The Impacts of Hurricane Katrina and Rita on Louisiana’s Energy Industry

Presentation to the Louisiana Economic Development Council

March 8, 2006

David E. Dismukes
Center for Energy Studies
Louisiana State University
• Hurricanes were incredibly destructive to energy business – effects felt for some time.

• Hurricanes clearly showed the interrelationship of all types of energy infrastructure in the Gulf – the “4 Ps” – production, processing, pipes, and power.

• Hurricanes impacts were felt nationally – drives home importance of Gulf coast.

• Price and supply wildcards: geopolitics, weather, and industrial activity. Recent industrial demand destruction not clear but a big potential looming problem.

• Energy markets are likely to not be back on their feet prior to the next hurricane season.
The WORST Case Scenario:

Two Hurricanes in the Heart of the Largest Energy Infrastructure Region of the U.S.
Shut-ins have reached a difficult plateau trend much like Hurricane Ivan.

**Note:** Shut-in statistics for Ivan were no longer reported after 150 days. The latest shut-in statistics for Katrina and Rita were published on February 22, 2006. 
Source: Minerals Management Service
Shut-ins have reached a difficult plateau trend much like Hurricane Ivan.

Note: Shut-in statistics for Ivan were no longer reported after 150 days. The latest shut-in statistics for Katrina and Rita were published on February 22, 2006.
Source: Minerals Management Service
State Oil Production
32% Shut-in

64,429 barrels per day remains shut-in. This represents 31.7 percent of daily production

138,710 barrels per day has been restored. This represents 68.3 percent of daily production

State Natural Gas Production
19% Shut-in

420.5 MMcf per day remains shut-in. This represents 18.8 percent of daily production

Restored gas production is 1,814.5 MMcf per day. This represents 81.2 percent of daily production

Note: As of February 26, 2006.
Source: Louisiana Department of Natural Resources
Total Immediate Refinery Impact

Hurricane Katrina

LA/MS/AL Gulf Coast Refiners
(reduced runs and shutdowns)
2,528 mbbl/day
15% of US operating capacity

Port Arthur/Lake Charles
(reduced runs and supply loss)
775 mbbl/day
5% of US operating capacity

Midwest
(reduced runs – supplied by Capline Pipeline)
1,628 mbbl/day
10% of US operating capacity

Remaining US Operating Capacity
12,075 mbbl/day
70% of US operating capacity

Total Refinery Impact
4,931 mbbl/day
30% of US operating capacity

Source: Energy Information Administration, Department of Energy

Hurricane Rita

Port Arthur/Lake Charles
(shutdowns and damaged facilities)
1,715 mbbl/day
10% of US operating capacity

Houston/Texas City
(shutdowns and damaged facilities)
2,292 mbbl/d
13.5% of US operating capacity

Corpus Christi
(shutdown and reduced runs)
706 mbbl/day
4% of US operating capacity

Midwest
(reduced runs from supply loss)
338 mbbl/day
2% of US operating capacity

Remaining US Operating Capacity
11,954 mbbl/day
70% of US operating capacity

Total Refinery Impact
5,052 mbbl/day
30% of US operating capacity

© LSU Center for Energy Studies
Regional Changes in Gasoline Prices
(cents per gallon)

Source: American Petroleum Institute

© LSU Center for Energy Studies
Outages at gas processing facilities throughout all of south Louisiana was one of the more unique aspects of the combined hurricanes.

<table>
<thead>
<tr>
<th>Location</th>
<th>Capacity (MMcf/d)</th>
<th>Throughput (MMcf/d)</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Mississippi and Alabama Plants</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>BP Pascagoula</td>
<td>1,000.0</td>
<td>768.0</td>
</tr>
<tr>
<td>DEFS Mobile Bay</td>
<td>600.0</td>
<td>272.0</td>
</tr>
<tr>
<td>RDS Yellowhammer</td>
<td>200.0</td>
<td>135.0</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td>1,800.0</td>
<td>1,175.0</td>
</tr>
<tr>
<td><strong>East Louisiana Plants</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>DYN Venice</td>
<td>1,300.0</td>
<td>997.0</td>
</tr>
<tr>
<td>EPD Toca</td>
<td>1,100.0</td>
<td>607.8</td>
</tr>
<tr>
<td>DYN Yscloskey</td>
<td>1,850.0</td>
<td>1,343.0</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td>4,250.0</td>
<td>2,947.8</td>
</tr>
<tr>
<td><strong>West Louisiana Plants</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>DYN Barracuda</td>
<td>225.0</td>
<td>155.0</td>
</tr>
<tr>
<td>BP Grand Chenier</td>
<td>600.0</td>
<td>344.0</td>
</tr>
<tr>
<td>WMB Johnson Bayou</td>
<td>425.0</td>
<td>114.0</td>
</tr>
<tr>
<td>EPD Sabine Pass</td>
<td>300.0</td>
<td>166.0</td>
</tr>
<tr>
<td>DYN Stingray</td>
<td>305.0</td>
<td>257.0</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td>1,855.0</td>
<td>1,036.0</td>
</tr>
<tr>
<td><strong>Central Louisiana Plants</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>DYN Lowry</td>
<td>300.0</td>
<td>195.0</td>
</tr>
<tr>
<td>EPD Cow Island</td>
<td>500.0</td>
<td>134.0</td>
</tr>
<tr>
<td>AHC Sea Robin</td>
<td>900.0</td>
<td>571.8</td>
</tr>
<tr>
<td>EPD Calumet</td>
<td>1,600.0</td>
<td>733.0</td>
</tr>
<tr>
<td>Norcen Patterson I</td>
<td>600.0</td>
<td>500.0</td>
</tr>
<tr>
<td>DUK Patterson II</td>
<td>500.0</td>
<td>246.0</td>
</tr>
<tr>
<td>EPD Pelican</td>
<td>325.0</td>
<td>290.0</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td>4,725.0</td>
<td>2,669.8</td>
</tr>
<tr>
<td><strong>Grand Total</strong></td>
<td>12,630.0</td>
<td>7,828.6</td>
</tr>
<tr>
<td>Assumed Total GOM Production</td>
<td>10,000.0</td>
<td></td>
</tr>
<tr>
<td>Percent of Total</td>
<td>78.3%</td>
<td></td>
</tr>
</tbody>
</table>

Source: LMOGA

© LSU Center for Energy Studies
Examples of Energy Infrastructure Damage
Semi-Sub Stuck Under Bridge
North Mobile Bay

Source: Rigzone.com
Venice Port, Supply & Crew Bases
Air Products Facility – Normal Day
New Orleans, Louisiana (Intracoastal Drive)

Source: Air Products
Air Products Facility – Post Hurricane Katrina
New Orleans, Louisiana

Source: Air Products
Power Outages
Generating Stations – Entergy Patterson

Source: Entergy
Power Outages
Substation Damage

Source: Entergy
Then,
Along Comes Rita
Facility rental of $3.5 million for 3 weeks – for 250 employees – roughly $156 per day per person
Temporary Natural Gas Release: To date, all unknown safety valves have held. There have been a couple of incidents where pipeline damage has allowed the temporary venting of gas that was in the pipeline. There are currently no known incidents of gas venting from wells and the temporary venting from pipelines appears to have stopped.
Chevron Typhoon TLP

Source: Chevron, Rigzone.com
Energy Capacity Offline: Current and Forecast
Shut in production will total 192.2 million barrels by the end of the third quarter 2006. Cumulative shut in for through 2005 totals 109.1 million barrels, while cumulative shut in for the first three quarters of 2006 total 83.1 million barrels – 43% of total impact yet to be experienced.

Note: Assuming recovery of 15.65 bcf per day for 150 days.
Shut in production will total 693.4 bcf by the end of the third quarter 2006. Cumulative shut in for through 2005 totals 561.2 bcf, while cumulative shut in for the first three quarters of 2006 total 132.2 bcf.

Note: Assuming recovery of 15.65 bcf per day for 150 days.
23% of pre-storm gas processing capacity is still shut-in
27% of pre-storm gas processing volumes are not flowing

Note: Data are for plants with capacity equal to or greater than 100 MMcf per day, in the coastal counties of Texas, Louisiana, Mississippi and Alabama.
Source: Energy Information Administration, Department of Energy
Refining capacity should return to normal soon, but there will be a stubborn five percent of total capacity that has unknown return date – not good for tight markets.

Source: Assumes 95 percent capacity factor; assumes 4 week recovery for facilities damaged by Rita.
Impacts of Katrina and Rita result in a loss of 240 million barrels, or 4 percent of total, by the end of the year. This is equivalent to shutting down all US refineries for 14 days.
• Short Run Impacts (Current to June, 2006)
  • Mild winter has resulted in lower than anticipated demand.
  • Economy generally strong running into this crisis and momentum will continue to carry.
  • Continued mild weather will have bearish impact on natural gas prices through spring.
  • Geopolitical concerns will drive crude (slight downward tendency).
  • Attention to tropical season on both crude and natural gas.

• Longer Run Impacts: (6 months and beyond)
  • Tropical activity could be concern (cyclical shift in weather trends)
  • High prices are bad for energy sensitive industries – will eventually show up in trade deficit numbers (chemicals, refining, and paper and pulp).
  • Imports for energy (crude, natural gas) will pick up and have impacts on trade deficit.
  • Potential crash in energy prices in future versus “treadmill effect” created by more hurricane activity (global warming vs 20-year cycle) – global economic activity will decided where we go.
Questions, Comments, & Discussion

dismukes@lsu.edu

www.enrg.lsu.edu