutbacks by Iraq, that began in December, OPEC production was up about 3 million barrels/day from its March level. The cutbacks came after the UN rejected its demand that buyers pay a 50 cent/barrel surcharge directly to Iraq.

published by the Bureau of Labor Statistics, are shown for 1990 through 2000 (first 11 month average) and for the latest month available (November). Returns on Investment are for the FRS reporting companies, and extend only through 1999.

The panel on the left shows trends for oil and gas production. Employment in 2000 was about 100,000 less than in 1990, but above 1999. The figure for the latest month, November, indicates employment is still moving up. The rate of return on investment of the FRS companies shows significant fluctuation since 1990 but with a clear near-zero low point in 1998. Return on investment moved back up in 1999 and while the figure for 2000 is unavailable, the sharp increase in net income reported by major companies in the first nine months, up 172%, indicates returns on investment will be much higher than in 1999.

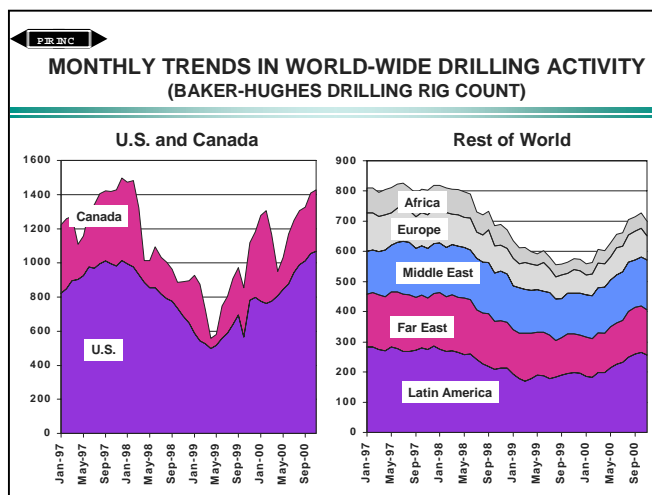


Employment in refining has fallen steadily since 1990 and, unlike the upstream, the decline is continuing. Generally, the downstream has shown much lower returns on investment (in refining and marketing combined) than the upstream although 1998 and 1999 showed the highest returns over the course of the 1990's.<sup>3</sup> Net income figures for the first 9 months of last year for major companies was up 88% versus 1999. While the reported return on downstream investment should be up substantially in 2000, the gain is not having the same positive effects on employment as in the upstream.

### TRENDS IN WORLD-WIDE DRILLING ACTIVITY

For the upstream, drilling activity provides a clear indication of industry response to changing market conditions. The chart on the right summarizes worldwide monthly activity since the beginning of 1997 as indicated by the Baker-Hughes drilling rig count. The left panel shows activity in the US and Canada while the right panel shows activity in the rest of the world.

In the US and Canada, low prices caused an immediate, sharp fall-off in drilling. From a level of nearly 1,500 rigs in early 1998, the count fell to a low-point of under 600 in



<sup>3</sup> The sample of FRS companies was modified in 1998 to include large independent refiners. In 1998, the newcomers had slightly higher refined product margins (by about 8%) than the incumbents. Their inclusion may have led to a small upward shift in reported returns on investment.

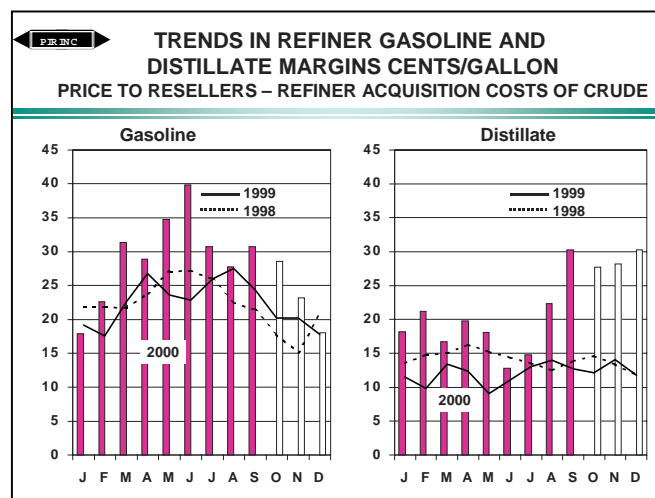
April- May, 1999. But as of November 2000, the total was up over 1,400. In the early months of recovery, the gains were strongest for gas drilling. But as of November, the number of US oil rigs was up 61% versus the year earlier (234 versus 145) while the number of gas rigs was up 31% (832 versus 635). Since extremely tight gas supplies, and extremely high gas prices, this past year have been pushing interruptible and spot market customers into the oil market for alternative supply, an improvement in gas supply would help take pressure off of oil markets, especially the market for distillate (and particularly heating oil in the Northeast). There has already been a small improvement in lower 48 oil production after declines in 1998 and 1999, and in domestic gas production, as a result of the increased drilling activity with further gains, especially in gas, anticipated for next year.<sup>4</sup>

Elsewhere in the world, the decline was less steep but recovery came much later, not until the spring of 2000, nearly a year after the turning point in the US and Canada. Moreover, activity as of November was still below early 1998 levels. Part of the lag reflects the market perspective of major OPEC producers. Although oil prices began to move up as early as March 1999, OPEC (apart from Iraq) maintained its production cutbacks until March of 2000. Without the prospect of increased production and sales, the incentives for increased drilling efforts, despite higher prices, were clearly limited.

## TRENDS IN REFINING MARGINS

The downstream has also received strong, favorable market signals this past year but the response has been far more problematic. The chart below gives another indicator of the recent gains for the US refining sector, the trends in refiner gasoline and distillate margins since 1998.

As shown in the left panel, gasoline margins last year, especially in the spring and early summer, were significantly higher than in the prior two years, although at year-end, they were more-or-less in line with earlier levels. The gains for distillate, shown on the right, have been even stronger, with what appeared to be a significant increase last February dwarfed by far larger increases beginning in August that have persisted into the new year. The persistent, exceptionally high margins since August are linked to distillate's role as a key substitute for natural gas for interruptible and spot gas customers. With natural gas storage levels at extremely low



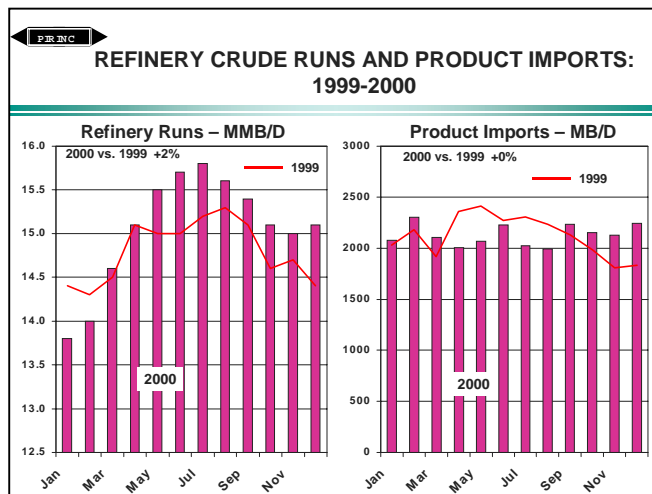
<sup>4</sup> The December 2000 Department of Energy Short Term Energy Outlook estimates lower-48 crude production for 2000 at 4.87 MMB/D, up slightly from 4.83 in 1999. Total domestic dry gas production for 2000 is estimated at 18.79 TCF, up slightly from 18.66 in 1999.

levels, and soaring spot gas prices, these customers are being pushed into the distillate market. The low level of distillate inventories, especially in the Northeast, is also helping to sustain high prices and margins.

## SUPPLY RESPONSES TO HIGHER PRODUCT MARGINS

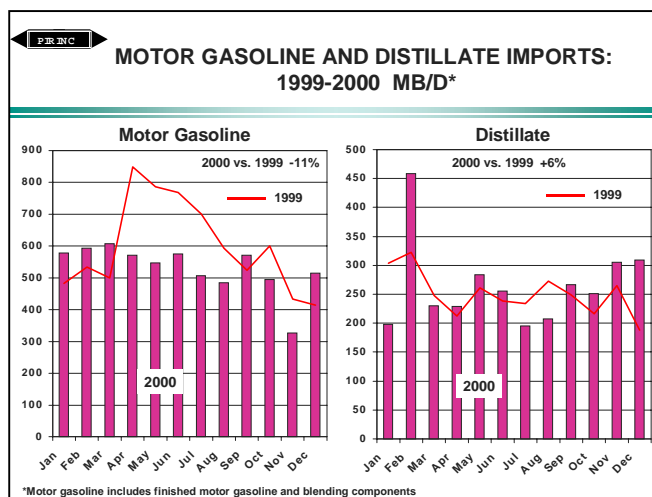
The downstream was receiving clear signals that their product was needed and that it would be unusually profitable to meet that need. Nonetheless, the supply response has been somewhat muted. The next chart shows recent trends in refinery runs and product imports.

As shown in the left panel, crude runs by US refiners were up 2% last year versus 1999. On a monthly basis, after a slow start, runs moved above 1999 levels in May and have remained higher each month thereafter. While the average utilization rate last year was high, 91%, it was not exceptional.<sup>5</sup> The average was the same as in 1999 and below the 95% average rates for 1997 and 1998. Product imports, in aggregate, last year, showed no growth at all, despite the strong market signals for more supply. Throughout the spring and summer, imports were running significantly below year-earlier levels.



To focus on the reasons for the limited supply response, the next chart shows trends in imports of two specific products, motor gasoline and distillate. Motor gasoline includes both the finished product and blending components.

In the case of motor gasoline, imports last year were 11% below their level in 1999. The differences were greatest in the late spring and early summer, just the period when market signals for more supply were strongest. The timing of the import shortfalls corresponds almost exactly with the introduction last year of Phase II reformulated gasoline. In effect, US product specifications for reformulated got ahead of foreign ability to supply the market. At home, the new requirements also limited the ability to supply, especially production of ethanol-based reformulated



<sup>5</sup> Utilization rates are calculated as crude runs divided by published beginning-of-year crude distillation capacity.

gasoline for the mid-west.<sup>6</sup> Overall, domestic production of finished gasoline in 2000 was up less than 1% versus 1999.

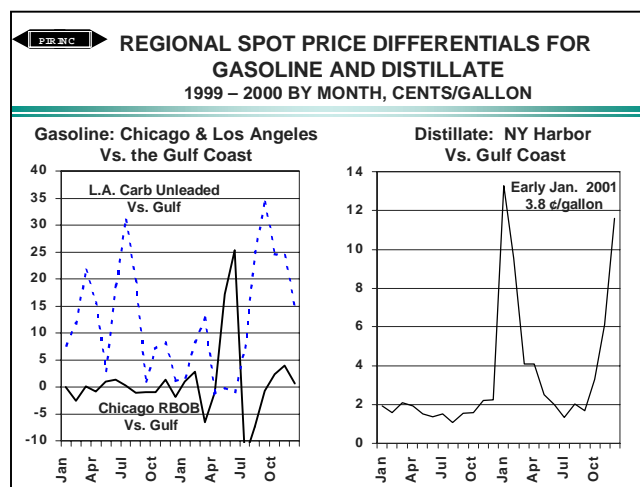
On the other hand, distillate imports show a strong response to market signals. Overall, distillate imports were up last year by 6% versus 1999. The monthly patterns indicate even more clearly the supply response to market conditions. In February, when distillate prices, especially in the Northeast, were particularly strong, imports were up nearly 50% from year-earlier levels. In November and December, imports of distillate appear to be running at nearly 30% above year-earlier levels. Domestic production of distillate also responded strongly, up about 5½% last year versus 1999, and up by 9% since August. Unlike gasoline, distillate product specifications were not changed last year. The industry therefore faced no new production problems for this product and remained free to shop the world market for needed supplies.

## MARKET BALKANIZATION

So far, the downstream discussion has focused on national developments. But last year, another aspect of downstream problems became exceptionally visible, the “Balkanization” of the national market for particular products, especially for gasoline where distinct “boutique” markets have been created.

The left panel of the next chart illustrates the point with respect to two notorious markets, California and Chicago. It shows the average monthly spot price differentials for: (1) Los Angeles Carb unleaded, and (2) Chicago RBOB (Reformulated Gasoline Blendstock for Oxygenate Blending used with ethanol in a ratio of about 90:10) versus Gulf Coast reformulated gasoline. California has long been known for its unique gasoline specifications and tight refinery balances which together leave the market extremely sensitive to any disruption in local supply. Accordingly, spot price differentials for Los Angeles Carb unleaded versus the Gulf Coast have been extremely volatile, ranging from near zero to over 30 cents/gallon over the past two years. Last June, Chicago (and Milwaukee) looked like California as a spike in spot price of RBOB pushed the average monthly differential versus Gulf Coast reformulated from about zero to 25 cents/gallon. Refiners had great difficulty in meeting Phase II specifications for ethanol-based reformulated gasoline---used almost exclusively in Chicago and Milwaukee. The resulting supply shortfalls, although small (about 2-3%), resulted in sharp increases in prices to consumers, as would be expected when the product involved is a virtual necessity. After the television cameras went away, and calls for investigations of “gouging” died down, the specifications were quietly relaxed, helping to bring supply shortfalls to an end.

Distillate is not immune either from regional market segmentation, but causes are



<sup>6</sup> Production was also inhibited to a certain extent by the UNOCAL patent-infringement legal issues.

different. The right panel of the chart shows monthly average differentials between the spot price of no. 2 oil in New York Harbor and the price on the Gulf Coast. Note that the scale from the distillate differentials is about one-third the scale for gasoline. Over the course of 1999, the differential averaged less than 2 cents/gallon. But in January last year, the differential averaged 13 cents/gallon. At that time, a severe, prolonged cold snap raised normal residential consumer demand for heating oil while limits on gas deliverability pushed interruptible and spot gas customers into the Northeast distillate market. Inventories were quickly drawn down to extremely low levels. With a lag, new supplies reached the market, primarily, as shown earlier, through a substantial increase in imports.

Late last year, the differential moved up again averaging nearly 12 cents/gallon in December, although so far daily levels remain well below those extreme values reached last winter. Indeed, the daily differentials narrowed to below 4 cents/gallon as we entered the New Year. Regional inventories remain very low, even allowing for the 2 million barrels in the newly created Northeast Heating Oil Reserve. With pipelines full, the marginal sources of supply are imports and waterborne shipments from the Gulf Coast. But international tanker rates are high; a result of the surge in OPEC production and thus international oil movements while domestic, Jones Act tanker capacity is also limited. Thus some significant differential is likely to persist until it is clear heating season needs are met and shipments to the Northeast recede.

## CONCLUDING NOTES

Looking ahead, it's clear upstream stresses are easing. In the US, production of oil, and especially gas, is moving up. Internationally, the OPEC focus has shifted from expanding production to managing a potential oversupply.

For the downstream, conditions are different. High prices for natural gas and low storage are combining to prop up distillate demand and margins---conditions that are likely to persist until it's clear winter demands have been met. In the case of gasoline, presumably refiners have managed to learn from last year's experience while the quiet adjustments made to the reformulated specifications ease the risks of a new mid-west price spike.

But the problems and risks of "boutique" fuels remain. Indeed, there are new challenges to the downstream that could aggravate risks, in particular, the new regulations for ultra-low sulfur diesel and the coming phase-out of MTBE. Unless carefully---and flexibly---managed, the result could be new domestic supply shortfalls and new limits on the industry's ability to shop world markets to overcome them.