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before the

SUBCOMMITTEE ON ENERGY AND RESOURCES
COMMITTEE ON GOVERNMENT REFORM

U. S. HOUSE OF REPRESENTATIVES

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Mr. Chairman and Members of the Committee, I appreciate the opportunity to appear before you today. The Energy Information Administration (EIA) is the independent statistical and analytical agency within the Department of Energy. We are charged with providing objective, timely, and relevant data, analyses, and projections for the use of the Congress, the Administration, and the public. While we do not take positions on policy issues, our work can assist energy policymakers in their deliberations. Because we have an element of statutory independence with respect to our activities, our views are strictly those of EIA and should not be construed as representing those of the Department of Energy or the Administration.

Much of my testimony today is based on EIA's June 2006 *Short-Term Energy Outlook*, which was issued on June 6. The *Outlook* contains a special report that reviews the past impacts of hurricanes in the Gulf of Mexico on crude oil and natural gas production. Before turning to the outlook for the summer and the hurricane season, I will briefly review the major forces affecting world energy markets and, in particular, oil markets.

Oil market developments are a matter of vital interest to all Americans. During most of the 1990s, the West Texas Intermediate (WTI) crude oil price averaged close to \$20 per barrel, but plunged to almost \$10 per barrel in late 1998 as a result of the Asian financial crisis slowing demand growth while extra supply from Iraq was entering the market for the first time since the Gulf War. Subsequently, as Organization of Petroleum Exporting Countries (OPEC) producers adhered to a coordinated production quota and reduced output, crude oil prices not only recovered, but increased to about \$30 per barrel as

demand grew. The most recent increase in crude oil prices began in 2004, when they almost doubled from 2003 levels, rising from about \$30 per barrel at the end of 2003 to peak at \$56.37 on October 26, 2004. After falling back briefly, prices then continued to rise in 2005 and in the early months of 2006. For much of this May, we saw WTI prices above \$70 per barrel. This is a significant change from what we experienced during the latter half of the 1980s and the 1990s.

In recent testimony before another House committee, I outlined EIA's perspective on the forces driving crude oil prices in today's marketplace. To summarize briefly, crude oil prices are set in the global marketplace and largely reflect the fundamentals that determine supply and demand. In recent years, increases in global oil production capacity have struggled to keep pace with rapidly growing demand, particularly in China, the other emerging economies in Asia, and the United States. That slower growth in productive capacity relative to growth in demand has resulted in a decline in global surplus capacity to produce crude oil. At the same time, perceived risks to supply posed by geopolitical instability and other uncertainties have grown. In the present environment, with a minimal cushion of surplus production and refining capacity to meet disruptions in supply and with futures markets in many cases showing prices for commodities delivered in future months that are higher than for those delivered in months closer to the present, market participants have a strong demand for inventories. Absent an unexpected downturn in global economic activity, neither demand-side nor supply-side corrections will come quickly; thus, crude oil prices are expected to remain at relatively high levels, supporting high gasoline prices for the foreseeable future.

In the past few years a great deal of attention has been turned toward the importance of the refining sector, especially following the hurricanes last year. The storm-related shutdown of many Gulf Coast refineries highlighted a situation that had been developing for some time. Excess capacity in the refining industry, like that for crude oil production, has been shrinking as demand has grown, leaving less of a buffer for emergencies or for any periods when the balance between supply and demand becomes unusually tight. The reduction in excess refining capacity is a global phenomenon. EIA estimates that global refinery utilization has grown to about 90 percent of capacity, up from 85 percent as recently as 2002, as the overall growth in demand for petroleum products has outpaced refinery additions.

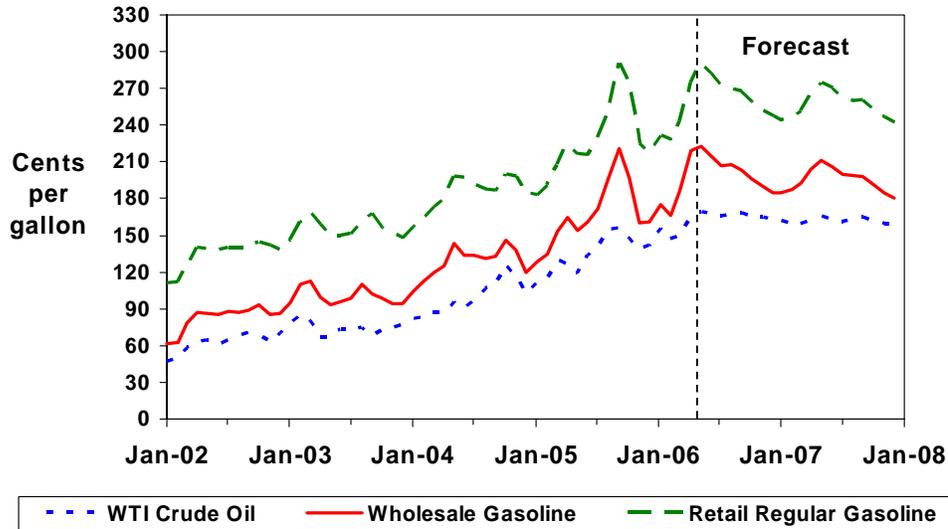
The Short-Term Energy Outlook

As discussed later, another active hurricane season is possible this year, and news of developing hurricanes and tropical storms could add volatility to near-term oil and natural gas prices. Our monthly baseline *Short-Term Energy Outlook* does not explicitly include hurricane scenarios, in part due to data limitations and in part due to the inability of the underlying model to accurately incorporate large, short-lived unpredictable events such as hurricanes. However, we can use our assessment of how past hurricanes have affected production in the Gulf of Mexico, and in conjunction with our energy outlook, to provide some insight for the upcoming season.

While U.S. crude oil production in 2006 will grow with recovery from last year's hurricanes, only moderate increases in OPEC and other non-OPEC production and capacity are expected. Steady and continued growth in world oil demand will likely

combine with only modest increases in world oil production capacity, leaving little room to increase production in the event of geopolitical instability. We expect that crude oil prices will remain high through 2007. The monthly average WTI crude oil price is projected to average \$68 per barrel in both 2006 and 2007. Retail regular gasoline prices are projected to average about \$2.60 per gallon in 2006 and \$2.56 per gallon in 2007 (Figure 1. Gasoline and Crude Oil Prices). Summer 2006 (April 1 to September 30) regular gasoline pump prices are expected to average \$2.76 per gallon, 39 cents higher than last year's average of \$2.37 per gallon. By September 2006, fuel prices are expected to be lower than last year because of the return of crude oil and natural gas production and refineries affected by Hurricanes Katrina and Rita in 2005.

Figure 1. Gasoline and Crude Oil Prices



Short-Term Energy Outlook, June 2006

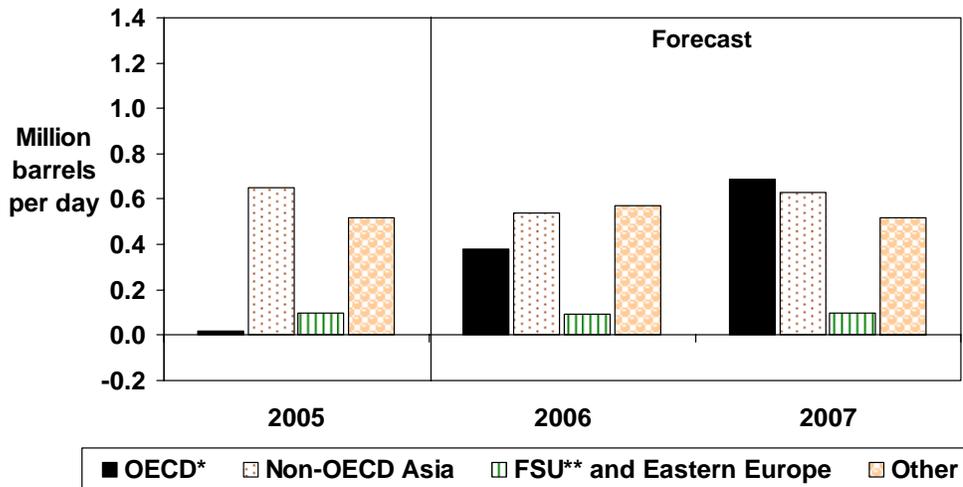


Natural gas prices are projected to be lower through the rest of this year relative to the corresponding 2005 levels. The expected average for 2006 for Henry Hub spot prices of

\$7.74 per thousand cubic feet (mcf) is down \$1.12 from the 2005 average. For 2007, the Henry Hub average price moves back up to average \$8.81 per mcf, assuming sustained high oil prices, normal weather, and continued economic expansion in the United States.

Global Petroleum Markets. Although world petroleum consumption growth has slowed because of higher prices, projected consumption growth nevertheless remains strong at 1.7 million barrels per day in 2006 and 1.9 million barrels per day in 2007 (**Figure 2. World Oil Consumption Growth**). Most of that consumption growth will be met by increases in non-OPEC (Organization of Petroleum Exporting Countries) production. The shortfall will be compensated for by increases in OPEC production or drawdown of inventories.

**Figure 2. World Oil Consumption Growth
(Change from Previous Year)**



* Countries belonging to Organization for Economic Cooperation and Development

** Former Soviet Union

Source: Energy Information Administration, *Short-Term Energy Outlook*, June 2006

OPEC members' crude oil production in 2006 will likely be slightly below 2005 production then increasing by about 0.7 million bpd in 2007. World surplus crude oil production capacity, which is primarily located in Saudi Arabia, is just slightly higher in 2006 and 2007 compared to 2005. Because of only limited surplus capacity throughout the forecast period, continued concern about potential or existing supply problems in Nigeria, Iran, Iraq, Venezuela, and elsewhere, as well as the threat of more hurricane damage and the continued tight supply-demand balance, we expect little change in the current high-price environment.

U.S. Petroleum Markets. Average domestic crude oil production is expected to increase by about 160 thousand barrels per day or 3.1 percent in 2006, to a level of almost 5.3 million barrels per day. For 2007, a 6.6-percent increase is expected, resulting in an average production rate of 5.6 million barrels per day for the year. Most of the production increase will likely occur in the offshore Gulf of Mexico, including production from the Mars, Thunder Horse, and Atlantis platforms.

In 2006 and 2007, U.S. petroleum consumption is projected to increase by 0.9 percent and 2.1 percent, respectively. Gasoline consumption, which exhibited almost no growth in 2005, is projected to grow 0.9 percent in 2006 and 1.3 percent in 2007. This pattern reflects continued economic growth and the stabilization of gasoline prices. Distillate (diesel fuel and heating oil) consumption, having increased 1.3 percent in 2005, is projected to increase 2.4 percent in 2006 and 3.1 percent in 2007. Transportation diesel fuel consumption is projected to show solid growth in 2006 and 2007 of 3.4 percent per year as the economy continues to expand. However, this year's unusually warm weather

during the first quarter is expected to result in a substantial decline in heating oil demand for the year as a whole, limiting total distillate consumption growth for 2006.

Refinery inputs of crude oil through the first 5 months of 2006 have averaged nearly 470,000 bbl/d (3.0 percent) below the same period last year. There are several reasons for this decline. Several refineries were still shut down or operated at reduced rates because of hurricane damage. Others pursued maintenance schedules that had been deferred from last fall, while others installed equipment to meet the new Tier 2 gasoline and ultra-low-sulfur-diesel regulations. The lower crude runs had the greatest impact on motor gasoline and distillate inventories, which fell by 23 and 20 million barrels, respectively, from the end of February through the end of April. Inventories did rebound partially in May, with total primary motor gasoline stocks ending May at less than 2 million barrels below the last 5-year average and distillate stocks 8 million barrels above the last 5-year average.

While significant supply uncertainties remain, some softening in the near-term gasoline balance is expected to dampen retail prices somewhat, barring new, unanticipated supply disruptions. The potential for midsummer retightening exists, however, if demand growth picks up to higher rates than currently expected or if refinery outages occur at unusual rates. As noted previously, retail regular gasoline prices are projected to average about \$2.60 per gallon in 2006 and \$2.56 per gallon in 2007. Summer 2006 (April 1 to September 30) regular gasoline pump prices are expected to average \$2.76 per gallon, 39 cents higher than last year's average of \$2.37 per gallon.

The transition to ultra-low-sulfur diesel (ULSD) fuel begins this month. Refiners and importers must ensure that at least 80 percent of the volume of highway diesel fuel they supply meets the new 15 parts per million (ppm) maximum sulfur limit this year, down from 500 ppm. Terminals will have until September 1, 2006, and retailers will have until October 15, 2006, to complete their transitions to ULSD. The major difficulty to overcome is delivering ULSD, rather than producing it. The Nation's complex pipeline and tank network also handles high-sulfur products, which can leave behind enough sulfur to ruin the ULSD even if the product leaving the refinery is much cleaner than the required standard at retail. Summer 2006 retail diesel fuel prices are expected to average \$2.79 per gallon, 38 cents higher than last year's average of \$2.41 per gallon.

Natural Gas Markets. In 2006, U.S. total natural gas consumption will likely fall below 2005 levels by about 0.2 trillion cubic feet (tcf), or 0.9 percent, then increase by 0.8 tcf, or 3.8 percent, in 2007. With weak electric heating load due to the warm January and weaker expected cooling load this summer compared to 2005, the consumption of natural gas for generation of electricity is expected to increase only slightly by 0.3 percent in 2006, then increase by 0.7 percent in 2007. Also, because of an exceptionally warm January this year, residential consumption is projected to fall by 6.0 percent from 2005 levels in 2006 and then increase by 7.7 percent in 2007. Recovery in natural-gas-intensive industrial output following the 2005 hurricanes will likely contribute to growth in industrial gas consumption this year (2.2 percent) and in 2007 (3.6 percent).

Domestic dry natural gas production in 2005 declined by 2.7 percent, largely in response to hurricane-induced infrastructure disruptions in the Gulf of Mexico. Dry natural gas

production is projected to increase by 0.7 percent in 2006 and 1.2 percent in 2007. Total net liquefied natural gas (LNG) imports are expected to increase from their 2005 level of 630 billion cubic feet (bcf) to 710 bcf in 2006 and 950 bcf in 2007.

On May 26, 2006, working natural gas in storage stood at an estimated 2,243 bcf. Stocks are 477 bcf above 1 year ago and 706 bcf above the last 5-year average. The unexpectedly warm winter weather, particularly in January, accounts for much of the current high storage level. Spot Henry Hub natural gas prices, which averaged \$8.86 per mcf in 2005, are expected to fall to an average of less than \$7.00 per mcf over the next few months (down from an average of \$13.44 per mcf in December). Thus, barring extreme weather conditions for the rest of the year, we expect a decline in the annual average Henry Hub spot price to about \$7.74 per mcf for 2006. The respite is expected to be short-lived. Concerns about potential future supply tightness and continuing pressure from high oil market prices will likely drive spot natural gas prices to just over \$10.00 per mcf this coming December and January. The Henry Hub price is expected to average \$8.81 per mcf in 2007.

Electricity Markets. Electricity consumption is expected to increase only slightly in 2006 (0.8 percent) in response to weak heating-related demand this past January and the lower expected cooling-related demand this summer, compared to 2005. Continued growth in the economy and a boost in heating-related demand during the first quarter next year, as weather is assumed to return to normal, will likely push up overall growth in electricity consumption by 2.1 percent in 2007.

Residential electricity prices rose an estimated 5.0 percent nationally in 2005. Some of the fastest increases in household electricity prices occurred in the Northeast (particularly the Middle Atlantic region) and in the North Central regions. Sharply higher prices for peaking fuels and very high summer demand for those fuels, particularly natural gas, fueled those increases. Some additional increases in delivered residential prices are likely in many regions in 2006 and 2007, but at a slower pace than seen in 2005.

Hurricane Impacts on Gulf of Mexico Production and Refining Operations

The Gulf of Mexico region is an important source for U.S. production of crude oil and natural gas. In 2004, crude oil production from the Federally-administered Gulf of Mexico fields was about 27 percent of U.S. total production. Gulf natural gas production was about 20 percent of the U.S. total in 2004. The Gulf Coast States of Alabama, Louisiana, Mississippi, and Texas also contribute significant onshore and State-administered offshore oil and natural gas production. The Gulf is also an important refining center, where the Gulf Coast States account for over 46 percent of U.S. total crude oil distillation capacity.

The Minerals Management Service (MMS) has the primary responsibility for monitoring fossil fuel production on the Gulf of Mexico Outer Continental Shelf (OCS). Nearly all Gulf OCS production occurs in the Western and Central MMS planning areas, roughly defined as the offshore area north of the southern-most tip of Texas and west of the Florida panhandle. Oil and natural gas platforms are especially concentrated south of the Louisiana coastline.

The Atlantic hurricane season of 2005 was the most active season since accurate record-keeping began in 1944. There were 27 named storms, including 15 hurricanes, seven of which were classified as Category 3, 4, or 5. The paths of five of those major hurricanes passed through the Gulf of Mexico, significantly disrupting oil and natural gas production.

Hurricanes Katrina and Rita passed through the heart of the Gulf producing region, resulting in widespread shut-in production, some of which continues to the present. At one point just prior to the landfall of Katrina, 79 percent of Gulf platforms were evacuated and 1.4 million barrels per day of oil production (95 percent of production, relative to the MMS base level) and 8.8 billion cubic feet per day of natural gas production (88 percent of production, relative to the MMS base level) were shut in. Hurricane Katrina destroyed 44 platforms as it passed over the OCS producing region, including some of the deepwater projects that are still under construction. As Hurricane Rita passed over the producing region, up to 93 percent of platforms were evacuated and 100 percent of daily oil production and 81 percent of natural gas production were shut in. Sixty-nine platforms were destroyed by the hurricane-force winds. As of June 1, 2006 (latest MMS data), total production of crude oil has been reduced by more than 162 million barrels and production of natural gas reduced by 784 billion cubic feet since the first hurricane struck 9 months ago. That reduction amounts to about 30 percent and 21 percent of yearly oil and natural gas production, respectively, from the Federal offshore fields in the Gulf of Mexico, according to MMS data. Additional volumes of gas production were lost in areas under Louisiana state jurisdiction. As of June 1, 2006,

about 228 thousand barrels per day of Gulf OCS oil production and 1.1 billion cubic feet per day of natural gas production still remained offline. While most of that production will ultimately be restored, some part of it may be permanently lost.

In addition to the upstream impacts to Gulf production, the hurricanes had significant impacts on midstream and downstream infrastructure. Four hundred fifty-seven underwater pipelines were damaged, and the Louisiana Offshore Oil Port had to temporarily stop accepting shipments during both hurricanes. Finally, some onshore refineries and natural gas processing facilities suffered heavy damage. After Katrina hit Louisiana, nearly 2 million barrels per day of refinery capacity were shut down, due to either direct damage or interruption of power supplies. EIA estimates that at the height of the refinery outages (September 22-25, 2005), as much as 4.9 million barrels per day of refining capacity (nearly 29 percent of U.S. refining capacity and over 60 percent of refining capacity in the Gulf Coast region) were shut down. Some of the shutdowns were precautionary, ahead of the storms, but several refineries were damaged extensively, thus keeping them shut down for a relatively long time. For example, even as late as October 10, 2005, more than 2 million barrels per day of refining capacity were still shut down.

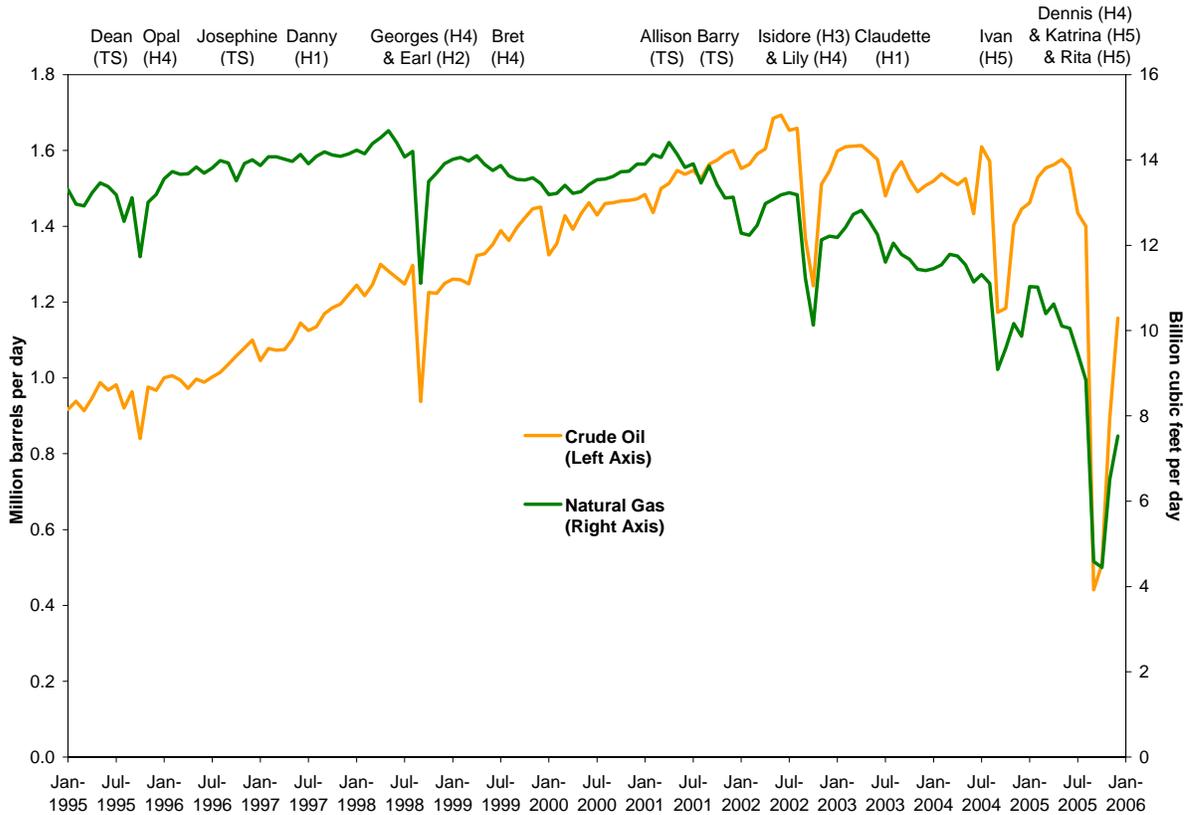
Those refinery shutdowns dramatically reduced the production of refined products. EIA estimates that from August 26, 2005, through December 31, 2005, about 150 million barrels of refined products were not produced as a result of shutdowns caused by the hurricanes, whether precautionary or due to extensive damage. Of the 150 million barrels of product not produced, about 76 million barrels were gasoline, with another 46 million barrels of distillate production shut in.

Even though significant amounts of damaged refinery capacity had been restored to service before the end of 2005, the refining market suffered continuing reverberations from past outages through this spring. For example, an unusually large amount of major refinery maintenance occurred this year as a result of, among other things, delayed maintenance during the fall following the hurricanes and final preparations for the ultra-low-sulfur diesel program that begins this month. EIA estimated that about 1 million barrels per day of capacity were offline during April, which is almost 6 percent of U.S. capacity. The affected refineries represented about 500 thousand barrels per day of gasoline production. The end of maintenance outages by the middle of May and the continuing return of the remaining hurricane-damaged refineries should help to ease the refinery capacity crunch this summer.

Historical Impacts of Hurricanes on Oil and Natural Gas Production. Notwithstanding the large impacts of the recent hurricanes, severe weather in the region has historically had a much more modest impact (see **Figure 3. Federal Gulf of Mexico (OCS) Oil and Natural Gas Production**). There have been six hurricanes during the past decade that have caused significant disruption in oil and natural gas production: Opal (1995), Georges (1998), Lili (2002), Ivan (2004), and Katrina/Rita (2005). However, with the exception of Ivan and Katrina/Rita, most disruptions have been temporary with near-normal production returning the following month. In fact, most Gulf hurricanes only shut in production for a few days. For example, in 1997, Hurricane Danny passed within 50 miles of the center of OCS production, yet production registered a barely perceptible drop in daily production rates. Hurricane Bret in 1999, with 125-mile-per-hour winds, slightly

affected crude oil production but had almost no effect on the trend in natural gas production.

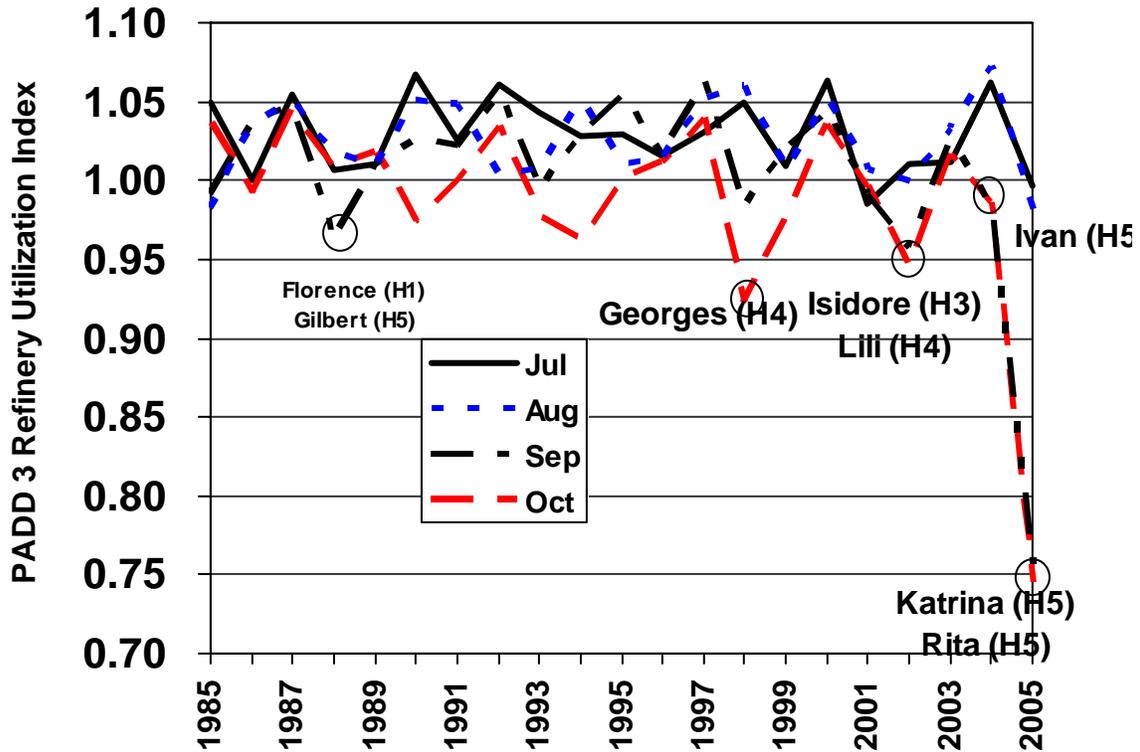
Figure 3. Federal Gulf of Mexico (OCS) Oil and Natural Gas Production



Gulf tropical storms and hurricanes typically cause small disruptions when measured on a seasonal basis. The average seasonal shut-in production (as a percentage of normal annual Gulf OCS production) from 1960-2005 was 1.4 percent for crude oil and 1.3 percent for natural gas. However, these averages are skewed upwards by the estimated 19 percent of annual oil production and 18 percent of natural gas production that were shut in following Hurricanes Katrina and Rita through the end of 2005. The median seasonal shut-in production has only been 0.6 percent and 0.5 percent of annual Gulf OCS oil and natural gas production, respectively.

Historical Impacts of Hurricanes on Refinery Capacity. There is no long-term data source that tracks the impact of hurricanes and tropical storms on the refinery sector. Refinery utilization rates are generally affected by overall capacity availability relative to demand, forced outages, and seasonal maintenance and product turnaround cycles, as well as by hurricanes. Despite the inherent difficulty of isolating the effect of storms on refineries, EIA has developed a simple index of normalized capacity utilization for refineries in the Petroleum Administration for Defense District (PADD) 3, which encompasses the Gulf Coast. **Figure 4** displays the monthly normalized index (monthly utilization rate divided by the average January-through-June utilization rate) for PADD 3 refinery capacity for the months of July through October, when disruptions related to tropical storms and hurricanes are most likely to occur. The index highlights the uniqueness of the refinery damage experienced in 2005.

Figure 4. Refinery Utilization on the Gulf Coast During Hurricane Season



Forecasting Shut-In Production. In May of each year, the National Oceanic and Atmospheric Administration (NOAA) produces an outlook for the upcoming hurricane season in the Atlantic basin, which includes the Caribbean Sea and the Gulf of Mexico. As the season progresses, NOAA fine-tunes its projections. Those projections are driven primarily by their forecasts of the seasonal Accumulated Cyclone Energy (ACE) index, which measures the collective intensity and duration of all tropical storms and hurricanes in the Atlantic. For 2006, NOAA currently expects the seasonal Atlantic ACE index to range from 118 to 179 (135 percent to 205 percent of the normal level). This range corresponds to an 80 percent chance of an above-normal hurricane season in 2006. Although that forecast predicts a very active hurricane season, it is considerably lower

than the Atlantic activity observed last year, which had an ACE index about 280 percent of the normal level. In addition to the ACE projections of overall tropical cyclone activity, for the 2006 north Atlantic hurricane season, NOAA predicts 13 to 16 named tropical cyclones, with 8 to 10 becoming hurricanes, of which 4 to 6 could become major hurricanes (Category 3 or higher).

Seasonal hurricane-related disruptions to oil and natural gas production are difficult to predict, primarily due to the uncertainty involved in predicting the location and intensity of future tropical cyclones. However, an analysis of historical impacts provides some insight into the range of potential effects given a seasonal hurricane forecast. EIA has developed two models using the NOAA seasonal Atlantic predictions to form expectations of the range of annual crude oil and natural gas shut-in production. The first model is based on the forecast Atlantic basin ACE index, while the second model uses the predicted number of Atlantic tropical cyclones. The equations are estimated based on seasonal tropical cyclone activity and Gulf OCS production records from 1960 through 2005.

Those two models allow us to produce an estimate of the expected Gulf ACE and an estimate of expected impact on crude oil and natural gas production from the NOAA Atlantic ACE forecast range. However, and perhaps more important, those estimates are not official forecasts, but instead only analysis intended to help us better understand the correlation between hurricane activity and shut-in production. At this time, we have examined only the impact on Federal offshore oil and natural gas production in the Gulf

of Mexico, but we recognize the need to expand analysis to include refineries, pipelines, and other processing and delivery channels.

Based on NOAA's May 2006 projections for the 2006 hurricane season and the historical relationship between tropical storm activity and production disruptions between 1960 and 2005, total reductions in crude oil and natural gas production from the Federal outer continental shelf (OCS) due to tropical storm activity in 2006 are expected to range from 0 to 35 million barrels and 0 to 206 billion cubic feet respectively. NOAA emphasizes that its May hurricane outlook is based on climatological conditions that are still evolving. An updated hurricane outlook will be issued in August, when conditions favorable for hurricanes are more predictable. There is a possibility that NOAA could substantially revise its projections for seasonal hurricane activity, as in 2005, when the May outlook, projecting hurricane activity for 2005 somewhat lower than what is currently projected for 2006, was revised upward substantially in August, prior to Hurricane Katrina. Actual storm activity in 2005 then ended up close to the upper bound of the revised range. If a similar situation occurs in 2006, EIA estimates of shut-in crude oil and natural gas production due to tropical storm activity would be significantly higher.

Department of Energy Response

The Department of Energy (DOE) Office of Electricity Delivery and Energy Reliability (OE) and Office of Fossil Energy were instrumental in providing support during the 2005 hurricane season, and OE currently hosts a web site that tracks its past actions and demonstrates its preparedness for the upcoming season. Last year, DOE deployed over

40 emergency response experts who assisted with fuel distribution; allocated emergency response resources; and provided daily assessments (including those of EIA's) of oil, petroleum product, and natural gas supplies and the impacts on the electricity sector. A full description of the Department's response activities and preparations for the upcoming season is beyond the scope of this testimony, but I can assure you that both EIA and the Departmental offices with direct responsibility for the energy assurance mission are fully prepared to mount an effective response and information gathering program should hurricanes once again threaten critical energy sector infrastructure along the Gulf Coast.

Mr. Chairman and members of the Committee, this completes my testimony. I would be happy to answer any questions that you might have.