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A Perspective on the Houston Economy

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Concentration of Energy Production and Processing on the Gulf Coast

Because of the heavy concentration of energy facilities on the Texas and Louisiana Gulf Coast, the disruptions of Hurricanes Katrina and Rita became a compelling pocketbook issue throughout the United States.

One of the results of Hurricanes Katrina and Rita was a sudden and widespread public recognition that energy facilities are heavily concentrated on the Texas and Louisiana Gulf Coast. As these storms limited the production, processing and movement of U.S. energy products, the unfolding events in Texas and Louisiana became a compelling pocketbook issue throughout the United States. This article reviews the reasons for the concentration of so much energy activity on the Texas and Louisiana Gulf Coast and documents the extent of this concentration in both production and processing of oil and natural gas.

Why the Gulf of Mexico?

A question asked again and again by television reporters as the recent hurricanes crossed the Gulf of Mexico and approached land was how so

much energy infrastructure came to be located on the Gulf Coast. Table 1 shows that the size of the Gulf Coast population and economy probably plays a relatively small role. Texas and Louisiana combined account for 9.2 percent of the nation's population and 8.3 percent of its personal income. The Gulf Coast portions of these two states represent less than half the state totals, and the Houston–Texas City region alone makes up about half the Gulf Coast population and income.¹

Much more important than population is the concentration of oil and natural gas reserves in the region. Table 2 shows that 22.4 percent of the nation's oil reserves and 35.4 percent of its natural gas reserves are on the Gulf Coast or in adjacent state and federal waters. For both oil and gas, the federal offshore is home to by far the most reserves. In terms of production from these reserves, the Gulf's share is significantly higher for both products: 30.6 percent of U.S. oil and 38.7 percent of natural gas. Once again, the waters of the Gulf of Mexico dominate, providing 26.4

percent of U.S. oil production and 21.3 percent of natural gas.

Oil and gas exploration activity in the region accounted for 28.8 percent of the rigs active in the U.S. during the 12 months ending in October 2005. Although the Gulf of Mexico has fallen out of favor in this drilling cycle as a target for exploration, it was still the most active Gulf Coast region, with 12.8 percent of active rigs.² South Texas was the most active land area, with 8.2 percent of the working U.S. rigs.

History also plays a role in the concentration of energy facilities along the Gulf Coast. The first true gushers in the U.S. were the salt dome discoveries of the Texas Gulf Coast, beginning with Spindletop in 1900 and followed quickly by Sour Lake, Batson, North Dayton, Humble and many others. Several large refineries on the Gulf Coast, especially in Beaumont, Port Arthur and Houston, date to these huge discoveries in the industry's early days. The ties in skills and inputs between refineries, gas processors and petrochemical plants created numerous agglomerative cost economies as the region developed.

Energy processors are also drawn to the region by water transportation, an inexpensive way to move massive amounts of gas and liquid product by

Table 2

Gulf Coast and Offshore Areas as a Share of U.S. Reserves, Production and Drilling Activity (Percent)

	Reserves		Production		Drilling
	Oil	Natural Gas	Oil	Natural Gas	
United States	100.0	100.0	100.0	100.0	100.0
Gulf Coast	22.4	35.4	30.6	38.7	28.8
South Louisiana	1.4	1.8	2.0	4.2	2.3
Houston + Port Arthur	0.9	1.7	1.5	3.7	5.5
South Texas	0.4	5.5	0.7	9.5	8.2
Offshore Texas	1.1	3.5	3.5	N.A.	0.9
Offshore Louisiana	18.6	22.9	22.9	N.A.	11.9
Total Offshore	19.7	26.4	26.4	21.3	12.8

NOTE: Drilling data are for the 12-month period from November 2004 to October 2005. Offshore data are for both federal and state waters. Houston and Port Arthur are Texas Railroad Commission District 3; South Texas is District 2 plus District 4. Reserves and production data are for 2004.

SOURCES: Reserves and production are from the Energy Information Administration or from Texas and Louisiana state governments; drilling data are from Baker Hughes; authors' calculations.

ship or barge. These large volumes may be inputs, such as crude to be refined, or products, such as gasoline or fuel oil. The growing U.S. dependence on imported oil in recent years has simply heightened the importance of port facilities like the Louisiana Offshore Oil Port and the Houston Ship Channel.

Finally, for regions of the U.S. less familiar with gas processing, refining or petrochemical production, the plants are simply perceived as big, noisy, dirty and dangerous. They are natural targets for local not-in-my-backyard movements, often met with sympathy by regulators. In Texas and Louisiana, long familiarity has bred a comfort level and acceptance of the negatives generated by these plants that is not found elsewhere, as well as a better understanding of the positive economic impacts that accompany these facilities.

Processing Energy

Energy-processing facilities on the Gulf Coast fall primarily into three groups: refineries, gas processors and petrochemical producers. The refinery is the most familiar of these, taking a barrel of crude oil and turning it into

gasoline, heating oil, jet fuel, diesel and other oil products. Table 3 shows that about 17.1 million barrels per day of crude oil are refined in the U.S., 39.8 percent of it on the Gulf Coast. The share refined by the Texas and Louisiana Gulf Coast is slightly larger than the share refined in the East Coast, West Coast and Great Lakes regions combined.

On the Texas and Louisiana coastline, we see refinery capacity more or less uniformly divided between South Louisiana, Port Arthur–Lake Charles and Houston–Texas City. South Texas has only 4 percent of U.S. refining, concentrated in Corpus Christi.

Table 3

Refining Capacity on the Gulf Coast as a Share of U.S. Gas Processing

	Barrels (thousands)	Capacity (percent)
United States	17,125	100.0
West Coast	2,643	15.4
East Coast	1,717	10.0
Great Lakes	2,322	13.6
Gulf Coast	6,818	39.8
South Louisiana	2,123	12.4
Port Arthur–Lake Charles	1,716	10.0
Houston–Texas City	2,293	13.4
South Texas	686	4.0
Other U.S.	3,625	21.2

NOTE: Data refer to early 2005.

SOURCES: Energy Information Administration; authors' calculations.

Table 1

Texas, Louisiana and the Gulf Coast as a Share of U.S. Population and Income (Percent)

	Population	Personal income
Texas	7.6	7.0
Louisiana	1.6	1.3
Gulf Coast	4.0	3.6
South Louisiana	1.1	1.0
Port Arthur–Lake Charles	0.3	0.3
Houston–Texas City	1.9	2.0
South Texas	0.7	0.4

NOTE: Totals may not add due to rounding error. Data are for 2003.

SOURCES: Bureau of Economic Analysis; authors' calculations.

Table 4
Natural Gas Processing on the Gulf Coast as a Share of U.S. Gas Processing (Percent)

	Capacity	Gas throughput	Liquid products
United States	100.0	100.0	100.0
Gulf Coast	34.5	31.1	22.8
South Louisiana	21.5	18.1	11.1
Port Arthur–Lake Charles	5.4	4.5	3.4
Houston–Texas City	2.7	2.5	3.2
South Texas	5.0	6.1	5.1

NOTE: Parts may not sum to total due to rounding error. Data are annual for 2004.

SOURCES: *Oil and Gas Journal*; authors' calculations.

Natural gas used by consumers is primarily methane. When natural gas is produced from an oil or gas well, it may contain water vapor, hydrogen sulfide, carbon dioxide, helium, nitrogen or various natural gas liquids. The gas stream must be processed to remove impurities, but also to remove the heavier hydrocarbon liquids—ethane, butane, propane, isobutanes and natural gasoline—which have a higher value than the methane gas stream. The liquids will then be used for the manufacture of plastics or home heating fuel or as refinery feedstock.

Table 4 shows the concentration of natural gas-processing capacity and 2004 throughput of natural gas streams. The Gulf Coast accounts for 34.5 percent of U.S. capacity and 31.1 percent of throughput, figures that are slightly lower than the 38.7 percent share the Gulf Coast holds in natural gas production. The region accounts for only 22.8 percent of the

U.S. production of liquids because the Gulf Coast gas stream is less rich in liquids than it is in other parts of the country. South Louisiana is the dominant Gulf Coast location for these gas-processing facilities, accepting the gas streams as they come ashore from pipelines in the Gulf of Mexico. The Houston–Texas City share of U.S. gas processing is the smallest at only 2.5 percent, despite the fact that the Mont Belvieu market center, located outside Houston, is the NYMEX settlement point for gas liquids and a major storage center.

Petrochemical plants use the natural gas liquids or oil-based naphtha to produce plastic or synthetic rubber. Ethane and propane would be the large bellwether products for the industry, among thousands of plastic, rubber and polymer products that evolve as you go further downstream. Table 5 shows that the Gulf Coast dominates U.S. ethylene production, turning out 90.9 percent of the 28.3 million tons of ethylene produced each year. The Houston–Texas City region accounts for about half of the Gulf Coast ethylene production, while South Louisiana and Port Arthur–Lake Charles each account for 19 percent of U.S. output.

Table 6 is yet another way to see the concentration of a number of chemical products on the Gulf Coast. As Hurricanes Katrina and Rita crossed the Gulf of Mexico, the uncertainty of their paths and their power caused widespread precautionary shutdowns of petrochemical facilities. This table shows the percentage of

Table 6.
Chemical Plants Affected by Hurricanes (Percent capacity shut down at peak by each storm)

	Katrina	Rita
Ethylene	15.8	58.5
Propylene	18.5	30.7
Benzene	19.6	68.5
Polyethylene	3.7	63.0
Styrene	29.3	85.3
Butadiene	9.1	95.8

NOTE: Data are for 2004, expressed as a percentage of North American capacity.

SOURCE: CMAI Inc.

capacity shut down at the peak period by each storm, expressed as a percentage of North American capacity. It is again clear from this table the extent to which the Texas and Louisiana coasts dominate the U.S. petrochemical industry.

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Notes

¹ Table 1 divides the Texas and Louisiana Gulf Coast into four regions based on county definitions. Each region is anchored by one or more metropolitan areas. Seven counties of the Houston–Sugar Land–Baytown metropolitan area make up 92.2 percent of the population of the Houston–Texas City region. New Orleans is 64.5 percent of South Louisiana. Beaumont–Port Arthur and Lake Charles are 62.9 percent of the Port Arthur–Lake Charles region. Corpus Christi, Brownsville–Harlingen and McAllen–Edinburg are 68.8 percent of South Texas. Tables 3 through 5 are also based on these definitions. Table 2, as explained in the note, is based on state energy regulator definitions of Railroad Commission Districts (for Texas), South Louisiana and offshore state waters.

² The average number of working rigs in the Gulf of Mexico was 136 in 2000 and 148 in 2001. Drilling in the Gulf never bounced back from a cyclical low of 109 in 2002; the rig count averaged only 93 in 2004 and 88 year-to-date in 2005.

Table 5
Gulf Coast Ethylene Capacity as a Share of U.S. Capacity

	Million tons per year	Percent
United States	28.32	100.0
Gulf Coast	25.73	90.9
South Louisiana	5.37	19.0
Port Arthur–Lake Charles	5.39	19.0
Houston–Texas City	12.52	44.2
South Texas	2.45	8.7
Other	2.59	9.1

NOTE: Data are for 2004.

SOURCES: *Oil and Gas Journal*; authors' calculations.

Houston's economy continues to grow and perform well. Seasonally adjusted job growth has been at a 2.1 percent annual rate over the past three months, and the unemployment rate (inflated by hurricane evacuees) ticked down from 5.9 percent to 5.8 percent in October. Houston's Purchasing Managers Index continues to indicate rapid underlying growth in the local economy, with readings staying near 60—well above the 50 value that indicates no growth. Elevated energy prices and growing exploration activity continue to provide the basis for much of the current local expansion.

Retail and Auto Sales

October saw retailers generally meet their plan for the month, and soft sales in early November quickly picked up with the onset of cooler weather. Both department and discount stores were reporting good results as Thanksgiving approached. Talk of high gasoline prices as a barrier to retail sales dropped off as prices fell, but it has been replaced by concern about winter utility bills as another potential shock to consumer budgets.

Sales of cars and trucks in Houston followed the national trend downward in October, falling 1.2 percent compared with the year earlier. On a year-to-date basis, sales are up nearly 6 percent.

Single-Family Housing

Houston's existing home sales surged 12 percent in October, partly because of September closings that were

delayed until October by hurricanes. The median price of an existing home has risen 7.2 percent over the past 12 months.

Houston homebuilders had their best third quarter ever, with starts up 14 percent over the same period last year. New home sales equaled 96 percent of these third-quarter starts, keeping supply and demand in line. First-time homebuyers have been the primary driver in this market in recent quarters, perhaps hoping to beat interest rate increases.

Energy Prices

Crude prices in early October were near \$63 per barrel. They weakened steadily to near \$58 through the month. Rising crude inventories (about 10 percent above normal by mid-November) are due to weak domestic demand. The demand for distillates (diesel and heating oil) bounced back to above-normal levels in October, as did gasoline demand. The wholesale price of these products tended to follow crude down, although strong demand for diesel and the approach of the winter heating season kept distillates from falling as much as gasoline. Both gasoline and distillate inventories were near normal.

Refining and Chemicals

By mid-November, refining capacity utilization on the Gulf Coast had returned to 70 percent, from 40 percent in early October. Refining margins were

about \$25 per barrel for the month—an average of \$50 early in the month and \$10 at the end. Imports of refined products were up 70 percent from year-earlier levels.

Petrochemical producers have raised prices for a long list of basic products: polyethylene, acrylic, polypropylene, polystyrene and PVC. Spot prices for caustic soda have doubled in recent weeks. Ethylene prices have risen sharply as supply problems on the Gulf Coast were compounded by plant and pipeline outages in Canada. Transportation problems continue to plague the Gulf Coast, with complaints about truck and rail service, as well as a growing shortage of truck drivers.

Oil Services and Machinery

One contact described the oil service industry as running machinery and equipment at 100 percent capacity and asking 120 percent from its employees. Although exploration activity has slowed in the Gulf of Mexico, activity has shifted elsewhere. The domestic rig count has been flat in recent weeks. The most important shortages at present are cement and sand. About 200 new rigs are under construction, with 50 of those headed for use offshore. The big question is whether crews will be available as the rigs come on line. The industry is increasingly looking abroad for skills and labor.



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