Impacts of Recent Hurricanes and the Outlook for Energy Markets

Presentation to Baton Rouge Rotary Club
November 8, 2005

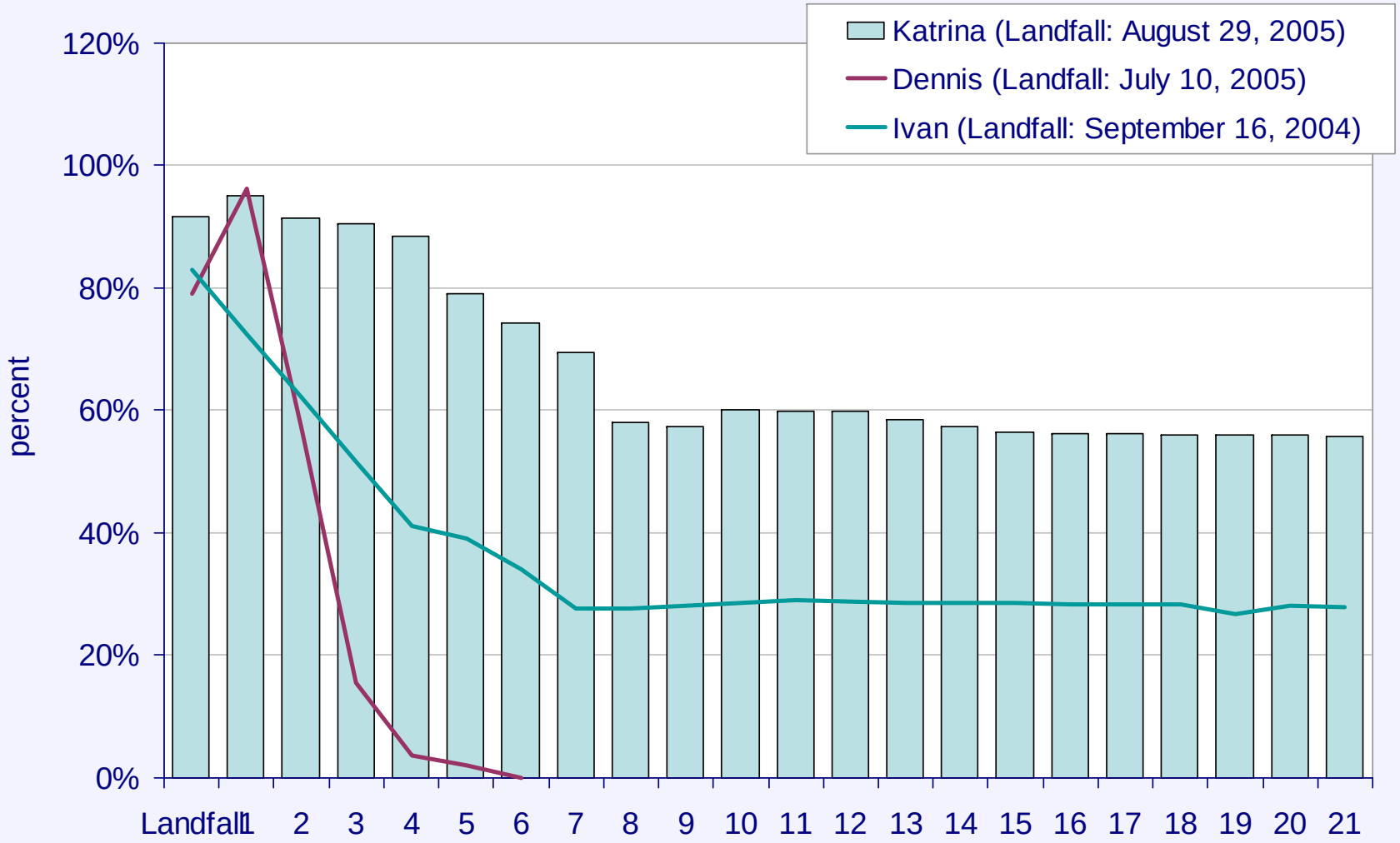
David E. Dismukes
Center for Energy Studies
Louisiana State University

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 ramification 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.

Center for Energy Studies

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



Source: Minerals Management Service

Center for
Energy Studies

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

Source: Energy Information Administration, Department of Energy

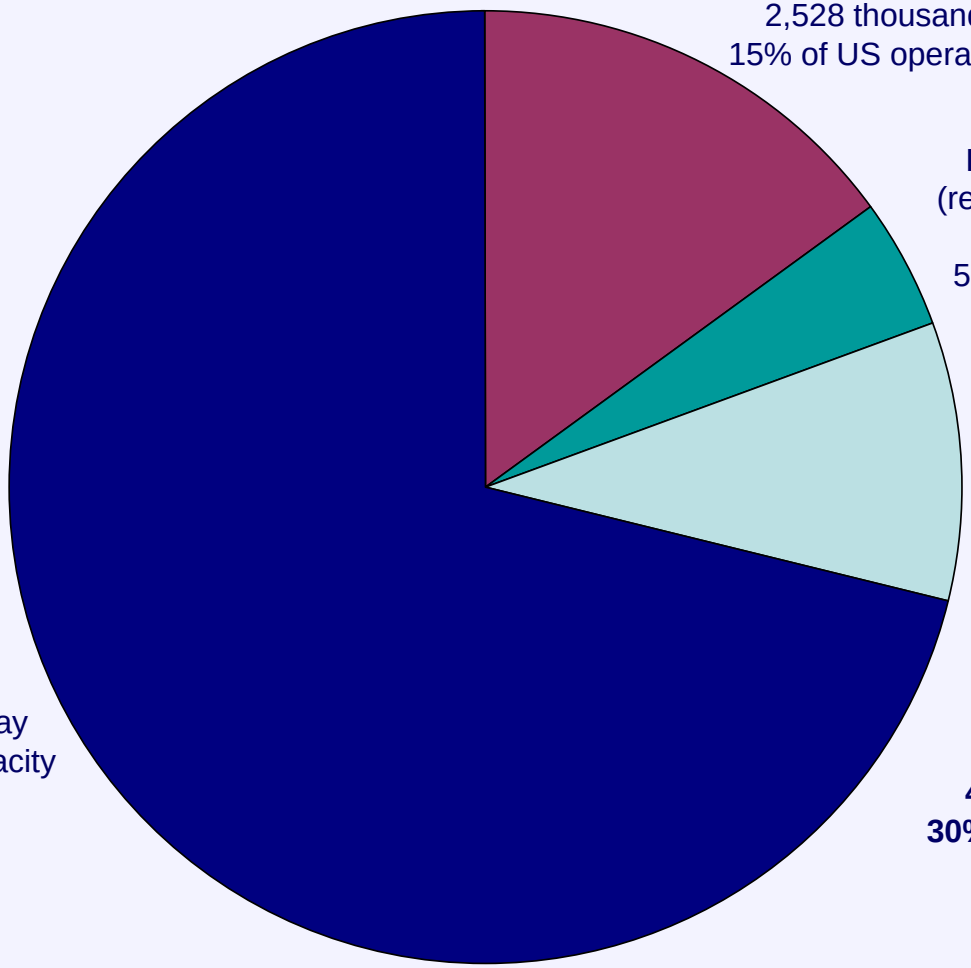
Center for
Energy Studies

Total Immediate Refinery Impact

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

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

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



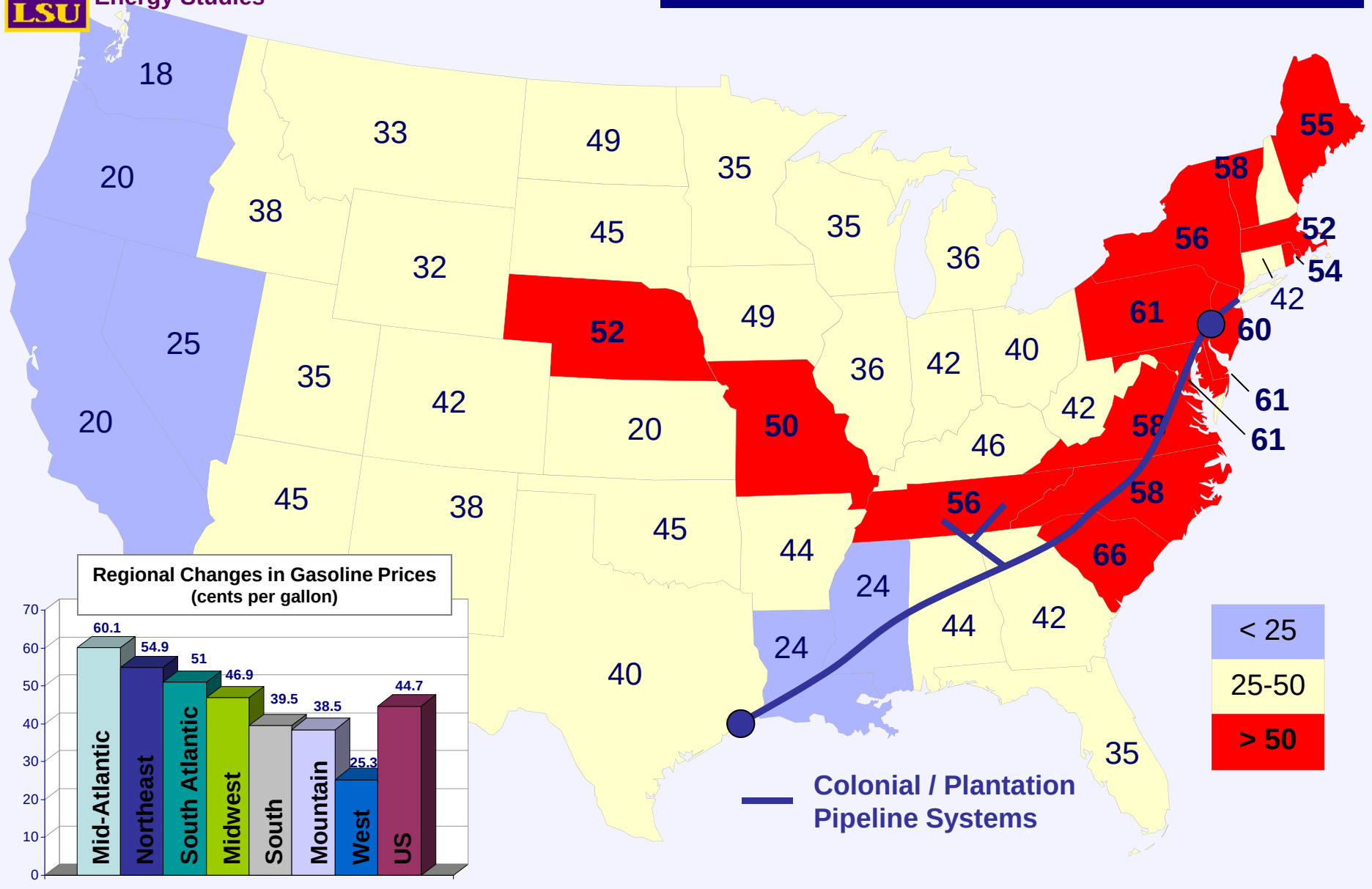
Remaining US
Operating Capacity
12,075 thousand bbls/day
70% of US operating capacity

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

Source: Energy Information Administration, Department of Energy

Center for
Energy Studies

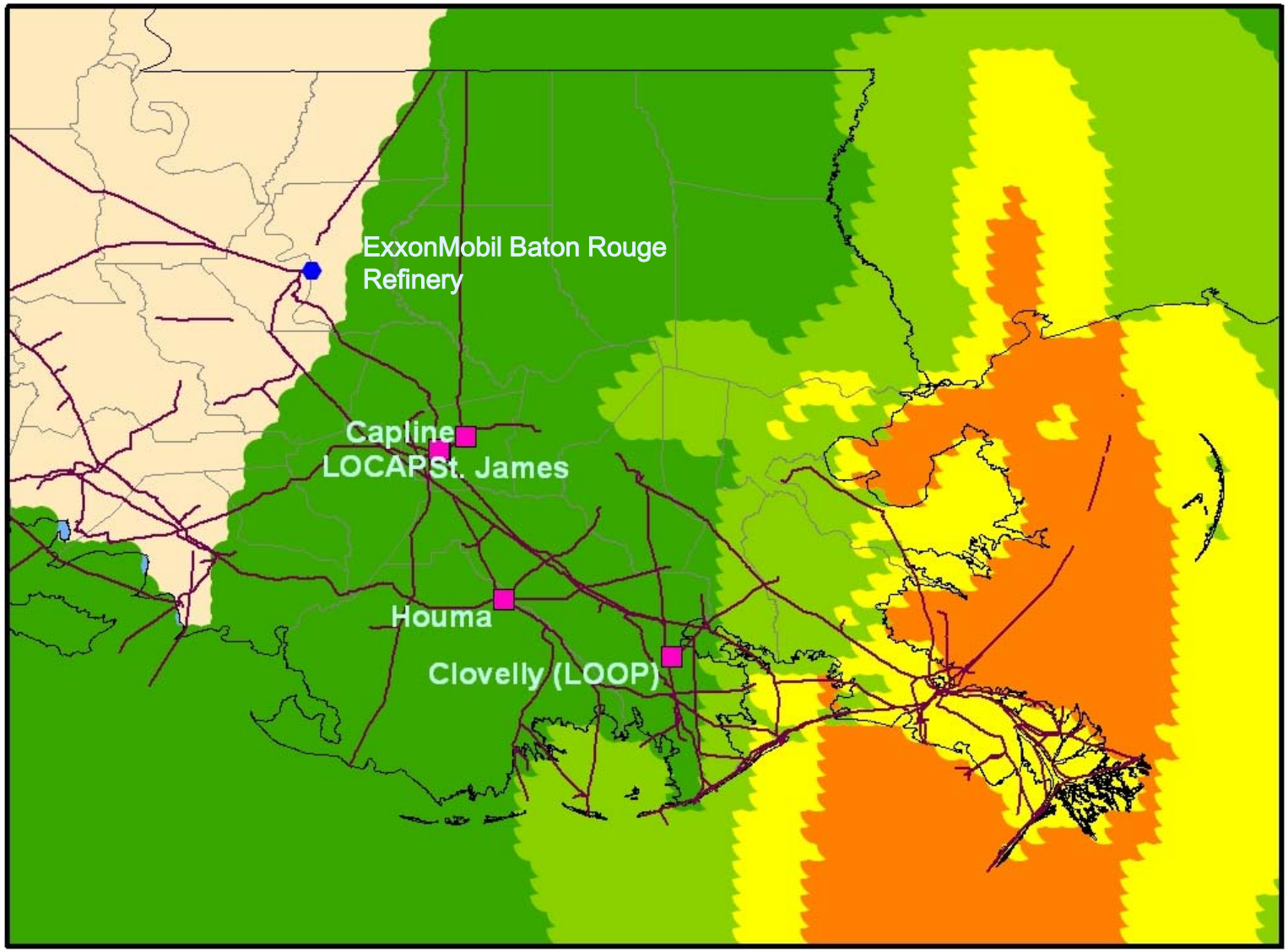
Gasoline Price Increases
August 30, 2005 to September 6, 2005



Source: American Petroleum Institute

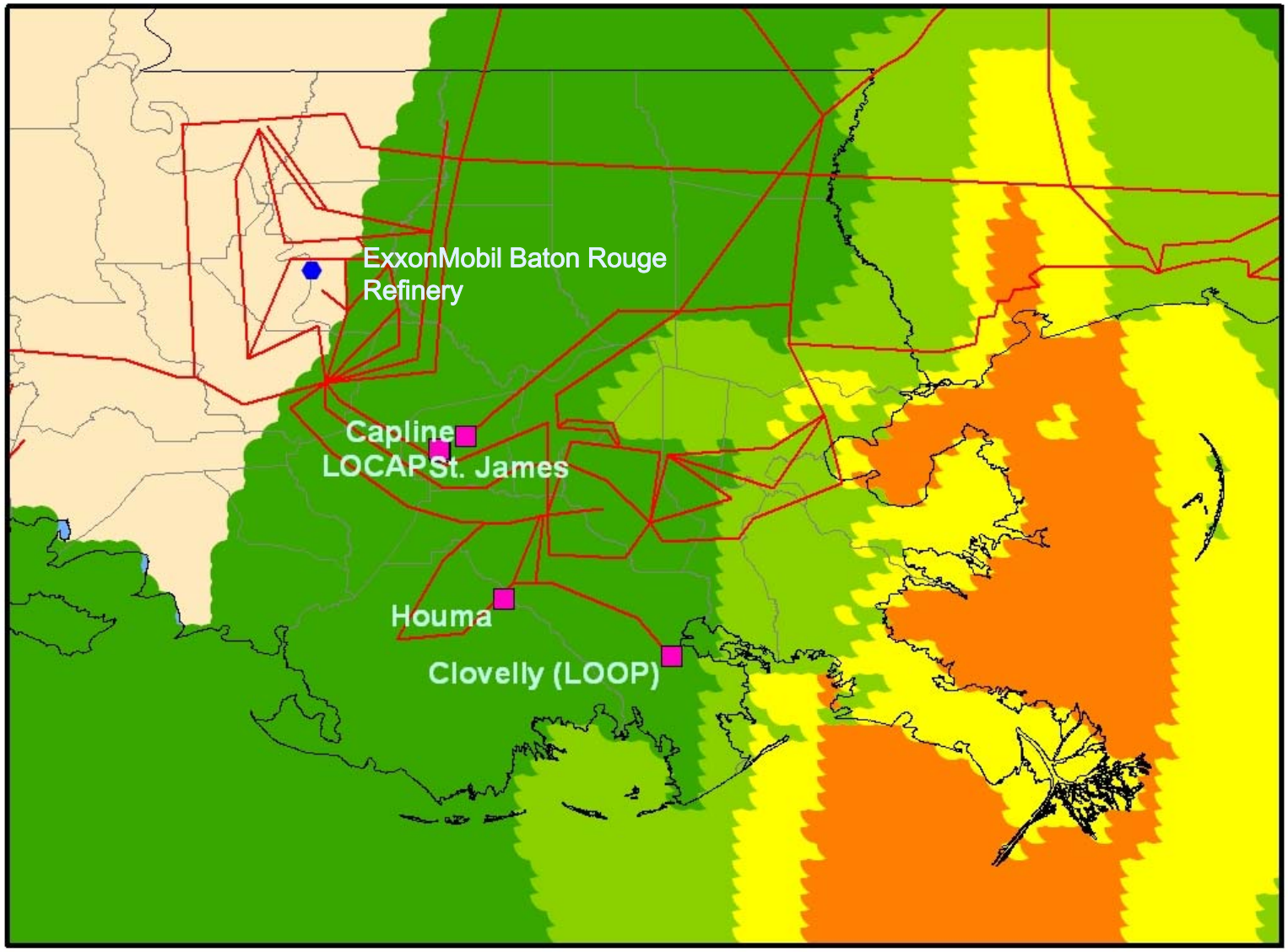
Center for
Energy Studies

Critical Terminals Impacted by Katrina



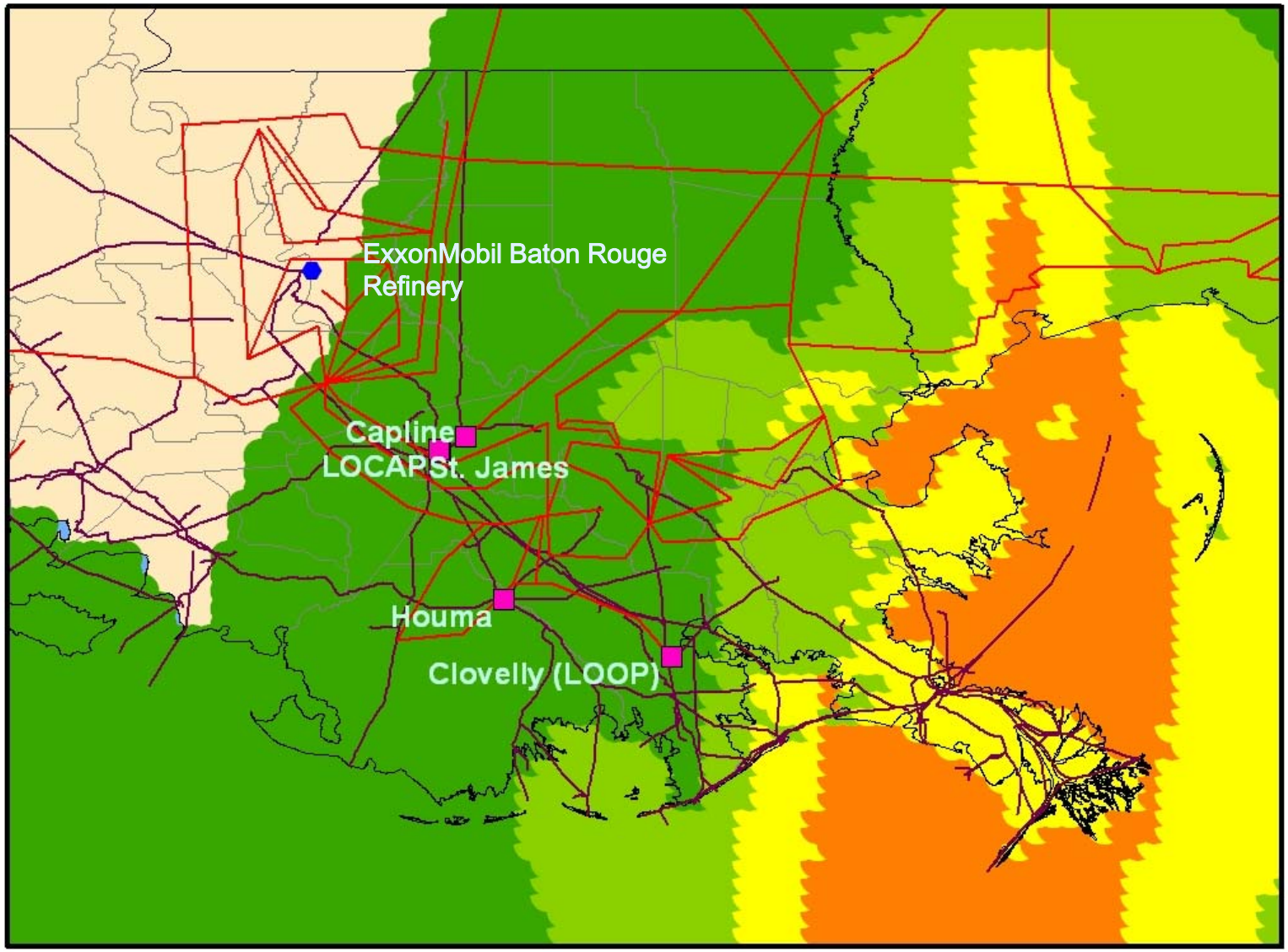
Center for
Energy Studies

Critical Electricity Transmission Lines Impacted by Katrina



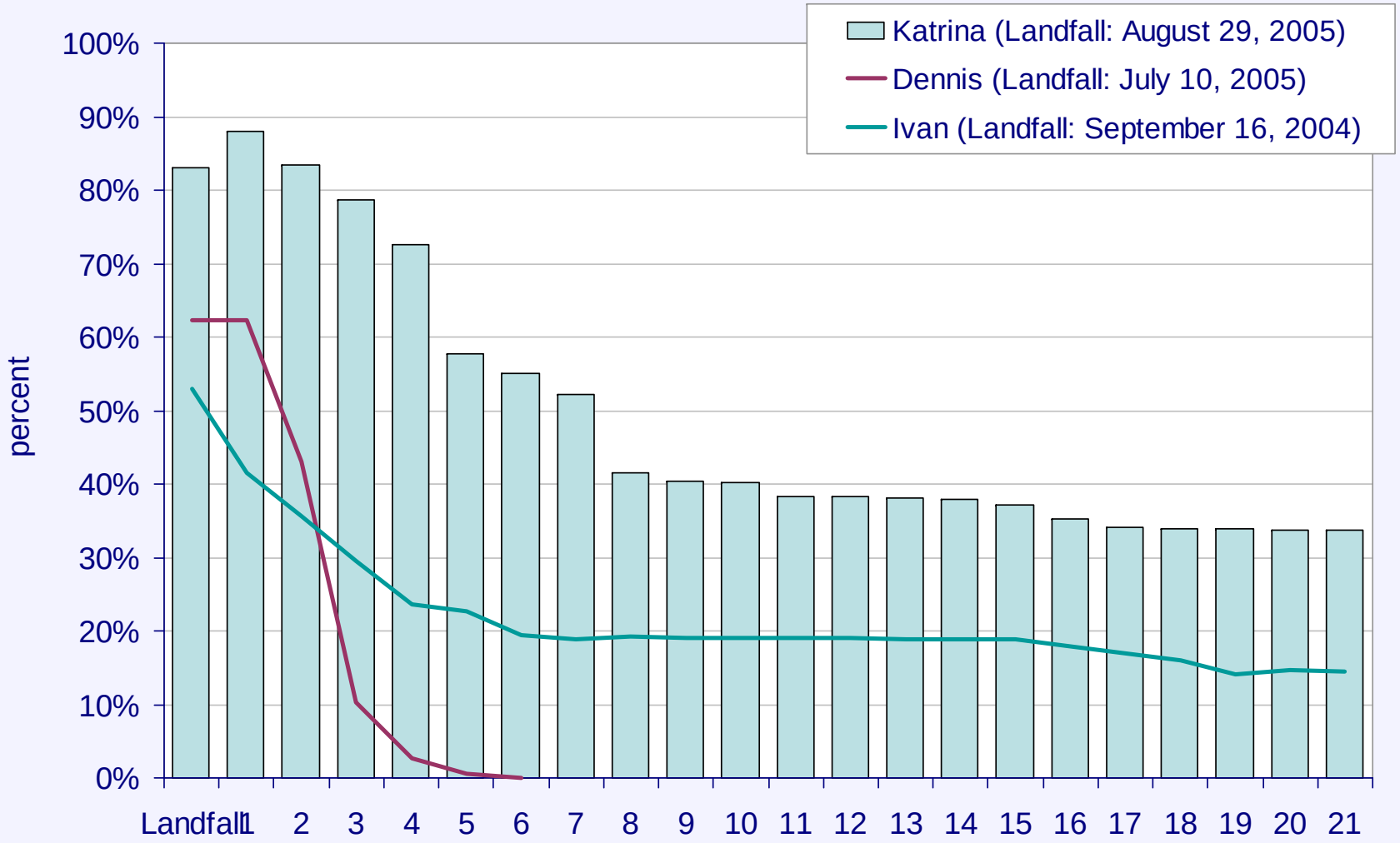
Center for
Energy Studies

Critical Terminals and the Power-Pipeline Infrastructure



Center for
Energy Studies

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



Source: Minerals Management Service

Center for
Energy Studies

Number of Natural Gas Processing Facilities Out

Plant	Location	Capacity as of Jan 1, 2005 --------- (MMcf/d) ---------	2004 Average Throughput	Status (as of September 10)
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

Source: Energy Information Administration, Department of Energy

Center for
Energy Studies

Shell Mars Tension Leg Platform

Source: Shell.com

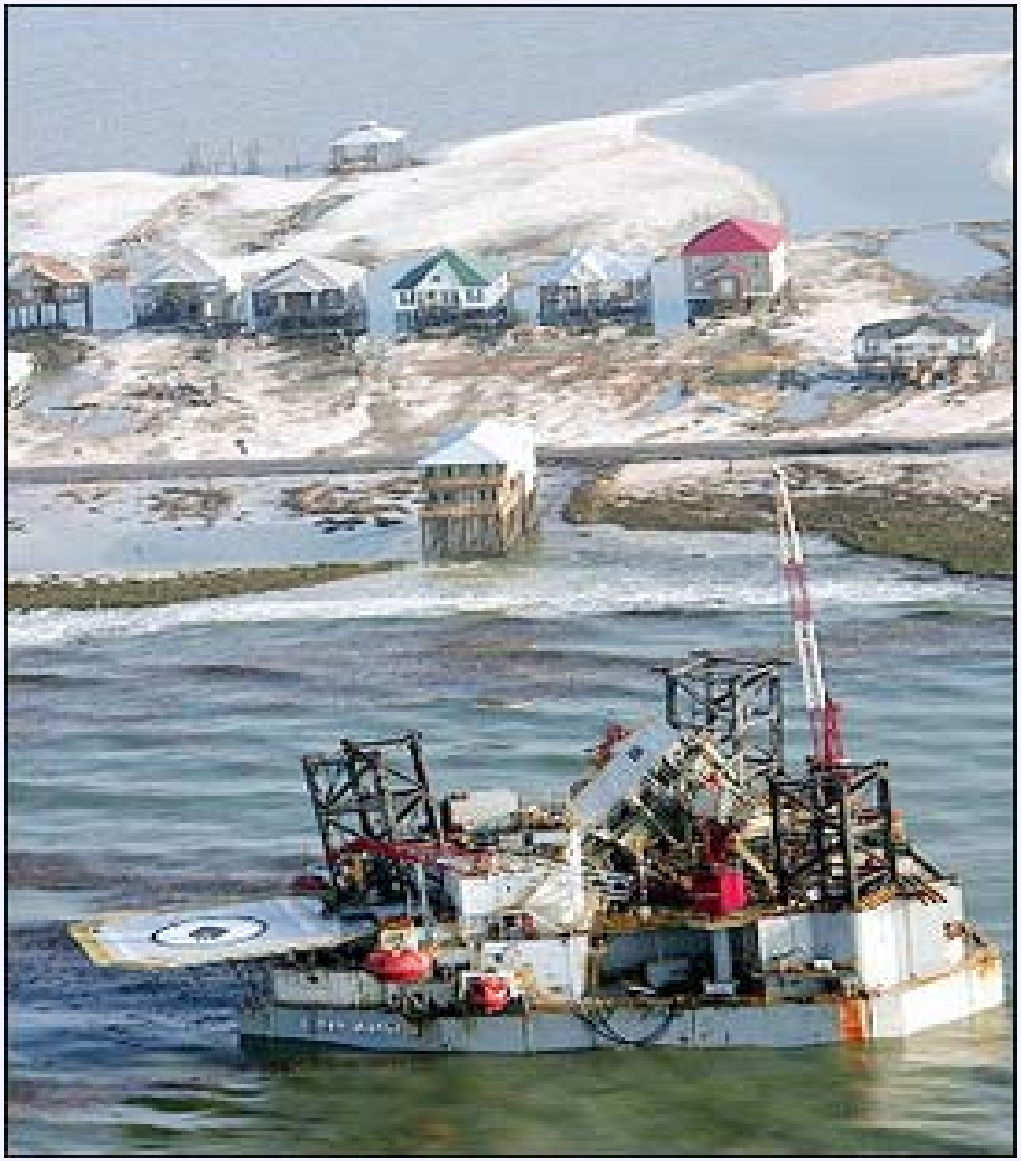
Center for
Energy Studies

Shell Mars Tension Leg Platform

Source: Shell.com

Center for
Energy Studies

Ocean Warwick
Dauphin Island, AL



Center for
Energy Studies

Semi-Sub Stuck Under Bridge
North Mobile Bay

Center for
Energy Studies

Venice Port, Supply & Crew Bases

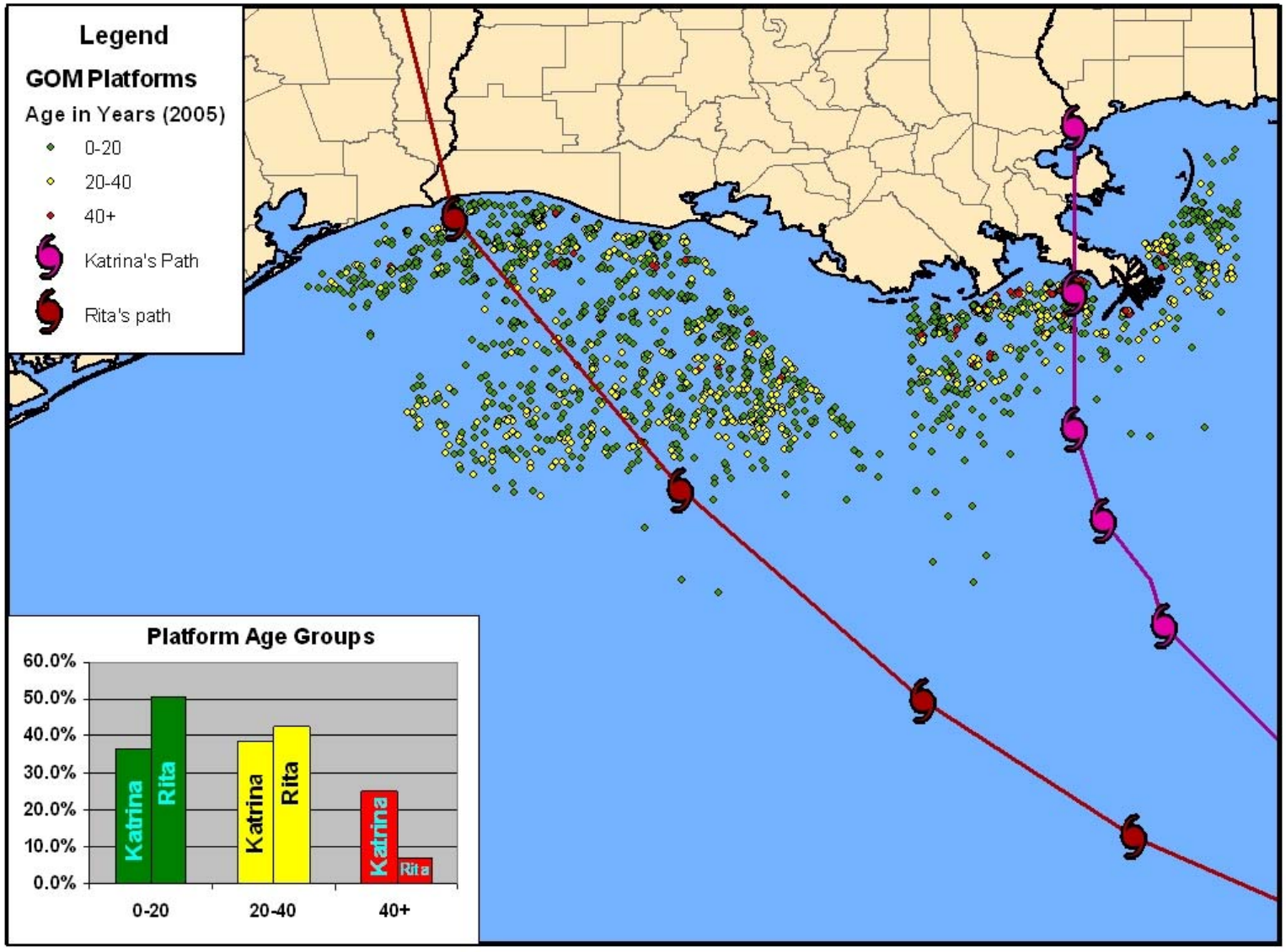
Center for
Energy Studies

Chevron Refinery
Pascagoula, MS

Then,
Along Comes Rita

Center for
Energy Studies

Platforms/Structures Impacted by Rita



Center for
Energy Studies

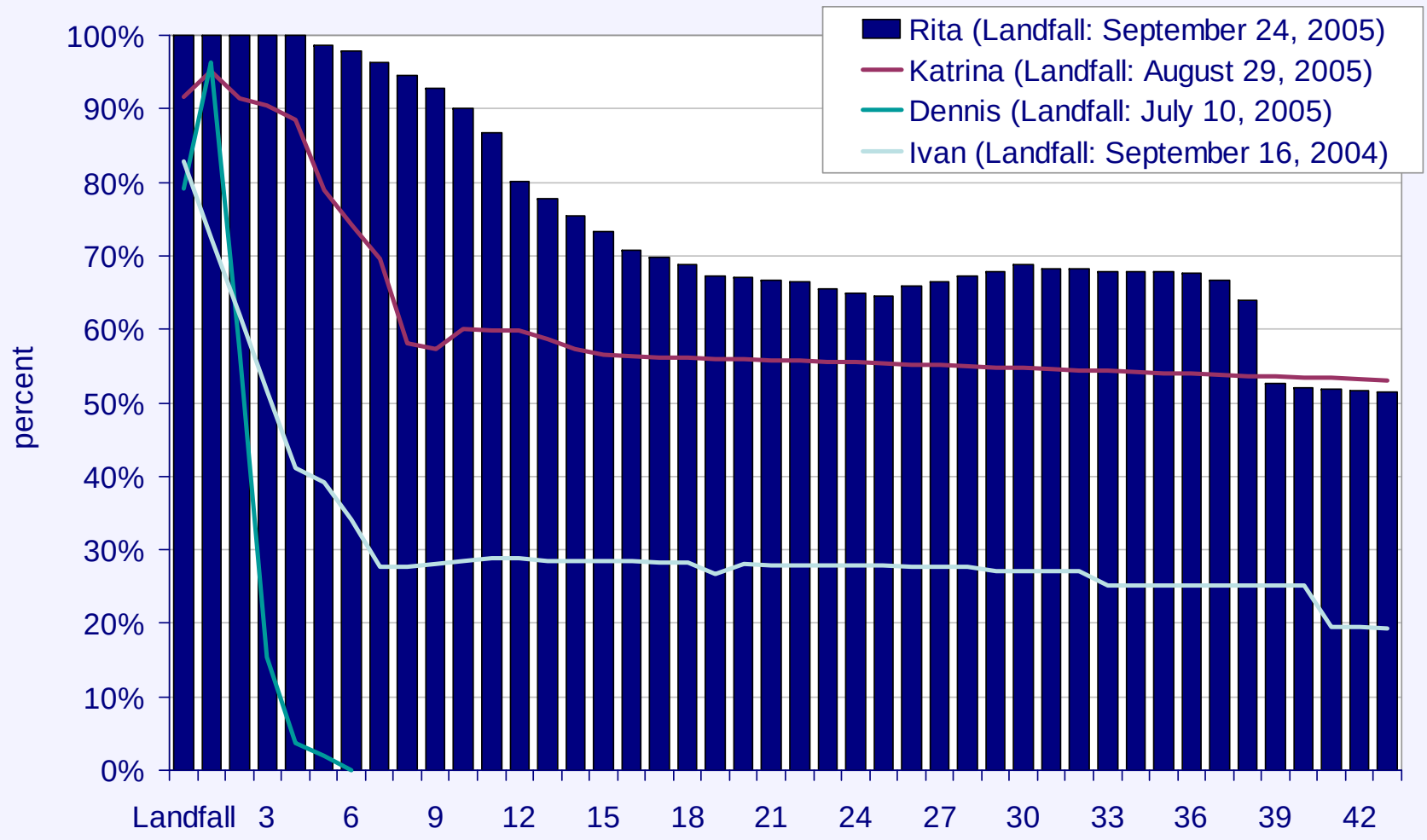
Shut-in Statistics
Crude Oil

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[1] (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: [1] cumulative production is as of August 26, 2005
Source: Minerals Management Service

Center for Energy Studies

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



Source: Minerals Management Service

Center for
Energy Studies

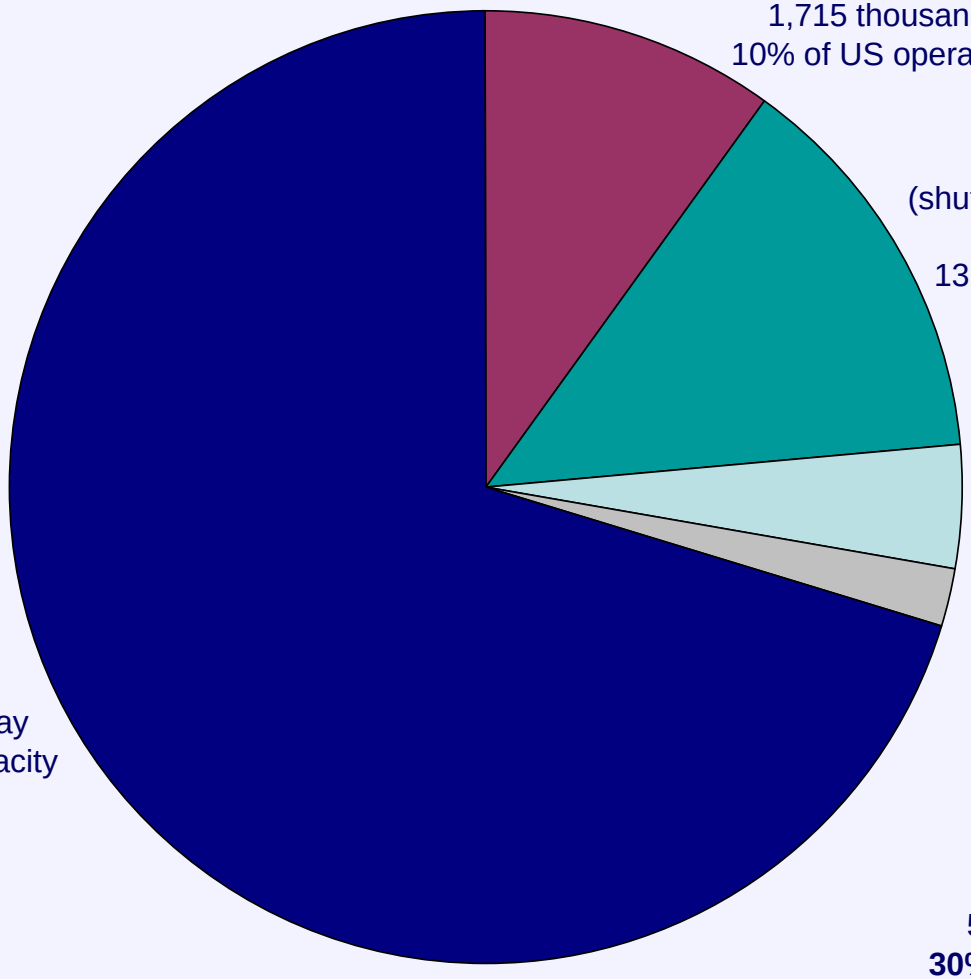
Total Immediate Refinery Impact

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

Houston/Texas City
(shutdowns and damaged facilities)
2,292 thousand bbls/day
13.5% of US operating capacity

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

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



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

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

Source: Energy Information Administration, Department of Energy

Center for
Energy Studies

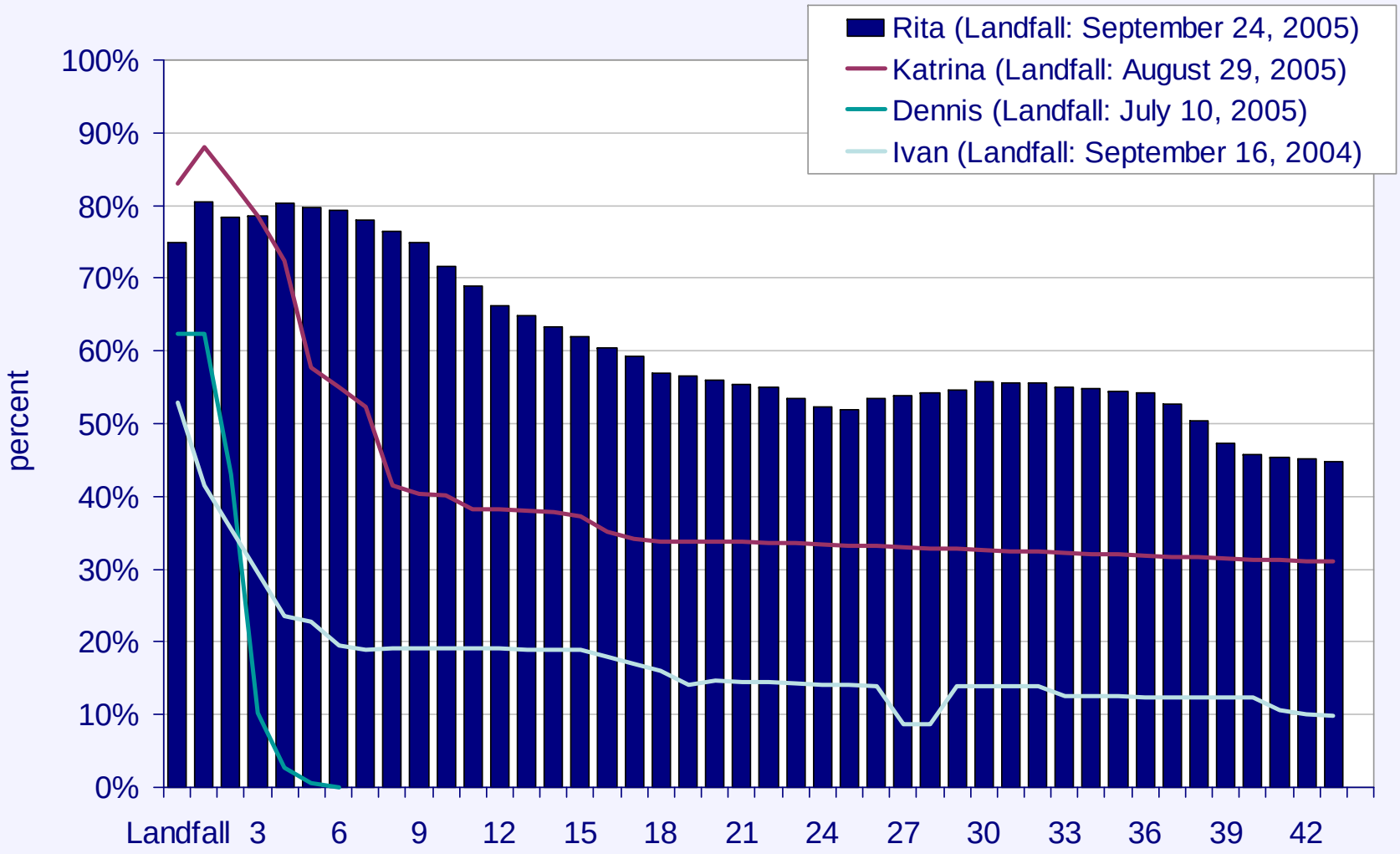
Shut-in Statistics
Natural Gas

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[1] (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: [1] cumulative production is as of August 26, 2005
Source: Minerals Management Service

Center for
Energy Studies

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

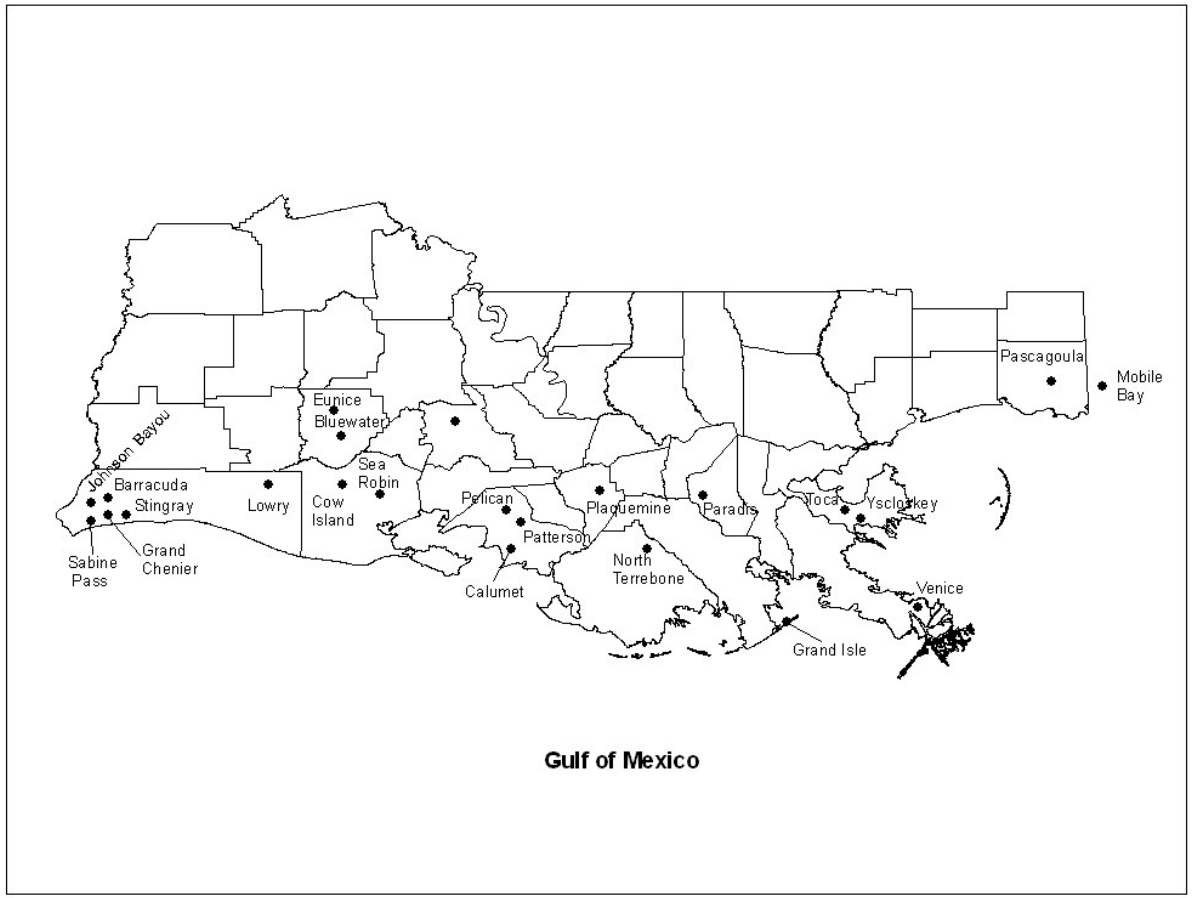


Source: Minerals Management Service

Center for
Energy Studies

Number of Natural Gas Processing Facilities Out

	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%**



Center for
Energy Studies

Henry Hub, September 25, 2005

Source: LIOGA

Center for
Energy Studies

Entergy Transmission

Source: Entergy.com

Center for
Energy Studies

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.

Source: MMS

Center for
Energy Studies

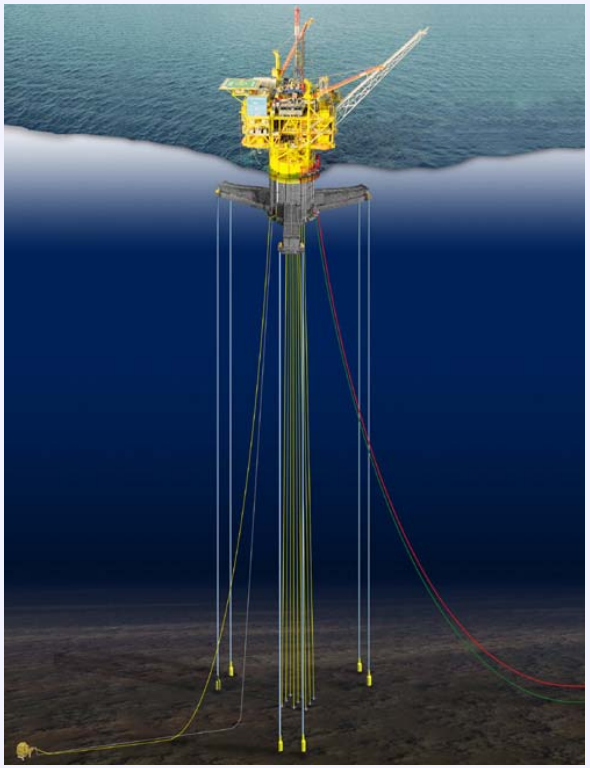
Natural Gas Pipeline Leak

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.

Source: MMS

Center for
Energy Studies

Chevron Typhoon TLP



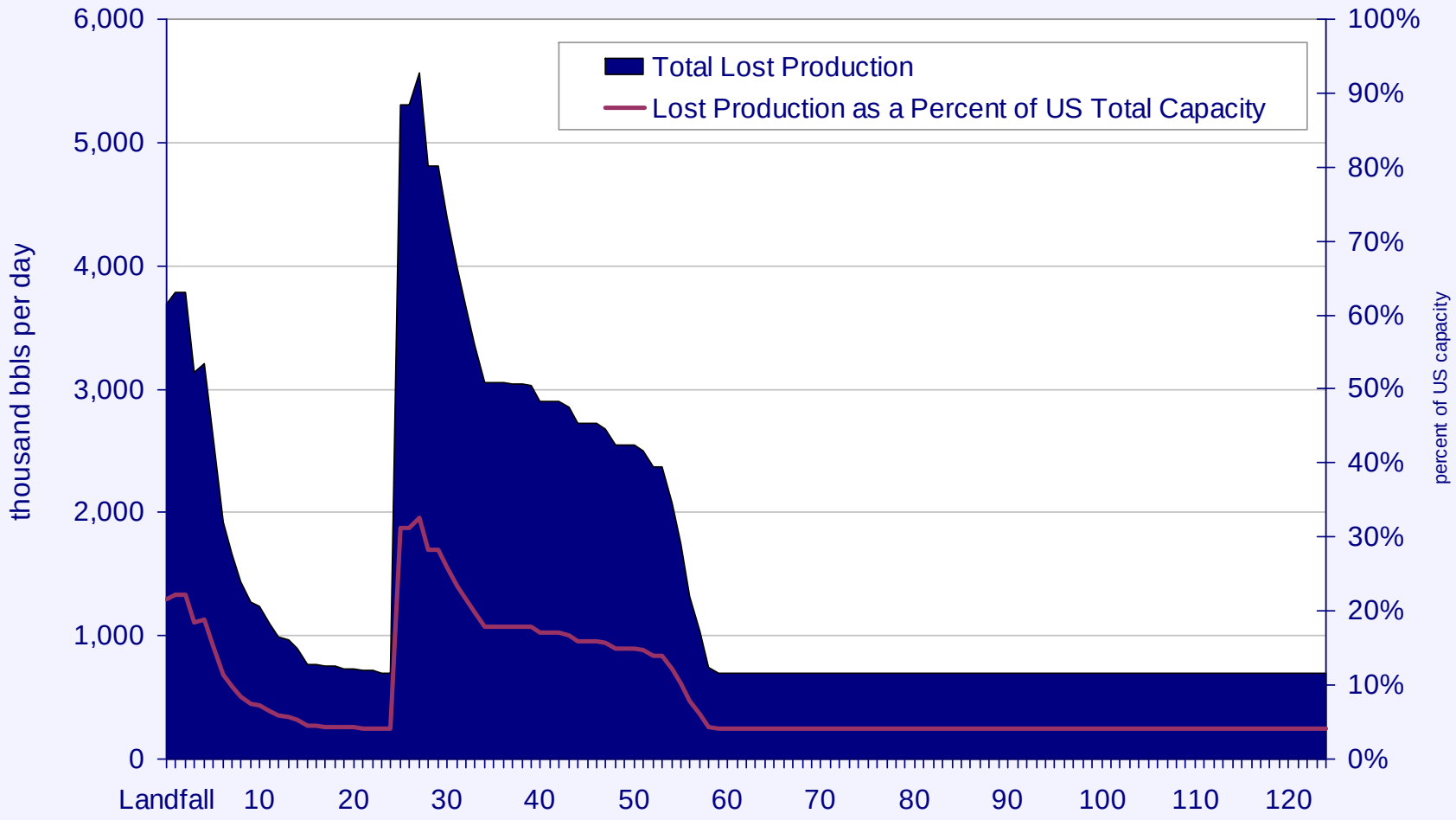
Center for
Energy Studies

Longer Run Impacts of Hurricanes Katrina and Rita

Center for
Energy Studies

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

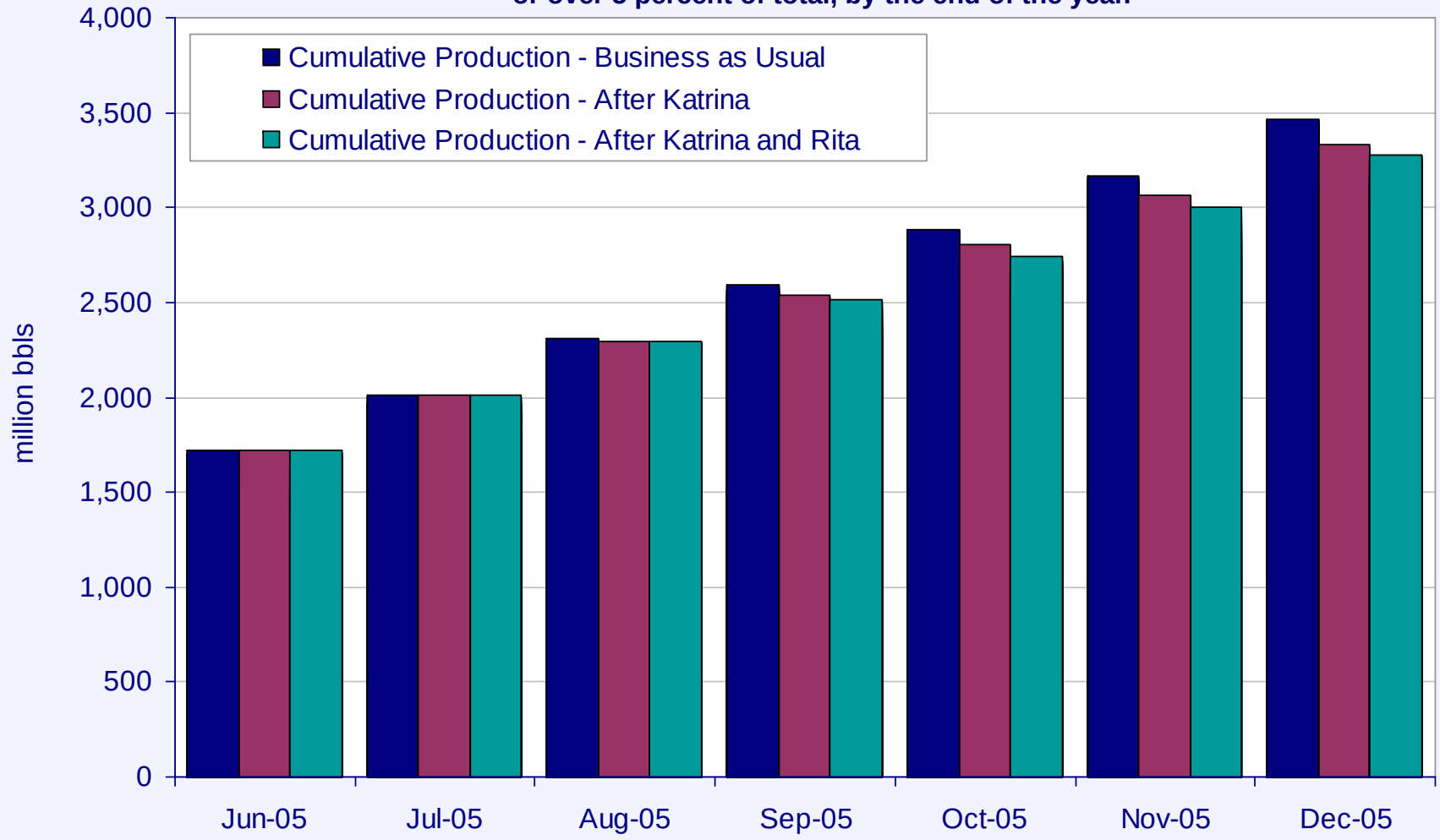


Source: Assumes 95 percent capacity factor; assumes 4 week recovery for facilities damaged by Rita.

Center for
Energy Studies

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.

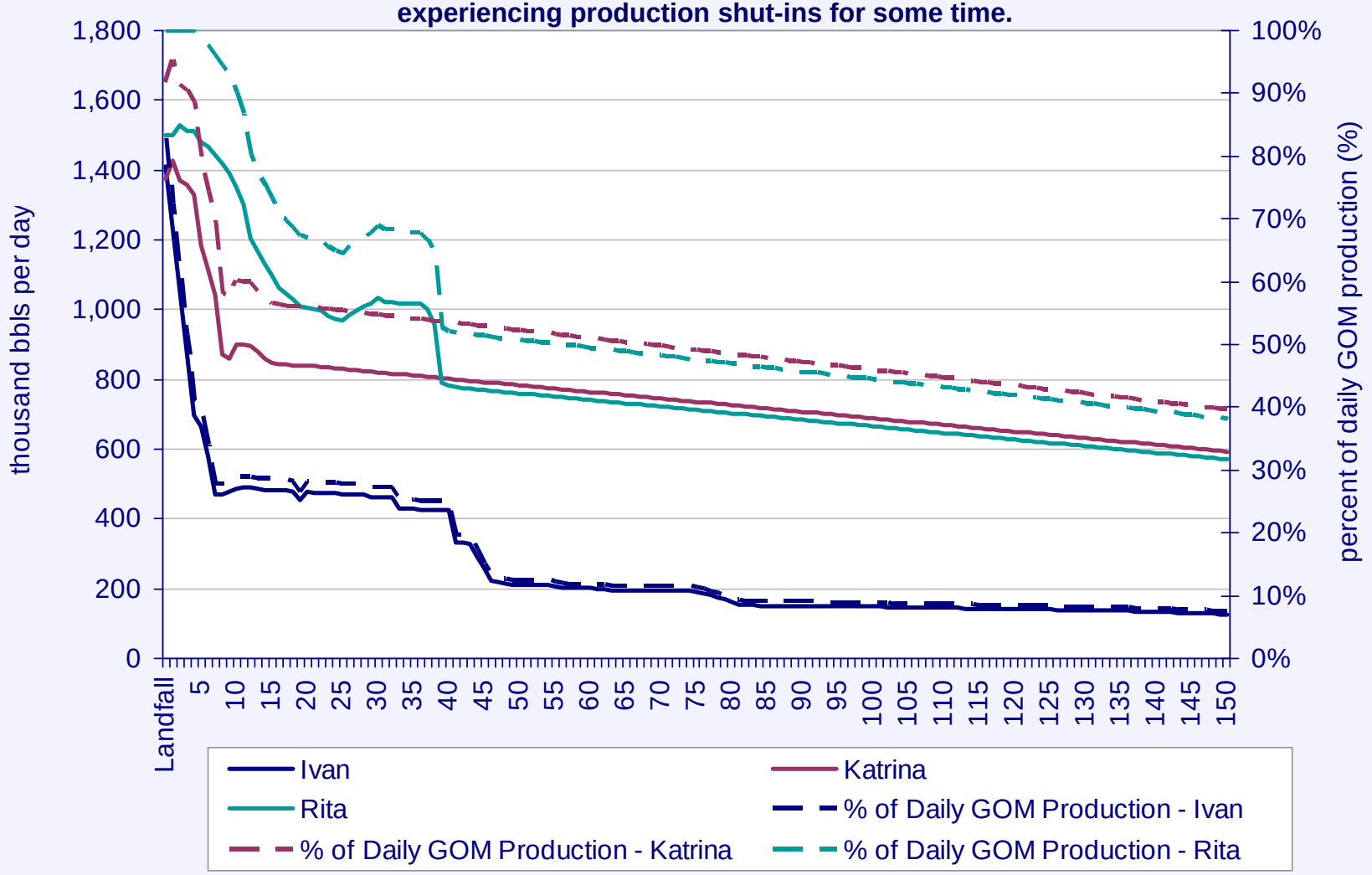


Source: Assumes 95 percent capacity factor

Center for
Energy Studies

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.

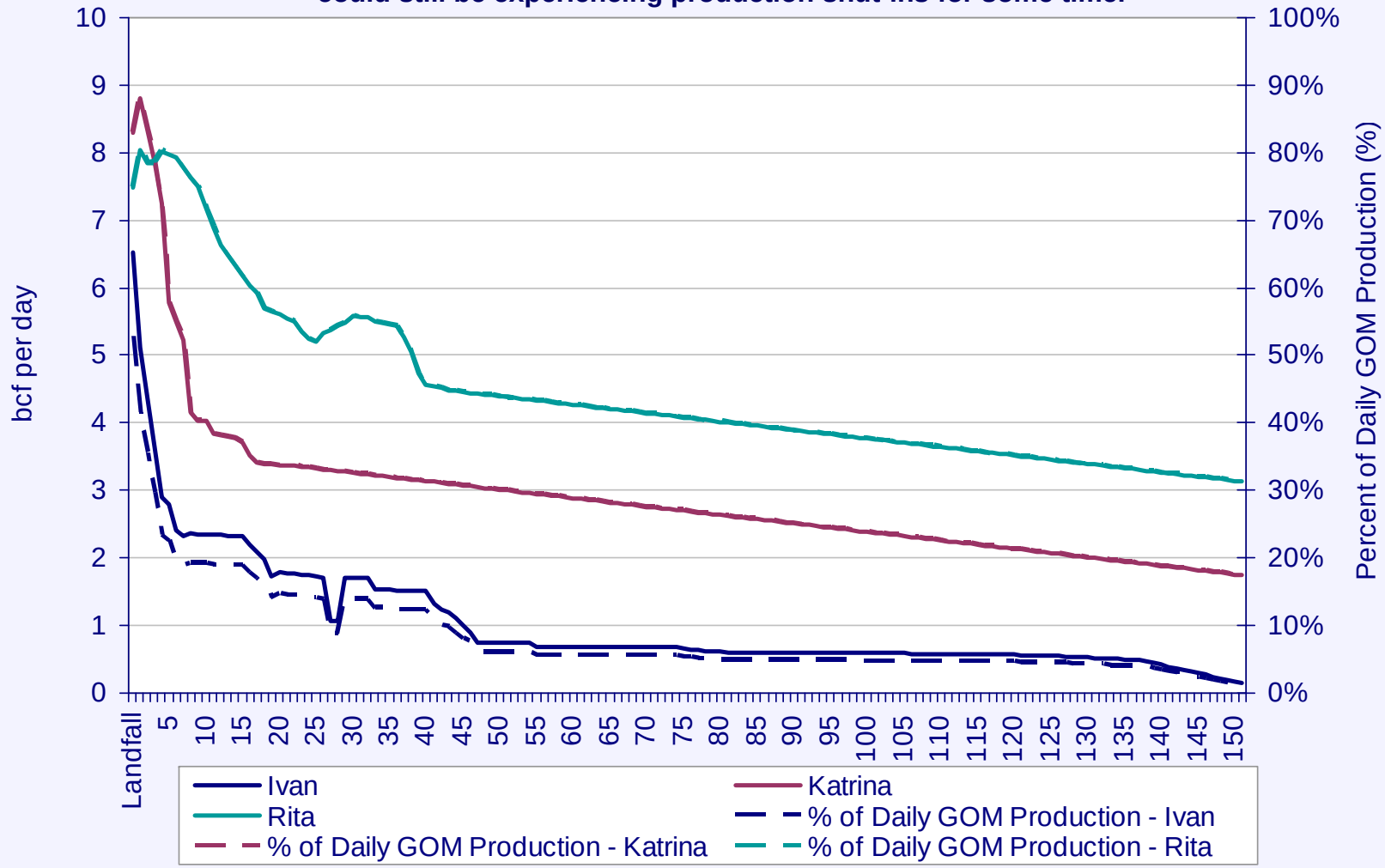


Note: Assuming recovery of 2,685 barrels per day for remaining days.

Center for
Energy Studies

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.



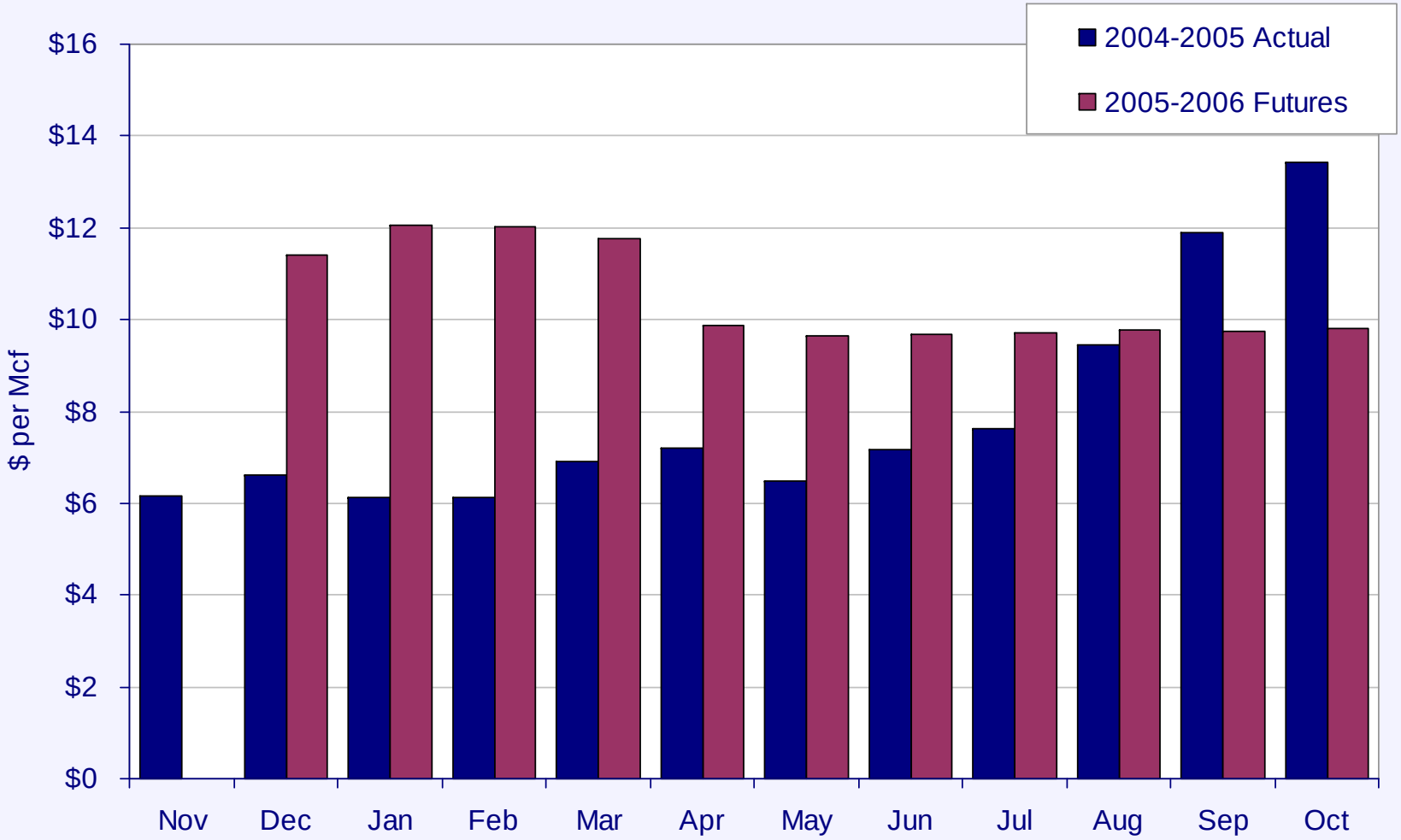
Note: Assuming recovery of 12.53 bcf per day for remaining days.

Center for
Energy Studies

Where Have We Been?
Where Are We Now?

Center for
Energy Studies

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

Center for
Energy Studies

Energy Market Outlook

Fall Signal (Sep-Oct)	Winter Signal (Nov-Mar)	Overall 6 Mo. Market Trend
Bullish, weather, supply concerns Range: 12.00 - 14.00	**Bullish,** weather, supply concerns - daily super spikes probable Range: 13.00 - 16.00	**Bullish,** 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**

Center for
Energy Studies

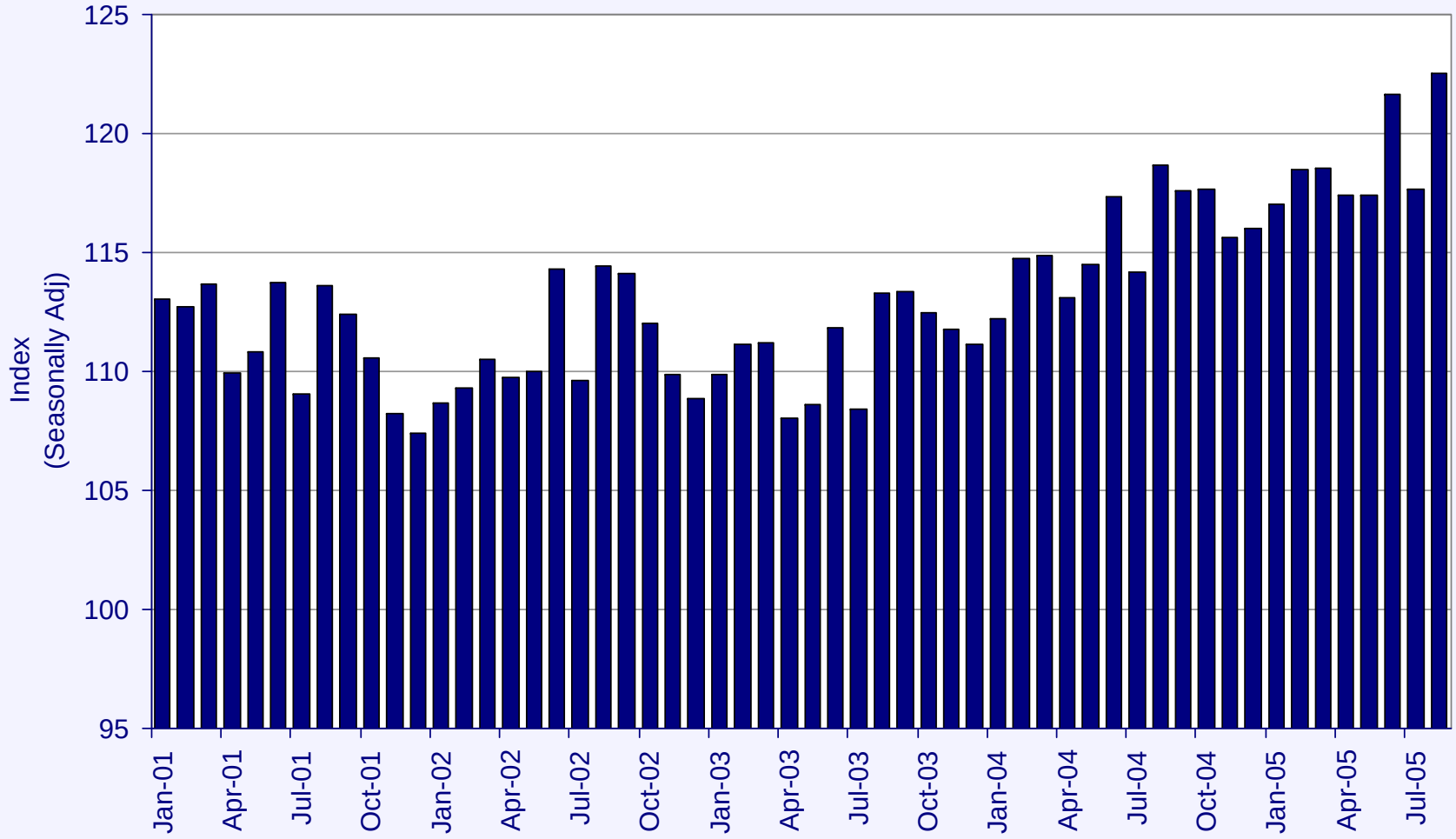
Outlook for Winter Gas Demand

Sector	Winter 2005-2006 (Bcf)	Winter 2005-2006 Average (Bcf/d)	Winter 2004-2005 (Bcf)	Winter 2004-2005 Average (Bcf/d)	Difference (Bcf)	Difference 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
Total	**11,448**	**75.8**	**11,186**	**74.1**	**262**	**1.7**

Source: Energy Ventures Analysis, Inc.

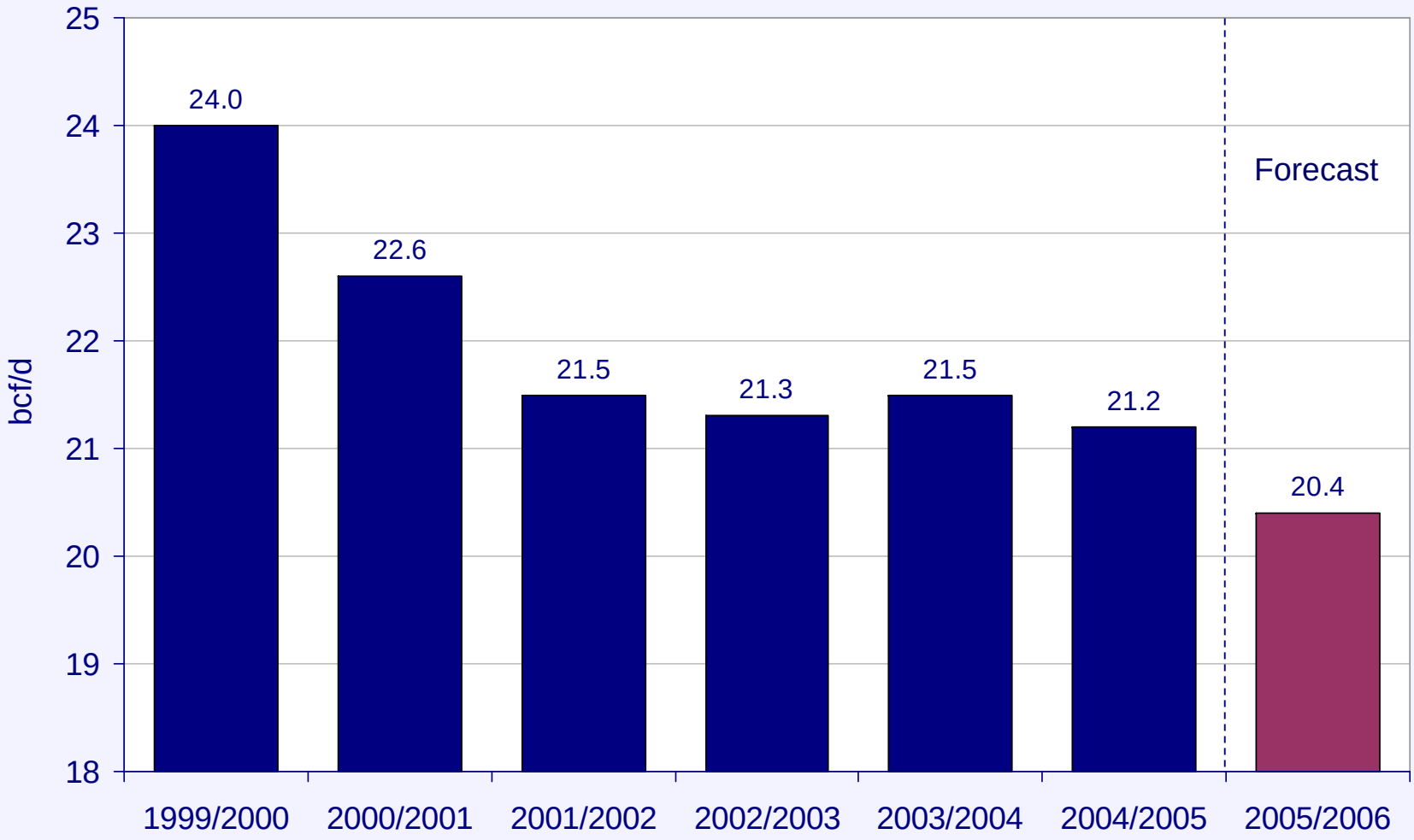
Center for
Energy Studies

Industrial Production Index



Center for
Energy Studies

Historic and Forecasted Winter Season Industrial Gas Usage



Source: Energy Ventures Analysis, Inc.

Center for
Energy Studies

Questions, Comments, & Discussion

dismukes@lsu.edu

www.enrg.lsu.edu