

Energy Markets: Impacts and Outlook

*Presentation to 2006 LIOGA Annual Conference
L'Auberge du Lac Hotel and Casino
Lake Charles, Louisiana*

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Louisiana State University



Summary on Impacts of Hurricanes

- **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.**



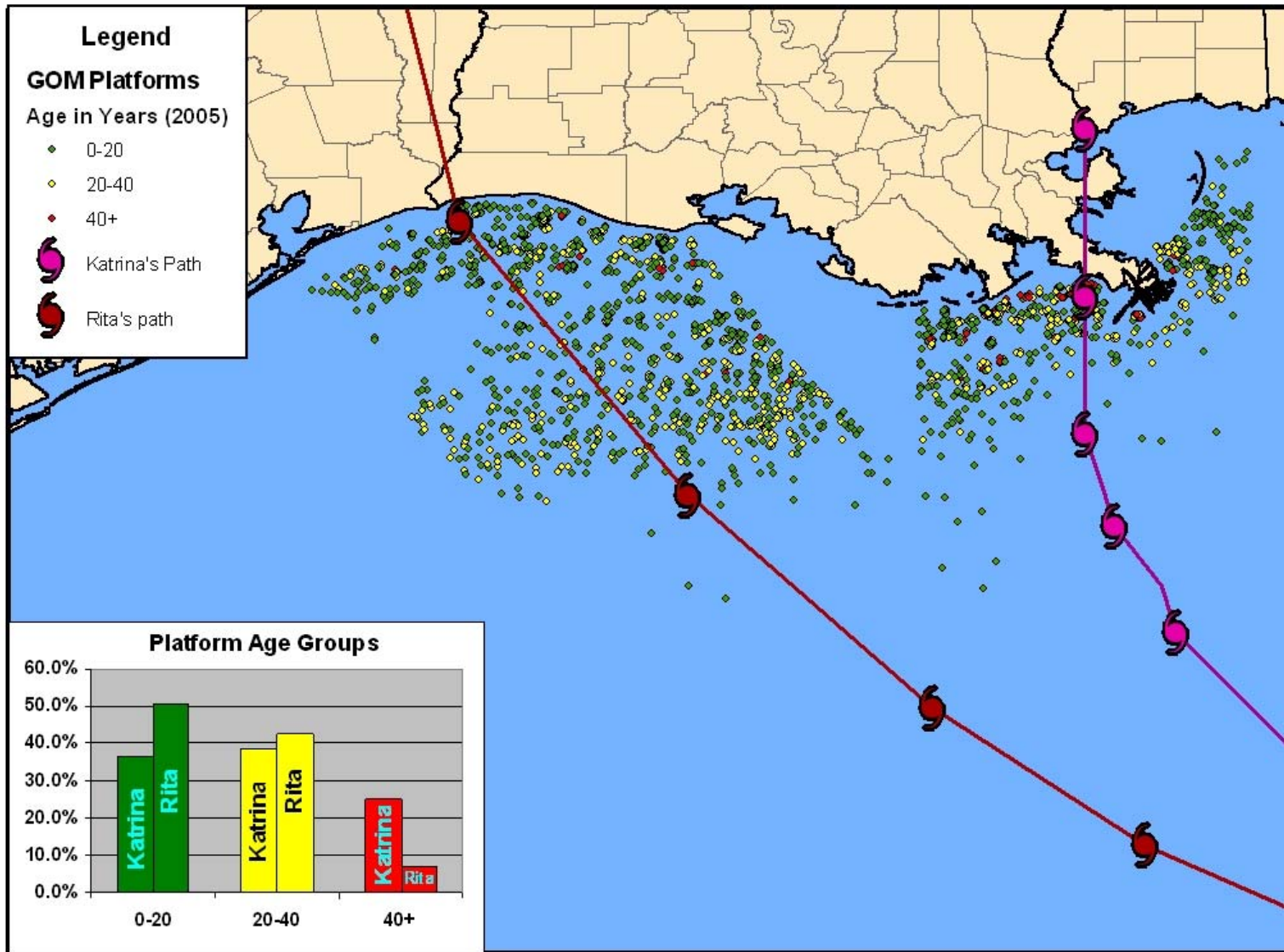
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The WORST Case Scenario:

**Two Hurricanes in the Heart of the Largest
Energy Infrastructure Region of the U.S.**



Platforms/Structures Impacted by Rita





Date	Shut-in Natural Gas Production (bcf/day)	Percent of Daily GOM Gas Production (%)	Total Cumulative Shut-in Gas Production ¹ (bcf)	Percent of Annual GOM Gas Production (%)	Percent of Annual US Production (%)
week ending 9/23/05	7.20	72.0%	140.50	3.8%	0.6%
week ending 9/30/05	7.94	79.4%	196.48	5.4%	0.8%
week ending 10/7/05	6.44	64.4%	246.47	6.8%	1.0%
week ending 10/14/05	5.65	56.5%	288.87	7.9%	1.2%
week ending 10/21/05	5.34	53.4%	326.52	8.9%	1.4%
week ending 10/28/05	5.50	55.0%	364.72	10.0%	1.5%
week ending 11/4/05	4.57	45.7%	400.74	11.0%	1.7%
week ending 11/10/05	4.02	40.2%	426.43	11.7%	1.8%
week ending 11/18/05	3.62	36.2%	456.74	12.5%	1.9%
week ending 11/23/05	3.20	32.0%	473.55	13.0%	2.0%
week ending 12/02/05	2.94	29.4%	501.22	13.7%	2.1%
week ending 12/09/05	2.35	23.5%	519.24	14.2%	2.1%
December 12, 2005	2.31	23.1%	526.22	14.4%	2.2%
December 15, 2005	2.23	22.3%	532.93	14.6%	2.2%
December 19, 2005	2.01	20.1%	541.09	14.8%	2.2%
December 22, 2005	1.96	19.6%	547.07	15.0%	2.3%
December 29, 2005	1.95	19.5%	560.77	15.4%	2.3%
January 5, 2006	1.88	18.8%	574.21	15.7%	2.4%
January 9, 2006	1.86	18.6%	581.68	15.9%	2.4%
January 11, 2006	1.81	18.1%	585.31	16.0%	2.4%
January 25, 2006	1.66	16.6%	609.26	16.7%	2.5%
February 8, 2006	1.55	15.5%	631.33	17.3%	2.6%
February 22, 2006	2	15.0%	653	17.9%	2.7%

Note: ¹ cumulative production is as of August 26, 2005
Source: Minerals Management Service



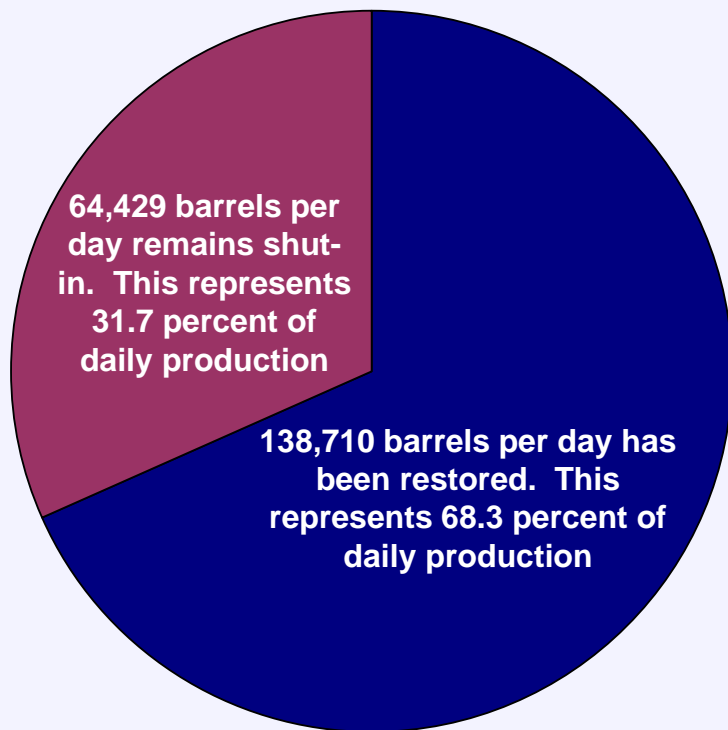
Date	Shut-in Oil Production (bbls/day)	Percent of Daily GOM Oil Production (%)	Total Cumulative Shut-in Oil Production ¹ (bbls)	Percent of Annual GOM Oil Production (%)	Percent of Annual US Production (%)
week ending 9/23/05	1,486,877	99.1%	30,280,661	5.5%	1.5%
week ending 9/30/05	1,467,577	97.8%	40,828,134	7.5%	2.0%
week ending 10/7/05	1,162,913	77.5%	50,105,764	9.2%	2.4%
week ending 10/14/05	1,008,909	67.3%	57,642,292	10.5%	2.8%
week ending 10/21/05	986,805	65.8%	64,547,816	11.8%	3.1%
week ending 10/28/05	1,017,551	67.8%	71,613,334	13.1%	3.4%
week ending 11/4/05	780,633	52.0%	78,193,735	14.3%	3.8%
week ending 11/10/05	736,279	49.1%	82,735,894	15.1%	4.0%
week ending 11/18/05	702,556	46.8%	88,540,236	16.2%	4.3%
week ending 11/23/05	615,623	41.0%	91,731,141	16.8%	4.4%
week ending 12/02/05	539,074	35.9%	96,956,676	17.7%	4.7%
week ending 12/09/05	447,425	29.8%	100,369,239	18.3%	4.8%
December 12, 2005	441,394	29.4%	101,693,483	18.6%	4.9%
December 15, 2005	426,282	28.4%	102,973,119	18.8%	4.9%
December 19, 2005	414,495	27.6%	104,648,778	19.1%	5.0%
December 22, 2005	412,687	27.5%	105,889,263	19.3%	5.1%
December 29, 2005	410,618	27.4%	108,775,910	19.9%	5.2%
January 5, 2006	403,861	26.9%	111,633,122	20.4%	5.4%
January 9, 2006	402,259	26.8%	113,246,964	20.7%	5.4%
January 11, 2006	396,786	26.5%	114,042,425	20.8%	5.5%
January 25, 2006	373,407	24.9%	119,356,377	21.8%	5.7%
February 8, 2006	364,195	24.3%	124,502,898	22.7%	6.0%
February 22, 2006	362,796	24.2%	129,590,370	23.7%	6.2%

Note: ¹ cumulative production is as of August 26, 2005
Source: Minerals Management Service

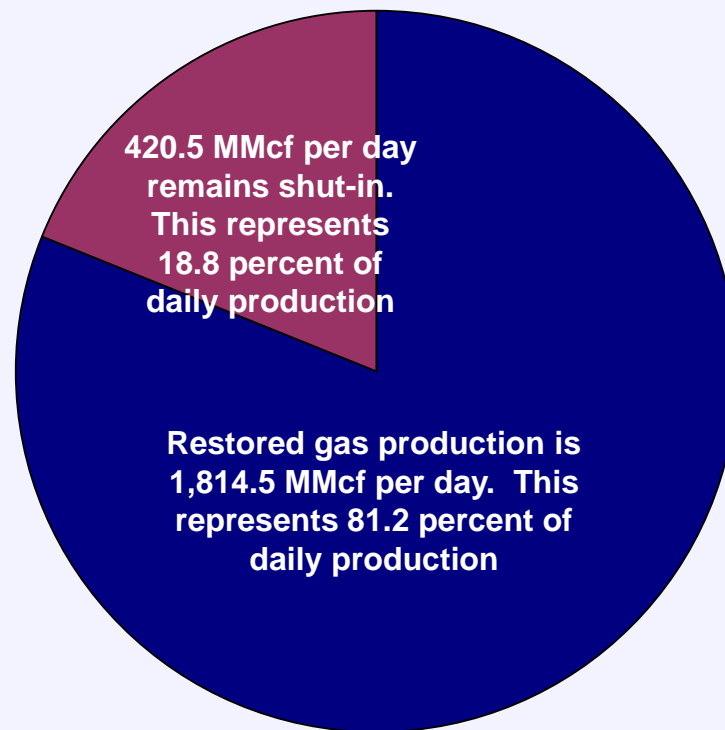


Status of Louisiana Oil and Gas Production

**State Oil Production
32% Shut-in**



**State Natural Gas Production
19% Shut-in**



Note: As of February 26, 2006.

Source: Louisiana Department of Natural Resources



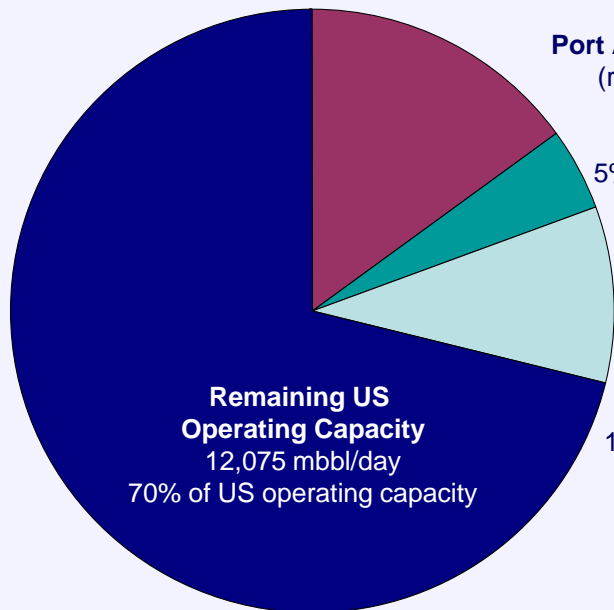
Total Immediate Refinery Impact

Hurricane Katrina

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

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

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



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

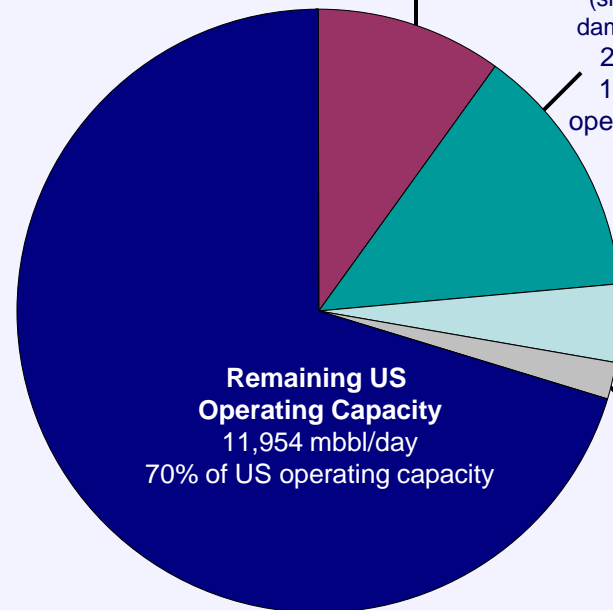
Hurricane Rita

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

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

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

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

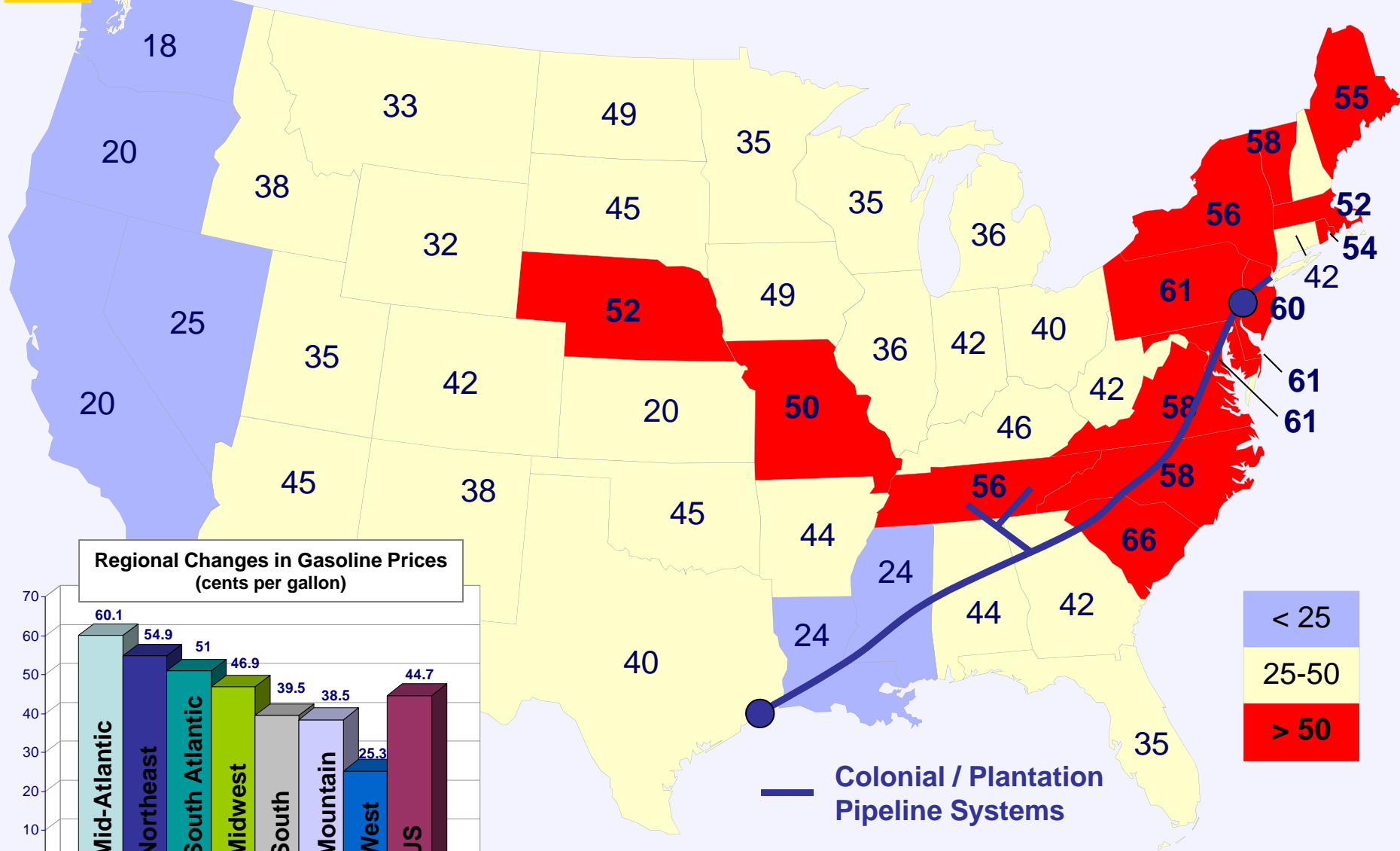


Total Refinery Impact
5,052 mbbbl/day
30% of US operating capacity



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Gasoline Price Increases August 30, 2005 to September 6, 2005



Source: American Petroleum Institute

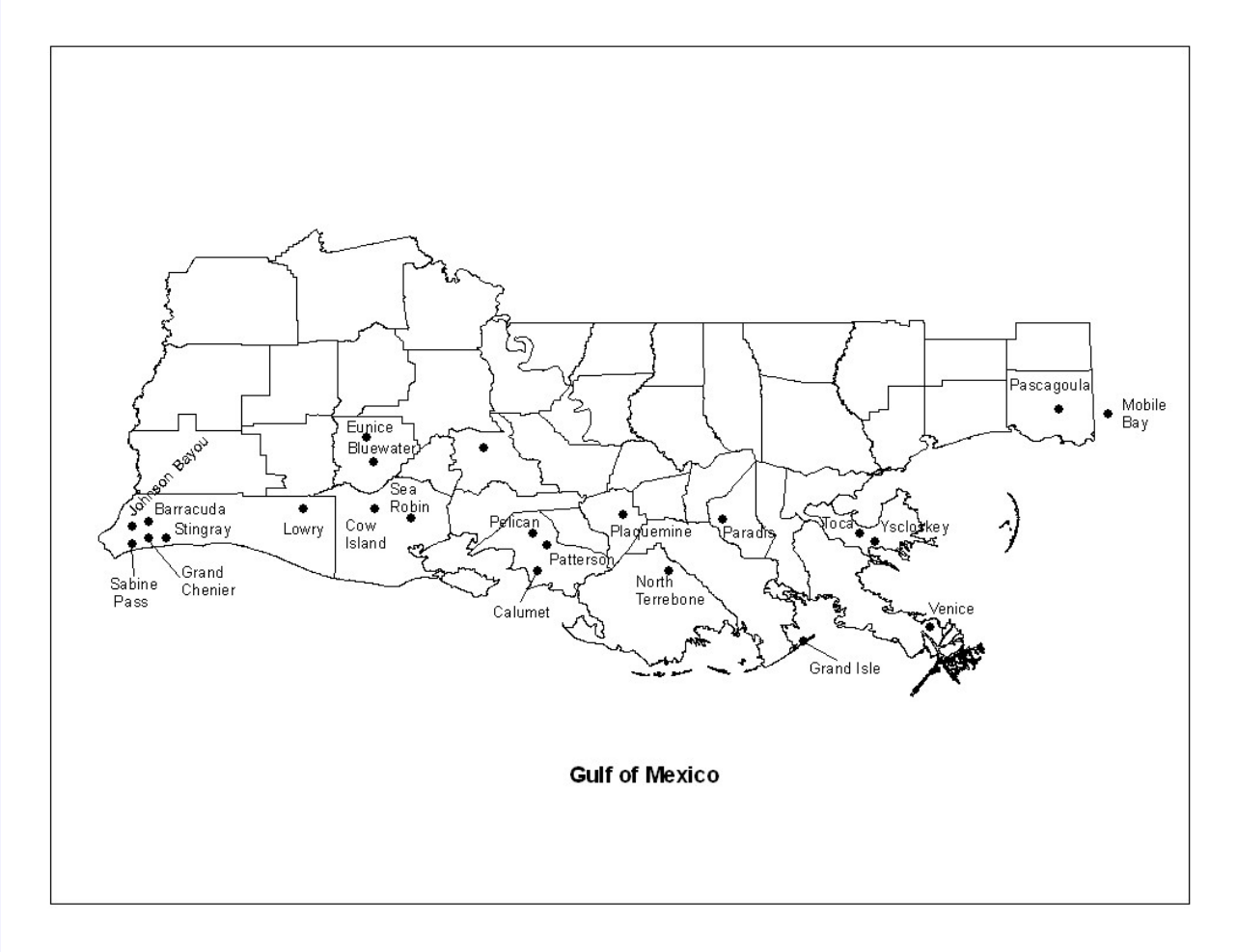
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Number of Natural Gas Processing Facilities Out

Outages at gas processing facilities throughout all of south Louisiana was one of the more unique aspects of the combined hurricanes.

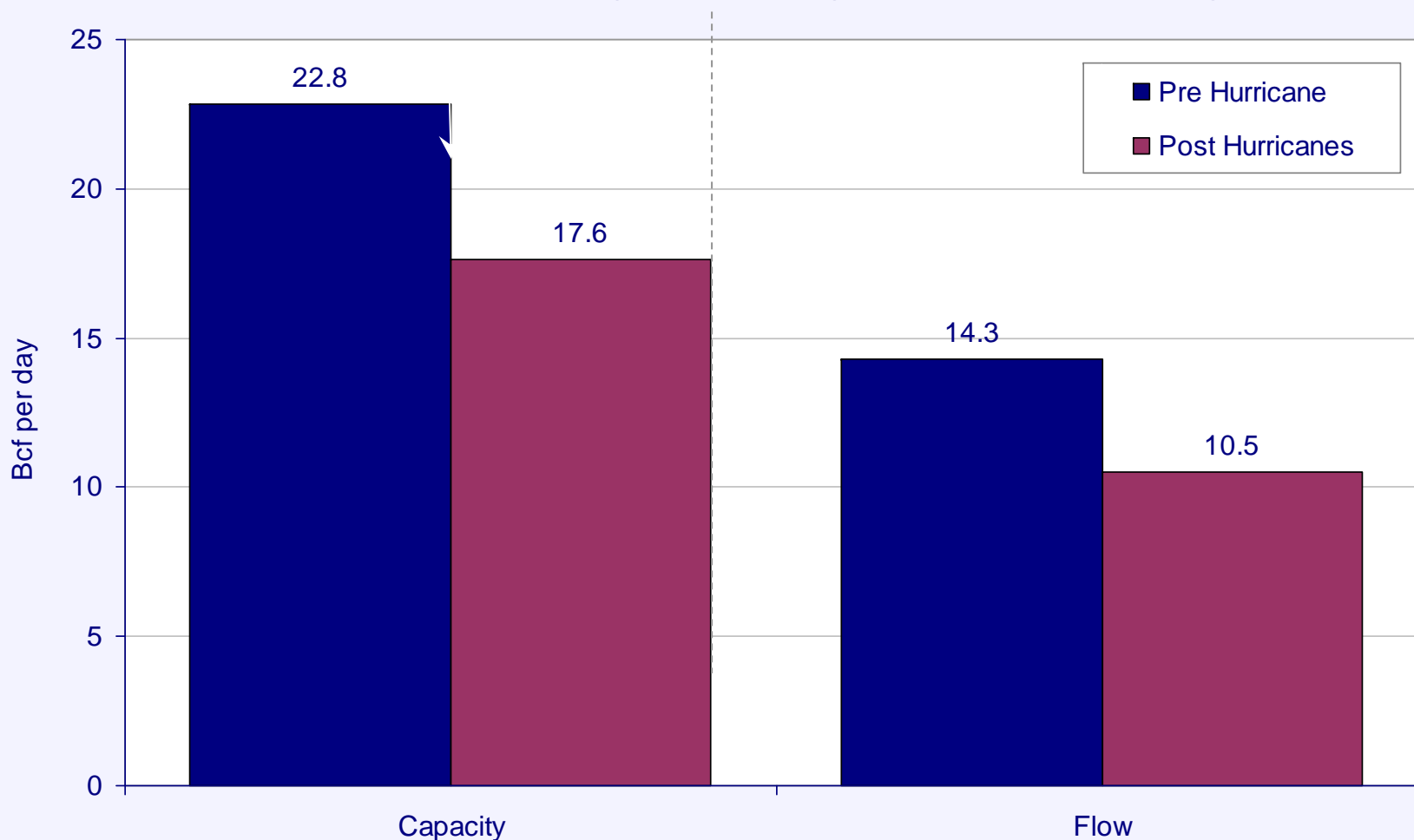
	Capacity (MMcf/d)	Throughput (MMcf/d)
Mississippi and Alabama Plants		
BP Pascagoula	1,000.0	768.0
DEFS Mobile Bay	600.0	272.0
RDS Yellowhammer	200.0	135.0
Total	1,800.0	1,175.0
East Louisiana Plants		
DYN Venice	1,300.0	997.0
EPD Toca	1,100.0	607.8
DYN Yscloskey	1,850.0	1,343.0
Total	4,250.0	2,947.8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





Current Status of Natural Gas Plants in the Coastal Gulf Region

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



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Examples of Energy Infrastructure Damage



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Shell Mars Tension Leg Platform



© LSU Center for Energy Studies

Source: Shell.com



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Shell Mars Tension Leg Platform



Source: Shell.com

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Ocean Warwick Dauphin Island, AL



Source: Rigzone.com

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Semi-Sub Stuck Under Bridge North Mobile Bay



Photo via Noble Drilling and GlobalSantaFe

© LSU Center for Energy Studies

Source: Rigzone.com



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Venice Port, Supply & Crew Bases



Source: LIOGA

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Chevron Refinery Pascagoula, MS



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Source: Chevron



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Air Products Facility – Normal Day New Orleans, Louisiana (Intracoastal Drive)



© LSU Center for Energy Studies

Source: Air Products



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Air Products Facility – During Hurricane Katrina New Orleans, Louisiana



Source: Air Products

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Air Products Facility – Post Hurricane Katrina New Orleans, Louisiana



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Source: Air Products



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Power Outages Generating Stations – Entergy Patterson



Source: Entergy



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Power Outages Substation Damage



Source: Entergy



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Then,
Along Comes Rita



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Henry Hub, September 25, 2005



© LSU Center for Energy Studies

Source: LIOGA



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Energy Transmission



Source: Entergy.com

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Citgo Refinery – Storage Tank Lake Charles, Louisiana Post-Rita



Source: Citgo

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Citgo Refinery – Onsite Dock Lake Charles, Louisiana Post-Rita



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Source: Citgo



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Citgo Refinery – Cooling Tower Lake Charles, Louisiana Post-Rita



Source: Citgo

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Citgo Refinery – Tent City Lake Charles, Louisiana Post-Rita

Facility rental of \$3.5 million for 3 weeks – for 250 employees – roughly \$156 per day per person



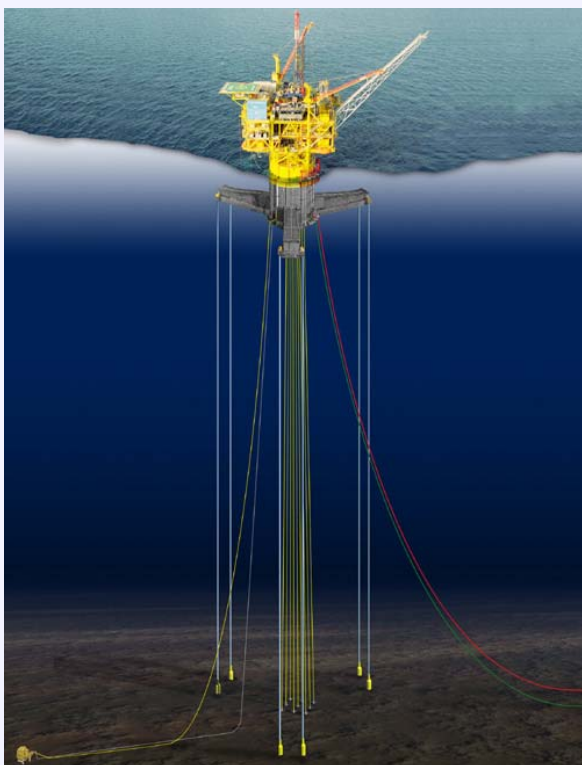


Temporary Natural Gas Release: To date, all subsea safety valves have held. There have been a couple of incidents where pipeline damage has allowed the temporary venting of gas that was in the pipeline. There are currently no known incidents of gas venting from wells and the temporary venting from pipelines appears to have stopped.



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Chevron Typhoon TLP



Source: Chevron, Rigzone.com

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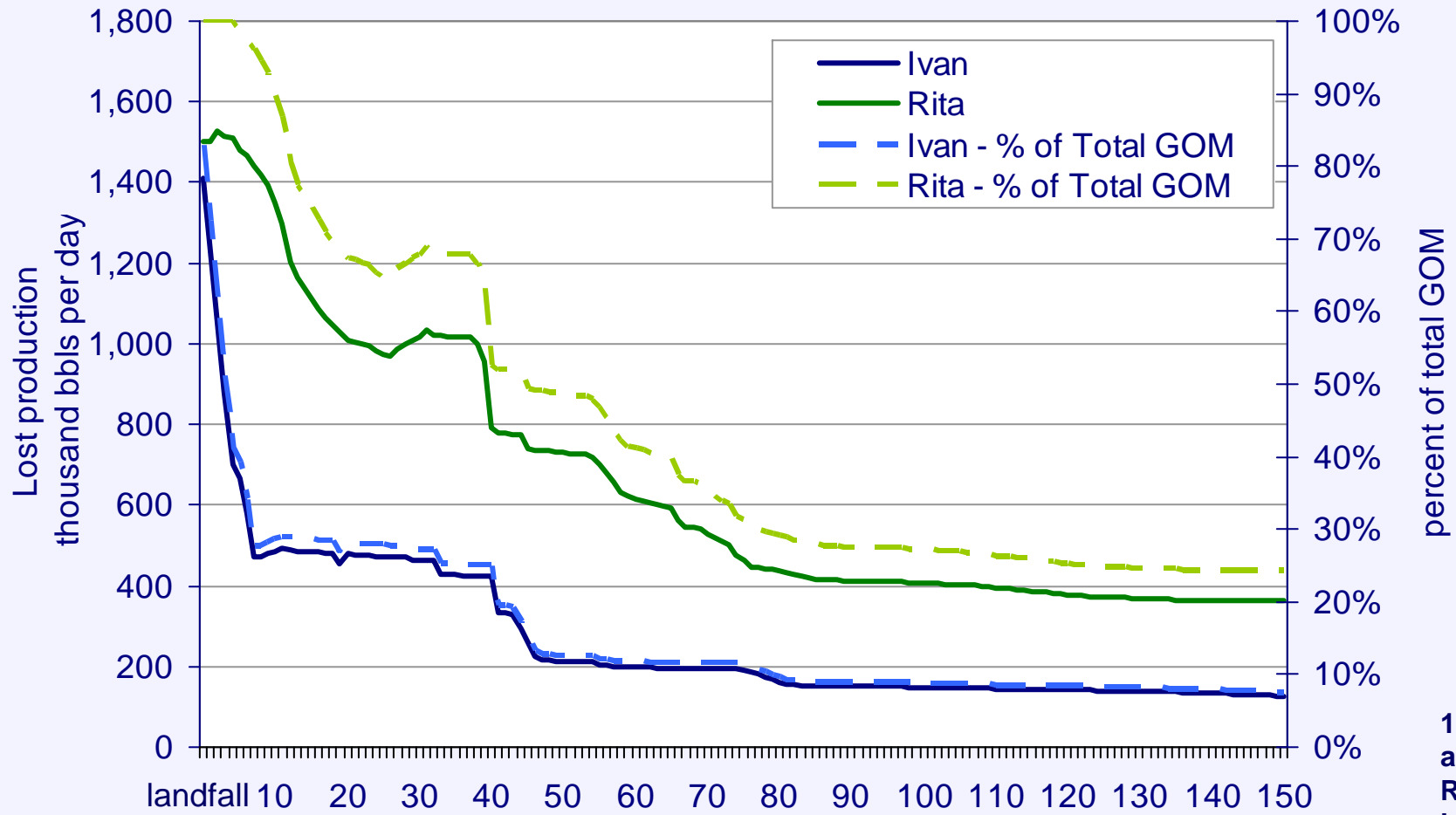
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Energy Capacity Offline: Current and Forecast



Estimated Return of Existing Crude Production

Shut-ins have reached a difficult plateau trend much like Hurricane Ivan

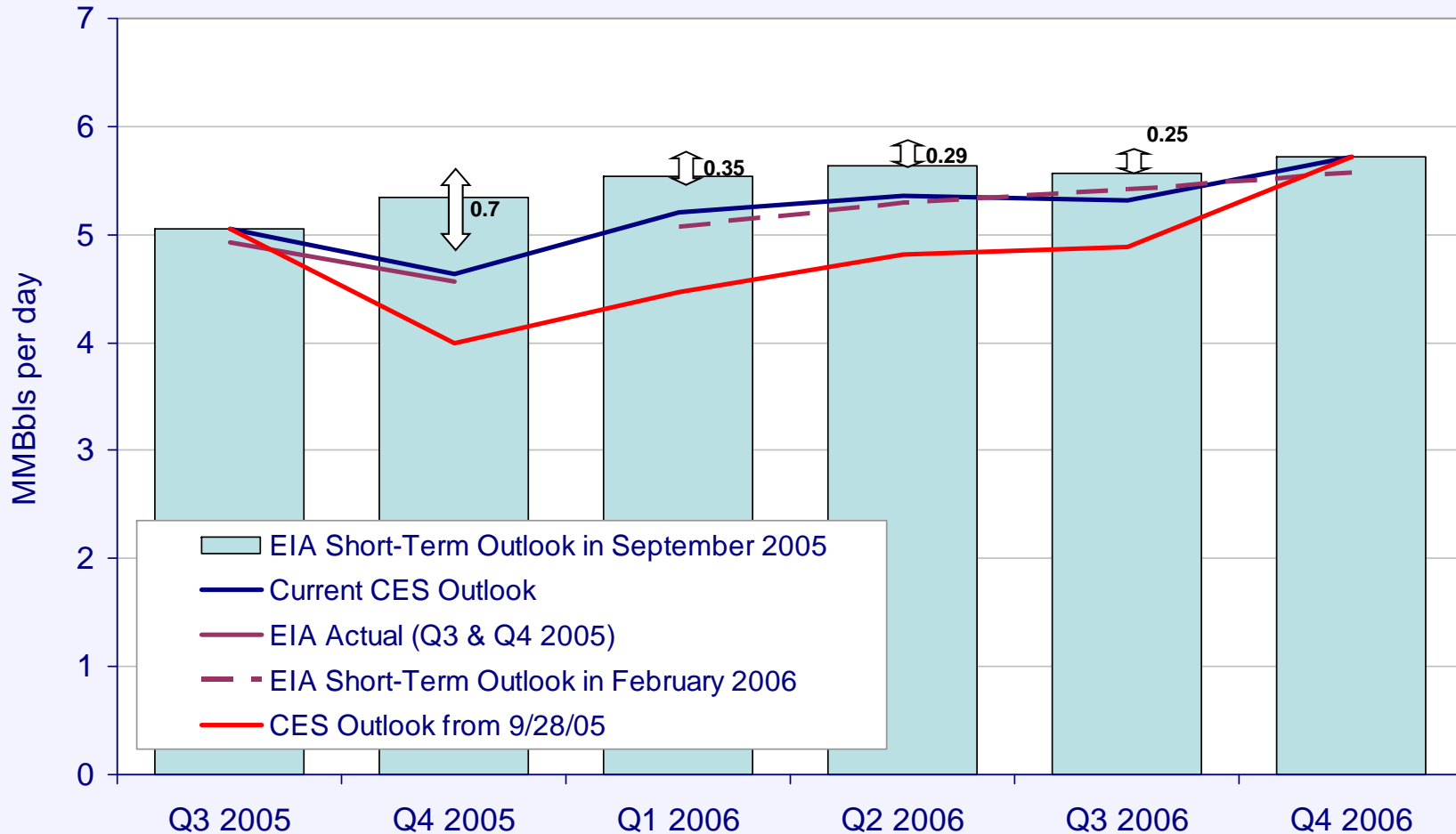


150 days after Rita's landfall is 21-Feb-06

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 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.

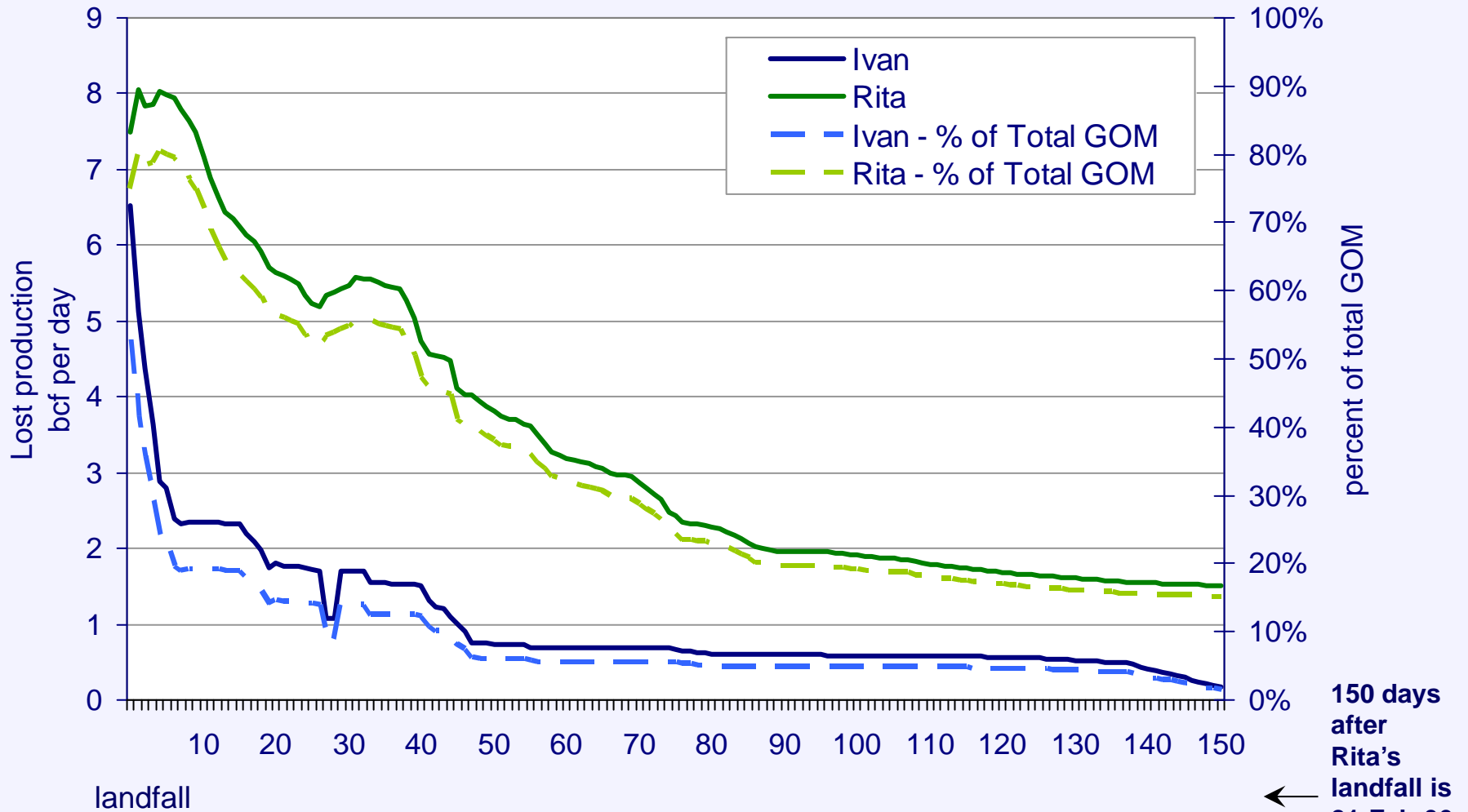


Note: Assuming recovery of 15.65 bcf per day for 150 days.



Estimated Return of Existing Natural Gas Production

Shut-ins have reached a difficult plateau trend much like Hurricane Ivan



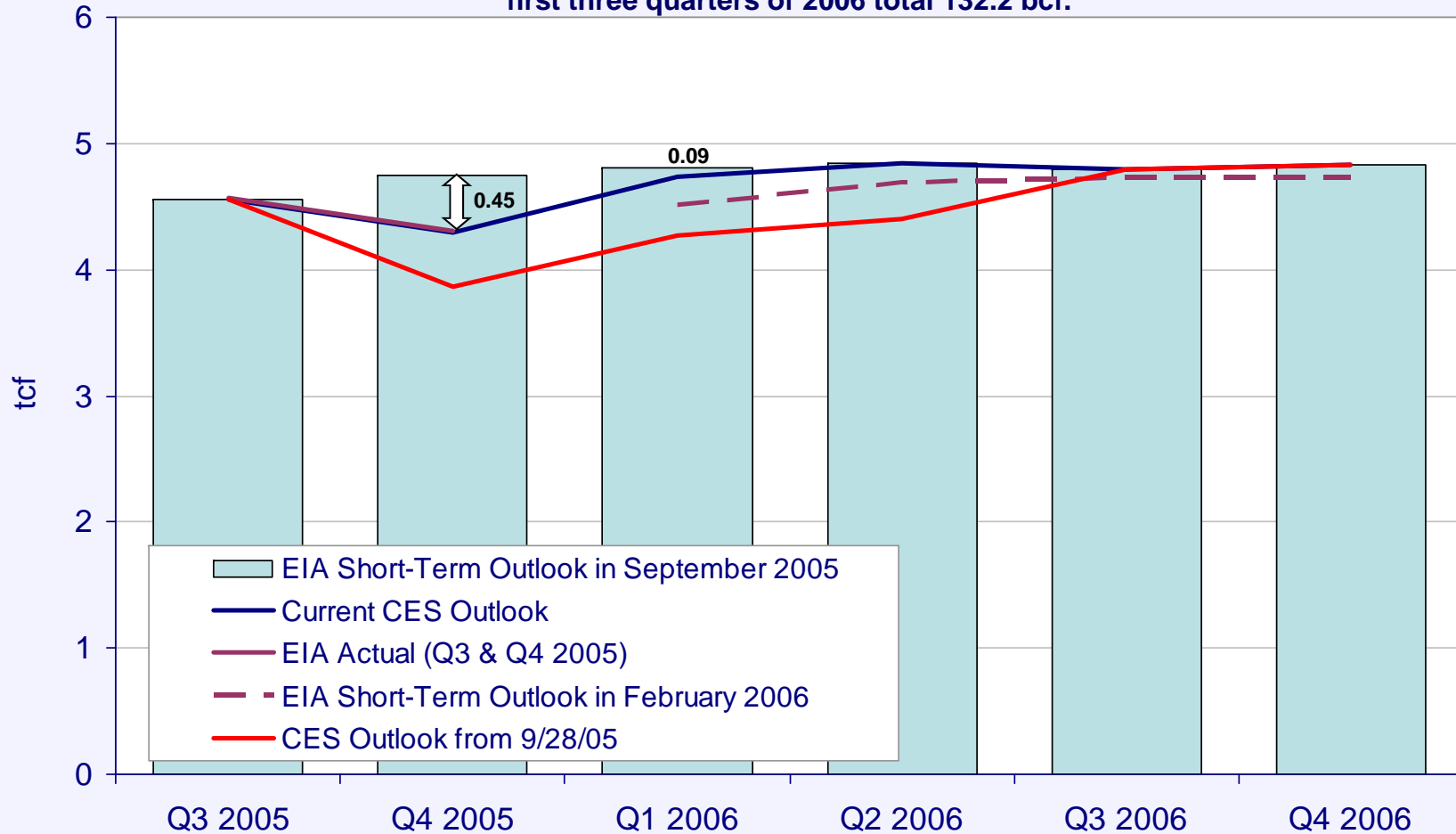
Note: Shut-in statistics for Ivan were no longer reported after 150 days. The latest shut-in statistics for Katrina and Rita were published on February 22, 2006.

Source: Minerals Management Service

150 days after Rita's landfall is 21-Feb-06



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.



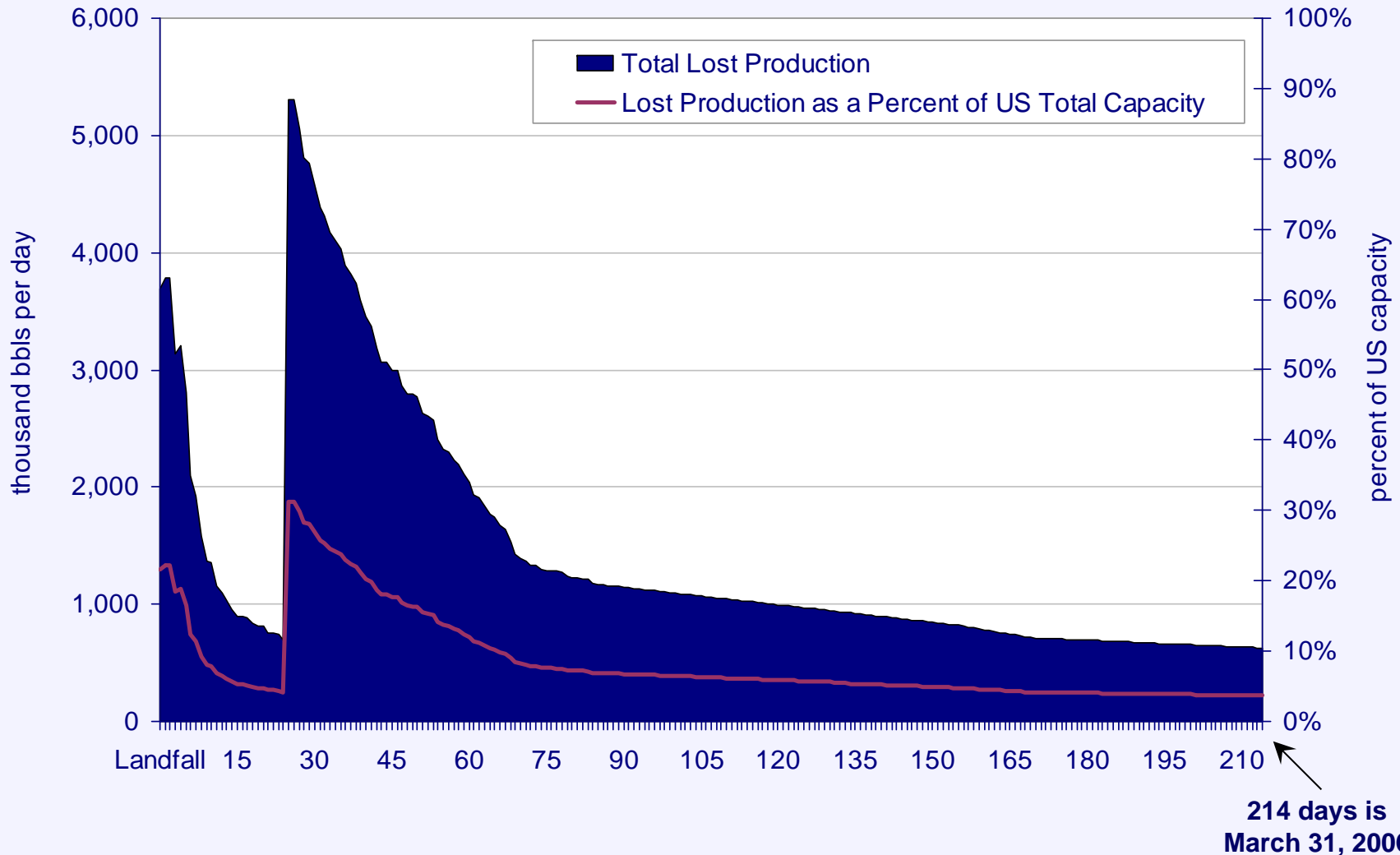
Note: Assuming recovery of 15.65 bcf per day for 150 days.



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Estimated Decrease in Refining Production from both Katrina and Rita

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

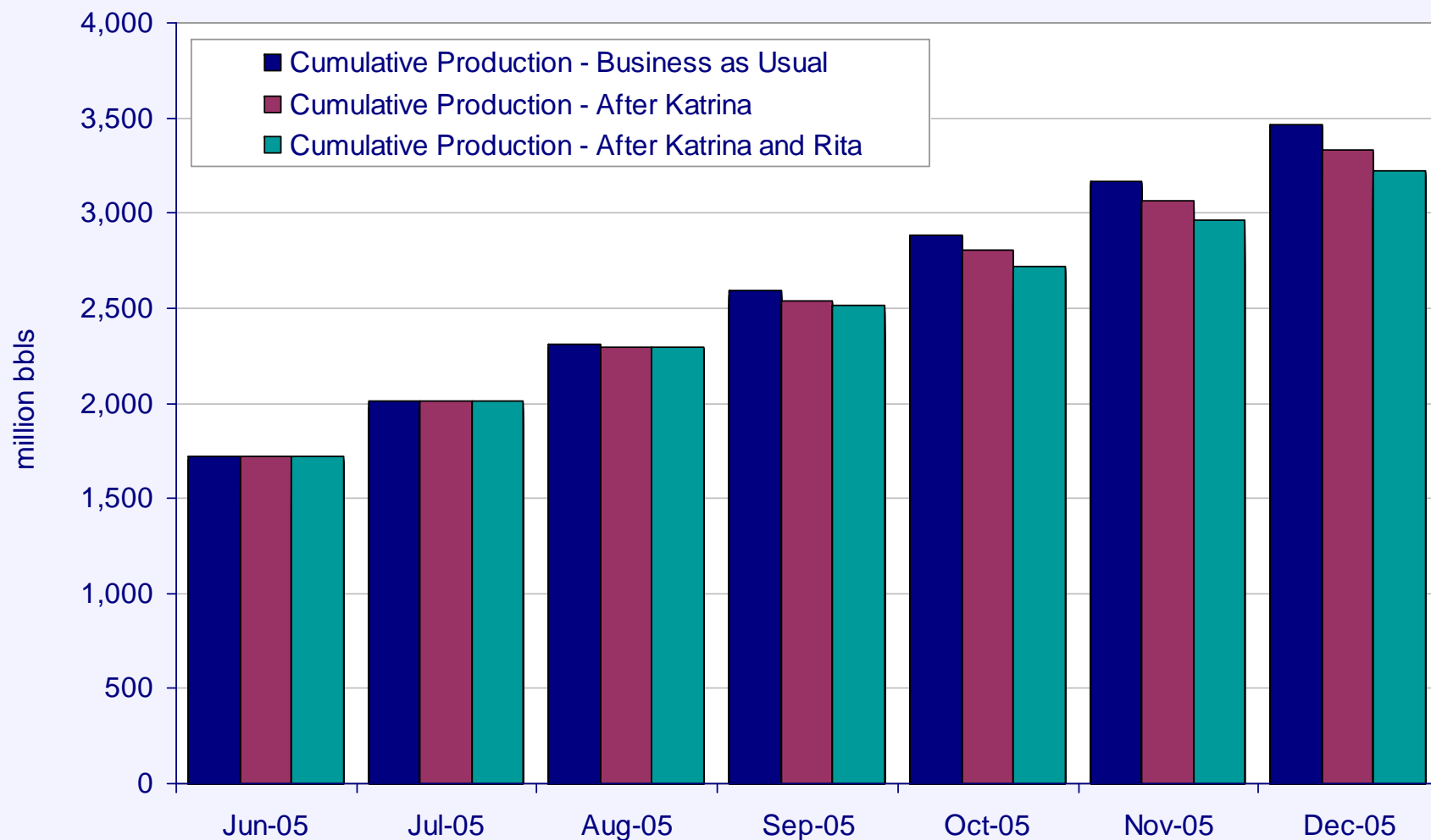


Source: Assumes 95 percent capacity factor; assumes 4 week recovery for facilities damaged by Rita.



Cumulative Refining Production

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.



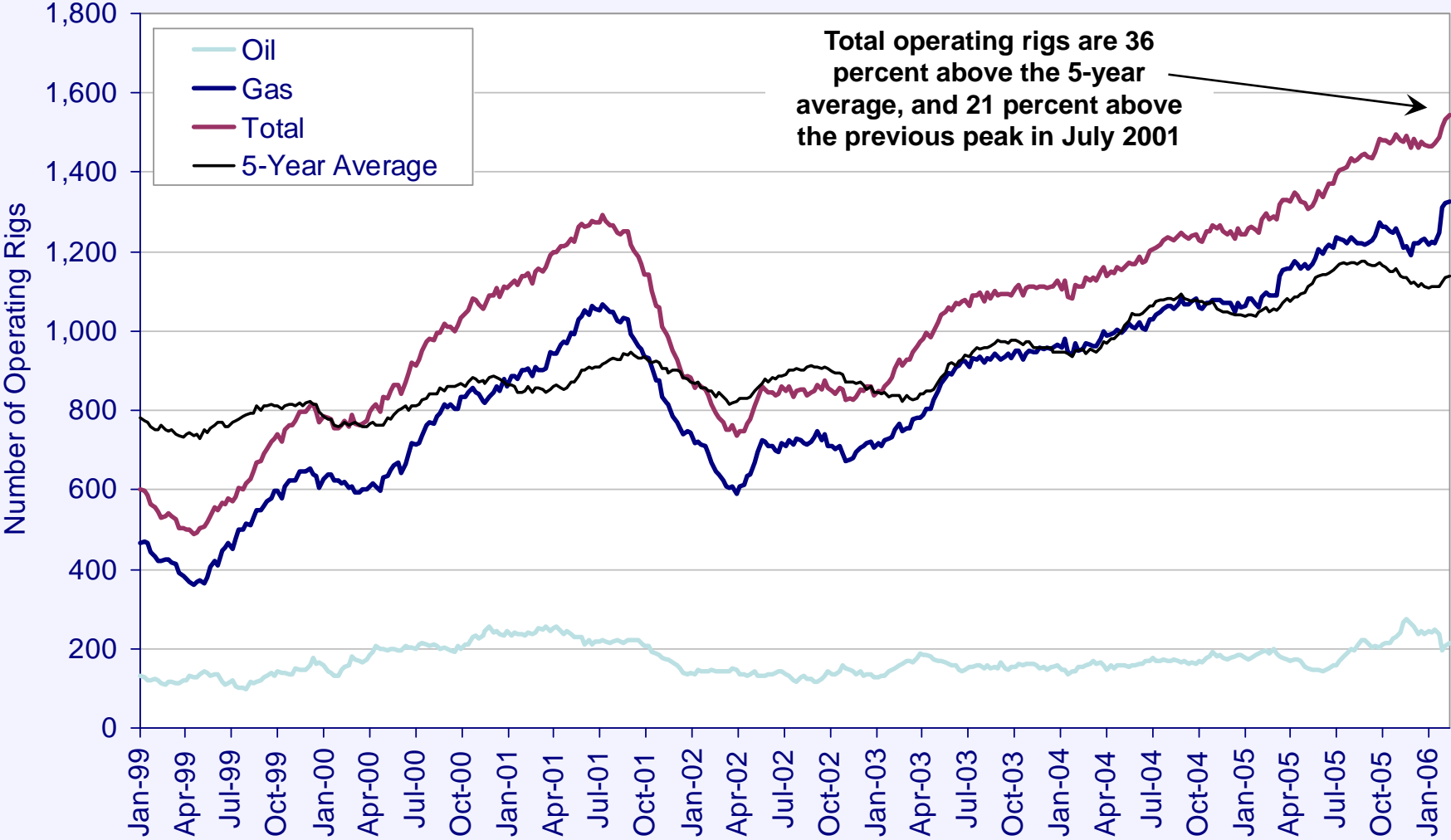
Source: Assumes 95 percent capacity factor



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Ongoing Production Challenges

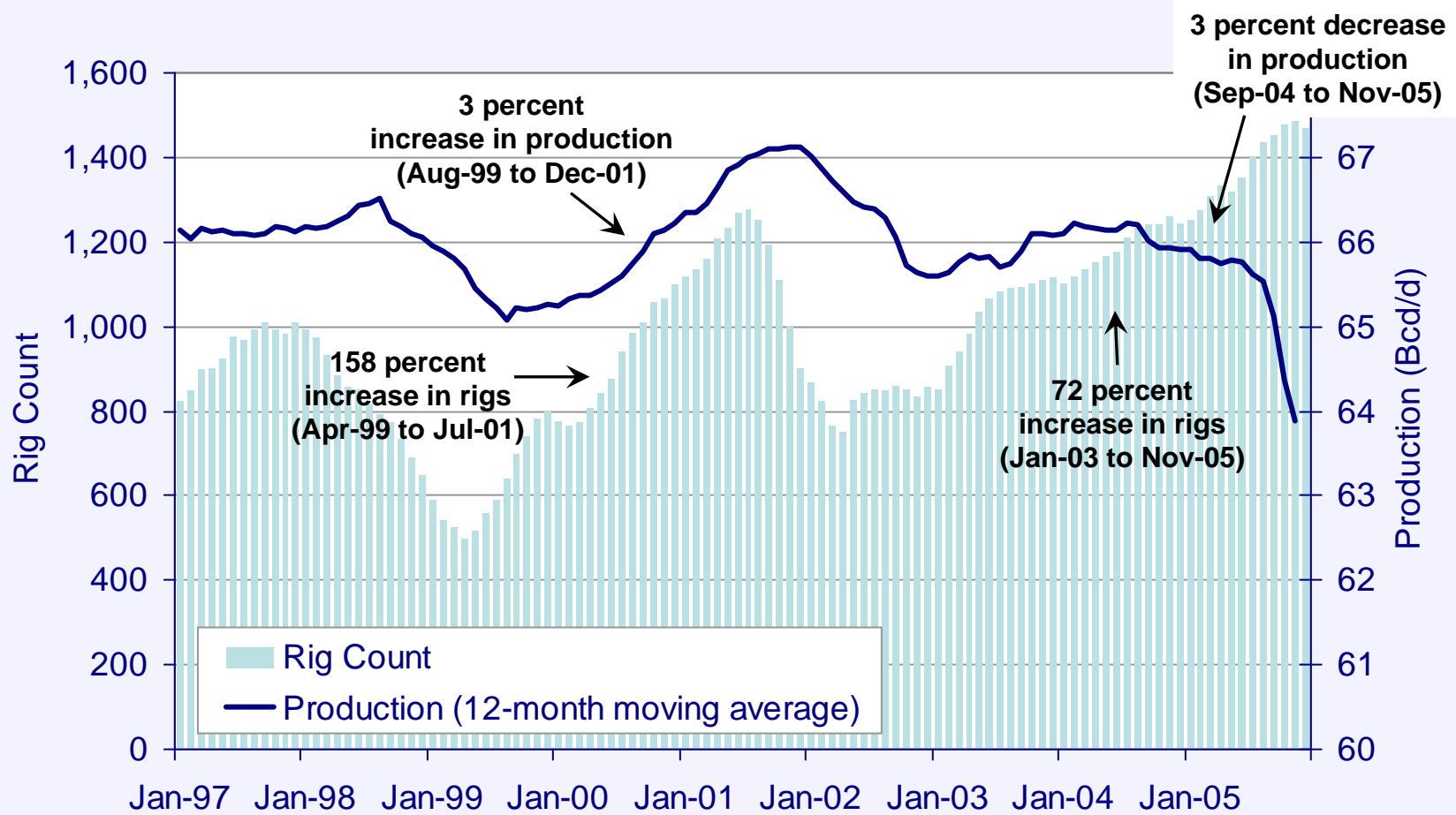
Weekly Counts of Rotary Rigs in Operation



Source: Baker-Hughes Inc.

U.S. Natural Gas Production and Monthly Rig Count (1997-Present)

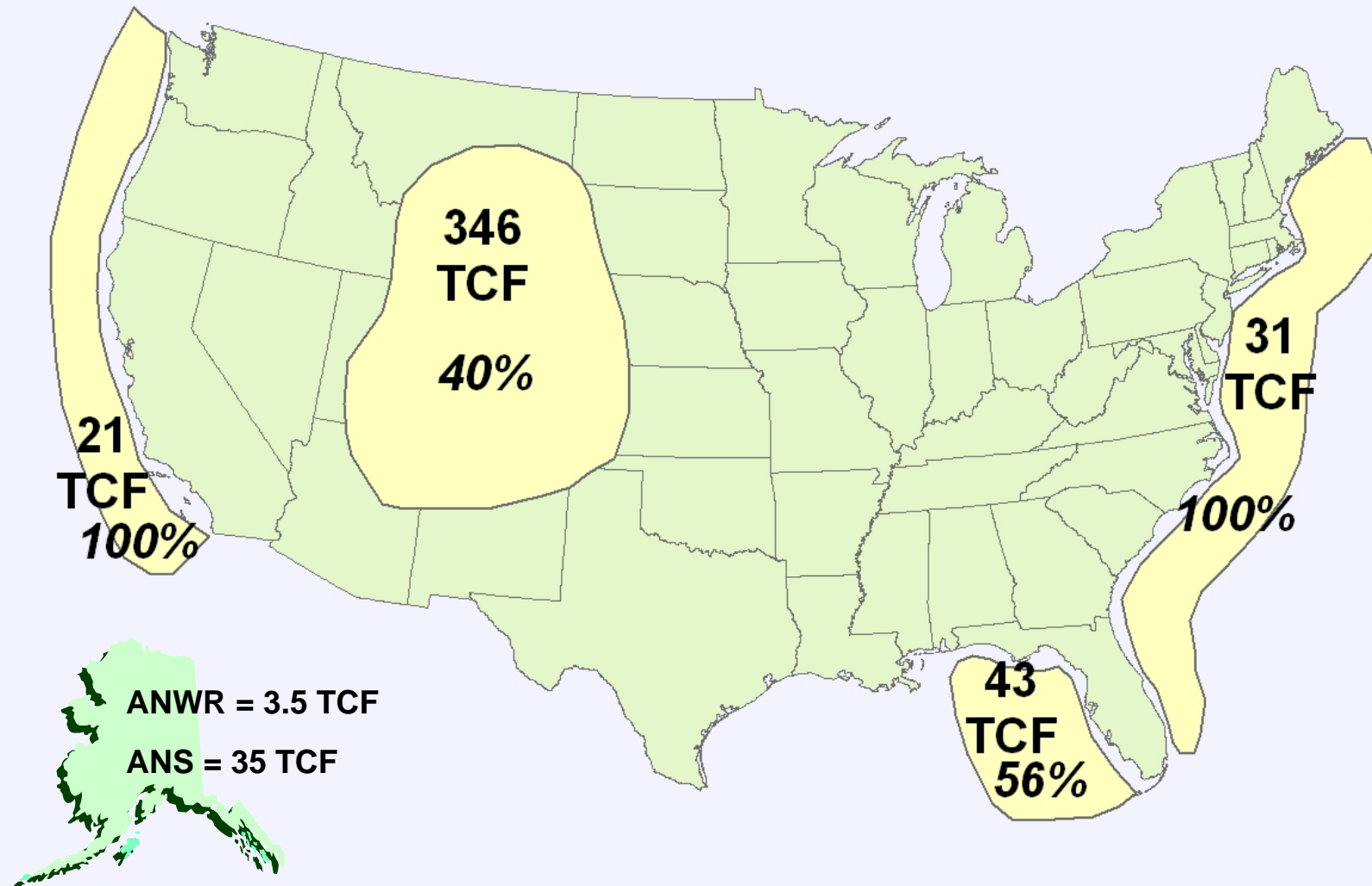
Despite increased drilling efforts, production is falling;
The US is seeing decreasing drilling productivity



Source: Energy Information Administration, Department of Energy; and Baker-Hughes Inc.

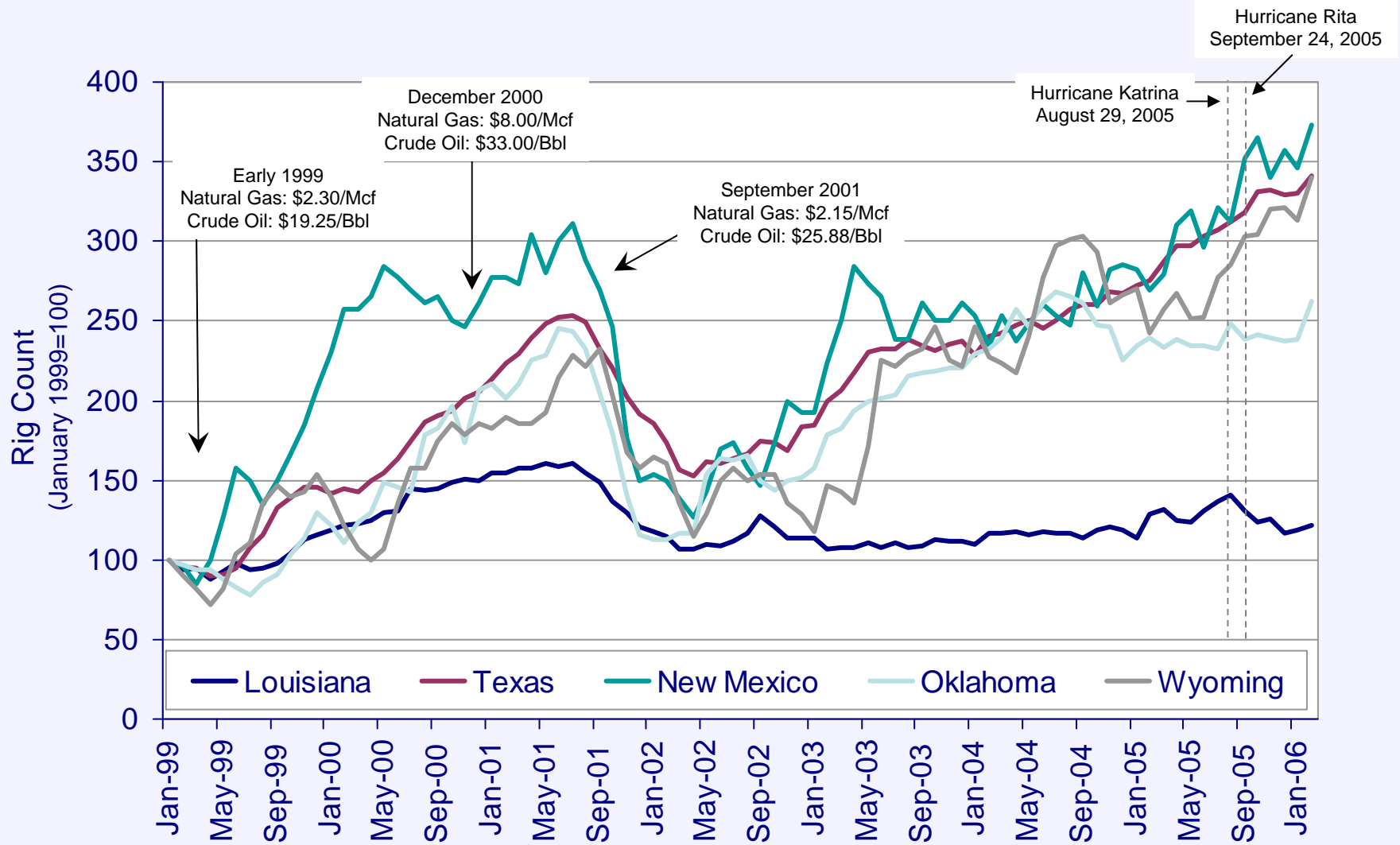
Resource Estimates – Restricted Areas Estimated, Percentage Restricted

High return frontier areas are off limits for new drilling and production activity.



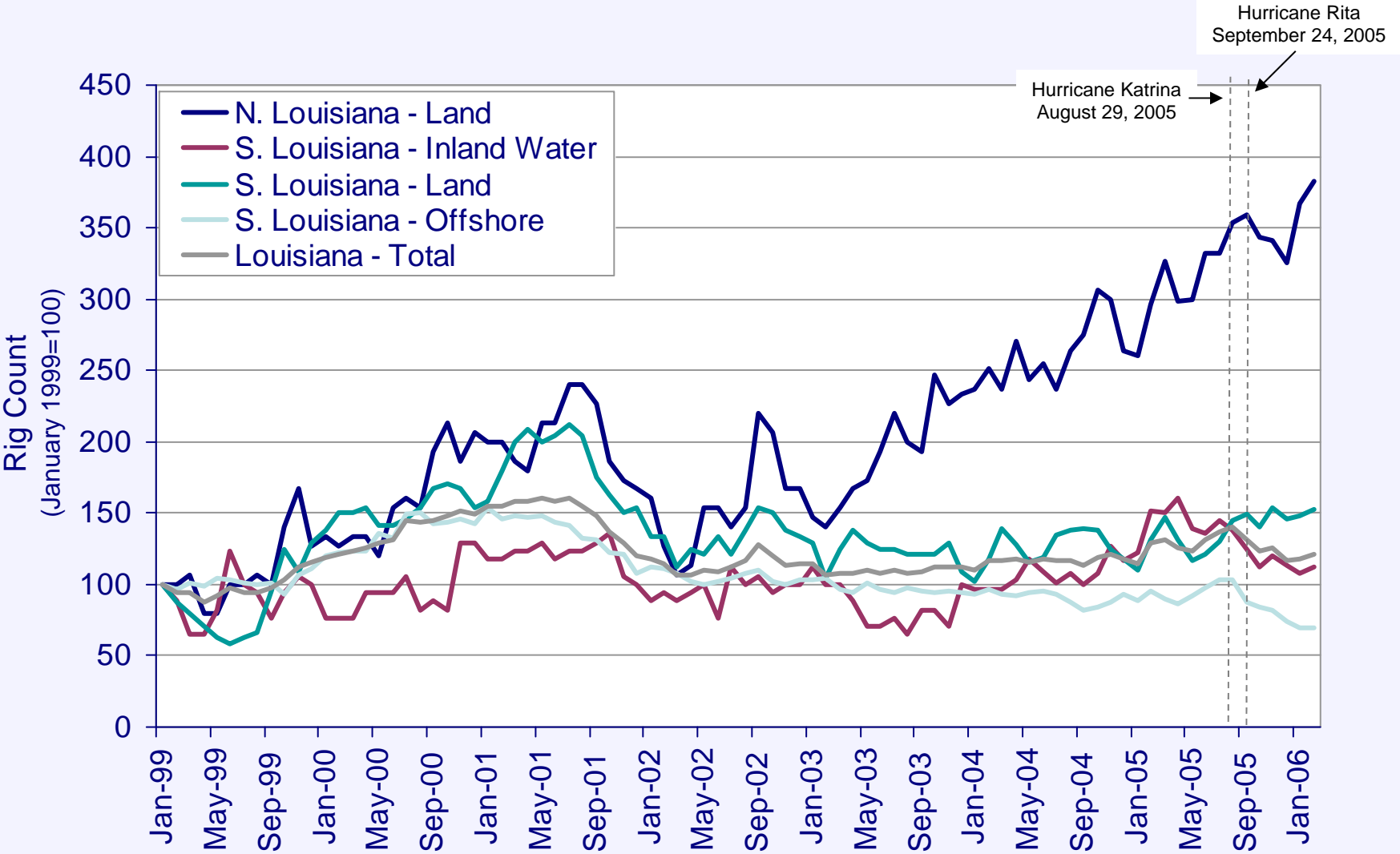
Monthly Rig Count

On a relative basis, Louisiana drilling activity has not enjoyed the same success as other states



Louisiana Monthly Rig Count

Since February 2002, Louisiana drilling activity became a “tale of two regions” – North versus South



Source: Baker Hughes

CES Estimated Economic Impact From Decreased Relative Drilling Activities Total Louisiana (Pre-Hurricanes)

Decreased relative drilling activities have serious economic ramifications in terms of lost expenditures, jobs and wages.

Total Louisiana - Results from Economic Impact Model (constant 2004 \$)						
	2000	2001	2002	2003	2004	Total
Total Lost Number of Wells (Number)	67.0	105.2	58.1	152.5	199.8	582.5
Adjusted Lost Drilling Expenditures (million \$)	\$ 354.33	\$ 778.12	\$ 566.05	\$ 1,849.36	\$ 3,186.76	\$ 6,734.62
Total Lost Economic Output Opportunities (million \$)						
Direct Impacts	\$ 354.33	\$ 778.12	\$ 566.05	\$ 1,849.36	\$ 3,186.76	\$ 6,734.62
Indirect Impacts	\$ 129.87	\$ 285.11	\$ 207.39	\$ 677.58	\$ 1,167.33	\$ 2,467.28
Induced Impacts	\$ 112.95	\$ 248.09	\$ 180.49	\$ 589.66	\$ 1,016.27	\$ 2,147.45
Total Impacts	\$ 597.15	\$ 1,311.31	\$ 953.92	\$ 3,116.60	\$ 5,370.36	\$ 11,349.35
Total Lost Employment Opportunities (Jobs)						
Direct Impacts	503.3	790.7	436.4	1,146.3	1,501.8	4,378.5
Indirect Impacts	192.8	303.0	167.2	439.2	575.5	1,677.8
Induced Impacts	199.2	313.0	172.8	453.8	594.5	1,733.3
Total Impacts	895.4	1,406.7	776.4	2,039.3	2,671.9	7,789.6
Total Lost Wages (million \$)						
Direct Impacts	\$ 23.62	\$ 37.35	\$ 20.67	\$ 54.24	\$ 71.54	\$ 207.42
Indirect Impacts	\$ 6.55	\$ 10.33	\$ 5.71	\$ 14.99	\$ 19.72	\$ 57.30
Induced Impacts	\$ 4.40	\$ 6.92	\$ 3.82	\$ 10.04	\$ 13.18	\$ 38.36
Total Impacts	\$ 32.24	\$ 50.89	\$ 28.14	\$ 73.86	\$ 97.22	\$ 282.35

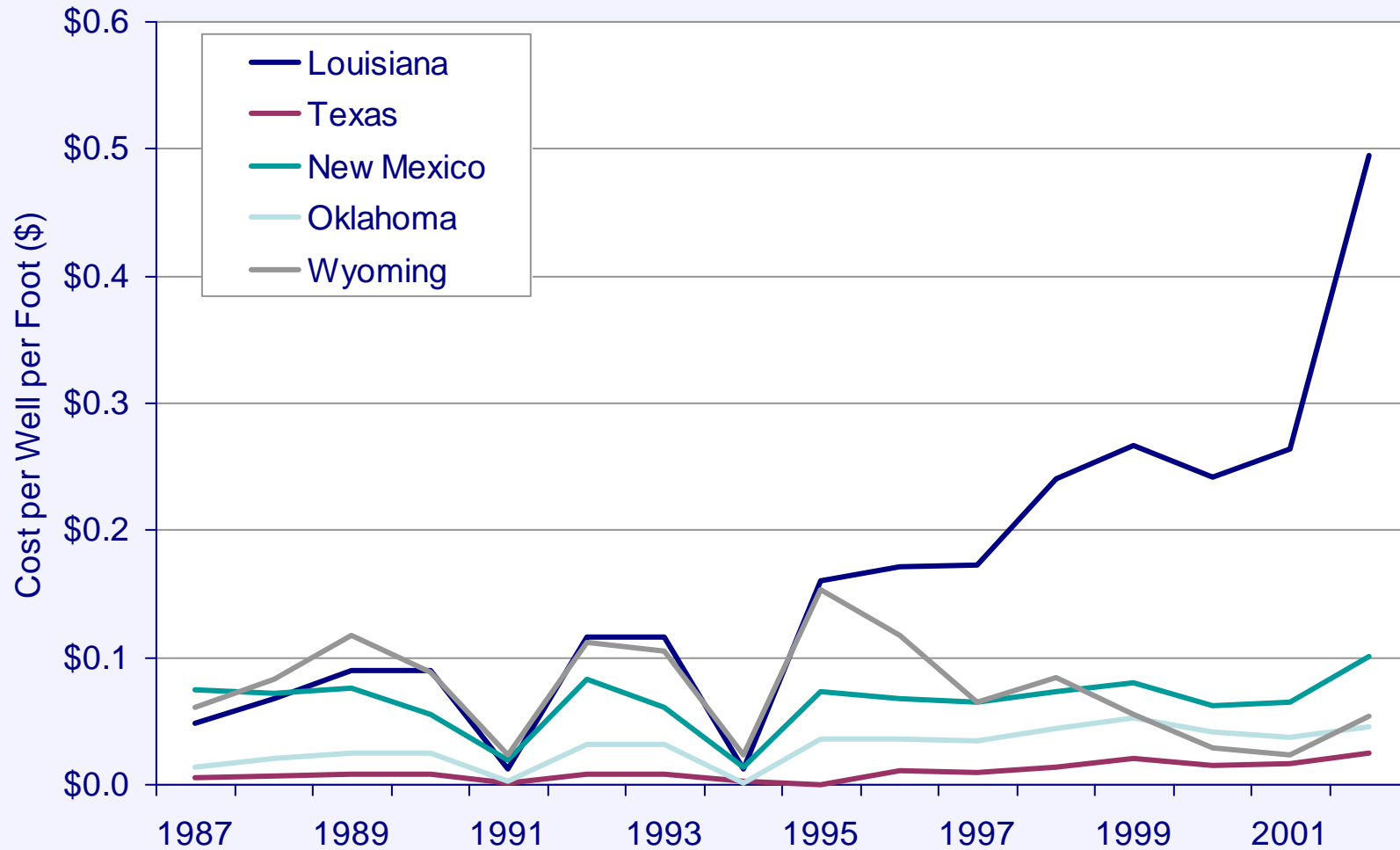
Economic Impact Results Relative to Actual Louisiana Oil and Gas Activity

Well activity is estimated to be 7 to 12 percent lower than it should be given current prices.
Lost economic output is estimated to be 5 to 7 percent lower than it should be given current prices.
Employment is 7 to 12 percent lower than anticipated.
Wages are 3 to 8 percent lower than anticipated.

	2000	2001	2002	2003	2004	Total
Estimated Lost Number of Wells (Number)	67.0	105.2	58.1	152.5	199.8	582.5
Total Wells Drilled (Number)	945.0	1,364.0	935.0	1,248.0	n.a.	
Estimated Lost Wells as Percent of Actual	7.1%	7.7%	6.2%	12.2%	n.a.	
Total Lost Direct Economic Output Opportunities (million \$)	\$ 354.3	\$ 778.1	\$ 566.0	\$ 1,849.4	\$ 3,186.8	\$ 6,735
Total Oil and Gas Sector Output (million \$)	\$ 17,237	\$ 16,039	\$ 10,025	n.a.	n.a.	
Estimated Lost Economic Output as Percent of Total	2.1%	4.9%	5.6%	n.a.	n.a.	
Total Lost Direct Employment Opportunities (Jobs)	895.4	1,406.7	776.4	2,039.3	2,671.9	7,789.6
Total Oil and Gas Sector Employment	n.a.	19,610.0	17,556.0	15,952.0	n.a.	
Lost Jobs as Percent of Total Employment	n.a.	7.2%	4.4%	12.8%		
Estimated Total Lost Direct Wages (million \$)	\$ 23.6	\$ 37.4	\$ 20.7	\$ 54.2	\$ 71.5	\$ 207
Total Oil and Gas Sector Wages (million \$)	n.a.	\$ 806	\$ 777	\$ 734	n.a.	
Estimated Lost Wages as Percent of Total	n.a.	4.6%	2.7%	7.4%	n.a.	

Estimated Cost of Drilling and Equipping Wells (All Types)

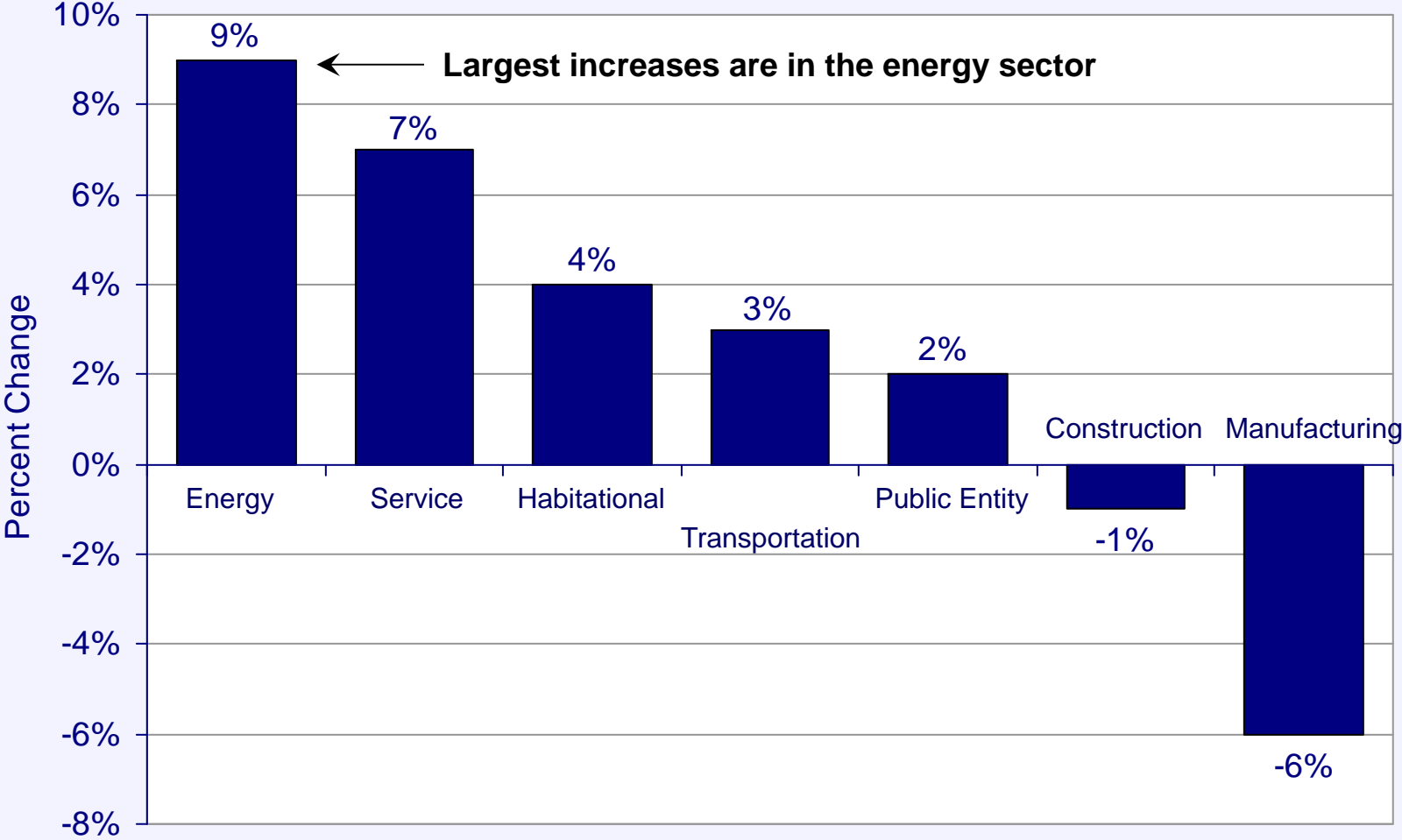
Drilling costs have increased rapidly in Louisiana since 1995 relative to other areas



Source: American Petroleum Institute. Joint Industry Survey.

Average Rate Increase/Decrease by Industry Class

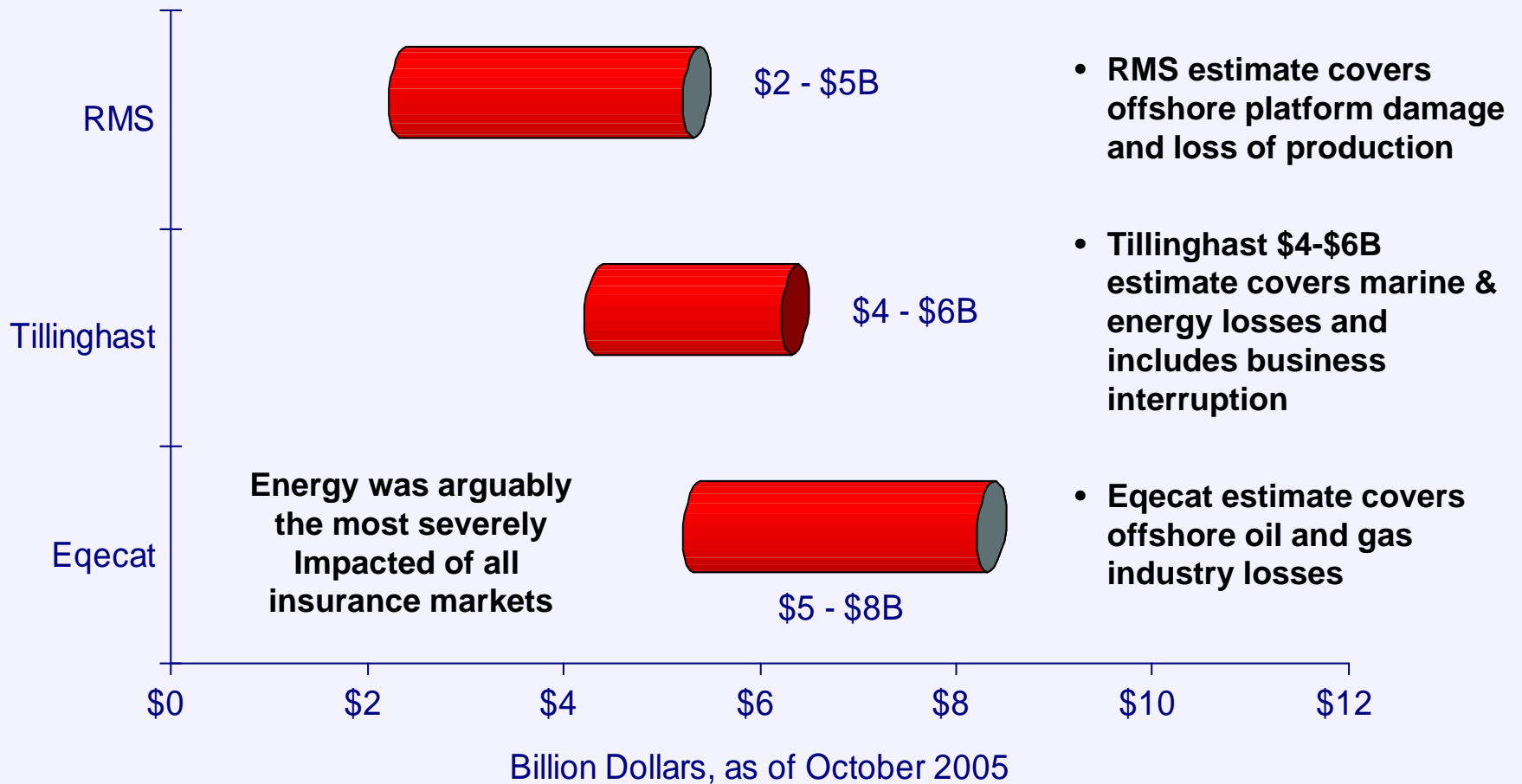
Insurance costs already increasing at rapid pace prior to hurricanes.



Source: MarketScout.com

Energy Insured Loss Estimates – Katrina Only

Insurance damage losses will have to be made up – reduced coverage, higher premiums, and coverage caps



**U.S. Chamber of Commerce:
Business Leaders Ranking
of Liability Systems for 2005**

Best States

1. Delaware
2. Nebraska
3. North Dakota
4. Virginia
5. Iowa
6. Indiana
7. Minnesota
8. South Dakota
9. Wyoming
10. Idaho

New in 2005
ND, IN, SD, WY

Drop-Offs
ID, UT, NH, KS

Worst States

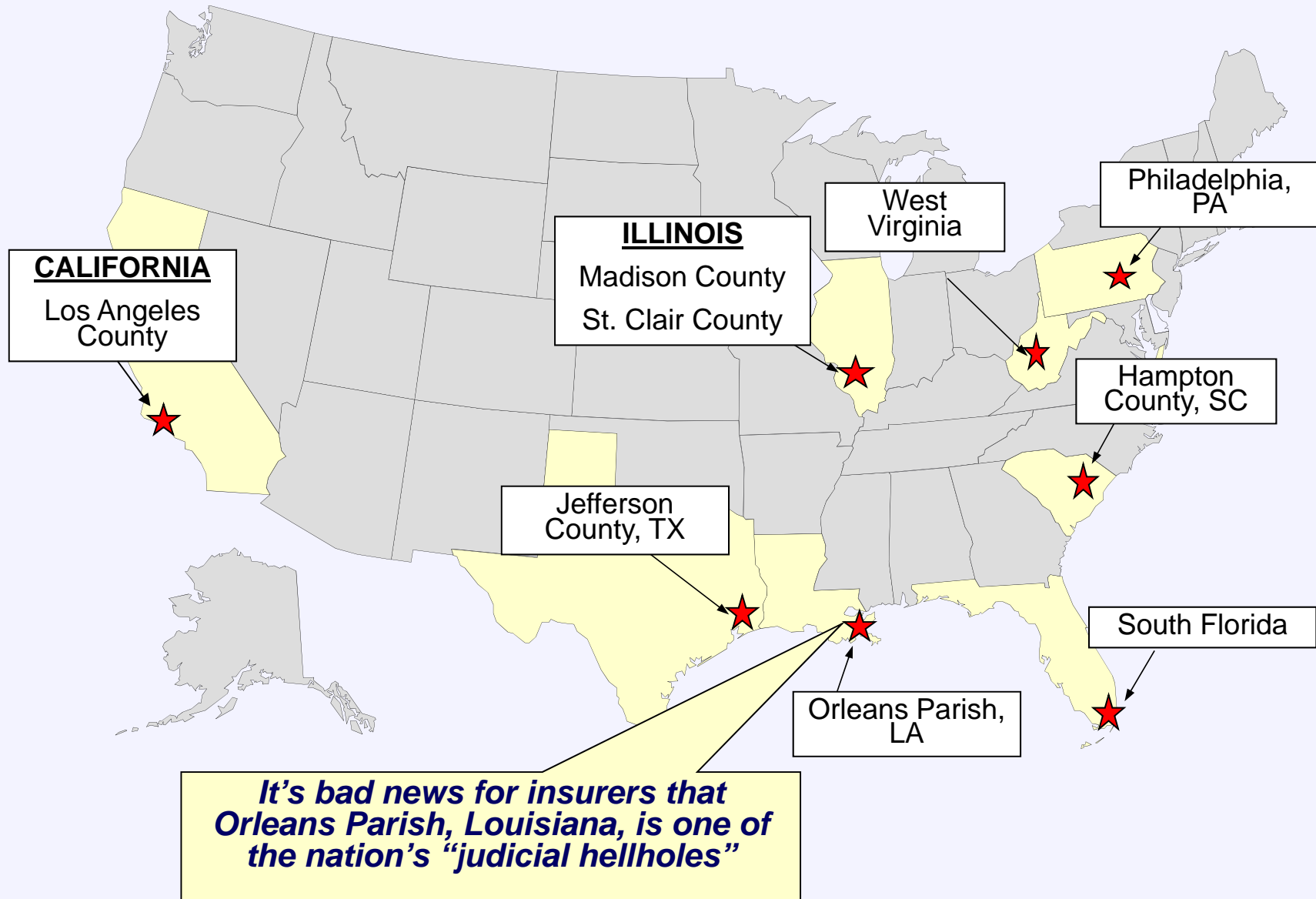
41. Hawaii
42. Florida
43. Arkansas
44. Texas
45. California
46. Illinois
47. **Louisiana**
48. **Alabama**
49. West Virginia
50. **Mississippi**

Newly Notorious
HI, FL

Rising Above
MO, MT

***LA, AL and MS's liability
systems are ranked among
the worst in the country by
the US Chamber of
Commerce***

American Tort Reform Association: The Nation's Judicial "Hellholes"





- **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.



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Questions, Comments, & Discussion

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