

# Impacts of Recent Hurricanes on Markets and Energy Infrastructure

*Presentation to the Louisiana Independent Oil & Gas Association Board of Directors Meeting*

November 8, 2005



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Center for Energy Studies  
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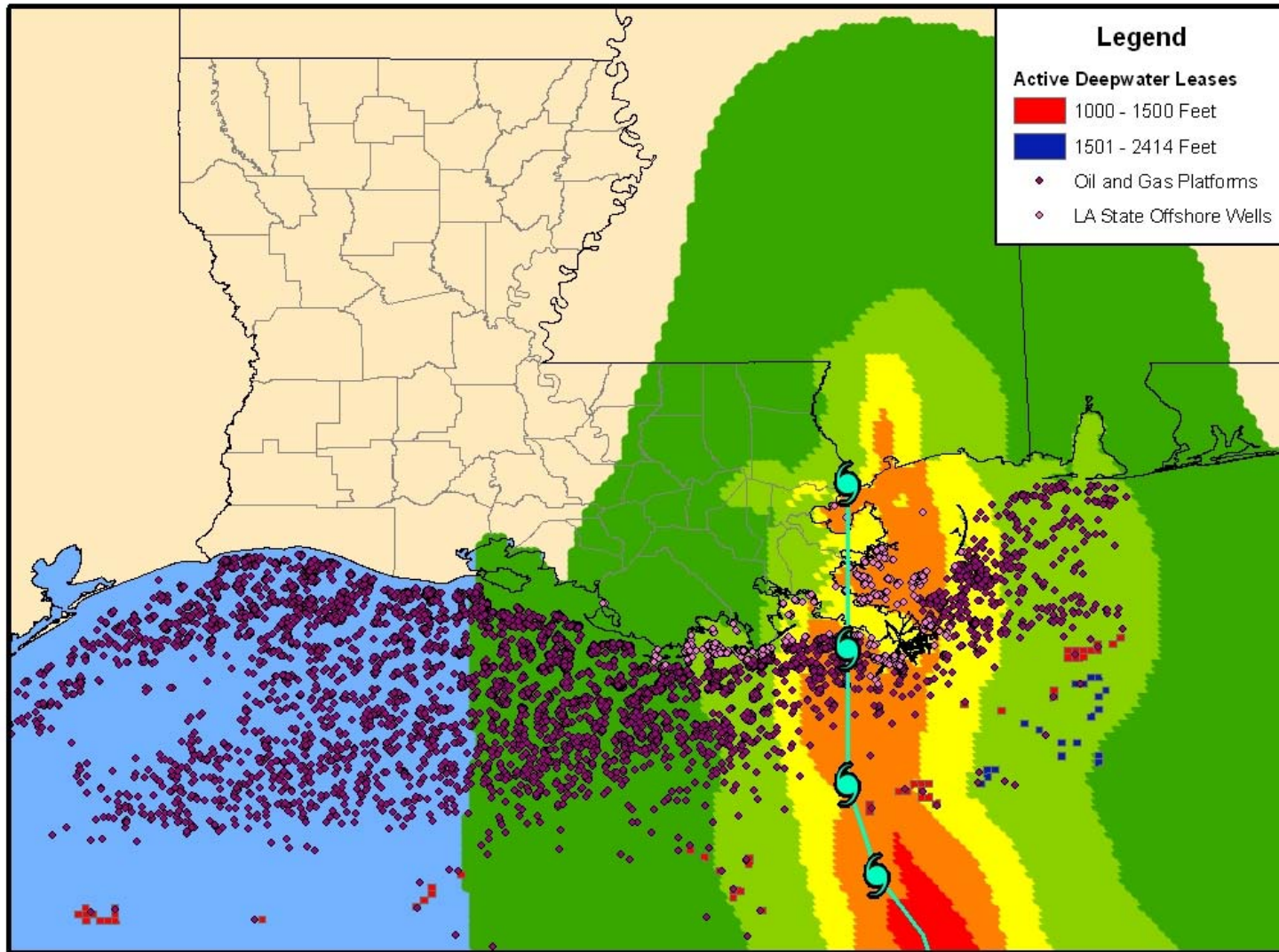
## Summary on Impacts of Hurricanes

- Hurricanes were incredibly destructive to energy business and ramifications are going to be long lived (locally and nationally).
- Hurricanes created more destruction than offshore production – storms clearly showed the interrelationship of all types of energy infrastructure in the Gulf – the “4 Ps” – production, processing, pipes, and power.
- Hurricanes created more destruction than just that along the Gulf – price ramifications were felt nationally – and impacts felt globally in energy markets.
- In the near term, this will be the most expensive heating season on record for American consumers.
- Price and supply wildcards: weather and industrial activity. The claims of demand destruction potentially overstated in very near term – not in intermediate to longer term.
- Energy markets are likely to not be back on their feet prior to the next hurricane season.
- Potentially setting ourselves up for a **major** “supply-demand” realignment.



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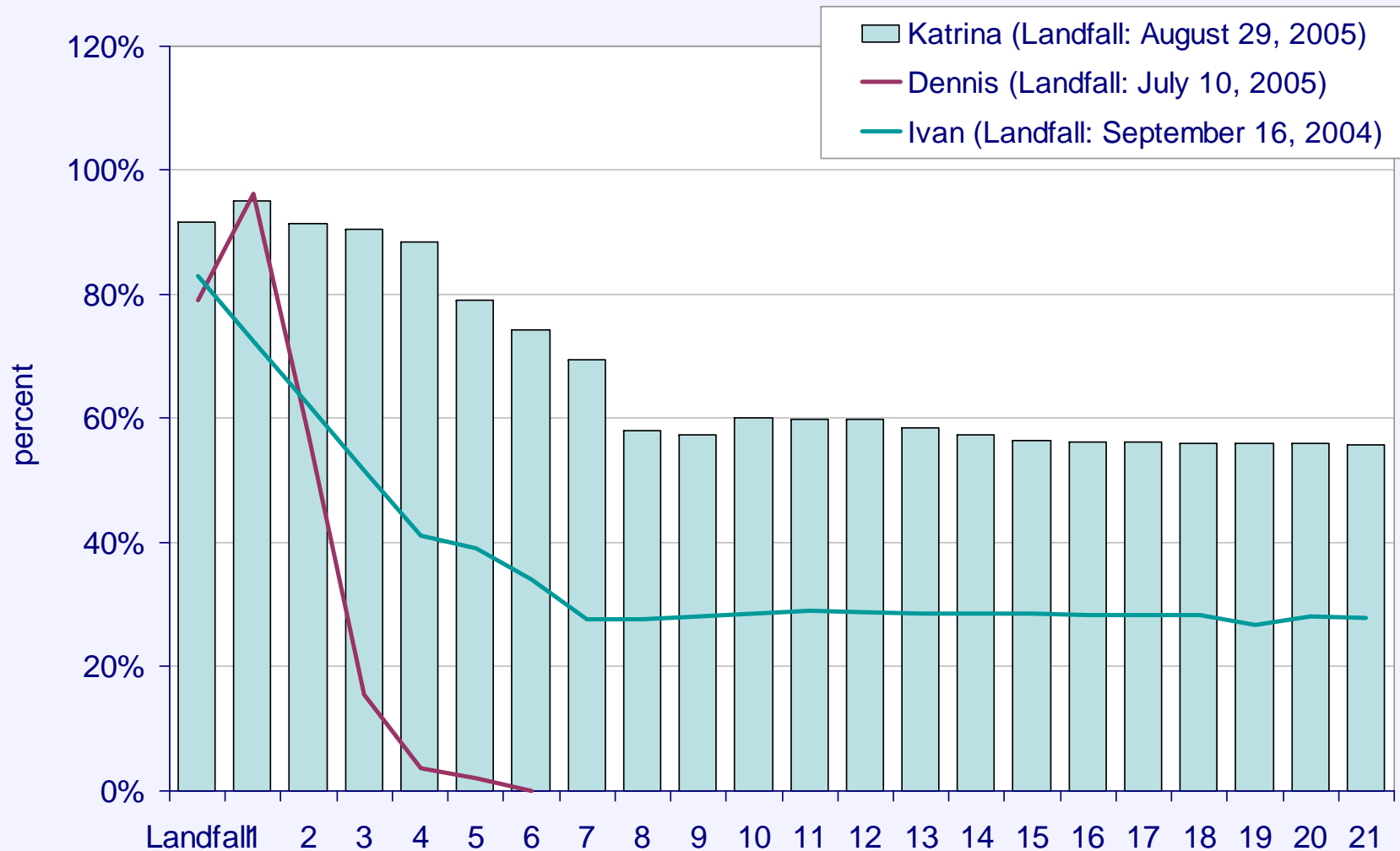
## Platforms/Structures Impacted by Katrina





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## Katrina versus Other Major Hurricanes - Shut-in Oil Production as a Percent of Daily GOM Production



Source: Minerals Management Service

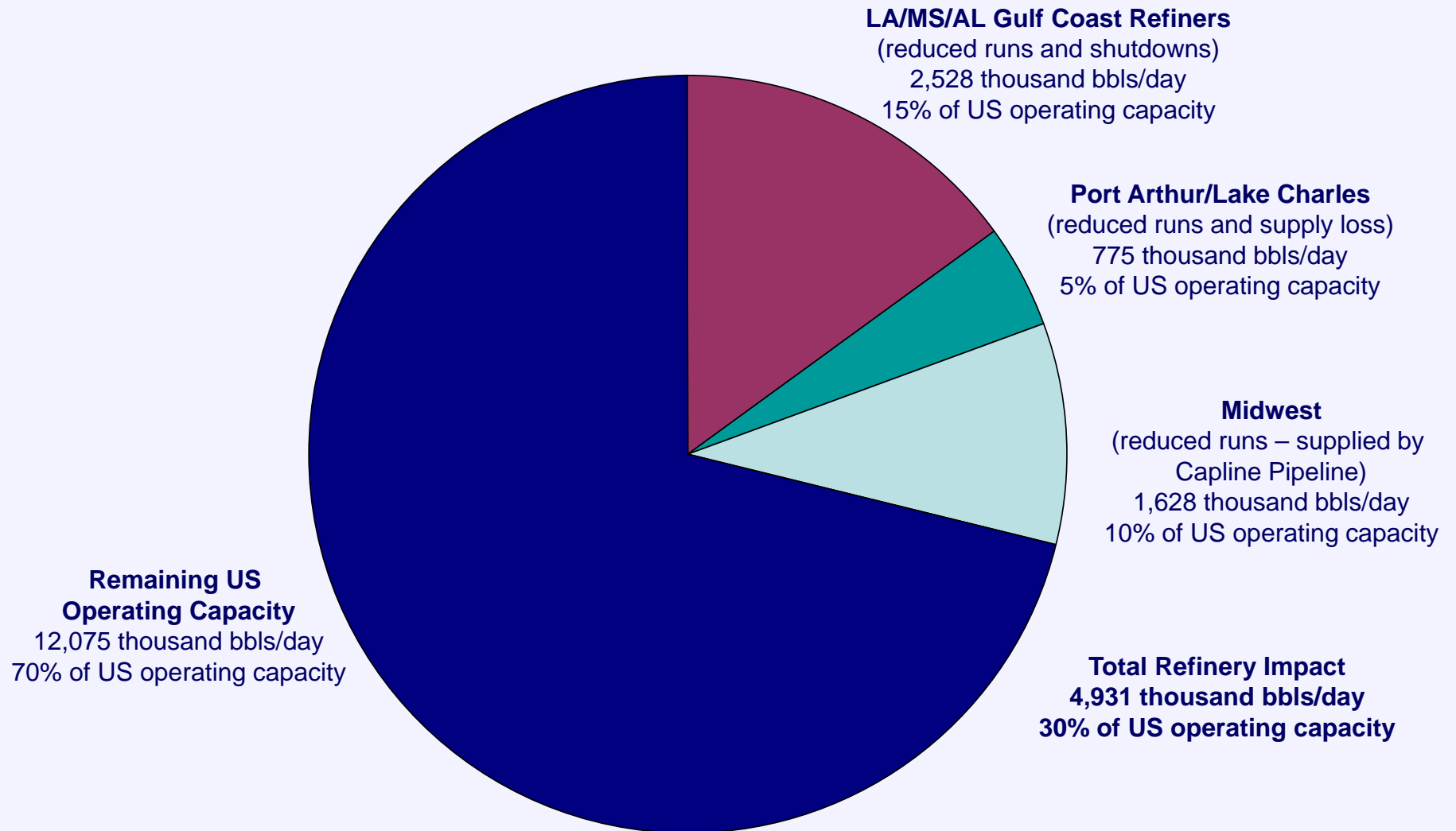


## Refineries Impacted by Katrina Gulf Coast, Port Arthur and Lake Charles

Company	Location	Processing Capacity (barrels per day)	Status (as of August 31)
ExxonMobil	Baton Rouge, LA	493,500	reduced runs
ChevronTexaco	Pascagoula, MS	325,500	shutdown
Citgo	Lake Charles, LA	324,300	total supply loss
ConocoPhillips	Belle Chasse, LA	247,000	shutdown
Marathon	Garyville, LA	245,000	shutdown
ConocoPhillips	Lake Charles, LA	239,400	total supply loss
Motiva (Shell)	Convent, LA	235,000	shutdown
Motiva (Shell)	Norco, LA	226,500	shutdown
Total	Port Arthur, TX	211,500	reduced runs
ExxonMobil	Chalmette, LA	187,200	shutdown
Valero	St. Charles	185,000	shutdown
Murphy	Meraux	120,00	shutdown
Valero	Krotz Springs, LA	80,000	reduced runs
Shell Chemical	Saraland, AL	80,000	?
Shell Chemical	St Rose, LA	55,000	shutdown
Placid Oil	Port Allen, LA	48,500	reduced runs



## Total Immediate Refinery Impact

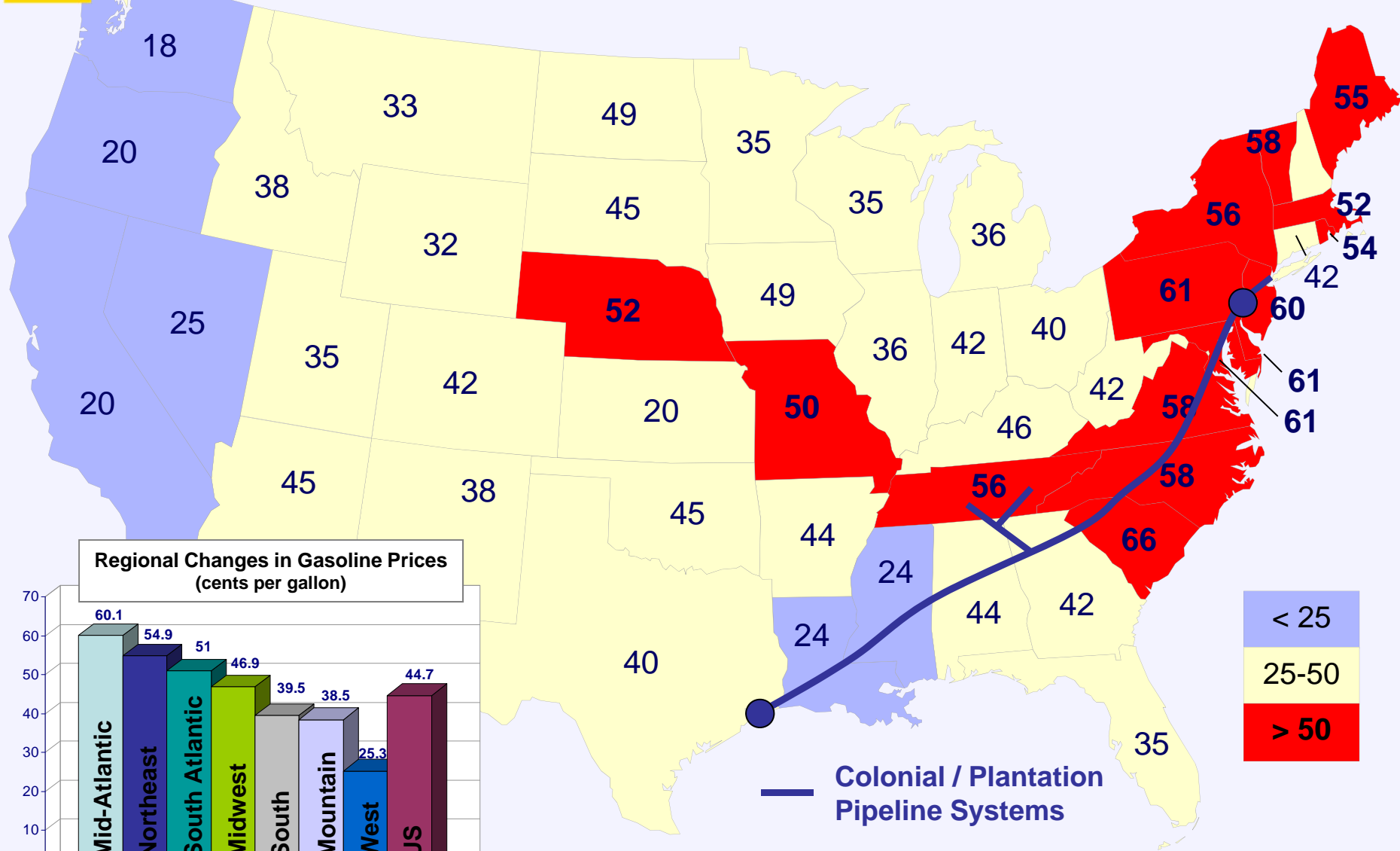




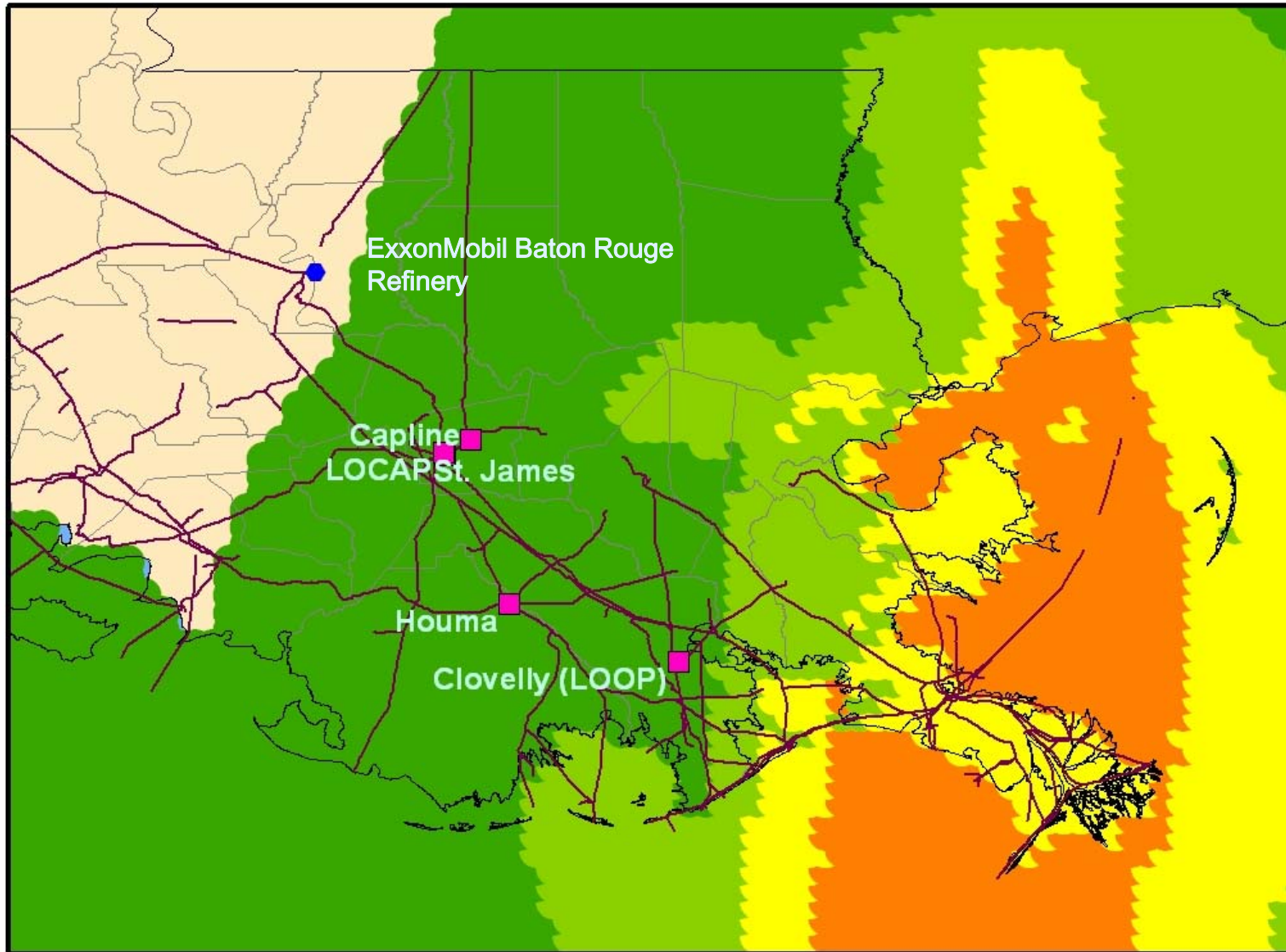


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# Gasoline Price Increases August 30, 2005 to September 6, 2005



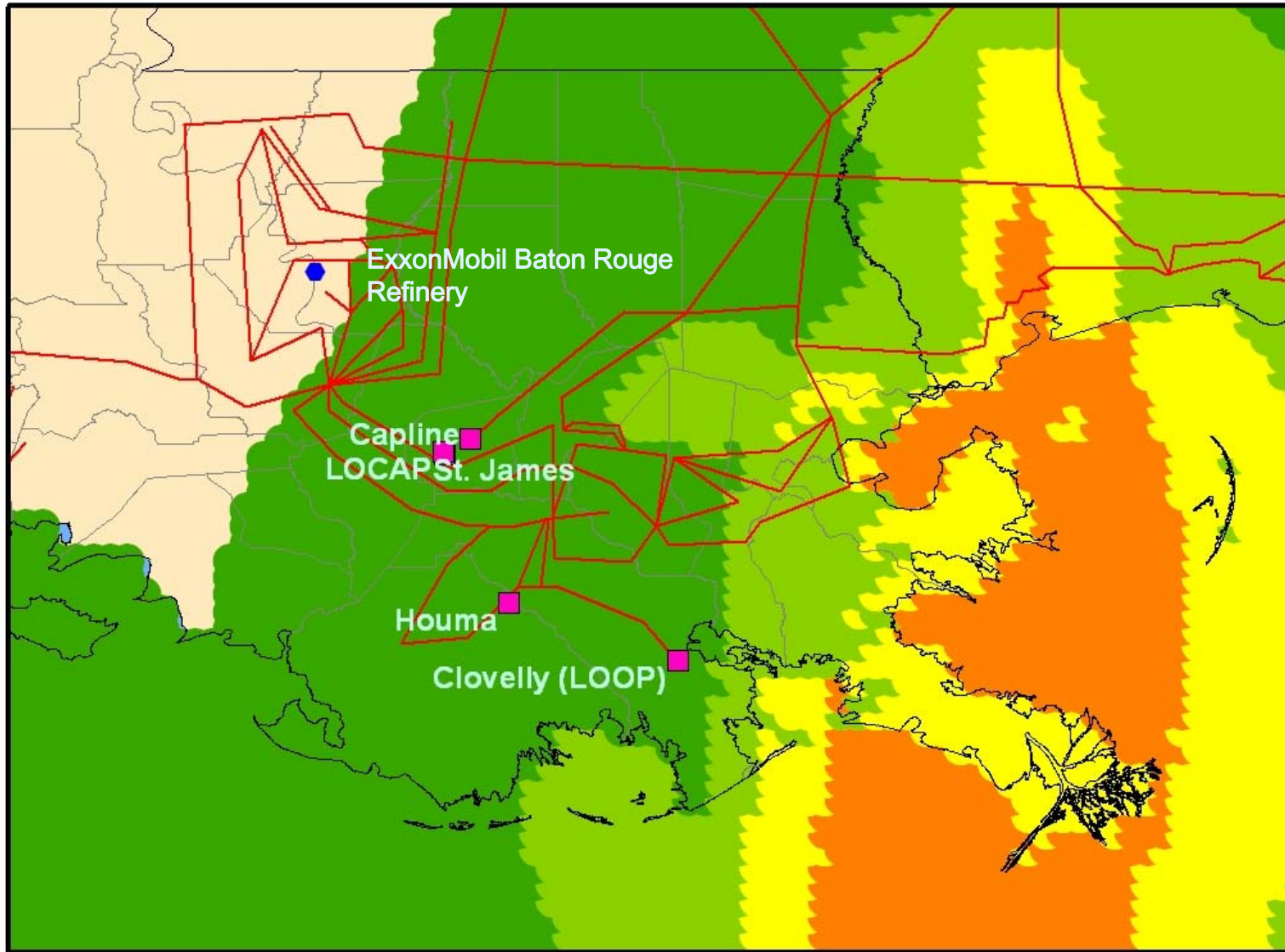
Source: American Petroleum Institute





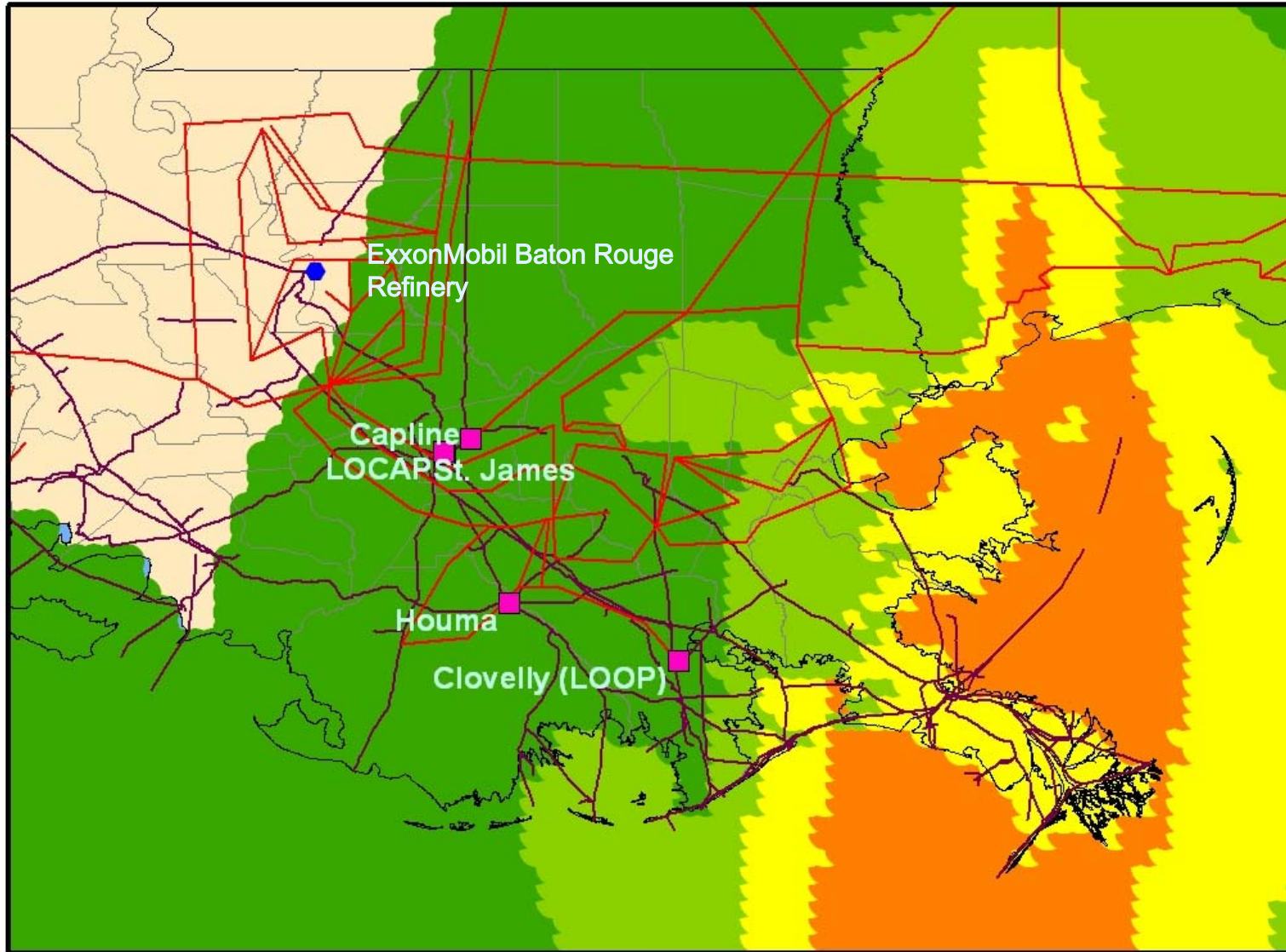


## Critical Electricity Transmission Lines Impacted by Katrina





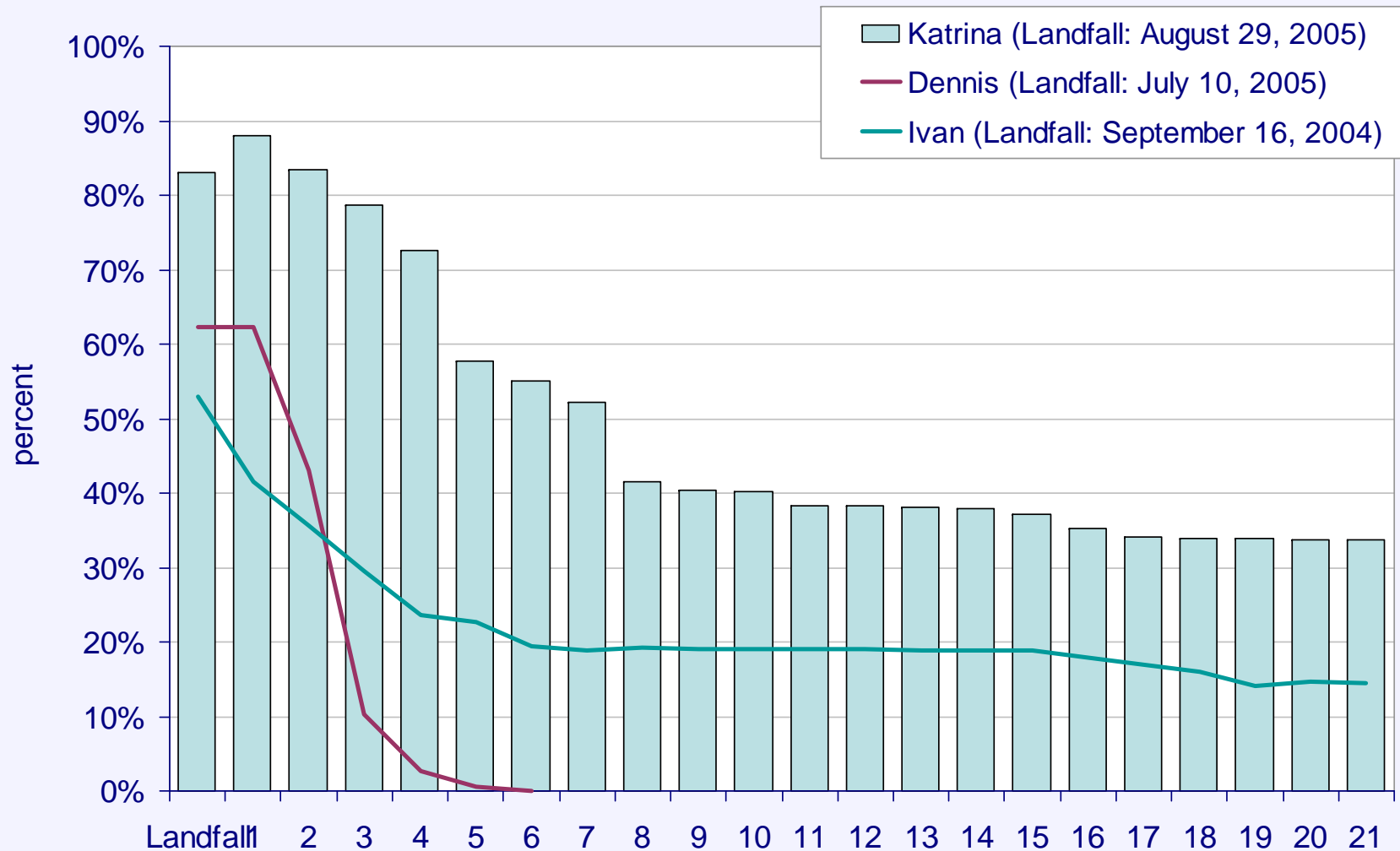
## Critical Terminals and the Power-Pipeline Infrastructure





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## Katrina versus Other Major Hurricanes - Shut-in Gas Production as a Percent of Daily GOM Production



Source: Minerals Management Service



## Number of Natural Gas Processing Facilities Out

Plant	Location	Capacity	2004	Status (as of September 10)
		as of Jan 1, 2005 ----- (MMcf/d)	Average Throughput -----	
Dynegy	Yscloskey, LA	1,850	1,343	serious damage
Dynegy	Venice, LA	1,300	997	serious damage
Enterprise Prod.	Toca, LA	1,100	468	assessment ongoing
BP	Pascagoula, MS	1,000	768	temporary pipeline outages
ExxonMobil	Garden City, LA	630	n.a.	waiting on power
Duke Energy	Bay, AL	600	172	temporary pipeline outages
Marathon	Burns Point, LA	200	60	waiting on power
ExxonMobil	Grand Isle, LA	115	72	waiting on power





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## Shell Mars Tension Leg Platform



Source: Shell.com



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## Shell Mars Tension Leg Platform



Source: Shell.com





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## Ocean Warwick Dauphin Island, AL





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## Semi-Sub Stuck Under Bridge North Mobile Bay



Photo via Noble Drilling and GlobalSantaFe



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## Venice Port, Supply & Crew Bases







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## Chevron Refinery Pascagoula, MS



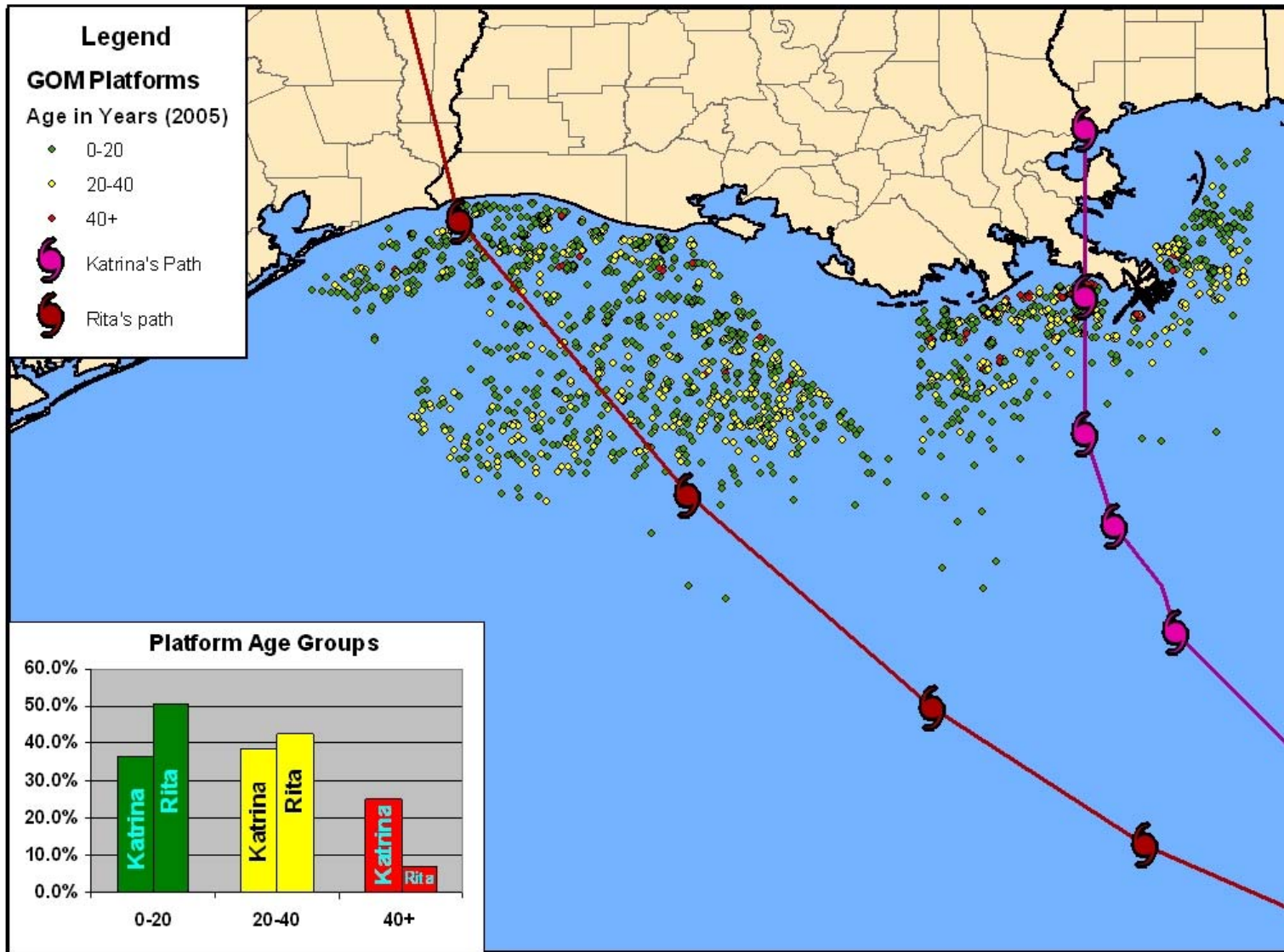


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Then,  
Along Comes Rita



# Platforms/Structures Impacted by Rita







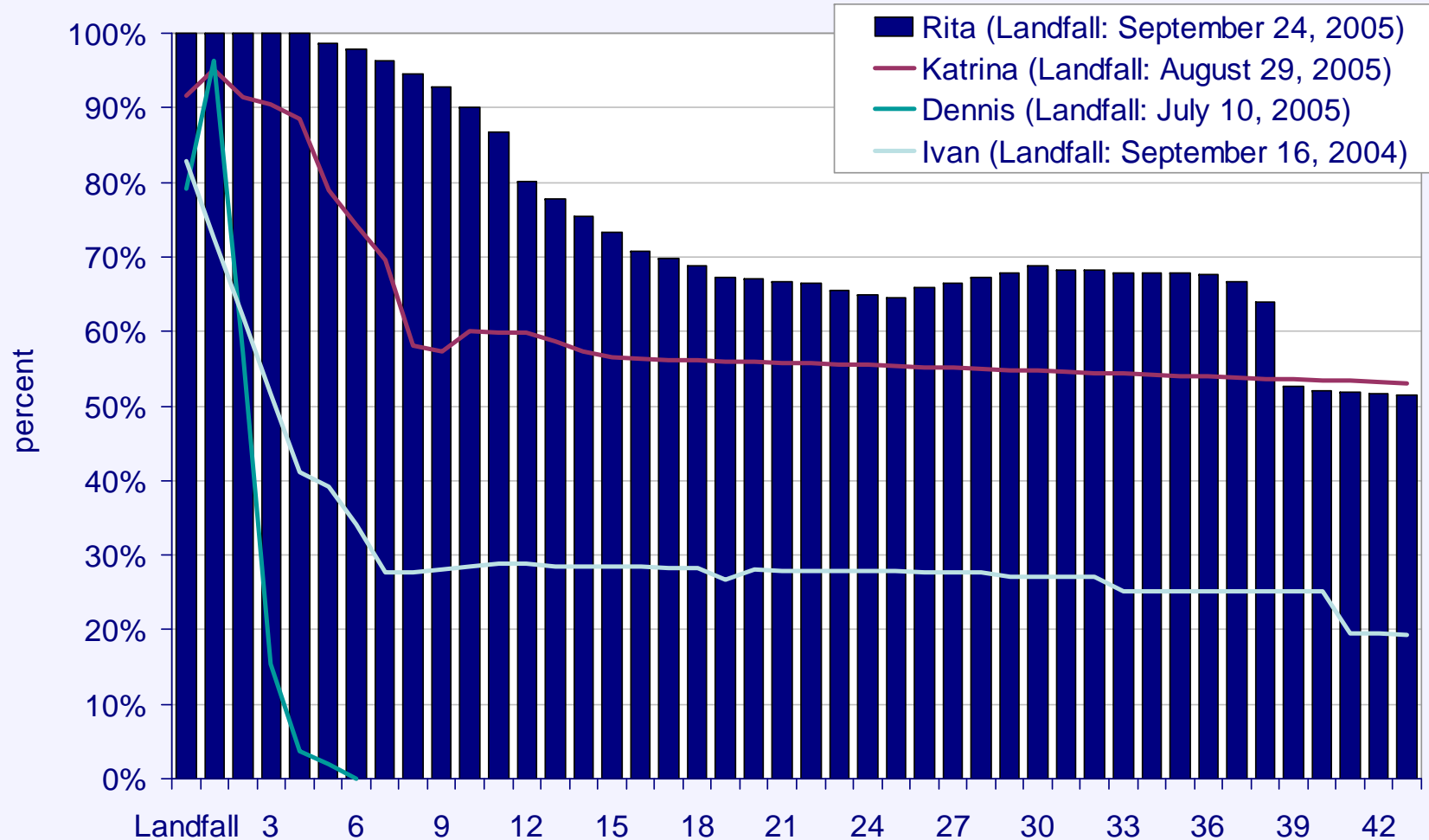
Date	Shut-in Oil Production (bbls/day)	Percent of Daily GOM Oil Production (%)	Rita Cumulative Shut-in Oil Production (bbls)	Percent of Annual GOM Oil Production (%)	Total Cumulative Shut-in Oil Production <sup>1</sup> (bbls)	Percent of Annual GOM Oil Production (%)
week ending 9/23/05	1,486,877	99.1%	4,840,509	0.9%	30,280,661	5.5%
week ending 9/30/05	1,467,577	97.8%	15,341,909	2.8%	40,828,134	7.5%
week ending 10/7/05	1,162,913	77.5%	21,748,657	4.0%	50,105,764	9.2%
week ending 10/14/05	1,008,909	67.3%	25,897,819	4.7%	57,642,292	10.5%
week ending 10/21/05	986,805	65.8%	30,803,744	5.6%	64,547,816	11.8%
week ending 10/28/05	1,017,551	67.8%	35,918,222	6.6%	71,613,334	13.1%
31-Oct-05	1,015,859	67.7%	1,015,859	0.2%	74,664,422	13.6%
1-Nov-05	1,000,092	66.7%	2,015,951	0.4%	75,664,514	13.8%
2-Nov-05	957,978	63.9%	2,973,929	0.5%	76,622,492	14.0%
3-Nov-05	790,610	52.7%	3,764,539	0.7%	77,413,102	14.1%
4-Nov-05	780,633	52.0%	4,545,172	0.8%	78,193,735	14.3%
7-Nov-05	773,097	51.5%	773,097	0.1%	80,526,022	14.7%

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



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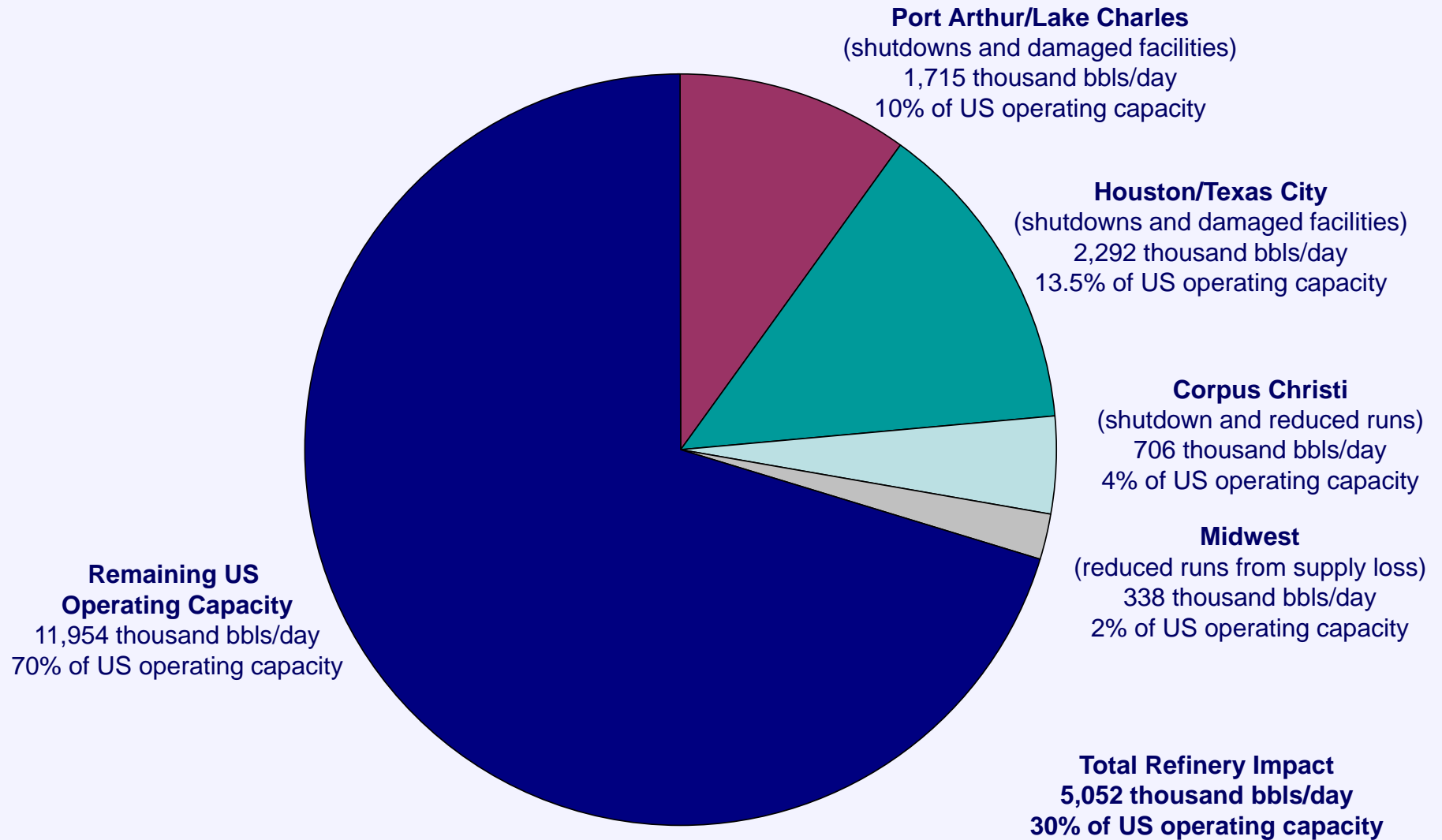
## Rita versus Other Major Hurricanes - Shut-in Oil Production as a Percent of Daily GOM Production



Source: Minerals Management Service



## Total Immediate Refinery Impact





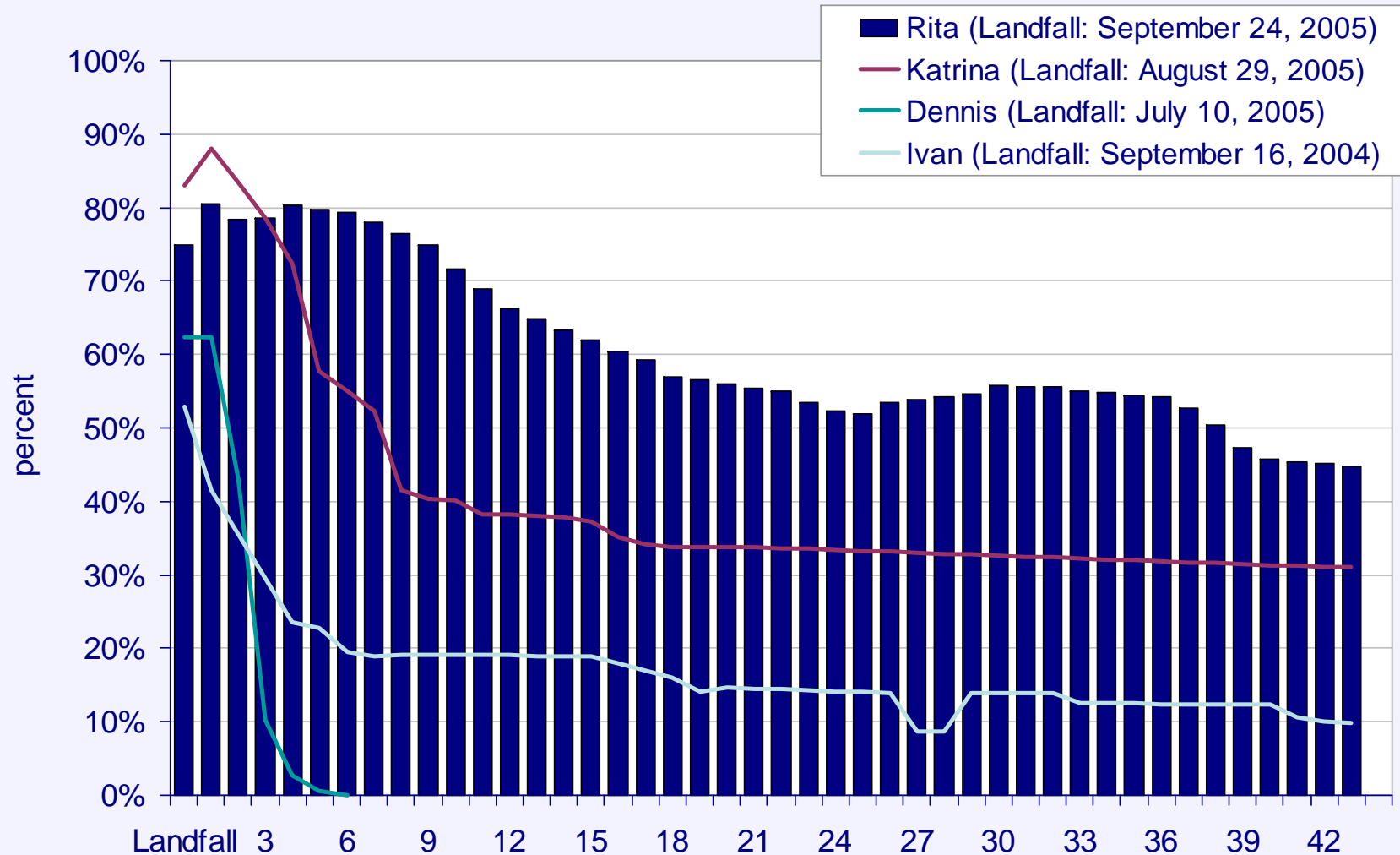
Date	Shut-in Oil Production (bbls/day)	Percent of Daily GOM Oil Production (%)	Rita Cumulative Shut-in Oil Production (bbls)	Percent of Annual GOM Oil Production (%)	Total Cumulative Shut-in Oil Production <sup>1</sup> (bbls)	Percent of Annual GOM Oil Production (%)
week ending 9/23/05	7,204	72.0%	21,993	0.6%	141	3.8%
week ending 9/30/05	7,941	79.4%	77,174	2.1%	196	5.4%
week ending 10/7/05	6,441	64.4%	111,802	3.1%	246	6.8%
week ending 10/14/05	5,647	56.5%	135,109	3.7%	289	7.9%
week ending 10/21/05	5,337	53.4%	161,728	4.4%	327	8.9%
week ending 10/28/05	5,504	55.0%	189,408	5.2%	365	10.0%
31-Oct-05	5,427	54.3%	5,427	0.1%	381	10.4%
1-Nov-05	5,269	52.7%	10,696	0.3%	386	10.6%
2-Nov-05	5,043	50.4%	15,739	0.4%	391	10.7%
3-Nov-05	4,727	47.3%	20,466	0.6%	396	10.9%
4-Nov-05	4,569	45.7%	25,035	0.7%	401	11.0%
7-Nov-05	4,482	44.8%	4,482	0.1%	414	11.4%

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



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## Rita versus Other Major Hurricanes - Shut-in Gas Production as a Percent of Daily GOM Production

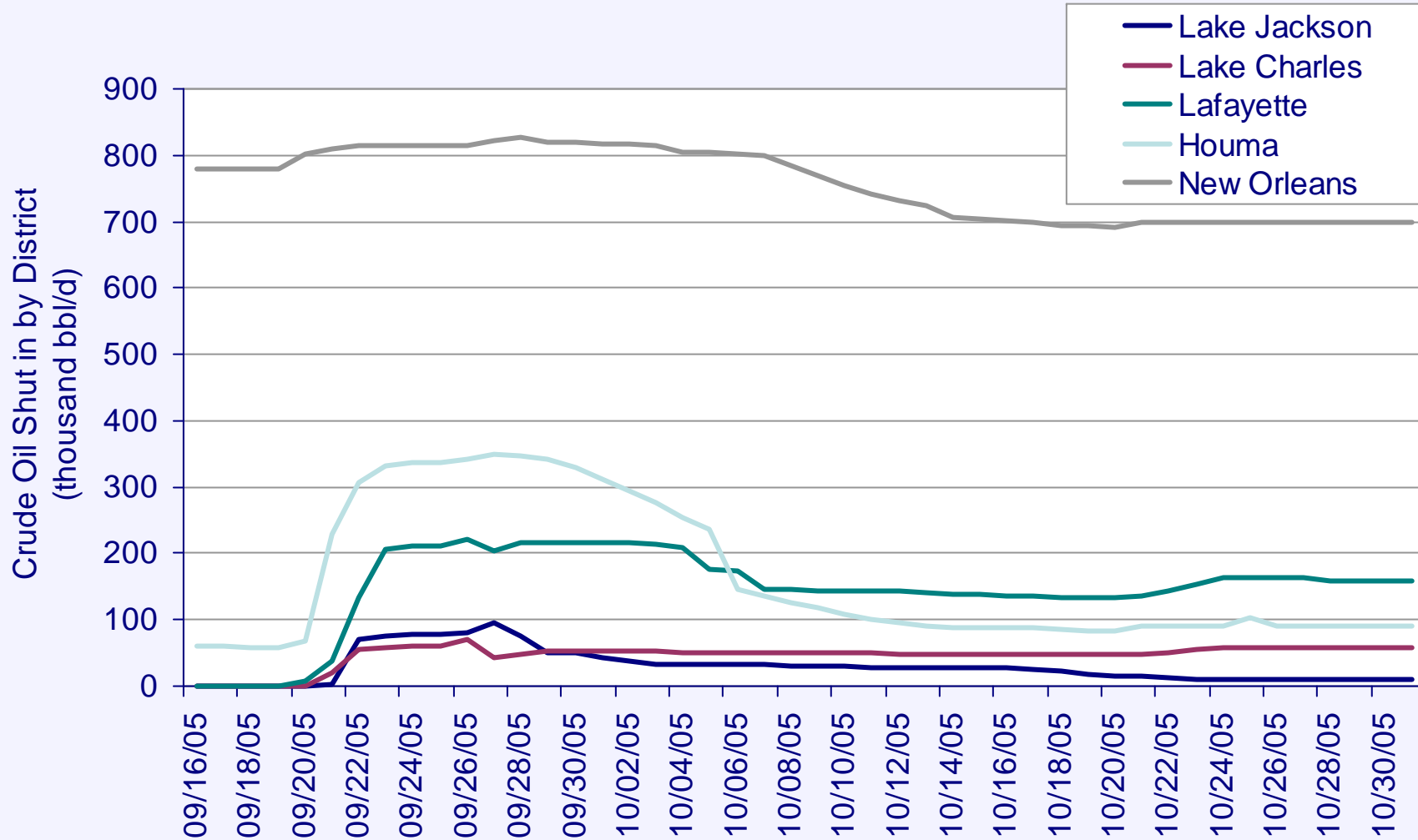


Source: Minerals Management Service



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# MMS Production Data for Hurricane Rita Crude Oil

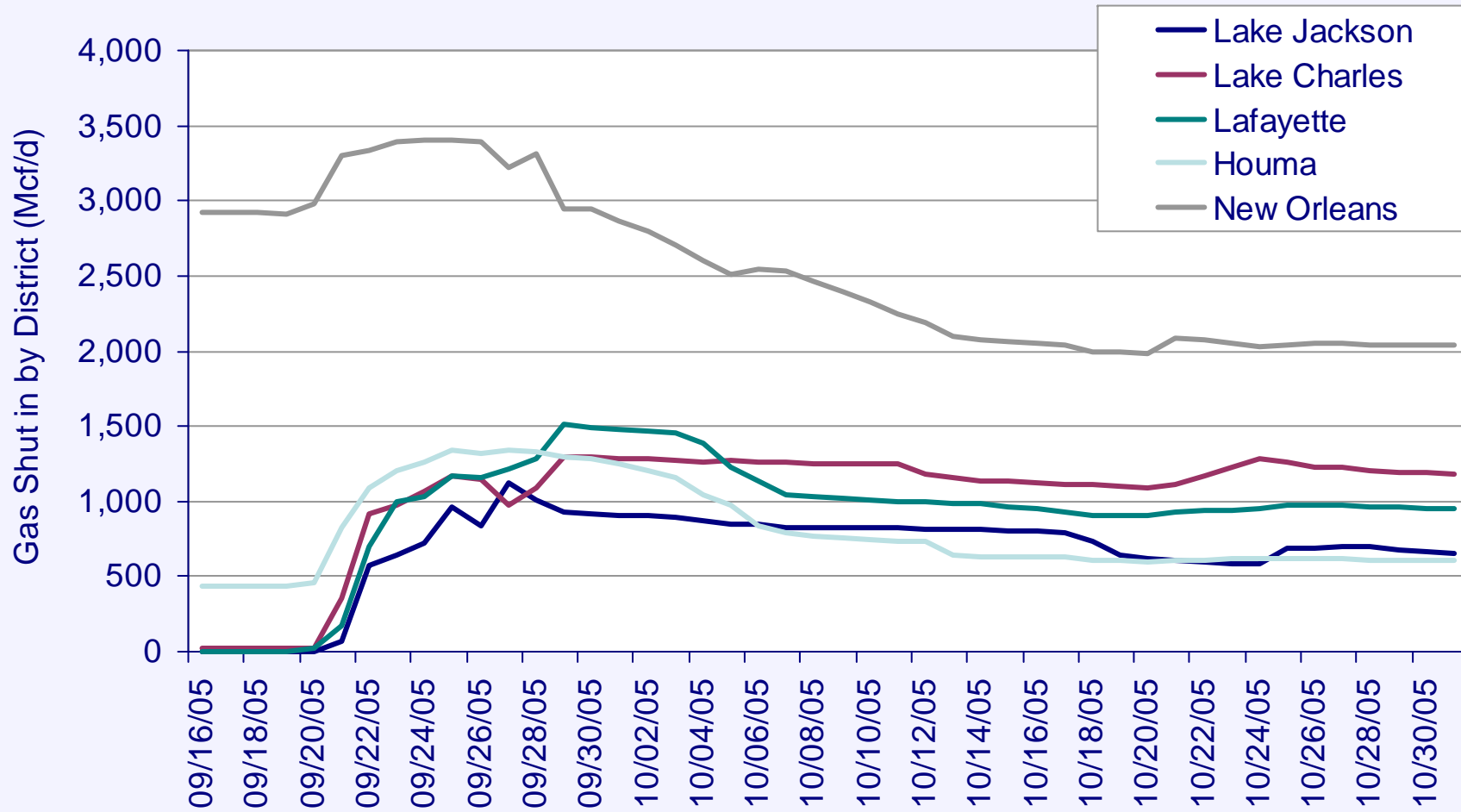






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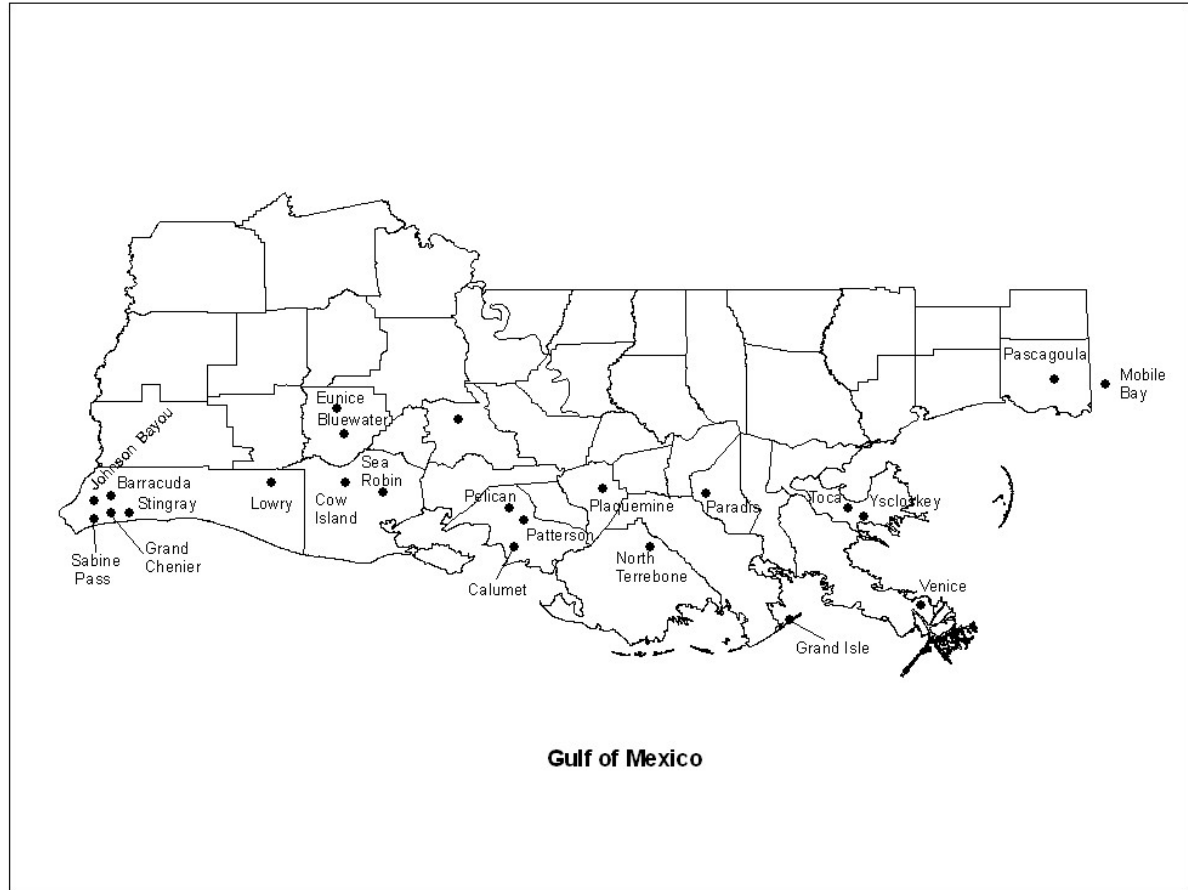
## MMS Production Data for Hurricane Rita Natural Gas





# Number of Natural Gas Processing Facilities Out

	Capacity (MMcf/d)	Throughput (MMcf/d)
<b>Mississippi and Alabama Plants</b>		
BP Pascagoula	1,000.0	768.0
DEFS Mobile Bay	600.0	272.0
RDS Yellowhammer	200.0	135.0
<b>Total</b>	<b>1,800.0</b>	<b>1,175.0</b>
<b>East Louisiana Plants</b>		
DYN Venice	1,300.0	997.0
EPD Toca	1,100.0	607.8
DYN Yscloskey	1,850.0	1,343.0
<b>Total</b>	<b>4,250.0</b>	<b>2,947.8</b>
<b>West Louisiana Plants</b>		
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
<b>Total</b>	<b>1,855.0</b>	<b>1,036.0</b>
<b>Central Louisiana Plants</b>		
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
<b>Total</b>	<b>4,725.0</b>	<b>2,669.8</b>
<b>Grand Total</b>	<b>12,630.0</b>	<b>7,828.6</b>
<b>Assumed Total GOM Production</b>		<b>10,000.0</b>
<b>Percent of Total</b>		<b>78.3%</b>





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Henry Hub, September 25, 2005



Source: LIOGA



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## Energy Transmission

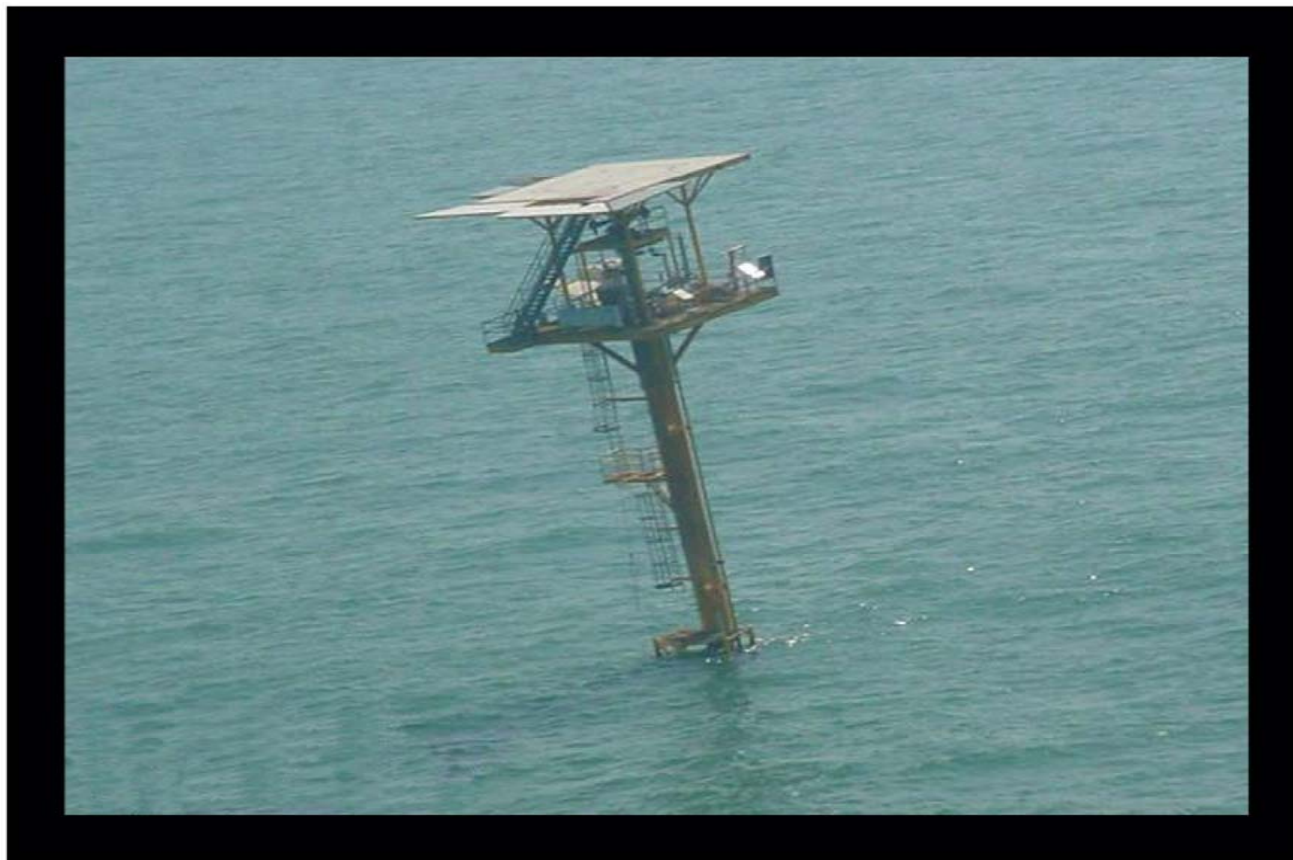


Source: Entergy.com



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## Single Well Caisson – Western GOM



**Damaged Single-Well Caisson:** The vast majority of damage occurred to small, older platforms. Damage ranged from stripping of decking and rails to bending of well jacket and in some cases total removal of all above sea level structural components.





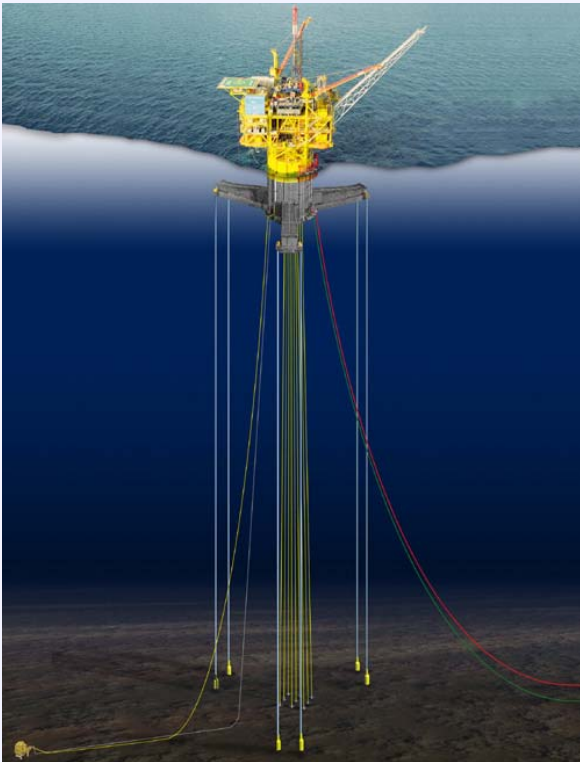
Temporary Natural Gas Release: To date, all subsea safety valves have held. There have been a couple of incidents where pipeline damage has allowed the temporary venting of gas that was in the pipeline. There are currently no known incidents of gas venting from wells and the temporary venting from pipelines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





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## Chevron Typhoon TLP





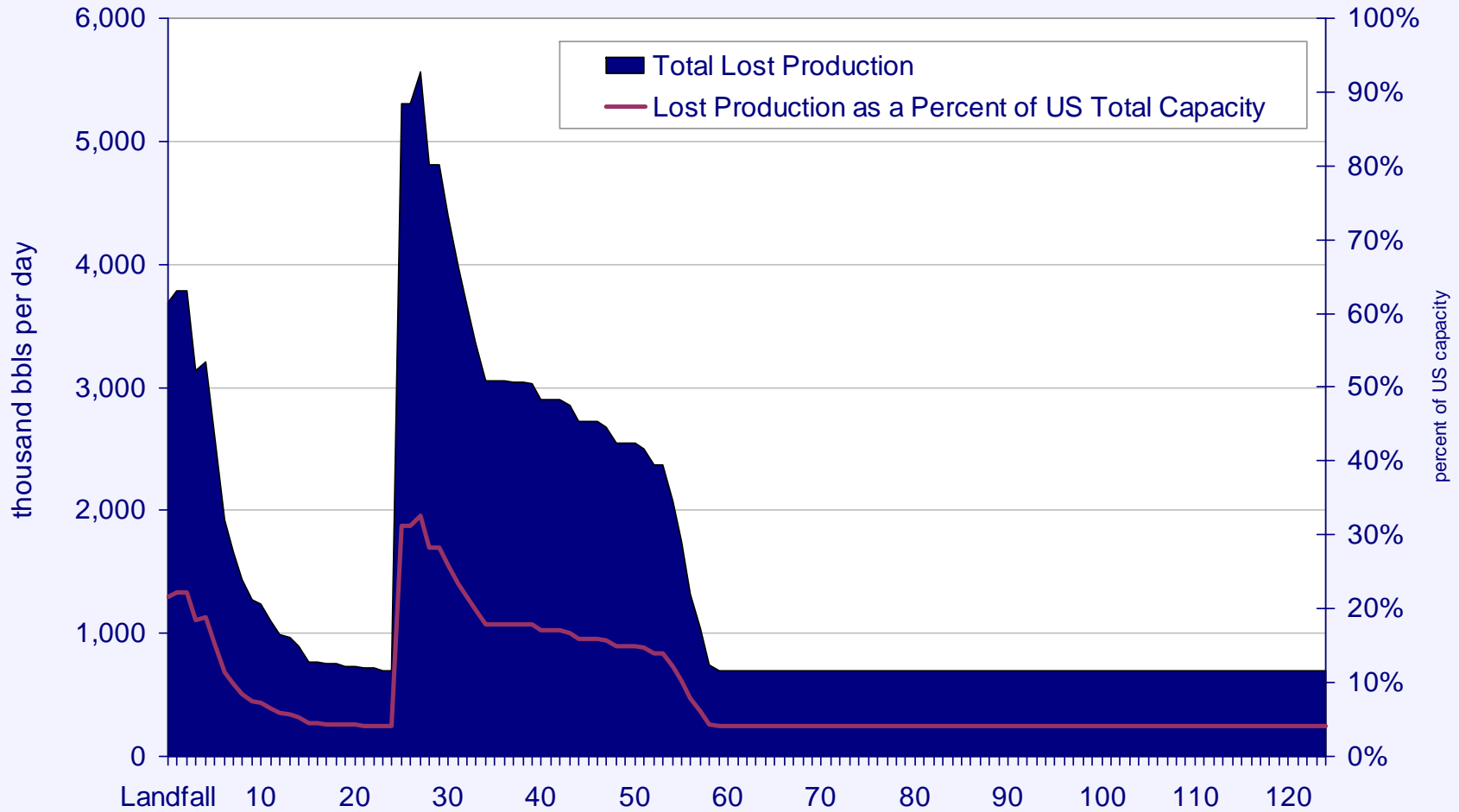
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## Longer Run Impacts of Hurricanes Katrina and Rita



## Estimated Decrease in Refining Production from both Katrina and Rita

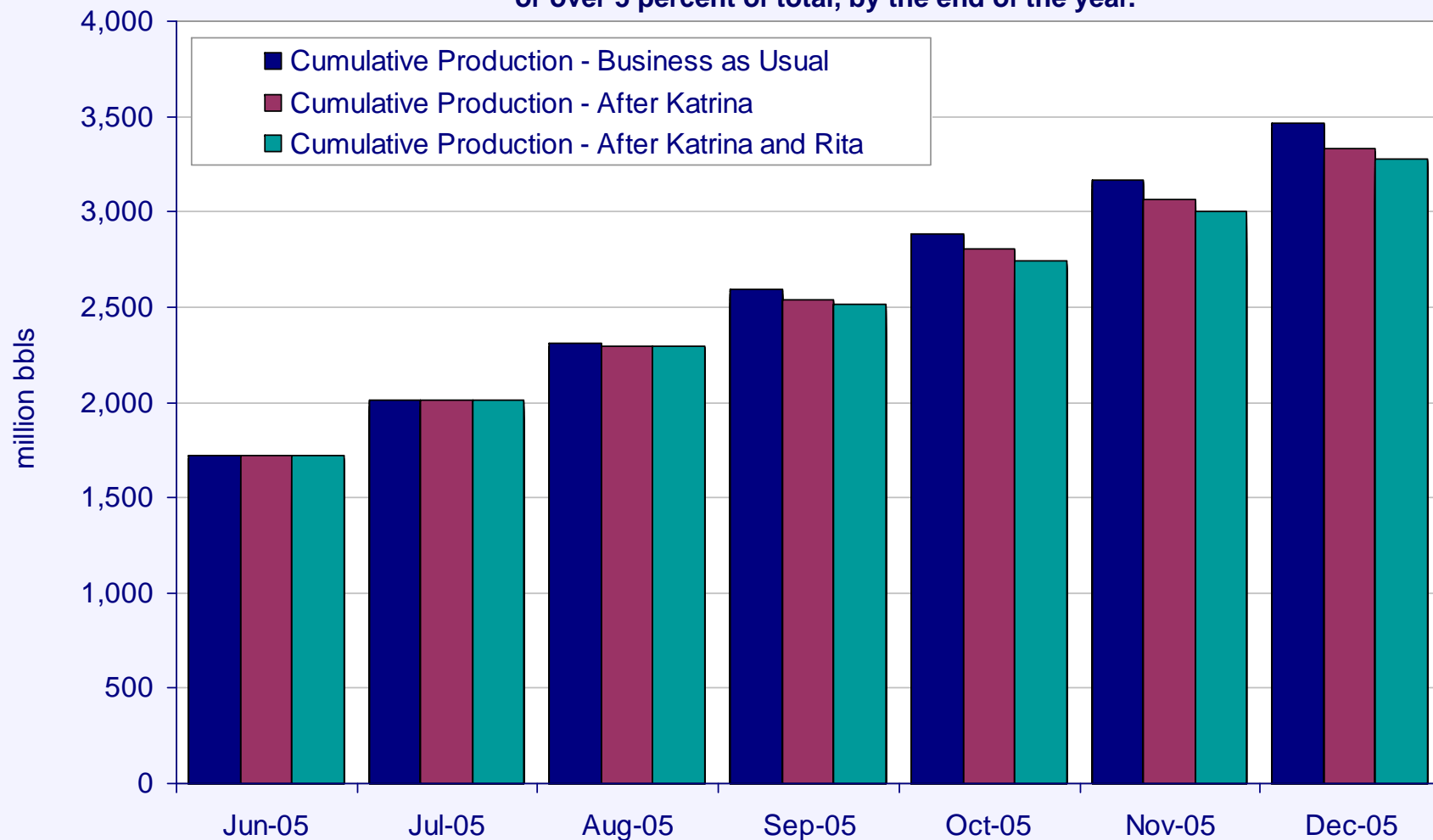
Refining capacity should return to normal soon, but there will be a stubborn  
five percent of total capacity that has unknown return date – not good for tight markets





## Cumulative Refining Production

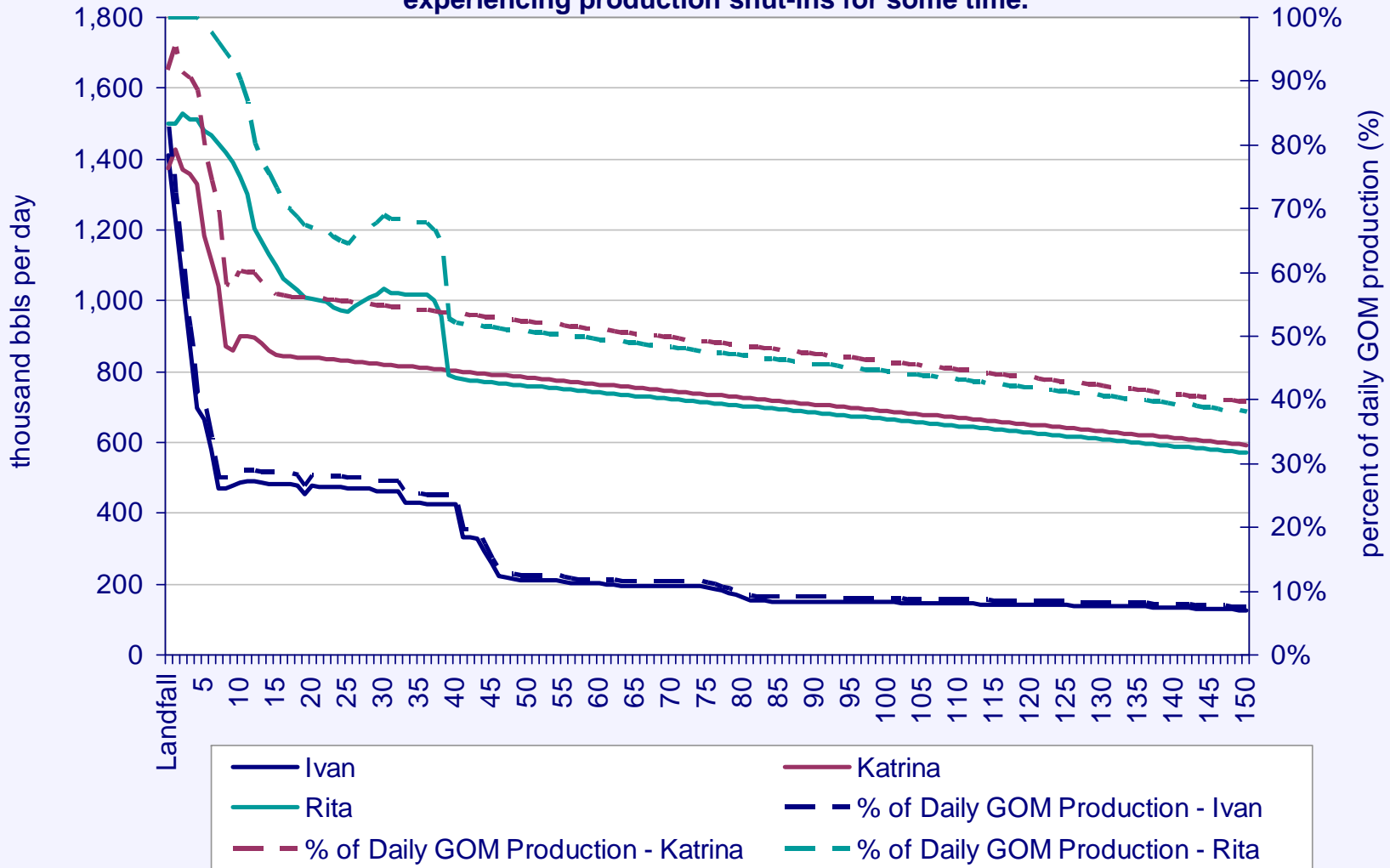
Impacts of Katrina result in a loss of 136.5 million barrels, or 4 percent of total production, by the end of the year. Impacts of Katrina and Rita result in a loss of 188.7 million barrels, or over 5 percent of total, by the end of the year.





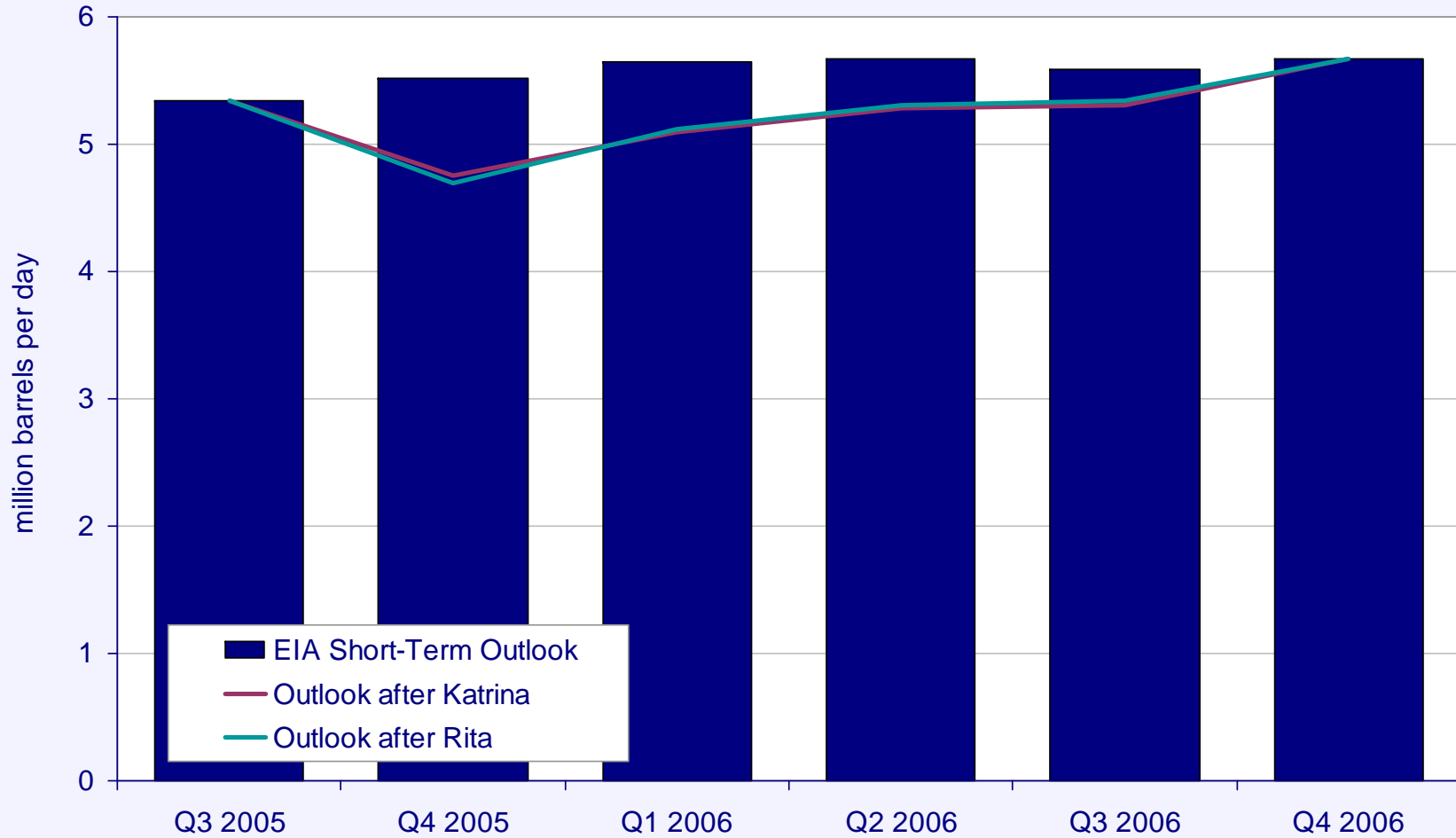
# Estimated Return of Existing Crude Production

If crude production returns follow path similar to Ivan, we could still be experiencing production shut-ins for some time.



Note: Assuming recovery of 2,685 barrels per day for remaining days.



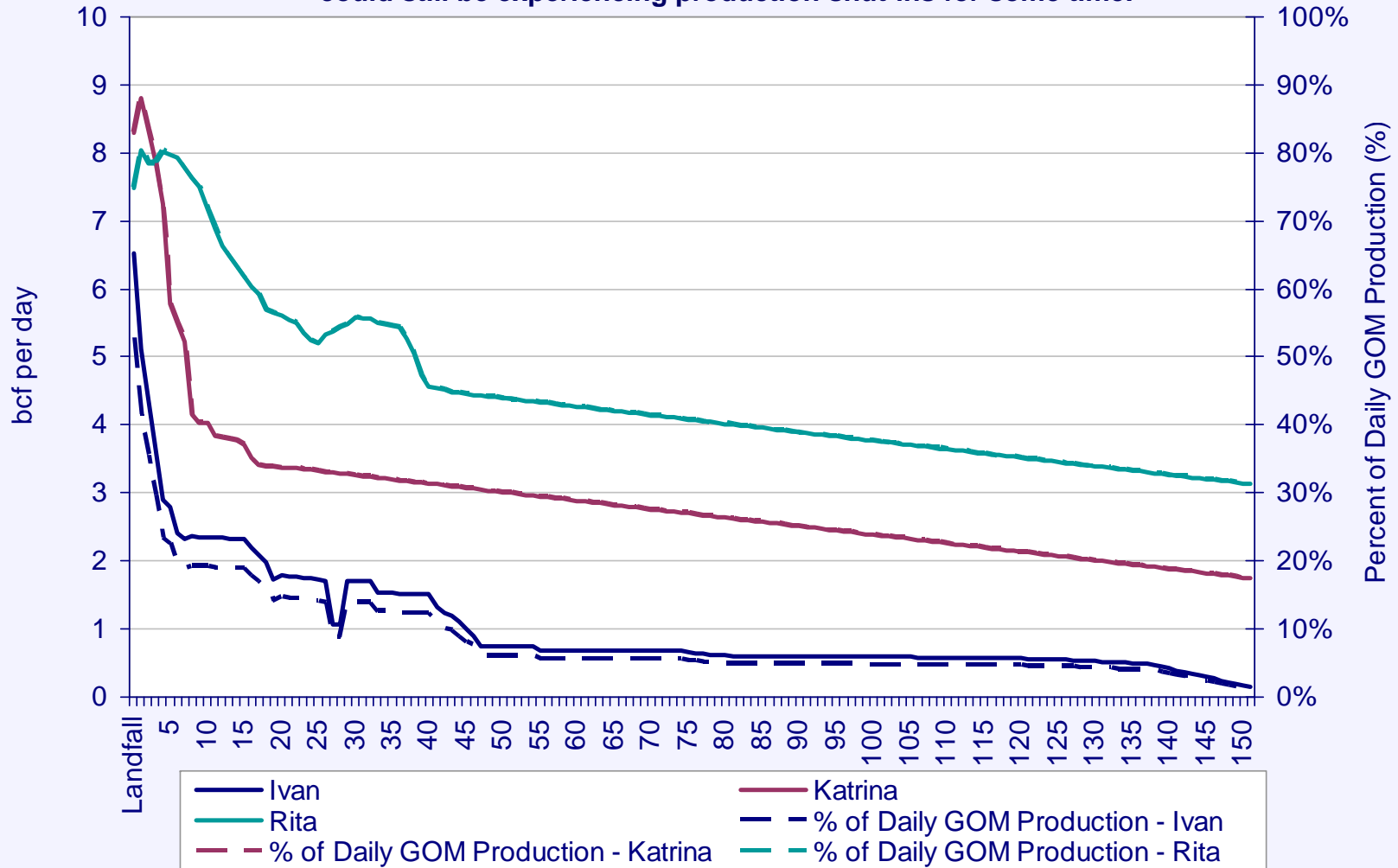


Note: Assuming recovery of 15.65 bcf per day for 150 days.



# Estimated Return of Existing Natural Gas Production

If natural gas production returns follow path similar to Ivan, we could still be experiencing production shut-ins for some time.

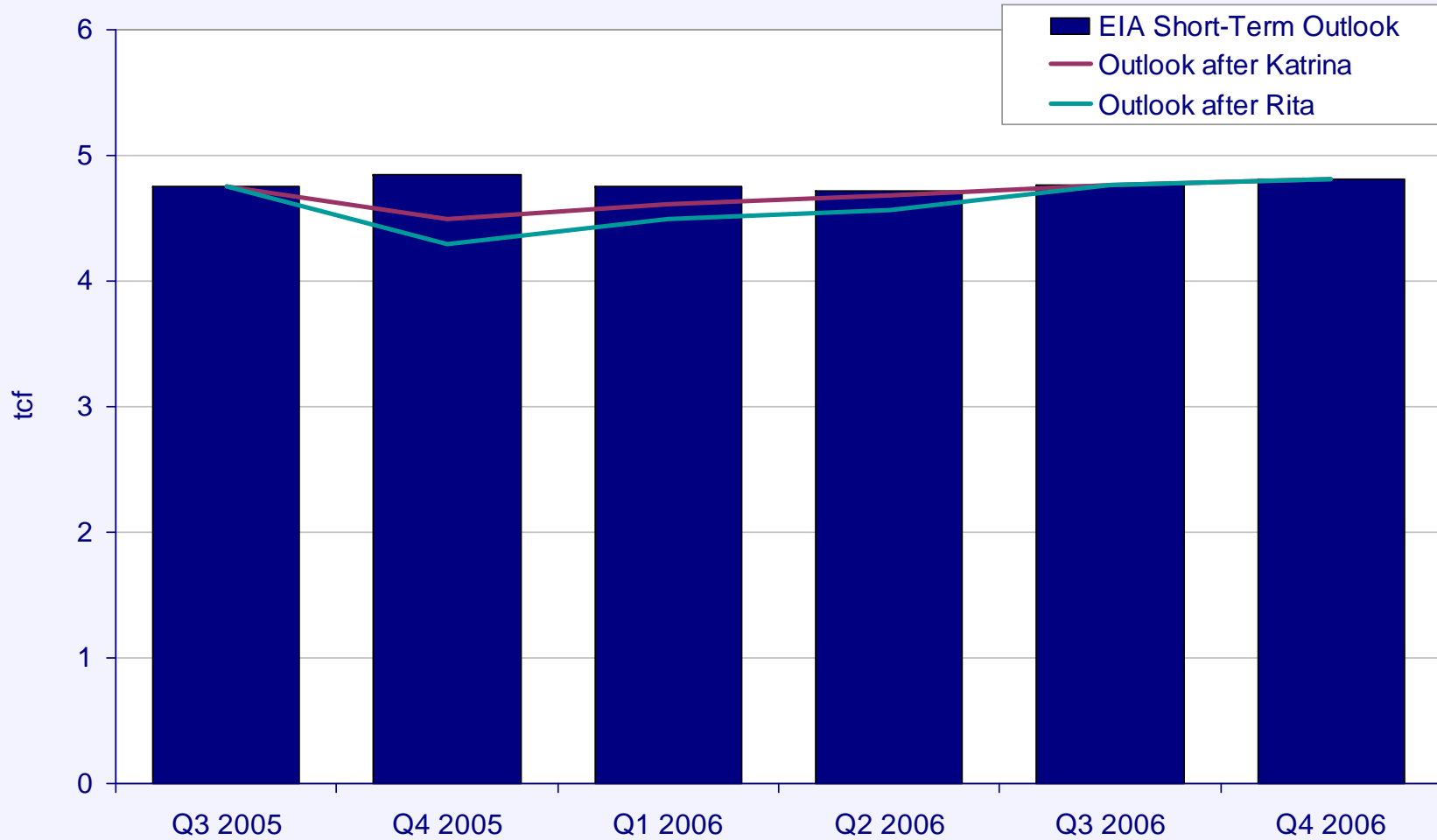


Note: Assuming recovery of 12.53 bcf per day for remaining days.



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## Forecast versus New Forecast Natural Gas



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



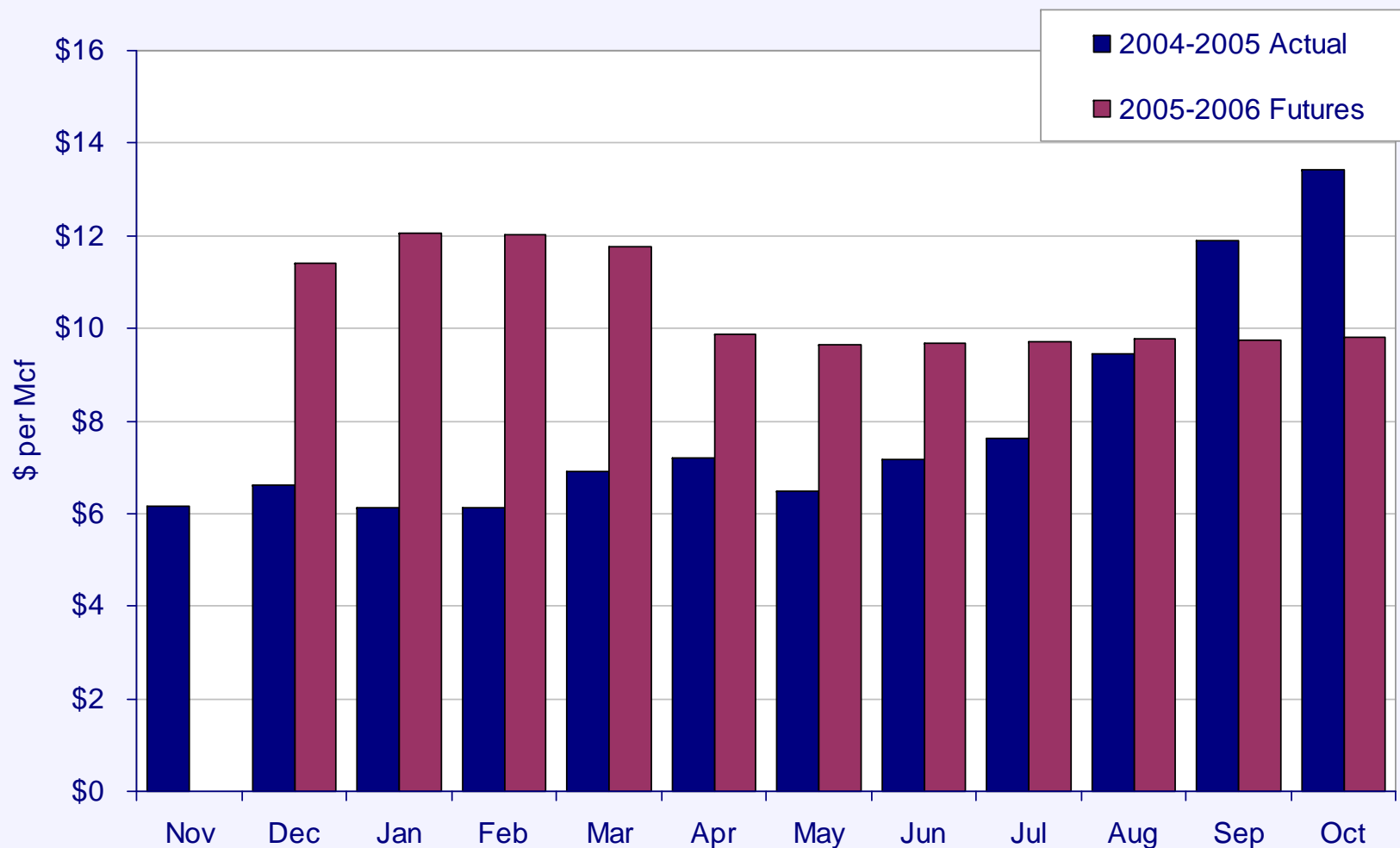
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**Where Have We Been?  
Where Are We Now?**



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## Forecast for Energy Commodity Prices Natural Gas Futures



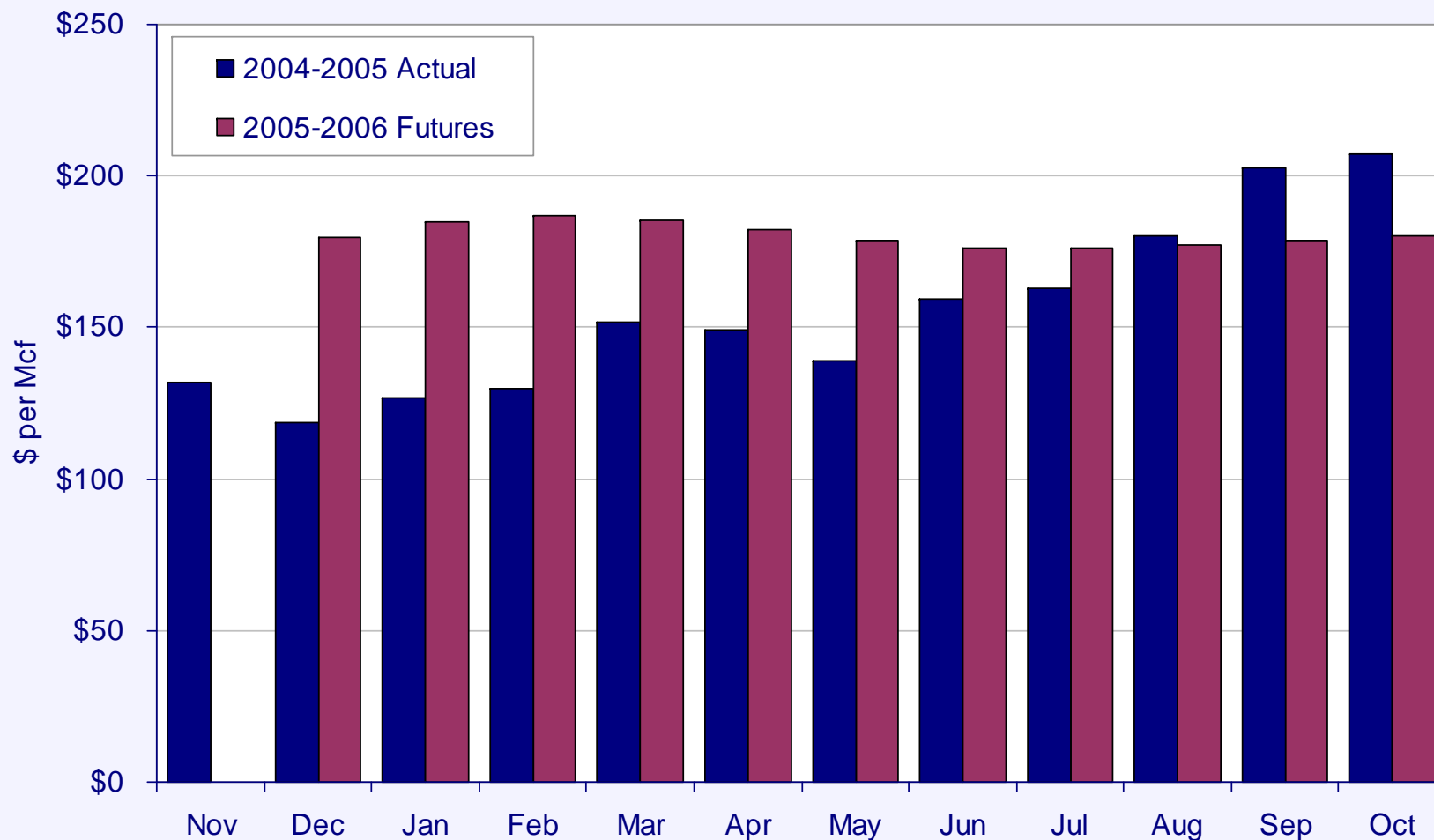
Note: Prices recorded on November 7, 2005

Source: Federal Reserve Bank of St. Louis; and Nymex.com





## Forecast for Energy Commodity Prices Heating Oil Futures



Note: Prices recorded on November 7, 2005

Source: Energy Information Administration, Department of Energy; and Nymex.com



Fall Signal (Sep-Oct)	Winter Signal (Nov-Mar)	Overall 6 Mo. Market Trend
<b>Bullish</b> , weather, supply concerns  Range: 12.00 - 14.00	<b>Bullish</b> , weather, supply concerns - daily super spikes probable  Range: 13.00 - 16.00	<b>Bullish</b> , low injections, set up chronic tight market conditions -- potential lows going into next injection season  Range: 12.00 - 16.00

- Short term (September-October) weather futures prices are bullish for natural gas in the South and West, but neutral in the East and Midwest
- Forecast of \$58 to \$70 crude through the end of 2006. Refining capacity challenges will keep pressure on refined product prices.
- Diminishing natural gas surpluses especially in the aftermath of Katrina and Rita. Storage forecasts combined with production shut-ins call into question the supply adequacy heading into the winter season given our preliminary winter assessments. Is 3.2 tcf adequate in the face of 50 percent plus shut-ins?
- Katrina and Rita impacts felt until next hurricane season.
- Usage wild cards: weather & industrial activity



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## November – March HDD Forecast

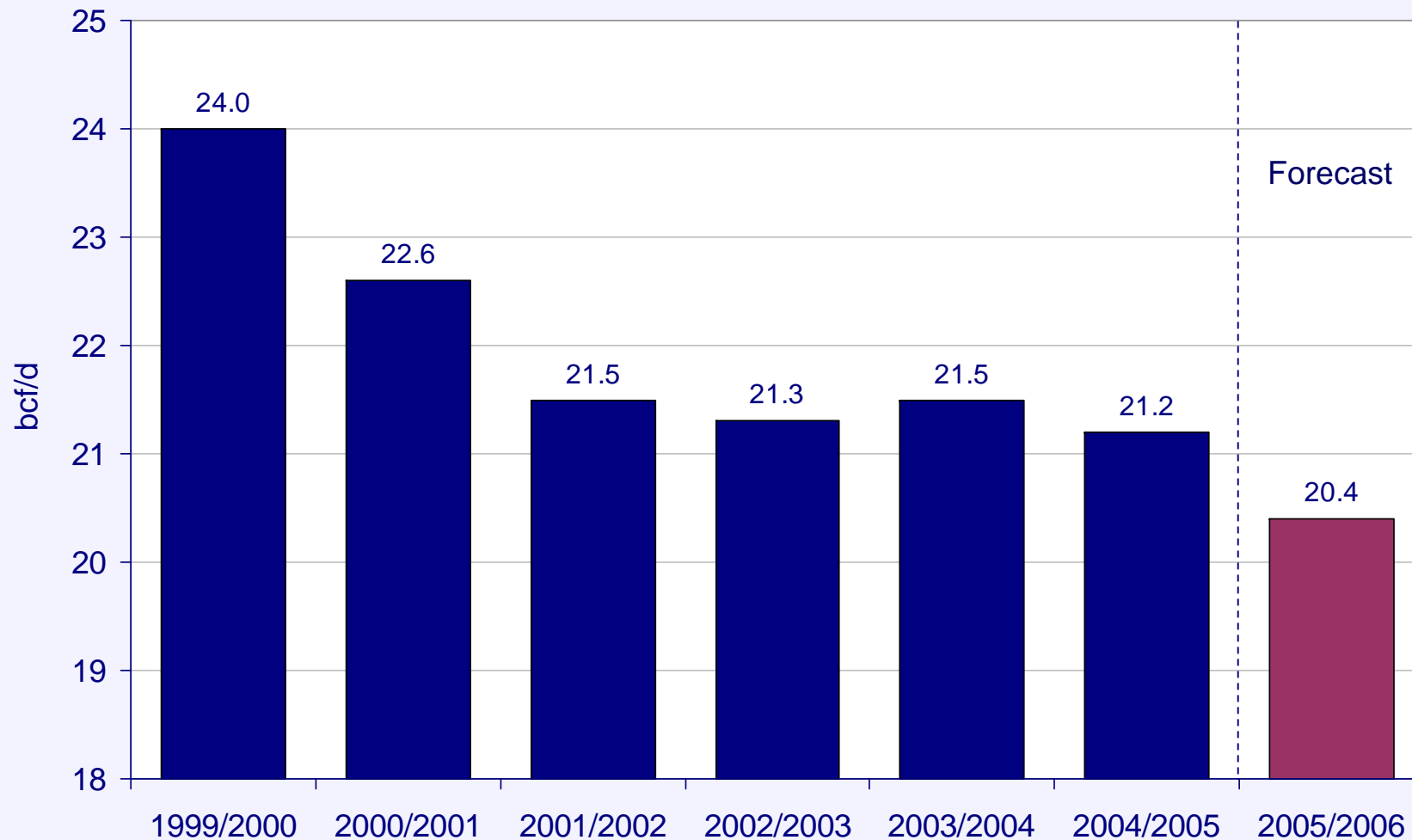
Region	Market	10-Year Average	% Difference from 10-Year Average
Northeast	4164	4034	3.1%
Midwest	5233	5127	2.0%
South	2042	1967	3.7%
West	1973	2106	-6.7%
Average	3353	3308	1.3%



Sector	Winter 2005-2006		Winter 2004-2005		Difference	
	(Bcf)	Average (Bcf/d)	(Bcf)	Average (Bcf/d)	(Bcf)	Average (Bcf/d)
Residential	3,710	24.6	3,453	22.9	257	1.7
Commercial	1,975	13.1	1,893	12.5	82	0.6
Industrial	3,084	20.4	3,200	21.2	(116)	(0.8)
Electric	1,864	12.3	1,849	12.2	15	0.1
Lease, Plant and Pipeline Fuel	815	5.4	791	5.3	24	0.1
<b>Total</b>	<b>11,448</b>	<b>75.8</b>	<b>11,186</b>	<b>74.1</b>	<b>262</b>	<b>1.7</b>



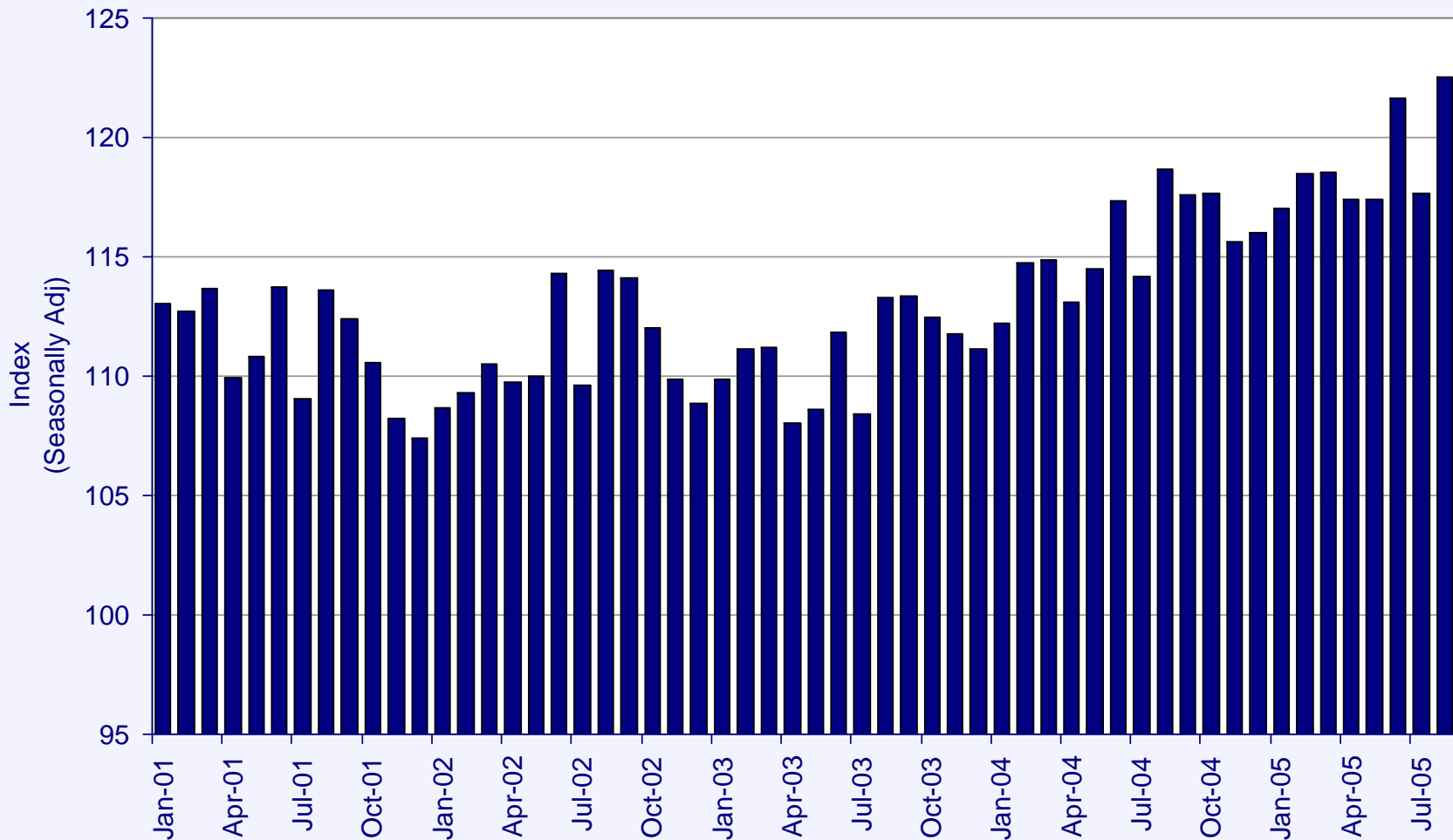
## Historic and Forecasted Winter Season Industrial Gas Usage





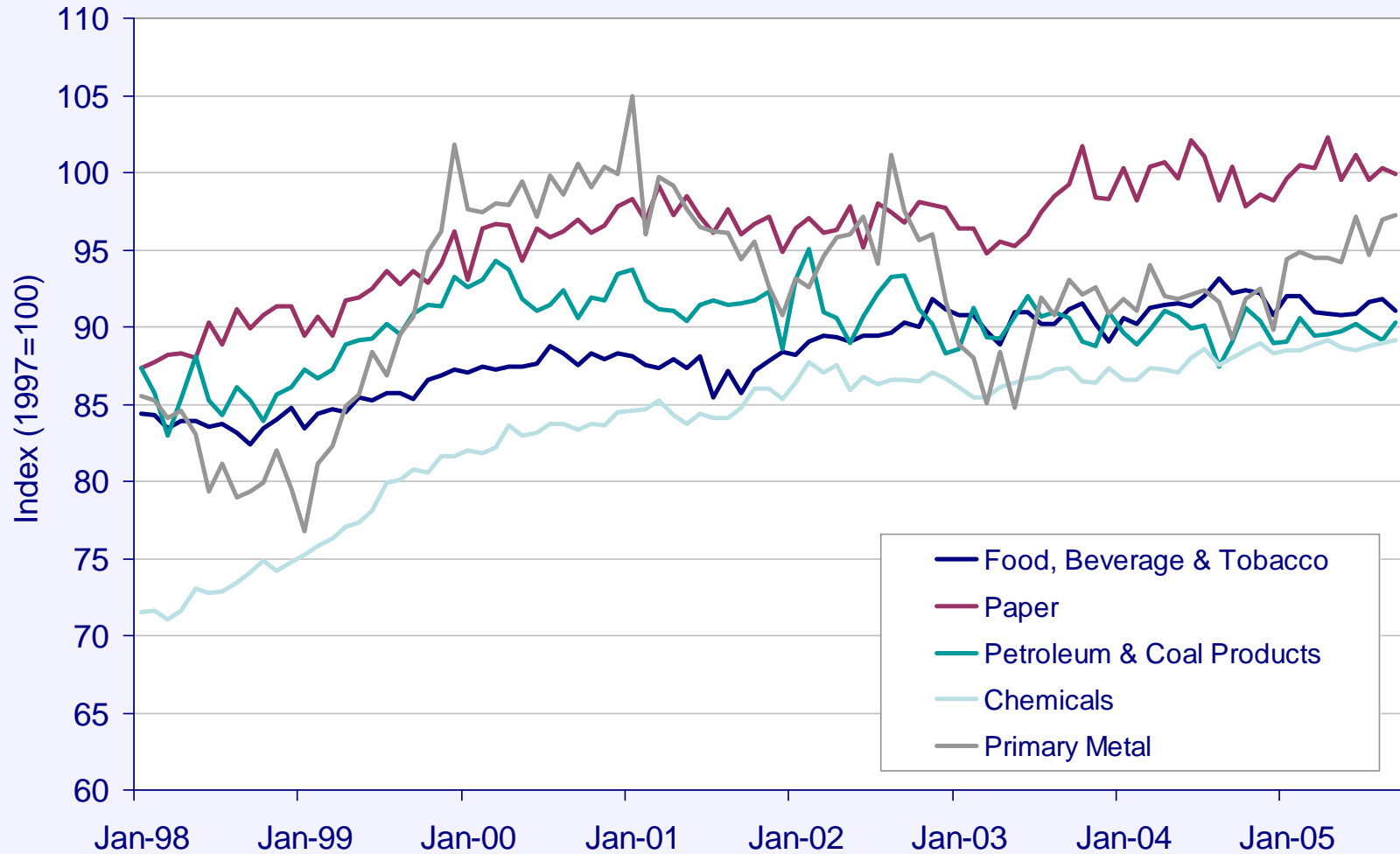


# Industrial Production Index



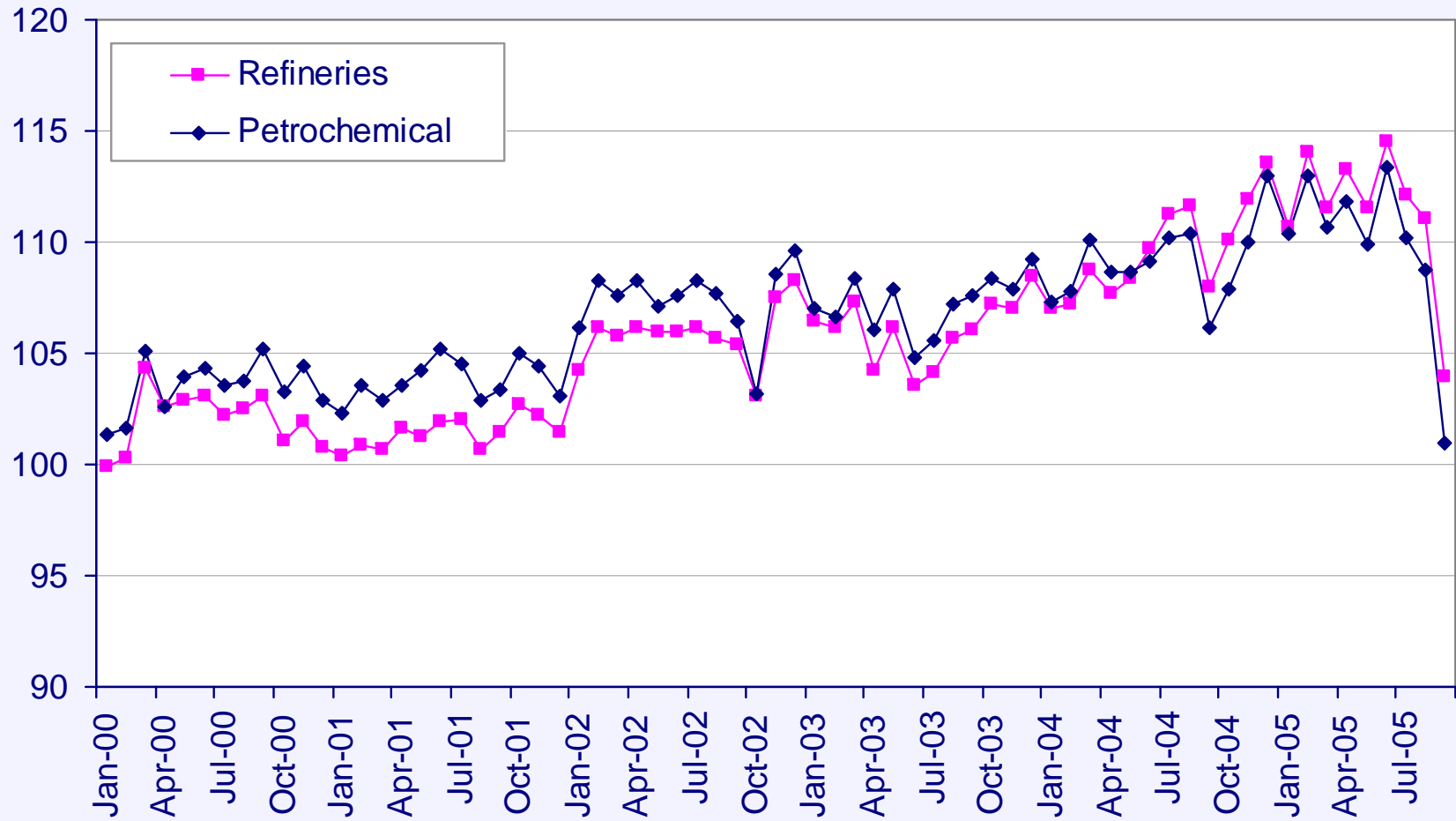


## Industrial Production Indices Energy Intensive Industries





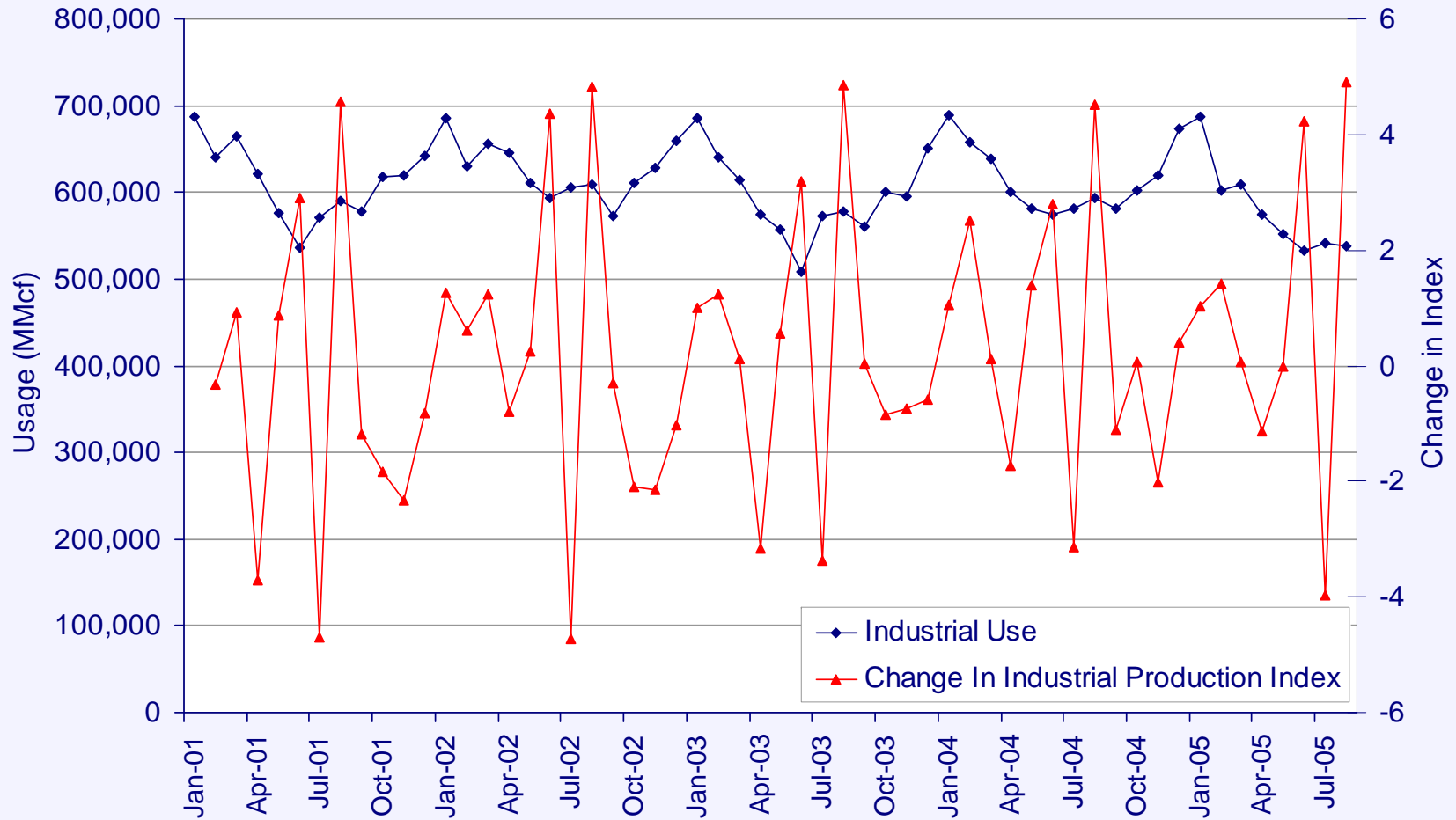
# Petrochemical and Refinery Industrial Production Indices





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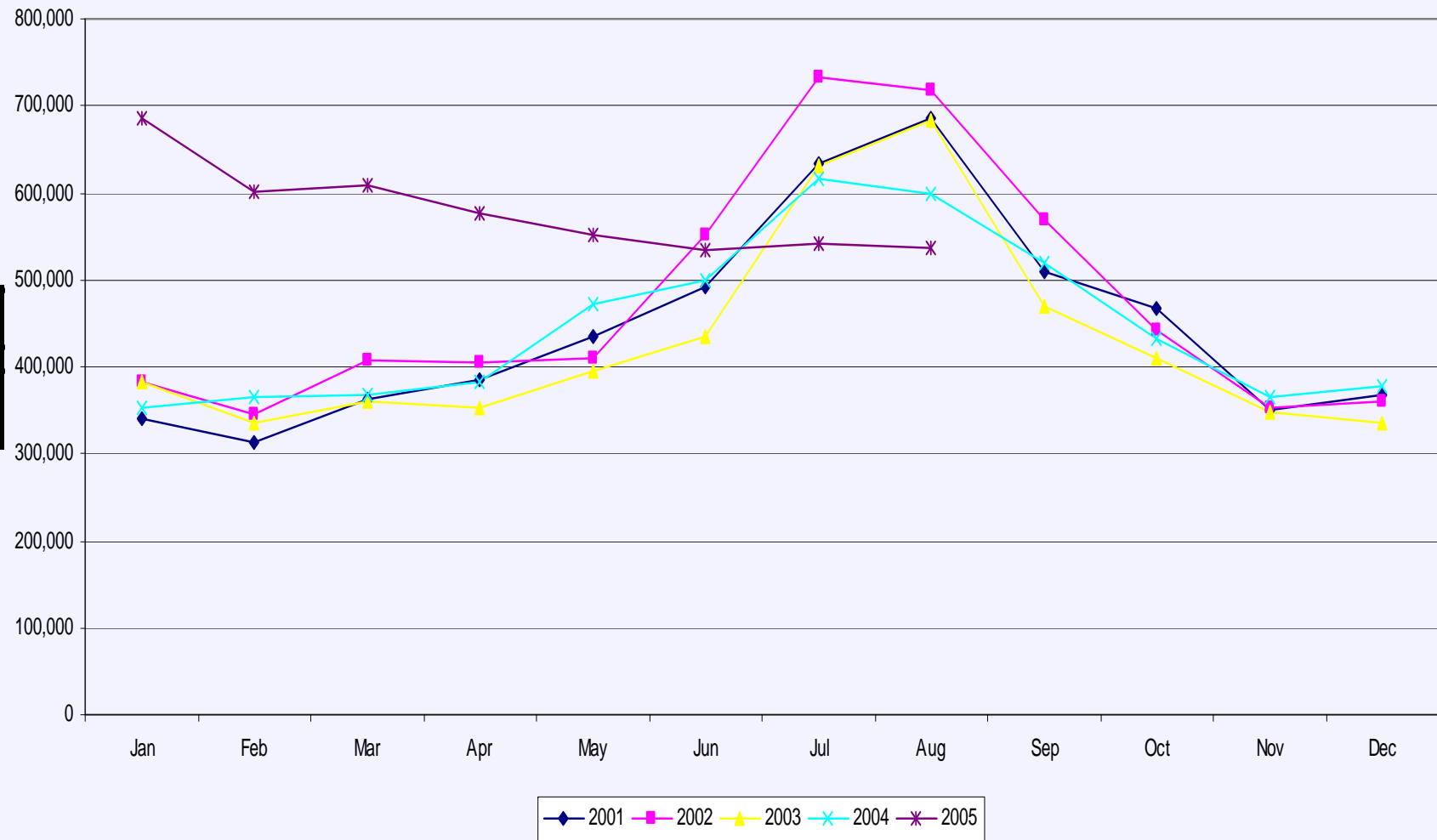
# Industrial Natural Gas Usage and Industrial Activity





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# Power Generation Natural Gas Usage





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## Questions, Comments, & Discussion

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