

A Contrast Between Distillate Fuel Oil Markets in Autumn 1996 and 1997¹

As the winter season approaches, distillate markets this year provide a series of stark contrasts to distillate markets last year (Table FE 1). A year ago, distillate markets were on a precipice. Record-low stocks created fears of possible supply disruptions and soaring prices for the core winter months. These fears were not realized, however, as warm weather, record-high refinery output and smooth logistics, kept winter distillate markets calm. Last year's autumn stock levels did not represent a fundamental change in distillate markets. The factors that led last year to such low stock levels have not been repeated this year. Hence, stocks are higher and markets less vulnerable (but not *invulnerable*) to price spikes.

additional heating oil. Even the high refinery output could only keep pace with the unusual draw on supply. By the end of March 1996, and again at the end of April, inventories of distillate fuel oil were about 90 million barrels, a record low.

In contrast, the heating season of 1996-97 ended calmly. Weather in the Northeast had generally been warmer than normal in the depth of winter, and was close to normal as spring broke through. The end-season panic of the previous year was not repeated, and stocks reached their annual low point (April) within the historical range.

Stocks at end of last winter set stage

The winter of 1995-96 ended with a significant cold snap in the northeastern United States. Heating degree-days² in March 1996 were 15 percent higher [higher when colder] than normal in the Mid-Atlantic States and 10 percent higher than normal in the New England States. Hence, at a time when refiners have generally turned their attention to gasoline, they instead needed to pump out

Markets calmer, this winter's prevailing prices lower

With crude oil prices at their highest levels since the Gulf War, oil markets last year were providing no comfort to consumers. Prices in 1996 seemed only to climb, in spite of market expectations to the contrary³. In September 1996, for instance, the precariously poised world crude oil market touched \$25 per barrel after a

Table FE 1. Distillate Markets as Winter Approaches
(Contrast Autumn 1996 and Autumn 1997)

| 1996 | Factor | 1997 |
|--------------------------------|-----------------------------------|--------------------------|
| Record low | Previous end-winter stocks | In the historical range |
| High | Prevailing prices | \$5/barrel lower (WTI) |
| Falling prices | Price expectations (overall) | Stable prices |
| Falling prices | Price expectations (heating oil) | Seasonally higher prices |
| Strong growth | Off-season demand | Weaker growth |
| Europe out-bidding US | World competition for heating oil | Europe's markets calm |
| Untested; Trainor refinery out | Autumn refinery output | Record levels proven |
| Record low | End-September inventories | High end of range |

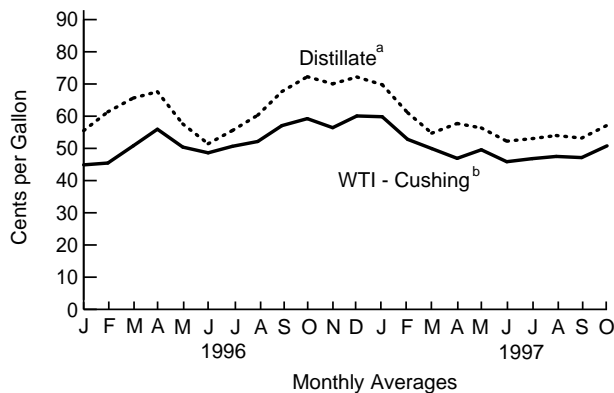
¹Cheryl J. Trench, an independent petroleum analyst, contributed to this article. Unless otherwise referenced, data in this article are taken from the following Energy Information Administration sources: *Weekly Petroleum Status Report*, DOE/EIA-0208; *Petroleum Supply Monthly*, DOE/EIA-0109; *Petroleum Supply Annual*, DOE/EIA-0340; *Petroleum Marketing Monthly*, DOE/EIA-0380; *Short-Term Energy Outlook*, DOE/EIA-0202; and Short-Term Integrated Forecasting System.

²Heating degree-days (HDD) are a measure of how cold a location was over a period of time relative to a base temperature, 65 degrees F.

political stand-off in the Middle East. By early October, barrels were running consistently at the \$25 level.

By September 1997, crude oil prices had declined more than \$5 per barrel since their peak in late 1996 (Figure FE 1). This 12-cent-per-gallon decrease has been reflected throughout product price markets. Heating oil prices, for instance, were about 67 cents per gallon on the New York Harbor spot market last September, and ran about 53 cents per gallon this September.

Figure FE 1. Spot Prices for Distillate and Crude Oil by Month, January 1996 - October 1997



^a Distillate fuel oil as measured by No.2 Heating Oil delivered at New York Harbor.
^b One of the the bellwether crude oils, West Texas Intermediate delivered at Cushing, OK.

Source: Table 13, *Weekly Petroleum Status Report*.

Overall outlook suggests stable, not falling prices

The 1996 oil market suffered a variety of anomalies, including the persistent view that prices would be falling in the next few months. With new supply just over the horizon, crude oil prices looked poised for a fall. But with stocks low and additions to supply consistently disappointing, prices remained high for prompt delivery. The tenacious contradiction between the near-term view (available supplies were limited) and the longer-term view (the market would be oversupplied in the months ahead) was a prime mover throughout 1996. Industry response was rational from an economic standpoint, but confounded policy makers and other market observers. Stocks remained low, but any purchase for current consumption carried a high price premium.

It was not until the supply from Iraq under the United Nations limited oil for food sale finally came into the market, combined with easing of delays in bringing some other production supplies on (North Sea, for example), that the market began to correct itself. Prices for the crude oil contract on the New York Mercantile Exchange, for instance, have recently reflected a stable market view, showing almost no difference between the price for near term supplies and the price for volumes three and six months from now.

³ as reflected in futures markets.

⁴ EIA report on *Petroleum 1996: Issues and Trends*, DOE/EIA-0615 (see Chapter 5, 'Petroleum Stocks: Causes and Effects of Lower Inventories,' especially page 88)

Price expectations for heating oil reflect a normal seasonal increase

In the normal course of events, heating oil inventories are built up in the off-season with the expectation that they can be sold during the winter at the higher seasonal prices. At a minimum, a company making a decision to store oil will want to cover the cost of purchase, the cost of money for the purchase, and the storage cost between the time of the purchase and the sale.

Between 1991 and 1994, the seasonal increase reflected in futures contracts as the winter approached was 1 cent per gallon per month: November was about 1 cent higher than October, December 1 cent higher than November. The December-January price increase was shallower. Prices generally peaked in January and reflected end-of-season declines thereafter. Prices in 1995 fell away from the old pattern, offering less than 0.5 cents per gallon for each month's increase, about the minimum. At 0.5 cents per month, the seasonal increase would remunerate the cost of money, but would not pay for the cost of storage, which provided a mild disincentive for holding prior-year levels of inventories.

Autumn 1996 prices, however, marked a significant departure from the norm. Because of the unusual market situation, futures prices reflected a decrease as the heating season approached. A firm making a decision to store was therefore looking at the likelihood of losing money, not making it, on its inventories. This economic disincentive to store oil was powerful. While some firms still chose to store oil, many could not afford to take the risk.

In 1997, the seasonal increase reflected in futures contracts returned to the old 1 cent per month level. Furthermore, the autumn stockbuilds proceeded comfortably. The return to the old norms is a clear indication that the market in 1996 did not reflect a sea change in the distillate markets. Even a preference for the lowest reasonable operating inventories, for instance, does not deter a seasonal inventory increase when the stockbuild is supported by market economics.⁴

More modest demand increases in 1997 have reduced supply pressure

During the second and third quarters of 1996, when distillate stocks would normally have been building, distillate demand was instead absorbing all available supplies. In spite of high refinery output levels, therefore, stockbuilds fell away from the historical pace. Demand in the first nine months of 1996, for instance, was about 4 percent above the 1995 level. In contrast, demand in the first nine months of 1997 increased about 1.5 percent over year-ago rates. A growth of approximately 4 percent per year for two years in a row would have been most unusual.

Demand increases, however, deserve a closer look (Figure FE 2.) The low sulfur portion of the distillate barrel, the portion used for on-highway transportation, and in particular trucking, is expected

to continue to increase in line with the economy. For example, the Short-Term Energy Model uses a broad measure of economic activity, the Industrial Production Index, as a key variable in the distillate demand equation. According to EIA⁵, on-highway transportation accounted for about 50 percent of distillate use nationwide in 1996. Thus, a strong economy is rapidly evident in distillate demand data.

In contrast, the high sulfur portion of the barrel supplies heat and hot water to homes and commercial establishments, and fuels farm and industrial equipment. The use of distillate oil for heat and hot water accounts for approximately 20 percent of distillate use nationwide on an annual basis. By far the biggest users of distillate oil for heat and hot water are homes and commercial establishments in the Northeast (approximately 68 percent of the U.S. total in 1996) and Midwest (about 14 percent). This heating oil heats a relatively stable stock of housing units from year to year. Seasonal changes in heating oil consumption therefore reflect weather variations more than changes in the numbers of customers or the consumption characteristics of oil-heated houses.

Europe's markets also calmer this year

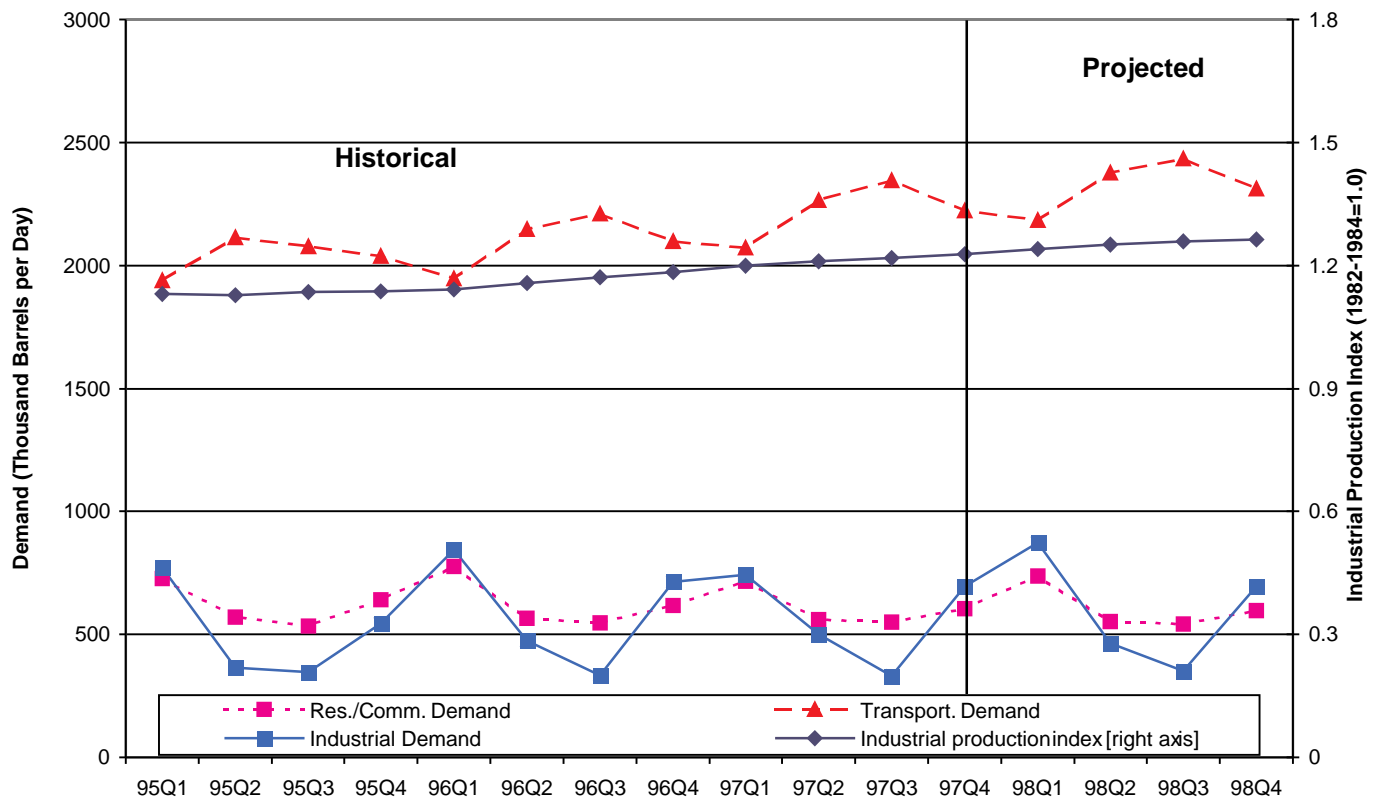
Competition among world consumers for distillate supply reflects another contrast between autumn 1996 and the current situation. In the autumn of 1996, Europe was shifting to ultra-low sulfur diesel, similar to that required in the United States since late 1993. While Europe's refining industry ramped up to meet the new requirement, its heating oil buyers were fighting for supply. Consumer stocks, a much more critical part of supply in Europe (especially Germany) than in the United States, were historically low. Also unlike the United States, where consumers have relatively small tanks that are filled as many as 5 times per season on a schedule dictated by degree-day calculations, consumer tanks in Germany with capacities up to 1,000 gallons are filled just once a year.

When Europe's consumers needed their winter supplies, the price signals were clear (Figure FE 3). Rotterdam prices rose well above those in New York Harbor or the U.S. Gulf Coast, beckoning supply. In September and October 1996, markets in Northwest Europe were bidding up to 7 cents more per gallon for heating oil than U.S. markets were willing to pay, more than enough to cover the shipping and related costs. As a result, supplies went to Europe⁶.

⁵EIA report *Fuel Oil and Kerosene Sales 1996*, DOE/EIA-0535(96).

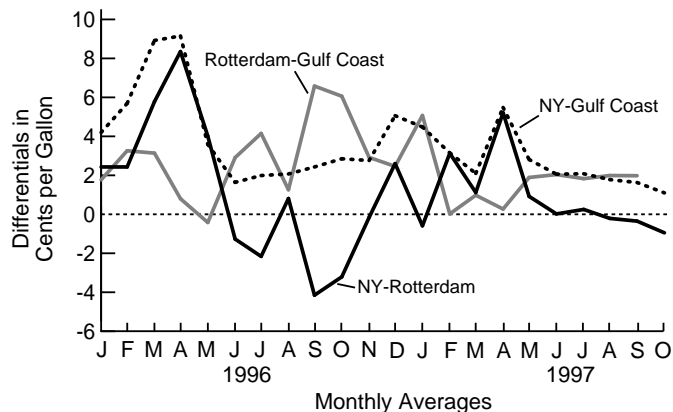
⁶An address by EIA Administrator Jay E. Hakes on the *Fall 1996 Heating Fuel Assessment* before the Winter Fuels Conference, November 7, 1996.

Figure FE 2. Distillate Demand and Industrial Production, First Quarter 1995 - Fourth Quarter 1998



In contrast, Europe's markets this year are calm. Differentials have been running a few cents per gallon in favor of Europe, not enough to cause a U.S.-to-Europe flow.

Figure FE 3. Distillate Spot Price Differentials in the North Atlantic Basin by Month, January 1996 - October 1997



Source: Calculated from Table 13. *Weekly Petroleum Status Report*.

Refinery output levels reached new heights last year

Among the positive developments during autumn 1996 was refinery output. The high distillate prices encouraged refineries to make distillate in ever-higher quantities. Both the volume and the yield relative to crude oil were at record levels. For example, where autumn output has generally been equal to about 24 percent of crude oil inputs, or 3.4 million barrels per day, in autumn 1996 distillate output from U.S. refineries averaged more than 25 percent of crude oil inputs, topping 3.6 million barrels per day.

Interestingly, however, refinery output has been unusually high for the 1997 autumn period (Figure FE 4). Refineries are running at counterseasonally high utilization rates, until recently well above 95 percent. As a consequence, recent distillate output has also reached historically high levels, as much as 3.7 million barrels per day, a level that would have seemed exceedingly unlikely in the absence of evidence from last year. Also significant, one of the major East Coast refineries (Tosco's Trainor), which was not operating last year, is now back in operation. Hence, last year's refinery output provided new assurance of the market's capability in the event of a demand spike, assurance that has been confirmed by experience in the fall of 1997.

Figure FE 4. Distillate Output from U.S. Refineries by Month, January 1992 - October 1997

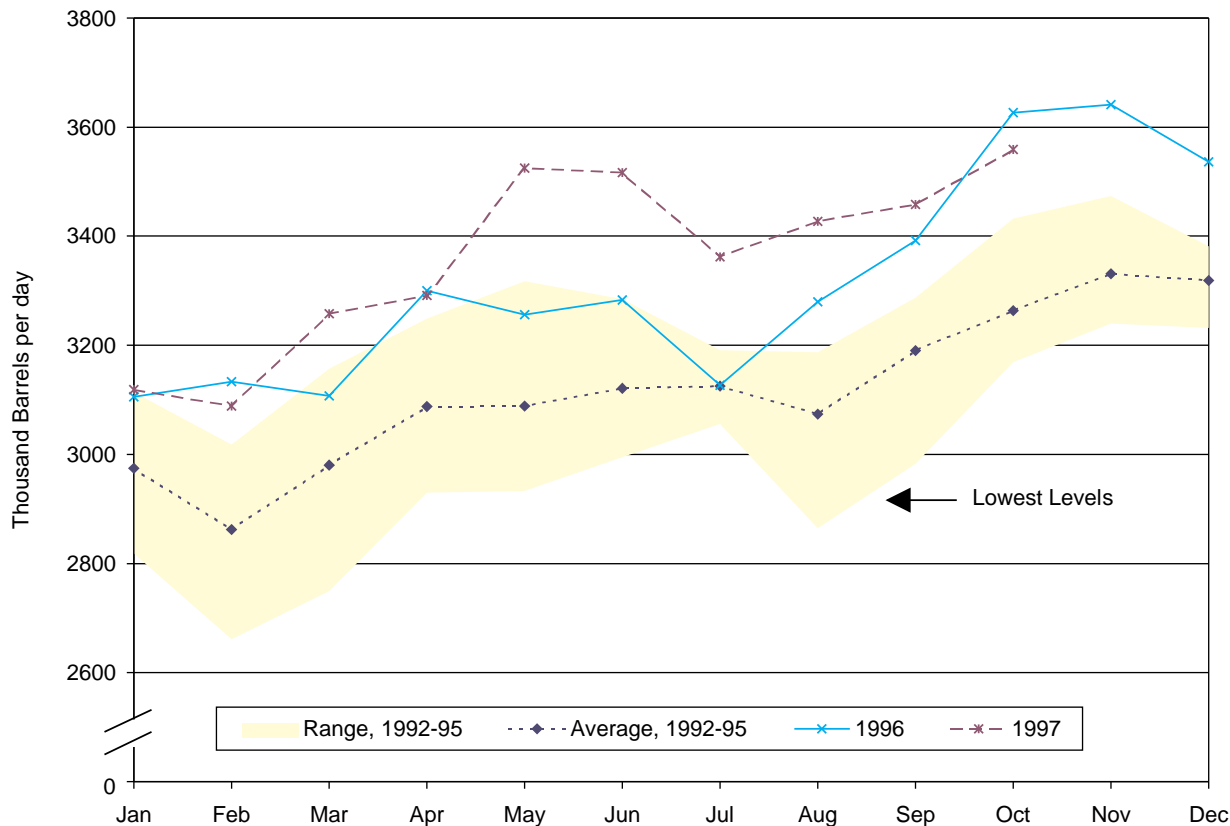
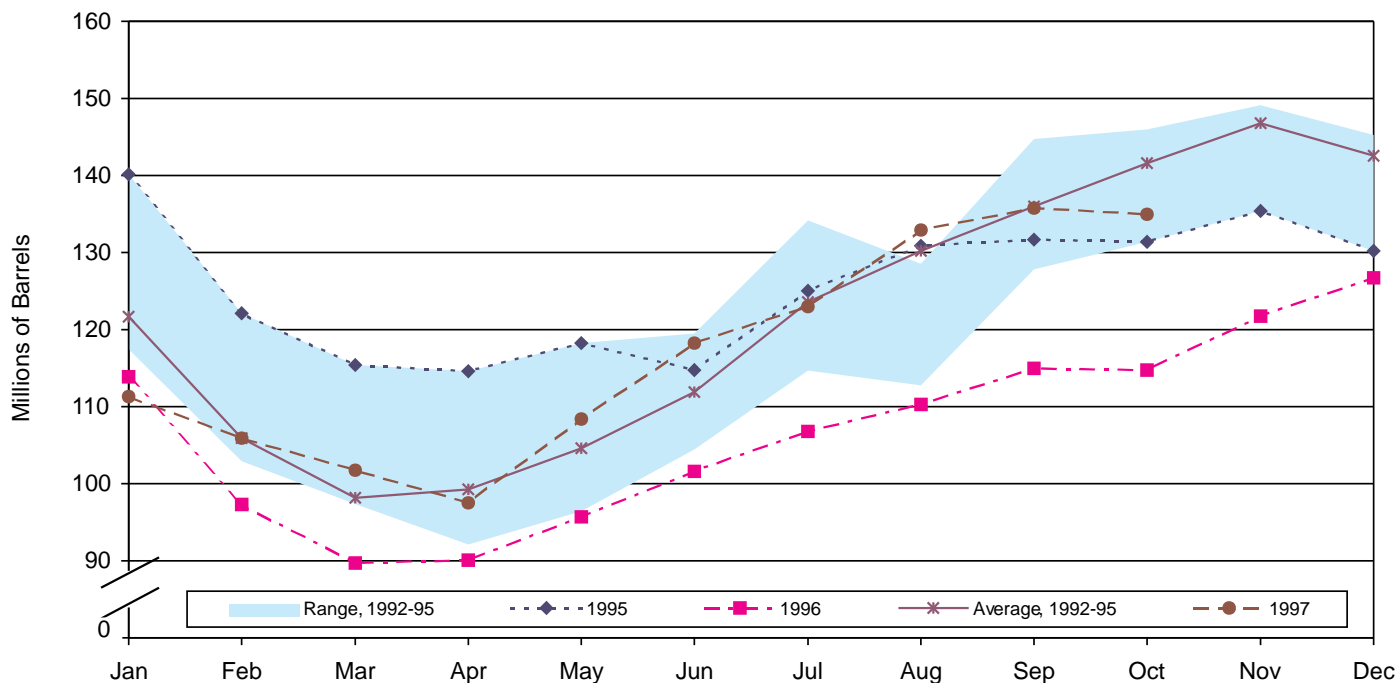


Figure FE 5. Distillate Stocks by Month, January 1992 - October 1997



Note: September 1997 is preliminary.

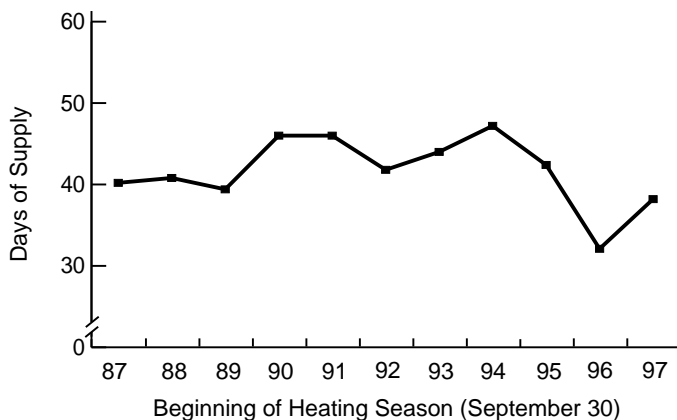
End-September inventories at high end of historical range

The factors described above -- these contrasts between the autumn of 1996 and 1997 -- get their proof in the 1997 inventory levels (Figure FE 5.) In 1996, end-September inventories were about 115 million barrels, a record low. In contrast, inventories at the end of September 1997 were at the high end of the range of the last few years.

Although total inventories are comfortable, they have not returned to the early 1990's level of "forward demand cover." ("Forward demand cover" is a measure of stocks relative to demand. It is calculated for this purpose as the stock level at the end of one month divided by the daily rate of consumption, or expected consumption, in the following month. It is expressed as "days of supply" (Figure FE 6). Forward demand cover for the distillate pool of both high and low sulfur product stood at about 38 days at the end of September 1997, a big increase above the 1996 level of 32, but not back to the average of 44 days of 1991-95. An essential point when assessing the days of supply is that seasonal inventories are built to meet winter heating oil demand. As noted above, demand for heating oil varies because of weather, but does not have an underlying growth trend. The days of supply

calculation for heating oil alone would show a more comfortable result this year. (While the separation of high versus low sulfur distillate allows a closer comparison, these data have only been available since late 1993.)

Figure FE 6. Distillate Stocks in Days of Supply at Beginning of Heating Season, 1987-1997



Source: Calculated from Table 13, *Petroleum Supply Monthly*.

Vulnerabilities Still Remain

With inventories at comfortable levels and with price signals showing the traditional seasonal increase (and hence, no barrier to storage), the outlook for distillate markets during the 1997-98 heating season provides a welcome contrast to the view a year ago. In the event of an unforeseen event, however, prices could still spike, either because of a surge in demand or an unforeseen problem with supply. Even a price spike, however, is likely to be shallower and shorter this year than it would have been last year.

While distillate markets and market signals are comfortable, gasoline markets remain tight. Thus, a demand spike in the distillate market would likely elicit an output increase from refiners. Such an increase, however, would come at the expense of gasoline supply. Thus, a cold first quarter could lay the groundwork for springtime gasoline price run-ups⁷.

One area of uncertainty in any winter assessment is weather, and this year's El Niño event has brought the winter weather outlook

to the front page. According to many experts, an El Niño event that follows the pattern of 1982-83, while having a potentially devastating impact on the West Coast, could lead to a mild winter in the Midwest and Northeast. The mild winter of course would reduce demand, and would also reduce the likelihood of weather-related logistics problems such as frozen rivers and ports⁸.

Perhaps the largest shadow over the oil market currently is Iraq. Iraq is exporting limited volumes of oil under the UN's humanitarian aid program. The program was scheduled to end on December 4, 1997. The shadow of uncertainty relating to Iraq was removed for the near term when the UN extended the program for another six months. Additionally, the Organization of Petroleum Exporting Countries (OPEC) voted at its late November meeting to raise its self-imposed export ceiling by approximately 10 percent, further easing the global oil supply/demand balance.

⁷EIA report on *Petroleum 1996: Issues and Trends*, DOE/EIA-0615 (see Chapter 2, 'Spring '96 Gasoline Price Runup: An Example of Petroleum Market Dynamics')

⁸On-going developments and forecasts of El Niño are available at the following WEB site: <http://www.elnino.noaa.gov>