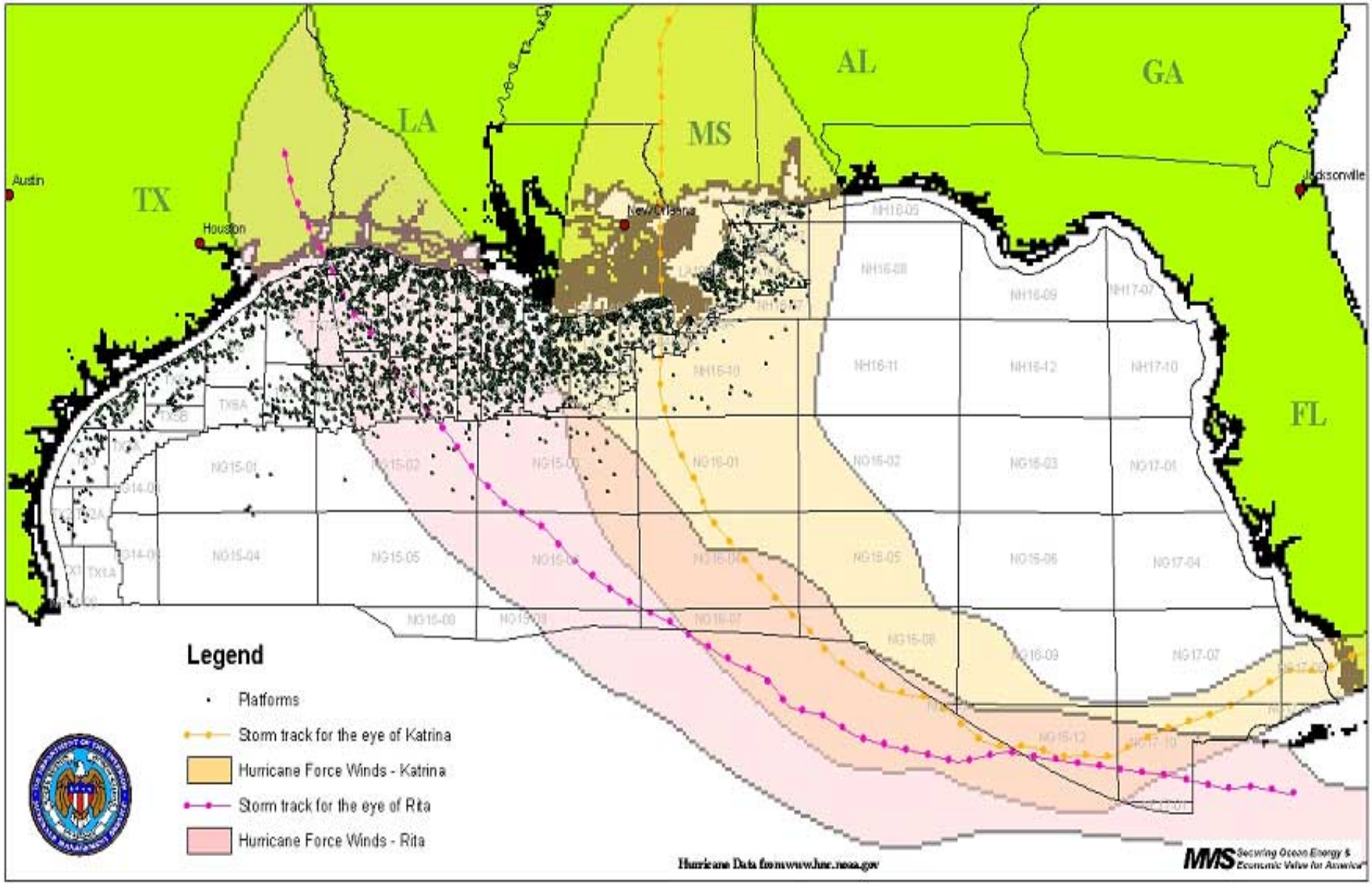
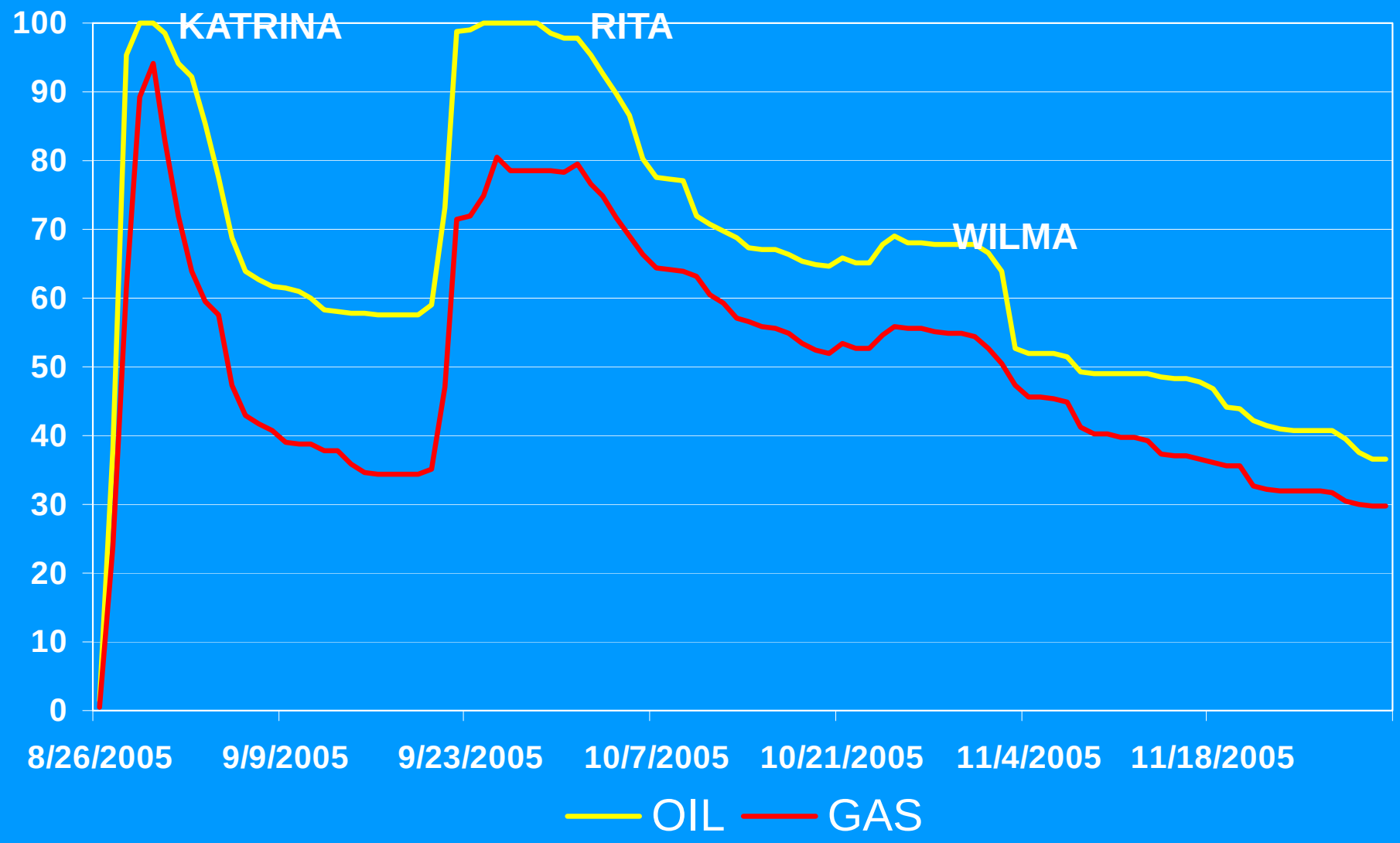

Louisiana State University
Center for Energy Studies
Rebuilding Utility Infrastructure
Challenges and Opportunities
Entergy-Tulane Energy Institute
Eric N. Smith 2/22/06

Hurricanes Rita and Katrina, August - September 2005



Percentage of GOM Production Shut-in



As of 5/6/05

MMS

Damaged & Destroyed Platforms

	Katrina	Rita
Destroyed	47	66
Extensive Damage	20	32

Damaged & Destroyed Platforms

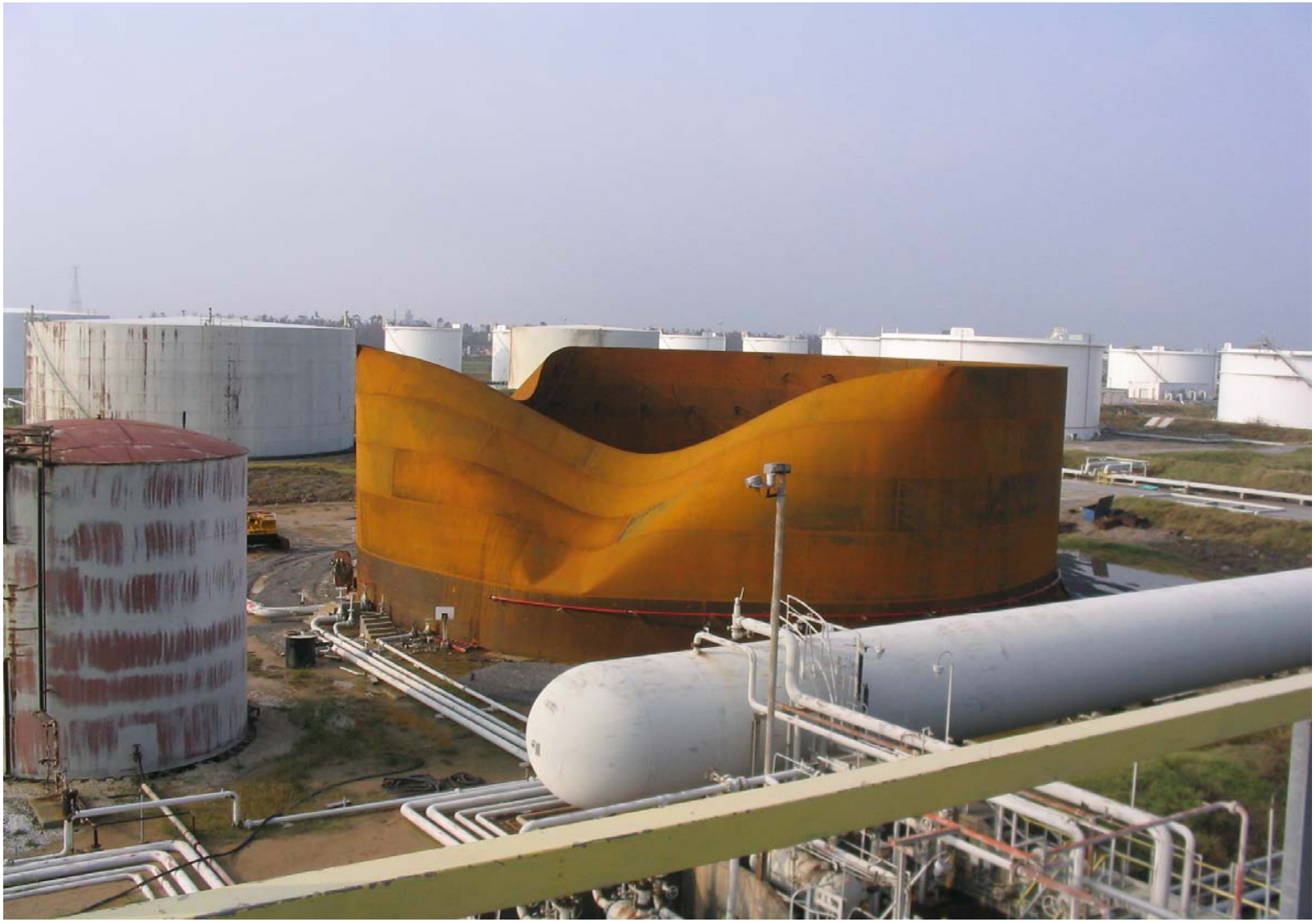
Hurricane Damage to Refining

API as of Oct. 11th	Reduced Ops	Down/Restarting
Katrina 5%		
New Orleans		554,000 (3)
Pascagoula		325,000 (1)
Rita 15%		
Houston Area	200,000 (1)	133,700 707,200 (2)
Beaumont/ Port. Arthur		1,122,000 (4)
Lake Charles		563,700 (2)
Totals 20%	200,000 (1)	3,405,600 (12)

API

Center for
Energy Studies

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



Source: Citgo

Indicative Losses of US petrochemical capacity during Hurricane outages

Acrylonitrile	- 55%	LDPE	-46%
Butadiene	-62%	LLDPE	-73%
Chlorine	-16%	Methyl Methacrylate	-69%
Caustic Soda	-16%	Phenol	-38%
Cyclohexane	-80%	Polybutadiene	-84%
Ethylene Glycol	-39%	Polypropylene	-55%
Ethylene Oxide	- 43%	PVC	-21%
HDPE	- 55%	Styrene-Butadiene Rubber	-55%

American Chemical Council, CMAI, and Dow

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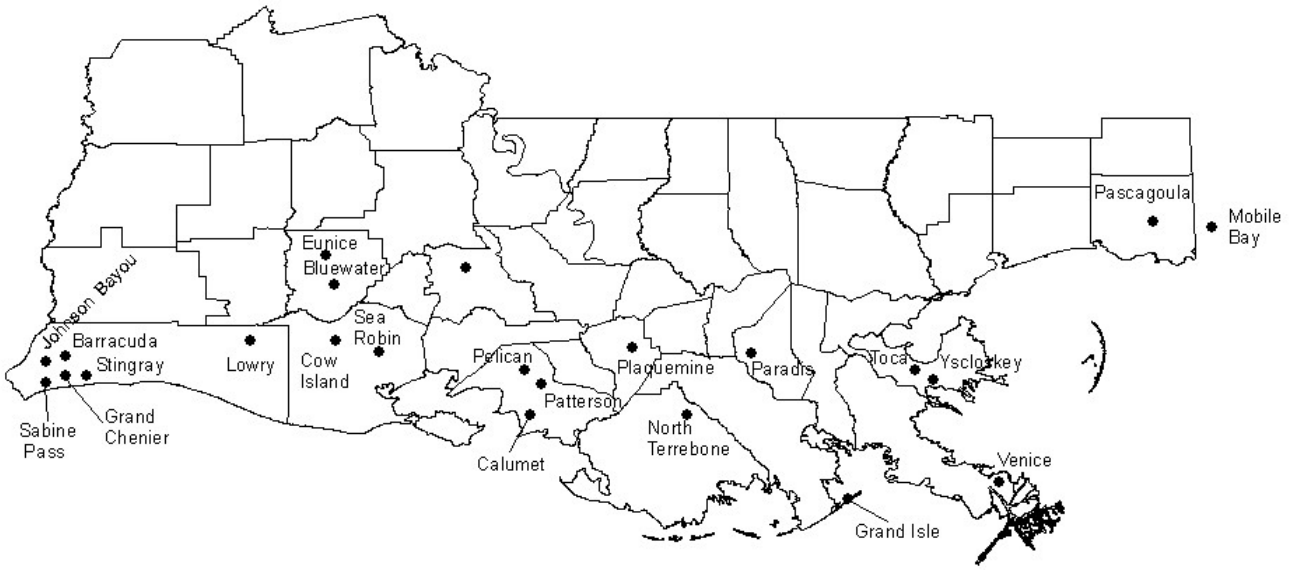
Number of Natural Gas Processing Facilities Out

	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%**



Source: LMOGA

Gas Supply Outages Henry Hub, September 25, 2005

Source: LIOGA **and LSU Center for Energy Studies**

OIL&GAS JOURNAL online

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Hurricanes worsen Louisiana's sliding output

By OGJ editors
HOUSTON, Feb. 14 -- Damage from two hurricanes and a global shortage of overwater rigs led to unusually large declines in Louisiana's oil and gas production in 2005, state figures show.

Gas production was down 13.1% to 1.17 tcf compared with a gain of 0.4% in 2004 over 2003, the Louisiana Department of Natural Resources estimated. Crude and condensate production in 2005 totaled 69.3 million bbl, a drop of 17.1%, after a decline of 7.4% the previous year.

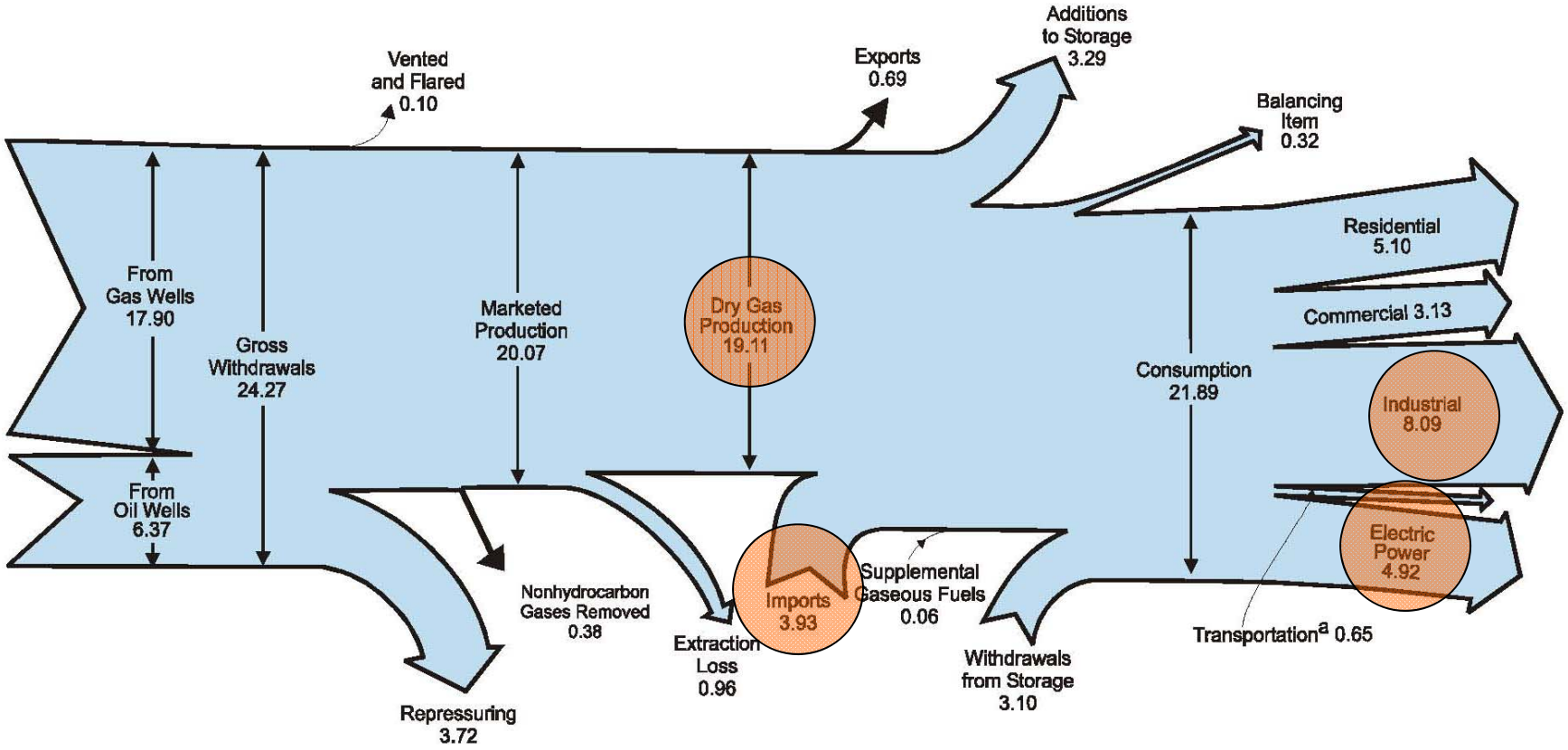
The 2005 gas production is derived 65% from South Louisiana, 26.5% from North Louisiana, and 8.4% from fields in state waters. The 2005 crude and condensate output came 73.4% from South Louisiana, 15% from North Louisiana, and 11.6% from the state offshore.

For each of the three areas, the 2005 production was the lowest since at least 1984, the earliest year shown on the department's January 2006 tabulation.

Louisiana's crude and condensate production is estimated to have averaged 190,094 b/d in 2005, down almost 17% from 2004.

After the hurricanes, production in the last quarter of 2005 slumped to 40-55%/month lower than it was in the same month of 2004, the department estimated. Totals are 123,255 b/d in September 2005, 96,642 b/d in October, 106,483 b/d in November, and 110,438 b/d in December.

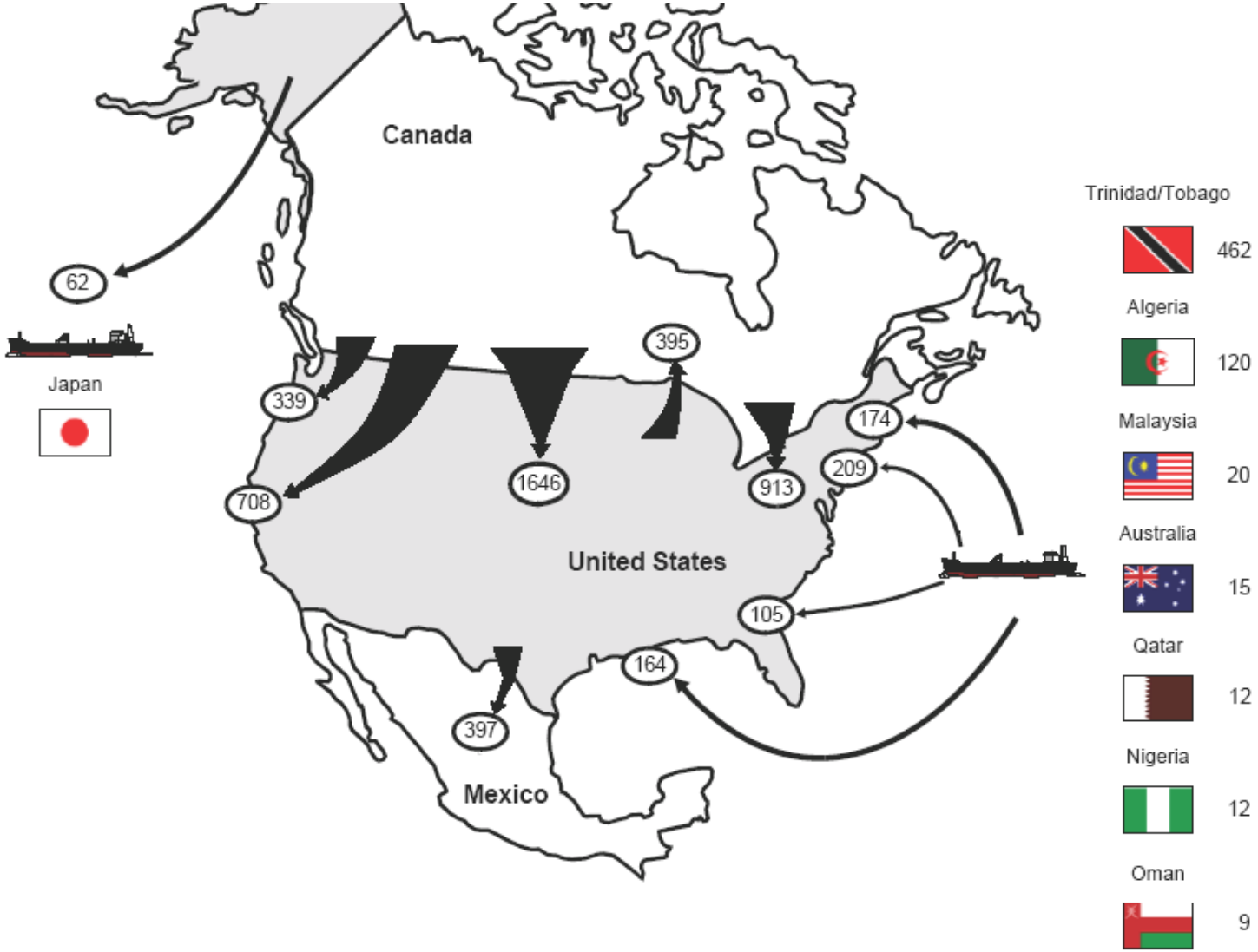
Diagram 3. Natural Gas Flow, 2003
(Trillion Cubic Feet)



[a] Natural gas consumed in the operation of pipelines, primarily in compressors, and a small quantity used as vehicle fuel.

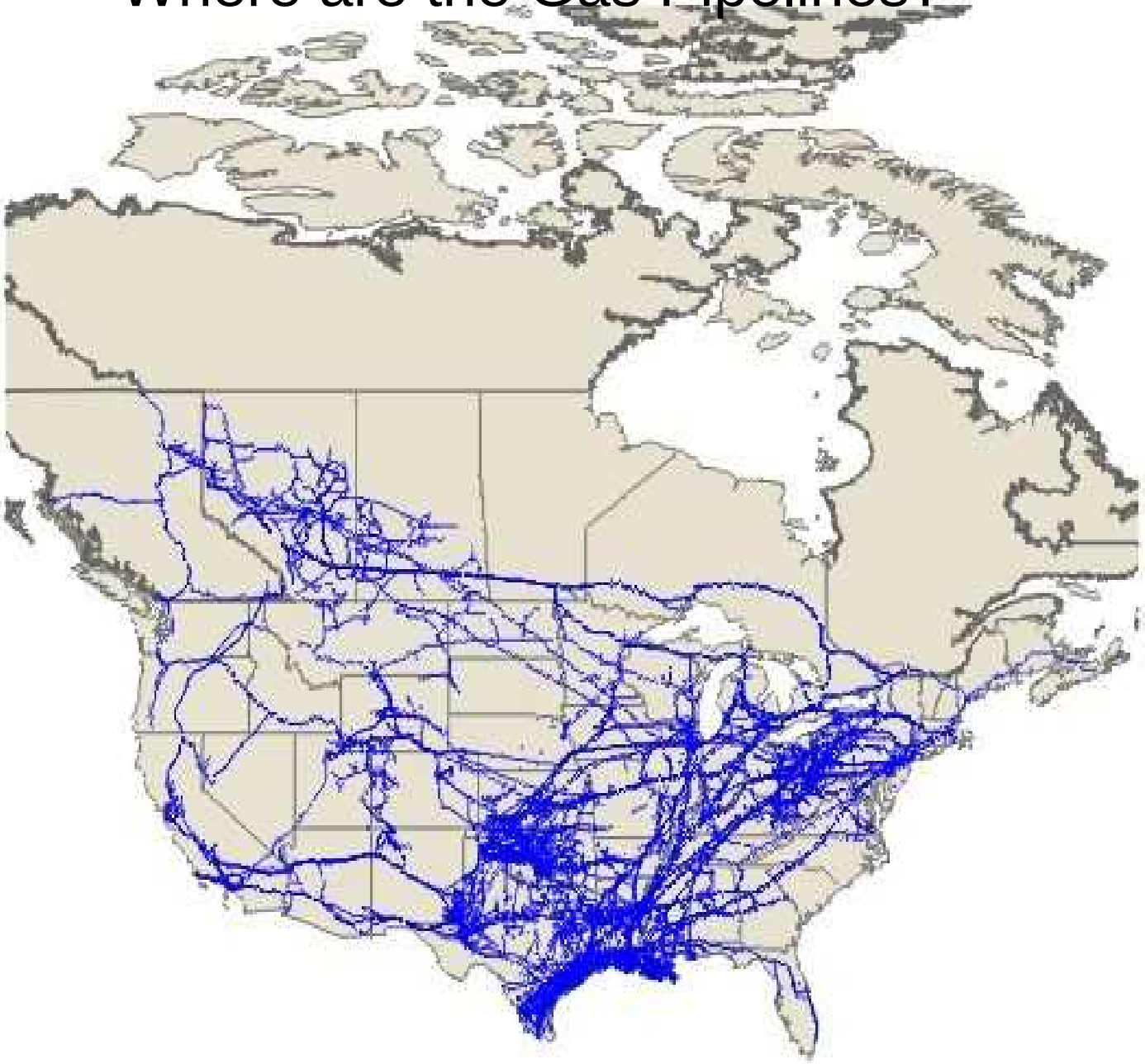
Notes: • Data are preliminary. • Totals may not equal sum of components due to independent rounding.
Sources: Tables 6.1, 6.2, and 6.5.

Flow of Natural Gas Imports and Exports, 2004
(Billion Cubic Feet)



Source: Energy Information Administration, based on data from the Office of Fossil Energy, U.S. Department of Energy, *Natural Gas Imports and Exports*.

Where are the Gas Pipelines?



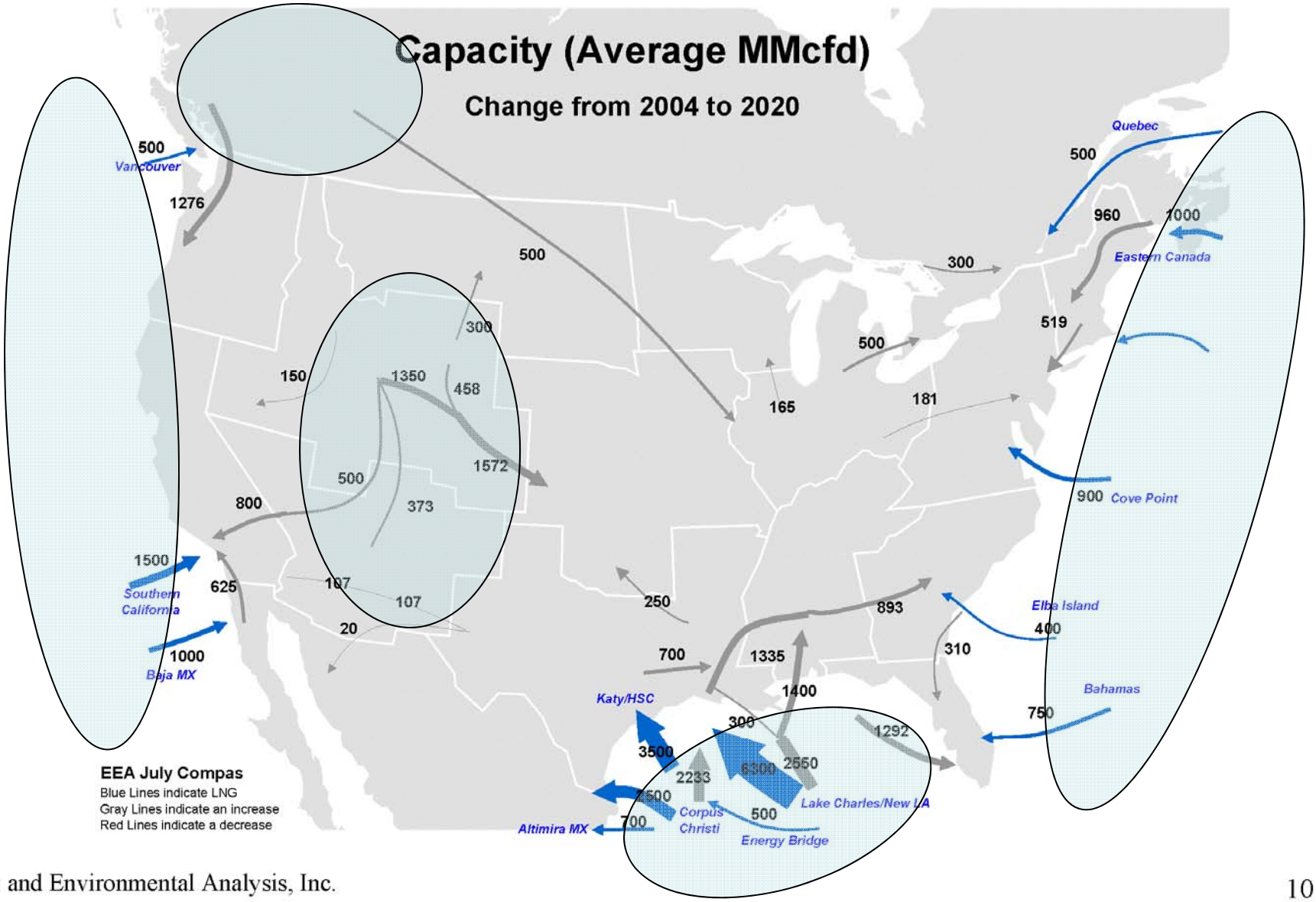
Natural Gas pipeline locations provided by PennWell MAPSearch (800-823-6277).

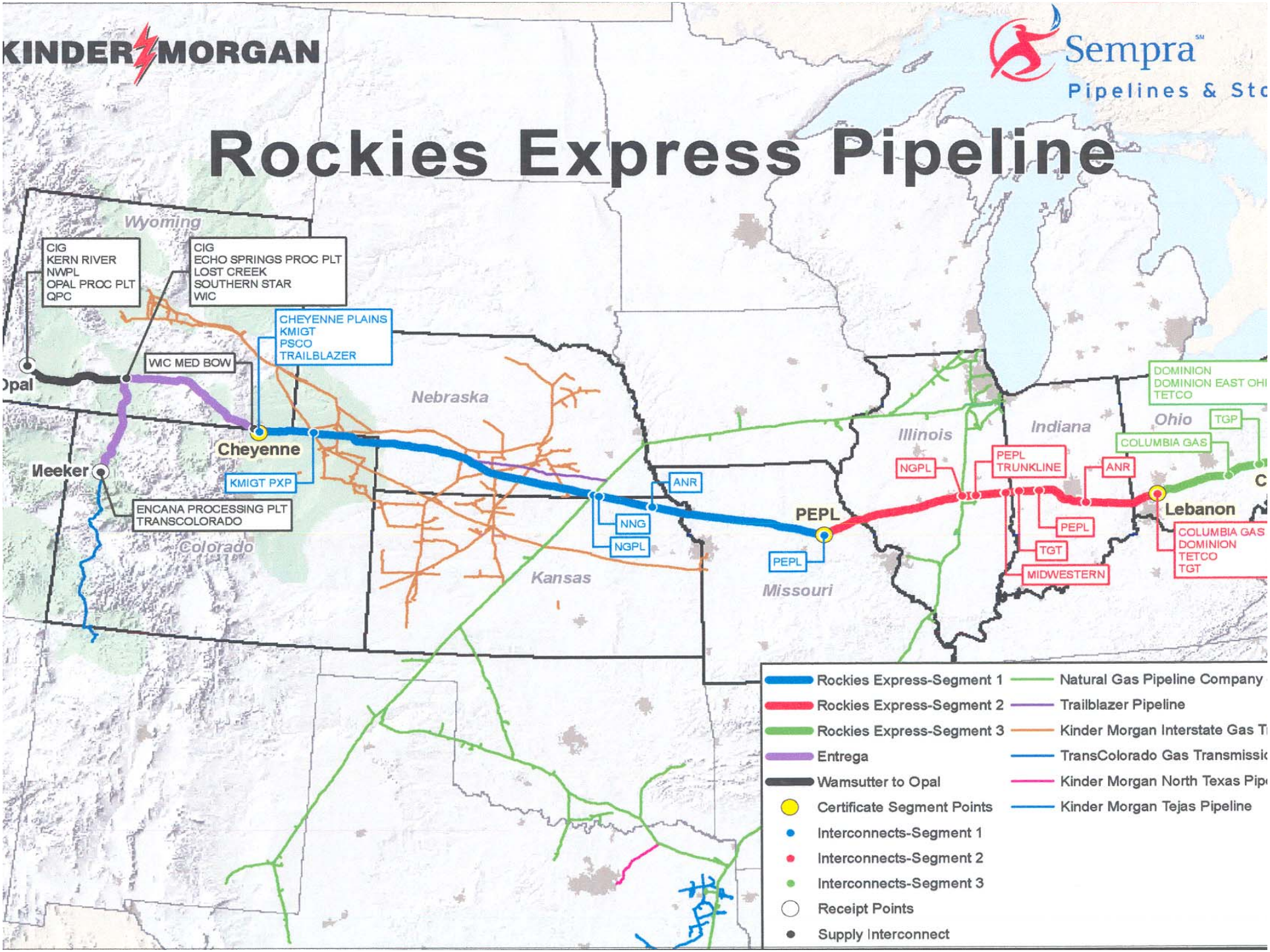
World's Largest Gas Market—22 TCF in 2002

Source: EIA/Cheniere

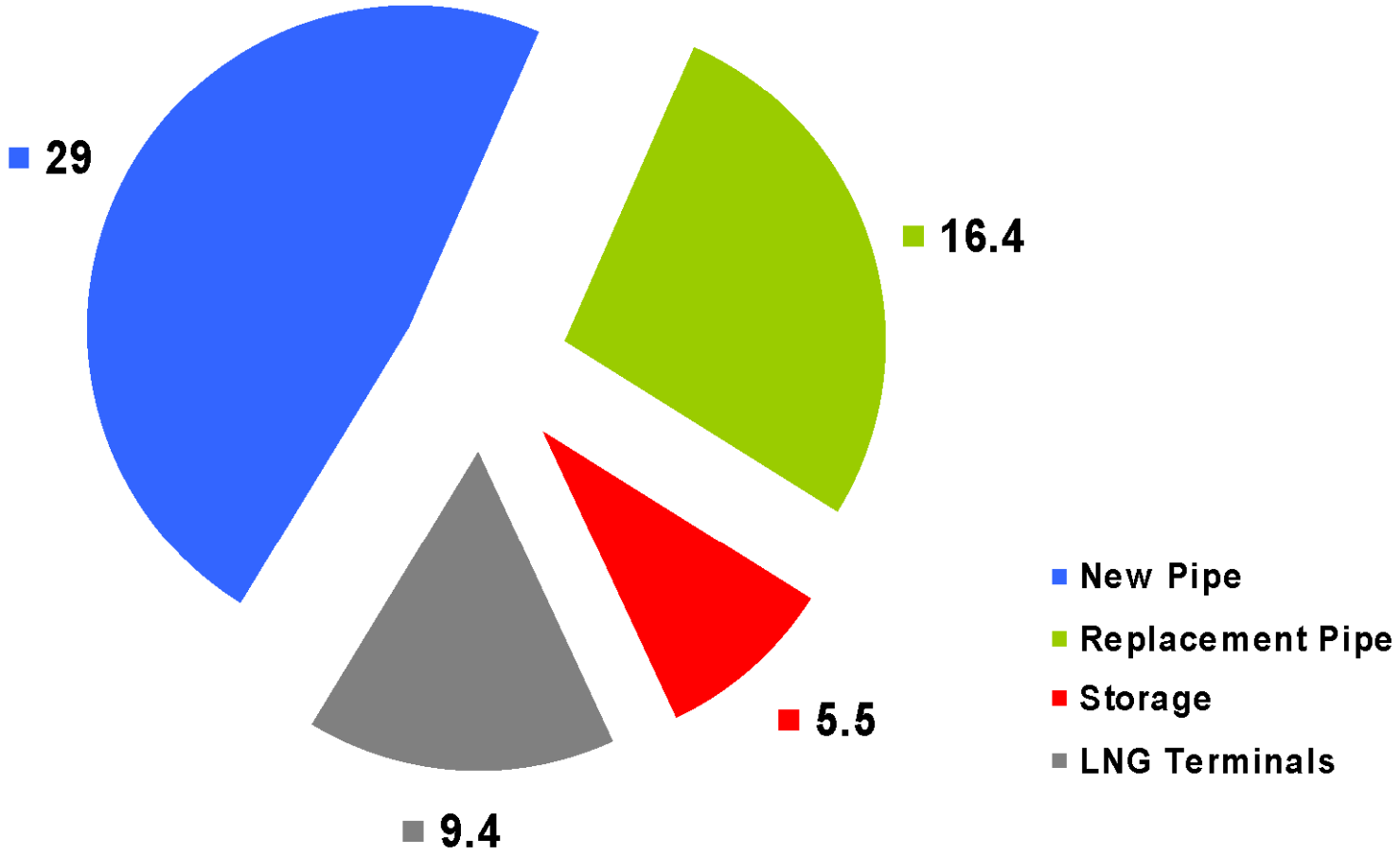
➔ North American production dominates—LNG supplies ~1% of demand

New Long Haul Pipeline Capacity




KINDER MORGAN
Sempra
Pipelines & Sto
Rockies Express Pipeline
Wyoming
CIG
KERN RIVER
NWPL
OPAL PROC PLT
QPC
CIG
ECHO SPRINGS PROC PLT
LOST CREEK
SOUTHERN STAR
WIC
CHEYENNE PLAINS
KMIGT
PSCO
TRAILBLAZER
WIC MED BOW
Opal
Cheyenne
Meeker
KMIGT PXP
ENCANA PROCESSING PLT
TRANSCOLORADO
Colorado
Nebraska
Kansas
ANR
NNG
NGPL
PEPL
Missouri
Illinois
Indiana
Ohio
NGPL
PEPL
TRUNKLINE
ANR
TGP
COLUMBIA GAS
DOMINION
DOMINION EAST OHI
TETCO
Lebanon
PEPL
TGT
MIDWESTERN
COLUMBIA GAS
DOMINION
TETCO
TGT
Rockies Express-Segment 1
Rockies Express-Segment 2
Rockies Express-Segment 3
Entrega
Wamsutter to Opal
Certificate Segment Points
Interconnects-Segment 1
Interconnects-Segment 2
Interconnects-Segment 3
Receipt Points
Supply Interconnect
Natural Gas Pipeline Company
Trailblazer Pipeline
Kinder Morgan Interstate Gas T
TransColorado Gas Transmissi
Kinder Morgan North Texas Pip
Kinder Morgan Tejas Pipeline

Infrastructure Costs to 2020: $60 billion



Louisiana — Natural Gas 2004

	Million Cu. Feet	Percent of National Total
Total Net Movements:	-89,452	—
Dry Production:	1,223,932	6.53
Deliveries to Consumers:		
Residential:	42,482	0.87
Commercial:	24,671	0.79
Industrial:	819,248	11.30
Vehicle Fuel:	133	0.65
Electric Power:	245,361	4.49
Total Delivered:	1,131,895	5.45

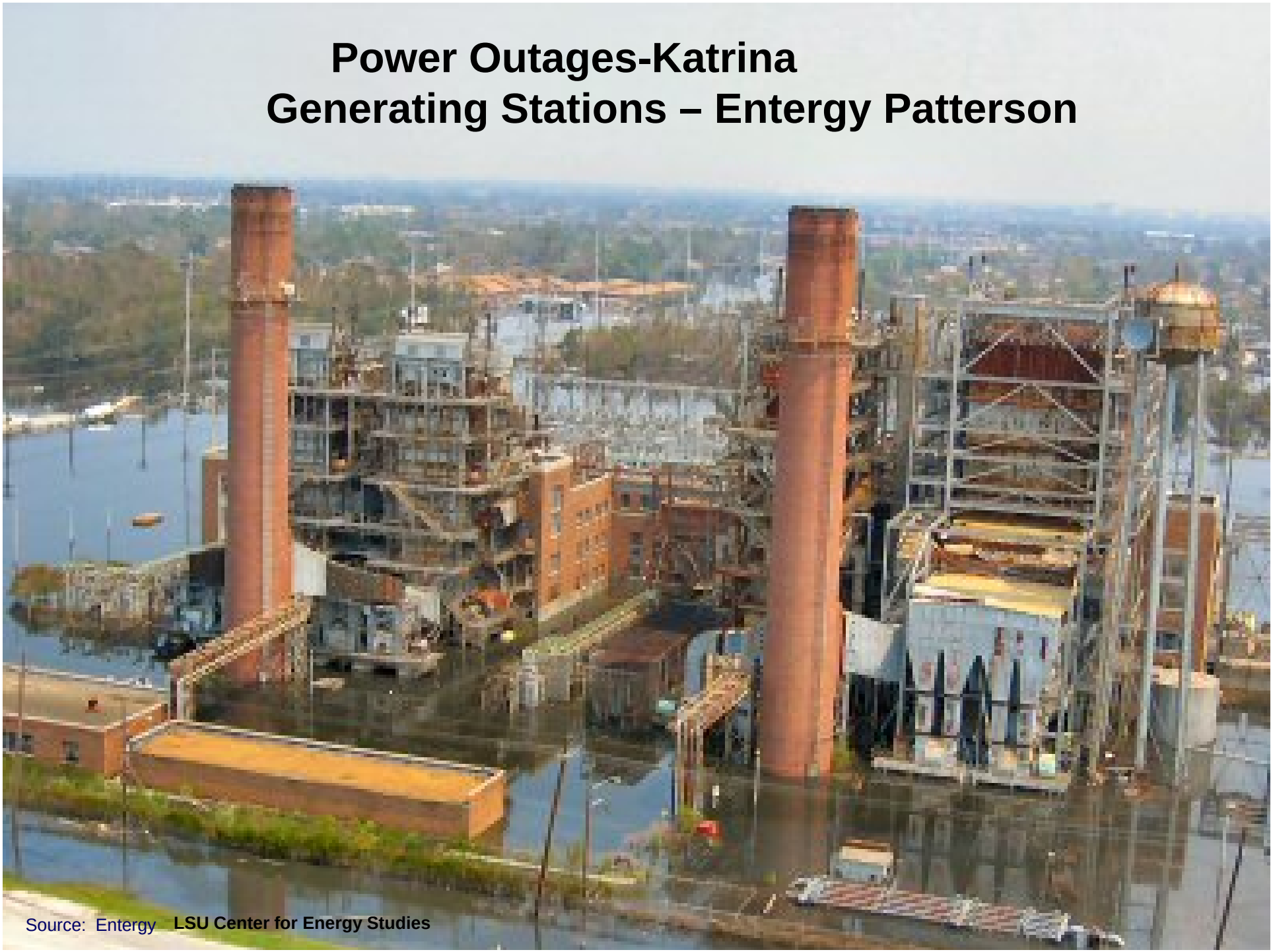
Generation by Producer and Source in Louisiana during 2004

Megawatthours from	Utilities		IPP		CHP		Total	
Coal	**11,324,239**	12%	**12,289,357**	13%	**39,362**	0%	**23,652,958**	24%
Petroleum	3,693,520	4%	14,453	0%	137,938	0%	3,845,911	4%
Natural Gas	**15,138,928**	**15%**	**5,334,742**	**5%**	**25,343,780**	**26%**	**45,817,450**	**47%**
Other Gas	366,934	0%			2,827,222	3%	3,194,156	3%
Nuclear	**17,079,981**	17%					**17,079,981**	17%
Hydroelectric			1,098,825	1%			1,098,825	1%
Renewables			73,373		2,706,118	3%	2,779,491	3%
Other					703,537	1%	703,537	1%
Total	**47,603,602**	**48%**	**18,810,750**	**19%**	**31,757,957**	**32%**	**98,172,309**	**100%**

Fossil Fuel Use by Producer in Louisiana during 2004

		Utilities		IPP		CHP		Total	
Coal	(sh tons)	8,141,544	51%	7,833,859	49%	13,024	0%	15,988,427	100%
Petroleum	(Barrels)	6,492,814	96%	26,222	0%	224,730	3%	6,743,766	100%
Natural Gas	**(Mcf)**	**159,321,588**	**39%**	**38,607,672**	**10%**	**207,863,297**	**51%**	**405,792,557**	**100%**
Other Gas	(MMBTU)	5,105	19%			21,547	81%	26,652	100%

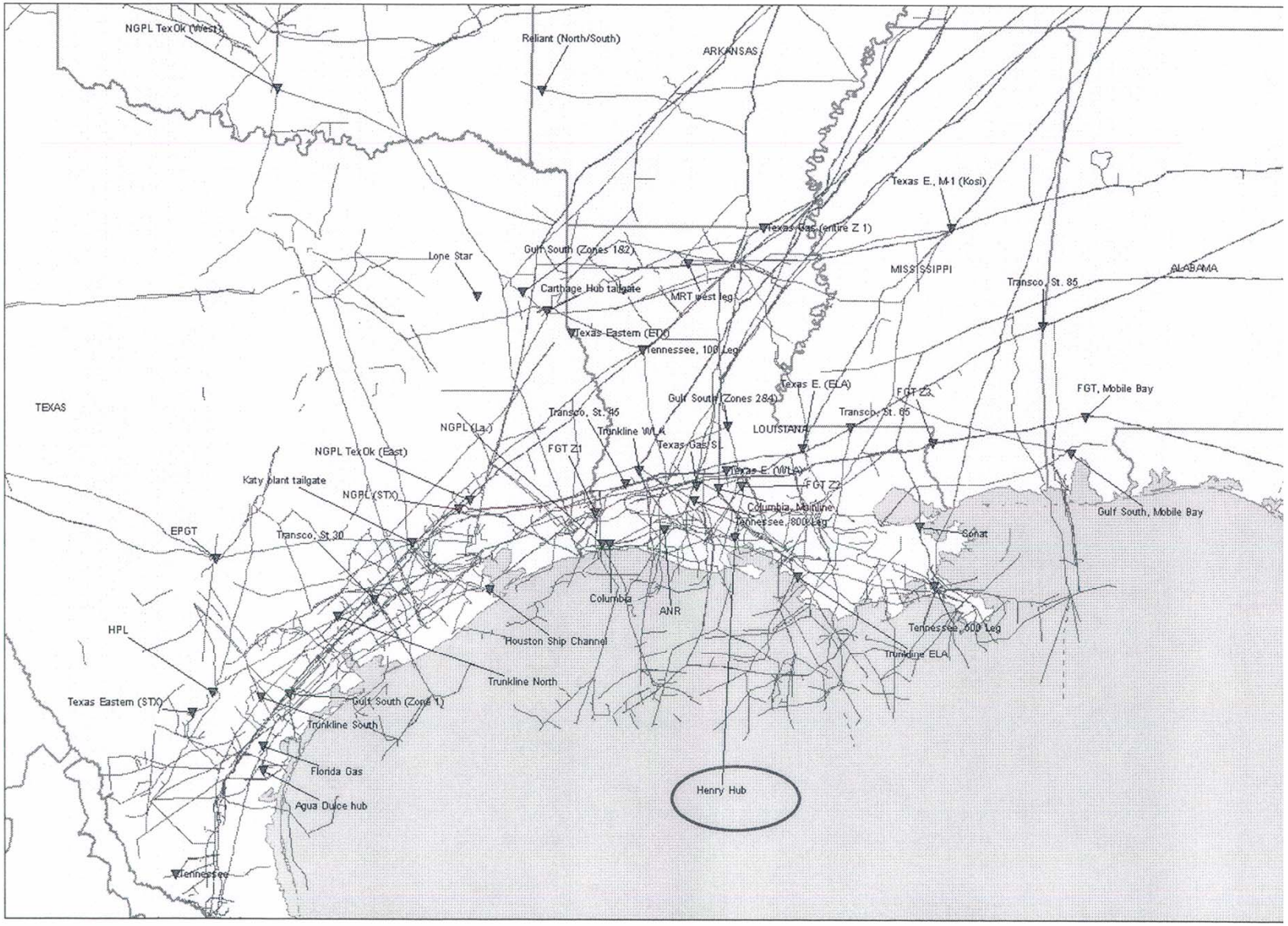
Power Outages-Katrina
Generating Stations – Entergy Patterson



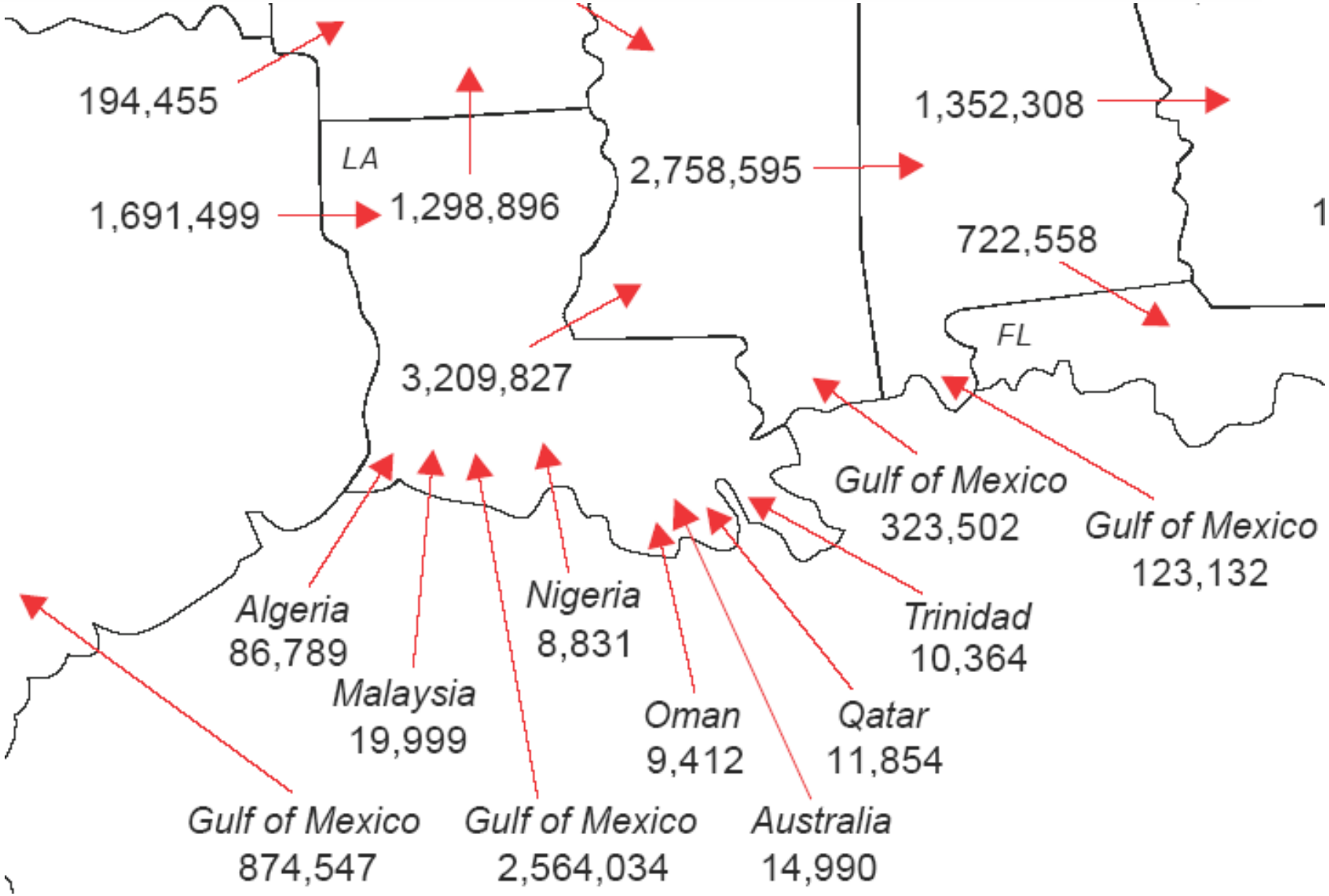
Source: Entergy

Power Outages-Rita

Moving Gas in N. America: Pipeline Transportation
Louisiana Region Pipelines



Interstate Movements of Natural Gas in the United States, 2004
(Million Cubic Feet)



Source: Energy Information Administration (EIA), Form EIA-176, "Annual Report of Natural and Supplemental Gas Supply and Disposition."

Natural Gas Flow Throughout Louisiana

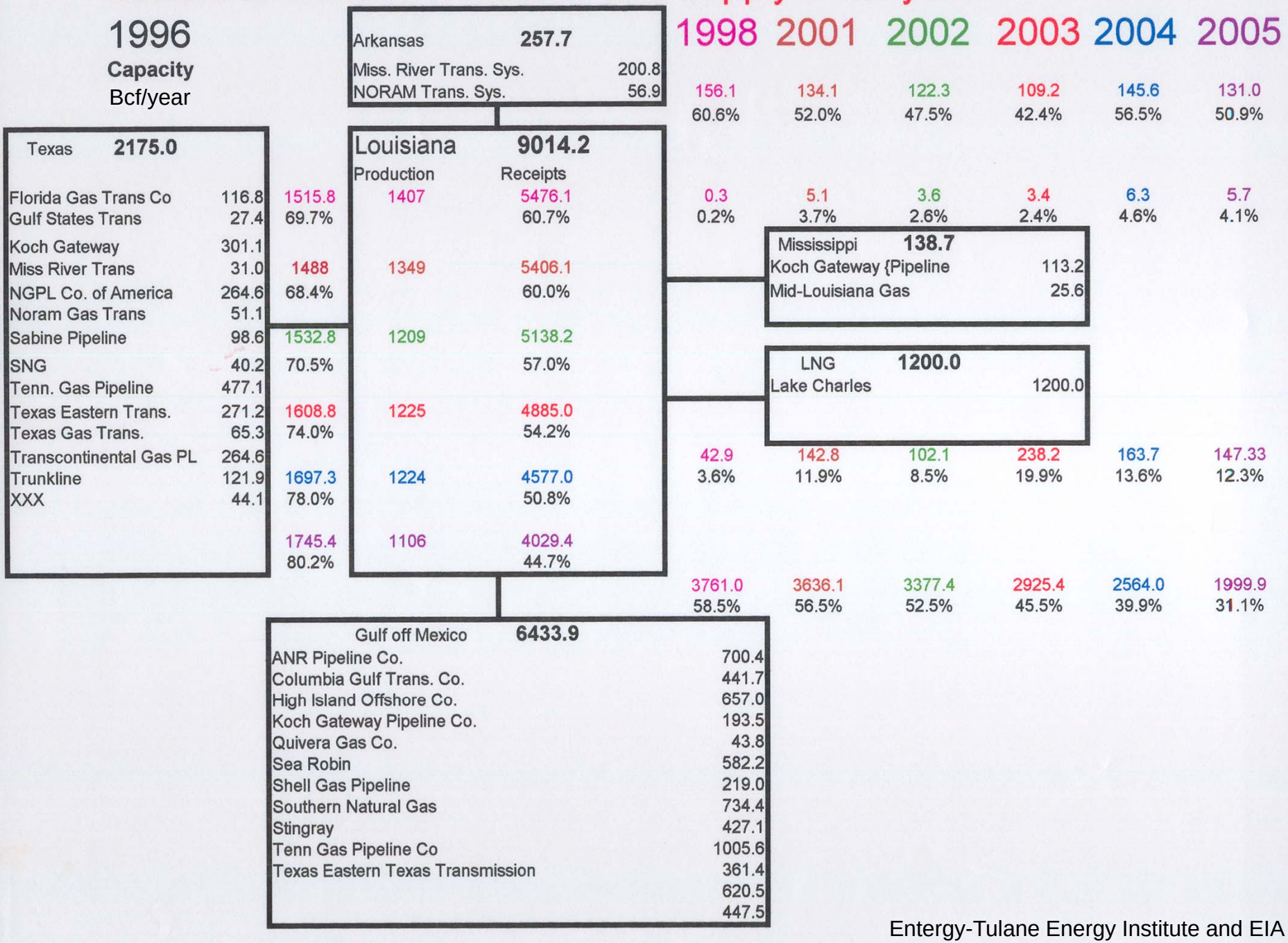
2000 LOUISIANA NATURAL GAS FLOW (Billion Cubic Feet)

2004 Numbers

Still about 21% of US supply

WS Nelson and Co., US Corps of Engineers and ETEI

Louisiana Inbound Domestic Gas Supply in bcf/year

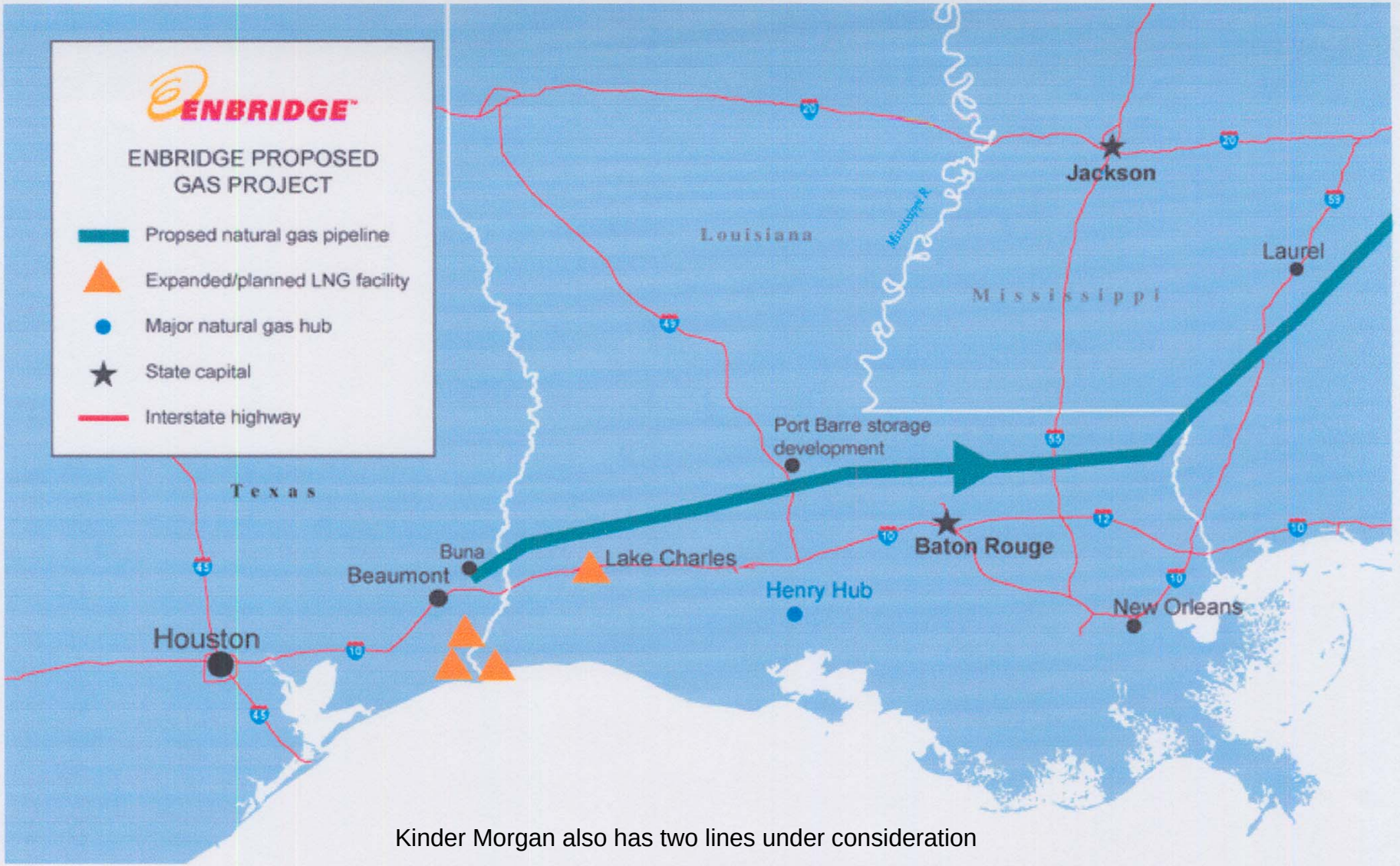


Entergy-Tulane Energy Institute and EIA

Potential Projects to Consider

- Pipeline Enhancements
  - Existing
  - New Capacity, same direction
  - New Capacity new gas sources
- Salt Cavern Storage
  - Onshore
  - Offshore
- Alternate Delivery Systems
  - Barges
  - Rail
  - Truck
- Buyer Aggregation
  - Petrochemicals
  - Paper
  - Power

New Pipelines and LNG terminals can provide Louisiana Access (But only if we acquire firm capacity)



Kinder Morgan also has two lines under consideration


Questions?
esmith11@tulane.edu