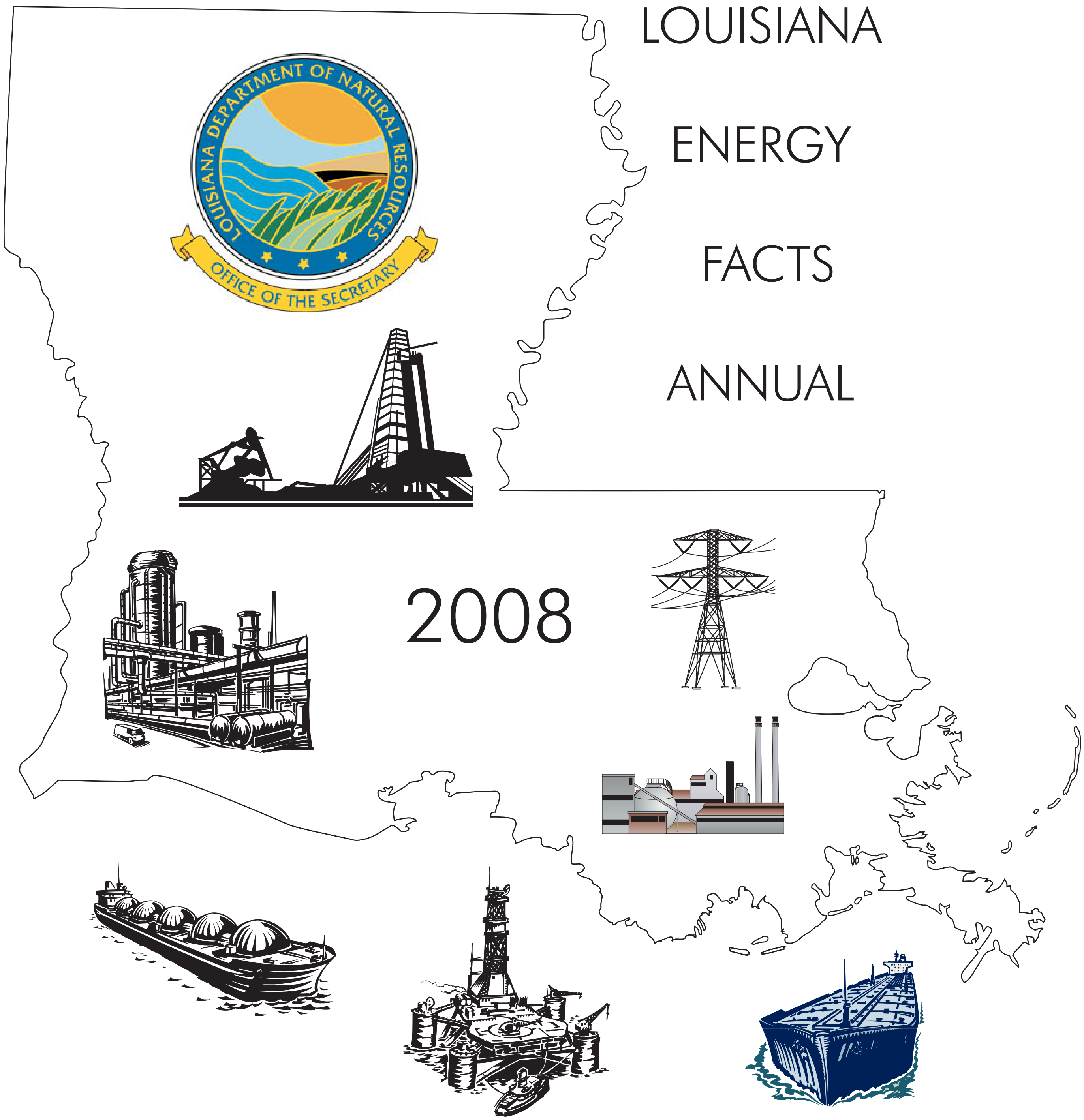
LOUISIANA ENERGY FACTS ANNUAL

2008



DEPARTMENT OF NATURAL RESOURCES
Technology Assessment Division
January 9, 2009

This issue of **Louisiana Energy Facts Annual - 2008** is funded 100% ($6,050.00) with Petroleum Violation Escrow funds as part of the State Energy Conservation Program as approved by the U.S. Department of Energy and the Department of Natural Resources.

This public document was published at a total cost of $6,050.00. 1,030 copies of this public document were published in this first printing at a total cost of $6,050.00 The total cost of all printings of this document, including reprints is $6,050.00. This document was published by the Department of Natural Resources, P.O. Box 94396, Baton Rouge, LA 70804-9396, to promulgate the State Energy Conservation Plan developed under authority of P.L. 94-163. This material was printed in accordance with the standards for printing by state agencies pursuant to R.S. 43:31.

LOUISIANA ENERGY FACTS

ANNUAL 2008

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January 9, 2009

General Questions and Comments

The **Louisiana Energy Facts Annual - 2008** (**Annual**) was published by the Technology Assessment Division of the Louisiana Department of Natural Resources under the direction of Manuel Lam. The division director is T. Michael French, William J. Delmar, Jr., is Assistant Director.

General questions and comments regarding the **Annual** may be referred to Technology Assessment Division staff at (225) 342-1270. Questions concerning specific areas of the **Annual** may be directed to the Technology Assessment Division staff members listed below.

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INTRODUCTION

ABOUT THIS PUBLICATION

The **Louisiana Energy Facts Annual** (**Annual**) is published to provide a comprehensive compendium of Louisiana related energy production and use statistics on a yearly basis. The data tables are supplemented with numerous graphs and charts to aid in the interpretation of the data and the discernment of trends. The **Annual** is published as soon as sufficient data for the previous calendar year is available. Due to time lags in the availability of some of the data, there is approximately a nine month lag before the current **Annual** can be published. Some changes have been introduced in order to incorporate the latest available data.

If you receive our monthly **Louisiana Energy Facts**, you may find that some of the previously published data has been revised in the **Annual**. This data, by its nature, continues to be revised, sometimes years after its initial publication. We try to bring attention to these changes by marking them as revisions.

The most recent **Louisiana Energy Facts** monthly newsletter may contain even more updates. Please refer to the recent monthlies for the very latest data. The **Louisiana Energy Facts** monthly newsletter is available in print and online at our website:

http://www.dnr.louisiana.gov/tad

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Note: the data in these tables will be updated throughout the year. The data files are not audited and will change as more reliable data becomes available.

The state oil and gas production data has been modified. Starting with the 2002 Annual, current production data and all future reports will reflect changes due to modifications in the reporting system by the DNR Office of Conservation, Production Audit Section. The new data for oil does not include crude oil, condensate, or raw make recovered from gas plants. In the past, these products were added to the state production as crude oil or condensate. A separate report on gas plant liquids production is not available at present. The gas data system was adjusted to reflect production from the well on the date produced. It was previously reported on the date first purchased.

Also the producing oil and gas well data since 2000 reflect changes due to modifications in the reporting system by the Department of Natural Resources Office of Conservation. The new data for oil and natural gas producing wells count them as productive if they had any production in the month, previous system counted only the producing wells at the end of the month.

This new reporting system aims to produce more accurate and timely data. The Technology Assessment Division is not the source of the data, but merely reports data provided to us by the responsible agency. We understand that users of our time series data need consistency and, for that reason, our time series have been adjusted backward to reflect these new modifications.

We hope you find this document useful, and we welcome any comments or suggestions.

Any comments or suggestions about this publication should be directed to the Technology Assessment Division staff members listed on the General Questions and Comments page.

2008 HIGHLIGHTS

The data in the 2008 **Louisiana Energy Facts Annual** contains some recent trends.

2008 crude oil prices and natural gas prices were in a roller coaster ride
Gas spot price average was $7.17 per MCF in 2007, and it was $9.21 per MCF in 2008; which is 28.5% higher than in 2007. The Louisiana natural gas spot market average in January 2008 was $7.78 per MCF, peaked in June at $13.61 per MCF, and fell to $6.32 per MCF. The 2009 average price for gas is expected to be around $6 per MCF.

South Louisiana average spot crude oil price was $102.29 per barrel in 2008 and it was $74.60 per barrel in 2007, a 37.1% increase compared to 2007. The Louisiana crude oil spot market average in January 2008 was $96.12 per barrel, peaked in June at $137.91 per barrel, and fell to $43.93 per barrel. The 2009 average is expected to be around $53 per barrel.

Oil and gas production decreased
Louisiana state crude oil and condensate production, excluding federal Outer Continental Shelf (OCS), was 70 million barrels in 2008, a 9.6% decrease from 2007. Louisiana state natural gas and casinghead, excluding OCS production was 1.29 TCF in 2008, a 4.4% decrease over 2007. The decline in oil and gas were caused by the closing of producing fields due to Hurricanes Gustav and Ike.

Drilling activity were mixed in state areas and decreased in OCS areas
The overall rig count in Louisiana, including the OCS area, decreased 6% from an average of 177 rigs operating each month in 2007 to 167 in 2008. Looking at where the activity was, though, shows drilling activity dropped 15% in OCS areas, rose 42% in state offshore waters, dropped 17% in state inland waters, dropped 25% in South Louisiana on land, and rose 18% in North Louisiana. The effects of Hurricanes Gustav and Ike are felt in drilling activities over OCS and South Louisiana; inland areas are showing a recovery. The North Louisiana drilling increased due to the rising activities in the Haynesville shale areas.

Other significant items
Louisiana's proved oil reserves and proved gas reserves were lower in 2007 than in 2006. The lower reserves were the reflection of fast depletion of oil and gas in the federal OCS areas. The onshore and state offshore showed some increase on oil as the result of strong drilling activities and high energy prices, but gas continous to decline.

Louisiana refineries' 2008 daily crude oil average runs to stills were 2.33 million barrels per day, 13% lower than the 2007 average reflecting the downturn in consumption due to recession.

Average employment in the oil and gas extraction industries was 46,764 in 2007, a 5% increase over 2006.

SUBDIVISIONS OF LOUISIANA

Table 1

LOUISIANA STATE CRUDE OIL PRODUCTION

Excluding OCS
(Barrels)

DATE	NORTH	SOUTH	OFFSHORE	TOTAL
1987	25,036,758	95,476,492	23,372,480	143,885,730
1988	23,966,252	88,701,776	22,800,047	135,468,075
1989	22,249,645	78,352,396	20,890,198	121,492,239
1990	22,681,173	72,770,216	21,356,618	116,808,007
1991	22,693,470	69,567,532	22,498,111	114,759,114
1992	21,914,801	68,285,536	21,820,087	112,020,424
1993	20,088,542	65,698,407	21,593,063	107,380,012
1994	17,236,407	59,754,375	21,163,672	98,154,453
1995	16,643,923	59,472,528	20,140,864	96,257,315
1996	16,900,516	58,970,676	19,117,088	94,988,280
1997	17,099,931	60,458,696	17,213,800	94,772,427
1998	15,607,719	60,784,952	15,120,246	91,512,918
1999	12,904,010	56,035,888	12,098,536	81,038,434
2000	11,740,980	53,090,500	11,131,564	75,963,044
2001	10,723,518	50,690,472	10,166,568	71,580,558
2002	8,934,876	43,931,982	8,139,036	61,005,894
2003	8,958,304	42,984,673	8,205,118	60,148,095
2004	8,422,901	42,226,686	6,942,556	57,592,143
2005	8,808,795 r	36,590,575 r	6,152,192 r	51,551,562 r
2006	7,363,723 r	36,237,002 r	6,365,574 r	49,966,299 r
January	642,379 r	3,325,643 r	527,665 r	4,495,687 r
February	594,805 r	2,911,895 r	556,018 r	4,062,718 r
March	668,736 r	3,283,775 r	644,308 r	4,596,819 r
April	645,429 r	3,223,220 r	612,533 r	4,481,182 r
May	676,793 r	3,289,665 r	622,625 r	4,589,083 r
June	622,216 r	3,141,323 r	572,567 r	4,336,106 r
July	634,521 r	3,212,255 r	584,093 r	4,430,869 r
August	632,344 r	3,195,889 r	582,185 r	4,410,418 r
September	611,349 r	3,204,362 r	525,252 r	4,340,963 r
October	658,221 r	3,305,581 r	575,969 r	4,539,771 r
November	582,936 r	3,197,825 r	537,034 r	4,317,795 r
December	645,400 r	3,212,305 r	575,237 r	4,432,942 r
2007 Total	**7,615,128 r**	**38,503,738 r**	**6,915,486 r**	**53,034,353 r**
January	607,050	3,030,180	644,340	4,281,570
February	578,122	2,873,184	629,654	4,080,960
March	618,747	3,115,978	659,989	4,394,715
April	601,673	3,056,742	645,766	4,304,181
May	612,580	3,132,276	657,308	4,402,164
June	604,933	3,090,413	649,946	4,345,291
July	615,753	3,179,033	664,771	4,459,557
August	576,154	3,017,737	628,736	4,222,627
September	476,528 p	1,832,587 p	295,045 p	2,604,160 p
October	509,154 p	2,195,557 p	364,212 p	3,068,922 p
November	506,487 p	2,429,537 p	411,275 p	3,347,300 p
December	534,321 p	2,731,890 p	422,164 p	3,688,375 p
2007 Total	**7,554,118 p**	**38,196,420 p**	**6,861,666 p**	**52,612,204 p**

e Estimated r Revised p Preliminary

Table 2

LOUISIANA STATE CONDENSATE PRODUCTION

Excluding OCS
(Barrels)

DATE	NORTH	SOUTH	OFFSHORE	TOTAL
1987	2,512,024	25,594,838	1,811,598	29,918,460
1988	2,780,394	27,008,968	1,739,471	31,528,833
1989	2,979,706	26,767,411	1,856,899	31,604,016
1990	3,341,804	26,878,867	1,686,289	31,906,959
1991	4,009,441	26,227,271	1,685,555	31,922,267
1992	3,787,973	25,395,894	1,601,573	30,785,440
1993	3,647,665	25,236,291	1,629,298	30,513,254
1994	3,726,903	23,751,352	1,497,320	28,975,575
1995	3,927,927	22,866,531	2,177,611	28,972,069
1996	5,162,593	26,495,266	2,313,383	33,971,242
1997	4,397,384	24,247,395	2,737,982	31,382,760
1998	3,962,756	24,405,878	2,400,173	30,768,807
1999	3,555,355	24,032,940	2,233,271	29,821,566
2000	3,670,053	25,212,928	2,339,594	31,222,575
2001	3,848,826	26,913,618	2,527,900	33,290,343
2002	3,771,112	26,452,434	2,445,060	32,668,607
2003	3,300,274	24,554,490	2,402,148	30,256,912
2004	2,680,844	22,097,844	1,300,488	26,079,176
2005	2,978,176 r	19,978,912 r	1,171,310 r	24,128,398 r
2006	2,590,620 r	20,126,121 r	1,291,477 r	24,008,218 r
January	229,834 r	1,712,196 r	114,579 r	2,056,608 r
February	194,404 r	1,565,782 r	98,336 r	1,858,522 r
March	210,145 r	1,794,453 r	105,569 r	2,110,167 r
April	198,056 r	1,698,608 r	99,886 r	1,996,550 r
May	217,832 r	1,771,683 r	110,296 r	2,099,811 r
June	202,586 r	1,753,049 r	102,992 r	2,058,627 r
July	206,101 r	1,791,677 r	105,209 r	2,102,987 r
August	194,834 r	1,701,390 r	99,862 r	1,996,085 r
September	187,194 r	1,642,143 r	96,340 r	1,925,676 r
October	195,821 r	1,725,749 r	101,198 r	2,022,767 r
November	183,508 r	1,734,600 r	95,231 r	2,013,338 r
December	192,661 r	1,822,764 r	100,403 r	2,115,829 r
2007 Total	**2,412,974 r**	**20,714,093 r**	**1,229,900 r**	**24,356,967 r**
January	203,042	1,803,577	108,273	2,114,893
February	192,018	1,699,839	104,027	1,995,885
March	207,627	1,845,163	110,771	2,163,561
April	199,552	1,790,650	107,513	2,097,714
May	208,965	1,876,810	108,324	2,194,100
June	196,278	1,788,352	110,769	2,095,400
July	201,929	1,850,440	111,029	2,163,399
August	190,077	1,720,927	103,249	2,014,254
September	144,744 p	996,932 p	45,049 p	1,186,726 p
October	167,220 p	1,217,218 p	57,811 p	1,442,249 p
November	171,343 p	1,376,926 p	72,260 p	1,620,529 p
December	177,389 p	1,497,364 p	84,511 p	1,759,265 p
2008 Total	**2,260,186 p**	**19,464,200 p**	**1,123,588 p**	**22,847,974 p**

e Estimated r Revised p Preliminary

Table 3

LOUISIANA STATE CRUDE OIL and CONDENSATE PRODUCTION

Excluding OCS
(Barrels)

DATE	NORTH	SOUTH	OFFSHORE	TOTAL
1987	27,548,782	121,071,330	25,184,078	173,804,190
1988	26,746,646	115,710,745	24,539,518	166,996,908
1989	25,229,350	105,119,808	22,747,097	153,096,255
1990	26,022,976	99,649,083	23,042,907	148,714,966
1991	26,702,911	95,794,803	24,183,667	146,681,381
1992	25,702,774	93,681,430	23,421,660	142,805,864
1993	23,736,207	90,934,698	23,222,361	137,893,266
1994	20,963,310	83,505,726	22,660,992	127,130,028
1995	20,571,849	82,339,060	22,318,475	125,229,384
1996	22,063,110	85,465,942	21,430,471	128,959,522
1997	21,497,315	84,706,090	19,951,782	126,155,187
1998	19,570,475	85,190,830	17,520,419	122,281,725
1999	16,459,365	80,068,828	14,331,807	110,860,000
2000	15,411,033	78,303,428	13,471,159	107,185,619
2001	14,572,344	77,604,090	12,694,467	104,870,901
2002	12,705,988	70,384,416	10,584,096	93,674,501
2003	12,258,578	67,539,163	10,607,266	90,405,007
2004	11,103,745	64,324,530	8,243,044	83,671,319
2005	11,786,972 r	56,569,486 r	7,323,502 r	75,679,960 r
2006	9,954,343 r	56,363,123 r	7,657,051 r	73,974,517 r
January	872,213 r	5,037,838 r	642,244 r	6,552,295 r
February	789,209 r	4,477,677 r	654,354 r	5,921,240 r
March	878,881 r	5,078,229 r	749,877 r	6,706,986 r
April	843,485 r	4,921,828 r	712,419 r	6,477,732 r
May	894,625 r	5,061,348 r	732,921 r	6,688,894 r
June	824,802 r	4,894,372 r	675,559 r	6,394,733 r
July	840,621 r	5,003,932 r	689,303 r	6,533,856 r
August	827,177 r	4,897,279 r	682,047 r	6,406,503 r
September	798,543 r	4,846,505 r	621,592 r	6,266,639 r
October	854,042 r	5,031,330 r	677,166 r	6,562,538 r
November	766,444 r	4,932,424 r	632,265 r	6,331,133 r
December	838,061 r	5,035,070 r	675,640 r	6,548,771 r
2007 Total	**10,028,102 r**	**59,217,831 r**	**8,145,387 r**	**77,391,320 r**
January	810,092	4,833,758	752,613	6,396,463
February	770,141	4,573,023	733,682	6,076,845
March	826,374	4,961,142	770,760	6,558,276
April	801,225	4,847,391	753,279	6,401,895
May	821,546	5,009,087	765,632	6,596,264
June	801,211	4,878,765	760,715	6,440,691
July	817,682	5,029,473	775,801	6,622,956
August	766,232	4,738,664	731,985	6,236,881
September	621,272 p	2,829,519 p	340,095 p	3,790,886 p
October	676,374 p	3,412,774 p	422,023 p	4,511,171 p
November	677,830 p	3,806,463 p	483,535 p	4,967,828 p
December	711,709 p	4,229,254 p	506,676 p	5,447,639 p
2008 Total	**9,101,688 p**	**53,149,313 p**	**7,796,794 p**	**70,047,795 p**

e Estimated r Revised p Preliminary

Figure 1

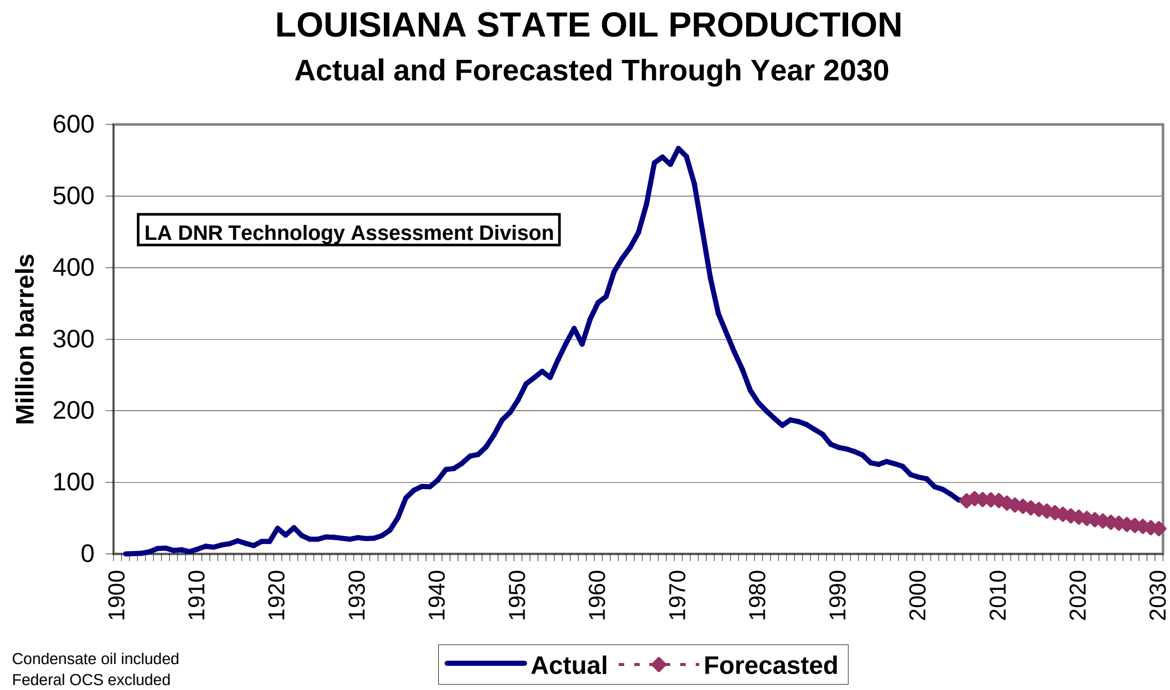
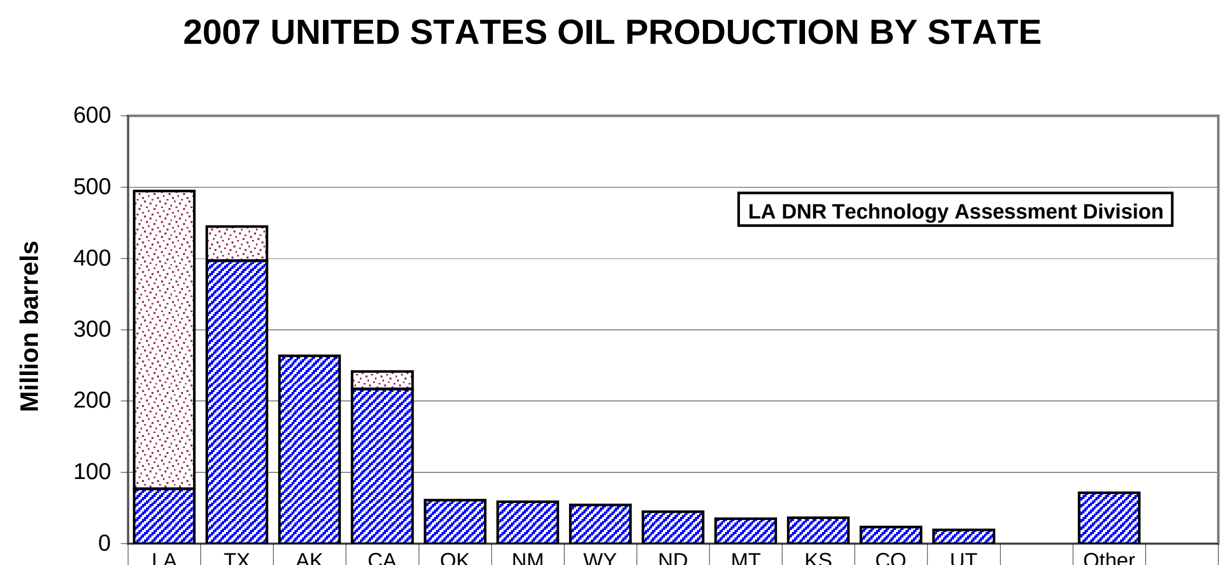


Figure 2



	LA	TX	AK	CA	OK	NM	WY	ND	MT	KS	CO	UT		Other	
Fed. OCS	418	48		25											
State	77	397	264	217	61	59	54	45	35	37	23	20		71	

Table 4

LOUISIANA TOTAL CRUDE OIL and CONDENSATE PRODUCTION
(Barrels)

DATE	ONSHORE	OFFSHORE State	OFFSHORE Federal OCS	TOTAL
1987	148,620,112	25,184,078	307,950,881	481,755,071
1988	142,457,390	24,539,518	261,936,530	428,933,438
1989	130,349,158	22,747,097	246,207,653	399,303,908
1990	125,672,059	23,042,907	264,670,535	413,385,501
1991	122,497,714	24,183,667	262,647,733	409,329,114
1992	119,384,204	23,421,660	288,918,208	431,724,072
1993	114,670,905	23,222,361	293,443,881	431,337,147
1994	104,469,036	22,660,992	293,077,191	420,207,219
1995	102,910,909	22,318,475	320,255,087	445,484,471
1996	107,529,051	21,430,471	349,101,048	478,060,570
1997	106,203,405	19,951,782	399,536,004	525,691,191
1998	104,761,306	17,520,419	425,865,901	548,147,626
1999	96,528,193	14,331,807	451,391,454	562,251,454
2000	93,686,412	13,468,756	477,645,662	584,800,830
2001	92,176,434	12,694,467	502,115,031	606,985,932
2002	83,090,405	10,584,096	508,630,349	602,304,850
2003	79,797,741	10,607,266	505,203,116 e	595,608,123
2004	75,428,275	8,243,044	477,182,586 e	560,853,905 e
2005	68,356,458 r	7,323,502 r	407,154,253 e	482,834,213 e r
2006	66,317,466 r	7,657,051 r	419,555,392 e	493,529,909 e r
January	5,910,051 r	642,244 r	38,118,980 e	44,671,275 e r
February	5,266,886 r	654,354 r	33,814,759 e	39,735,999 e r
March	5,957,109 r	749,877 r	35,965,043 e	42,672,029 e r
April	5,765,313 r	712,419 r	36,442,210 e	42,919,942 e r
May	5,955,973 r	732,921 r	38,297,771 e	44,986,665 e r
June	5,719,174 r	675,559 r	35,866,910 e	42,261,643 e r
July	5,844,553 r	689,303 r	35,818,248 e	42,352,104 e r
August	5,724,456 r	682,047 r	35,668,563 e	42,075,066 e r
September	5,645,047 r	621,592 r	32,289,087 e	38,555,726 e r
October	5,885,372 r	677,166 r	35,921,961 e	42,484,499 e r
November	5,698,868 r	632,265 r	32,417,487 e	38,748,620 e r
December	5,873,131 r	675,640 r	36,412,141 e	42,960,912 e r
2007 Total	**69,245,933 r**	**8,145,387 r**	**427,033,161 e**	**504,424,481 e r**
January	5,643,850	752,613	36,631,521 e	43,027,984 e
February	5,343,163	733,682	33,797,986 e	39,874,831 e
March	5,787,516	770,760	35,323,699 e	41,881,975 e
April	5,648,616	753,279	34,851,255 e	41,253,150 e
May	5,830,632	765,632	35,489,548 e	42,085,812 e
June	5,679,976	760,715	34,896,276 e	41,336,967 e
July	5,847,155	775,801	36,636,491 e	43,259,447 e
August	5,504,896	731,985	31,622,837 e	37,859,718 e
September	3,450,791 p	340,095 p	N/A	3,790,886 p
October	4,089,148 p	422,023 p	N/A	4,511,171 p
November	4,484,293 p	483,535 p	N/A	4,967,828 p
December	4,940,964 p	506,676 p	N/A	5,447,639 p
2008 Total	**62,251,001 p**	**7,796,794 p**	**279,249,614 e**	**349,297,410 p**

e Estimated r Revised p Preliminary

TABLE 5

LOUISIANA STATE OIL PRODUCTION* BY TAX RATES AS PUBLISHED IN SEVERANCE TAX REPORTS[8]
(Barrels)

DATE	FULL RATE	INCAPABLE WELLS RATE	STRIPPER WELLS RATE	TAXED VOLUME
1987	155,987,737	3,201,095	8,809,543	168,015,044
1988	142,605,746	3,288,994	8,242,330	154,150,151
1989	139,442,253	3,265,429	7,429,510	150,165,554
1990	131,140,448	3,274,774	7,154,125	141,577,610
1991	136,212,521	3,888,128	8,112,117	148,212,765
1992	133,399,849	3,665,298	7,718,696	144,783,843
1993	128,699,431	3,448,387	7,240,065	139,387,883
1994	118,109,958	3,691,802	6,347,047 e	128,148,807 e
1995	108,373,913	4,239,717	6,230,454 e	118,844,084 e
1996	103,524,192	3,786,147	6,240,956 e	113,551,295 e
1997	101,772,533	3,466,389	6,101,247 e	111,340,169 e
1998	89,083,365	2,878,225	5,892,007 e	97,853,597 e
1999	85,207,438	2,786,515	5,690,984 e	93,684,937 e
2000	88,411,207	2,783,268	5,322,515	96,516,990
2001	83,994,058	2,576,683	5,175,142	91,745,883
2002	79,038,703 e	2,571,901 e	4,681,607 e	86,292,211 e
2003	75,070,785	2,565,017	4,912,890	82,548,691
2004	73,133,821 r	2,852,851 r	4,838,681 r	80,825,353 r
2005	61,356,971	2,754,911	4,784,530	68,896,412
2006	61,520,365	2,621,592	4,786,820	68,928,778
January	5,763,025	244,528	413,008	6,420,561
February	4,880,474	209,914	438,751	5,529,139
March	4,562,688	178,309	324,043	5,065,040
April	6,074,834	170,158	378,266	6,623,257
May	5,581,901	279,168	454,952	6,316,021
June	4,372,531	255,812	327,192	4,955,535
July	7,369,947	272,132	433,594	8,075,673
August	5,301,248	205,006	376,054	5,882,308
September	5,071,598	96,231	176,212	5,344,041
October	5,408,842	248,138	415,448	6,072,428
November	5,036,543	226,050	398,589	5,661,183
December	4,612,977	227,051	395,346	5,235,375
2007 Total	**64,036,607**	**2,612,497**	**4,531,456**	**71,180,560**
January	5,490,146	219,983	399,429	6,109,558
February	4,526,833	207,434	432,833	5,167,100
March	5,252,980	174,947	409,016	5,836,944
April	5,567,585	161,546	371,905	6,101,036
May	5,924,849	482,316	363,612	6,770,778
June	5,564,100	-4,424	493,185	6,052,861
July	5,240,982	171,024	381,486	5,793,492
August	3,265,091	188,964	380,158	3,834,214
September	6,900,280	279,252	363,298	7,542,830
October	6,124,346	236,712	471,280	6,832,338
November	3,409,740	252,079	474,287	4,136,106
December	N/A	N/A	N/A	N/A
2008 Total	**57,266,932**	**2,369,833**	**4,540,490**	**64,177,255**

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* Due to reporting time lag and well exemptions the above figures are different from actual production. See footnote in Appendix B.

Figure 3

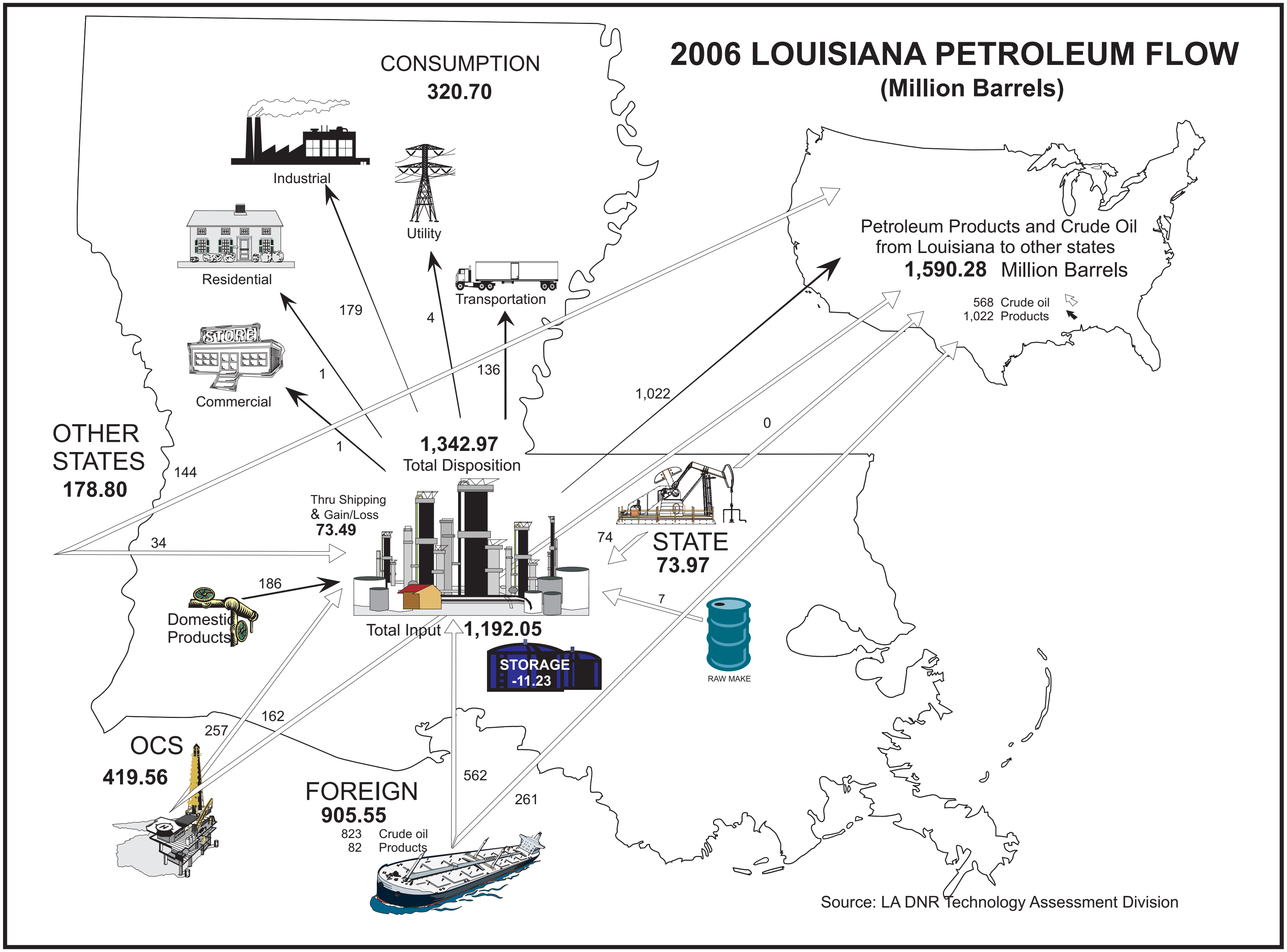
2006 LOUISIANA PETROLEUM FLOW
(Million Barrels)
CONSUMPTION
320.70
Industrial
Utility
Residential
Transportation
Commercial
179
4
1
136
1
1,342.97
Total Disposition
OTHER
STATES
178.80
144
34
Thru Shipping
& Gain/Loss
73.49
186
Domestic
Products
Total Input
1,192.05
STORAGE
-11.23
Petroleum Products and Crude Oil
from Louisiana to other states
1,590.28 Million Barrels
568 Crude oil
1,022 Products
1,022
0
74
STATE
73.97
7
RAW MAKE
OCS
419.56
257
162
FOREIGN
905.55
823 Crude oil
82 Products
562
261
Source: LA DNR Technology Assessment Division

Table 6

UNITED STATES OCS CRUDE OIL AND CONDENSATE PRODUCTION[12]

(Barrels)

YEAR	LOUISIANA	TEXAS	CALIFORNIA	TOTAL
1962	89,733,099	3,483	0	89,736,582
1963	104,526,436	52,804	0	104,579,240
1964	122,495,173	4,953	0	122,500,126
1965	144,964,868	3,747	0	144,968,615
1966	187,831,472	882,598	0	188,714,070
1967	218,995,828	2,865,786	0	221,861,614
1968	263,825,359	3,110,642	2,059,889	268,995,890
1969	300,159,292	2,759,851	9,940,844	312,859,987
1970	333,411,492	2,247,048	24,987,628	360,646,168
1971	385,760,351	1,685,047	31,103,548	418,548,946
1972	387,590,662	1,733,018	22,562,213	411,885,893
1973	374,196,856	1,617,829	18,915,314	394,729,999
1974	342,435,496	1,381,825	16,776,744	360,594,065
1975	313,592,559	1,340,136	15,304,757	330,237,452
1976	301,887,002	1,054,554	13,978,553	316,920,109
1977	290,771,605	909,037	12,267,598	303,948,240
1978	278,071,535	2,107,599	12,085,908	292,265,042
1979	271,008,916	3,595,546	10,961,076	285,565,538
1980	256,688,082	10,502,007	10,198,886	277,388,975
1981	255,875,717	14,284,661	19,605,027	289,765,405
1982	275,513,489	17,263,766	28,434,202	321,211,457
1983	298,093,559	19,710,197	30,527,487	348,331,243
1984	318,024,622	21,960,086	30,254,306	370,239,014
1985	338,901,863	20,640,957	29,781,465	389,324,285
1986	340,152,276	19,835,882	29,227,846	389,216,004
1987	307,950,881	24,634,142	33,556,686	366,141,709
1988	261,936,530	26,115,776	32,615,118	320,667,424
1989	246,207,653	25,887,841	33,072,161	305,167,655
1990	264,670,535	24,970,114	33,312,719	324,423,181
1991	262,647,733	24,380,908	29,146,090	323,831,064
1992	288,918,208	23,639,788	41,222,801	346,053,626
1993	293,443,881	20,376,996	50,078,144	358,655,540
1994	293,077,191	26,819,958	57,229,464	371,300,873
1995	320,255,087	20,419,104	71,254,440	416,293,300
1996	349,101,048	25,841,553	67,804,200	436,634,538
1997	399,536,004	28,718,405	58,279,489	469,873,968
1998	425,865,901	27,837,631	40,636,231	484,861,417
1999	451,391,454	31,758,296	42,071,101	537,198,889
2000	477,645,662	35,044,216	34,373,524	557,370,524
2001	502,115,031	42,991,844	34,763,192	592,514,727

	GULF OF MEXICO		PACIFIC	TOTAL
	CENTRAL	WESTERN		
2002	478,652,767	88,169,359	29,783,000	596,606,889
2003	476,746,239	83,696,697	30,001,000	596,824,889
2004	447,625,460	86,932,724	27,052,000	593,875,889
2005	327,825,527	74,791,038	26,554,000	593,377,889
2006	393,445,174	76,794,758	26,113,000	592,936,889
2007	407,085,520	57,946,760	24,691,000	489,723,280

NOTE: Starting in 2002 MMS has not formally published production by state adjacent areas

Table 7

UNITED STATES CRUDE OIL AND CONDENSATE PRODUCTION AND IMPORTS
(Thousand barrels)

DATE	ALL OCS[12]	DOMESTIC PRODUCTION[7]	IMPORTS OTHER[7]	IMPORTS SPR[7]
1987	366,142	3,047,385	1,679,365	26,645
1988	320,667	2,979,240	1,850,130	18,666
1989	305,168	2,778,745	2,112,255	20,440
1990	324,423	2,684,575	2,141,455	9,855
1991	315,693	2,707,039	2,110,332	0
1992	353,726	2,618,125	2,212,344	3,594
1993	362,676	2,495,933	2,451,415	5,367
1994	369,474	2,418,981	2,560,220	4,485
1995	408,875	2,383,404	2,642,689	0
1996	438,004	2,368,535	2,738,387	0
1997	478,775	2,339,981	2,918,425	0
1998	476,655	2,293,763	3,120,791	0
1999	513,318	2,162,752	3,132,376	2,065
2000	558,242	2,135,062	3,271,257	3,006
2001	591,588	2,136,179	3,334,438	3,914
2002	597,594	2,097,124	3,336,175 r	5,767
2003	599,132	2,073,454	3,527,696	747
2004	558,952	1,983,300	3,692,063	30,646 r
2005	494,332	1,890,107	3,663,887 r	14,746
2006	526,637	1,874,753	3,689,995	3,089
January	45,566	161,072	316,538	0
February	40,456	144,125	252,238	0
March	44,952	160,530	321,781	546
April	44,442	156,546	304,815	0
May	46,092	162,452	320,168	0
June	43,443	154,183	300,437	0
July	44,241	158,711	308,120	0
August	42,999	154,266	319,805	0
September	38,138	146,970	309,200	0
October	41,670	156,188	303,317	1,051
November	38,088	150,178	300,115	555
December	42,168	157,219	304,870	0
2007 Total	**512,255**	**1,862,440**	**3,661,404**	**2,152**
January	42,821	157,893	310,010	0
February	40,680	148,275	278,566	0
March	43,368	159,321	297,084	1,076
April	42,411	154,867	297,122	522
May	44,406	160,159	298,332	1,048
June	41,985	153,272	299,809	0
July	43,245	158,401	313,134	0
August	N/A	151,744	318,791	0
September	N/A	118,805	252,205	0
October	N/A	N/A	N/A	N/A
November	N/A	N/A	N/A	N/A
December	N/A	N/A	N/A	N/A
2008 Total	**298,916**	**1,362,737**	**2,665,053**	**2,646**

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Table 8

LOUISIANA STATE ROYALTY OIL, GAS AND PLANT PRODUCTS CALCULATED VOLUMES, Excluding OCS

DATE	OIL (Barrels)	GAS (MCF)	PLANT LIQUIDS (Barrels)
1987	8,040,773	78,166,315	511,790
1988	7,544,770	69,991,244	456,976
1989	7,184,774	69,936,929	461,237
1990	6,781,765	66,417,089	348,776
1991	6,923,565	61,809,109	1,063,909
1992	6,837,552	57,911,258	1,689,942
1993	6,721,350	67,052,274	698,857
1994	6,288,843	54,798,617	600,660
1995	6,301,254	57,032,170	938,660
1996	6,489,394	60,326,587	477,640
1997	6,534,913	60,778,002	1,440,435
1998	6,604,124	56,691,269	331,767
1999	6,030,138	51,051,870	204,124
2000	6,366,604 r	53,780,835	355,112
2001	7,059,789 r	65,034,347 r	983,641
2002	4,707,772 r	53,434,290 r	800,697 r
2003	4,910,469	53,135,969	1,459,006
2004	4,222,899	45,261,610	2,185,235
2005	3,337,902	34,431,220	1,098,219
2006	3,603,669 r	40,523,542 r	1,426,155 r
January	369,767 r	3,348,490 r	138,956 r
February	335,041 r	3,148,612 r	169,806 r
March	381,185 r	3,660,812 r	173,047 r
April	381,628 r	3,472,639 r	131,347 r
May	395,472 r	3,787,154 r	102,095 r
June	386,945 r	3,719,730 r	90,054 r
July	384,969 r	3,717,845 r	91,384 r
August	453,637 r	3,403,234 r	127,852 r
September	370,194 r	3,390,848 r	81,284 r
October	393,733 r	3,567,340 r	82,970 r
November	381,299 r	3,374,608 r	91,569 r
December	404,265 r	3,684,321 r	115,144 r
2007 Total	**4,638,135 r**	**42,275,632 r**	**1,395,509 r**
January	359,884	3,628,423	117,187
February	362,695	3,455,617	123,662
March	383,071	3,699,489	115,421
April	392,120	3,543,895	159,447
May	410,726	4,153,545	139,530
June	379,805	4,164,090	126,379
July	412,820	4,216,882	176,856
August	381,354	3,789,888	78,713
September	130,329	1,426,615	14,879
October	272,369	N/A	N/A
November	N/A	N/A	N/A
December	N/A	N/A	N/A
2008 Total	**3,485,172**	**32,078,445**	**1,052,073**

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Table 9
LOUISIANA STATE NATURAL GAS PRODUCTION
WET AFTER LEASE SEPARATION
Excluding OCS and Casinghead Gas
(Thousand Cubic Feet (MCF) at 15.025 psia and 60 degrees Fahrenheit)

DATE	NORTH	SOUTH	OFFSHORE	TOTAL
1987	303,050,793	1,041,232,533	199,093,721	1,543,377,047
1988	322,955,920	1,058,079,256	191,498,869	1,572,534,045
1989	335,963,137	1,035,013,840	180,876,988	1,551,853,965
1990	354,696,578	1,040,239,002	160,569,034	1,555,504,613
1991	345,612,948	1,022,125,055	129,387,685	1,497,125,688
1992	343,439,890	994,039,578	123,902,708	1,461,382,176
1993	333,395,251	970,764,461	130,660,784	1,434,820,496
1994	334,564,842	925,335,735	134,106,599	1,394,007,176
1995	344,719,040	908,236,089	140,906,019	1,393,861,148
1996	392,345,447	933,446,378	166,901,010	1,492,692,835
1997	405,754,260	871,963,879	165,420,090	1,443,138,229
1998	394,713,751	846,071,218	158,947,618	1,399,732,587
1999	361,118,420	814,417,104	134,177,750	1,309,713,274
2000	357,189,761	837,258,899	135,260,467	1,329,709,126
2001	353,377,620	852,065,248	134,462,013	1,339,904,880
2002	320,769,341	793,717,154	120,466,249	1,234,952,744
2003	312,104,013	797,103,212	118,553,029	1,227,760,254
2004	298,595,776	822,972,021	115,591,994	1,237,159,791
2005	387,732,660 r	704,136,734 r	97,391,905 r	1,189,261,298 r
2006	326,326,001 r	842,801,373 r	86,876,078 r	1,256,003,452 r
January	25,366,393 r	72,499,365 r	6,244,056 r	104,109,814 r
February	22,768,435 r	64,644,916 r	5,615,994 r	93,029,344 r
March	25,809,658 r	73,474,818 r	6,279,064 r	105,563,540 r
April	25,212,051 r	71,776,530 r	6,212,882 r	103,201,463 r
May	25,954,942 r	76,270,914 r	6,596,052 r	108,821,908 r
June	25,111,592 r	73,816,307 r	6,351,184 r	105,279,083 r
July	25,956,140 r	76,323,573 r	6,532,971 r	108,812,683 r
August	24,065,750 r	74,128,963 r	6,805,868 r	105,000,582 r
September	23,534,646 r	72,626,236 r	6,643,906 r	102,804,788 r
October	23,845,817 r	74,330,254 r	6,793,485 r	104,969,556 r
November	23,107,652 r	72,083,930 r	6,561,900 r	101,753,482 r
December	24,235,388 r	75,659,420 r	6,859,657 r	106,754,465 r
2007 Total	**294,968,465 r**	**877,635,225 r**	**77,497,019 r**	**1,250,100,708 r**
January	24,682,272	74,154,338	7,067,962	105,904,572
February	23,733,959	69,713,963	6,429,518	99,877,441
March	25,024,973	75,656,112	7,162,204	107,843,290
April	24,254,272	73,546,011	6,938,528	104,738,811
May	24,951,739	75,878,448	7,133,795	107,963,982
June	23,929,446	72,967,772	6,836,215	103,733,433
July	24,164,868	73,976,222	6,880,598	105,021,688
August	24,042,597	73,823,268	6,841,957	104,707,821
September	23,307,447 p	56,987,130 p	5,234,369 p	85,528,946 p
October	23,945,485 p	61,440,580 p	5,314,182 p	90,700,246 p
November	23,031,866 p	60,653,841 p	5,560,723 p	89,246,430 p
December	23,568,268 p	62,257,124 p	5,686,770 p	91,512,162 p
2008 Total	**288,637,193 p**	**831,054,809 p**	**77,086,820 p**	**1,196,778,822 p**

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Table 10

LOUISIANA STATE CASINGHEAD GAS PRODUCTION, WET AFTER LEASE SEPARATION, Excluding OCS

(Thousand Cubic Feet (MCF) at 15.025 psia and 60 degrees Fahrenheit)

DATE	NORTH	SOUTH	OFFSHORE	TOTAL
1987	53,608,927	111,178,438	29,030,143	193,817,508
1988	51,642,390	111,388,728	22,754,523	185,785,641
1989	43,226,234	95,636,544	22,432,765	161,295,543
1990	35,720,964	97,403,093	21,463,782	154,587,839
1991	36,360,803	94,750,220	20,506,337	151,617,360
1992	28,776,676	130,335,922	23,086,767	182,199,364
1993	20,416,003	134,059,073	23,177,673	177,652,749
1994	19,490,914	102,313,166	21,100,651	142,904,730
1995	18,712,027	100,070,988	23,542,867	142,325,882
1996	24,806,243	93,986,744	18,713,358	137,506,345
1997	36,266,759	103,835,554	20,423,408	160,525,721
1998	42,665,167	114,280,211	20,701,170	177,646,548
1999	33,073,036	96,225,193	15,421,052	144,719,281
2000	30,719,192	89,676,008	14,171,691	134,566,892
2001	36,132,040	102,647,460	16,582,573	155,362,073
2002	31,310,773	81,103,638	14,494,925	126,909,336
2003	31,296,272	74,469,504	11,825,368	117,591,144
2004	31,121,057	70,537,507	11,082,690	112,741,254
2005	25,077,958 r	62,376,328 r	8,137,507 r	95,591,793 r
2006	29,207,247 r	55,996,967 r	8,612,220 r	93,816,435 r
January	2,759,514 r	4,957,621 r	782,213 r	8,499,348 r
February	2,524,688 r	4,427,271 r	704,288 r	7,656,246 r
March	2,773,043 r	4,787,206 r	779,628 r	8,339,877 r
April	2,807,469 r	4,749,249 r	779,319 r	8,336,036 r
May	2,950,016 r	4,889,033 r	814,402 r	8,653,452 r
June	2,942,644 r	4,776,653 r	811,788 r	8,531,085 r
July	3,035,935 r	4,825,565 r	831,631 r	8,693,130 r
August	3,054,060 r	5,092,813 r	835,228 r	8,982,101 r
September	2,941,200 r	4,814,741 r	774,177 r	8,530,118 r
October	3,266,152 r	5,311,888 r	861,545 r	9,439,585 r
November	3,357,836 r	5,350,939 r	865,452 r	9,574,227 r
December	3,048,093 r	4,758,398 r	775,833 r	8,582,324 r
2007 Total	**35,460,649 r**	**58,741,375 r**	**9,615,505 r**	**103,817,529 r**
January	2,897,993	5,502,900	864,060	9,264,953
February	2,463,035	4,482,039	733,604	7,678,678
March	2,548,117	4,841,958	757,705	8,147,780
April	2,504,631	4,761,023	743,773	8,009,427
May	2,703,367	5,140,639	801,707	8,645,712
June	2,305,075	4,384,842	682,667	7,372,584
July	2,444,194	4,641,241	721,609	7,807,045
August	2,481,903	4,714,536	731,740	7,928,179
September	2,348,685 p	3,402,490 p	544,766 p	6,295,940 p
October	2,322,499 p	3,650,681 p	546,292 p	6,519,471 p
November	2,350,052 p	3,798,573 p	586,511 p	6,735,136 p
December	2,585,360 p	4,180,431 p	644,345 p	7,410,137 p
2008 Total	**29,954,911 p**	**53,501,352 p**	**8,358,779 p**	**91,815,042 p**

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Figure 4

LOUISIANA STATE GAS PRODUCTION
Actual and Forecasted Through Year 2030

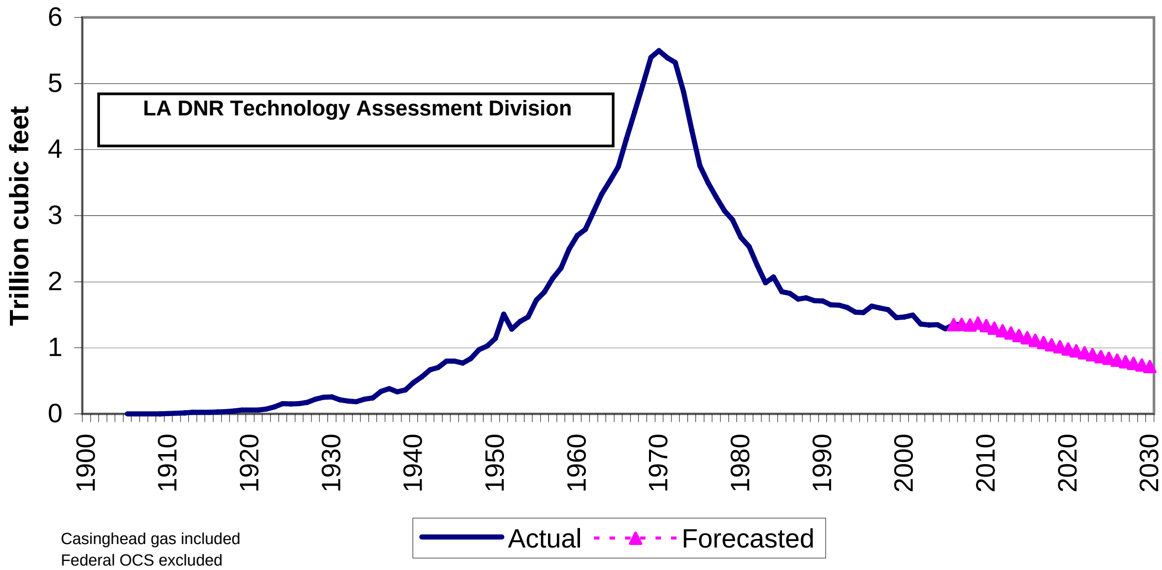
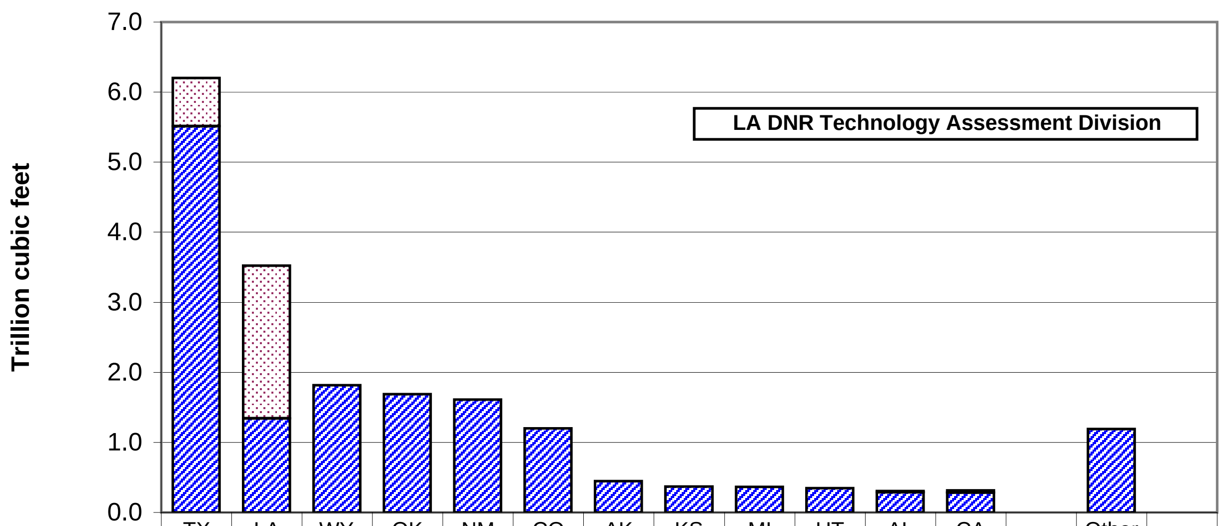


Figure 5

2007 UNITED STATES MARKETED GAS PRODUCTION BY STATE



	TX	LA	WY	OK	NM	CO	AK	KS	MI	UT	AL	CA		Other	
Fed. OCS	0.7	2.2					0.0				0.0	0.0			
State	5.5	1.3	1.8	1.7	1.6	1.2	0.4	0.4	0.4	0.3	0.3	0.3		1.2	

Table 11

LOUISIANA STATE GAS PRODUCTION, WET AFTER LEASE SEPARATION

Natural Gas and Casinghead Gas, Excluding OCS

(Thousand Cubic Feet (MCF) at 15.025 psia and 60 degrees Fahrenheit)*

DATE	NORTH	SOUTH	OFFSHORE	TOTAL
1987	356,659,720	1,152,410,971	228,123,864	1,737,194,555
1988	374,598,311	1,169,467,984	214,253,392	1,758,319,686
1989	379,189,370	1,130,650,385	203,309,753	1,713,149,508
1990	390,417,542	1,137,642,094	182,032,816	1,710,092,452
1991	381,973,751	1,116,875,275	149,894,021	1,648,743,048
1992	372,216,566	1,124,375,499	146,989,475	1,643,581,540
1993	353,811,255	1,104,823,534	153,838,456	1,612,473,245
1994	354,055,756	1,027,648,900	155,207,250	1,536,911,906
1995	363,431,067	1,008,307,077	164,448,886	1,536,187,030
1996	417,151,690	1,027,433,122	185,614,368	1,630,199,180
1997	442,021,019	975,799,433	185,843,498	1,603,663,950
1998	437,378,918	960,351,429	179,648,787	1,577,379,135
1999	394,191,456	910,642,297	149,598,802	1,454,432,555
2000	387,908,953	926,934,907	149,432,158	1,464,276,018
2001	389,509,659	954,712,708	151,044,585	1,495,266,953
2002	352,080,114	874,820,792	134,961,175	1,361,862,080
2003	343,400,285	871,572,716	130,378,397	1,345,351,398
2004	329,716,833	893,509,528	126,674,684	1,349,901,045
2005	412,810,617 r	766,513,062 r	104,086,979 r	1,284,853,091 r
2006	355,533,248 r	898,798,340 r	94,332,346 r	1,349,819,887 r
January	28,125,907 r	77,456,986 r	6,320,282 r	112,609,162 r
February	25,293,122 r	69,072,186 r	7,058,692 r	100,685,590 r
March	28,582,701 r	78,262,024 r	6,992,201 r	113,903,417 r
April	28,019,519 r	76,525,779 r	7,410,454 r	111,537,499 r
May	28,904,959 r	81,159,947 r	7,162,972 r	117,475,360 r
June	28,054,236 r	78,592,960 r	7,364,601 r	113,810,168 r
July	28,992,075 r	81,149,137 r	7,641,097 r	117,505,813 r
August	27,119,810 r	79,221,776 r	7,418,083 r	113,982,683 r
September	26,475,846 r	77,440,977 r	7,655,030 r	111,334,906 r
October	27,111,969 r	79,642,142 r	7,427,353 r	114,409,141 r
November	26,465,488 r	77,434,868 r	7,635,490 r	111,327,709 r
December	27,283,481 r	80,417,818 r	7,932,022 r	115,336,789 r
2007 Total	**330,429,114 r**	**936,376,600 r**	**88,018,277 r**	**1,353,918,237 r**
January	27,580,265	79,657,238	7,163,123	115,169,525
February	26,196,994	74,196,002	7,919,910	107,556,119
March	27,573,090	80,498,070	7,682,301	115,991,070
April	26,758,903	78,307,034	7,935,501	112,748,238
May	27,655,106	81,019,087	7,518,882	116,609,694
June	26,234,522	77,352,614	7,602,207	111,106,017
July	26,609,063	78,617,464	7,573,697	112,828,733
August	26,524,499	78,537,804	5,779,135	112,636,000
September	25,656,132 p	60,389,620 p	5,860,474 p	91,824,886 p
October	26,267,984 p	65,091,260 p	6,147,234 p	97,219,718 p
November	25,381,918 p	64,452,414 p	6,331,115 p	95,981,566 p
December	26,153,628 p	66,437,555 p	7,614,132 p	98,922,298 p
2008 Total	**318,592,104 p**	**884,556,161 p**	**85,127,709 p**	**1,288,593,864 p**

e Estimated r Revised p Preliminary

* See Appendix D-1 for corresponding volumes at 14.73 psia and footnote in Appendix B.

Table 12

LOUISIANA TOTAL GAS PRODUCTION, WET AFTER LEASE SEPARATION

Natural Gas and Casinghead Gas

(Thousand Cubic Feet (MCF) at 15.025 psia and 60 degrees Fahrenheit)*

DATE	ONSHORE	OFFSHORE State	OFFSHORE Federal OCS[12]	TOTAL
1987	1,509,070,691	228,123,864	3,117,669,167	4,854,863,722
1988	1,544,066,294	214,253,392	3,036,077,646	4,794,397,332
1989	1,509,839,755	203,309,753	2,947,545,132	4,660,694,640
1990	1,528,059,636	182,032,816	3,633,554,307	5,343,646,759
1991	1,498,849,027	149,894,021	3,225,373,562	4,874,116,610
1992	1,496,592,065	146,989,475	3,272,561,370	4,916,142,910
1993	1,458,634,789	153,838,456	3,320,312,261	4,932,785,506
1994	1,381,704,656	155,207,250	3,423,837,064	4,960,748,970
1995	1,371,738,144	164,448,886	3,564,677,663	5,100,864,693
1996	1,444,584,812	185,614,368	3,709,198,609	5,410,100,330
1997	1,417,820,452	185,843,498	3,825,354,038	5,400,353,243
1998	1,397,730,348	179,648,787	3,814,583,541	5,347,968,497
1999	1,304,833,753	149,598,802	3,836,619,562	5,215,724,146
2000	1,314,843,860	149,432,158	3,761,812,062	5,226,088,080
2001	1,344,222,368	151,044,585	3,818,657,416	5,313,924,369
2002	1,226,900,905	134,961,175	3,457,864,868	4,819,726,948
2003	1,214,973,001	130,378,397	3,276,387,510 e	4,621,738,908 e
2004	1,223,226,361	126,674,684	2,840,552,489 e	4,190,453,534 e
2005	1,179,323,679 r	105,529,412 r	2,185,591,643 e	3,470,444,734 e r
2006	1,254,331,588 r	95,488,299 r	2,048,437,877 e	3,398,257,764 e r
January	105,582,893 r	7,026,269 r	171,693,025 e	284,302,187 e r
February	94,365,308 r	6,320,282 r	155,471,541 e	256,157,131 e r
March	106,844,725 r	7,058,692 r	174,312,810 e	288,216,227 e r
April	104,545,298 r	6,992,201 r	170,576,234 e	282,113,733 e r
May	110,064,906 r	7,410,454 r	180,137,943 e	297,613,303 e r
June	106,647,196 r	7,162,972 r	171,478,116 e	285,288,284 e r
July	110,141,212 r	7,364,601 r	172,674,649 e	290,180,462 e r
August	106,341,586 r	7,641,097 r	168,067,709 e	282,050,392 e r
September	103,916,823 r	7,418,083 r	156,498,201 e	267,833,107 e r
October	106,754,111 r	7,655,030 r	167,906,447 e	282,315,588 e r
November	103,900,356 r	7,427,353 r	162,043,006 e	273,370,715 e r
December	107,701,299 r	7,635,490 r	171,198,900 e	286,535,689 e r
2007 Total	**1,266,805,713 r**	**87,112,524 r**	**2,022,058,582** e	**3,375,976,819 e r**
January	107,237,503	7,932,022	165,702,114 e	280,871,639 e
February	100,392,996	7,163,123	157,227,906 e	264,784,025 e
March	108,071,160	7,919,910	161,899,779 e	277,890,849 e
April	105,065,937	7,682,301	150,394,096 e	263,142,334 e
May	108,674,193	7,935,501	151,686,387 e	268,296,081 e
June	103,587,135	7,518,882	148,998,194 e	260,104,211 e
July	105,226,526	7,602,207	145,456,393 e	258,285,125 e
August	105,062,303	7,573,697	135,093,728 e	247,729,728 e
September	86,045,752 p	5,779,135 p	N/A	91,824,886 p
October	91,359,244 p	5,860,474 p	N/A	97,219,718 p
November	89,834,332 p	6,147,234 p	N/A	95,981,566 p
December	92,591,183 p	6,331,115 p	N/A	98,922,298 p
2008 Total	**1,203,148,264 p**	**85,445,599 p**	**1,216,458,598 e**	**2,505,052,462 p**

e Estimated   r Revised   p Preliminary

* See Appendix D-2 for corresponding volumes at 14.73 psia and footnote in Appendix B.

Table 13

LOUISIANA MARKETED AND DRY GAS PRODUCTION

(Billion Cubic Feet (BCF) at 15.025 psia and 60 degrees Fahrenheit)*

DATE	MARKETED State	MARKETED OCS[12]	MARKETED Total[3]	EXTRACTION LOSS[3]	DRY[3]
1966	4,063 e	937	5,000 e	N/A	N/A
1967	4,549 e	1,055	5,605 e	113	5,492
1968	4,918 e	1,372	6,290 e	138	6,153
1969	5,317 e	1,769	7,086 e	176	6,910
1970	5,429 e	2,206	7,635 e	189	7,446
1971	5,367 e	2,556	7,923 e	191	7,732
1972	5,020 e	2,797	7,816 e	194	7,622
1973	5,115 e	2,966	8,081 e	203	7,878
1974	4,351 e	3,251	7,601 e	191	7,411
1975	3,717 e	3,234	6,951 e	186	6,766
1976	3,472 e	3,397	6,869 e	169	6,700
1977	3,533 e	3,540	7,073 e	163	6,910
1978	3,302 e	4,028	7,330 e	158	7,171
1979	3,087 e	4,036	7,124 e	162	6,961
1980	2,908 e	3,896	6,804 e	139	6,664
1981	2,661 e	3,986	6,647 e	140	6,507
1982	2,359 e	3,692	6,050 e	126	5,924
1983	2,147 e	3,080	5,227 e	122	5,106
1984	2,237 e	3,473	5,711 e	130	5,581
1985	1,890 e	3,025	4,915 e	115	4,800
1986	1,958 e	2,842	4,799 e	113	4,686
1987	1,935 e	3,086	5,022 e	122	4,899
1988	2,073 e	3,006	5,079 e	118	4,961
1989	2,060 e	2,918	4,978 e	119	4,859
1990	1,542 e	3,597	5,139 e	117	5,022
1991	1,742 e	3,193	4,936 e	127	4,809
1992	1,617 e	3,201	4,818 e	130	4,688
1993	1,642 e	3,252	4,893 e	128	4,765
1994	1,658 e	3,410	5,068 e	126	4,942
1995	1,650 e	3,358	5,008 e	143	4,865
1996	1,596 e	3,590	5,186 e	137	5,049
1997	1,505	3,580	5,085	144	4,882
1998	1,552	3,580	5,132	139	4,933
1999	1,567	3,565	5,132	158	4,912
2000	1,455	3,592	5,047	165	4,928
2001	1,502	3,601 e	5,103 e	153 e	4,926 e
2002	1,362	3,351 e	4,713 e	157 e	4,532 e
2003	1,350	3,172 e	4,522 e	125 e	4,467 e
2004	1,357	2,754 e	4,111 e	133 e	4,249 e
2005	1,296	2,116 e	3,412 e	130 e	3,273 e
2006	1,380	2,052 e	3,432 e	129 e	3,293 e
2007	1,200	1,916 e	3,116 e	127 e	2,989 e

e Estimated r Revised p Preliminary

* See Appendix D-3 for corresponding volumes at 14.73 psia and footnote in Appendix B.

Figure 6

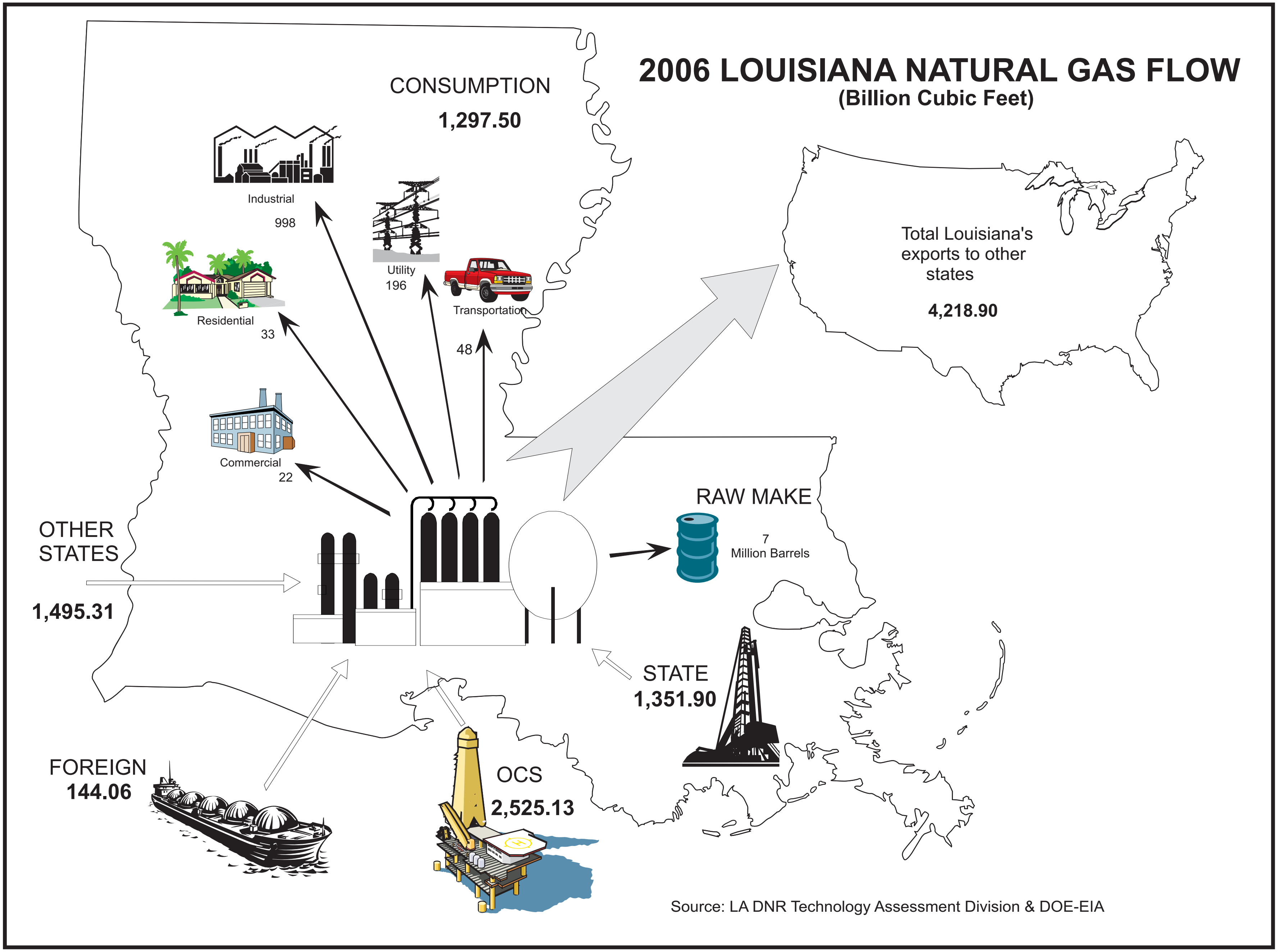

2006 LOUISIANA NATURAL GAS FLOW
(Billion Cubic Feet)
CONSUMPTION
1,297.50
Industrial
998
Utility
196
Transportation
48
Residential
33
Commercial
22
Total Louisiana's exports to other states
4,218.90
OTHER STATES
1,495.31
RAW MAKE
7
Million Barrels
STATE
1,351.90
FOREIGN
144.06
OCS
2,525.13
Source: LA DNR Technology Assessment Division & DOE-EIA

Table 14

LOUISIANA STATE GAS PRODUCTION BY TAX RATES

AS PUBLISHED IN SEVERANCE TAX REPORTS[8]

(MCF at 15.025psia and 60 degrees Fahrenheit)

DATE	FULL RATE	INCAPABLE GAS WELLS RATE	OTHER RATES	TAXED VOLUME
1987	1,577,841,418 r	56,316,278 r	20,374,445 r	1,654,532,141 r
1988	1,487,438,834 r	54,709,819 r	22,370,768 r	1,564,519,421 r
1989	1,529,057,929 r	54,419,642 r	31,800,386 r	1,615,277,957 r
1990	1,525,451,737 r	53,547,797 r	19,438,902 r	1,598,438,436 r
1991	1,492,986,396 r	52,500,178 r	35,820,609 r	1,581,307,183 r
1992	1,499,489,622 r	55,146,661 r	25,466,874 r	1,580,103,157 r
1993	1,463,723,027 r	46,017,071 r	13,839,450 r	1,523,579,548 r
1994	1,410,035,722 r	52,417,334 r	13,688,870 r	1,476,141,926 r
1995	1,334,980,887 r	53,491,942 r	13,759,192 r	1,402,232,021 r
1996	1,354,105,430 r	52,368,159 r	11,191,715 r	1,417,665,304 r
1997	1,343,182,922 r	57,663,413 r	9,951,387 r	1,410,797,722 r
1998	1,191,471,607 r	60,242,544 r	11,733,098 r	1,263,447,249 r
1999	1,151,493,116 r	57,308,865 r	10,617,631 r	1,219,419,612 r
2000	1,217,171,149 r	53,797,867 r	8,195,799 r	1,279,164,815 r
2001	1,264,513,132 r	74,687,708 r	7,806,688 r	1,347,007,528 r
2002	1,068,512,639 r	75,724,074 r	7,748,258 r	1,151,984,971 r
2003	1,091,483,424 r	80,659,914 r	7,963,553 r	1,180,106,891 r
2004	1,139,626,885 r	83,441,736 r	5,507,456 r	1,235,308,986 r
2005	1,130,014,025 r	91,951,579 r	4,642,451 r	1,227,085,699 r
2006	1,134,544,485 r	113,490,843 r	5,545,802 r	1,253,870,355 r
January	94,914,940 r	9,051,086 r	542,187 r	104,508,213 r
February	81,451,825 r	8,406,131 r	602,148 r	90,503,465 r
March	79,685,460 r	10,245,994 r	673,386 r	90,625,996 r
April	92,383,059 r	9,065,815 r	810,947 r	102,276,578 r
May	94,872,491 r	10,166,354 r	621,877 r	105,677,344 r
June	78,161,634 r	10,720,017 r	519,750 r	89,415,411 r
July	124,449,626 r	12,737,772 r	869,069 r	138,084,785 r
August	92,338,062 r	11,174,892 r	526,814 r	104,039,768 r
September	81,378,577 r	8,592,290 r	527,020 r	90,511,398 r
October	91,289,876 r	12,293,765 r	327,958 r	103,921,692 r
November	86,814,611 r	10,852,684 r	610,590 r	98,299,202 r
December	72,771,008 r	9,093,029 r	733,454 r	82,597,491 r
2007 Total	**1,070,511,169** r	**122,399,829** r	**7,365,200** r	**1,200,461,343** r
January	85,134,647	10,694,516	511,188	96,358,968
February	95,247,522	11,995,084	715,551	107,958,157
March	86,245,743	9,746,823	593,092	96,596,304
April	75,431,836	9,986,625	613,801	86,061,712
May	93,069,866	14,349,916	545,281	107,979,256
June	86,575,149	11,031,237	557,726	98,179,385
July	102,915,391	13,390,052	650,769	116,973,626
August	36,492,269	5,275,993	144,853	41,913,115
September	140,396,102	16,889,543	914,858	158,230,250
October	91,329,296	11,762,050	404,443	103,507,764
November	65,390,930	10,865,459	252,501	76,521,468
December	N/A	N/A	N/A	N/A
2008 Total	**958,228,751**	**125,987,298**	**5,904,063**	**1,090,280,005**

e Estimated r Revised p Preliminary

See footnote in Appendix B.

Table 15

UNITED STATES OCS GAS PRODUCTION[12]

Natural Gas and Casinghead Gas
(MCF at 15.025 psia and 60 degrees Fahrenheit)*

YEAR	LOUISIANA	TEXAS	CALIFORNIA	TOTAL
1963	553,272,142	0	0	553,272,142
1964	609,524,401	0	0	609,524,401
1965	632,914,005	0	0	632,914,005
1966	946,433,484	41,233,595	0	987,667,078
1967	1,065,915,553	97,990,476	0	1,163,906,029
1968	1,385,715,670	107,752,805	783,984	1,494,252,460
1969	1,786,760,423	124,601,568	4,750,708	1,916,112,699
1970	2,228,516,212	130,683,192	11,989,041	2,371,188,444
1971	2,582,297,962	124,857,371	15,363,786	2,722,519,119
1972	2,824,792,196	144,267,198	9,836,582	2,978,895,976
1973	2,995,634,220	145,754,588	7,143,485	3,148,532,293
1974	3,283,413,450	156,838,375	5,464,209	3,445,716,035
1975	3,266,745,456	120,166,178	3,874,047	3,390,785,681
1976	3,431,149,749	90,764,667	3,406,969	3,525,321,386
1977	3,575,898,616	85,236,246	3,225,368	3,664,360,230
1978	4,068,255,571	227,305,175	3,404,117	4,298,964,864
1979	4,076,873,552	501,546,069	2,810,535	4,581,230,155
1980	3,934,902,550	612,378,333	3,046,020	4,550,326,904
1981	4,025,867,929	715,937,640	12,515,654	4,754,321,224
1982	3,729,057,653	841,173,981	17,402,403	4,587,634,037
1983	3,111,576,348	834,112,318	15,709,672	3,961,398,338
1984	3,508,475,799	913,008,621	27,260,940	4,448,745,360
1985	3,055,687,773	818,533,627	48,198,926	3,922,420,326
1986	2,870,347,386	959,161,285	41,850,867	3,871,359,539
1987	3,117,669,167	1,180,839,487	40,181,438	4,338,690,093
1988	3,036,077,646	1,155,285,485	33,891,880	4,225,255,011
1989	2,947,545,132	1,142,237,197	28,013,874	4,117,796,204
1990	3,633,554,307	1,321,607,333	37,775,234	4,992,936,873
1991	3,225,373,562	1,161,671,524	39,828,917	4,426,874,003
1992	3,272,561,370	1,215,055,449	40,071,149	4,593,647,066
1993	3,320,312,261	1,007,755,289	41,255,853	4,444,381,437
1994	3,423,837,064	994,291,314	40,860,740	4,565,582,229
1995	3,564,677,663	890,682,224	35,710,325	4,600,143,070
1996	3,709,198,609	953,772,416	37,080,328	4,925,771,640
1997	3,825,354,038	946,381,458	39,922,549	4,977,314,878
1998	3,814,583,541	850,572,237	25,912,242	4,740,449,969
1999	3,836,619,562	798,140,396	36,529,861	4,894,344,157
2000	3,761,812,062	869,068,079	36,131,657	4,879,959,028
2001	3,818,657,416	898,035,393	39,653,837	5,114,612,578

	GULF OF MEXICO		PACIFIC	TOTAL
	CENTRAL	WESTERN		
2002	3,510,522,709	999,720,152	35,248,976	4,575,073,329
2003	3,326,281,736	1,065,770,532	37,453,422	4,482,554,088
2004	2,883,809,634	1,099,125,084	37,501,415	4,087,674,506
2005	1,935,105,938	773,450,925	36,734,604	2,746,755,154
2006	2,122,733,551	779,987,637	37,229,814	2,940,229,138
2007	2,095,397,494	635,587,701	25,016,839	2,801,958,969

NOTE: Starting in 2002 MMS has not formally published production by state adjacent areas

e Estimated r Revised p Preliminary

* See Appendix D-4 for corresponding volumes at 14.73 psia and footnote in Appendix B.

Figure 7

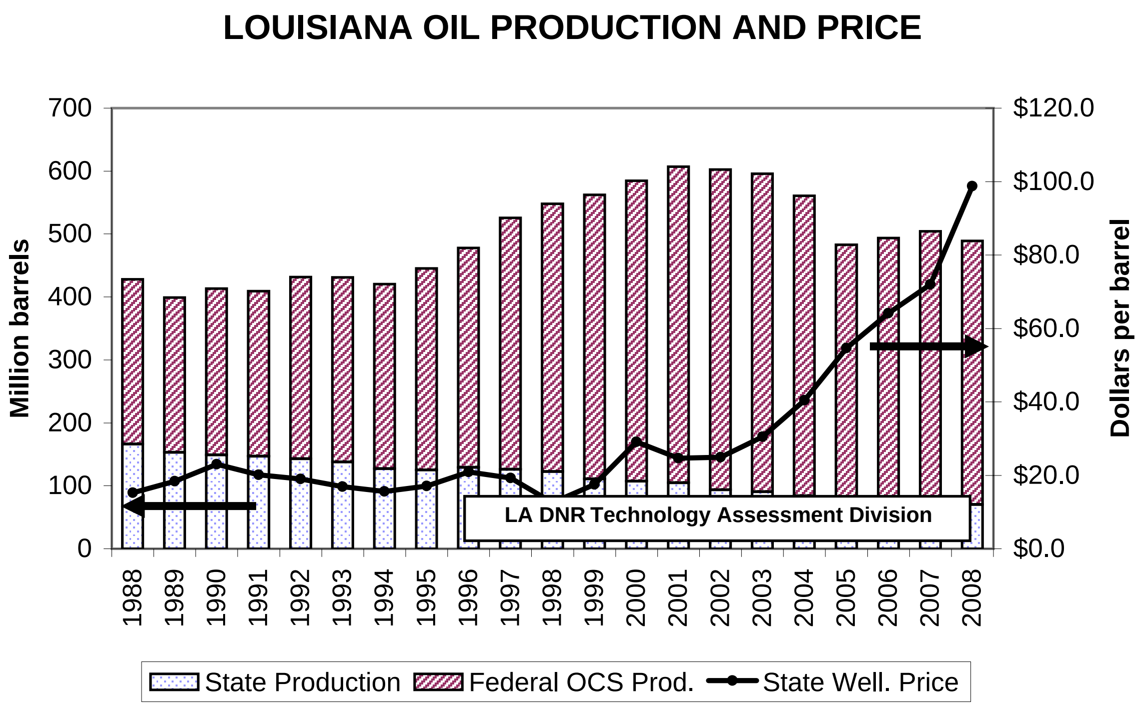


Figure 8

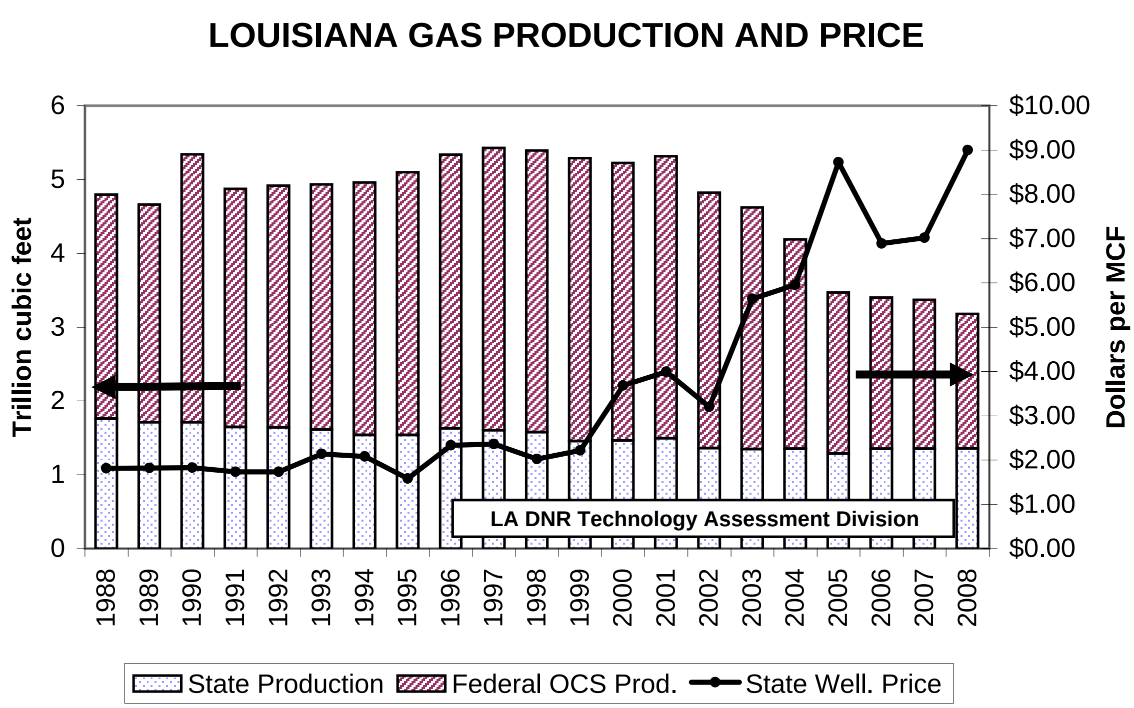


Table 16

UNITED STATES NATURAL GAS AND CASINGHEAD GAS PRODUCTION[3]

(Billion Cubic Feet (BCF) at 15.025 psia and 60 degrees Fahrenheit)*

DATE	GROSS	WET AFTER LEASE SEPARATION	MARKETED	DRY	GROSS IMPORTS
1987	19,745	17,212	17,091	16,294	973
1988	20,587	17,706	17,567	16,767	1,268
1989	20,661	17,879	17,740	16,971	1,354
1990	21,100	18,376	18,229	17,460	1,502
1991	21,322	18,336	18,169	17,351	1,738
1992	21,698	18,509	18,344	17,490	2,096
1993	22,279	18,832	18,609	17,740	2,304
1994	23,118	19,547	19,323	18,451	2,572
1995	23,277	19,402	19,123	18,233	2,785
1996	23,640	19,690	19,423	18,484	2,880
1997	23,737	19,727	19,475	18,531	2,935
1998	23,635	19,670	19,569	18,650	3,090
1999	23,355	19,524	19,416	18,462	3,515
2000	23,699	19,890	19,801	18,805	3,707
2001	24,020	20,261	20,166	19,231	3,899
2002	23,471	19,627	19,530	18,591	3,937
2003	23,645	19,678	19,582	18,724	3,866
2004	23,499	19,230	19,134	18,226	4,175
2005	22,996	18,672	18,555	17,696	4,256
2006	23,046	19,129	19,001	18,113	4,104
January	2,003	1,637	1,627	1,559	385
February	1,805	1,472	1,464	1,401	366
March	2,037	1,663	1,654	1,582	394
April	1,960	1,612	1,604	1,534	379
May	2,038	1,660	1,650	1,577	373
June	1,939	1,633	1,623	1,553	374
July	2,015	1,694	1,683	1,611	410
August	2,019	1,692	1,683	1,611	418
September	1,966	1,646	1,635	1,564	354
October	2,066	1,708	1,697	1,622	340
November	2,053	1,690	1,680	1,606	334
December	2,154	1,765	1,755	1,680	389
2007 Total	**24,055**	**19,872**	**19,756**	**18,899**	**4,517**
January	2,153	1,758	1,748	1,675	375
February	2,036	1,670	1,660	1,590	337
March	2,199	1,802	1,792	1,716	354
April	2,091	1,732	1,721	1,647	312
May	2,145	1,789	1,778	1,700	287
June	2,103	1,764	1,753	1,681	277
July	2,174	1,839	1,827	1,751	307
August	2,144	1,832	1,822	1,747	307
September	1,929	1,581	1,572	1,511	307
October	N/A	N/A	N/A	N/A	N/A
November	N/A	N/A	N/A	N/A	N/A
December	N/A	N/A	N/A	N/A	N/A
2008 Total	**18,974**	**15,766**	**15,674**	**15,018**	**2,863**

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* See Appendix D-5 for corresponding volumes at 14.73 psia and footnote in Appendix B.

TABLE 17

LOUISIANA AVERAGE CRUDE OIL PRICES

(Dollars per Barrel)

	SOUTH LOUISIANA SWEET		ALL GRADES AT WELLHEAD			
DATE	Spot Market[10]	Refinery Posted	State[6]	OCS Gulf[6]	Severance Tax[8]	State Royalty
1987	19.38	18.52	17.97	17.54	17.55	17.85
1988	16.13	15.75	15.22	14.71	16.38	14.67
1989	19.75	18.97	18.39	17.83	17.87	17.92
1990	25.11	23.35	23.04	22.40	22.54	22.76
1991	21.70	20.60	20.15	19.40	21.13	19.90
1992	20.77	19.72	19.01	18.38	19.31	19.10
1993	18.56	17.27	16.72	16.17	17.39	16.84
1994	17.25	15.84	15.61	14.72	15.46	15.52
1995	18.60	17.16	17.06	16.16	16.98	17.06
1996	22.32	20.77	20.87	20.00	20.56	21.24
1997	20.69	18.90	19.23	18.63	19.80	19.22
1998	14.21	12.17	12.52	12.03	13.47	12.31
1999	19.00	16.73	17.55	16.46	16.09	17.22
2000	30.29	27.88	29.14	27.57	28.10	25.96
2001	25.84	23.23	24.70	23.36	26.23	19.81
2002	26.18	23.14	24.92	23.36	25.17	24.39
2003	31.20	27.88	30.50	28.69	30.28	29.77
2004	41.47	37.85	40.43	37.54	38.34	39.06
2005	56.86	52.75	54.68	50.97	54.62	52.20
2006	67.44	62.41	64.17	60.62	63.55	63.10
January	56.72	51.14	53.86	53.06	58.55	55.35
February	62.56	55.92	58.26	53.90	56.60	57.51
March	64.62	57.25	59.99	56.42	53.79	61.10
April	69.19	60.69	63.32	59.74	56.98	63.01
May	69.09	59.76	64.01	62.47	58.08	63.88
June	73.20	64.15	67.92	64.60	59.88	67.03
July	69.14	72.11	75.60	70.21	62.38	74.99
August	73.33	69.36	73.85	69.12	63.51	59.99
September	79.86	75.56	78.30	72.83	70.90	77.31
October	86.25	82.06	84.53	77.75	71.31	82.37
November	95.97	91.51	93.38	84.26	74.03	97.45
December	95.32	88.02	90.74	87.02	83.64	89.93
2007 Average	**74.60**	**68.96**	**71.98**	**67.62**	**64.14**	**70.83**
January	96.12	89.72	93.57	89.00	91.05	94.03
February	98.45	94.12	94.97	91.10	90.94	92.26
March	107.45	101.82	104.87	96.68	92.34	99.05
April	115.13	109.05	111.72	104.68	92.09	110.32
May	128.74	122.16	124.42	114.81	102.10	121.57
June	137.91	131.19	133.42	125.90	111.80	134.00
July	137.80	131.23	133.74	130.06	124.51	127.97
August	119.41	113.39	116.80	123.56	123.46	114.57
September	107.07	101.09	104.29	117.29	132.61	107.49
October	78.78	73.68	N/A	N/A	118.52	75.23
November	56.74	54.20	N/A	N/A	98.89	80.52
December	43.87	45.20	N/A	N/A	N/A	N/A
2008 Average	**102.29**	**97.24**	**113.09**	**110.34**	**107.12**	**105.18**

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See footnote in Appendix B.

Figure 9

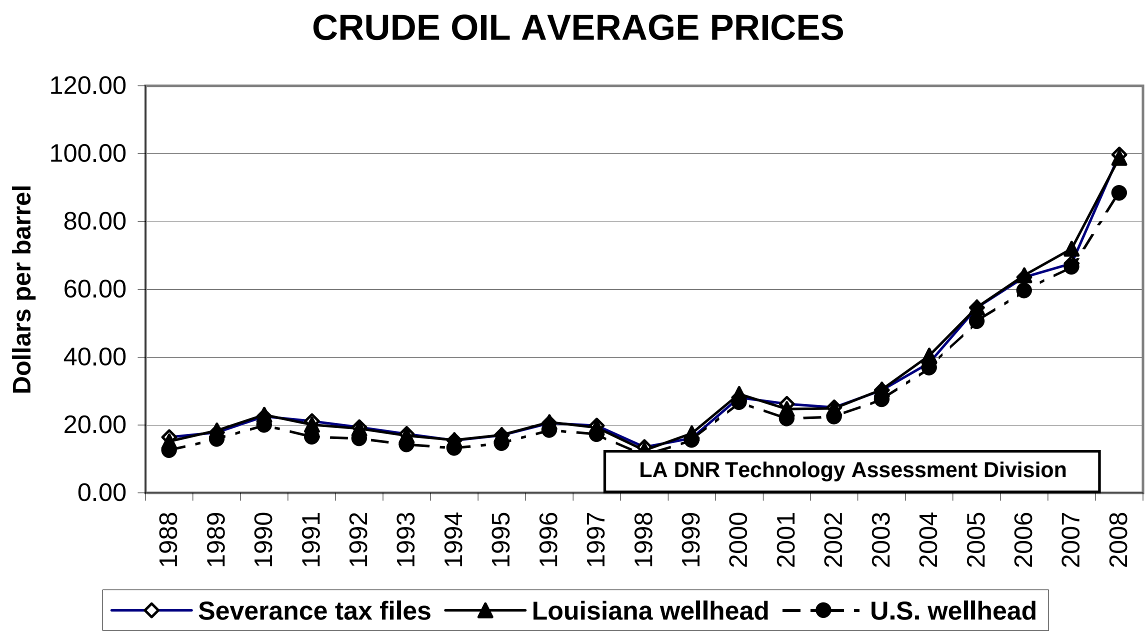

Figure 10

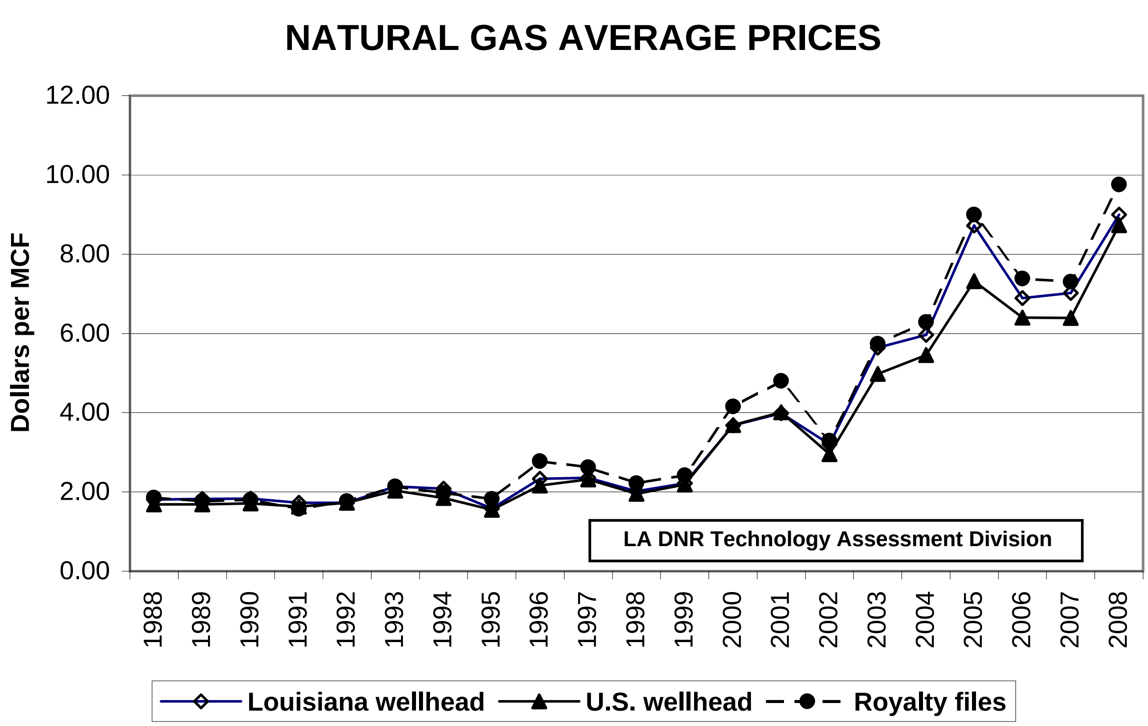

TABLE 18

UNITED STATES AVERAGE CRUDE OIL PRICES [2]

(Dollars per Barrel)

DATE	REFINERY ACQUISITION Domestic Costs	REFINERY ACQUISITION Imports Costs	DOMESTIC WELLHEAD	IMPORTS LANDED	IMPORTS FOB	IMPORTS OPEC FOB
1988	14.74	14.56	12.58	14.08	13.25	13.43
1989	17.87	18.08	15.86	17.68	16.89	17.06
1990	22.59	21.76	20.03	21.13	20.37	20.40
1991	19.35	18.74	16.53	18.02	16.91	17.01
1992	18.62	18.12	16.00	17.65	16.66	16.76
1993	16.66	16.17	14.24	15.75	14.72	14.72
1994	15.64	15.41	13.19	15.07	14.13	13.94
1995	17.32	17.15	14.62	16.77	15.69	15.35
1996	20.81	20.60	18.46	20.27	19.24	18.87
1997	19.65	18.55	17.23	18.14	16.98	16.33
1998	13.15	12.35	10.94	11.86	10.75	10.17
1999	17.64	17.27	15.53	17.38	16.48	16.01
2000	29.08	27.68	26.72	27.54	26.26	25.55
2001	24.34	21.99	21.90	21.77	20.45	19.56
2002	24.56	23.63	22.50	23.82	22.57	22.19
2003	29.78	27.87	27.54	27.83	26.06	25.61
2004	38.97	35.79	36.86	36.05	33.73	33.99
2005	53.05	48.93	50.53	49.41	47.74	49.75
2006	62.50	58.89	59.65	59.03	57.03	59.17
January	53.10	49.57	49.32	50.53	48.11	50.92
February	55.72	53.77	52.94	54.04	51.97	53.84
March	57.86	56.31	54.95	57.42	55.46	57.79
April	61.13	60.45	58.20	60.99	59.53	62.32
May	62.04	61.55	58.90	62.92	60.72	63.77
June	64.95	65.24	62.35	66.26	64.38	67.05
July	72.08	70.75	69.23	70.51	69.30	72.04
August	71.57	68.28	67.77	69.07	66.69	68.86
September	75.84	72.34	73.27	73.92	72.21	75.30
October	82.20	78.61	79.32	79.45	78.51	82.10
November	89.25	85.53	87.16	84.89	83.75	87.15
December	88.98	83.21	85.28	84.28	82.85	86.61
2007 Average	**69.56**	**67.13**	**66.56**	**67.86**	**66.12**	**68.98**
January	89.57	84.82	87.06	86.61	83.43	85.41
February	92.25	87.41	89.41	90.67	87.81	91.81
March	99.87	97.03	98.44	100.03	96.42	100.22
April	108.46	104.94	106.64	108.47	104.20	108.47
May	119.75	116.55	118.55	119.55	115.02	118.23
June	129.45	126.22	127.47	125.93	123.62	126.49
July	131.47	127.77	128.08	124.30	122.12	121.93
August	118.32	111.21	112.83	111.00	108.20	109.03
September	103.33	96.55	98.50	96.08	92.62	91.79
October	81.16	69.13	N/A	N/A	N/A	N/A
November	N/A	N/A	N/A	N/A	N/A	N/A
December	N/A	N/A	N/A	N/A	N/A	N/A
2008 Average	**107.36**	**102.16**	**107.44**	**106.96**	**103.72**	**105.93**

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See footnote in Appendix B.

Table 19

LOUISIANA NATURAL GAS WELLHEAD PRICES (MCF)

(Dollars/Thousand Cubic Feet)

DATE	MMS OCS[12]	DOE State Wells[3]	DNR State Royalty	Henry Hub Settled NYMEX	SPOT MARKET[5]		
					Low	High	Average
1988	1.84	1.81	1.86	N/A	1.40	2.29	1.79
1989	1.86	1.82	1.77	N/A	1.40	2.29	1.76
1990	1.87	1.83	1.80	N/A	1.35	2.60	1.77
1991	1.77	1.73	1.57	N/A	1.43	1.56	1.50
1992	1.77	1.73	1.77	N/A	1.74	1.85	1.80
1993	2.18	2.14	2.14	2.19	2.08	2.21	2.15
1994	2.10	2.08	1.98	1.97	1.86	1.95	1.91
1995	1.61	1.58	1.82	1.70	1.62	1.68	1.65
1996	2.37	2.33	2.78	2.69	2.47	2.69	2.60
1997	2.63	2.36	2.62	2.69	2.54	2.67	2.60
1998	2.36	2.02	2.22	2.19	2.08	2.18	2.14
1999	2.18	2.22	2.42	2.36	2.25	2.36	2.31
2000	3.59	3.68	4.16	4.04	3.92	4.03	3.98
2001	4.05	3.99	4.80	4.44	4.27	4.47	4.38
2002	2.98	3.20	3.30	3.39	3.29	3.43	3.37
2003	5.12	5.64	5.74	5.61	5.32	5.92	5.66
2004	6.04	5.96	6.29	6.39	5.98	6.18	6.08
2005	8.58	8.72	9.00	8.96	8.84	9.26	9.05
2006	6.77	6.89	7.38	7.54	6.91	7.24	7.08
January	N/A	N/A	6.40	6.07	6.30	6.50	6.37
February	N/A	N/A	7.85	7.19	8.02	8.57	8.20
March	N/A	N/A	7.72	7.85	7.34	7.53	7.44
April	N/A	N/A	8.02	7.86	7.69	7.90	7.80
May	N/A	N/A	8.07	7.81	7.82	7.94	7.89
June	N/A	N/A	7.74	7.89	7.74	7.86	7.81
July	N/A	N/A	6.88	7.21	6.53	6.67	6.62
August	N/A	N/A	6.68	6.35	6.50	6.78	6.58
September	N/A	N/A	6.24	5.65	5.84	6.02	5.93
October	N/A	N/A	7.15	6.68	6.70	6.89	6.79
November	N/A	N/A	7.95	7.56	7.12	7.32	7.24
December	N/A	N/A	7.95	7.49	7.29	7.48	7.39
2007 Average	**7.15**	**7.02**	**7.39**	**7.13**	**7.08**	**7.29**	**7.17**
January	N/A	N/A	8.15	7.46	7.97	8.48	8.09
February	N/A	N/A	8.89	8.32	8.48	8.69	8.57
March	N/A	N/A	10.00	9.29	9.51	9.64	9.60
April	N/A	N/A	10.92	9.96	10.26	10.42	10.33
May	N/A	N/A	12.14	11.73	11.52	11.64	11.59
June	N/A	N/A	8.69	12.39	12.77	12.98	12.84
July	N/A	N/A	12.62	13.63	12.27	12.43	12.34
August	N/A	N/A	9.56	9.59	8.79	9.05	8.86
September	N/A	N/A	8.86	8.73	7.96	8.34	8.09
October	N/A	N/A	7.79	7.77	7.02	7.21	7.13
November	N/A	N/A	N/A	6.73	6.66	6.87	6.77
December	N/A	N/A	N/A	7.16	6.25	6.37	6.32
2008 Average	**N/A**	**N/A**	**9.76**	**9.40**	**9.12**	**9.34**	**9.21**

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See footnote in Appendix B.

Table 19A

LOUISIANA NATURAL GAS WELLHEAD PRICES (MMBTU)

(Dollars/MMBTU)

DATE	MMS OCS[12]	DOE State Wells[3]	DNR State Royalty	Henry Hub Settled NYMEX	SPOT MARKET[5] Low	High	Average
1988	1.77	1.74	1.79	N/A	1.35	2.20	1.73
1989	1.79	1.75	1.70	N/A	1.35	2.20	1.70
1990	1.80	1.76	1.73	N/A	1.30	2.50	1.70
1991	1.70	1.66	1.51	N/A	1.38	1.50	1.44
1992	1.70	1.66	1.70	N/A	1.68	1.78	1.73
1993	2.10	2.06	2.05	N/A	2.00	2.12	2.06
1994	2.02	2.00	1.91	1.89	1.79	1.88	1.84
1995	1.55	1.52	1.75	1.63	1.56	1.61	1.59
1996	2.28	2.24	2.67	2.59	2.37	2.58	2.50
1997	2.53	2.27	2.52	2.59	2.44	2.57	2.50
1998	2.27	1.94	2.13	2.10	2.00	2.10	2.05
1999	2.10	2.13	2.33	2.27	2.17	2.27	2.22
2000	3.45	3.54	4.00	3.88	3.77	3.88	3.83
2001	3.89	3.84	4.62	4.27	4.11	4.30	4.21
2002	2.87	2.93	3.17	3.26	3.16	3.30	3.24
2003	4.92	5.03	5.52	5.40	5.11	5.69	5.44
2004	5.81	5.73	6.04	6.15	5.75	5.95	5.85
2005	8.25	8.38	8.65	8.62	8.50	8.90	8.70
2006	6.51	6.63	7.10	7.25	6.64	6.96	6.81
January	N/A	N/A	6.15	5.84	6.06	6.25	6.12
February	N/A	N/A	7.55	6.92	7.71	8.24	7.88
March	N/A	N/A	7.42	7.55	7.06	7.24	7.15
April	N/A	N/A	7.71	7.56	7.40	7.59	7.50
May	N/A	N/A	7.76	7.51	7.52	7.63	7.59
June	N/A	N/A	7.44	7.59	7.44	7.55	7.51
July	N/A	N/A	6.62	6.93	6.28	6.42	6.36
August	N/A	N/A	6.43	6.11	6.25	6.52	6.33
September	N/A	N/A	6.00	5.43	5.62	5.79	5.70
October	N/A	N/A	6.87	6.42	6.44	6.62	6.53
November	N/A	N/A	7.64	7.27	6.85	7.04	6.96
December	N/A	N/A	7.64	7.20	7.01	7.20	7.11
2007 Average	**7.02**	**6.75**	**7.10**	**6.86**	**6.80**	**7.01**	**6.89**
January	N/A	N/A	7.83	7.17	7.66	8.16	7.78
February	N/A	N/A	8.55	8.00	8.15	8.35	8.24
March	N/A	N/A	9.61	8.93	9.14	9.27	9.23
April	N/A	N/A	10.50	9.58	9.86	10.02	9.94
May	N/A	N/A	11.67	11.28	11.08	11.19	11.14
June	N/A	N/A	8.36	11.92	12.28	12.48	12.35
July	N/A	N/A	12.13	13.11	11.80	11.96	11.87
August	N/A	N/A	9.19	9.22	8.45	8.70	8.52
September	N/A	N/A	8.52	8.39	7.65	8.02	7.77
October	N/A	N/A	7.49	7.47	6.75	6.93	6.85
November	N/A	N/A	N/A	6.47	6.41	6.61	6.51
December	N/A	N/A	N/A	6.89	6.01	6.13	6.08
2008 Average	**N/A**	**N/A**	**9.39**	**9.03**	**8.77**	**8.99**	**8.86**

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See footnote in Appendix B.

Table 20

LOUISIANA AVERAGE NATURAL GAS PRICES DELIVERED TO CONSUMER [3] (MCF)

(Dollars/Thousand Cubic Feet)

DATE	CITY GATES	RESIDENTIAL	COMMERCIAL	INDUSTRIAL	UTILITY
1988	2.93	5.74	5.14	1.99	1.70
1989	3.01	5.97	5.19	1.97	1.78
1990	2.97	6.09	5.26	2.00	1.73
1991	2.56	6.24	4.91	1.74	1.63
1992	2.48	6.19	4.85	2.00	1.93
1993	2.75	6.68	5.41	2.31	2.49
1994	2.52	6.78	5.39	2.18	2.24
1995	2.17	6.59	5.15	1.82	1.92
1996	3.03	7.55	6.18	2.83	3.07
1997	2.94	7.60	6.12	2.87	2.88
1998	2.32	7.51	5.72	2.43	2.40
1999	2.73	7.55	5.83	2.51	2.55
2000	4.50	9.20	7.52	4.01	4.56
2001	5.11	9.99	7.85	5.22	4.56
2002	4.07	8.99 r	6.77 r	3.66 r	3.71
2003	5.72 r	11.68 r	8.86 r	5.56 r	6.00 r
2004	6.46	12.50	9.66	6.50	6.56
2005	8.93	14.88	11.61	9.33	9.50
2006	7.49	15.62	11.62	7.44	7.93
January	7.13	12.33	11.92	6.75	6.8
February	7.84	12.97	11.98	7.93	8.40
March	7.81	13.80	12.28	8.28	7.98
April	7.93	15.20	12.15	8.29	8.14
May	7.89	16.29	12.25	8.25	8.24
June	7.58	17.36	12.02	7.40	8.35
July	7.27	17.42	11.37	7.72	7.26
August	8.15	16.74	10.51	N/A	7.06
September	5.59	16.86	10.04	5.58	6.29
October	6.18	16.31	11.04	6.27	7.27
November	6.85	14.89	11.95	6.78	7.77
December	7.44	13.41	12.31	7.23	7.79
2007 Average	**7.31**	**15.30**	**11.65**	**7.32**	**7.61**
January	8.48	13.03	12.41	7.69	8.30
February	9.74	13.75	12.69	N/A	9.36
March	9.07	14.21	12.93	9.82	9.78
April	10.13	17.02	13.83	10.04	10.65
May	10.75	18.40	15.20	11.51	12.31
June	11.67	22.21	16.64	12.12	13.91
July	11.84	24.66	16.96	12.91	13.56
August	11.76	20.27	14.00	9.36	10.39
September	11.76	18.53	12.46	8.47	N/A
October	N/A	N/A	N/A	N/A	N/A
November	N/A	N/A	N/A	N/A	N/A
December	N/A	N/A	N/A	N/A	N/A
2008 Average	**10.58**	**18.01**	**14.12**	**10.24**	**11.03**

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See footnote in Appendix B.

Table 20A

LOUISIANA AVERAGE NATURAL GAS PRICES DELIVERED TO CONSUMER [3] (MMBTU)

(Dollars/MMBTU)

DATE	CITY GATES	RESIDENTIAL	COMMERCIAL	INDUSTRIAL	UTILITY
1988	2.82	5.52	4.94	1.91	1.63
1989	2.89	5.74	4.99	1.89	1.71
1990	2.86	5.86	5.06	1.92	1.66
1991	2.46	6.00	4.72	1.67	1.57
1992	2.38	5.95	4.66	1.92	1.86
1993	2.64	6.42	5.20	2.22	2.39
1994	2.42	6.52	5.18	2.09	2.16
1995	2.09	6.33	4.95	1.75	1.84
1996	2.91	7.26	5.94	2.72	2.95
1997	2.83	7.30	5.88	2.76	2.77
1998	2.23	7.22	5.50	2.34	2.31
1999	2.63	7.26	5.60	2.42	2.45
2000	4.33	8.84	7.23	3.85	4.39
2001	4.91	9.60	7.55	5.02	4.39
2002	3.92	8.64 r	6.51 r	3.52 r	3.56
2003	5.30 r	11.23 r	8.52 r	5.35 r	5.77 r
2004	6.21	12.02	9.29	6.25	6.29
2005	8.59	14.31	11.16	8.97	9.14
2006	7.20	15.02	11.18	7.16	7.62
January	6.86	11.86	11.46	6.49	6.54
February	7.54	12.47	11.52	7.63	8.08
March	7.51	13.27	11.81	7.96	7.67
April	7.63	14.62	11.68	7.97	7.83
May	7.59	15.66	11.78	7.93	7.92
June	7.29	16.69	11.56	7.12	8.03
July	6.99	16.75	10.93	7.42	6.98
August	7.84	16.10	10.11	N/A	6.79
September	5.38	16.21	9.65	5.37	6.05
October	5.94	15.68	10.62	6.03	6.99
November	6.59	14.32	11.49	6.52	7.47
December	7.15	12.89	11.84	6.95	7.49
2007 Average	**7.02**	**14.71**	**11.20**	**7.03**	**7.32**
January	8.15	12.53	11.93	7.39	7.98
February	9.37	13.22	12.20	N/A	9.00
March	8.72	13.66	12.43	9.44	9.40
April	9.74	16.37	13.30	9.65	10.24
May	10.34	17.69	14.62	11.07	11.84
June	11.22	21.36	16.00	11.65	13.38
July	11.38	23.71	16.31	12.41	13.04
August	11.31	19.49	13.46	9.00	9.99
September	11.31	17.82	11.98	8.14	N/A
October	N/A	N/A	N/A	N/A	N/A
November	N/A	N/A	N/A	N/A	N/A
December	N/A	N/A	N/A	N/A	N/A
2008 Average	**10.17**	**17.32**	**13.58**	**9.85**	**10.61**

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See footnote in Appendix B.

Table 21

UNITED STATES AVERAGE NATURAL GAS PRICES (MCF)
(Dollars/Thousand Cubic Feet)

DATE	WELLHEAD[3]	SPOT MARKET[5]	FOREIGN IMPORTS[3]	CITY GATES[3]	DELIVERED TO RESIDENTIAL[3]
1988	1.69	1.69	2.00	2.92	5.47
1989	1.69	1.64	2.04	3.01	5.64
1990	1.71	1.67	1.94	3.03	5.80
1991	1.63	1.45	1.82	2.90	6.22
1992	1.73	1.75	1.85	3.01	6.28
1993	2.03	2.10	2.03	3.21	6.67
1994	1.85	1.84	1.87	3.07	6.89
1995	1.55	1.56	1.49	2.78	6.58
1996	2.16	2.39	1.96	3.27	6.97
1997	2.32	2.54	2.15	3.66	6.94
1998	1.95	2.11	1.97	3.07	7.45
1999	2.19	2.28	2.23	3.10	7.34
2000	3.69	3.94	3.88	4.62	8.51
2001	4.02	4.34	4.36	5.24	9.91
2002	2.95	3.26	3.14	4.10	8.60
2003	4.88 r	5.48	5.18	5.84	10.62 r
2004	5.45	5.94	5.78	6.61	11.64 r
2005	7.32	8.67	8.09	8.72	13.72
2005	6.40	6.81	6.87	8.28	14.18
January	5.92	6.41	6.49	7.89	12.09
February	6.66	8.07	7.39	8.59	12.12
March	6.56	7.21	7.45	8.81	12.86
April	6.84	7.38	7.23	8.19	13.27
May	6.98	7.50	7.44	8.35	14.61
June	6.86	7.32	7.32	8.40	16.20
July	6.19	6.35	6.56	7.95	16.65
August	5.90	6.25	6.00	7.46	16.64
September	5.61	5.56	5.49	6.90	15.94
October	6.25	6.43	6.36	7.36	14.25
November	6.37	6.73	7.20	8.05	12.82
December	6.53	7.51	7.51	8.13	12.17
2007 Average	**6.39**	**6.89**	**6.87**	**8.01**	**14.14**
January	6.99	8.28	7.66	8.34	12.10
February	7.55	8.61	8.35	8.87	12.44
March	8.29	9.46	9.03	9.45	12.97
April	8.94	10.14	9.61	9.86	14.30
May	9.81	11.11	10.80	10.97	16.02
June	10.82	12.16	11.71	11.73	18.32
July	10.62	11.81	N/A	12.39	20.20
August	8.32	8.48	N/A	10.16	19.63
September	7.27	7.20	N/A	8.96	17.94
October	N/A	6.16	N/A	N/A	N/A
November	N/A	5.98	N/A	N/A	N/A
December	N/A	6.15	N/A	N/A	N/A
2008 Average	**8.73**	**8.80**	**9.53**	**10.08**	**15.99**

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See footnote in Appendix B.

Table 21A

UNITED STATES AVERAGE NATURAL GAS PRICES (MMBTU)
(Dollars/MMBTU)

DATE	WELLHEAD[3]	SPOT MARKET[5]	FOREIGN IMPORTS[3]	CITY GATES[3]	DELIVERED TO RESIDENTIAL[3]
1988	1.63	1.63	1.92	2.81	5.26
1989	1.63	1.58	1.96	2.89	5.42
1990	1.64	1.61	1.87	2.91	5.58
1991	1.57	1.40	1.75	2.76	5.98
1992	1.67	1.68	1.78	2.91	6.04
1993	1.95	2.02	1.95	3.14	6.42
1994	1.78	1.77	1.80	2.95	6.63
1995	1.49	1.50	1.43	2.69	6.33
1996	2.08	2.30	1.88	3.19	6.70
1997	2.23	2.44	2.07	3.44	7.16
1998	1.88	2.03	1.89	2.94	7.16
1999	2.11	2.19	2.15	3.04	7.06
2000	3.54	3.79	3.73	4.48	8.18
2001	3.86	4.17	4.19	5.04	9.53
2002	2.83	3.14	3.02	3.94	8.27
2003	4.69 r	5.27	4.98	5.62	10.21 r
2004	5.24	5.71	5.56	6.35	11.19 r
2005	7.04	8.34	7.77	8.38	13.19
2006	6.16	6.55	6.60	7.96	13.63
January	5.69	6.17	6.24	7.59	11.63
February	6.40	7.76	7.11	8.26	11.65
March	6.31	6.94	7.16	8.47	12.37
April	6.58	7.10	6.95	7.88	12.76
May	6.71	7.21	7.15	8.03	14.05
June	6.60	7.04	7.04	8.08	15.58
July	5.95	6.11	6.31	7.64	16.01
August	5.67	6.01	5.77	7.17	16.00
September	5.39	5.35	5.28	6.63	15.33
October	6.01	6.18	6.12	7.08	13.70
November	6.13	6.47	6.92	7.74	12.33
December	6.28	7.22	7.22	7.82	11.70
2007 Average	**6.14**	**6.63**	**6.61**	**7.70**	**13.59**
January	6.72	7.96	7.37	8.02	11.63
February	7.26	8.28	8.03	8.53	11.96
March	7.97	9.09	8.68	9.09	12.47
April	8.60	9.75	9.24	9.48	13.75
May	9.43	10.68	10.38	10.55	15.40
June	10.40	11.69	11.26	11.28	17.62
July	10.21	11.35	N/A	11.91	19.42
August	8.00	8.16	N/A	9.77	18.88
September	6.99	6.93	N/A	8.62	17.25
October	N/A	5.93	N/A	N/A	N/A
November	N/A	5.75	N/A	N/A	N/A
December	N/A	5.91	N/A	N/A	N/A
2008 Average	**8.40**	**8.46**	**9.16**	**9.69**	**15.38**

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See footnote in Appendix B.

Table 22

LOUISIANA STATE OIL AND GAS DRILLING PERMITS ISSUED BY TYPE
Excluding OCS

DATE	DEVELOPMENTAL +	WILDCATS	= TOTAL =	OFFSHORE +	ONSHORE
1987	2,148	284	2,432	73	2,359
1988	1,601	249	1,850	94	1,756
1989	1,486	204	1,690	75	1,615
1990	1,526	181	1,707	85	1,622
1991	1,209	100	1,309	77	1,232
1992	1,044	92	1,136	59	1,077
1993	1,040	109	1,149	76	1,073
1994	1,015	98	1,113	74	1,039
1995	979	86	1,065	68	997
1996	1,248	133	1,381	121	1,260
1997	1,424	138	1,562	85	1,477
1998	1,171	115	1,286	96	1,190
1999	908	109	1,017	79	938
2000	1,363	90	1,453	151	1,302
2001	1,277	88	1,365	96	1,269
2002	902	123	1,025	90	935
2003	1,152	112	1,264	83	1,181
2004	1,535	98	1,633	57	1,576
2005	1,882	114	1,996	74	1,922
2006	2,040	97	2,137	61	2,076
January	161	4	165	4	161
February	136	8	144	3	141
March	200	8	208	6	202
April	150	7	157	2	155
May	227	5	232	3	229
June	180	4	184	5	179
July	187	8	195	2	193
August	190	5	195	3	192
September	159	5	164	0	164
October	170	4	174	2	172
November	172	8	180	4	176
December	150	2	152	0	152
2007 Total	**2,082**	**68**	**2,150**	**34**	**2,116**
January	167	5	172	0	172
February	147	6	153	3	150
March	156	2	158	6	152
April	191	7	198	5	193
May	218	10	228	4	224
June	219	11	230	5	225
July	283	9	292	1	291
August	300	8	308	4	304
September	209	7	216	2	214
October	169	3	172	3	169
November	113	4	117	6	111
December	124	6	130	1	129
2008 Total	**2,296**	**78**	**2,374**	**40**	**2,334**

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Figure 11

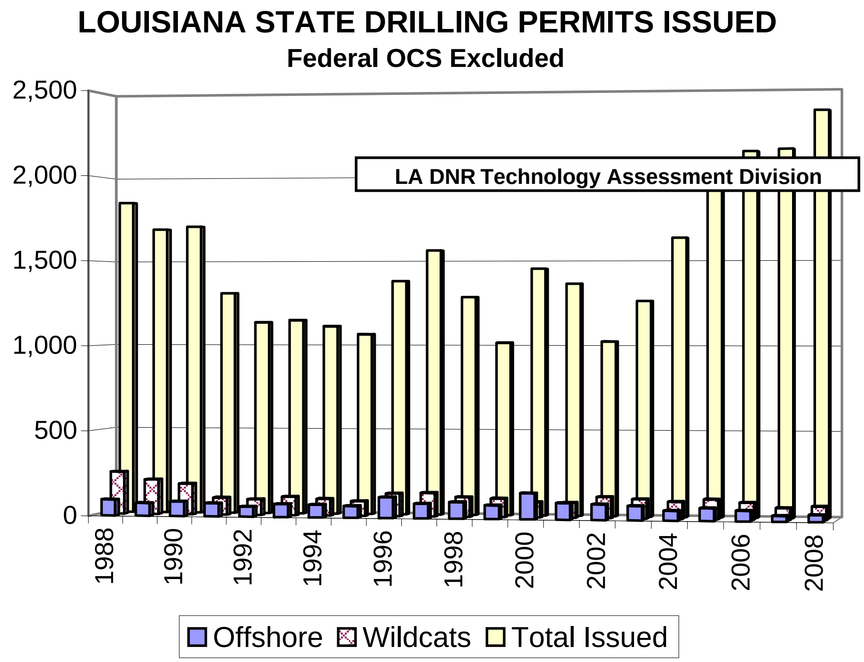

Figure 12

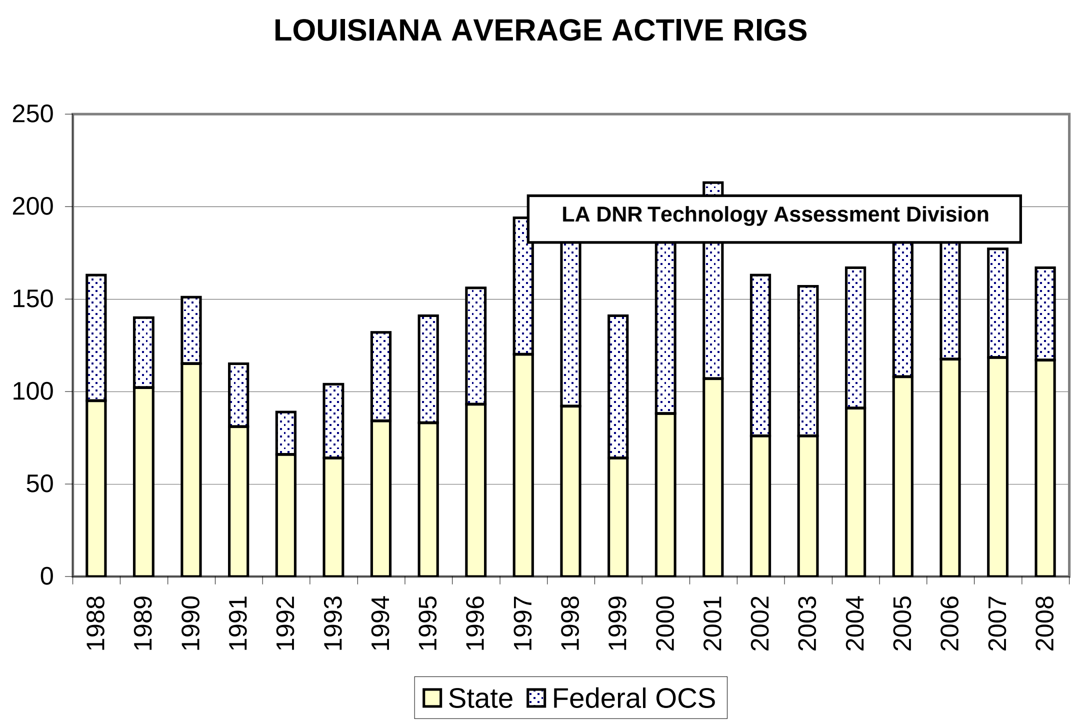

Table 23

LOUISIANA AVERAGE RIGS RUNNING

DATE	State North[4]	State South Inland Water[4]	State South Inland Land[4]	State Offshore	Total State	Federal Offshore	Total Offshore[4] (State+OCS)	LA[4] TOTAL
1987	11	23	36	26	96	39	65	135
1988	14	27	35	20	95	68	88	163
1989	16	17	35	34	102	38	72	140
1990	19	20	36	40	115	36	76	151
1991	11	16	31	23	81	34	57	115
1992	9	13	27	16	66	23	39	88
1993	11	12	22	19	64	40	59	104
1994	14	16	25	29	84	48	78	132
1995	16	15	28	23	82	58	81	141
1996	19	19	31	25	93	63	88	156
1997	21	23	48	28	120	74	102	194
1998	19	21	38	14	93	92	106	184
1999	16	16	21	12	65	76	88	141
2000	24	16	37	10	86	108	118	195
2001	30	20	44	10	104	108	119	213
2002	23	16	32	5	76	87	92	163
2003	29	14	29	4	76	81	85	157
2004	39	18	30	3	91	76	79	167
2005	48	23	32	4	108	74	79	182
2006	57	19	38	3	118	70	73	188
January	53	19	46	2	119	66	68	185
February	56	23	46	1	126	69	71	195
March	57	26	41	2	126	69	70	195
April	60	28	36	2	125	63	64	188
May	58	26	32	3	118	61	64	180
June	55	22	32	3	113	63	66	175
July	59	21	35	3	118	65	68	183
August	60	24	31	4	119	59	63	178
September	62	25	25	3	115	56	59	171
October	56	26	28	2	112	40	42	152
November	61	26	29	1	117	48	49	165
December	58	27	27	3	114	45	48	160
2007 Average	**58**	**24**	**34**	**2**	**118**	**59**	**61**	**177**
January	52	22	27	4	105	44	48	149
February	47	19	28	3	97	46	49	143
March	49	16	28	1	95	50	51	144
April	50	19	21	4	94	50	54	144
May	52	22	21	4	99	52	55	151
June	65	22	26	4	117	51	55	168
July	72	23	29	6	129	50	56	180
August	80	26	28	4	138	50	54	188
September	85	19	26	3	133	52	55	185
October	82	21	29	2	134	58	60	192
November	95	20	22	3	140	48	50	188
December	90	14	19	4	126	49	53	175
2008 Average	**68**	**20**	**25**	**3**	**117**	**50**	**53**	**167**

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Table 24

LOUISIANA STATE PRODUCING CRUDE OIL WELLS
Excluding OCS

DATE	NORTH	SOUTH	OFFSHORE	TOTAL
1963	12,833	14,144	N/A	26,977
1964	13,901	13,661	1,265	28,826
1965	14,505	11,558	3,938	30,001
1966	14,419	12,165	4,330	30,915
1967	14,191	12,183	4,677	31,051
1968	13,856	11,698	4,767	30,321
1969	13,670	11,131	4,954	29,756
1970	13,166	10,363	1,179	24,707
1971	12,889	9,626	1,107	23,623
1972	12,475	8,912	1,048	22,436
1973	11,698	8,249	1,025	20,972
1974	11,984	8,262	985	21,230
1975	12,259	8,094	936	21,288
1976	12,393	7,730	1,073	21,196
1977	12,915	7,444	1,067	21,425
1978	13,019	7,219	1,086	21,324
1979	12,961	6,859	1,078	20,898
1980	13,981	6,832	1,073	21,885
1981	15,084	6,777	1,105	22,966
1982	15,540	6,608	1,112	23,259
1983	16,299	6,374	1,037	23,710
1984	17,544	6,300	1,038	24,882
1985	18,794	6,223	1,014	26,031
1986	19,346	6,061	1,001	26,408
1987	18,630	5,768	945	25,343
1988	17,953	5,698	964	24,615
1989	16,849	5,474	927	23,250
1990	17,369	5,215	906	23,490
1991	17,731	5,143	868	23,742
1992	17,449	5,155	842	23,446
1993	16,810	5,015	814	22,640
1994	15,904	4,682	805	21,392
1995	15,260	4,451	769	20,479
1996	15,148	4,295	719	20,163
1997	14,573	4,165	619	20,358
1998	13,975	3,962	546	18,484
1999	13,747	3,971	546	18,264
2000	16,795	3,914	408	21,117
2001	16,494	4,257	393	21,144
2002	16,531	4,071	423	21,026
2003	16,516	3,583	467	20,566
2004	16,148	3,485	462	20,095
2005	17,153	3,648	317	21,117
2006	17,072	3,615	241	20,928
2007	16,994 e	3,711 e	262 e	20,966
2008	17,080 e	3,742 e	266 e	21,088

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Figure 13

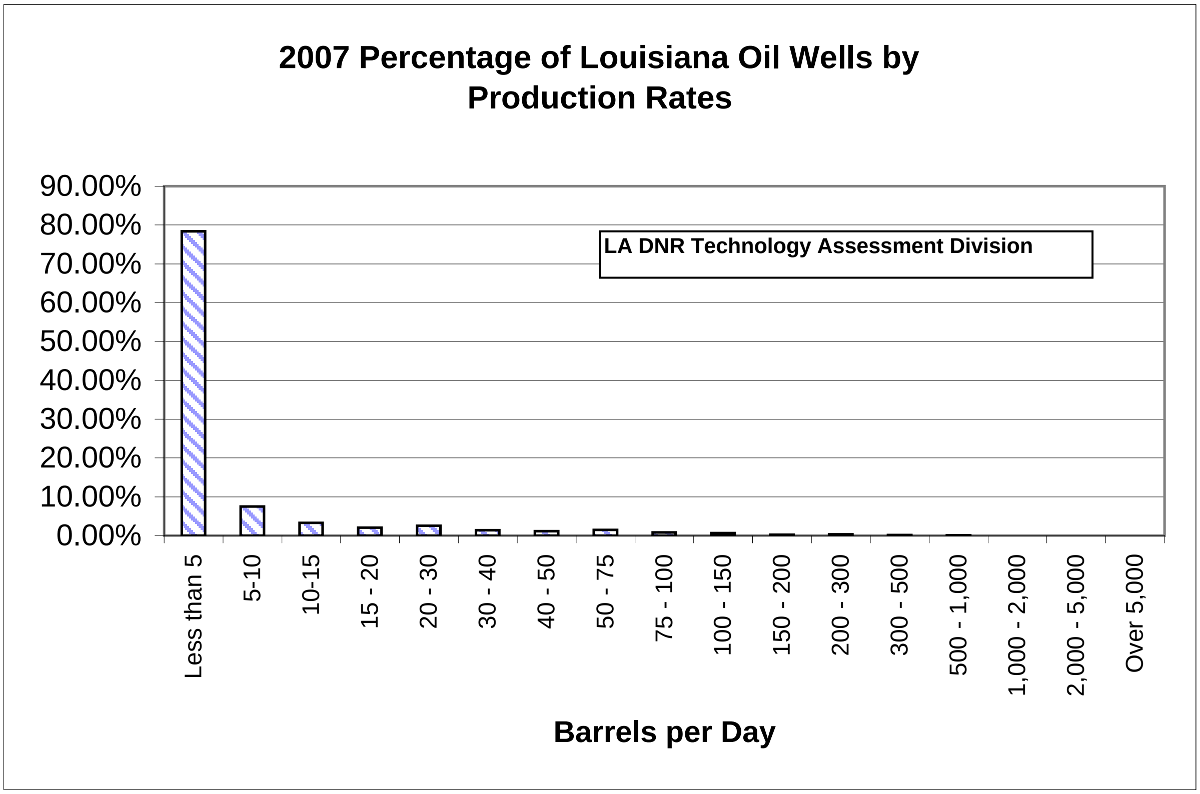

Figure 14

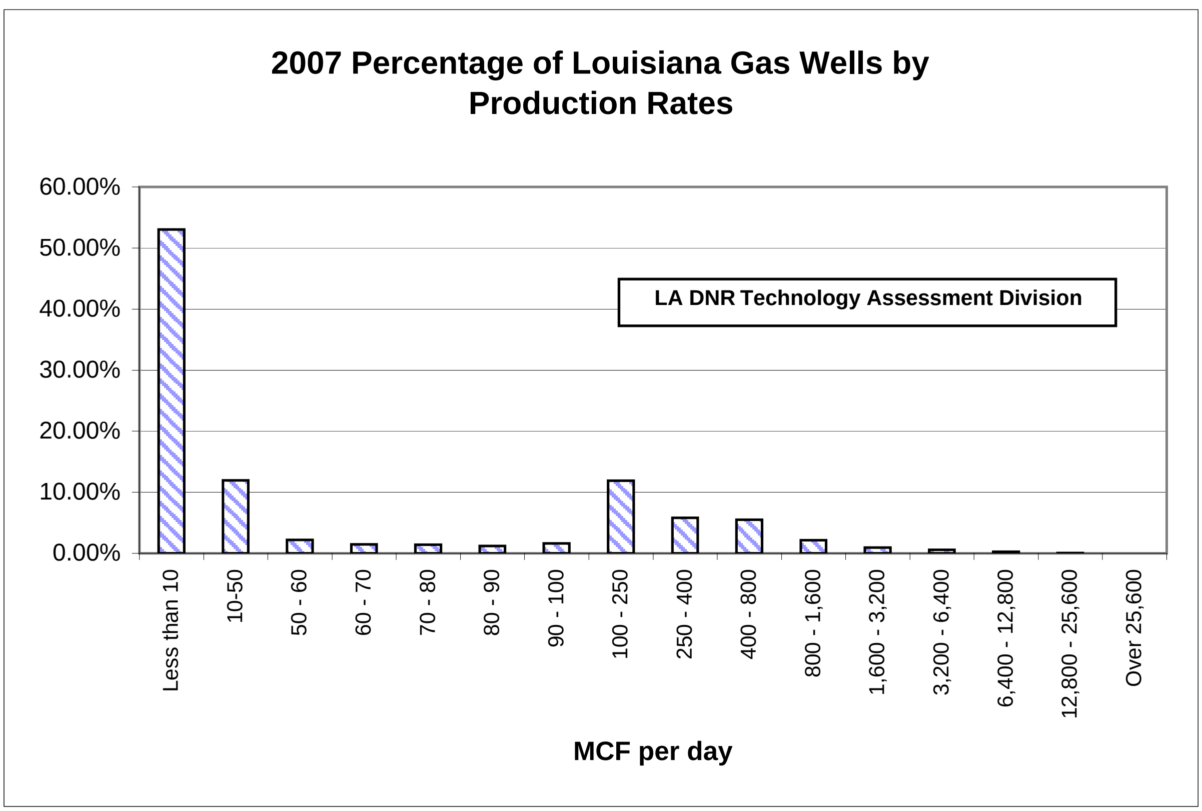

Table 25

LOUISIANA STATE PRODUCING NATURAL GAS WELLS
Excluding OCS

DATE	NORTH	SOUTH	OFFSHORE	TOTAL
1963	4,103	3,545	0	7,648
1964	4,336	3,502	187	8,025
1965	4,477	3,227	618	8,321
1966	4,566	3,381	748	8,694
1967	4,548	3,448	882	8,878
1968	4,563	3,582	1048	9,194
1969	4,558	3,451	1297	9,306
1970	4,511	3,438	311	8,260
1971	4,449	3,389	327	8,164
1972	4,664	3,397	316	8,378
1973	4,927	3,449	332	8,707
1974	5,159	3,458	313	8,929
1975	5,373	3,331	308	9,012
1976	5,851	3,289	362	9,502
1977	6,343	3,331	449	10,123
1978	6,915	3,253	472	10,640
1979	7,372	3,214	514	11,100
1980	8,360	3,277	551	12,188
1981	9,479	3,226	557	13,262
1982	10,154	3,136	564	13,855
1983	10,502	3,065	549	14,115
1984	10,812	2,955	532	14,299
1985	11,026	2,887	511	14,424
1986	11,049	2,730	436	14,216
1987	10,726	2,635	413	13,774
1988	10,813	2,539	445	13,796
1989	10,861	2,474	501	13,836
1990	10,802	2,407	512	13,721
1991	10,702	2,261	496	13,459
1992	10,498	2,149	496	13,143
1993	10,506	2,192	490	13,189
1994	10,596	2,260	473	13,329
1995	10,452	2,200	335	12,987
1996	10,376	2,148	274	12,799
1997	10,446	2,149	296	12,891
1998	10,579	1,995	259	12,833
1999	10,581	2,010	262	12,853
2000	13,704	3,194	333	17,231
2001	13,054	3,369	311	16,734
2002	13,438	3,309	344	17,092
2003	13,607	2,952	384	16,944
2004	13,924	3,005	398	17,327
2005	13,996	2,977	258	17,231
2006	14,478	3,066	204	17,748
2007	14,707 e	3,211 e	227 e	18,145
2008	15,187 e	3,312 e	239 e	18,738

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Table 26

LOUISIANA STATE WELL COMPLETION BY TYPE AND BY REGION

Excluding OCS

	YEAR	OFFSHORE	SOUTH	NORTH	TOTAL
	1993	24	136	173	333
	1994	13	103	117	233
	1995	31	100	137	268
C	1996	34	67	122	223
R O	1997	39	168	106	313
U I	1998	24	100	64	188
D L	1999	4	35	60	99
E	2000	10	51	77	138
	2001	11	92	97	200
	2002	5	91	89	185
	2003	1	106	53	160
	2004	2	106	69	177
	2005	1	86	113	200
	2006	4	137	164	305
	2007	3	164	140	307
	1993	6	89	176	271
	1994	9	141	180	330
	1995	8	126	216	350
N	1996	22	154	325	501
A	1997	22	160	383	565
T G	1998	23	170	407	600
U A	1999	17	169	287	473
R S	2000	21	166	359	546
A	2001	20	279	426	725
L	2002	15	215	249	479
	2003	15	194	383	592
	2004	7	186	649	842
	2005	9	197	769	975
	2006	6	190	826	1,022
	2007	7	225	973	1,205
	1993	4	168	234	406
	1994	12	141	236	389
	1995	8	138	155	301
	1996	12	151	170	333
D H*	1997	9	165	188	362
R O	1998	7	104	121	232
Y L	1999	8	80	135	223
E	2000	9	98	154	261
	2001	10	184	205	399
	2002	4	122	147	273
	2003	6	166	134	306
	2004	10	144	105	259
	2005	12	166	142	320
	2006	5	197	165	367
	2007	3	222	206	431

* Includes non-producing wells

Table 27

LOUISIANA STATE MINERAL BONUS, RENTAL AND ROYALTY OVERRIDE REVENUES, Excluding OCS

(Million Dollars)

DATE	BONUSES	OVERRIDE ROYALTY	RENTALS	TOTAL
1987	26.82	0.39	6.70	33.90
1988	17.65	0.29	9.28	27.22
1989	11.59	0.29	8.34	20.21
1990	19.02	0.32	6.76	26.10
1991	9.82	0.32	8.71	18.85
1992	4.26	0.32	6.97	11.55
1993	13.29	0.20	4.20	17.68
1994	15.31	0.19	6.15	21.65
1995	31.96	0.69	9.47	42.12
1996	39.63	-0.27	18.40	57.76
1997	38.27	0.84	25.00	64.11
1998	42.27	0.69	25.86	68.82
1999	14.17	0.45	20.27	34.89
2000	21.12	1.13	14.16	36.41
2001	29.70	1.89	13.75	45.34
2002	24.74	2.29	14.26	41.28
2003	19.54	3.36	12.93	35.83
2004	29.79	5.05	9.47	44.31
2005	35.78	2.03	13.75	51.56
2006	33.49	2.05	21.64	57.18
January	4.75	0.12	1.21	6.08
February	11.44	0.11	3.00	14.55
March	1.87	0.32	3.47	5.66
April	3.04	0.47	1.37	4.88
May	4.95	0.46	1.87	7.27
June	7.57	0.42	1.59	9.58
July	-1.11	0.22	2.21	1.31
August	2.53	0.02	2.05	4.60
September	1.93	0.28	1.48	3.69
October	5.59	0.30	1.81	7.70
November	1.22	0.30	1.47	2.99
December	2.16	0.33	1.07	3.55
2007 Total	**45.91**	**3.35**	**22.59**	**71.85**
January	1.83	0.34	2.18	4.35
February	0.24	0.44	4.56	5.23
March	3.62	0.49	0.97	5.09
April	1.12	0.33	1.87	3.32
May	1.99	0.46	3.21	5.67
June	35.58	0.69	2.30	38.57
July	1.85	0.82	1.79	4.46
August	82.16	0.54	1.13	83.82
September	0.00	0.54	1.29	1.83
October	38.61	0.52	1.41	40.55
November	3.05	0.53	0.90	4.48
December	1.22	0.20	1.47	2.89
2008 Total	**171.28**	**5.89**	**23.09**	**200.26**

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Table 28

LOUISIANA STATE MINERAL ROYALTY REVENUE

Excluding OCS
(Million Dollars)

DATE	OIL	GAS	PLANT LIQUIDS	OTHER	TOTAL
1987	125.72	120.54	4.90	1.60	252.76
1988	98.55	124.06	4.39	1.35	228.35
1989	112.30	116.18	3.92	1.42	233.82
1990	135.44	113.14	3.80	0.90	253.28
1991	120.49	91.43	4.51	0.34	216.76
1992	113.29	97.07	4.69	0.00	215.04
1993	99.20	125.01	4.53	0.00	228.74
1994	85.72	102.95	4.05	0.00	192.72
1995	95.82	146.60	4.60	0.00	247.02
1996	123.51	211.31	6.72	0.00	341.54
1997	112.76	154.62	5.93	0.00	273.31
1998	68.85	121.17	2.58	0.00	192.60
1999	91.52	115.10	2.05	0.00	208.66
2000	145.80	212.71	3.46	0.00	361.97
2001	122.16	252.68	6.33	0.00	381.17
2002	100.10	165.24	8.03	0.00	273.37
2003	127.61	288.91	9.31	0.00	425.83
2004	143.84	274.64	14.82	0.00	433.30
2005	149.55	278.58	10.41	0.00	438.55
2006	201.35 r	284.02 r	14.02	0.00	499.38 r
January	18.05	20.31	1.13	0.00	39.48 r
February	17.04	23.68	1.18	0.00	41.90 r
March	20.63	27.07	1.37	0.00	49.08 r
April	21.26	26.76	1.13	0.00	49.15 r
May	22.35	29.36	1.27	0.00	52.98 r
June	22.92	27.60	1.30	0.00	51.82 r
July	25.60	24.74	1.37	0.00	51.71 r
August	24.07	21.98	1.15	0.00	47.20 r
September	25.28	20.37	1.55	0.00	47.20 r
October	28.62	24.45	1.88	0.00	54.95 r
November	30.50	25.97	2.27	0.00	58.73 r
December	31.64	27.62	2.21	0.00	61.47 r
2007 Total	**287.98**	**299.92**	**17.80**	**0.00**	**605.69 r**
January	29.91	28.68	2.26	0.00	60.86
February	29.55	29.99	1.88	0.00	61.43
March	33.49	36.05	1.88	0.00	71.42
April	38.14	37.72	2.04	0.00	77.90
May	44.27	49.47	2.99	0.00	96.72
June	45.23	54.01	2.87	0.00	102.10
July	47.01	52.21	3.15	0.00	102.37
August	39.00	35.44	2.17	0.00	76.61
September	20.28 e	18.37 e	1.55 e	0.00 e	40.20 e
October	16.06 e	17.09 e	1.28 e	0.00 e	34.43 e
November	16.14 e	19.80 e	1.22 e	0.00 e	37.15 e
December	15.91 e	21.20 e	1.17 e	0.00 e	38.28 e
2008 Total	**374.99 e**	**400.04 e**	**24.46 e**	**0.00 e**	**799.48 e**

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Table 29

LOUISIANA STATE MINERAL SEVERANCE TAX REVENUE[8]

Excluding OCS
(Million Dollars)

DATE	OIL	GAS	OTHER MINERALS	SEVERANCE TOTAL
1987	345.18	111.84	2.99	460.01
1988	296.45	106.29	2.65	405.39
1989	312.99	108.84	2.43	424.26
1990	373.21	124.61	2.75	500.58
1991	367.13	146.83	1.97	515.93
1992	326.07	126.24	1.63	453.94
1993	283.68	107.32	1.76	392.76
1994	229.40	114.58	2.02	346.00
1995	233.37	114.58	1.85	349.80
1996	270.36	98.60	1.88	370.84
1997	257.13	118.27	1.85	377.25
1998	148.96	120.98	1.40	271.34
1999	171.29	102.48	1.82	275.60
2000	337.51	104.33	1.50	443.34
2001	281.95	165.77	1.65	449.38
2002	235.84	173.51	1.33	410.67
2003	316.70	152.13	1.70	470.53
2004	359.77	216.73	1.73	578.23
2005	439.00	243.62	1.61	681.50
2006	506.31	331.40	1.69	839.41
January	43.76	35.45	0.15	79.36
February	35.67	29.95	0.07	65.69
March	31.83	29.72	0.14	61.69
April	44.42	32.70	0.09	77.22
May	42.30	33.80	0.07	76.17
June	34.27	23.45	0.15	57.88
July	59.26	46.08	0.18	105.52
August	43.51	33.93	0.24	77.68
September	45.65	22.21	0.08	67.94
October	50.14	23.54	0.19	73.87
November	48.51	23.12	0.15	71.78
December	50.44	20.15	0.15	70.73
2007 Total	**529.75**	**354.11**	**1.67**	**885.52**
January	64.71	23.58	0.14	88.43
February	53.86	27.75	0.12	81.73
March	62.85	23.34	0.12	86.31
April	62.59	20.70	0.09	83.38
May	79.79	27.62	0.16	107.57
June	79.13	23.18	0.17	102.48
July	84.16	28.22	0.13	112.51
August	52.93	10.15	0.16	63.25
September	118.27	38.70	0.20	157.17
October	94.28	26.22	0.10	120.60
November	45.23	19.06	0.11	64.40
December	25.00 e	14.00 e	0.10 e	39.10 e
2008 Total	**822.79 e**	**282.51 e**	**1.60 e**	**1,106.91 e**

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Table 30

STATE SECTION 8(g) REVENUE FROM LOUISIANA'S OUTER CONTINENTAL SHELF [13]

(Dollars)

YEAR	RENTALS	BONUSES	ROYALTIES	8G ESCROW	SETTLE-MENT	TOTAL
1991	303,824	2,220,094	8,461,261	0	2,520,000	13,505,179
1992	258,787	1,189,989	6,405,279	0	5,880,000	13,734,055
1993	235,250	965,504	7,373,550	0	5,880,000	14,454,304
1994	1,016,932	1,913,682	11,780,932	0	5,880,000	20,591,546
1995	255,213	890,002	8,012,718	0	5,880,000	15,037,933
1996	292,445	4,666,400	12,283,395	0	5,880,000	23,122,240
1997	686,051	5,689,689	11,855,454	0	8,400,000	26,631,194
1998	412,229	1,744,928	9,621,860	0	8,400,000	20,179,017
1999	357,379	241,659	6,284,879	0	8,400,000	15,283,917
2000	321,695	1,268,244	12,690,937	0	8,400,000	22,680,876
2001	303,675	2,148,111	30,454,058	0	8,400,000	41,305,844
2002	94,841	N/A	11,768,383	0	0	11,863,224
2003	284,563	2,842,662	26,447,045	0	0	29,574,271
2004	490,745	7,620,500	30,145,237	0	0	38,256,482
2005	374,717	2,521,931	27,995,948	0	0	30,892,596
2006	494,362	5,947,411	24,325,787	0	0	30,767,560
2007	196,129	-2,695,489	25,498,932	0	0	22,999,572
2008	412,813	6,196,386	36,547,175	0	0	43,156,374

See footnotes on Appendix B

Royalty revenues from Federal offshore leases on the Outer Continental Shelf (OCS) are distributed to the Land and Water Conservation Fund, the Historic Preservation Fund, and the General Fund of the U.S. Treasury. Transfers are made in each fiscal year from OCS royalties, rentals and bonuses in order to maintain the Land and Water Conservation Fund's annual authorization of $900 million. Annually, $150 million is put into the Historic Preservation Fund. The balance of offshore revenue receipts is directed to the General Fund of the U.S. Treasury.

Section 8(g) of the Outer Continental Shelf Lands Act Amendments of 1978 provided that the states were to receive a "fair and equitable" division of revenues generated from the leasing of lands within 3 miles of the seaward boundary of a coastal state that contains one or more oil and gas pools or fields underlying both the OCS and lands subject to the jurisdiction of the state. The states and the federal government, however, were unable to reach agreement concerning the meaning of the term "fair and equitable". Revenues generated in the 3-mile boundary zone were subsequently placed into an escrow fund in August 1979.

Congress resolved the dispute over the meaning of "fair and equitable" in the Outer Continental Shelf Lands Act Amendments of 1985, Public Law 99-272. The law provided for the following distribution of revenues to the states under section 8(g):

Before 1986: Louisiana did not receive any shared revenue from OCS production prior to 1986.

1986: Louisiana received a payment of $68.7 million from royalties, rentals and bonuses collected in 1986 and prior years.

1998-2000: In 1987 Louisiana received an initial settlement payment of $572 million from the escrow funds. A series of annual settlement payments have been disbursed to the states over a 15-year period along with an annual disbursement of 27 percent of royalty, rental, and bonus revenues received within each affected state's 8(g) zone. The annual settlement payments are: From 1987 through 1991, Louisiana received an annual settlement payment of $2.52 million per year. From 1992 through 1996, the state received an annual settlement payment of $5.88 million per year. Beginning in 1997 until the last payment in 2001, Louisiana will receive an annual settlement payment of approximately $8.40 million per year.

2002 and After: No further settlement payments; states receive only a recurring annual disbursement of 27 percent of royalty, rental, and bonus revenues received within each affected state's 8(g) zone. Louisiana will receive an annual disbursement of 27 percent of royalty, rental, and bonus revenues received within Louisiana's affected 8(g) zone.

TABLE 31

LOUISIANA STATE TOTAL MINERAL REVENUE
(Dollars)

YEAR	FEDERAL OCS (8g)	FEDERAL ONSHORE	STATE BOUNDARIES	TOTAL
1983	0	637,000	1,328,700,057	1,329,337,057
1984	0	905,000	1,329,965,030	1,330,870,030
1985	0	795,000	1,164,969,360	1,165,764,360
1986	68,699,504	555,000	832,406,385	901,660,889
1987	588,862,212	517,000	746,675,897	1,336,055,109
1988	16,909,646	545,000	660,959,699	678,414,345
1989	12,749,220	452,000	678,301,987	691,503,207
1990	14,759,941	542,000	779,963,703	795,265,644
1991	13,505,179	328,000	751,117,246	764,950,425
1992	13,734,055	376,000	680,527,788	694,637,843
1993	14,454,304	782,000	639,182,812	654,412,032
1994	20,591,546	532,000	560,371,998	581,495,544
1995	15,037,933	728,000	638,942,698	654,708,631
1996	23,122,240	943,209	770,137,601	794,203,050
1997	26,631,194	817,329	714,672,685	742,121,208
1998	20,179,017	996,000	532,755,940	553,930,957
1999	15,283,917	1,276,465	519,144,200	535,704,582
2000	22,680,876	1,024,730	839,883,694	863,589,300
2001	41,305,844	1,481,176	875,887,102	918,674,122
2002	11,863,224	730,156	725,323,377	737,916,757
2003	29,574,271	1,182,451	932,191,569	962,948,290
2004	38,256,482	1,364,964	1,055,838,962	1,095,460,408
2005	30,892,596	1,569,882	1,166,491,860	1,198,954,338
2006	30,767,560	1,170,670	1,395,971,977	1,427,910,208
2007	22,999,572	940,888	1,545,321,941	1,569,262,400
2008	45,763,396	3,703,240	2,115,369,681 p	2,164,836,317 p

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See footnote in Appendix B.

Federal OCS: See table 30.

Federal Onshore: Revenue distributed to the state under section 35 of the Mineral Leasing Act (MLA). MLA provides to the state 50% of mineral revenue from federal lands located within the state boundaries. Revenues came from royalties, rents and bonuses. It is fiscal year data.
Oil and gas produced on federal onshore pay severance tax to the state by the producer on the non-royalty share of the production, and the royalty share of the production is exempted.

State Boundaries: Revenue from mineral production such as bonuses, override royalties, rents, royalties and severance taxes within state boundaries.

Table 32

REVENUE TO FEDERAL GOVERNMENT COLLECTED FROM OIL AND GAS LEASES IN THE LOUISIANA OUTER CONTINENTAL SHELF [12]

(Area beyond the state's 3-mile offshore boundary)

(Dollars)

YEAR	BONUS PAYMENTS	RENTAL PAYMENTS	OTHER REVENUES	PRODUCTION ROYALTIES	TOTAL[a] COLLECTION
1970	945,064,773	6,243,362	1,692,274	262,709,833	1,215,710,242
1971	96,304,523	5,687,848	1,564,845	324,815,819	428,373,035
1972	2,251,347,556	6,396,291	1,725,573	342,476,302	2,601,945,722
1973	193,031,709	5,272,797	2,005,785	380,509,177	580,819,468
1974	3,528,744,084	8,350,760	1,739,159	535,836,029	4,074,670,032
1975	325,424,688	8,947,571	1,837,253	593,359,397	929,568,909
1976	482,592,035	12,974,770	1,879,704	682,922,971	1,180,369,480
1977	813,991,004	7,740,185	1,248,616	899,016,863	1,721,996,668
1978	1,015,873,944	8,616,027	1,502,963	1,086,517,424	2,112,510,358
1979	2,521,190,635	7,328,999	1,105,865	1,344,995,442	3,874,620,941
1980	2,676,927,673	7,361,904	1,277,987	1,866,737,837	4,552,305,401
1981	3,308,009,881	8,205,515	1,211,959	2,825,271,285	6,142,698,640
1982	1,110,172,751	7,288,316	1,349,850	3,166,294,042	4,285,104,959
1983	3,796,644,766	13,620,158	2,540,294	2,764,348,600	6,577,153,818
1984	1,154,495,009	16,323,567	2,010,462	3,195,995,282	4,368,824,320
1985	830,710,260	33,756,447	2,139,530	2,940,519,737	3,807,125,974
1986	113,731,609	34,110,029	3,199,547	2,006,205,199	2,157,246,384
1987	247,344,486	52,115,828	19,239,027	1,803,208,740	2,121,908,081
1988	388,730,457	35,752,757	8,727,373	1,571,981,500	2,005,192,087
1989	386,710,637	48,498,402	26,261,190	1,618,163,065	2,079,633,294
1990	421,375,632	55,568,777	16,028,740	2,068,487,831	2,561,460,980
1991	276,234,849	59,126,732	15,444,167	1,857,392,914	2,208,198,662
1992	53,716,797	49,087,621	33,533,897	1,848,599,157	1,984,937,472
1993	61,454,861	29,268,366	119,445,091	2,009,644,653	2,219,812,971
1994	256,271,643	30,003,884	141,190,812	1,888,953,102	2,316,419,441
1995	296,254,733	62,526,069	19,803,444	1,764,875,791	2,143,460,037
1996	24,330,068	53,231,380	40,394,227	2,549,759,516	3,154,940,691
1997	1,169,790	55,761,920	65,651,370	2,857,126,443	3,789,383,151
1998	9,207,972	51,518,286	-14,452,431	2,267,502,514	2,313,776,341
1999	1,169,790	40,463,226	49,219,184	2,228,250,265	2,319,102,465
2000	83,630,219	32,710,256	167,647,231	3,045,847,943	3,329,835,649
2001	160,037,859	30,078,009	177,773,259	5,126,344,201	5,494,233,328
		GULF OF MEXICO TOTAL			
2001	632,482,979	188,455,045	3,126,962	6,674,371,634	7,498,436,619
2002	138,423,162	153,303,576	3,252,702	3,841,164,517	4,136,143,958
2003	1,147,014,322	245,963,859	4,983,819	4,535,938,009	5,933,900,009
2004	523,416,154	214,303,045	2,570,343	4,607,776,092	5,348,065,634
2005	518,426,651	221,784,370	1,897,501	5,313,350,455	6,055,458,976
2006	865,262,735	224,006,816	2,839,550	6,514,658,836	7,606,767,938
2007	373,930,998	200,993,255	3,166,689	6,441,214,179	7,019,305,120
2008	6,818,747,137	231,026,391	3,105,849	7,850,622,155	14,903,501,532

[a] Total collection, including state 8G shares.

See footnote in Appendix B.

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Table 33

LOUISIANA ESTIMATED CRUDE OIL PROVED RESERVES [9]
EXCLUDING LEASE CONDENSATE

As of December 31st of Each Year
(Million Barrels)

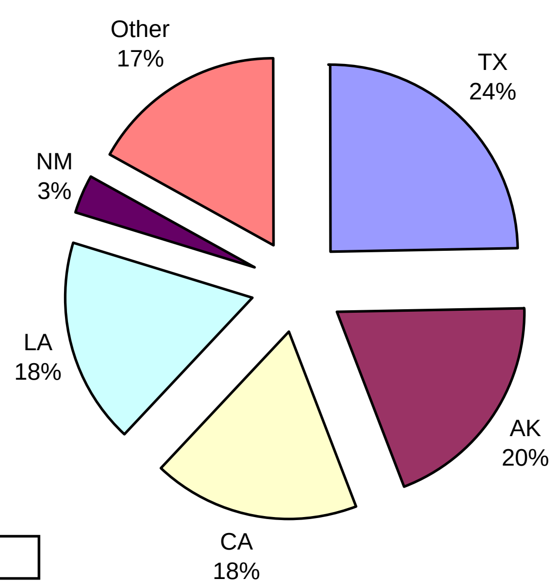
YEAR	North	South Onshore	South Offshore	Federal OCS	Total Louisiana	TOTAL US
1987	175	505	127	1,514	2,321	27,256
1988	154	511	135	1,527	2,327	26,825
1989	123	479	143	1,691	2,436	26,501
1990	120	435	150	1,772	2,477	26,254
1991	127	408	144	1,775	2,454	24,682
1992	125	417	126	1,643	2,311	23,745
1993	108	382	149	1,880	2,519	22,957
1994	108	391	150	1,922	2,571	22,457
1995	108	387	142	2,269	2,906	22,351
1996	128	382	148	2,357	3,015	22,017
1997	136	427	151	2,587	3,301	22,546
1998	101	357	97	2,483	3,038	21,034
1999	108	384	108	2,442	3,042	21,765
2000	97	310	122	2,751	3,280	22,045
2001	87	341	136	3,877	4,441	22,446
2002	75	335	91	4,088	4,589	22,677
2003	66	314	72	4,251	4,703	21,891
2004	58	304	65	3,919	4,346	21,371
2005	68	299	65	3,852	4,284	21,757
2006	68	312	48	3,500	3,928	20,972
2007	76	326	56	3,320	3,778	21,317

See footnotes on Appendix B

Figure 15

UNITED STATES CRUDE OIL RESERVES
December 31, 2007
Excluding Lease Condensate
(Million Barrels)

STATE	VOLUME
Texas	5,266
Alaska	4,163
California	3,763
Louisiana	3,778
New Mexico	735
Other	3,612
TOTAL	**21,317**



LA DNR Technology Assessment Division

Table 34

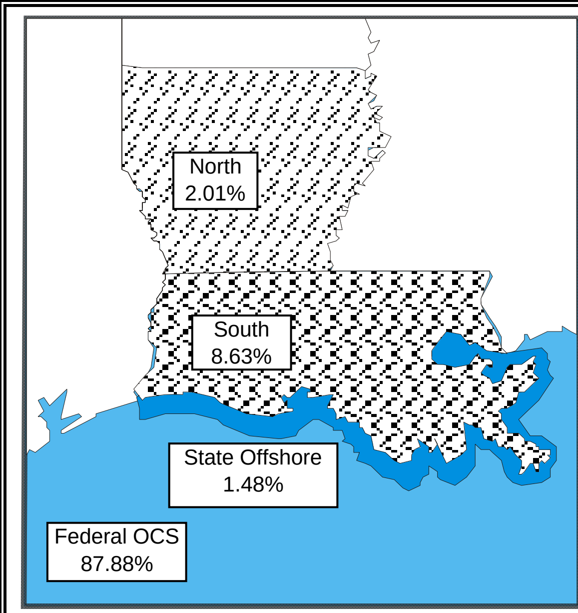
LOUISIANA ESTIMATED LEASE CONDENSATE PROVED RESERVES[9]

As of December 31st of Each Year
(Million Barrels)

YEAR	North	South Onshore	South Offshore	Federal OCS	Total Louisiana	TOTAL US
1987	17	194	13	223	447	1,402
1988	17	193	13	223	446	1,389
1989	20	196	12	278	506	1,389
1990	20	182	12	258	472	1,302
1991	21	175	9	253	458	1,244
1992	19	151	8	226	404	1,226
1993	19	133	9	235	396	1,192
1994	21	123	9	233	386	1,147
1995	24	136	11	305	476	1,197
1996	24	127	11	422	584	1,307
1997	30	134	12	433	609	1,341
1998	23	138	16	435	612	1,336
1999	25	134	15	435	609	1,295
2000	22	130	17	437	606	1,333
2001	27	141	19	325	512	1,398
2002	19	107	11	300	437	1,346
2003	19	82	11	251	363	1,215
2004	21	66	9	205	301	1,221
2005	23	72	9	228	332	1,218
2006	29	65	10	185	289	1,339
2007	31 e	69 e	11 e	180 e	291 e	1,415 [e]

See footnotes on Appendix B

Figure 16



LOUISIANA CRUDE OIL RESERVES

December 31, 2007
(Million Barrels)

North	76
South	326
Offshore	
State	56
Fed. OCS	3,320
TOTAL	**3,778**

LA DNR Technology Assessment Division

Table 35

LOUISIANA ESTIMATED DRY NATURAL GAS PROVED RESERVES[9]

As of December 31st of Each Year
(Billion Cubic Feet, at 14.73 psia and 60 degrees Fahrenheit)

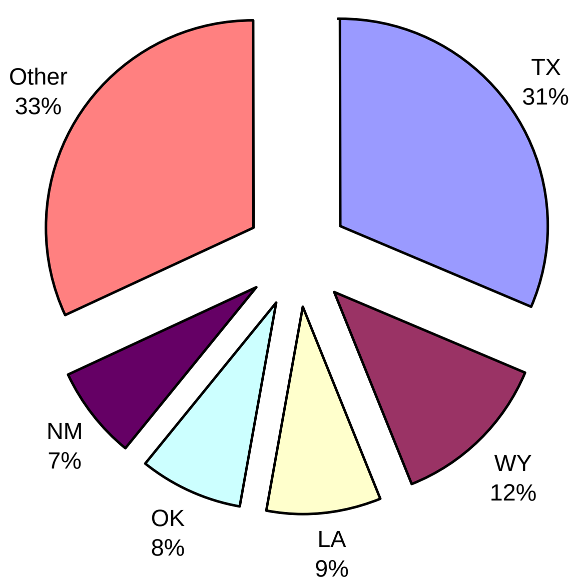
YEAR	North	South Onshore	South Offshore	Federal OCS	Total Louisiana	TOTAL US
1987	2,306	8,693	1,431	23,260 c	35,690 c	187,211
1988	2,398	8,654	1,172	23,471 c	35,695 c	168,024
1989	2,652	8,645	1,219	24,187 c	36,703 c	167,116
1990	2,588	8,171	969	22,679 c	34,407 c	169,346
1991	2,384	7,504	1,024	21,611 c	32,523 c	167,062
1992	2,311	6,693	776	19,653 c	29,433 c	165,015
1993	2,325	5,932	917	19,383 c	28,557 c	162,415
1994	2,537	6,251	960	20,835 c	30,583 c	163,837
1995	2,788	5,648	838	21,392 c	30,666 c	165,146
1996	3,105	5,704	734	21,856 c	31,399 c	166,474
1997	3,093	5,855	725	21,934 c	31,607 c	167,223
1998	2,898	5,698	551	20,774 c	29,921 c	164,041
1999	3,079	5,535	628	19,598 c	28,840 c	167,406
2000	3,298	5,245	696	19,788 c	29,027 c	177,427
2001	3,881	5,185	745	19,721 c	29,532 c	183,460
2002	4,245	4,224	491	18,500 c	27,460 c	186,946
2003	5,074	3,746	506	16,728 c	26,054 c	189,044
2004	5,770	3,436	382	14,685 c	24,273 c	192,513
2005	6,695	3,334	418	13,665 c	24,112 c	204,385
2006	6,715	3,335	424	11,824 c	22,298 c	211,085
2007	6,344	3,323	378	11,090 c	21,135 c	237,726

C Includes Federal Offshore Alabama

Figure 17

UNITED STATES NATURAL GAS RESERVES
December 31, 2007
(Billion Cubic Feet)

STATE	VOLUME
Texas	74,625
Wyoming	29,710
Louisiana	21,135
Oklahoma	19,031
New Mexico	17,245
Other	75,980
TOTAL	**237,726**



LA DNR Technology Assessment Division

Table 36

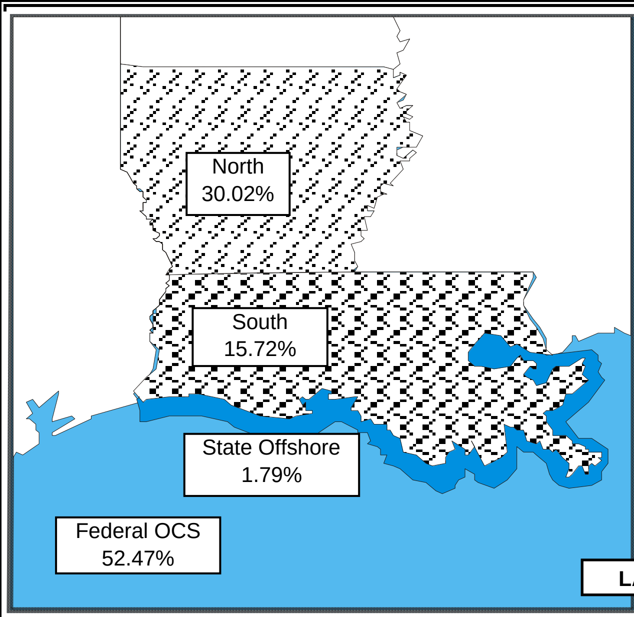
LOUISIANA ESTIMATED NATURAL GAS LIQUIDS PROVED RESERVES[9]
EXCLUDING LEASE CONDENSATE

As of December 31st of Each Year
(Million Barrels)

YEAR	North	South Onshore	South Offshore	Federal OCS	Total Louisiana	TOTAL US
1987	33	235	33	309	610	5,343
1988	39	228	27	289	583	5,460
1989	40	215	39	297	591	4,991
1990	38	249	37	261	585	4,982
1991	38	242	41	292	613	4,978
1992	41	229	47	246	563	4,999
1993	38	201	21	255	515	4,838
1994	48	214	19	267	548	4,876
1995	55	359	16	191	621	5,005
1996	61	284	36	199	580	5,209
1997	50	199	12	352	613	5,291
1998	34	187	13	341	575	4,852
1999	36	230	19	398	681	5,316
2000	39	207	21	315	582	7,012
2001	35	128	41	273	477	6,595
2002	30	119	37	346	532	6,648
2003	48	100	35	235	418	6,244
2004	53	87	27	410	577	6,707
2005	61	96	32	375	563	6,947
2006	60	94	22	390	484	7,133
2007	69 e	99 e	24 e	348 e	540 e	7,728 e

See footnotes on Appendix B

Figure 18



LOUISIANA NATURAL GAS RESERVES
December 31, 2007
(Billion Cubic Feet)

North	6,344
South	3,323
Offshore	
State	378
Fed. OCS	11,090
TOTAL	**21,135**

LA DNR Technology Assessment Division

Table 37

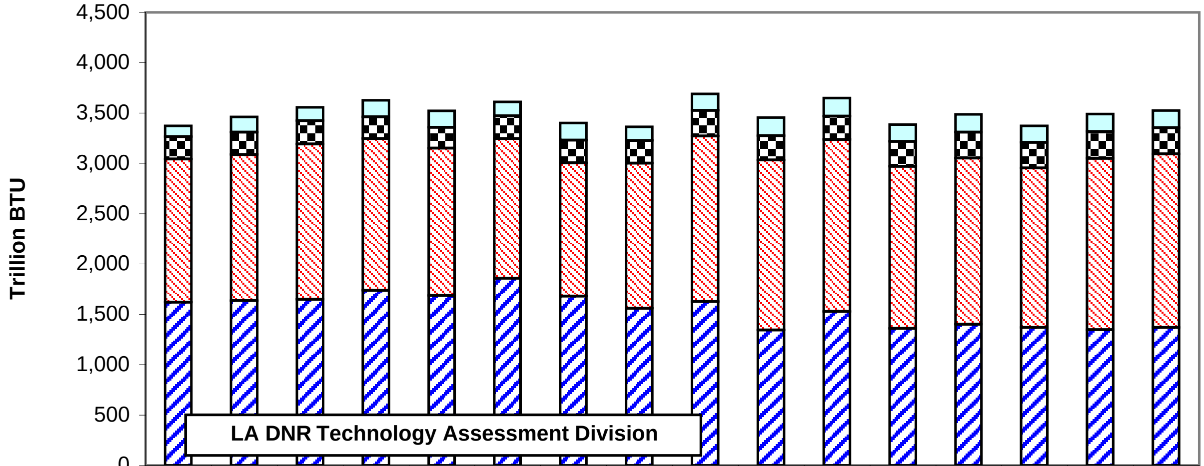
LOUISIANA NONAGRICULTURAL EMPLOYMENT [1]

DATE	OIL & GAS PRODUCTION	CHEMICAL INDUSTRY	PETROLEUM MANUFACTURING	ALL PIPELINE*	TOTAL EMPLOYMENT
1986	58,888	25,998	12,233	1,168	1,475,318
1987	52,117	25,345	12,225	1,051	1,438,793
1988	54,565	26,957	11,258	1,039	1,468,508
1989	52,509	27,717	11,321	1,016	1,492,051
1990	54,063	29,083	11,535	1,041	1,546,820
1991	54,412	29,412	12,268	1,073	1,566,779
1992	45,869	30,349	12,543	1,095	1,583,423
1993	44,422	30,419	12,728	1,078	1,613,577
1994	44,885	30,014	13,037	1,014	1,671,087
1995	44,279	30,168	11,603	932	1,721,651
1996	46,885	30,096	11,262	789	1,757,619
1997	51,559	29,935	11,038	792	1,797,225
1998	54,875	30,196	10,984	702	1,837,505
1999	44,645	28,898	11,046	693	1,846,026
2000	45,714	28,335	10,345	724	1,872,494
2001	47,009	27,337	10,643	2,417	1,868,902
2002	43,839	25,694	10,566	2,306	1,848,656
2003	42,339	24,558	10,395	2,334	1,851,570
2004	40,249	23,516	9,958	2,122	1,866,870
2005	41,179	23,269	10,240	2,179	1,843,237
January	41,799	22,449	10,132	2,274	1,747,593
February	42,154	22,441	10,228	2,266	1,765,886
March	42,550	22,391	10,254	2,379	1,793,167
April	43,037	22,248	10,207	2,325	1,799,727
May	43,361	22,273	10,223	2,332	1,814,871
June	44,373	22,333	10,325	2,362	1,831,664
July	44,914	21,431	10,354	2,369	1,794,314
August	45,474	21,505	10,386	2,380	1,812,496
September	46,288	22,271	10,309	2,361	1,836,951
October	46,278	22,199	10,421	2,356	1,832,341
November	46,120	22,288	10,464	2,372	1,843,923
December	46,381	22,430	10,416	2,384	1,855,074
2006 Average	**44,394**	**22,188**	**10,310**	**2,347**	**1,810,667**
January	45,486	22,279	10,474	2,410	1,829,355
February	45,771	22,351	10,497	2,436	1,842,996
March	45,851	22,403	10,499	2,441	1,863,469
April	47,068	22,554	10,627	2,403	1,863,025
May	47,310	22,604	10,637	2,404	1,875,182
June	47,587	22,573	10,868	2,439	1,880,239
July	47,066	22,798	10,935	2,423	1,847,901
August	47,492	22,855	10,918	2,521	1,870,700
September	47,201	22,836	10,888	2,497	1,880,726
October	46,782	22,686	10,916	2,472	1,886,594
November	46,937	22,664	10,972	2,492	1,896,338
December	46,615	22,745	10,941	2,509	1,903,057
2007 Average	**46,764**	**22,612**	**10,764**	**2,454**	**1,869,965**

* Natural Gas Pipeline employment is included in 2001 forward but excluded in prior years.
See footnote in Appendix B.

Figure 19

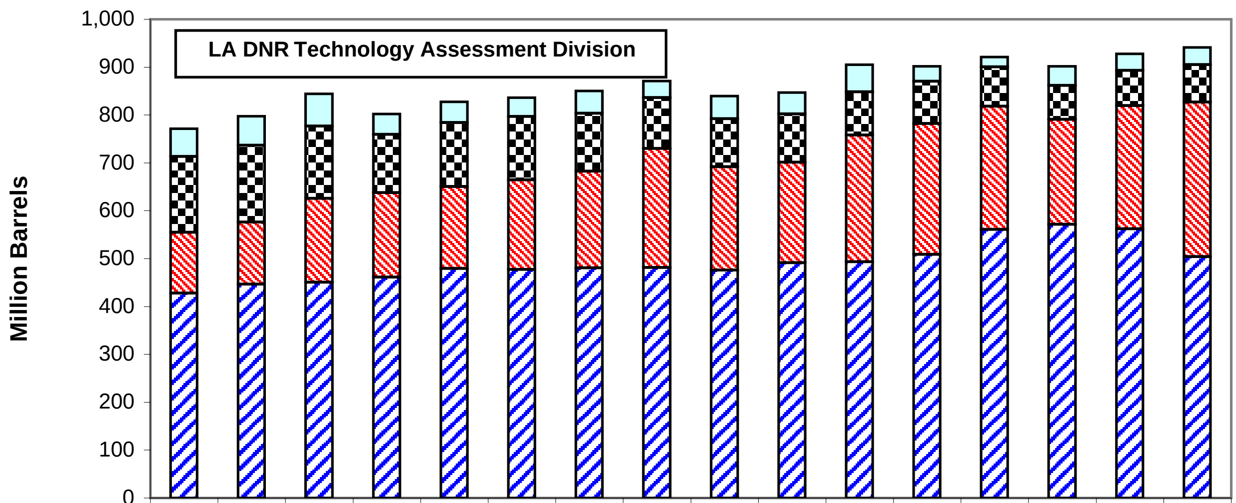
LOUISIANA ENERGY CONSUMPTION BY SOURCE



	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007
Nuclear	108	151	134	165	166	142	172	137	165	181	181	168	178	163	175	170
Coal	224	224	231	217	205	226	225	228	253	240	232	248	257	254	265	262
Petroleum	1,422	1,448	1,542	1,508	1,464	1,387	1,325	1,441	1,645	1,691	1,711	1,610	1,651	1,587	1,702	1,725
Natural Gas	1,620	1,637	1,649	1,737	1,688	1,857	1,679	1,558	1,626	1,342	1,526	1,360	1,400	1,367	1,347	1,367
Total	3,621	3,685	3,800	3,849	3,851	3,914	3,648	3,661	3,972	3,699	3,896	3,693	3,816	3,613	3,764	3,799

Figure 20

LOUISIANA REFINERY CRUDE OIL INPUT BY SOURCE



	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007
Other States	58	61	68	43	44	40	47	35	47	45	57	32	20	40	34	36
Louisiana	159	160	151	122	134	132	121	106	100	101	90	88	82	71	74	78
Federal OCS	127	130	176	176	171	187	201	249	216	210	265	273	257	219	257	323
Foreign	428	446	450	461	479	477	481	481	476	491	493	509	561	572	562	504
Total	771	797	844	802	828	836	850	871	839	847	905	902	921	902	928	941

Table 38

LOUISIANA ENERGY CONSUMPTION ESTIMATES BY SOURCE [11]

Year	Total Energy (TBTU)	Total Natural Gas (BCF)	Total Petroleum (MBBLS)	Total Coal (MST)	Total Nuclear (Million KWH)	Imp(+) Exp(-) Net Electic (Million KWH)
1967	2,124.1	1,394	122,475	N/A	0	0
1968	2,295.0	1,521	134,583	N/A	0	0
1969	2,572.3	1,763	147,947	N/A	0	0
1970	2,701.4	1,841	150,456	0	0	0
1971	2,809.3	1,884	162,470	0	0	0
1972	2,989.3	1,940	184,947	0	0	0
1973	3,225.9	2,010	209,641	0	0	0
1974	3,313.3	2,008	218,882	0	0	0
1975	3,028.8	1,789	210,174	0	0	0
1976	3,419.1	2,044	234,995	0	0	0
1977	3,794.6	2,191	268,572	79	0	0
1978	3,930.1	2,249	277,765	172	0	0
1979	3,805.3	1,978	304,884	118	0	0
1980	3,651.3	1,794	293,743	111	0	0
1981	3,688.6	1,782	295,191	1363	0	0
1982	3,441.2	1,556	287,419	3724	0	0
1983	3,284.5	1,413	275,058	6,154	0	0
1984	3,413.5	1,594	248,344	6,855	0	0
1985	3,192.5	1,386	240,776	9,217	2457	0
1986	3,353.4	1,439	260,602	10,459	10637	0
1987	3,435.5	1,501	257,313	10,391	12,324	0
1988	3,473.1	1,446	271,773	12,848	13,785	0
1989	3,592.6	1,538	266,193	12,471	12,391	0
1990	3,623.8	1,571	259,533	12,547	14,197	0
1991	3,545.9	1,508	256,789	12,965	13,956	0
1992	3,636.0	1,546	268,559	13,674	10,356	656
1993	3,688.6	1,578	273,580	13,676	14,398	1232
1994	3,837.3	1,624	294,700	14,100	12,779	972
1995	3,837.2	1,718	288,998	13,357	15,686	952
1996	3,848.5	1,664	279,292	12,534	15,765	964
1997	3,828.0	1,659	258,290	13,874	13,511	1036
1998	3,564.0	1,568	248,094	13,891	16,428	1063
1999	3,608.6	1,495	278,926	13,953	13,112	802
2000	3,965.2	1,537 r	327,692 r	15,737	15,796	532
2001	3,712.6	1,306 r	325,828 r	14,934	17,336	732
2002	3,762.1	1,426 r	331,522 r	14,676	17,305	891
2003	3,693.3	1,308 r	300,899 r	15,592	16,126	892
2004	3,815.9	1,346 r	310,503 r	16,059	17,080	1099
2005	3,613.0	1,310 r	297,878 r	15,856	15,676	811
2006	3,763.8	1,298	320,703	16,410	16,735	955.0
2007	3,798.8 e	1,304 e	309,291 e	16,133 e	16,206 e	883.0

e Estimated r Revised p Preliminary

TBTU = Trillion BTU BCF = Billion Cubic Feet KWH = Kilowatt-hours

MBBLS = Thousand Barrels MST = Thousand Short Tons

See footnote in Appendix B.

TABLE 39

LOUISIANA REFINERY'S CRUDE OIL STATISTICS

DATE	AVERAGE STOCK ON HAND (Barrels)	DAILY AVERAGE RUNS TO STILL (Barrels)	LICENSED REFINERIES
1988	14,295,591	1,946,861	21
1989	14,158,306	2,051,304	23
1990	13,783,012	2,045,697	23
1991	14,197,185	2,071,276	23
1992	14,331,412	2,090,248	22
1993	14,521,046	2,159,422	20
1994	15,126,534	2,150,403	19
1995	14,325,305	2,109,245	19
1996	14,462,108	2,252,573	19
1997	14,275,221	2,257,275	19
1998	14,965,117	2,312,239	19
1999	15,467,674	2,414,781	17
2000	14,818,774	2,334,842	16
2001	15,425,670	2,480,357	17
2002	16,335,210	2,470,556	18
2003	15,246,004	2,469,756	17
2004	15,938,390	2,543,087	18
2005	16,217,856	2,458,189	18
2006	16,741,544	2,528,319	17
January	15,577,718	2,556,499	17
February	15,669,361	2,652,650	17
March	16,743,885	2,820,918	17
April	15,816,461	2,704,776	17
May	16,574,090	2,729,638	17
June	17,212,594	2,719,927	17
July	16,344,201	2,816,069	17
August	14,821,349	2,685,124	17
September	17,756,078	2,673,931	17
October	16,236,862 r	2,673,531 r	17
November	15,435,532 r	2,612,855 r	17
December	15,108,136 r	2,605,973 r	17
2007 Total	**16,108,022 r**	**2,687,658 r**	**17**
January	17,217,045	2,395,113	17
February	16,030,444	2,518,905	17
March	15,345,038	2,589,718	17
April	16,458,808	2,538,820	17
May	16,898,318	2,629,786	17
June	15,590,183	2,594,503	17
July	16,184,463	2,554,918	17
August	17,066,460	2,327,959	17
September	15,497,560 p	1,562,552 p	17
October	16,362,890 e	2,010,639 e	17 p
November	16,082,853 e	2,069,307 e	17 p
December	16,236,862 e	2,188,207 e	17 p
2008 Total	**16,247,577**	**2,331,702**	**17 p**

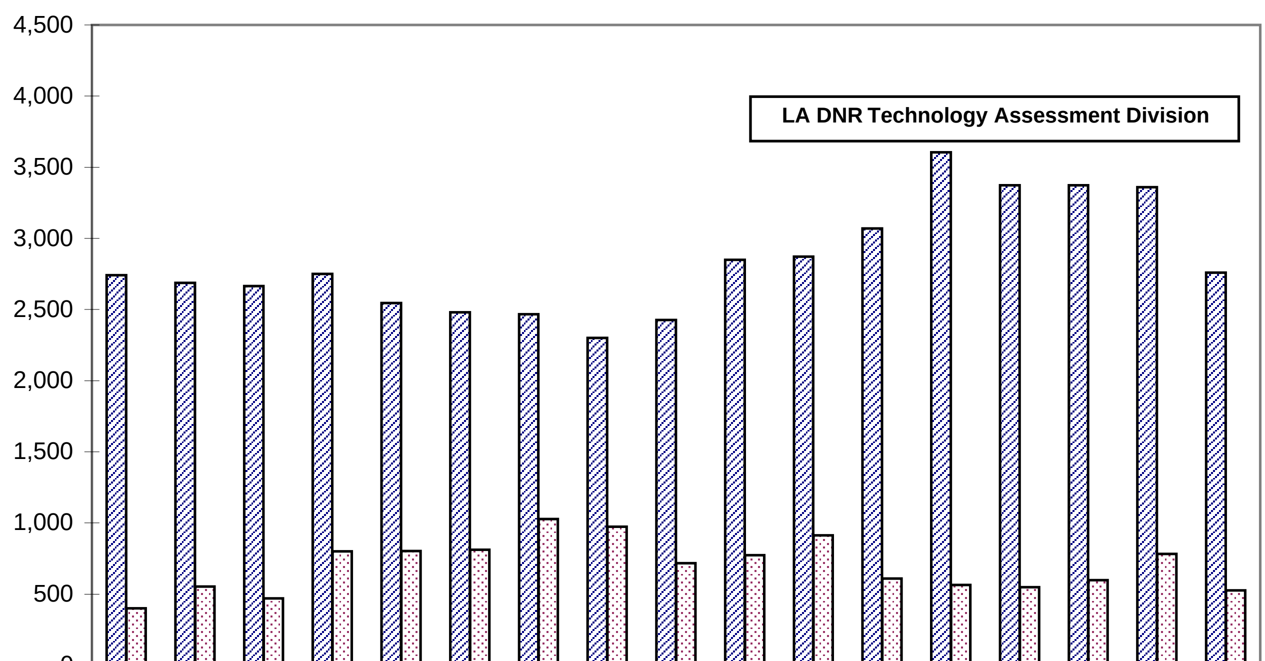
e Estimated r Revised p Preliminary

Exxon-Mobil Refinery - Baton Rouge

Figure 21

LOUISIANA LIGNITE PRODUCTION BY MINE SOURCE

(Thousand Tons Shipped)



	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007
Dolet Hills	2,742	2,688	2,665	2,750	2,546	2,480	2,466	2,301	2,426	2,850	2,872	3,069	3,604	3,373	3,374	3,361	2,759
Oxbow	401	554	470	800	804	812	1,029	974	717	773	912	609	564	548	599	783	527
Total	3,143	3,242	3,135	3,550	3,350	3,292	3,495	3,275	3,143	3,622	3,784	3,678	4,168	3,921	3,973	4,144	3,286

Table 40

LOUISIANA ELECTRIC UTILITIES NET ELECTRICITY GENERATION [14]
BY FUEL TYPE
(Million KWH)

YEAR	COAL	LIGNITE	OIL	GAS	NUCLEAR	TOTAL
1968	0	0	32	26,123	0	26,155
1969	0	0	26	32,301	0	32,327
1970	0	0	79	33,623	0	33,702
1971	0	0	N/A	N/A	0	37,118
1972	0	0	N/A	N/A	0	39,348
1973	0	0	14,353	36,351	0	40,704
1974	0	0	5,034	34,472	0	39,506
1975	0	0	3,257	35,967	0	39,224
1976	0	0	7,773	37,343	0	45,116
1977	0	0	13,255	35,196	0	48,451
1978	0	0	14,568	36,935	0	51,503
1979	0	0	8,259	38,396	0	46,655
1980	0	0	4,787	40,952	0	45,739
1981	1,529	0	2,634	39,947	0	44,110
1982	4,998	0	940	35,594	0	41,532
1983	8,377	0	356	28,311	0	37,044
1984	9,830	0	140	29,360	0	39,330
1985	13,968	0	100	27,736	2,457	44,261
1986	12,642	2,884	419	26,202	10,637	52,784
1987	12,176	2,926	60	23,823	12,324	51,309
1988	14,372	4,059	272	24,286	13,785	56,774
1989	14,227	3,854	298	21,900	12,391	52,670
1990	13,890	3,910	130	26,041	14,197	58,168
1991	14,786	4,126	45	24,245	13,956	57,158
1992	15,613	4,183	483	24,554	10,356	55,188
1993	15,794	3,572	1,838	23,751	14,398	59,353
1994	15,761	4,364	680	26,586	12,779	60,170
1995	14,632	4,321	49	30,867	15,686	65,555
1996	14,630	4,002	273	23,972	15,765	58,643
1997	16,453	4,499	646	26,010	13,511	61,120
1998	16,131	4,631	600	28,318	16,428	66,107
1999	16,386	4,780	397	30,162	13,112	64,837
2000	11,150 *	3,335 *	625	26,696	15,796	57,601 *
2001	8,157 *	2,760 *	1,722	20,402	17,336	50,378 *
2002	9,177 *	3,081 *	68	25,086	17,305	54,922 *
2003	8,075 *	2,946 *	1,008	15,094	16,126	43,485 *
2004	8,569 *	2,755 *	3,694	15,139	17,080	47,604 *
2005	8,838 *	2,578 *	3,378	13,688	15,676	44,158 *
2006	8,659 *	2,886 *	1,757	10,854	16,735	40,781 *
2007	8,540 *	2,196 *	1,920	13,885	17,078	43,619 *

* Cajun Electric Power Cooperative's purchase by Louisiana Generating LLC changed their classification from electric utility to independent power producer.

e Estimated r Revised

See footnotes on Appendix B

APPENDICES

The Sol of New Orleans II
The University of New Orleans's solar powered car

Appendix A

Abbreviations

BCF	Billion Cubic Feet
BTU	British Thermal Unit
DNR	Louisiana Department of Natural Resources
DOE	United States Department of Energy
DOI	United States Department of the Interior
EIA	Energy Information Administration, DOE
FOB	Free on Board
KWH	Kilowatt-hours
MBBLS	Thousand Barrels
MCF	Thousand Cubic Feet
MMS	Minerals Management Service, DOI
MST	Thousand Short Tons
NGC	Natural Gas Clearinghouse
OCS	Outer Continental Shelf
OPEC	Organization of Petroleum Exporting Countries
RAC	Refinery Acquisition Costs
SLS	South Louisiana Sweet Crude Oil
SPR	Strategic Petroleum Reserve
TBTU	Trillion BTU
TCF	Trillion Cubic Feet

State Abbreviations Used in the Louisiana Energy Facts Annual

AL	Alabama	MS	Mississippi
AK	Alaska	MT	Montana
CA	California	ND	North Dakota
CO	Colorado	NM	New Mexico
IL	Illinois	OK	Oklahoma
KS	Kansas	TX	Texas
LA	Louisiana	UT	Utah
MI	Michigan	WY	Wyoming

Appendix B

Data Sources*

1. EMPLOYMENT AND TOTAL WAGES PAID BY EMPLOYERS SUBJECT TO LOUISIANA EMPLOYMENT SECURITY LAW, Baton Rouge, LA: Louisiana Department of Labor, Office of Employment Security, Research and Statistics Unit.
2. MONTHLY ENERGY REVIEW and ANNUAL ENERGY REVIEW, Washington, D.C.: U.S. Department of Energy, Energy Information Administration.
3. NATURAL GAS MONTHLY and NATURAL GAS ANNUAL, Washington, D.C.: U.S. Department of Energy, Energy Information Administration.
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- Unless otherwise specified, data is from the Louisiana Department of Natural Resources.

AN EXPLANATION OF CHANGES IN OIL AND GAS STATISTICS

NOTE # 1

Current production data and all future reports will reflect changes due to modifications in the reporting system by the Department of Natural Resources Office of Conservation, Production Audit Section. Only the oil and gas production data in state jurisdiction is affected.

The new data for oil will not include crude oil, condensate or raw make recovered from natural gas processing plants. In the past these products were added to the state production as crude oil or condensate.

A separate report on gas plants liquids production is not available at the present.

In addition, the gas data system has been adjusted to reflect reporting production on the date produced. Previously it had been reported on the date first purchased.

The new reporting system should produce more accurate and timely data.

The Technology Assessment Division is not the source of these data sets, but merely reports data provided to us by the Office of Conservation. However, we understand that users of our time series data need consistency over time. For that reason our time series has been adjusted backwards to 1980 using these new definitions.

NOTE # 2

Producing oil and gas well data since 2000 reflect changes due to modifications in the reporting system by the Department of Natural Resources Office of Conservation.

The new data for oil and natural gas producing wells count them as productive if they had any production in the month, previous system counted only the producing wells at the end of the month. The new reporting system should produce more accurate and timely data.

The Technology Assessment Division is not the source of these data sets, but merely reports data provided to us by the Office of Conservation. However, we understand that users of our time series data need consistency over time, but due to lack of accurate information the time series has been adjusted only backwards to 2000 using the new system.

Other factors that affected the big increase on wells numbers are the big jump on energy prices around 2000, and the inactive wells

Appendix C

Glossary

Bonus. A cash payment by the lessee for the execution of a lease. A lease is a contract that gives a lessee the right: (a) to search for minerals, (b) to develop the surface for extraction, and (c) to produce minerals within the area covered by the contract.

Casinghead Gas. All natural gas released from oil during the production of oil from underground reservoirs.

City-Gate. A point or measuring station at which a gas distribution company receives gas from a pipeline company or transmission system.

Commercial Consumption. Gas used by non-manufacturing organizations such as hotels, restaurants, retail stores, laundries, and other service enterprises. This also includes gas used by local, state, and federal agencies engaged in non-manufacturing activities.

Condensate. (See Lease Condensate).

Crude Oil. A mixture of hydrocarbons that existed in the liquid phase in natural underground reservoirs and remains liquid at atmospheric pressure after passing through surface separating facilities.

CRUDE OIL PRICES

Domestic Wellhead. The average price at which all domestic crude oil is first purchased.

Imports FOB. The price actually charged at the producing country's port of loading. It is the responsibility of the buyer to arrange for transportation and insurance.

Imports Landed. The dollar per barrel price of crude oil at the port of discharge. It includes crude oil landed in the U.S. and U.S. company-owned refineries in the Caribbean, but excludes crude oil from countries that export only small amounts to the United States. The landed price does not include charges incurred at the port of discharge.

Imports OPEC FOB. The average price actually charged by OPEC at their country's port of loading. This price does not include transportation or insurance.

OCS Gulf. The average price at which all offshore, Outer Continental Shelf, Central Gulf region crude oil is first purchased as reported by the U.S. Department of Energy, Energy Information Administration.

Refinery Acquisition Costs (RAC). The average price paid by refiners in the U.S. for crude oil booked into their refineries in accordance with accounting procedures generally accepted and consistently and historically applied by the refiners.

a) **Domestic**. The average price of crude oil produced in the United States or from the Outer Continental Shelf of the U.S.

b**) Imports**. The average price of any crude oil not reported as domestic.

Refinery Posted. The average price from a survey of selected refiners' postings for South Louisiana Sweet (SLS) crude, which is effective at the middle and at the end of the month.

Severance Tax. The average wellhead price calculated from oil severance taxes paid to the Louisiana Department of Revenue and Taxation.

Spot Market. The spot market crude oil price is the average of daily South Louisiana Sweet (SLS) crude price futures traded in the month and usually includes transportation from the producing field to the St. James, Louisiana terminal.

State. The average price at which all Louisiana crude oil, excluding Louisiana OCS, is first purchased as reported in a survey by the U.S. Department of Energy, Energy Information Administration.

State Royalty. The average wellhead price from its royalty share of oil produced in state lands or water bottoms. The price is calculated by the ratio of received oil royalty gross revenue divided by royalty volume share reported to the Louisiana Department of Natural Resources.

Developmental Well. Wells drilled within the proved area of an oil or gas reservoir to the depth of a stratigraphic horizon known to be productive.

Dry Gas. (See Natural Gas, "Dry").

Dry Hole. An exploratory or developmental well found to be incapable of producing either oil or gas in sufficient quantities to justify completion as an oil or gas well.

Electric Utility Consumption. Gas used as fuel in electric utility plants.

Exploratory Well. A well drilled to find and produce oil or gas in an unproved area, to find a new reservoir in an old field, or to extend the limits of a known oil or gas reservoir.

Exports. Crude oil or natural gas delivered out of the Continental United States and Alaska to foreign countries.

Extraction Loss. The reduction in volume of natural gas resulting from the removal of natural gas liquid constituents at natural gas processing plants.

Federal Offshore or Federal OCS. (See Louisiana OCS)

FOB Price (Free on board). The price actually charged at the producing country's port of loading. The reported price includes deductions for any rebates and discounts or additions of premiums where applicable and should be the actual price paid with no adjustment for credit terms.

Gate. (See City-Gate)

Gross Revenue. Amount of money received from a purchaser, including charges for field gathering, transportation from wellhead to purchaser receiving terminal, and state production severance tax.

Gross Withdrawals. (See Natural Gas, Gross Withdrawals)

Imports. Crude oil or natural gas received in the Continental United States, Alaska, and Hawaii from foreign countries.

Industrial Consumption. Natural gas used by manufacturing and mining establishments for heat, power, and chemical feedstock.

Lease Condensate. A mixture consisting primarily of pentane and heavier hydrocarbons that is recovered as a liquid from natural gas in lease or field separation facilities, exclusive of products recovered at natural gas processing plants or facilities.

Lease Separator. A facility installed at the surface for the purpose of: (a) separating gases from produced crude oil and water at the temperature and pressure conditions of the separator, and/or (b) separating gases from that portion of the produced natural gas stream which liquefies at the temperature and pressure conditions of the separator.

Louisiana OCS. Submerged lands under federal regulatory jurisdiction that comprise the Continental Margin or Outer Continental Shelf adjacent to Louisiana and seaward of the Louisiana Offshore region.

Louisiana Offshore. A 3-mile strip of submerged lands under state regulatory jurisdiction located between the State coast line and the OCS region.

Louisiana Onshore. Region defined by the State boundary and the coast line.

Major Pipeline Company. A company whose combined sales for resale, and gas transported interstate or stored for a fee, exceeded 50 million thousand cubic feet in the previous year.

Marketed Production. (See Natural Gas, Marketed Production)

Natural Gas. A mixture of hydrocarbon compounds and small quantities of various non-hydrocarbons existing in the gaseous phase or in solution with crude oil in natural underground reservoirs at reservoir conditions. The principal hydrocarbons usually contained in the mixture are methane, ethane, propane, butanes and pentanes. Typical non-hydrocarbon gases that may be present in reservoir natural gas are carbon dioxide, helium, hydrogen sulfide and nitrogen. Under reservoir conditions, natural gas and the liquefiable portions occur either in a single gaseous phase in the reservoir or in solution with crude oil, and are not distinguishable at the time as separated substances.

Natural Gas, "Dry". The actual or calculated volume of natural gas which remains after: (a) the liquefiable hydrocarbon portion has been removed from the gas stream, and (b) any volumes of non-hydrocarbon gases have been removed where they occur in sufficient quantity to render the gas unmarketable.

Natural Gas, Gross Withdrawals. Full well-stream volume, including all natural gas plant liquids and all non-hydrocarbon gases, but excluding lease condensate.

Natural Gas Liquids. Lease condensate plus natural gas plant liquids.

Natural Gas, Marketed Production. Gross withdrawals less gas used for repressurizing, quantities vented and flared, and non-hydrocarbon gases removed in treating or processing operations. It includes all quantities of gas used in field and processing operations.

Natural Gas, OCS Gas. OCS gas volume is as reported. Most is "dry" gas, though some is "wet" gas.

Natural Gas Plant Liquids. Those hydrocarbons remaining in a natural gas stream after field separation and later separated and recovered at a natural gas processing plant or cycling plant through the processes of absorption, adsorption, condensation, fractionation or other methods. Generally such liquids consist of propane and heavier hydrocarbons and are commonly referred to as condensate, natural gasoline, or liquefied petroleum gases. Where hydrocarbon components lighter than propane (e.g., ethane) are recovered as liquids, these components are included with natural gas liquids.

NATURAL GAS PRICES

Henry Hub Settled NYMEX. The last trading day price for the month before delivery posted in the New York Mercantile Exchange for natural gas at Henry Hub.

Spot Market. The average price of natural gas paid at the regional spot market receipt points or zones as reported by the Energy Intelligence Group's NATURAL GAS WEEK. The data are a volume weighted average and reflect market activity information gathered during the entire month before the publication date, regardless of delivery date. The data are not an arbitrary weighting by production zone, but a true deal-by-deal volume weighting of prices gathered. Data prior to October 2002 were from Dynegy's survey of the domestic natural gas spot market receipt points or zones located in Louisiana. The new and old points or zones are as follows:

NATURAL GAS PIPELINES AND SALES POINTS FOR PRICES

Dynegy	Natural Gas Week
ANR	ANR
Eunice, LA	Patterson, LA
COLUMBIA GULF	COLUMBIA GULF TRANSMISSION CO.
Average Louisiana onshore laterals	Average of Erath, Rayne, and Texaco Henry Plant in Louisiana
LOUISIANA INTRASTATES	LOUISIANA INTRASTATES
Average of Faustina, LIG, Bridgeline, and Monterrey pipelines	Average of LIG, Bridgeline, LRC, and Acadian pipelines
SOUTHERN NATURAL	SONAT
South Louisiana	Saint Mary Parish, LA
TENNESSEE GAS	TENNESSEE GAS
Vinton, LA	Average Zone 1 of 500 & 800
TEXAS GAS TRANSMISSION	TEXAS GAS TRANSMISSION
Zone 1 (North Louisiana)	Zone 1 (North Louisiana)
GULF SOUTH PIPELINE	TRUNKLINE GAS CO.

OCS. The average wellhead price calculated from sales and volumes from Louisiana OCS natural gas as reported by the U.S. Department of Interior, Minerals Management Service.

State Royalty. The average wellhead price calculated from revenue received and volumes reported to the Louisiana Department of Natural Resources.

State Wells. The average price of gas sold at Louisiana wellhead. This price includes: (a) value of natural gas plant liquids subsequently removed from the gas, (b) gathering and compression charges, and (c) State production, severance, and/or similar charges.

Major Pipelines Purchases.

a) **Domestic Producers**. The average price of natural gas produced in the United States or from the Outer Continental Shelf of the U.S.

b**) Foreign Imports**. The average price of any natural gas not reported as domestic.

Wellhead. The wellhead sales price including: (a) value of natural gas plant liquids subsequently removed from the gas, (b) gathering and compression charges, and (c) State production, severance, and/or similar charges.

Natural Gas, Wet After Lease Separation. The volume of natural gas, if any, remaining after: (a) removal of lease condensate in lease and/or field separation facilities, and (b) exclusion of non-hydrocarbon gases where they occur in sufficient quantities to render the gas unmarketable. Also excludes gas returned to formation in pressure maintenance and secondary recovery projects and gas returned to earth from cycling and/or gasoline plants. Natural gas liquids may be recovered from volumes of natural gas, wet after lease separation, at natural gas processing plants.

Organization of Petroleum Exporting Countries (OPEC). Countries that have organized for the purpose of negotiating with oil companies on matters of oil production, prices, and future concession rights. Current members are Algeria, Gabon, Indonesia, Iran, Iraq, Kuwait, Libya, Nigeria, Qatar, Saudi Arabia, the United Arab Emirates, and Venezuela.

Outer Continental Shelf (OCS). All submerged lands that comprise the Continental Margin adjacent to the U.S. and seaward of the state offshore lands. Production in the OCS is under federal regulatory jurisdiction and ownership.

Processing Plant. A facility designed to recover natural gas liquids from a stream of natural gas which may or may not have passed through lease separators and/or field separation facilities. Another function of natural gas processing plants is to control the quality of the processed natural gas stream.

Proved Reserves of Crude Oil. As of December 31 of the report year, the estimated quantities of all liquids defined as crude oil which geological and engineering data demonstrate with reasonable certainty to be recoverable in future years from known reservoirs under existing economic and operating conditions. Volumes of crude oil in underground storage are not considered proved reserves.

Proved Reserves of Lease Condensate. The volumes of lease condensate as of December 31 of the report year expected to be recovered in future years in conjunction with the production of proved reserves of natural gas as of December 31 of the report year.

Proved Reserves of Natural Gas. The estimated quantities of natural gas as of December 31 of the report year which analysis of geologic and engineering data demonstrates with reasonable certainty to be recoverable in future years from known reservoirs under existing economic and operating conditions. Volumes of natural gas in underground storage are not considered proved reserves.

Proved Reserves of Natural Gas Liquids. The volumes of natural gas liquids (including lease condensate) as of December 31 of the report year, which analysis of geologic and engineering data demonstrates with reasonable certainty to be separable in the future from proved natural gas reserves under existing economic and operating conditions.

Rental. Money paid by the lessee to maintain the lease after the first year if it is not producing. A lease is considered expired when rental is not paid on time on an unproductive lease.

Reservoir. A porous and permeable underground formation containing an individual and separate natural accumulation of producible hydrocarbons (oil and/or gas) which is confined by impermeable rock or water barriers and is characterized by a single natural pressure system. Reservoirs are considered proved if economic producibility is supported by actual production or conclusive formation tests (drill stem or wire line), or if economic producibility is supported by core analysis and/or electric or other log interpretations. The area of a gas or oil reservoir considered proved includes: (a) that portion delineated by drilling and defined by gas-oil and/or gas-water contacts, if any; and (b) the immediately adjoining portions not yet drilled, but which can be reasonably judged as economically productive on the basis of available geological and engineering data.

Residential Consumption. Gas used in private dwellings, including apartments, for heating, cooking, water heating, and other household uses.

Royalty (Including Royalty Override) Interest. Those interests which entitle their owner(s) to a share of the mineral production from a property or to a share of the proceeds from there. These interests do not contain the rights and obligations of operating the property and normally do not bear any of the costs of exploration, development, or operation of the property.

Royalty Override (Or Overriding Royalty). An interest in oil and gas produced at the surface free of any cost of production. It is royalty in addition to the usual landowner's royalty reserved to the lessor. The Layman's Guide to Oil & Gas by Brown & Miller defines overriding royalty as a percentage of all revenue earned by a well and carrying no cost obligation.

State Offshore. (See Louisiana Offshore**).**

Wet After Lease Separation. (See Natural Gas, Wet After Lease Separation).

Wildcat Well . (See Developmental Well).

Appendix D

Gas Production at 14.73 psia

Page

Appendix D-1

LOUISIANA STATE GAS PRODUCTION, WET AFTER LEASE SEPARATION

Natural Gas and Casinghead Gas, Excluding OCS

(Thousand Cubic Feet (MCF) at 14.73 psia and 60 degrees Fahrenheit)*

DATE	NORTH	SOUTH	OFFSHORE	TOTAL
1987	363,802,599	1,175,490,485	232,692,536	1,771,985,620
1988	382,100,449	1,192,889,101	218,544,278	1,793,533,828
1989	386,783,455	1,153,294,096	207,381,469	1,747,459,020
1990	398,236,494	1,160,425,829	185,678,416	1,744,340,739
1991	389,623,599	1,139,243,110	152,895,972	1,681,762,681
1992	379,671,005	1,146,893,542	149,933,256	1,676,497,803
1993	360,897,088	1,126,950,007	156,919,403	1,644,766,497
1994	361,146,486	1,048,229,785	158,315,609	1,567,691,880
1995	370,709,558	1,028,500,599	167,742,330	1,566,952,486
1996	425,506,052	1,048,009,685	189,331,696	1,662,847,432
1997	450,873,442	995,341,920	189,565,415	1,635,780,777
1998	446,138,374	979,584,537	183,246,642	1,608,969,552
1999	402,085,989	928,879,872	152,594,840	1,483,560,702
2000	395,677,666	945,498,776	152,424,859	1,493,601,301
2001	397,310,430	973,832,888	154,069,579	1,525,212,897
2002	359,131,277	892,340,964	137,664,063	1,389,136,304
2003	350,277,616	889,027,838	132,989,506	1,372,294,960
2004	336,320,124	911,403,982	129,211,618	1,376,935,723
2005	421,078,040 r	781,864,138 r	106,171,546 r	1,310,585,044 r
2006	362,653,568 r	916,798,714 r	96,221,554 r	1,376,852,940 r
January	28,689,189 r	79,008,229 r	6,446,859 r	114,864,403 r
February	25,799,671 r	70,455,505 r	7,200,058 r	102,702,036 r
March	29,155,131 r	79,829,389 r	7,132,235 r	116,184,578 r
April	28,580,671 r	78,058,372 r	7,558,865 r	113,771,278 r
May	29,483,843 r	82,785,350 r	7,306,426 r	119,828,057 r
June	28,616,083 r	80,166,953 r	7,512,093 r	116,089,462 r
July	29,572,703 r	82,774,324 r	7,794,126 r	119,859,120 r
August	27,662,943 r	80,808,363 r	7,566,646 r	116,265,432 r
September	27,006,082 r	78,991,900 r	7,808,338 r	113,564,627 r
October	27,654,945 r	81,237,148 r	7,576,101 r	116,700,431 r
November	26,995,516 r	78,985,669 r	7,788,407 r	113,557,286 r
December	27,829,892 r	82,028,358 r	8,090,878 r	117,646,657 r
2007 Total	**337,046,669 r**	**955,129,559 r**	**89,781,032 r**	**1,381,033,368 r**
January	28,132,619	81,252,546	7,306,580	117,476,043
February	26,721,645	75,681,937	8,078,523	109,710,162
March	28,125,301	82,110,218	7,836,156	118,314,041
April	27,294,808	79,875,301	8,094,427	115,006,264
May	28,208,959	82,641,668	7,669,463	118,945,054
June	26,759,924	78,901,766	7,754,457	113,331,154
July	27,141,966	80,191,948	7,725,376	115,088,371
August	27,055,709	80,110,693	5,894,875	114,891,779
September	26,169,951 p	61,599,052 p	5,977,842 p	93,663,878 p
October	26,794,057 p	66,394,853 p	6,270,345 p	99,166,752 p
November	25,890,246 p	65,743,212 p	6,457,910 p	97,903,803 p
December	26,677,411 p	67,768,110 p	7,766,621 p	100,903,431 p
2008 Total	**324,972,597 p**	**902,271,304 p**	**86,832,574 p**	**1,314,400,733 p**

e Estimated r Revised p Preliminary

* See Table 11 corresponding volumes at 15.025 psia and footnote in Appendix B.

Appendix D-2

LOUISIANA STATE GAS PRODUCTION, WET AFTER LEASE SEPARATION

Natural Gas and Casinghead Gas

(Thousand Cubic Feet (MCF) at 14.73 psia and 60 degrees Fahrenheit)*

DATE	ONSHORE	OFFSHORE State	OFFSHORE Federal OCS[12]	TOTAL
1987	1,539,293,084	232,692,536	3,180,107,212	4,952,092,832
1988	1,574,989,550	218,544,278	3,096,881,645	4,890,415,472
1989	1,540,077,551	207,381,469	3,006,576,077	4,754,035,097
1990	1,558,662,324	185,678,416	3,706,324,064	5,450,664,803
1991	1,528,866,709	152,895,972	3,289,968,620	4,971,731,301
1992	1,526,564,547	149,933,256	3,338,101,465	5,014,599,268
1993	1,487,847,094	156,919,403	3,386,808,671	5,031,575,169
1994	1,409,376,270	158,315,609	3,492,406,781	5,060,098,660
1995	1,399,210,157	167,742,330	3,636,068,016	5,203,020,503
1996	1,473,515,737	189,331,696	3,783,483,306	5,446,330,739
1997	1,446,215,363	189,565,415	3,901,964,998	5,537,745,775
1998	1,425,722,911	183,246,642	3,890,978,799	5,499,948,351
1999	1,330,965,862	152,594,840	3,913,456,139	5,397,016,841
2000	1,341,176,442	152,424,859	3,837,150,457	5,330,751,758
2001	1,371,143,318	154,069,579	3,895,134,261	5,420,347,158
2002	1,251,472,241	137,664,063	3,527,116,066	4,916,252,369
2003	1,239,305,454	132,989,506	3,342,004,232	4,714,299,192
2004	1,247,724,105	129,211,618	2,897,440,676 e	4,274,376,399 e
2005	1,202,942,178 r	106,171,546 r	2,229,362,826 e	3,538,476,550 e r
2006	1,279,452,282 r	96,221,554 r	2,089,462,261 e	3,465,136,097 e r
January	107,697,418 r	6,446,859 r	175,131,548 e	289,275,825 e r
February	96,255,177 r	7,200,058 r	158,585,194 e	262,040,428 e r
March	108,984,520 r	7,132,235 r	177,803,799 e	293,920,555 e r
April	106,639,043 r	7,558,865 r	173,992,391 e	288,190,299 e r
May	112,269,193 r	7,306,426 r	183,745,594 e	303,321,212 e r
June	108,783,036 r	7,512,093 r	174,912,335 e	291,207,465 e r
July	112,347,027 r	7,794,126 r	176,132,831 e	296,273,984 e r
August	108,471,306 r	7,566,646 r	171,433,627 e	287,471,578 e r
September	105,997,982 r	7,808,338 r	159,632,415 e	273,438,735 e r
October	108,892,093 r	7,576,101 r	171,269,135 e	287,737,329 e r
November	105,981,185 r	7,788,407 r	165,288,266 e	279,057,858 e r
December	109,858,249 r	8,090,878 r	174,627,527 e	292,576,655 e r
2007 Total	**1,292,176,228 r**	**89,781,032 r**	**2,062,554,663** e	**3,444,511,924 e r**
January	109,385,165	7,306,580	169,020,656 e	285,712,401 e
February	102,403,582	8,078,523	160,376,734 e	270,858,839 e
March	110,235,518	7,836,156	165,142,171 e	283,213,845 e
April	107,170,109	8,094,427	153,406,062 e	268,670,598 e
May	110,850,628	7,669,463	154,724,234 e	273,244,325 e
June	105,661,691	7,754,457	151,982,204 e	265,398,352 e
July	107,333,914	7,725,376	148,369,470 e	117,311,861 e
August	107,166,402	5,894,875	137,799,272 e	117,080,127 e
September	87,769,003 p	5,977,842 p	N/A	98,553,583 p
October	93,188,910 p	6,270,345 p	N/A	112,961,788 p
November	91,633,458 p	6,457,910 p	N/A	110,528,300 p
December	94,445,521 p	7,766,621 p	N/A	110,181,564 p
2008 Total	**1,227,243,902 p**	**86,832,574 p**	**1,240,820,803 e**	**2,554,897,280 p**

e Estimated r Revised p Preliminary

* See Table 12 corresponding volumes at 15.025 psia and footnote in Appendix B.

NOTE: The 2003 Federal OCS production is estimated from the marketed production

Appendix D-3

LOUISIANA MARKETED AND DRY GAS PRODUCTION[12]

(Billion Cubic Feet (BCF) at 14.73 psia and 60 degrees Fahrenheit)*

	MARKETED			EXTRACTION	
DATE	State	OCS[12]	Total[3]	LOSS[3]	DRY[3]
1966	4,145 e	956	5,101 e	N/A	N/A
1967	4,640 e	1,076	5,717 e	N/A	N/A
1968	5,017 e	1,399	6,416 e	N/A	N/A
1969	5,424 e	1,804	7,228 e	N/A	N/A
1970	5,538 e	2,250	7,788 e	193	7,595
1971	5,474 e	2,608	8,082 e	195	7,887
1972	5,120 e	2,853	7,973 e	198	7,775
1973	5,217 e	3,025	8,242 e	207	8,036
1974	4,438 e	3,316	7,754 e	194	7,559
1975	3,792 e	3,299	7,091 e	190	6,901
1976	3,542 e	3,465	7,007 e	173	6,834
1977	3,604 e	3,611	7,215 e	166	7,049
1978	3,368 e	4,108	7,476 e	162	7,315
1979	3,149 e	4,117	7,266 e	166	7,101
1980	2,966 e	3,974	6,940 e	142	6,798
1981	2,715 e	4,065	6,780 e	142	6,638
1982	2,406 e	3,766	6,172 e	129	6,043
1983	2,190 e	3,142	5,332 e	124	5,208
1984	2,282 e	3,543	5,825 e	133	5,693
1985	1,928 e	3,086	5,014 e	118	4,896
1986	1,997 e	2,899	4,895 e	116	4,780
1987	1,974 e	3,148	5,123 e	125	4,998
1988	2,114 e	3,066	5,180 e	120	5,060
1989	2,102 e	2,977	5,078 e	121	4,957
1990	1,573 e	3,669	5,242 e	119	5,123
1991	1,777 e	3,257	5,034 e	129	4,905
1992	1,649 e	3,265	4,914 e	133	4,782
1993	1,674 e	3,317	4,991 e	130	4,861
1994	1,691 e	3,479	5,170 e	129	5,041
1995	1,683 e	3,425	5,108 e	146	4,962
1996	1,628 e	3,662	5,290 e	140	5,150
1997	1,535	3,652	5,187	147	4,980
1998	1,583	3,652	5,235	142	5,032
1999	1,598	3,636	5,234	162	5,011
2000	1,484	3,664	5,148	168	5,027
2001	1,532	3,673 e	5,205 e	156 e	5,025 e
2002	1,389	3,418 e	4,807 e	160 e	4,623 e
2003	1,377	3,235 e	4,613 e	127 e	4,556 e
2004	1,385	2,809 e	4,193 e	136 e	4,334 e
2005	1,322	2,158 e	3,480 e	132 e	3,339 e
2006	1,407	2,093 e	3,501 e	132 e	3,359 e
2007	1,225	1,954 e	3,179 e	130 e	3,049 e

e Estimated r Revised p Preliminary

* See Table 13 corresponding volumes at 15.025 psia and footnote in Appendix B.

Appendix D-4

UNITED STATES OCS GAS PRODUCTION[12]

Natural Gas and Casinghead Gas
(Thousand Cubic Feet (MCF) at 14.73 psia and 60 degrees Fahrenheit)*

YEAR	LOUISIANA	TEXAS	CALIFORNIA	TOTAL
1963	564,352,609	0	0	564,352,609
1964	621,731,441	0	0	621,731,441
1965	645,589,472	0	0	645,589,472
1966	965,387,854	42,059,386	0	1,007,447,240
1967	1,087,262,810	99,952,947	0	1,187,215,756
1968	1,413,467,614	109,910,788	799,685	1,524,178,086
1969	1,822,544,152	127,096,983	4,845,851	1,954,486,985
1970	2,273,147,052	133,300,405	12,229,147	2,418,676,604
1971	2,634,014,045	127,357,909	15,671,479	2,777,043,433
1972	2,881,364,748	147,156,460	10,033,581	3,038,554,789
1973	3,055,628,252	148,673,638	7,286,549	3,211,588,439
1974	3,349,170,882	159,979,402	5,573,642	3,514,723,926
1975	3,332,169,075	122,572,765	3,951,633	3,458,693,473
1976	3,499,865,919	92,582,425	3,475,201	3,595,923,545
1977	3,647,513,694	86,943,285	3,289,963	3,737,746,942
1978	4,149,731,158	231,857,451	3,472,292	4,385,060,901
1979	4,158,521,732	511,590,610	2,866,822	4,672,979,164
1980	4,013,707,456	624,642,529	3,107,023	4,641,457,008
1981	4,106,494,612	730,275,835	12,766,307	4,849,536,754
1982	3,803,740,070	858,020,303	17,750,924	4,679,511,297
1983	3,173,892,371	850,817,216	16,024,292	4,040,733,879
1984	3,578,740,589	931,293,587	27,806,899	4,537,841,075
1985	3,116,884,507	834,926,527	49,164,213	4,000,975,247
1986	2,927,832,280	978,370,557	42,689,021	3,948,891,858
1987	3,180,107,212	1,204,488,343	40,986,158	4,425,581,714
1988	3,096,881,645	1,178,422,567	34,570,638	4,309,874,850
1989	3,006,576,077	1,165,112,959	28,574,912	4,200,263,949
1990	3,706,324,064	1,348,075,368	38,531,764	5,092,931,196
1991	3,289,968,620	1,184,936,500	40,626,577	4,515,531,697
1992	3,338,101,465	1,239,389,554	40,873,660	4,685,644,750
1993	3,386,808,671	1,027,937,761	42,082,090	4,533,389,755
1994	3,492,406,781	1,014,204,140	41,679,064	4,657,017,854
1995	3,636,068,016	908,520,055	36,425,501	4,692,270,850
1996	3,783,483,306	972,873,764	37,822,941	5,024,420,834
1997	3,901,964,998	965,334,787	40,722,084	5,076,996,337
1998	3,890,978,799	867,606,779	26,431,191	4,835,387,697
1999	3,913,456,139	814,124,878	37,261,450	4,992,363,948
2000	3,837,150,457	886,473,041	36,855,271	4,977,690,726
2001	3,895,134,261	916,020,487	40,447,991	5,217,043,720

	GULF OF MEXICO		PACIFIC	TOTAL
	CENTRAL	WESTERN		
2002	3,580,828,493	1,019,741,703	35,954,912	4,666,699,034
2003	3,392,897,697	1,087,114,884	38,203,507	4,572,326,896
2004	2,941,564,138	1,121,137,433	38,252,462	4,169,538,999
2005	1,973,860,605	788,940,947	37,470,294	2,801,764,847
2006	2,165,245,866	795,608,571	37,975,421	2,999,113,564
2007	2,137,362,345	648,316,715	25,517,855	2,858,074,237

NOTE: Starting in 2002 MMS has not formally published production by state adjacent areas

e Estimated r Revised p Preliminary

* See Table 15 corresponding volumes at 15.025 psia and footnote in Appendix B.

Appendix D-5

UNITED STATES NATURAL GAS AND CASINGHEAD GAS PRODUCTION[3]

(Billion Cubic Feet (BCF) at 14.73 psia and 60 degrees Fahrenheit)*

DATE	GROSS	WET AFTER LEASE SEPARATION	MARKETED	DRY	GROSS IMPORTS
1987	20,140	17,557	17,433	16,621	993
1988	20,999	18,061	17,918	17,103	1,294
1989	21,074	18,237	18,095	17,311	1,382
1990	21,523	18,744	18,594	17,810	1,532
1991	21,749	18,703	18,532	17,698	1,773
1992	22,132	18,879	18,712	17,840	2,138
1993	22,725	19,209	18,982	18,095	2,350
1994	23,581	19,938	19,710	18,821	2,624
1995	23,743	19,790	19,506	18,598	2,841
1996	24,114	20,084	19,812	18,854	2,937
1997	24,213	20,122	19,865	18,902	2,994
1998	24,108	20,064	19,961	19,024	3,152
1999	23,823	19,915	19,805	18,832	3,586
2000	24,174	20,289	20,198	19,182	3,782
2001	24,501	20,667	20,570	19,616	3,977
2002	23,941	20,020	19,921	18,964	4,015
2003	24,119	20,072	19,974	19,099	3,944
2004	23,970	19,615	19,517	18,591	4,259
2005	23,457	19,046	18,927	18,051	4,341
2006	23,507	19,512	19,382	18,476	4,186
January	2,043	1,669	1,659	1,590	393
February	1,841	1,501	1,493	1,429	373
March	2,078	1,696	1,687	1,614	402
April	1,999	1,644	1,636	1,565	387
May	2,078	1,693	1,683	1,608	380
June	1,978	1,665	1,655	1,584	381
July	2,055	1,727	1,717	1,643	419
August	2,059	1,726	1,716	1,643	427
September	2,006	1,679	1,668	1,596	361
October	2,107	1,742	1,731	1,654	347
November	2,094	1,724	1,714	1,638	341
December	2,197	1,801	1,790	1,713	397
2007 Total	**24,536**	**20,270**	**20,151**	**19,278**	**4,608**
January	2,196	1,793	1,783	1,709	383
February	2,077	1,703	1,693	1,621	343
March	2,243	1,838	1,828	1,750	361
April	2,133	1,767	1,756	1,679	318
May	2,188	1,825	1,814	1,734	292
June	2,145	1,799	1,788	1,715	283
July	2,218	1,876	1,864	1,787	313
August	2,187	1,868	1,859	1,781	313
September	1,967	1,612	1,603	1,542	313
October	N/A	N/A	N/A	N/A	N/A
November	N/A	N/A	N/A	N/A	N/A
December	N/A	N/A	N/A	N/A	N/A
2008 Total	**19,353**	**16,082**	**15,988**	**15,319**	**2,920**

e Estimated r Revised p Preliminary

* See Table 16 corresponding volumes at 15.025 psia and footnote in Appendix B.

Appendix E

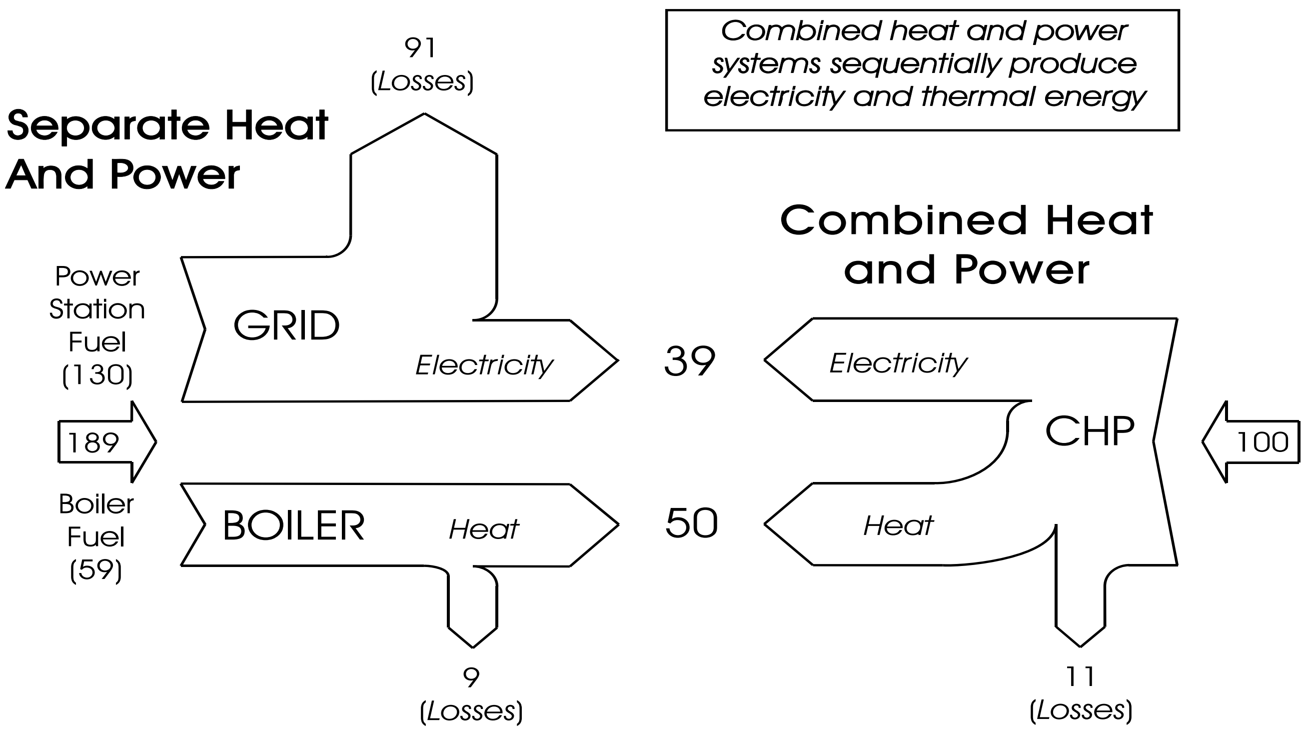
Louisiana Energy Topics

Combined Heat and Power Workshop Overview

by
Billy Williamson, EIT, EMIT

On August 9, 2007, the Louisiana Department of Natural Resources' Mrs. Paula Ridgeway welcomed over 50 engineers and architects to the Chateau Sonesta Hotel in New Orleans for a workshop titled "Preventing Hurricane Damage Due to Loss of Building Climate Controls: Opportunities for Combined Heat & Power." The workshop offered attendees a better understanding of combined heat and power (CHP) technology while helping them to make a case for implementing CHP systems. It was hosted by the Louisiana Department of Natural Resources (DNR) and the Gulf Coast CHP Application Center.

Figure 1. Combined Heat and Power Schematic
(Energy Units are Btu's)



Combined heat and power is a family of technologies which maximize fuel efficiency by using waste heat to perform different tasks. Many industrial processes produce excess heat which is discharged into the atmosphere. By using the heat, the overall efficiency of the process is increased. Combined heat and power is often called cogeneration.

Dan Bullock of Gulf Coast CHP Application Center opened the presentations with an overview of combined heat and power technology. Mr. Bullock discussed the Department of Energy's CHP strategy, which calls for 92 gigawatts of power provided by CHP systems by the year 2010. According to Mr. Bullock's presentation, CHP systems provided 81 gigawatts of power as of 2004. The strategy also calls for the Department of Energy to provide assistance in the adoption, development, and regulation of CHP technology. Mr. Bullock then discussed observations made during and after Hurricane Katrina that demonstrate the viability of CHP systems in the event of a large-scale natural disaster. Mr. Bullock's presentation can be viewed at URL: http://files.harc.edu/Sites/GulfCoastCHP/News/PreventingDamage2007/CHPOverview.pdf.

Lianne Lami of Bocci Engineering gave a presentation on the application and economics of CHP systems. She described six major business drivers for the implementation of CHP. These drivers are reliability, asset replacement, demand growth, energy risk, economics, and sustainability. The drivers were presented as needs and the way in which CHP meets those needs.

The morning ended with a panel discussion of the different CHP technologies. The panelists included Steve Brandon of Bluepoint Energy, Steve Cernik of Kawasaki Gas Turbines, Mark Hughes of Solar Turbines, Dr. Ted Kozman of the Louisiana Industrial Assessment Center, and Bob Tierney of UTC Power. The panel discussed available models and the positive and negative aspects of CHP technologies. Dr. Ted Kozman spoke about the problems encountered with the University of Louisiana at Lafayette's recently implemented CHP. The length of time required to apply for and receive air quality permits was one of the problems encountered.

The afternoon session started with a presentation by Bryan Johnston of the Louisiana Department of Environmental Quality discussing the air quality permitting of CHP technology. He began by describing the organization of LDEQ, as well as the air permits division. He then discussed the application process and government deadlines for approving or denying applications in a timely manner. He also discussed the expedited permit process, which has overwhelming support from industry leaders. The cost of the expedited permit process is equal to the total amount of overtime pay for the employee who performs the work. You can view his presentation at URL: http://files.harc.edu/Sites/GulfCoastCHP/News/PreventingDamage2007/CHPAirQualityPermitting.pdf.

One of the highlights of the workshop was the Natural Gas panel discussion on the reliability of the gas supply. Representatives from the three major natural gas providers in Louisiana were on hand to answer questions regarding natural gas supply dependability. Each panel member answered questions regarding the impact of Hurricanes Katrina and Rita on gas supplies and deliveries. The panel members also discussed the lessons learned from the disasters, as well as progress made toward returning to full supply. The final topics discussed by the panel considered the costs associated with natural gas. The panel briefly discussed distribution costs before considering the long term cost estimations of natural gas. The future prices were compared to the cost of electricity to demonstrate potential savings.

The workshop was concluded with three case studies of CHP in the Southern United States. Rickie Kramer from Tulane University provided a look at the CHP system in use at Tulane in New Orleans. He discussed the history of the system, problems realized during Hurricane Katrina, and plans to safeguard against future disasters. Next, Dr. Keith Hodge provided a look at the CHP system in use at the Mississippi Baptist Memorial Hospital in Jackson, MS. He discussed the history of the system and the value of the system during Hurricane Katrina. The CHP system kept the hospital nearly 100% operational throughout the storm, ensuring vital healthcare systems were available during the disaster. Finally, Ed Mardiat of Burns & McDonnell presented the CHP system in use at the new Dell Children's Hospital in Austin, Texas. The hospital, aided by the use of CHP technology, aspires to become the first Leadership in Energy and Environmental Design (LEED) Platinum hospital in the world.

Additional information about combined heat and power can be found on the DNR website (http://dnr.louisiana.gov/sec/execdiv/techasmt/electricity/nonutility/cogen_2005.pdf).

BIOFUEL FACILITIES IN LOUISIANA

by
Bryan Crouch, Engineer

Currently, there is only a small amount of biofuel production in Louisiana; however, several production facilities are either in the planning stages or under construction. The table below lists the operating, under construction, and planned biofuel production facilities in the state. More details about each facility are given after the table.

Biofuel Production Facilities in Louisiana

Company	Location	Product	Feedstock	Capacity (million gpy)	Status
Allegro Biodiesel Corporation	Pollock	Biodiesel	Soybean oil	12	Operating
Bionol Lake Providence LLC	Lake Providence	Ethanol	Corn	108	Under construction
Dynamic Fuels LLC	Geismer	Renewable diesel	Animal fat	75	Construction to begin in 2008
Greater Baton Rouge Ethanol LLC	Port Allen	Ethanol	Corn	100	Under construction
Green Earth Fuels of New Orleans LLC	Harvey	Biodiesel	Undecided	86	Construction not begun
Louisiana Green Fuels LLC	Lacassine	Ethanol	Sugar cane, sweet sorghum	22	Construction to begin early 2008
Renewable Energy Group Inc	St. Rose	Biodiesel	Soybean oil	60	Under construction
South Louisiana Ethanol LLC	Belle Chase	Ethanol	Corn	65	Construction on hold
Tiger State Ethanol LLC	Convent	Ethanol	Corn	110	Construction not begun
Tiger State Ethanol LLC	Lake Providence	Ethanol	Corn	110	Construction not begun
Verenium Corporation	Jennings	Ethanol	Biomass	Pilot scale	Operating
Verenium Corporation	Jennings	Ethanol	Bagasse, energy cane	1.4	Under construction

Allegro Biodiesel in central Louisiana is the only operating biodiesel plant in the state. The plant began production in April 2006 and is currently producing about 4 million gallons per year (gpy) with an estimated capacity of 12 million gpy. Their primary feedstock is soybean oil.

Bionol Lake Providence, a subsidiary of Massachusetts-based BioEnergy International, is building a conventional, corn feedstock ethanol plant in Lake Providence using technology designed by Delta-T Corporation. Construction on the 108 million gpy facility began in late 2007 and should be completed by mid 2009. The company plans to gradually introduce its own proprietary technology into the plant to produce bio-based specialty chemicals and fuels from a wide variety of biomass wastes.

Dynamic Fuels is a joint venture between Tyson Foods, Inc. and Syntroleum Corporation. Tyson will supply animal fats, greases, and vegetable oils that will be converted into renewable synthetic diesel fuel using Syntroleum's proprietary, Fischer-Tropsch based process. The plant will be located in Geismer and have an ultimate capacity of 75 million gpy. Construction is scheduled to start this year and completion in 2010.

Greater Baton Rouge Ethanol is a subsidiary of Baton Rouge-based Shaw Capital. The plant will be located in Port Allen on land leased from the Port of Greater Baton Rouge. Initial capacity will be 100 million gpy from corn feedstock. Construction began in late 2007 and is due to be completed late this year.

Houston-based Green Earth Fuels subsidiary **Green Earth Fuels of New Orleans** has planned and secured permits for an 86 million gpy biodiesel plant in Harvey at the Kinder Morgan Terminal. Construction is pending final financing arrangements.

Louisiana Green Fuels in Lacassine is being built to complement the Lacassine syrup mill. The company is owned by Andino Energy (80%) and a group of Lake Charles cane farmers (20%). The plant will use molasses from sugar cane and newly planted sweet sorghum for feedstock and have a capacity of 22 million gpy. Construction is expected to begin early this year and be completed by the fall.

Iowa-based **Renewable Energy Group** began construction in St. Rose on a 60 million gpy biodiesel plant in June 2007 which they will own and operate. Production is expected to begin towards the end of 2008. The feedstock will be soybean oil obtained from a large oilseed processing plant located just 2 miles away.

The former Missalco plant in Belle Chase is being refurbished by **South Louisiana Ethanol** with 50/50 partner Earth Biofuels out of Texas. The refurbished plant will have a 65 million gpy capacity utilizing corn feedstock. The project is under construction but currently on hold due to legal issues surrounding Earth Biofuels in regard to an equipment purchase.

Monroe-based **Tiger State Ethanol** has been permitted to build two 110 million gpy ethanol plants, one in Convent, and the other in Lake Providence. Both plants plan to use corn feedstock. Neither plant is yet under construction, but the Convent plant is awaiting approval for GO Zone bonds and should begin construction shortly afterwards.

Massachusetts-based **Verenium** (merged from Celunol and Diversa, formerly BCI) operates a pilot scale cellulosic ethanol plant in Jennings. The facility was originally an oil refinery that was converted to an ethanol plant in the 1980s. BCI purchased the facility in 1994 and began refurbishing it into the current pilot scale cellulosic plant that began operation in 1999. In February 2007, Verenium began construction on a 1.4 million gpy cellulosic plant (adjacent to the current plant) which is scheduled to start up in early 2008. Verenium has further plans to build a commercial scale cellulosic plant by 2010.

BUILDER'S GUIDE TO ENERGY EFFICIENT HOMES IN LOUISIANA: ENERGY EFFICIENT WINDOWS

by
Howard Hershberg, AIA

The Builder's Guide to Energy Efficient Homes in Louisiana (Builder's Guide) is being updated to reflect new code requirements. This is the ninth in a series of articles that will summarize the information in the guide and highlight updates.

Windows are one of the major sources of heat gain in the summer (cooling) season; and one of the major sources of transmission heat loss during the winter (heating) season. In spite of windows sometimes being a difficult energy conservation problem to overcome, they exist to provide natural light, ventilation, and a view to the outdoors. "Windows connect the interior of the house to the outdoors, provide daylight and ventilation, and are one of the key aesthetic features of the home."[1]

In passive solar homes, windows can provide a significant amount of heat for the heating (winter) season. The fact that windows traditionally have the lowest insulating value (R-Value) in the building envelope has been a major detraction. To make matters even more confusing, the National Fenestration Rating Council (NFRC), one of the foremost window labeling authorities in the U.S., does not label windows with R-Values. U-factor (the thermal transmittance) is how the window industry describes and rates windows. The consumer must look for a low U-factor on the window label to obtain the more energy efficient window.

Window manufacturers have studied windows' low insulation values for many years. They have recently researched and developed numerous features which will increase the overall insulating value of Energy Efficient windows.

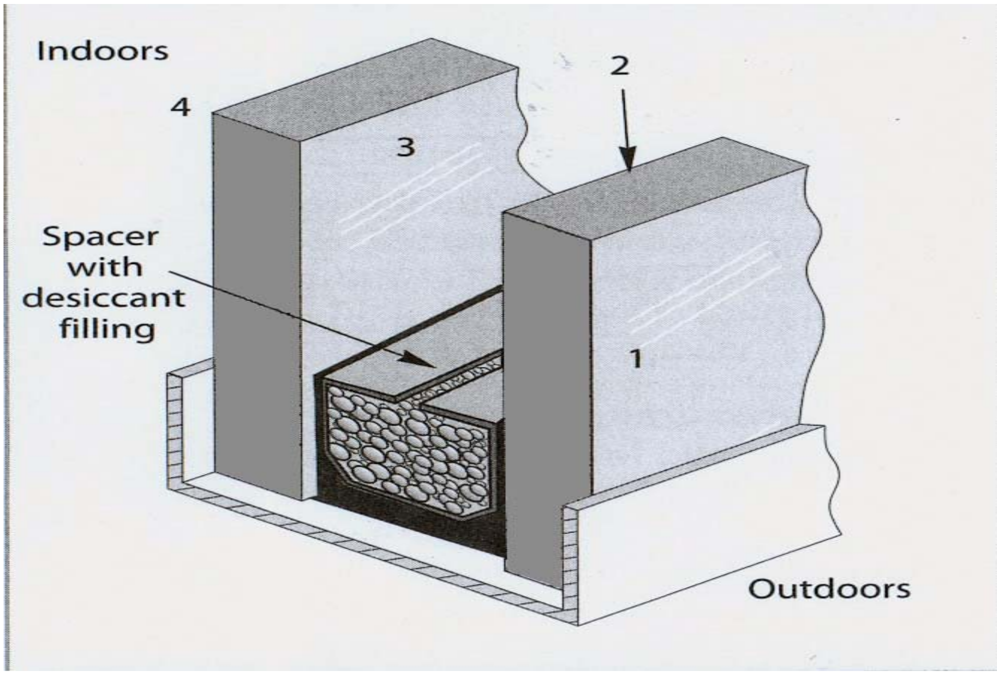
What to look for in an energy efficient window: [2]

1. Good insulating values – low U-Factors, combined with a minimum of double glazed glass for a maximum U-Factor of .65. The window should also have a spacer (thermal break) with a desiccant filling (figure 1). The lower the overall window U-factor the better.
2. Low air leakage rates - Less than .25 cubic feet per minute (cfm) per linear foot of sash opening for double hung windows. Less than .10 cfm per linear foot for casement, awning, and fixed windows.
3. A Visible Transmittance (VT) of .50 to .80.
4. A Solar Heat Gain Coefficient (SHGC) of .40 or less.

The NFRC labels all of it's manufacturer members' windows with all four of the window characteristics mentioned above.

[1] Louisiana Department of Natural Resources, *Builder's Guide to Energy Efficient Homes in Louisiana,* October 2002, p. 91.
[2] Louisiana Department of Natural Resources, *Builder's Guide to Energy Efficient Homes in Louisiana*, October 2002, p. 92.

Figure 1. Low-e Insulated Glass Unit (IGU)



Insulated glass employs a sealed spacer between the two glass panes. A low-e coating on one pane retards emission of radiant heat from that pane. In warm climates, the coating is located on surface #2. In cold climates, the coating is located on surface #3.

SOURCE: John Krigger and Chris Dorsi, *Residential Energy: Cost Savings and Comfort for Existing Buildings,* Saturn Resource management, Inc., Montana, 2004.

Solar and Optical Characteristics:[3]

Solar Heat Gain and Thermal Transmittance (U–factor) are both very important window energy characteristics. Solar heat gain through windows can account for 40% of the total heat removed by an air conditioner. The three factors to measure solar heat gain are as follows:

1. Solar Heat Gain Coefficient (SHGC): Ratio of solar heat passing through the glass to solar heat falling on the glass at a 90 degree angle. It includes radiant heat transmitted as well as heat absorbed and reradiated indoors. Single pane glass has an SHGC of .87. Generally, buildings in hot, sunny climates should have a window glass with an SHGC less than .50. South facing windows used for passive heating should have an SHGC of .70 or more.
2. Shading Coefficient (SC): Compares the solar transmittance of a glass assembly (with its interior and exterior shading devices to that of single pane glass which has a shading coefficient of one (1). The shading coefficient is always less than one, and greater than the SHGC of the glass being considered.

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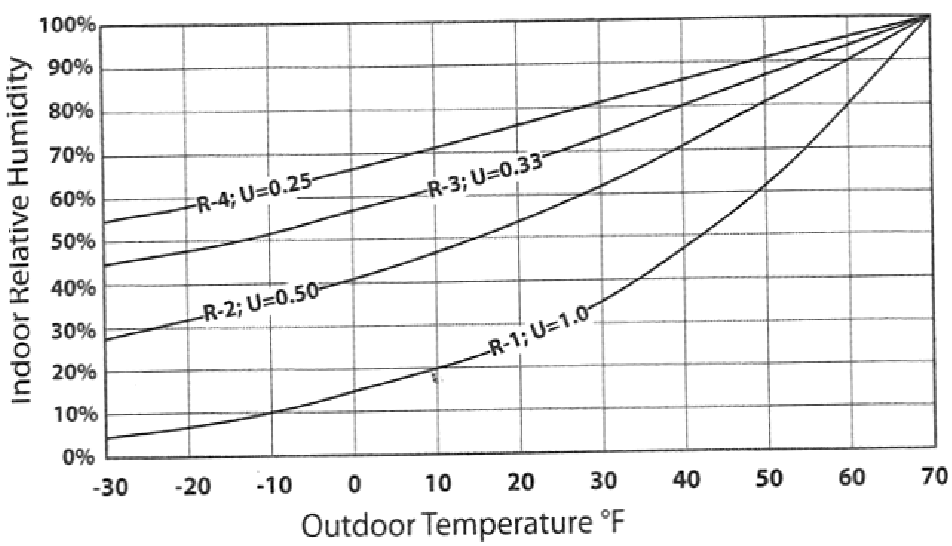
[3] John Krigger and Chris Dorsi, *Residential Energy: Cost Savings and Comfort for Existing Buildings*, Saturn Resource management, Inc., Montana, 2004, p. 123.

3. Visible Transmittance (VT): Measures how much visible light is allowed in by the window's glass. VT is important because it is one of the first things consumers notice about new windows. Also, one of the windows main functions is to admit visible light. Some reflective coatings and tints reduce VT of a window to around 30%, and this isn't acceptable for residential applications.
4. Air leakage: Residential windows are leak tested at a pressure equal to a 25 miles per hour (mph) wind under controlled laboratory conditions. This is a test known as American Society of Testing Materials (ASTM E 283). The test results from the ASTM E283 test are in cfm. Windows are less prone to air leakage than most consumers think. Much window air leakage is from installation of the window in the wall, versus from the window or door itself.[4]

Resistance to Condensation:

Another common complaint of consumers is window condensation. Condensation is mainly a winter problem. Condensation gets worse as the temperature drops. The NFRC now has a window rating of condensation resistance with a scale of 1 to 100. Mitigating condensation problems requires raising the thermal resistance of the window's interior surface or reducing the home's relative humidity and sometimes requires both. (figure 2).

Figure 2. Window Condensation Chart



The indoor relative humidity and thermal resistance of glass determines what outdoor temperature will cause condensation.

SOURCE: John Krigger and Chris Dorsi, *Residential Energy: Cost Savings and Comfort for Existing Buildings*, Saturn Resource management, Inc., Montana, 2004.

[4] John Krigger and Chris Dorsi, *Residential Energy: Cost Savings and Comfort for Existing Buildings*, Saturn Resource management, Inc., Montana, 2004, p. 124.

There are four organizations that serve as "gate keepers" nationally about window thermal and structural characteristics[5].

1. National Fenestration Rating Council (NFRC): Is a private/public collaborative agency created to establish standardized window testing and rating. NRFC simulates window performance with computers, and then verifies these simulations with laboratory testing. NFRC labels are applied to windows made by member manufacturers.

2. American Society of Heating, Refrigeration and Air-Conditioning Engineers (ASHRAE): Is a professional society providing the theoretical framework for calculating heat flows through windows. ASHRAE's "Handbook of Fundamentals" is the most common reference about window heat flows.

3. Lawrence Berkley Laboratory (LBL): Is North America's most prolific and authoritative research facility. LBL researches and develops new window technologies, and distributes information about windows.

4. American Society for testing and Materials (ASTM): Develops testing methodology for all types of building systems. Windows are tested under ASTM standards for air leakage, water leakage, and structural strength.

More information on energy savings features, and the full text of the *Builder's Guide*, can be found on the DNR Technology Assessment Division website at URL: http://www.dnr.louisiana.gov/tad and click on the *Builder's Guide* link.

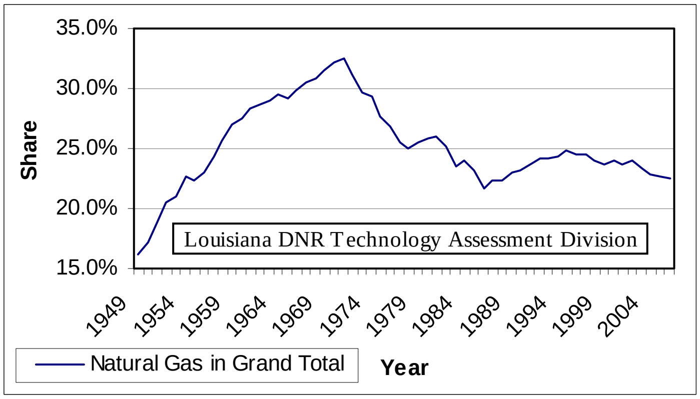
[5] John Krigger and Chris Dorsi, *Residential Energy: Cost Savings and Comfort for Existing Buildings*, Saturn Resource management, Inc., Montana, 2004, p. 122.

AN UPDATE ON LIQUEFIED NATURAL GAS

by
Manfred Dix, Economist

The United States consumes about 100 quadrillion British Thermal Units of energy each year [at least has done so over the last decade or so]. This is a lot of energy that needs to be supplied; otherwise, the highly sophisticated U.S. industrial infrastructure suffers severe disruptions. One important source of energy is, of course, natural gas. In Figure 1 below we show the share of natural gas in the total consumption of energy.

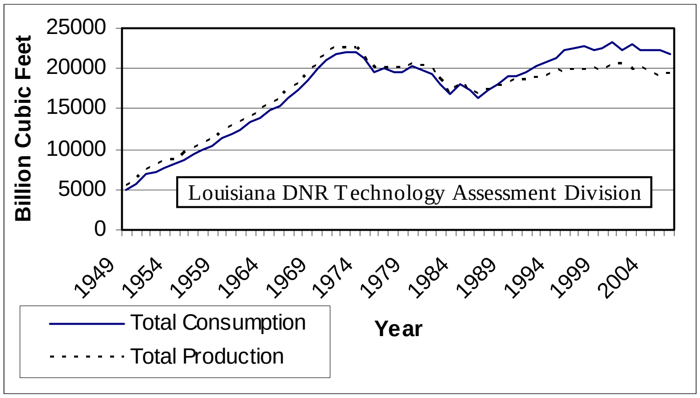
Figure 1. Consumption of Natural Gas as a Share of Total U.S. Energy Consumed (Share of Billions of BTUs)



Data Source: EIA (www.eia.gov)

As one can see, natural gas consumption increased dramatically in the post-war years, peaking in 1971 with almost 35% of total energy gulped up that year. After that, the share of gas fell consistently until the mid-1980s [coinciding with the rise of nuclear power]. Since the early 90s, the share of natural gas in total energy consumption hovered around 23%. This still is a sizable share that needs to be satisfied. The next figure illustrates production and consumption of natural gas over the same time span.

Figure 2. Consumption and Production of Natural Gas in the U.S.



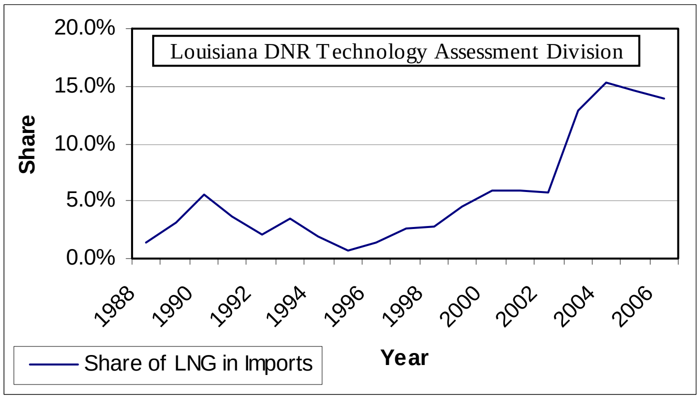
Data Source: EIA (www.eia.gov)

Production and consumption of natural gas matched almost perfectly from the post-war years until the late 1980s. Since then, however, consumption has outpaced production, and the gap needed to be filled with imports. This brings us to our subject at hand.

Natural gas is an excellent, clean burning, fuel; however, it has the drawback that it is difficult to transport and store. International trade in natural gas traditionally has come through long pipelines built between the United States, Canada and Mexico. Liquefied Natural Gas (LNG) changed all that.

LNG is natural gas that has been converted to liquid form [via cooling the gas to approximately -260 degrees Fahrenheit] for ease of storage and transport. In fact, in such form, it can be transported to remote locations where the set up of pipelines is not possible. In recent years, technology has become more cost-effective to do so, and the data bear out the remarkable increase in imports of LNG. See Figure 3.

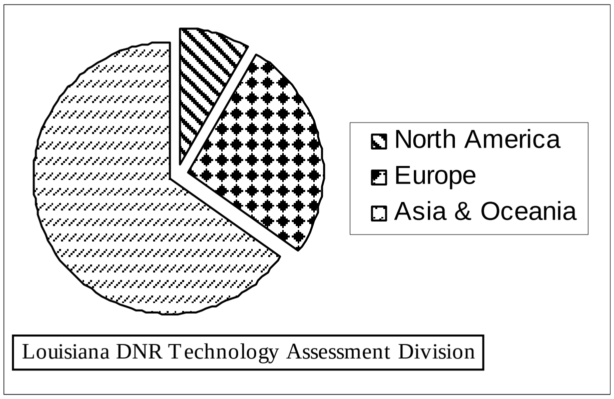
Figure 3. Share of LNG in U.S. Natural Gas Imports



Data Source: EIA (www.eia.gov)

The U.S. is not alone in this dramatic rise in LNG imports. The Asian countries have seen a big increase in their LNG purchases, with Japan, South Korea and Taiwan taking the lion's share of such imports. The following is a pie chart for world LNG imports in 2006:

Figure 4. World LNG Imports 2006

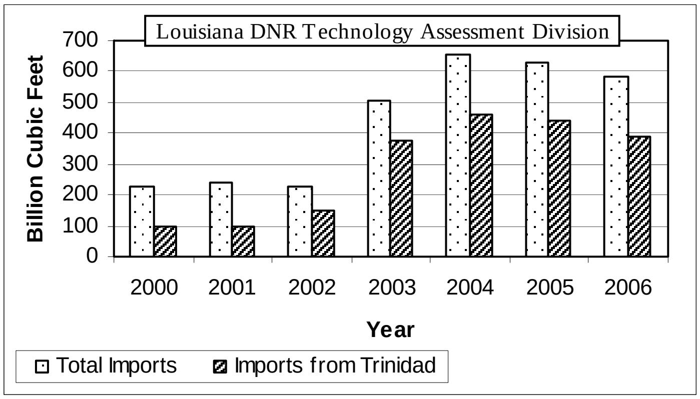


Data Source: EIA (www.eia.gov)

Asia & Oceania imported about 5 trillion cubic feet of LNG in 2006. Of this quantity, Japan amounted to 60% of it, and South Korea another 20%. The combined total of both of these countries takes about half of all LNG imported worldwide. In Europe, Spain and France are big importers of LNG, with the former purchasing more quantity and the latter about the same as the U.S., which imported almost 600 billion cubic feet in 2006.

For the United States, the most important supplier is Trinidad & Tobago:

Figure 5. LNG Imports



Data Source: EIA (www.eia.gov)

Given this dramatic rise in LNG trade, several terminals are being proposed for construction. The following is a list of terminals (as of January 14, 2008) in operation, and approved but not yet operative, taken from the Federal Energy Regulatory Commission (FERC) website accessed on February 11, 2008 (http://www.ferc.gov/industries/lng/indus-act/terminals/exist-prop-lng.pdf):

Table 1. Terminals in operation

Location	Regasification Capacity (billions of cubic feet per day)	Owner
Everett, MA	1.035	DOMAC – SUEZ LNG
Cove Point, MD	1.0	Dominion – Cove Point LNG
Elba Island, GA	1.2	El Paso – Southern LNG
Lake Charles, LA	2.1	Southern Union – Trunkline LNG
Gulf of Mexico, near LA	0.5	Gulf Gateway Energy Bridge – Excelerate Energy
Total Constructed	5.835	

Table 2. Approved by the Maritime Administration/Coast Guard

Location	Regasification Capacity (billions of cubic feet per day)	Owner
Port Pelican, off LA coast	1.6	Chevron-Texaco
Offshore Louisiana	1.0	Main Pass McMoRan Exp.
Offshore Boston	0.4	Neptune LNG – SUEZ LNG
Offshore Boston	0.8	N.E.Gateway – Excelerate En.
Total Approved	3.8	

Table 3. Projects approved by FERC

Location	Regasification Capacity (billions of cubic feet per day)	Owner
Hackberry, LA	1.8	Cameron LNG – Sempra Energy
Freeport, TX	1.5	Cheniere/Freeport LNG Dev.
Sabine, LA	2.6	Sabine Pass Cheniere LNG
Corpus Christi, TX	2.6	Cheniere LNG
Corpus Christi, TX	1.1	Vista del Sol – ExxonMobil
Fall River, MA	0.8	Weaver's Cove Energy/Hess LNG
Sabine, TX	2.0	Golden Pass – ExxonMobil
Corpus Christi, TX	1.0	Ingleside Energy – Occidental Energy Ventures
Logan Township, NJ	1.2	Crown Landing LNG – BP
Port Arthur, TX	3.0	Sempra Energy
Cove Point, MD	0.8	Dominion
Cameron, LA	3.3	Creole Trail LNG – Cheniere LNG
Sabine, LA	1.4 (Expansion)	Sabine Pass Cheniere LNG
Freeport, TX	2.5 (Expansion)	Cheniere/Freeport LNG Dev.
Hackberry, LA	0.85 (Expansion)	Cameron LNG – Sempra Energy
Pascagoula, MS	1.5	Gulf LNG Energy LLC
Pascagoula, MS	1.3	Bayou Casotte Energy LLC – Chevron Texaco
Port Lavaca, TX	1.0	Calhoun LNG – Gulf Coast LNG Partners
Elba Island, GA	0.9	El Paso – Southern LNG
Total Approved	31.15	

Table 4. Mexican Approved Terminals

Location	Regasification Capacity (billions of cubic feet per day)	Owner
Altamira - Tamulipas	0.700	Shell/Total/Mitsui
Baja California	1.000	EnergiaCosta Azul-Sempra Energy
Baja California	1.500	Energy Costa Azul-Sempra Energy -Expansion
Manzanillo	0.500	*Not given*
Total Approved	3.700	

A stable and dependable supply of natural gas is critical for the U.S. economy. The many projects approved by the federal government indicate that the market is recognizing such fact. However, local siting resistance, as well as policy uncertainty, especially with energy bills discussed in Congress, may derail many of the above projects.

BUILDER'S GUIDE TO ENERGY EFFICIENT HOMES IN LOUISIANA: LIGHTING

by
Howard Hershberg, AIA

The Builder's Guide to Energy Efficient Homes in Louisiana (Builder's Guide) is being updated to reflect new code requirements. This is the tenth in a series of articles that will summarize the information in the guide and highlight updates.

Lighting and appliances account for 10% to 50% of residential energy use (see figure 1). Consumers can reduce lighting energy consumption without losing lighting quality. Some ways to achieve this are to paint and decorate with light colors; set general overall lighting at minimum acceptable levels; provide task lighting for activities that require more light; increase the efficiency of lamps, ballasts and fixtures; improve light quality by reducing glare and brightness contrast; and use daylighting whenever possible.

Light quality describes how well people in a lighted space can see to do visual tasks, and how comfortable they feel in that space. Good lighting quality is characterized by uniform brightness and the absence of glare. Light quality is important to energy efficiency because spaces with good light quality require less illumination, and therefore demand less electrical energy.

Figure 1. Annual Electrical Energy: Kilowatt-Hours

Appliance	Low Estimate	High Estimate
Lighting	200	2000
Refrigerator	500	2000
Clothes Dryer	300	1500
Clothes Washer*	100	1000
Television	100	600
Well pump	250	750
Hot tub / spa	1000	2500
Computer	50	400

* Includes water heating.

Energy Information Administration, Lawrence Berkeley Laboratory, and utility sources.

When using daylighting to illuminate a building, eliminating glare is essential for good lighting quality. Glare can be avoided by using light shelves, wide window sills, walls, louvers, and other devices to reflect light deeply into the building. Windows and skylights carefully located away from the sun's direct rays minimize overheating. Likewise, new selective glazings can transmit most visible light, while excluding most solar heat.

There are four basic types of lighting – incandescent, fluorescent, high intensity discharge and low pressure sodium. Incandescent lamps are the oldest, most common, and most inexpensive lamps. Incandescent lighting is produced by a white hot coil of tungsten wire that glows when heated by an electrical current. The type of glass enclosure surrounding this tungsten filament determines its light beam's characteristics. Incandescent lamps have the shortest service life of the common lighting types. All incandescent lights are very inefficient compared to other lighting types.

Compact Fluorescents (CFL's) are the most significant recent lighting advance for homes. They combine the efficiency of fluorescent lighting with convenience and universality of incandescent fixtures. Recent advances in CFL design also provide more natural color rendition; and less flicker than older designs. CFL's can replace incandescent lights of roughly 3-4 times their wattage. CFL's are available in integral and modular designs. Integral CFL's combine ballast and lamp as a single disposable unit. Modular designs feature a separate ballast that will survive several lamp replacements before it wears out.

Lighting accounts for 20% to 25% of all American energy consumption. An average household dedicates 5% to 10% of its energy budget for lighting, while commercial establishments consume 20% to 30% of their total energy use for lighting. A typical residence or commercial facility wastes 50% or more of its lighting energy because:

1. Illumination levels are too high.
2. Lamp size and type are not optimized for their use.
3. Lights remain on too long because of carelessness or inadequate control.
4. The lighting system is dirty, antiquated, or inefficient.

Consumers can reduce light levels (without reducing lighting quality) and save lighting energy by following some or all of the following procedures:

1. Redesign visual tasks: Use a better printer with darker lettering, or install light filtering shading devices to reduce glare.
2. Reduce light levels where there are no visual tasks. Provide minimum light necessary for safety, security, and aesthetics.
4. Reduce electricity consumed by the light source, or reduce the time the light is on. Reduce a light sources' "on" time by improving lighting controls and educating users to turn off unneeded lights.
5. Lower the wattage by relamping with more efficient lighting such as CFL's.
6. Replace electric lights with natural lighting.

Maintenance is vital for lighting efficiency. Light levels fall over time because of fixture dirt, room surface dirt, and lamp aging. Together these factors can reduce lighting illumination by 50% or more while the lamps still draw full power. Clean lamps and lenses every 6 to 24 months. Replace all yellow appearing lenses. Clean or repaint walls and ceilings when dirt collects on surfaces, reducing the amount of light they reflect. Consider replacing all lamps in a lighting system at once. Common lamps, especially incandescent and fluorescent lamps, lose 20% to 30% of their light output over their service life. Group relamping saves labor, keeps illumination high, and avoids straining fluorescent ballasts with dying lamps.

This information was summarized from *Residential Energy: Cost Savings and comfort for Existing Buildings* by John Krigger and Chris Dorsi.[1] More information on energy savings features, and the full text of the *Builder's Guide*, can be found on the DNR Technology Assessment Division website at URL: http://www.dnr.louisiana.gov/tad and click on the *Builder's Guide* link.

[1] John Krigger and Chris Dorsi, *Residential Energy: Cost Savings and Comfort for Existing Buildings*, Saturn Resource Management, Inc., Montana, 2004.

INCENTIVES FOR THE USE OF RENEWABLE ENERGY

by
David McGee, P.E.

Louisiana has several incentives to promote the use of renewable energy. Following is a listing of select state tax incentives (found in the Louisiana Revised Statutes) and federal tax incentives (found in the United States Code).

Louisiana Residential Solar Energy System Property Tax Exemption[1]

Any solar equipment (This includes solar space heat, solar water heat, photovoltaics, solar pool heating, etc.) attached to an owner-occupied residential building or swimming pool as part of a solar energy system is considered personal property that is exempt from ad valorem taxation. 100% of the cost of the equipment is exempt and there is no limit on the eligible amount.

Louisiana Tax Credit for Wind and Solar Energy Systems on Residential Property[2]

Louisiana provides a personal, corporate or franchise tax credit for solar and wind energy systems purchased and installed on or after January 1, 2008. Eligible systems include solar[5] and wind energy systems for residential and multi-family residential dwellings. This refundable tax credit is 50% of all costs to a maximum credit of $12,500.00. The credit must be fully claimed in the taxable year in which the system is installed and placed in service. The credit may be combined with any federal tax incentive, but may not be combined with any other state tax incentive.

Louisiana Machinery and Equipment Sales Tax Exemption for Cogeneration

Machinery and equipment used by an industrial manufacturing plant to generate electric power of self-consumption or cogeneration are exempt from state sales tax.

Louisiana Sales Tax Exemption for Alternative Fuels[3]

State or local sales and use taxes shall not include the sale of any alternative substance when used as a fuel by a manufacturer. "Alternative substance" means any substance other than any product of oil, natural gas, coal, lignite, refinery gas, nuclear fuel, or electricity.

Louisiana Biodiesel Equipment and Fuel Tax Exemption[4]

Manufacturing machinery and equipment used to manufacture, produce, or extract unblended biodiesel, as well as unblended biodiesel used as fuel by a registered manufacturer, are exempt from state and local sales and use taxes.

Federal Residential Solar and Fuel Cell Tax Credit--Personal Tax Credit for Residential Solar Water Heat, Photovoltaics, Fuel Cells, Other Solar Electric Technologies[5]

This credit is for 30% of the cost of the system up to a maximum credit of $2000 for solar electric and solar water heating systems and $500 per 0.5 kW for fuel cells. The solar water heating property must be certified by SRCC or by a comparable entity and at least half of the energy used to heat the dwelling's water must be from solar. The credit is calculated based on the individual's expenditures excluding subsidized energy financing. Expenditures include labor costs for the onsite preparation,

[1] La. R.S. 47:1706
[2] La. R.S. 47:6030
[3] La. R.S. 47:301
[4] La. R.S. 47:301

assembly, or original installation of the system and for piping or wiring to interconnect the system to the dwelling. Note that this tax credit does not apply to solar water heating property for swimming pools or hot tubs. Excess credit may be carried forward to succeeding tax years.

Federal Business Energy Tax Credit-- Commercial, Industrial Corporate Tax Credit[6]

This credit is for solar water heat, solar space heat, solar thermal electric, solar thermal process heat, photvoltaics, geothermal electric, fuel cells, solar hybrid lighting, direct use geothermal, and microturbines. For equipment placed in service from January 1, 2006 until December 31, 2008, the credit is 30% (up to a maximum of $2000.00 for each system) for solar, solar hybrid lighting, and fuel cells, and 10% for microturbines and geothermal. A maximum incentive of $500 per 0.5 kW for fuel cells and $200 per kW for microturbines up to 2000 kW is specified with no maximum specified for other technologies. After January 1, 2009, the tax credit for solar energy property and solar hybrid lighting reverts to 10% and expires for fuel cells and microturbines. The geothermal credit remains unchanged at 10%. It does not include geothermal heat pumps. Energy property does not include public utility property, passive solar systems, or pool heating equipment. The equipment must be operational in the year in which the credit is first taken. The basis on which the credit is calculated must be reduced by any subsidized energy financing or by tax-exempt private activity bonds.

Federal Alternative Motor Vehicle Credit

Section 1341 of the Energy Policy Act of 2005 provides a tax credit to buyers of new alternative fuel vehicles placed in service after January 1, 2006. The tax credit is equal to 50% of the incremental cost of the vehicle. An additional 30% of the incremental cost for vehicles with near-zero emissions is also available.

The IRS has issued two notices to establish rules for manufacturers and qualified vehicle buyers to claim the credit. The Current Tax Credits table has information on certified vehicles and available credits (http://www.eere.energy.gov/afdc/vehicles/hybrid_electric_tax_credits.html). The credit is available on the purchase of light-, medium, and heavy-duty vehicles and fuel-cell, hybrid, and dedicated natural gas, propane, and hydrogen vehicles. Light-duty, lean burn diesel vehicles are also eligible. Vehicles are subject to the following incremental cost limitations:

- $5,000: 8,500 GVWR[7] or lighter
- $10,000: 8,501 - 14,000 GVWR
- $25,000: 14,001 - 26,000 GVWR
- $40,000: 26,001 GVWR and heavier

For non-tax-paying entities, the credit can be passed back to the vehicle seller. The credit expires December 31, 2010.

More information can be found on the Louisiana Department of Natural Resources Technology Assessment Division website (**http://www.dnr.louisiana.gov/tad**)

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[5] 26 USC § 25D
[6] 26 USC § 48
[7] Gross Vehicle Weight Rating (GVWR)

BUILDER'S GUIDE TO ENERGY EFFICIENT HOMES IN LOUISIANA: APPLIANCES

by
Howard Hershberg, AIA

The Builder's Guide to Energy Efficient Homes in Louisiana (Builder's Guide) is being updated to reflect new code requirements. This is the eleventh in a series of articles that will summarize the information in the guide and highlight updates.

Washers, dryers, and refrigerators and Central HVAC systems use approximately 44% to 66% of the energy consumed by some southern and southeastern American homes. This is especially true in Louisiana and in the Southern and Southeastern United States.

In the Southern and Southeastern U. S. energy costs for water heating can sometimes be the same as heating and cooling the house. However, in these exceptional instances, it is relatively easy to reduce these costs significantly through conservation measures and water heating alternatives.

Dishwashers

Most of the energy used by the dishwasher is consumed by the hot water heater. It is estimated that dishwashers may sometimes consume approximately 65% to 75% of the hot water produced by the hot water heater. Dishwashers commonly dictate the temperature setting for the hot water heater. Many older dishwashers require a temperature setting of at least 130 degrees to get dishes clean. Newer dishwashers have a small water heater to boost water temperature to approximately 140 degrees Fahrenheit. This saves water heating energy by reducing the required water temperature and standby losses of the main water heater in the residence. Dishwashers conserve energy and water when using their low and medium cycles. Running a dishwasher without a full load wastes water and energy. Dish washer water usage varies from a low of 7 gallons per wash for the medium cycle, to a high of 14 gallons per wash for the heavy duty cycle.

Clothes Washers

The efficiency of clothes washers' usage of water and energy has increased five fold over the past 20 years. Horizontal axis clothes washers use far less water and energy than vertical axis machines. Horizontal axis machines save 50% to 75% more energy and water over vertical axis machines. Although the horizontal axis washers cost more than vertical axis machines, horizontal axis machines will repay this initial investment in 7 years (or less) through reduced energy and water costs. In some parts of the country water is becoming a more important and more expensive resource every year. Clothes washers now also carry a rating for water use per cycle called the "Water Factor" (W.F.). Water Factor is the water use per cycle per cubic foot (C.F.) of tub capacity.

Clothes Dryers

Gas clothes dryers operate more economically than electric clothes dryers. At average prices for electricity and gas, electric clothes dryers cost $.30 to $.40 per load; while gas clothes dryers cost $.15 to

$.20 per load. Temperature sensing or humidity sensing dryer controls may save 5-15% over timed drying. When working correctly, these controls prevent over-drying. Humidity sensing controls are the most efficient. Cleaning the dryer lint filter after each load minimizes drying time. Over time, lint collects in the vent, elements, and air passageways reducing air-flow, and increasing drying time. Every few years a dryer and its vent should be thoroughly cleaned. Piping the dryer in a smooth metal vent pipe with silicon caulking rather than using a flexible duct reduces drying time.

Refrigerators and Freezers

Refrigerators are large energy consumers. They account for 9% to 15% of a household's total energy consumption. Refrigerator energy efficiency has improved tremendously in the past 15 years. Better insulation, and weather-stripping, more effective controls, bigger coils, and better motors, improve efficiency. Consumers should compare the energy guide labels of different models when purchasing a new refrigerator or freezer. Appliances that have earned the Energy Star Qualification have better than average energy efficiency. The most energy efficient standard refrigerators use less than 500 KWh of electricity per year; however they are more expensive than standard refrigerators.

The way individuals and families use refrigerators and freezers can make a significant difference in energy consumption. The following practices are recommended:

- Keep freezers as full as possible.
- Defrost the freezer when 1/4 inch of frost has accumulated.
- Minimize refrigerator or freezer door openings.
- Clean the coils on refrigerators and freezers with a soft brush at least once a year.

Refrigerator Energy Consumption

When selecting a new refrigerator, consider the following:

- Automatic defrost models waste energy. Choosing a manual defrost model if available in the size you want will save energy if one is willing to manually defrost.
- Side by side refrigerator/freezers use more energy than units that have the freezer compartments on top or bottom.
- Upright freezers use more energy than chest freezers.
- Operating two refrigerators uses far more energy than one larger model.

This information was summarized from *Residential Energy: Cost Savings and comfort for Existing Buildings* by John Krigger and Chris Dorsi.[1] More information on energy savings features, and the full text of the *Builder's Guide*, can be found on the DNR Technology Assessment Division website at URL: http://www.dnr.louisiana.gov/tad and click on the *Builder's Guide* link.

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UPDATE ON NATIONAL ELECTRIC TRANSMISSION CORRIDOR DESIGNATIONS

by
Patty Nussbaum

On October 5, 2007, the Department of Energy (DOE) published a National Electric Transmission Congestion Report and Order in which it designated the Mid-Atlantic National Interest Electric Transmission Corridor and the Southwest Area National Interest Electric Transmission Corridor. The states affected by the Mid-Atlantic Area National Corridor are Delaware, Washington DC, Maryland, New Jersey, New York, Ohio, Pennsylvania, Virginia, and West Virginia. California and Arizona are affected by the Southwest Area National Corridor. The National Corridor designations went into effect October 5, 2007 and will remain in effect until October 7, 2019 unless the designations are rescinded or renewed.

The Energy Policy Act of 2005 (EPACT 2005) charged DOE with identifying electricity transmission congestion.[1] EPACT 2005 also authorized the Secretary of the Department of Energy (Secretary) to designate geographic areas where transmission congestion occurs as National Interest Electric Transmission Corridors (National Corridors). The designation indicates that a transmission congestion problem exists and affects customers to the point that there is a national interest in eliminating it. The designation does not preempt State authority but it does provide the first step toward Federal Government siting authority. This means that if an applicant does not receive approval from a State to site a proposed new transmission facility within a National Corridor within a year, the applicant may then apply to the Federal Energy Regulatory Commission (FERC) for a permit to construct the facility.

FERC may issue a permit only if all of the conditions listed below are met:

- The facilities will be used for the transmission of electric energy in interstate commerce
- The project is consistent with the public interest
- The project will significantly reduce congestion in interstate commerce and protect or benefit consumers
- The project is consistent with national energy policy and will enhance energy independence
- The project maximizes, to the extent reasonable and economical, the transmission capabilities of existing towers or structures

DOE was charged with providing a backstop authority, a safety net, to be used as a method to analyze transmission requirements from a national perspective. DOE conducted a National Electric Transmission Study (as directed by EPACT 2005) and identified the Southwest and Mid-Atlantic as having critical transmission congestion and constraint problems. Determining where to site transmission facilities is very important to the people who live and work near those facilities. Many "interested parties" filed comments opposing the concept of National Corridors. DOE responded to the principal concerns of the interested parties in their October 2, 2007 report, however, they were virtually unchanged from those presented in the Draft report.

[1] Section 1221(a) of the Energy Policy Act of 2005 (EPAct) added a new section 216 to the Federal Power Act (FPA). New FPA section 216 requires the Secretary of Energy to conduct a nationwide study of electric transmission congestion within one year from the date of enactment of EPAct and every three years thereafter.

The designations are not intended to thwart state and local transmission planning.[2] Designation of a National Corridor does not:

- Mandate that additional transmission facilities must be built
- Direct anyone to build a transmission facility
- Preclude local generation, demand response and energy conservation as ways to resolve the congestion
- Determine a preferred route for a transmission solution
- Represent a siting decision

DOE used a source and sink approach to determine the boundaries of the National Corridors. "Source" is defined as an area of existing or potential generation and "sink" is defined as an area of consumer demand. The sink areas were determined by the load downstream of transmission congestion/constraints and the source areas were areas with underutilized generation capacity or areas with potential for developing renewable generation. The corridor boundaries were drawn to link the sources to the sinks; they connected the loads to sources of power. DOE used existing county boundaries for the corridor boundaries. If any part of the county is in the general source to sink corridor the entire county was included.

The FERC permit would constitute the construction permit and the developer would still need rights-of-way across each piece of public or private land. If the developer could not negotiate a right-of-way with a private property owner then the FERC permit would entitle the developer to acquire the right-of-way by exercise of the right of eminent domain. Eminent domain would not apply to Federal or State owned property. The developer would have to get permission from the Federal or State land managing agency to build a transmission facility.

Parties filed applications for rehearing and some parties requested that the designations be stayed. DOE has completed its consideration of the requests and the rehearing applications and the requests for stay have been denied. The DOE order denying rehearing is a final agency action. Parties to the proceeding who filed timely applications for rehearing have sixty days from the effective date of the order denying rehearing (March 11, 2008) to appeal in a Circuit Court of Appeals of the United States.

There are no other National Corridors besides the two mentioned above and DOE has not decided at this time whether they will designate additional National Corridors. For more information and to view maps of the National Corridors, visit: http://www.oe.energy.gov/nietc.htm.

[2] Under FPA section 216 (b)(1), FERC jurisdiction is triggered only when either: the State does not have authority to site the project; the State lacks the authority to consider the interstate benefits of the project; the applicant does not qualify for a State permit because it does not serve end-use customers in the State; the State has withheld approval for more than one year; or the State has conditioned its approval in such a manner that the project will not significantly reduce congestion or is not economically feasible.

PROJECTED STATE OIL AND GAS PRODUCTION AND PRICES, AND EFFECTS ON STATE MINERAL REVENUES

by
Manuel Lam

Production Projection

Louisiana ranks among the top four states in oil and gas production and is second in per capita energy consumption. It has produced oil and gas for almost a century. The following section presents forecast data for oil and gas production from state regulated land and water bottoms.

The oil production average annual rate of decline over the past ten-year period was 4.8%, and the gas decline was 2%. The DNR Technology Assessment Division long-term model is projecting an average of 3.3 % decline per year for oil and a 3.2% decline per year for gas. Even though the long-term model is accurate over long periods (10 to 30 years), the short-term fluctuation (as shown in the following tables) illustrates the need of a short-term model. It is required to project production over periods of one to five years. The short-term model projections for oil and gas are shown in Tables 1 and 2.

Table 1. DNR's Short Term Crude Oil Production Projection

	Date	Base Case (Barrels)	% Change	Low Case (Barrels)	High Case (Barrels)
Actual	FY2001/02	100,711,766	-5.17%	N/A	N/A
Actual	FY2002/03	91,071,712	-9.57%	N/A	N/A
Actual	FY2003/04	87,225,583	-4.22%	N/A	N/A
Actual	FY2004/05	83,536,446	-4.23%	N/A	N/A
Actual	FY2005/06	68,870,313	-17.56%	N/A	N/A
Actual	FY2006/07	76,823,640	11.55%	N/A	N/A
Projected	FY2007/08	76,770,447	-0.07%	74,165,577	79,290,977
Projected	FY2008/09	75,916,660	-1.11%	71,050,608	81,363,110
Projected	FY2009/10	75,092,386	-1.09%	70,330,121	80,804,618
Projected	FY2010/11	73,245,408	-2.46%	68,167,843	78,894,201
Projected	FY2011/12	70,797,686	-3.34%	65,464,339	76,504,103
Projected	FY2012/13	68,522,038	-3.21%	62,948,564	74,454,307

Factors contributing to the year-to-year deviations in oil and gas production are:

- Changes in wildcat drilling and development of marginal fields within the state
- Early capping of stripper wells by major producers
- Unstable prices of natural gas and crude oil
- Changes in environmental laws, especially those concerning salt water discharge and air quality
- World supply and demand, causing a glut or shortage depending on its growth rate
- The number of active rigs in the region
- Military conflicts or political instability in foreign producing countries
- Application of advanced technology such as 3-D and 4-D seismic
- Weather patterns

- Foreign imports
- State and local tax incentives

Table 2. DNR's Short Term Natural Gas Production Projection

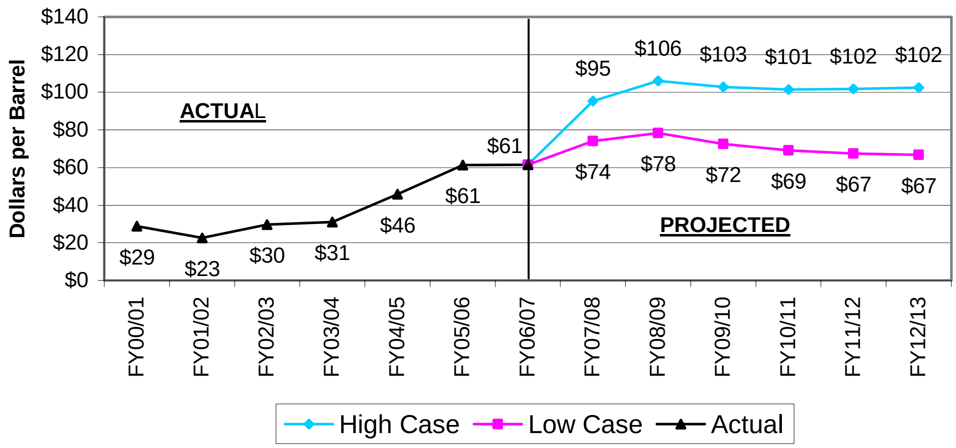
	Date	Base Case (MCF)	% Change	Low Case (MCF)	High Case (MCF)
Actual	FY2001/02	1,438,954,284	-3.67%	N/A	N/A
Actual	FY2002/03	1,345,284,191	-6.51%	N/A	N/A
Actual	FY2003/04	1,334,038,708	-0.84%	N/A	N/A
Actual	FY2004/05	1,355,404,766	1.60%	N/A	N/A
Actual	FY2005/06	1,282,002,890	-5.42%	N/A	N/A
Actual	FY2006/07	1,352,396,057	5.49%	N/A	N/A
Projected	FY2007/08	1,346,995,209	-0.40%	1,313,766,095	1,372,410,923
Projected	FY2008/09	1,308,505,554	-2.86%	1,240,918,575	1,385,771,417
Projected	FY2009/10	1,274,981,241	-2.56%	1,192,074,943	1,366,465,942
Projected	FY2010/11	1,237,771,654	-2.92%	1,152,454,593	1,330,338,381
Projected	FY2011/12	1,199,439,462	-3.10%	1,112,271,928	1,292,992,623
Projected	FY2012/13	1,160,837,489	-3.22%	1,073,144,600	1,256,294,728

The FY2005/06 deep decline was caused by Hurricanes Katrina and Rita, and FY2006/07 showed increases due to the recovery from the disaster rather than a reverse in production trend. In the short-term model, the following years projected volumes were lower than the long-term model projection, which can be attributed to the continued recovery and high prices for oil and gas.

Price Projection

The following figure shows historical fiscal year crude oil prices and the projected price range from FY2007/08 to FY2012/13.

Figure 1. Louisiana Crude Oil Price Projections

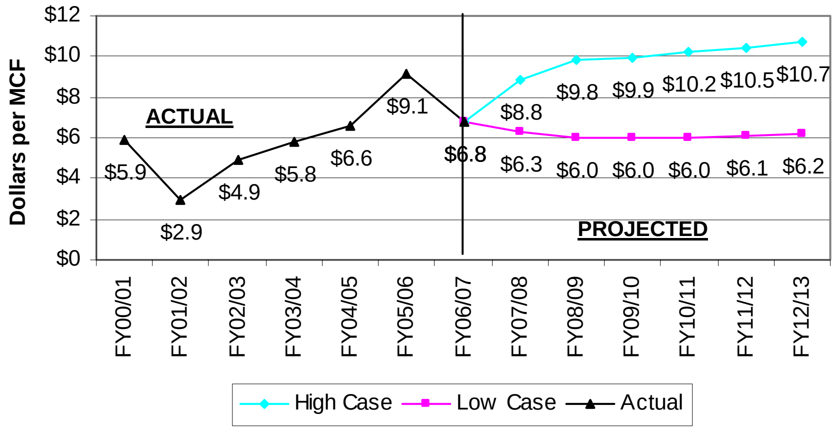


Oil prices are determined in the international markets and are difficult to project. As historical data shows great swings in the price of oil, there is also considerable uncertainty about future prices. The future price of oil is linked to the unpredictability of world oil supplies and world economics. Major factors affecting oil prices are: a) political stability of producing countries, b) world environmental issues,

c) industrialized countries conservation practices, d) weather related demand for petroleum products, e) production restraints by OPEC countries, f) economy changes in consumer nations, g) stability in labor forces, and h) wars in producing countries. If crude oil supply and demand for petroleum products are well balanced and refiners have the sufficient downstream capacity to process difficult crudes, the price of crude oil will seek a stable market condition.

The following figure shows historical fiscal year natural gas prices and the projected price range from FY2007/08 to FY2012/13.

Figure 2. Louisiana Natural Gas Price Projections



Natural gas prices recently started to behave similar to oil prices, but with a lag. The international gas market is showing its effect in the U.S. market. Natural gas is traded internationally in the form of liquid natural gas (LNG). LNG is harder to trade than oil because such trade needs a producer with large capabilities, special transport vessels, and proper receiving terminal infrastructure (regassification facilities, pipelines, compression stations, LNG tanks, etc.) and must overcome the NIMBY (not in my backyard) phenomenon from residents in areas of needed infrastructure on the receiving end. Gas prices are driven by factors such as: a) weather, b) demand for gas not satisfied by the pipeline system, c) availability of spot supplies, d) competing fuel prices, and e) worldwide LNG developments. The major cost components of natural gas prices are: • cost of infield production, • cost of transportation, • cost of marketing, and • investment rate of return. As the historical data shows, most components of natural gas prices are stable, with the exception of marketing cost. Marketing cost is the only cost that oscillates widely. Gas prices increased as regulations faded out in the early 1980's. With deregulation, natural gas started trading in the spot and commodity markets. Since 1985, this spot market for gas has grown in importance and, today, it is the major player in the determination of gas prices. In April 1990, natural gas futures contracts started trading in the New York Mercantile Exchange (NYMEX). A NYMEX gas future contract calls for delivery of 10,000 MCF of gas during a specific month, 1 to 12 months in the future. The contract delivery point of the gas is Sabine Pipe Line Company's Henry Hub terminal near Erath, Louisiana.

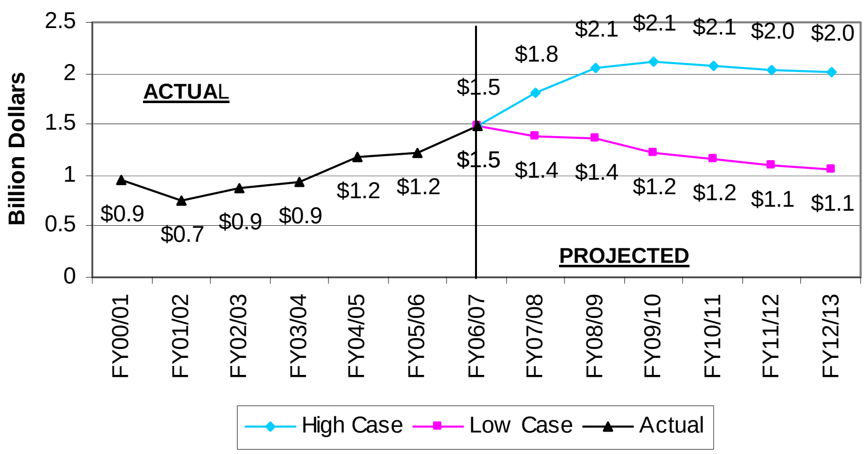
Mineral Revenue Projection

The State collects revenue in the form of severance taxes from oil and gas (O & G) production anywhere within the State's borders. If the minerals are produced from lands or water bottoms owned by the State, the State receives additional revenue such as: bonuses before leasing the land, rentals after leasing if it is not in production or under active development, royalties and overrides if it is in production.

The sum of royalties, bonuses, rentals and override on State lands, and severance taxes will be called O&G Mineral Revenue. The O&G Mineral Revenue first peaked in FY1981/82 at $1.61 billion, the highest in history. In FY1981/82, average oil prices were around $35 per barrel, and average gas prices were around $2 per MCF. With recent oil prices above $110 per barrel and gas prices above $8 per MCF, this record might be broken despite the decline in oil and gas production from maturity in most Louisiana producing fields.

The following figure shows historical revenue from fiscal year FY2000/01 through FY2006/07, and the estimated revenue range from FY2007/08 through FY2012/13.

Figure 3. Louisiana Oil and Gas Mineral Revenue Projection



The forecasted state oil and gas prices, and O&G revenue for the next five years by the Revenue Estimating Committee are listed below.

Table 3. Forecasted State Oil and Gas Prices

	FY2007/08	FY2008/09	FY2009/10	FY2010/11	FY2011/12
Oil Price ($/Barrel)	92.35	84.23	72.17	68.46	67.63
Gas Price ($/MCF)	7.85	8.72	8.36	7.85	7.91
O&G Revenue ($Billion)	$1.6	$1.7	$1.5	$1.5	$1.4

VALUE OF THE INTERNATIONAL RESIDENTIAL CODE TO LOUISIANA

by
Billy Williamson, EIT, EMIT

On November 29, 2005 Governor Kathleen Blanco signed ACT 12 (R.S. 40:1730.22.C) of the First Extraordinary Legislative Session of 2005. This act created the Louisiana State Uniform Construction Code and designated the 2006 International Residential Code (IRC 2006) as the building code for all one- and two-family dwellings. IRC 2006 includes a chapter dedicated to energy efficiency, chapter 11. The purpose of this chapter is to regulate energy efficiency in the design and construction of dwellings.

The IRC 2006 places the United States into 7 different climate zones, of which, 2 are in Louisiana. Each climate zone has specific requirements that must be met. All ceilings, floors, and walls are assigned minimum insulation R-values. These R-values represent the component's resistance to heat transfer. Basically, a material or component with a low R-value, such as a metal pan, will allow heat to pass through it easily, whereas a component with a high R-value, such as an oven mitt, will resist the flow of heat.

The inverse of thermal resistance is thermal conductance, or U-factor. A material that has a low R-value will have a correspondingly high U-factor. In the IRC, fenestration, such as windows, doors, and skylights, are assigned maximum allowable U-factors. This is to minimize heat entering or leaving through these components. Also, windows, glass doors, and skylights are given maximum solar heat gain coefficients (SHGC). The solar heat gain coefficient is a measure of the percentage of solar radiation (heat energy contained within the sun's light) that is allowed to pass through the glass. For example, if you were to stand outside under a piece of glass with a SHGC of 0, it would feel as though you are standing in the direct sunlight. If the glass were replaced with a piece that has a SHGC of 0.5, you would feel cooler, as your body would feel a 50% reduction in the amount of radiant heat being absorbed.

Cost, Energy and Emissions Savings

In June 2007, the United States Government Accountability Office released a Report to Congressional Addressees titled *Energy Efficiency: Important Challenges Must Be Overcome to Realize Significant Opportunities for Energy Efficiency Improvements in Gulf Coast Reconstruction*[1], which demonstrated the energy and cost savings that could be realized if Louisiana and Mississippi adopted statewide energy conservation codes. Table 1 illustrates the benefits of the energy portion of the IRC as it pertains to homeowners. The US Department of Energy's Pacific Northwest National Laboratory modeled the levels of energy efficiency that could be achieved and compared this to the homes that were being built prior to code adoption.

Table 1. Savings Projected for Hurricane Recovery Housing

	Annual Energy and Emissions Savings (per House)					
Construction Type	**[1]Annual Cost Savings**	**Energy Savings (kWh)**	**[2]CO_2 (Pounds)**	**[2]SO_2 (Pounds)**	**[2]NO_X (Pounds)**	**[2]Mercury (Pounds)**
Slab-on-grade	$167	1,895.57	2276.97	5.01	3.16	0.000023
Elevated	$233	2,644.72	3176.86	7.00	4.40	0.000033

These energy savings were then used to determine emissions savings using environmental emission rates from the US EPA's *Emissions & Generation Resource Integrated Database*[2].

Finally, the expected energy and emissions savings throughout the state for a single year, 2016, were calculated. The numbers of buildings included for slab-on-grade and elevated houses were taken from the Louisiana Recovery Authority's 2006 *Initial Quarterly Report*[3]. This information was used to determine overall energy savings that could be realized if the homes destroyed by Hurricanes Katrina and Rita were built to the new standard versus the business-as-usual approach. It was assumed that all of these houses would be rebuilt in 10 years, by 2016. The costs and savings associated with typical houses were found by taking the mean of slab-on-grade and elevated houses. Based on recent U.S. Census Bureau data, a total of 16,000 new homes were being added to the housing stock annually in the areas that were not severely affected by the hurricanes.[4] Basing the energy and emissions savings of this non-recovery growth on typical houses, the savings associated with 10 years of growth were determined. The construction types were then added together to find the overall energy, cost, and emissions that Louisiana should save because of the Louisiana State Uniform Construction Code. This information can be found in the following chart.

Table 2. Annual Energy and Emissions Savings from Code Built Housing by 2016

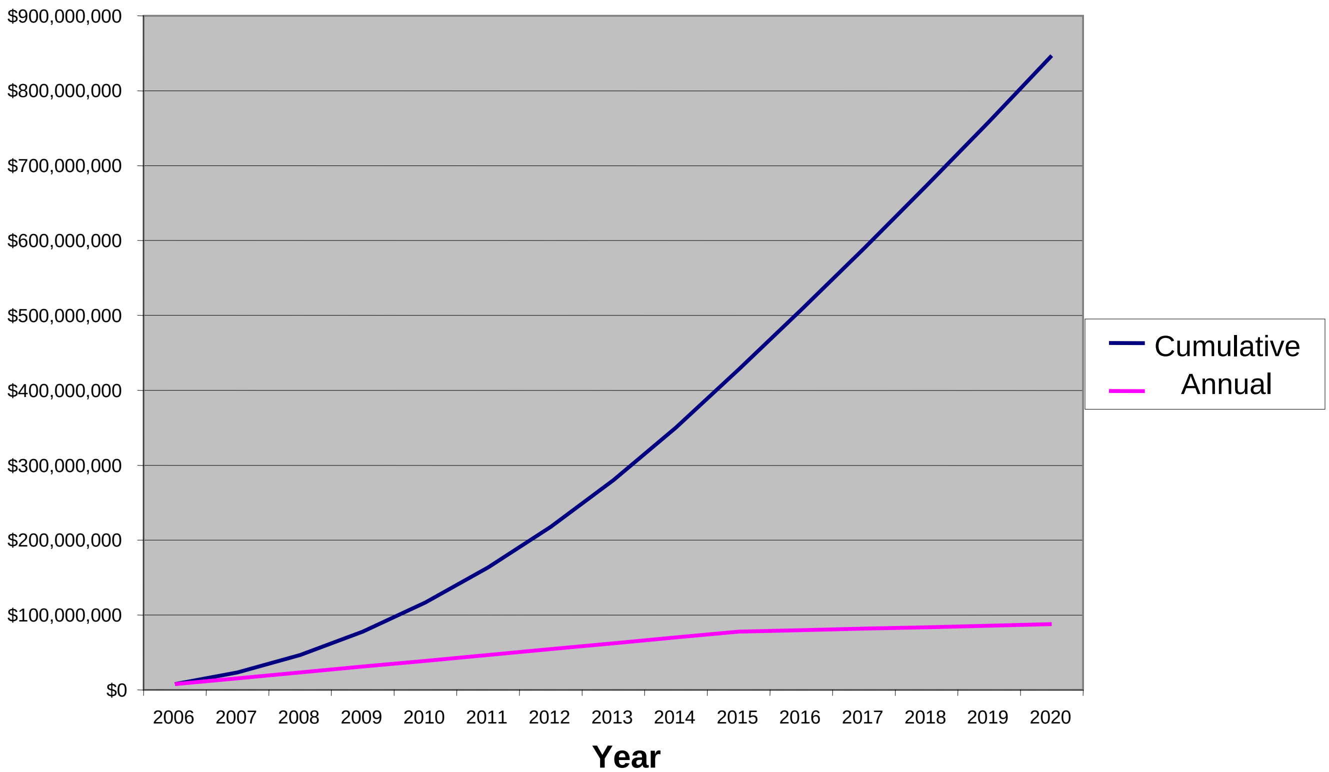
Recovery and Non-recovery Housing			Annual Energy and Emissions Savings Expected Statewide in 2016					
Construction Type	**[3]Number of Buildings Affected**	**[1]Annual Savings per Home**	**Total Annual Savings**	**Total Annual Energy Savings (kWh)**	**[2]CO_2 (Tons)**	**[2]SO_2 (Tons)**	**[2]NO_X (Tons)**	**[2]Mer-cury (lbs)**
Slab-on-grade	65,000	$167	$10,855,000	123,212,259	74,002	163.0	102.6	1.52
Elevated	150,000	$233	$34,950,000	396,708,286	238,264	524.7	330.3	4.88
Non-Recovery Growth	160,000	$200	$32,000,000	363,223,610	218,153	550.0	302.4	4.47
Sum of Construction	375,000		$77,805,000	883,144,154	530,419	1,168	735.3	10.86

It Pays For Itself

The US GAO report determined that the incremental cost increase of building to code versus the business-as-usual approach would be about $618 per house. Using this initial cost increase, the payback period can be determined, as well as a simple cash flow. For slab-on-grade houses, the investment in energy efficiency required by the code would be repaid in energy savings in approximately 3.7 years. For elevated houses, the payback period would be much shorter, about 2.7 years. On average, a payback period of 3.1 years would be reasonable. Projecting these savings over a 30 year period, building to the standards of the code will save $4,392 for slab-on-grade homes and $6,372 for elevated homes. Also, provisions within the energy code help prevent condensation inside of the home, which will ultimately reduce maintenance costs. Looking at the cost savings, the reduction in energy costs will more than pay for the nominal increase in mortgage payments.

The information in the following graph was taken from the chart above. The reconstruction of hurricane damaged houses was spread out across a 10 year period. On top of the reconstruction, an annual housing growth of 16,000 houses was included. Looking at the annual savings, it can be seen that the annual savings increase more rapidly for the first 10 years. This is because of the assumption that the reconstruction will be evenly spaced over that 10 year period.

Figure 1. Graph of Total Energy Cost Savings through 2020



In Summary

The previous analyses illustrate the benefits of the energy components of the International Residential Code, not only for the state, but for the individual homeowner. The homeowner would immediately begin saving money on his electric bill. The improvements to the construction will continue to reduce consumption. This would generally pay for the costs of the improvements in less than 4 years. It doesn't stop there, though. For the remainder of the house's life, the improvements will continue saving money on monthly energy bills, and, as they say, a penny saved is a penny earned.

For the environmentally-conscious homeowner, the benefits of the energy code are clear. At a time when the country is grappling with growing emissions, building energy codes represent an opportunity to reduce our impact on the environment. Although the amount of emissions saved annually may seem small for a single house, the sheer number of houses ensures that the overall impact is great. If we, as a state, want to continue living with an improved quality of life, we must begin investing in our future. This means doing everything that we can to ensure a solid economy and clean environment. Overall, the savings and environmental benefits of building to the code are ample to justify the incremental cost.

Important Notes:

- Annual Energy Reduction:
    - Slab-on-grade house: 1,896 kilowatt-hours
    - Elevated house: 2645 kilowatt-hours
    - Reconstruction and growth total: 935,811,578 kilowatt-hours
- Annual Energy Cost Savings:
    - Slab-on-grade house: $167
    - Elevated house: $233
    - Reconstruction and growth total: $82,445,000
- Annual Emissions Savings
    - Slab-on-grade house: 2277 pounds CO_2, 5 pounds SO_2, 3.2 pounds NO_X
    - Elevated house: 3177 pounds CO_2, 7 pounds SO_2, 4.4 pounds NO_X
    - Reconstruction and growth total: 562,051 tons CO_2, 1238 tons SO_2, 779 tons NO_X
- Cost Recovery period (GAO assumed energy price $0.0881/kWh) for:
    - Slab-on-grade house: 3.7 years
    - Elevated house: 2.7 years
- Cost Recovery period (Current energy price $0.0972/kWh) for:
    - Slab-on-grade house: 3.4 years
    - Elevated house: 2.4 years
- 10 years Savings (Total annual savings – cost increase):
    - Slab-on-grade house: ($167 X 10) - $618 = $1052
    - Elevated house: ($233 X 10) - $618 = $1712
- Status of Energy Codes: (Energy Policy and Conservation Act requires IECC 1998 or better)
    - States meeting 2006 IECC or equivalent: 18 (including Louisiana)
    - States meeting 2003 IECC or equivalent: 10
    - States meeting 1998 – 2001 IECC or equivalent: 7
    - States preceding 1998 IECC or equivalent: 6
- States without statewide energy code: 10

Sources:

[1] Mark E. Gaffigan, “Energy Efficiency: Important Challenges Must Be Overcome to Realize Significant Opportunities for Energy Efficiency Improvements in Gulf Coast Reconstruction,” United States Government Accountability Office, Washington, D.C., June 2007, pp. 30-31.

[2] “Emissions & Generation Resource Integrated Database,” April 30, 2007, <http://www.epa.gov/cleanenergy/documents/egridzips/eGRID2006_Version2-1.zip>, accessed on April 22, 2008.

[3] “2006 Initial Quarterly Report,” Louisiana Recovery Authority, Baton Rouge, LA, February 2006, p. 1.

[4] “Table 4: Annual Estimates of Housing Units for Counties in Louisiana: April 1, 2000 to July 1, 2006 (HU-EST2006-04-22),” <http://www.census.gov/popest/housing/tables/HU-EST2006-04-22.xls>, accessed on May 22. 2008.

BUILDER'S GUIDE TO ENERGY EFFICIENT HOMES IN LOUISIANA: WATER HEATING

by
Howard Hershberg, AIA

The Builder's Guide to Energy Efficient Homes in Louisiana (Builder's Guide) is being updated to reflect new code requirements. This is the twelfth in a series of articles that will summarize the information in the guide and highlight updates.

Water heating consumes approximately 15% of the electricity (electric water heater) and 23% of the natural gas (gas water heater) used in residences. Water heating is the most variable class of energy consumption depending on water heater capacity, climate, economic status and occupant behavior and utility consumption regarding showers, clothes washers and dishwashers. Americans use approximately 15 to 40 gallons of hot water per person per day (See Table 1). Designing or selecting a water heater involves consideration of the first hour rating[1]or recovery capacity and the storage capacity. The size of heating equipment, capacity of storage tanks, and piping design is determined by recovery capacity needed by a building. Water heating systems are designed for recovery capacities of 3 to 20 gallons per resident per hour. Storage capacity usually varies from approximately 8 to 20 gallons per person or approximately 30 to 65 gallons per living unit.

The majority of North American domestic hot water systems use storage hot water heaters consisting of a tank, insulation, and a heating device using gas, oil or electricity. Recent improvements in storage hot water heaters include more and better tank insulation and improved combustion systems. Most single family homes use direct storage water heaters that combine the heating device, heat exchanger and storage tank into one unit. The tanks are insulated with fiberglass or plastic foam insulation and covered with outer jackets or painted steel. Hot water exits the top of the tank and cold water enters through a tube extending to the tank's bottom. Since May 1980, all new storage hot water heaters sold in the U.S. must have an energy guide label. The energy guide label is intended for comparison shopping and not as a table for actual operating cost and performance. It features an estimated yearly operating cost, a bar scale comparing operating costs for similar models, and a table to allow the buyer to estimate the annual operating costs.

Fuels for water heating include: fossil fuel, electricity, solar energy and waste heat recovery. Each of the fuels can be used directly or indirectly. Direct water heating applies the fuel's heat to only one heat exchanger.[2] Indirect water heating applies heat collected by water or air in a remote area to heat the domestic hot water. This remote heat comes from a boiler, solar collector, or waste heat exchanger. Indirect water heaters employ two or more heat exchangers. In a standard gas water heater, combustion air enters the bottom, combines with gas, and rises through the flue (which is an annulus in the tank surrounded by water). The gases heat the water as they rise through the tank annulus.

Water heaters use energy in the following three ways.

1. Demand - energy used to heat incoming water as hot water in the tank is used up
2. Standby – energy used through heat loss through the storage tanks walls

[1] Hourly peak hot water flow rate in gallons per hour is known as the first hour rating or recovery capacity.
[2] A tank or pipes containing domestic hot water.

3. Distribution – energy used through heat escaping through pipes and fixtures.

The various efficiencies used for rating water-heating systems account for losses in the combustion process, standby losses, and distribution losses (all numbers are approximate):

- Combustion losses 10% - 30% of input
- Standby losses 0% - 70% of input
- Distribution losses 2% - 25% of input
- Output 35% - 70% of input

Table 1. Single Family House Data

Number of Residents	Annual kWh	Annual Therms[3]	Gallons Per Day
1	2700	180	25
2	3500	230	40
3	4900	320	50
4	5400	350	65
5	6300	410	75
6	7000	750	85

SOURCE: *Residential Energy: Cost Savings and Comfort for Existing Buildings* by John Krigger and Chris Dorsi.[4]

This information was summarized from *Residential Energy: Cost Savings and Comfort for Existing Buildings* by John Krigger and Chris Dorsi.[5] More information on energy savings features, and the full text of the *Builder's Guide*, can be found on the DNR Technology Assessment Division website at URL: http://www.dnr.louisiana.gov/tad and click on the *Builder's Guide* link.

[3] One Therm = 100,000 BTUs
[4] Author's interpretation of single-family house data from Energy Information Administration, Lawrence Berkley Laboratory, *Home Energy Magazine*, and others.
[5] John Krigger and Chris Dorsi, *Residential Energy: Cost Savings and Comfort for Existing Buildings*, Saturn Resource Management, Inc., Montana, 2004.

HIGHLIGHTS OF THE 16TH EDITION OF THE LOUISIANA CRUDE OIL REFINERY SURVEY REPORT

by
J. Bryan Crouch, P.E.

The 16th edition of DNR's *Louisiana Crude Oil Refinery Survey Report* covers the 12-month period from July 1, 2006 to June 30, 2007. The survey shows that Louisiana refineries have recovered from the effects of Hurricanes Katrina and Rita; capacity, throughput, and operating rate numbers are up from pre-hurricane levels. Louisiana has 17 operating refineries with a combined capacity of 2,975,152 barrels per calendar day (bcd). The throughput for the 12-month period was 1,041,781,623 barrels, and the operating rate was 95.9%, up from 84.5% for last year's survey. See Table 1 for details. ExxonMobil has the most refining capacity in Louisiana as well as the largest single refinery.

Gasoline by far makes up the largest percentage of the product slate of Louisiana refineries. For this survey, even more so than usual; the percentage of regular gasoline in the combined product slate, typically in the upper 40s, increased to almost 70. See Table 2 for other top product percentages.

The phase-in of ultra low sulfur diesel (ULSD) continued without any major issues. There had been concerns over refineries abilities to meet the deadlines. As of June 1, 2006, 80% of refined on-highway diesel was required to be ULSD. ULSD was required to be available at retail outlets by October 15, 2006. By December 1, 2010, all refined diesel for on-highway use will be required to be ULSD.

Placid is going to expand its Port Allen refinery. The $300 million investment will bring the facility's crude capacity up to 80,000 bcd, allow the processing of lower quality crudes, and increase its gasoline and diesel production capacity. Valero is planning a $1.4 billion expansion of its Norco facility. The expansion includes a 50,000 bcd hydrocracker and an increase in the capacity of its crude and coker units. The project will result in an increase of gasoline and diesel production. Marathon's Garyville facility is about midway through its 180,000 bcd expansion with completion set for late 2009.

For comparison, data is also presented in the report from the *Oil and Gas Journal* 2007 Worldwide Refinery Report, and the Energy Information Administration Refinery Capacity Report. The data in these reports complement each other as well as the data from DNR's survey.

According to *Oil and Gas Journal* data, Louisiana maintains its second place ranking among the states in number and capacity of refineries. Texas is first and California is third. Louisiana refineries make up 16.7% of U.S. refining capacity. The ExxonMobil refinery in Baton Rouge is the second largest refinery in the U.S. and tenth largest in the world. Valero Energy, which owns two refineries in Louisiana, has the most refining capacity in the U.S.

The full report will be published in June, 2008, and will be available in hard copy and online in PDF format on the Department of Natural Resources Technology Assessment Division website (http://dnr.louisiana.gov/sec/execdiv/techasmt/oil_gas/refineries/). If you are currently on our mailing list as a subscriber to the report, a hard copy will be mailed to you automatically. If you would like your name added to our subscriber mailing list to receive a free copy of the current, as well as future editions, submit an email request to techasmt@la.gov (include your name and address, and specify which publication you are requesting), or contact Jan Janney at 225-342-1270.

Table 1. Louisiana Operating Refinery Capacity and Throughput

Refinery	Operating Capacity as of 6/30/07 (bcd)	Operating Capacity Change [1] (%)	Throughput 7/1/06 - 6/30/07 (barrels)	Throughput Change [2] (%)
Calcasieu Refining Co - Lake Charles	78,000	41.82	25,021,052	84.69
Calumet Lubricants Co LP - Cotton Valley	12,158	0.00	2,849,661	-5.60
Calumet Lubricants Co LP - Princeton	7,294	-11.95	2,585,295	-9.36
Calumet Shreveport LLC - Shreveport	40,000	-2.44	12,702,606	-15.13
Chalmette Refining LLC - Chalmette	196,000	0.00	62,353,600	18.64
Citgo Petroleum Corp - Lake Charles	429,500	-1.94	141,083,299	-4.53
ConocoPhillips - Belle Chasse	247,000	0.00	89,316,000	90.08
ConocoPhillips - West Lake	239,000	0.00	87,999,331	38.47
ExxonMobil Refining & Supply Co - Baton Rouge	503,000	0.40	182,390,500	8.16
Marathon Petroleum Co LLC - Garyville	255,000	0.00	93,067,210	7.08
Motiva Enterprises LLC - Convent	230,000	2.22	81,780,000	-0.42
Motiva Enterprises LLC - Norco	242,200	0.92	70,818,334	-2.91
Murphy Oil USA Inc - Meraux	120,000	0.00	38,656,055	356.42
Placid Refining Co - Port Allen	56,000	0.00	19,477,226	-0.04
Shell Chemical Co - St. Rose	55,000	0.00	17,983,390	0.22
Valero Refining Co - Krotz Spings	80,000	0.00	28,364,866	16.99
Valero Refining Co - Norco	185,000	0.00	85,332,803	-0.01
Totals	2,975,152	0.74	1,041,781,228	14.31

1. Change from end date (6/30/2006) of previous DNR survey to end date (6/30/2007) of current DNR survey.
2. Change from previous DNR survey throughput (7/2005 - 6/2006) to current DNR survey throughput (7/2006 - 6/2007).

Table 2. Top Products from LA Refineries by % of Product Slate

Product	Total Product Slate (%)
Regular gasoline	69.59
Diesel	9.07
Jet fuel/Kerosene	4.23
Fuel oil	2.33
Residual/Coke	2.42
Premium gasoline	1.42

ECONOMICS OF COMMERCIAL PHOTOVOLTAIC AND NET METERING

by
Billy Williamson, EIT, EMIT

Photovoltaic is the technical name of one of the most talked about energy technologies on the market today, solar electricity. Photovoltaic, PV, systems are touted for their ability to provide clean power to homes and businesses. With increasing awareness of problems associated with power generation, such as pollution and reliability, PV systems are becoming more attractive to consumers. However, as with any technology, the costs and benefits must be considered before any final decision is made.

The analyses in this report illustrate the high cost of photovoltaic technology. However, costs are expected to decrease as the technology improves. Also, many benefits of the technology cannot be easily converted into monetary terms. For instance, in places where electric transmission is unavailable or costly, the benefits of the system may justify the cost. Another consideration is utility reliability. If the utility's supply goes down for any reason, a PV system can be used to power critical equipment, such as cash registers, refrigeration units, gas pumps, etc. The economics of PV systems is obviously a concern, but it isn't the only determining factor that must be considered.

Net Metering and What It Means to You

One major problem with PV systems is that the supply of power from the system does not always correspond with the demand for power. If the power supplied is greater than the power required, the excess power may be wasted. There are two common ways to address this problem. First, batteries may be added to the system to save the excess energy for later times when the demand for power exceeds the supply of the system. However, battery systems are large, expensive, and must be regularly maintained. The second way to address the problem is through a solution known as net metering.

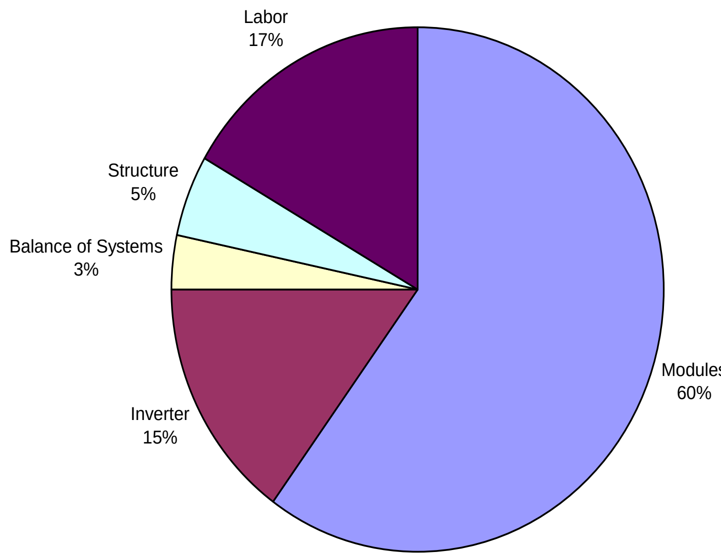
Net metering promotes the use of on-site renewable power by ensuring that the full benefit of the system is realized. Net metering is an important part of Louisiana's initiative to introduce renewable energy into the state. It allows individuals and businesses to be credited a fair value for excess power sent to the utility. When this occurs, the utility meter will reverse, crediting the consumer for the energy that was put onto the grid. This credit will show up on the consumer's bill as a reduction in the energy used. In the event that the monthly power supplied back to the grid exceeds the power taken from the grid, the remaining power will be applied as a credit to the next month's bill. In many cases, the full amount of power supplied by the photovoltaic system will exceed the power requirement of the building. However, during night, low light, or high demand conditions, the power required by the building may exceed the power supplied by the system. Net metering allows excess power to be fed back into the power grid. The maximum amount of power allowed for commercial entities under the current net metering law is 100 kilowatt (kW).

Economics of 100 kW Photovoltaic System

One of the first things to consider before installing a photovoltaic system is the economics of the system. This section will help you understand the costs and benefits of PV systems. Several different analyses were performed. First, the maximum initial costs required for 3 different payback periods, 8, 10, and 25 years, were determined using the expected energy savings. Next, taking the standard cost, the minimum electric rates required to reach the same 3 payback periods were determined. For all analyses, an interest rate of 3% and an annual system degradation of 1% were assumed.

Standard costs of equipment and installation are based on a typical 100 kW system. There are 5 major components considered. Modules refer to solar panels, which absorb sunlight and convert it into electricity in the form of a DC (direct current) voltage. To make this power usable for typical applications, an inverter is used to convert the DC voltage to a 120 volt AC (alternating current) voltage. The inverter also conditions the power to make it acceptable for the electric utility grid. Structure refers to the hardware required to mount the system. Labor costs are included, but will vary considerably depending on the nature of the installation. Finally, balance of system is used to refer to other applicable costs such as permitting and administration.

Figure 1. Cost Breakdown of Grid-Tied PV System



To determine the required minimum electric rates for each payback period, a standard cost per watt of installed power was given to each component. These costs were taken from typical systems of a comparable size, to take the economies of scale into account. For the sake of this analysis, all of these costs will be included in a single figure, referred to as installed cost. An installed cost of $6 per watt was assumed for the system. For a 100 kW system, the cost would be $600,000.

The total energy supplied by the panels annually was found using the U.S. Department of Energy's PV Watts software. The theoretical system was located in Baton Rouge with a fixed tilt of 30.7°, and default derate factor of 0.77 was used. Using this information PV Watts determined that the system should provide approximately 131,455 kilowatt-hours (kWh) annually. The annual savings required to reach the payback periods were then determined. Dividing the annual savings required by the amount of energy supplied by the panels annually, the minimum electric rates needed to make the investment economical were determined.

For the second analysis, the maximum initial costs that can be paid resulting in the selected payback periods were found. The cost of electricity was assumed to stay constant at the current rate of 9.72 cents per kilowatt-hour. The maximum allowable costs of the system were then found for each payback periods. These costs were then divided by the size of the system to determine the allowable cost per watt.

Table 1. Payback Requirements

Payback Period	Required Rate (¢/kWh)	Allowable Cost (Current Energy Rates)	Cost per Watt
25 years	29.2	$199,184.95	$1.99
10 years	56.3	$104,354.74	$1.04
8 years	67.8	$86,693.41	$0.87

SELECTED LOUISIANA ENERGY STATISTICS

Among the 50 states, Louisiana's rankings (in 2007 unless otherwise indicated) were:

PRIMARY ENERGY PRODUCTION
(Including Louisiana OCS*)
1st in crude oil
1st in OCS crude oil
1st in OCS natural gas
1st in OCS revenue generated for federal government
1st in mineral revenues from any source to the federal government
1st in LNG terminal capacity
1st in foreign oil import volume
2nd in natural gas
2nd in crude oil proved reserves
3rd in dry natural gas proved reserves
3rd in total energy from all sources

REFINING AND PETROCHEMICALS
1st in natural gas processing capacity
2nd in petroleum refining capacity
2nd in primary petrochemical production

PRIMARY ENERGY PRODUCTION
(Excluding Louisiana OCS)
4th in crude oil
5th in natural gas
6th in dry natural gas proved reserves
7th in crude oil proved reserves
12th in total energy (2006)
16th in nuclear electricity

ENERGY CONSUMPTION (2005)
2nd in industrial energy
3rd in per capita energy
3rd in natural gas (2006)
5th in petroleum
8th in total energy
24th in residential energy

PRODUCTION

State controlled (i.e., excluding OCS) natural gas production peaked at 5.6 trillion cubic feet (TCF) per year in 1970, declined to 1.5 TCF in 1995, and rebounded 4.5% to 1.6 TCF in 1996. Gas production was 1.35 TCF in 2003 and 2004, 1.28 TCF in 2005, and 1.35 TCF in 2006 and 2007.

State controlled gas production is on a long term decline rate of 3.2% per year, though the current short term (2008-2013) forecast decline is around 2.9% per year.

State controlled crude oil and condensate production peaked at 566 million barrels per year in 1970, declined to 127 million barrels in 1994, recovered to 129 million barrels in 1996, declined to 73.9 million barrels in 2006, and rebounded to 77.4 million barrels in 2007.

State controlled crude oil production is on a long term decline rate of 3.3% per year, though the current short term (2008-2013) forecast decline is around 2.1% per year. If oil stays above $110.00 per barrel, the decline trend should be reversed for the next two years.

Louisiana OCS (federal) territory is the most extensively developed and mature OCS territory in the U.S.

Louisiana OCS territory has produced approximately 85.7% of the 17.2 billion barrels of crude oil and condensate, and 81.0% of the 165 TCF of natural gas extracted from all federal OCS territories from the beginning of time through the end of 2007. Currently, Louisiana OCS territory produces 22.2% of the oil and 10.5% of the natural gas produced in the entire U.S., and 89.4% of the oil and 73.5% of the natural gas produced in the Gulf of Mexico OCS.

Louisiana OCS gas production peaked at 4.16 TCF per year in 1979, declined to 3.01 TCF in 1989, then recovered to 3.91 TCF in 1999, fell to 2.90 TCF in 2004, 2.33 TCF in 2005, 2.08 TCF in 2006, and 1.99 TCF in 2007.

Louisiana OCS crude oil and condensate production first peaked at 388 million barrels per year in 1972 and then declined to 246 million barrels in 1989. In this decade, the production has steadily risen from 264 million barrels in 1990 to 508 million barrels in 2002 due to the development of deep water drilling. 477 million barrels was produced in 2004, 407 million barrels in 2005, 419 million barrels in 2006, and 425 million barrels in 2007.

REVENUE

At the first revenue peak in Fiscal Year (FY) 1981/82, oil and gas revenue from severance, royalties, and bonuses amounted to $1.6 billion, or 41% of total state taxes, licenses and fees. For FY 2007/08, these revenues are estimated to reach a new dollar high of about $1.76 billion, but only 14.9% of total estimated taxes, licenses, and fees.

At constant production, the state treasury gains or loses about $10.7 million of direct revenue from oil severance taxes and royalty payments for every $1 per barrel change in oil prices.

For every $1 per MCF change in gas price, at constant production, the state treasury gains or loses $42.4 million in royalty payments, and increases or decreases gas full rate severance tax by 3.9 cents per MCF or about $38.9 million dollars for the following fiscal year (there is a 7 cents floor on gas severance tax).

There are no studies available on indirect revenue to the state from changes in gas and oil prices.

DRILLING ACTIVITY

Drilling permits issued on state controlled territory peaked at 7,631 permits in 1984 and declined to a low of 1,017 permits in 1999. In 2003 drilling permits issued fell to 1,264, rebounded to 1,996 permits in 2005, increased to 2,137 permits in 2006 and to 2,150 permits in 2007.

The average active rotary rig count for Louisiana, excluding OCS, reached a high of 386 rigs in 1981 and fell to 76 active rigs in 2002. In 2004 the average swung back to 91 active rigs, then rose in 2005 to 108 active rigs, 118 active rigs in 2006, and 119 active rigs in 2007. The lowest year average between 1981 and 2005 was 64 active rigs in 1993.

The annual average active rotary rig count for Louisiana OCS reached a high of 109 rigs in 2001 and is in a downward trend. It was 81 in 2003, 76 in 2004, 74 in 2005, 70 in 2006, and 59 in 2007. The lowest year average between 1981 and 2007 was 23 active rigs in 1992.

* Note: Louisiana OCS or Outer Continental Shelf is federal offshore territory adjacent to Louisiana's coast beyond the three mile limit of the state's offshore boundary.

HAYNESVILLE SHALE GAS PLAY AND LOUISIANA COAL SEAM NATURAL GAS

by
David McGee, P.E.

Coal seam natural gas (CSNG, known also as coalbed methane, or CBM) and shale gas development in northern Louisiana is taking off. Both have been identified and are being quantified in a large part of the state.

What they have in common is that the gas is trapped in a formation which is not porous. The coal beds are a sub-bituminous coal laid down in the Tertiary period between 2 and 50 million years ago, containing biogenic natural gas of high purity, greater than 98% CH_4. Biogenic methane is a waste product from certain bacteria that "eat" the carbon and release methane which is then adsorbed on to the coal. When the co-occurring water is removed from the coal, the gas is released. The water has to be pumped out and then is re-injected to a different strata. Shale is a rock formation mainly composed of consolidated very fine clay particles deposited and buried more than 170 million years ago during the Jurassic geologic time. It is characterized by ultra-low permeability compared to the conventional sandstone/limestone reservoir rocks that have high permeability. Shale methane is also of biogenic origin but may not be as pure as found in CSNG.

What is different about the two? CSNG is found at relatively shallow depth, 2500 to 4500 feet, while the shale deposits are much deeper, 10,000 to 14,000 feet. This obviously makes the shale deposits more expensive to produce, at least ten times more. CSNG underlies 70 or more percent of the state, while the gas bearing shale has only been found in the north west corner to date. Both require horizontal drilling and fracturing ("fracing") of large areas of the formation to release the gas in economical quantities.

What do these discoveries mean to Louisiana in 2008 with natural gas selling for upwards of $10 per thousand cubic feet (mcf)?

- The state receives royalties from the production which reduce the need for increased taxes.
- Each drilling rig operating means about 184 employees with high paying jobs.[1]
- Chemical plants will still have locally available raw materials which means retaining good jobs.
- Land owners will receive lease payments that will go back into the local economy.
- Natural gas will continue to generate electricity and heat homes.

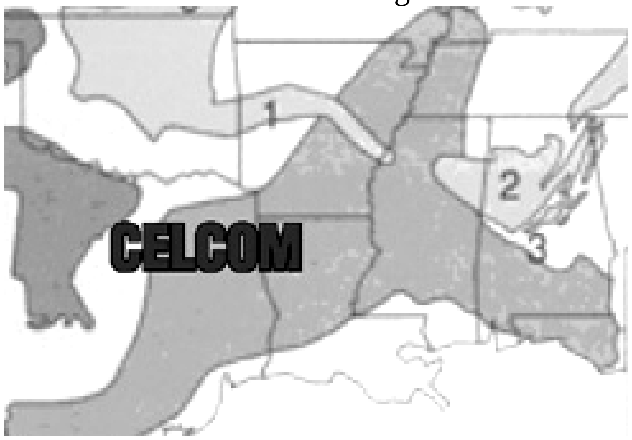
These are just some of the reasons to be interested in these natural resources.

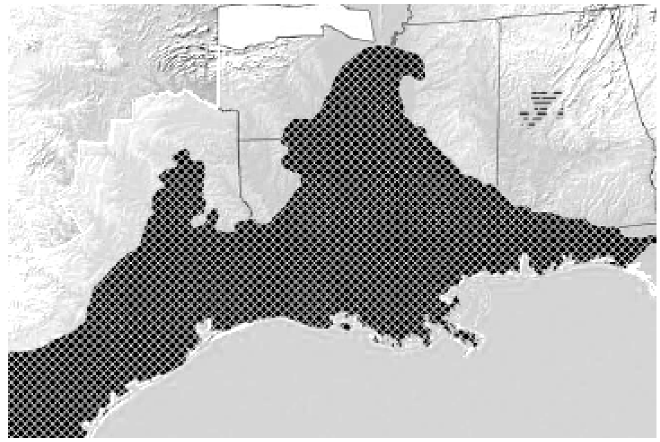
Coal Seam Natural Gas

Where Is It Located? The extent of the play is unknown, but is expected to be economic over a large section of the state. At present, exploration is being done in the north central portion of the state; Caldwell and LaSalle parishes and those surrounding them. Currently there are 44 producing wells that have produced from 10 to 250 mcf per day[2] according to some sources and 9 in various stages of dewatering. The companies drilling the wells have not divulged much information about the production or drilling details publicly. Figures 1 and 2 show the potential area being explored. Until many more wells are drilled, exact boundaries can not be determined.

[1] "Playing the Haynesville Shale" by Vickie Welborn, Shreveport Times May 4, 2008
[2] "North Louisiana CBM Play Could Someday Rival Powder River Basin" by John A. Sullivan, *Natural Gas Week* Monday, February 4, 2008 (Copyright © 2008 Energy Intelligence Group, Inc.)

Figures 1 and 2. Two maps, no exact answers.[3,4]





Prior to 2005 Louisiana did not have law appropriate for these types of wells. Scott Angelle, Secretary of the Department of Natural Resources, Jim Welch, Commissioner of Conservation and Dr. Madhurendu Kumar, state geologist, worked with the industry to make changes. Don Briggs, president of the Louisiana Oil and Gas Association, along with Welsh and Senator Robert Adley, successfully educated the legislature regarding the need for larger units and state regulations were changed. The horizontal wells these plays demand are expensive, but can effectively cover large areas, so up to 5000 acre units were created to maximize the potential of each location. These wells may intersect several beds as they go down and sideways.

What facts are known? Dr. Clayton Breland, with the Louisiana Geological Survey at Louisiana State University, involved Dr. Peter Warwick of the U.S. Geological Survey (USGS) and Dr. Gary Kinsland of the University of Louisiana at Lafayette to research results from test wells. They found these deeper coals at 2,500 to 4,000 feet, contain more gas per ton than is typically found in the prolific CBM fields of the Powder River Basin in Wyoming. Kinsland digitized 500 well logs across north Louisiana into a 3-D image that shows many of the coals cover a huge acreage. There may be 20 to 30 coal seams in a well, some very thin and some 30 feet thick.[5]

How do you get to it? A site may have six to eight wells that go down, then turn out approximately 90 degrees to run through the coal seam**.** This is called directional drilling. The laterals are "fraced" at various locations from the vertical well position to gather the gas. The fracturing creates cracks through the coal into which sand is forced to hold them open through which the water and gas can be extracted.

The technologies that enable directional drilling have been developing over the last 20 years and are now understood. The direction of a well bore can be controlled through the use of a motor attached above the drill bit that is powered hydraulically by the drilling fluid. This allows the drill bit to rotate without the rest of the drill string rotating. The motor has a slight "kink" built into it that causes the well bore to deviate in the direction that the kink is pointed in. Electro-mechanical instruments placed in the drill string above the

[3] COALBED METHANE: LOUISIANA'S UNDEREXPLOITED ENERGY RESOURCE by John B. Echols[1] Search and Discovery Article #10011 (2000) Adaptation for online presentation of article of the same title by the same author published in Volume 9, pages 18-27 (June, 2000) of the Basin Research Institute Bulletin, a publication of the Louisiana Geological Survey. Website of BRI is www.lgs.lsu.edu.

[4] SECARB Oil and Gas Reservoirs, NETL, U.S. DOE Carbon Sequestration Atlas of the United States and Canada pg 52 accessed at http://www.netl.doe.gov/technologies/carbon_seq/refshelf/atlas/Southeast%20Regional%20 <> Carbon%20Sequestration%20Partnership.pdf

[5] SHALE AND COALBED METHANE • *Oil and Gas Investor • January 2008 page 30*
"Louisiana CBM on the Cusp?" By Diana L. Chance

motor can measure and transmit precise position information back to the surface. These two technologies can be used in conjunction to steer a well to a desired location.

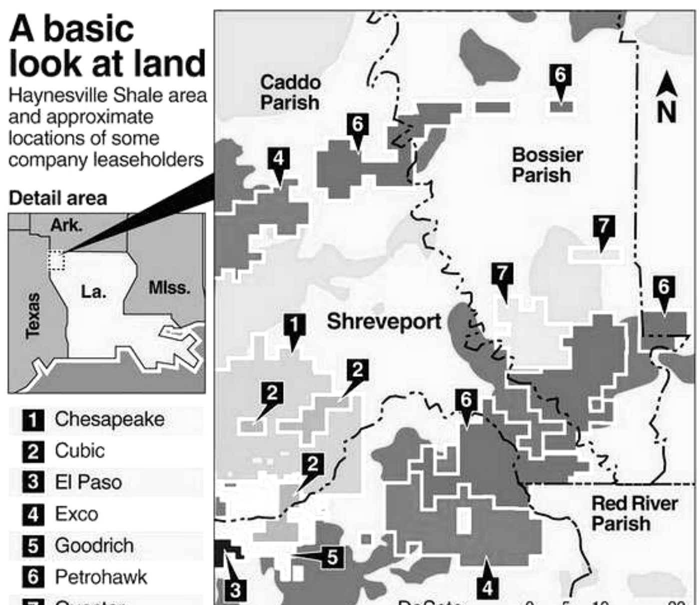
What does it cost? The major coals are at depths of 2,800 to 3,400 feet, so the average cost to drill and complete a well is only about $250,000 per well and early test data has established the gas content in the coals as economical.[6]

Who Are The Players? Devon Energy Co. drilled the first pilot program in Caldwell Parish, where Devon and Donner Properties share a common interest in the minerals over a large area. After John Echols left Louisiana State University Basin Research Institute for private industry, he also drilled a test in Caldwell Parish. King Drilling drilled an interesting coal seam well in LaSalle Parish. Other players include GeoMet Inc., Mark V Petroleum Co., Harvest Gas Management, Vintage Petroleum Inc., EnerVest Operating Co., Samson Resources and other companies are acquiring leases. Southwestern Energy Co. has the most producing wells, 29, as of the first of May 2008. Most of these companies are keeping what they know to themselves.

What Is A Shale Gas Play?

As described at the beginning, shale is compacted clay and fine material that also had carbon bearing material mixed in. Shale is formed where rivers deposit muddy water over many years such as a swamp or lake basin. When the water stops flowing, the clay and other matter settle out. If this area is "marsh" then plants grow very well. They usually have plenty of water and get "fertilized" with each flood. The plants become the source of carbon, that later, certain bacteria (methanogens) consume releasing methane (swamp gas). When such an area is buried under many feet of other material it is compacted to form a layer of shale with the methane and some water trapped in the tiny spaces between grains. Shale is not a very strong rock, but it does not permit the flow of water or gas through it. The Barnett Shale in Texas, the Fayetteville Shale in Arkansas and the Marcellus and Lower Huron Shales in Appalachia are the previously known shale gas plays. There are a number of others.

Figure 3. Leasing activity for Haynesville Shale



Mike Silva The Shreveport Times • May 30, 2008

Where is it located and who are the players? Chesapeake Energy has over 200,000 acres leased and is trying to lease 300,000 more in the northwest corner of the state. Petrohawk, Exco Resources, Questar and others are actively leasing acreage. Basically Exco and Petrohawk have said where they think it is, but the most telling fact that can be verified is where they are leasing mineral rights. Figure 3 above shows who has leased what area. Goodrich just merged their holdings with Chesapeake for cash to explore other strata. Industry officials say another company, Cubic Energy, has been drilling on the shale for four years.

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[6] SHALE AND COALBED METHANE • *Oil and Gas Investor • January 2008 page 30*
"Louisiana CBM on the Cusp?" By Diana L. Chance, Donner Properties

What does it cost? These deep wells, drilled in hard rock, are expensive, typically over $4 million. The tooling is high priced and the technology for this depth is new. On top of this, the play is not well defined so there is always the chance of coming up empty.

Chesapeake's CEO has said in published reports his company estimates the Haynesville Shale holds at least 7.5 trillion cubic feet of natural gas and maybe up to 20 trillion cubic feet. By comparison, Chesapeake at the end of 2007 reported proved reserves in the Barnett Shale at just over 2 trillion cubic feet, which until now gives it the reputation of being the largest onshore natural gas field in the United States.

Shale Play Economic Summary for several known plays based on $70/bbl oil and $7.30 Gas:[7]

Play Name:	Before Tax Rate of Return	After Tax Rate of Return
Barnett Core	102%	53%
Barnett Tier 1	56%	28%
Fayetteville	33%	14%
Barnett non-core	29%	13%
Woodford Arkoma	27%	11%
Montana Bakken	22%	10%
North Dakota Bakken	21%	10%

To date, there have been 30, 640 acre units formed for the Haynesville Shale in the Caspiana, Metcalf and Johnson Branch fields. Briggs said, "I think you will see at least 70 rigs running up there next year. That's a good number, with about 40 running now."[8] It could take several years before the potential, or lack thereof, of the Haynesville Shale is fully realized. Predictions are it will take another year or so to know if it's a viable commercial opportunity. As can be seen in the table below, although expensive to drill, shale gas has strong incentives for development. With oil prices double those shown and gas 50 percent more the returns will be too good to resist.

According to State Mineral Board Secretary Marjorie McKeithen, in the July 9, 2008 lease sale, seven north Louisiana leases were located in Caddo Parish and averaged over $30,000 per acre in bonus and 30 percent royalty. The total bonus money received for these leases amounted to $17,683,171, covering approximately 585 acres. The other north Louisiana lease covered 1,045 acres in DeSoto Parish and brought in $28,750,040 in bonus which tallies $27,512 per acre and 27.5 percent royalty. The August sale brought similar rates on 4070 acres in this area as shown in the table below. This was the second largest sale in state history.

Results from the August 13, 2008 lease sale

Parish	Avg $/acre	Low	High	Royalty %
Bossier	$22,562	$18,500	$27,500	25-27.5
Caddo	$23,019	$16,550	$27,500	25-30
Desoto	$18,500	$18,500	$19,286	25-30
Red River	$20,396	$18,500	$27,500	25-30
Bienville	$24,162	$18,500	$27,500	25-27.5
$92,224,110 for 4070.3 acres	**$22,658.00**			

Louisiana is entering a new age of oil and gas exploration and production. There is much opportunity for those willing to gamble.

[7] Accessed July 7 2008 from "Shale Plays Soar" By John White, Natixis Bleichroeder Inc. at http://www.oilandgasinvestor.com/pdf/OGI_2008-01_InvestorsguideToUnconventionalGas.pdf

[8] "Playing the Haynesville Shale" by Vickie Welborn, Shreveport Times May 4, 2008

LOUISIANA, AN ENERGY CONSUMING STATE: AN UPDATE USING 2005 DATA

by
Bryan Crouch, P.E.

Louisiana is a net energy consuming state; that is, Louisiana consumes more energy than it produces. In 2005, Louisiana consumed 3,612.9 trillion BTUs (TBTUs) of energy and produced 2,161.0 TBTUs (not including OCS oil and gas production). The reason for Louisiana's huge energy consumption is the petrochemical and petroleum refining industry in the state that produces and exports to the rest of the nation, enormous volumes of energy intensive chemicals and fuel products. Figures 1 & 2 break up total Louisiana energy consumption by sector and source, respectively.

Figure 1. Louisiana Energy Consumption Percentage by Sector - 2005

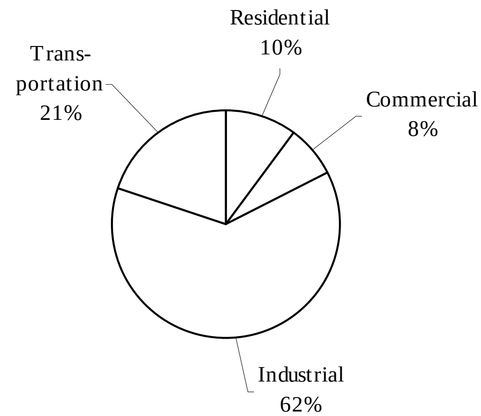
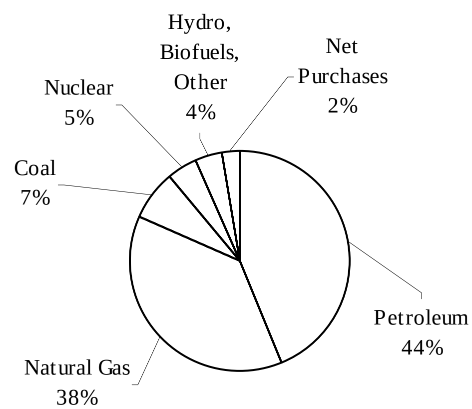


Figure 2. Louisiana Energy Consumption Perecentage by Source - 2005



The industrial sector is, by far, the largest energy consumer in Louisiana. The abundance of Louisiana's natural resources has historically meant low energy prices, which have attracted a large cluster of energy intensive industries to the state. The large industrial sector consumption is also reflected in Louisiana's high natural gas consumption, which is used both as an energy source and a feedstock.

Table 1 shows where Louisiana ranks among the states in various energy consumption categories, and lists the top energy consuming state for each category. Louisiana's high ranking for per capita energy consumption is a reflection of high industrial energy consumption.

Table 2 on the following page presents the Louisiana energy balance for 2005. Energy production from Louisiana's federal OCS area dwarfs state production. The energy balance is calculated both inclusive and exclusive of Louisiana's OCS oil and gas production.

Table 1. Louisiana Energy Consumption Rankings Among the States - 2005

Category	Rank	TBTU	#1 State (TBTU)
Residential	24	363.6	California (1,617.7)
Commercial	23	272.7	California (1,551.5)
Industrial	2	2,258.6	Texas (5,812.3)
Transportation	13	718.1	California (3,290.7)
Coal	30	253.5	Texas (1,627.9)
Natural Gas	3	1367.3	Texas (3,625.2)
Petroleum	5	1,587.4	Texas (5,671.1)
Electricity	20	264.1	Texas (1,140.5)
Total	8	3,613.0	Texas (11,558.3)
Per Capita (MBTU)	3	803.7	Alaska (1,193.9)

Table 2. Louisiana Energy Balance - 2005 [1]

ENERGY SOURCE		PRODUCTION	CONSUMPTION	NET STATE ENERGY PRODUCTION Excluding OCS	NET STATE ENERGY PRODUCTION Including OCS
PETROLEUM:	STATE OIL[2]	438.9 TBTU[4] (75.7 MMBBL)	1,587.4 TBTU (297.9 MMBBL)	-1,148.5 TBTU	1,213.0 TBTU
	LOUISIANA OCS OIL[2]	2,361.5 TBTU[4] (407.2 MMBBL)			
NATURAL GAS:	STATE GAS[3]	1,342.0 TBTU[4] (1.29 TCF)	1,367.3 TBTU (1.31 TCF)	-25.3 TBTU	2,256.5 TBTU
	LOUISIANA OCS GAS[3]	2,281.8 TBTU[4] (2.19 TCF)			
COAL:	LIGNITE	61.5 TBTU (4.161 MMSTON)	253.5 TBTU (15.9 MMSTON)	-192.0 TBTU	-192.0 TBTU
NUCLEAR ELECTRIC POWER		163.4 TBTU (15.7 Billion kWH)	163.4 TBTU (15.7 Billion kWH)	0.0 TBTU	0.0 TBTU
HYDROELECTRIC, BIOFUELS & OTHER		155.2 TBTU	155.2 TBTU	0.0 TBTU	0.0 TBTU
NET INTERSTATE PURCHASES OF ELECTRICITY INCLUDING ASSOCIATED LOSSES			86.1 TBTU (25.249 Billion kWH)	-86.1 TBTU	-86.1 TBTU
TOTALS:	EXCLUDING LOUISIANA OCS	2,161.0 TBTU	3,612.9 TBTU	-1,451.9 TBTU	
	INCLUDING LOUISIANA OCS	6,804.3 TBTU	3,612.9 TBTU		3,191.4 TBTU

The Louisiana energy balance for 2005 shows that the state consumed 1,452 more TBTUs of energy than it produced if Louisiana OCS production is not included. If Louisiana OCS production is included, the state is a net producer of energy by 3,194 TBTUs.

TCF = Trillion Cubic Feet
TBTU = Trillion BTU's
MMBBL = Million Barrels
OCS = Outer Continental Shelf (federal waters seaward of the state's 3-mile offshore boundary)
kWH = Kilowatt hour
MMSTON = Million Short Tons

1. Unless otherwise noted, data is obtained from the Energy Information Administration's latest published figures for state energy consumption.
2. Includes condensate
3. Includes gas plant liquids
4. Louisiana Department of Natural Resources data

BUILDER'S GUIDE TO ENERGY EFFICIENT HOMES IN LOUISIANA: WATER HEATING - PART 2

by
Howard Hershberg, AIA

The Builder's Guide to Energy Efficient Homes in Louisiana (Builder's Guide) is being updated to reflect new code requirements. This is the thirteenth in a series of articles that will summarize the information in the guide and highlight updates.

Energy efficient retrofits to water heating systems generally follow three strategies.

1. Reducing hot water usage
2. Reducing standby losses from storage tanks and pipes
3. Reducing distribution losses through pipes and fittings

Repairing leaks in fixtures or pipes is the first priority for hot water energy conservation. Low flow shower heads also save energy by limiting hot water use in the shower and are one of the most cost effective energy conservation projects for homes. Insulating the hot water pipes can usually save 50 to 150 kWh per year in single family homes. Designing the system to reduce the length and diameter of the piping is the most effective way to minimize distribution losses in new water heating systems.

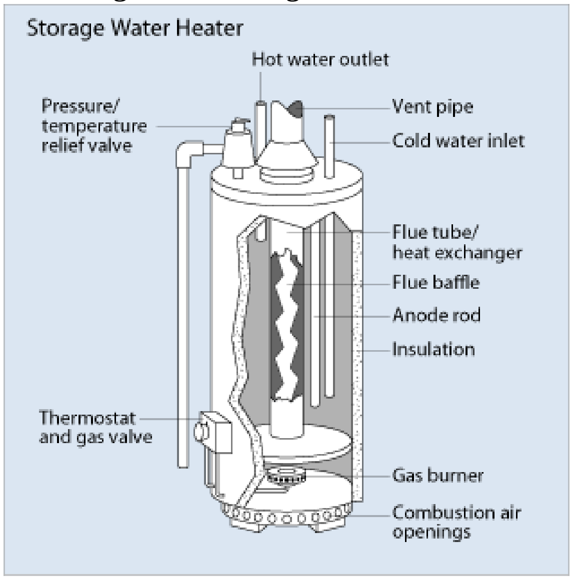
As fossil fuel costs continue to escalate, less energy waste in water heating is a very desirable goal. Conventional gas water heaters waste a greater percentage of energy than electric hot water heaters because of the design of the burner and venting system (Figure 1). Every molecule of air flowing out of the chimney carries wasted heat with it. Improved gas and oil water heaters reduce the losses by restricting the airflow through the flue and chimney and by eliminating the draft diverter (or barometric draft control). Two examples of improved combustion water heaters are:

1. Induced Draft Water Heater – uses a draft fan to pull the combustion gasses through the flue at the center of the hot water heater storage tank. The draft fan regulates the air that passes through the burner thus minimizing the excess air during combustion and also limits airflow during the "off" cycle
2. Sealed Combustion Water Heater – uses a combustion and venting system that is totally sealed from the home.

Storage hot water heaters dominate the single-family housing market in the United States, but indirect hot water heaters are common in multifamily housing facilities. An indirect water heater is a heat exchanger that derives its heat from a boiler, a solar collector, a heat pump or an air conditioner. A boiler is the most common heat source for indirect water heating systems (Figure 2). Indirect water heaters can have significant advantages over direct water heaters.

1. They eliminate the need for a chimney and the associated chimney losses.
2. An indirect water heater can surpass a direct water heater's efficiency if it is well insulated and linked to a boiler that provides space heating.

Figure 1. Storage Water heater

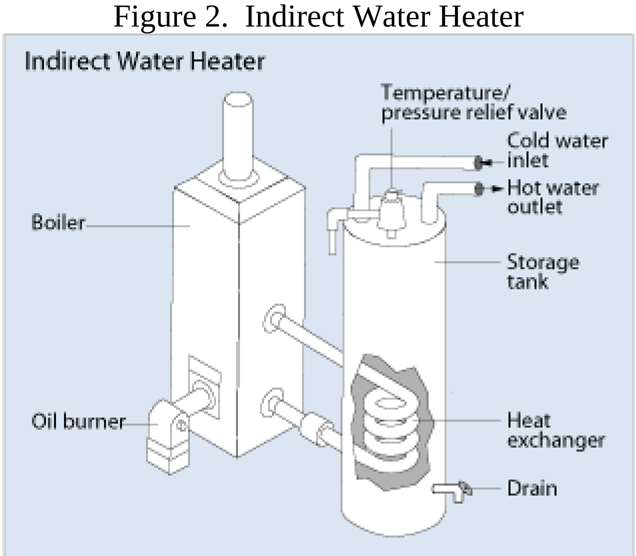


SOURCE: http://www.eere.energy.gov/consumer/your_home/water_heating/index.cfm/mytopic=12760

The two most common types of indirect water heaters are the immersed coil and the tankless coil water heaters. Immersed coil water heaters have a coil immersed in a tank of water with boiler water or solar heated water circulating through the coil. Tankless coils are heat exchangers installed inside a large boiler that are used for heating domestic water for a separate storage tank near the boiler.

Tankless water heaters (Figure 3), also called demand or instantaneous water heaters, provide a continuous flow of hot water at a specific flow rate and temperature. However, they might not adequately serve the needs of two or more fixtures. Demand hot water heaters offer a reasonable alternative when hot water use is moderate, space is limited and fuel is expensive. Tankless electric units are often used at remote fixtures far from the main water heater and in vacation homes.

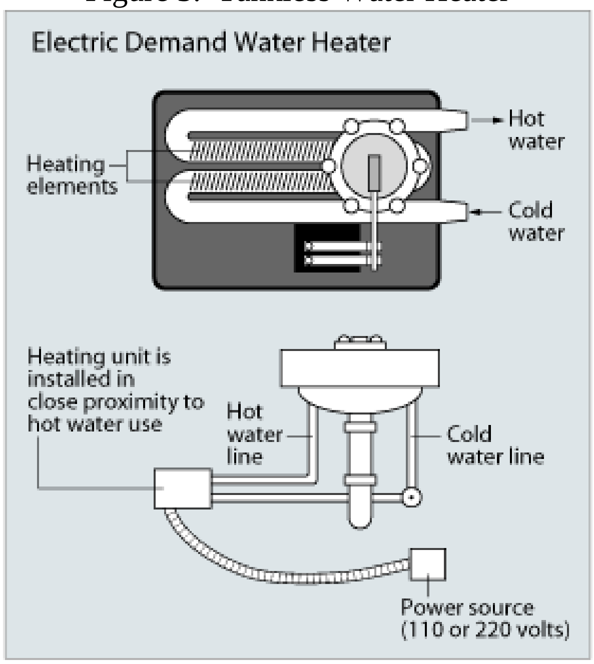
Figure 2. Indirect Water Heater



SOURCE: http://www.eere.energy.gov/consumer/your_home/water_heating/index.cfm/mytopic=12760

Solar hot water heating equipment is initially expensive, but it has a competitive life cycle cost with hot water heating storage units where hot water demand is high. Solar water heaters are classified as active (Figure 4) or passive (Figure 5) depending on whether or not they use a pump to circulate the water. Active solar water heating systems circulate water using pumps. They need freeze protection in temperate climates because their collectors become even colder than the outdoor air due to radiation losses into the night sky. Solar water heaters that circulate domestic hot water through the collector employ an automatic valve to drain the water back to the storage tank. Other solar water heating systems circulate a water antifreeze mixture through the collectors for protection from freezing. Antifreeze systems circulate the water-antifreeze mixture through the collector then through a heating coil inside a water storage tank. Solar water heaters are usually connected to back up water heaters in case of cloudy weather. Thermosiphoning solar water heaters are passive solar water heaters. They move water from the collector to a storage tank on top of the collector using only the buoyancy of the hot water.

Figure 3. Tankless Water Heater

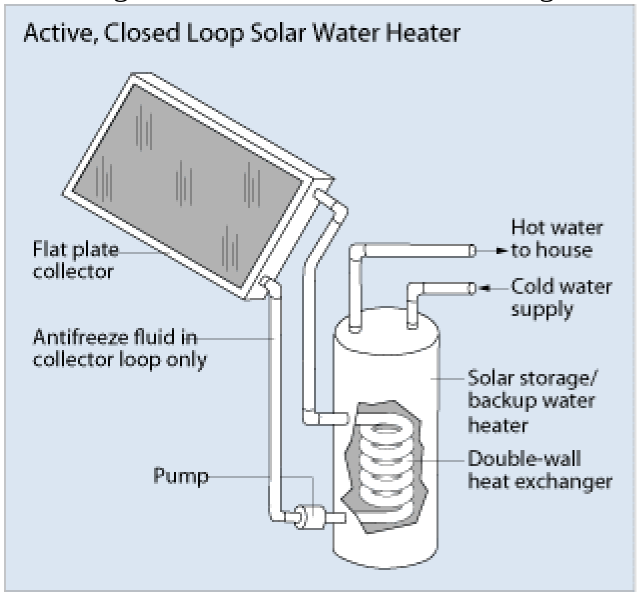


SOURCE: http://www.eere.energy.gov/consumer/your_home/water_heating/index.cfm/mytopic=12760

This information was summarized from *Residential Energy: Cost Savings and Comfort for Existing Buildings* by John Krigger and Chris Dorsi.[1] More information on energy savings features, and the full text of the *Builder's Guide*, can be found on the DNR Technology Assessment Division website at URL: http://www.dnr.louisiana.gov/tad and click on the *Builder's Guide* link.

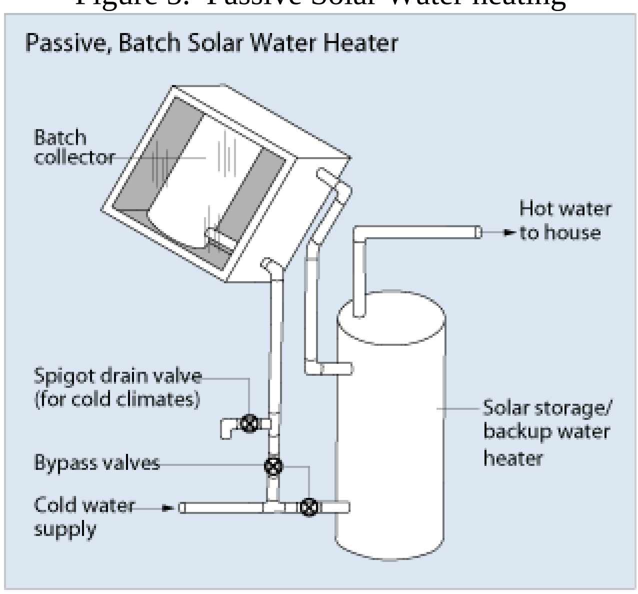
[1] John Krigger and Chris Dorsi, *Residential Energy: Cost Savings and Comfort for Existing Buildings*, Saturn Resource Management, Inc., Montana, 2004.

Figure 4. Active solar water heating



SOURCE: http://www.eere.energy.gov/consumer/your_home/water_heating/index.cfm/mytopic=12760

Figure 5. Passive Solar Water heating



SOURCE: http://www.eere.energy.gov/consumer/your_home/water_heating/index.cfm/mytopic=12760

WIND RESOURCE MAPS OF OFFSHORE LOUISIANA

by
J. Bryan Crouch, P.E.

DNR recently contracted with AWS Truewind of New York to construct maps of the offshore Louisiana wind resource. AWS Truewind employed their proprietary MesoMap weather modeling system to produce maps of the predicted mean annual wind speed at elevations of 10, 30, 50, 90, 150 and 300 meters above sea level, the predicted mean annual wind power density at an elevation of 50 meters, and the predicted mean monthly wind speeds at an elevation of 50 meters, for offshore Louisiana, extending 50 nautical miles offshore.

The MesoMap system was developed by AWS Truewind and consists of a large scale computer weather model that simulates regional weather patterns, a wind flow computer model that is sensitive to terrain and surface conditions, and several meteorological databases. This combination allows the mapping of large areas with a high level of detail. The typical margin of error between predicted and actual wind speeds is 5 – 7%.

The 50 meter elevation map shows predicted mean annual wind speeds of 6.5 to 7.0 meters per second (14.5 to 15.7 mph) from near shore to about 30 miles offshore for most of the Louisiana coast, and 7.0 to 7.5 meters per second (15.7 to 16.8 mph) from 30 miles to 50 miles offshore for most of the Louisiana coast. For the extreme western Louisiana coast, mean annual wind speeds over 7.0 meters per second are predicted within just a few miles of the shore line. The predicted mean power densities shown on the 50 meter elevation map mostly range from 300 to 400 watts per square meter (National Renewable Energy Laboratory class 3) with some areas over 400 watts per square meter (NREL class 4). NREL wind classifications range from 1 (no potential) to 7 (superb). Class 3 and 4 are listed as fair and good, respectively.

AWS Truewind consulted NREL for help to validate their model by comparing the predicted data to data gathered from various wind monitoring stations and satellite data.

A report by AWS Truewind describing the model in more detail, discussing the results, and giving guidelines on interpreting and using the maps can be accessed from DNR's website on the following page: http://dnr.louisiana.gov/sec/execdiv/techasmt/energy_sources/index.htm. Also available on the same page are the individual maps in Adobe PDF format, and an interactive map that can be viewed with ArcReader software from Environmental Systems Research Institute, Inc., which can be downloaded free of charge at: http://www.esri.com/software/arcgis/arcreader/download.html.

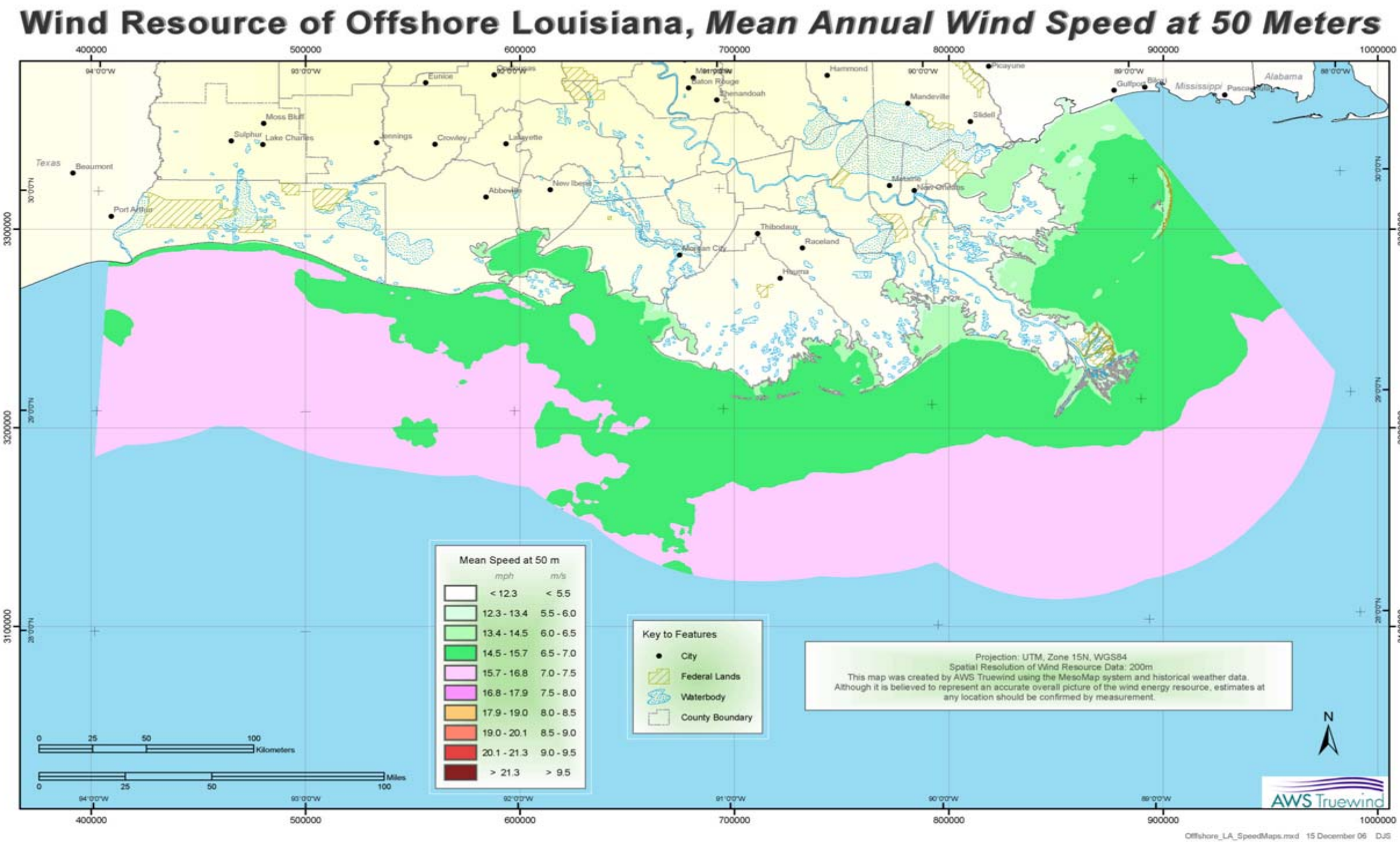


Figure 1. Mean Annual Wind Speed for Offshore Region of Louisiana at 50 m

ENERGY LEGISLATION - 2008 REGULAR LEGISLATIVE SESSION

by
Billy Williamson, Engineer Intern

During the **2008 Regular Legislative Session** ten pieces of energy legislation were passed. In the House of Representatives, twelve pieces of energy legislation were proposed, only six of which passed. In the Senate, eight pieces of energy legislation were proposed, only four of which passed. This report discusses the most important pieces of legislation which the Technology Assessment Division was monitoring.

Early in the session, several bills were introduced that would have effected the Louisiana State Uniform Construction Code, LSUCC. **House Bill 204**, proposed by Representative Chandler, sought to exempt from enforcement of the residential code all parishes that lie entirely north of the International Residential Code's 100 MPH wind load line. The bill was brought before the House Commerce Committee, where it became clear that the committee would not change the current code. The bill was thus involuntarily deferred. On the same date, the House Commerce Committee also considered **House Bill 41**, which sought to remove the entire energy portion of the Uniform Construction Code. After the lengthy discussion about HB 204, this bill was quickly deferred.

However, several bills affecting the LSUCC were passed during the session. **Act 484, effective June 25, 2008,** requires that all updates to the International Residential Code be evaluated before adoption. Ultimately, however, the update must be accepted as code within 2 years of its release. In the event that the update is determined to be too costly or inefficient, the legislature would have 2 years to pass legislation denying or amending the update.

Act 343, effective June 21, 2008, and **Act 813, effective July 7, 2008**, both deal with enforcement of the code. One of the complaints by rural parishes has been that the code is costly and burdensome for their small offices. To help overcome this obstacle, **Act 813** allows the State Fire Marshal's Office to act as a third-party provider for residential code reviews. Similarly, **Act 343** provides for a fee structure between governmental entities and 3rd party code enforcement providers.

Two bills were passed regarding the purchase of state vehicles. **Act 542, effective June 30, 2008** requires that all vehicles purchased by the state must be capable of and equipped to run on an alternative fuel (compressed natural gas, liquefied petroleum gas, ethanol, reformulated gasoline, electricity), including but not limited to hybrid vehicles. However, the law contains several exceptions. First, the purchase or lease of such vehicles must be able to recoup actual costs through reduced operating costs within 48 months of the purchase or lease. The commissioner of administration may also waive the requirements if the department provides evidence that the vehicle will be operating in an area without a refueling station for alternative fuels. Overall, the bill has limited effect, as nearly any new automobile is capable of running on reformulated gasoline.

Act 592, effective July 1, 2008, requires that state purchased vehicles have a fuel efficiency rating of no less than 18 miles per gallon for city driving and no less than 28 miles per gallon for highway driving, or a combined fuel efficiency of 24 miles per gallon. The law pertains only to alternative fuel vehicles, sedans, and station wagons. Exceptions to this law include vehicles to be used by law enforcement personnel, certified first responders, and emergency personnel when required for the performance of their duties, or a vehicle used for military activities. Also, exceptions can be made with written authorization from the department head to the commissioner of administration and approved by the commissioner or for vehicles purchased on state contract by political subdivisions when approved by the governing authority.

Act 543, effective June 30, 2008, changes the definition of a net metering facility, increasing the maximum generating capacity allowed for commercial or agricultural use from 100 kilowatts to 300 kilowatts. This increase could lead to increased renewable energy capacity by allowing companies with larger demands to address their needs within the scope of net metering.
The act also adds the provision that nothing in the chapter shall hinder the public service commission's ability to regulate, as applicable, all common carriers and utilities.

Act 881, effective July 9, 2008, requires that that any performance-based energy contract entered into must be equal to the lesser of twenty years or the average life of the equipment installed. Also, the contract shall contain a guarantee of energy savings, including total units of energy saved, the method, device or financial arrangement to establish the savings, and, if applicable, the basis for any adjustment in the state's cost. Each energy saving measure shall be provided with a detailed scope of work, price to be paid, annual energy cost savings, annual maintenance savings, total annual savings, and a schedule for savings audit reports. The law also requires that a third party evaluation review and evaluate all proposals.

Act 382, effective June 21, 2008, establishes "The Advanced Biofuel Industry Development Initiative." The law requires that a feedstock other than corn be used. The feedstock must be derived solely from Louisiana harvested crops which are capable of an annual yield of at least 600 gallons of ethanol per acre and capable of being grown in marginal soils. The feedstock must also require less than one half of the water, one third of the nitrogen, and one half of the energy to create ethanol required by corn. The requirements of the bill should improve the environmental and economic impacts of ethanol production, but the rigid requirements will tend to favor a handful of feedstock crops.

House Study Request Number 8, approved on June 3, 2008, requests the House Committee on Appropriations to study the effect of requiring minimal energy efficiency standards, such as Leadership in Energy and Environmental Design's Silver Standard, in the construction of state buildings. Also, **Senate Concurrent Resolution Number 85, filed June 23, 2008**, requests the Louisiana Department of Agriculture and Forestry to develop a strategy to implement an incentive program for the production of renewable fuels.

More detailed information about the Acts of the 2008 Regular Legislative Session can be found on the internet at URL: http://www.legis.state.la.us/archive/08rs/08rs.htm.

ENERGY STAR IN LOUISIANA

By
James Davidson

The ENERGY STAR (http://www.energystar.gov/) designation means saving you money by reducing the amount of electricity consumed and thus reducing the pollution produced. What should ENERGY STAR mean to you? It depends on who you are.

If you are a home owner, investing in ENERGY STAR labeled products means that you get the same performance (or better performance) while using less energy. You will save money over the life of the products. ENERGY STAR appliances are at least 10%, and often over 50%, more efficient than the same sized non ENERGY STAR model. One of the best investments being made in multi-family housing facilities around the country is replacing old refrigerators with ENERGY STAR labeled models. Utility costs are significantly reduced by doing so, particularly if the existing refrigerator is over ten years old.

If you are a home buyer, investing in the ENERGY STAR label means buying a home that is energy efficient. These homes use less energy and generate less pollution, so you save on your utility bill and help the environment. You may decide to have an ENERGY STAR Partner Builder build an ENERGY STAR-labeled home for you, or you might buy an ENERGY STAR modular home to place on your lot. ENERGY STAR homes meet the International Residential Code (IRC) with its energy conservation feature requirements and then exceed the code by improving on the tightness of the building envelope, the air conditioning duct work, the efficiency of the heating ventilating and air conditioning system, the internal air quality and the lighting fixture efficiency. An ENERGY STAR qualified home is 15% more efficient than a similar home built to only meet the 2004 IRC. To find an ENERGY STAR Partner Builder in Louisiana, visit the ENERGY STAR website.

Typical features to look for in ENERGY STAR qualified homes include:

- **An Efficient Home Envelope**, with effective levels of wall, floor, and attic insulation properly installed, comprehensive air barrier details, and high-performance windows;
- **Efficient Air Distribution**, where ducts are installed with minimum air leakage and effectively insulated;
- **Efficient Equipment** for heating, cooling, and water heating;
- **Efficient Lighting**, including fixtures that earn the ENERGY STAR; and
- **Efficient Appliances,** including ENERGY STAR qualified dishwashers, refrigerators, and clothes washers.

SOURCE: WWW.ENERGYSTAR.GOV

Commercial buildings and industrial plants can be awarded the ENERGY STAR designation. ENERGY STAR buildings have been found to be excellent energy performers. Currently there are 3 hospitals, 2 hotels, 13 private offices, and 10 government offices in Louisiana. The ExxonMobil refinery in Baton

Rouge was declared an ENERGY STAR industrial facility in 2007. ConocoPhillips's refinery in Westlake won an award in 2006 and Marathon's refinery in Garyville has been designated in each of the last three years. These plants were awarded an ENERGY STAR for pursuing energy efficiency in the operations. Formosa Plastics Corporation–Louisiana in Baton Rouge and SUCRON, Inc. in Clinton are ENERGY STAR Partners which means they are implementing ENERGY STAR guidelines in their plants.

ENERGY STAR for congregations (found on www.energystar.gov) is targeted to help faith based organizations improve the energy efficiency of houses of worship. The aim is to educate and assist congregations identify building equipment and systems that can be upgraded to save them money.

ENERGY STAR is the national mark that means you are saving energy, saving money and helping the environment. Assuming that energy costs will continue to rise, every dollar spent on ENERGY STAR improvements will return a dividend from the first day that the improvements are made through a reduced utility bill.[1]

October is Energy Awareness Month 2008: Working to Secure A Clean Energy Future Where Energy is Abundant, Reliable, and Affordable

Taking concerted action to achieve a ***clean energy future*** is not only a long-term goal, it results in a number of immediate benefits: it enhances economic vitality, increases energy security, and improves environmental quality. Federal agencies are taking concerted action by implementing bold, innovative energy initiatives that will make our buildings more efficient, our fleets less dependent on foreign sources of fuel, and our energy managers better stewards of our nation's resources.
The Federal government is demonstrating that the United States is a global leader in deploying cleaner, more efficient technologies to save money and resources. Improving operations and maintenance practices, reducing energy intensity, and installing renewable energy technologies takes a unified long-term commitment. The Federal government is ready to ***lead by example***.

SOURCE: U.S. DOE http://www1.eere.energy.gov/femp/pdfs/eam_theme2008.pdf accessed October 7, 2008

Nearly Two Million Americans Have Pledged To Change A Light (October 2008)

EPA celebrates the 4th annual ENERGY STAR Change a Light Day on October 1, by recognizing the more than 1.8 million Americans who have already pledged to change at least one light at home to an ENERGY STAR qualified light. Together these actions will save $220 million dollars in energy bills and prevent the release of 3 billion pounds of greenhouse gases. EPA is now challenging Americans to take the newly expanded ENERGY STAR Pledge to do more in the fight against climate change by taking additional actions that will save them energy at home and at work.

SOURCE: WWW.ENERGYSTAR.GOV

[1] Note that this assumes that you do not have a net increase in power usage. In other words, adding square footage would result in a net increase in power demand. The same would apply to the refrigerator; your electric bill will not decrease if you buy a bigger refrigerator or if you keep the old one in the garage to use for drinks.

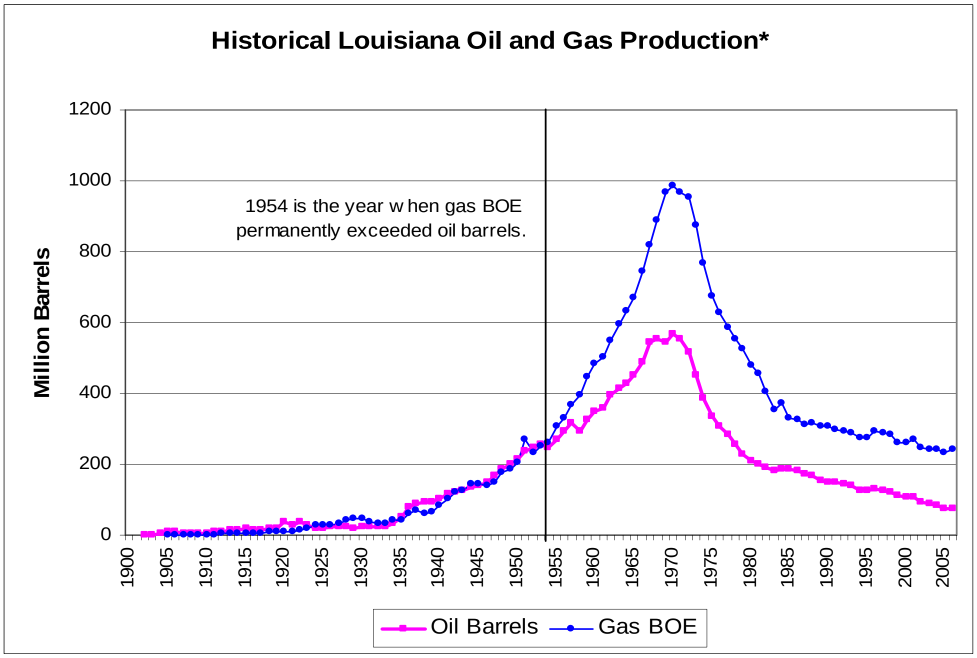
AN OVERVIEW OF THE OIL AND GAS PRODUCTION AND PRICES IN LOUISIANA

by
Manfred Dix & Manuel Lam

Production

In this short review, we revisit the evolution of the production of oil and gas in Louisiana and the development of their prices. Oil and gas production is intimately linked to the economy of our state. Presently, Louisiana is the fourth ranked producer of crude oil and fifth ranked producer of natural gas in the US[1]. More than 210,000 wells have been drilled searching for oil and gas in Louisiana, since the first commercial oil well was drilled in 1901 at Jennings. The Louisiana OCS oil and gas production is greater than any other federally regulated offshore areas in the US.

Figure 1



Louisiana's reservoir of crude oil was known to its native Indians for centuries before commercial oil was produced, and natural gas bubbles were reported rising to the surface at Bayou Bouillon in St. Martin Parish as early as 1833. Commercial oil was first discovered in Louisiana near the town of Jennings, in Jefferson Davis Parish, in the year 1901. As the story goes, a landowner, Jules Clement, had noticed bubbles rising from a spot on a rice field. Word spread about this discovery, and soon enough, one of the first developers of the Spindletop oil wells (in Texas), Scott Heywood, was brought in for exploration. After dramatic and unsuccessful attempts that almost made the project not worth the while, oil was found on September 21, 1901. From this date onward, our state would no longer be the same; the oil and gas industry became absolutely central to the state's economic and social development. Natural gas also started to be produced in commercial quantities. In the first few years, crude oil

[1] This is, *not including* the federal Outer Continental Shelf (OCS) productions in the ranking.

dominated production. There was no widespread use of natural gas; gas pipelines had not been installed, and homes were not "wired" for this form of energy. And, of course, natural gas was very difficult to store. However, as time passed and technology of transporting and storing natural gas improved, the production of this fossil fuel became more important. And, in fact, as Figure 1 above shows, production of natural gas nowadays is more important than the production of crude oil. The diagram shows annual production of crude oil and natural gas, measured in comparable units (barrels of oil equivalent), since 1905, which is the first year for which we have reliable data on the production of both fuels.

In the beginning, oil production exceeded gas production by a big multiple. Around the mid-1910s, natural gas began to catch up, and between 1920 and the mid-1930s, natural gas production was higher in terms of barrels of oil equivalents. By the mid-1930s, the war effort probably caused an increased production of crude, which finished when World War II was over by 1945. A period of more or less equal production followed; but since 1954, natural gas production definitely dominates. Furthermore, the trend seems to be, at least judging from the last fifty years or so and the recent discovery of the Haynesville formation, that such domination is not reversible.

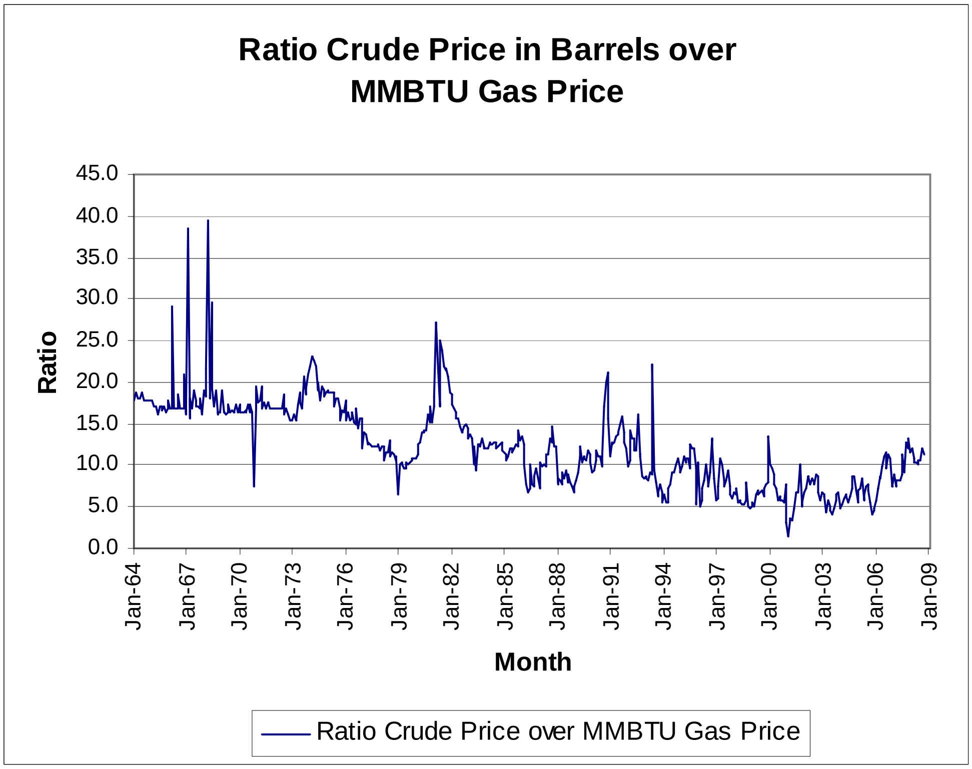
The Haynesville formation is a layer of sedimentary rock more than 10,000 feet below the ground in the area of northwestern Louisiana, southwestern Arkansas and eastern Texas, with some of the formation stretching well across the northern central portion of Louisiana. Several energy companies have begun work in the area to explore the shale formation and drill for natural gas based on findings indicating a potentially large supply of gas trapped within some portions of the shale. This type of formation was once considered too costly to explore, but rising energy costs and newer, less expensive technology and processes have changed that.

Some other interesting benchmarks in the Louisiana oil and gas production history are that, in 1910, the first freestanding above-water platform was used in Caddo Lake, near Shreveport; in 1938, the first well over water was completed in the Gulf of Mexico near Creole, offshore Cameron Parish; in 1947, the first oil well was completed out of the sight of land in Ship Shoal Block 32, south of Morgan City, offshore St. Mary Parish; and in 1951, the first concrete-coated pipeline was laid in the Gulf of Mexico.

Prices

Prices are not privy to Louisiana, since crude oil and natural gas are traded, basically, in the world market. There are differences in the types of crude and, to a lesser extent, natural gas sold, but the different types usually move in tandem. What can we say about the relationship between the price of crude oil and the price of natural gas? A few rules of thumb have been proposed over time regarding such relationships. One of the most common is the so-called "6-to-1" rule, where the price of one barrel of crude oil should be (approximately) six times the price of natural gas per million BTUs (MMBTUs). The reason is that the BTU content of a barrel of oil amounts to, roughly speaking, six times the quantity of a million BTUs of natural gas. Does such a relationship hold up? In Figure 2 below, we use the longest series for which DNR-Technology Assessment has monthly data (from January 1964 onward to September 2008), which is the royalty price paid for Louisiana crude oil and the royalty price of Louisiana natural gas. The diagram plots the ratio of the average monthly price of a barrel of crude oil divided by the average monthly price of a million BTUs of natural gas.

Figure 2

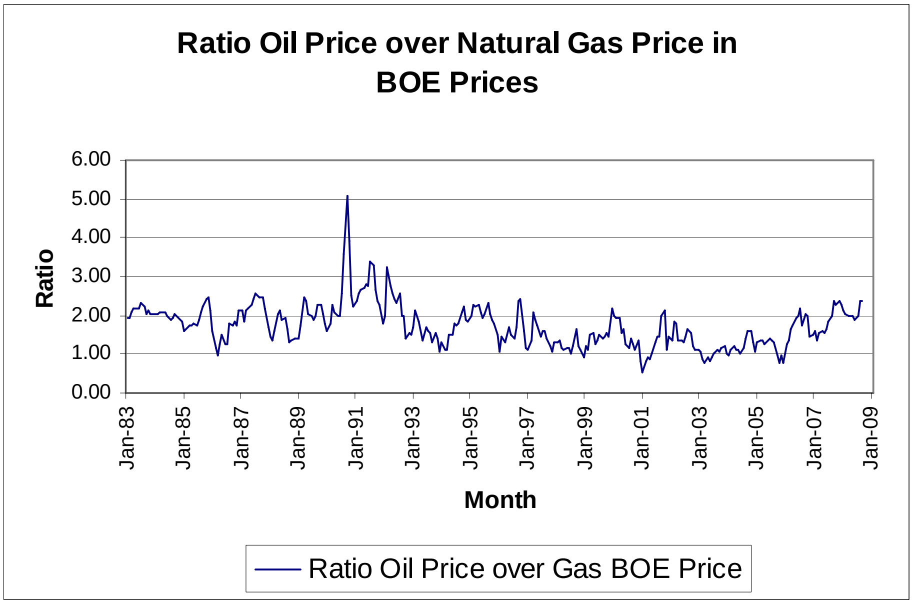


From the beginning of the series until around January 1994, the ratio does not seem to be anywhere near 6. Between January 1994 and January 2006 (with several exceptions), it seems to fluctuate within the band of 5 and 10. But, after January 2006, the ratio seems to increase and move beyond 10.

One problem with this ratio is that it uses different units for both energy sources. To make a useful comparison, the price must be stated in the same measurement of energy. Only then, can we draw conclusions on whether one fuel is “more expensive” than the other, and by what kind of magnitude. Figure 3 below plots such a diagram, which looks very similar to the previous one, but now we have both fuels in the same unit of measurement.

In Figure 3 below, a ratio of 1 means that crude oil and natural gas were priced equally. A ratio higher than 1 indicates that for the same amount of fuel content, crude oil was relatively more expensive, and a ratio less than 1, natural gas was more expensive. The diagram shows that by and large the ratio stayed above 1 during the period considered, except for brief periods after the turn of the millennium.

Figure 3



With these price series, we can ask some interesting questions. For starters, we would like to find out if the prices for crude oil and natural gas conserve the same statistical features over time; in other words, do the price series for crude oil and natural gas preserve (more or less) the same average, the same variability over time, or do such properties diverge as time passes by? Economic science gives us statistical tests that we can perform to study such issues. Preliminary investigations carried out with our data at hand suggest that we should reject the fact that the properties of prices series of crude oil and natural gas remain constant. This is important, because this means that, when utilizing the series for further study, we need to be very careful with its usage. For example, one well known technique in economics to make a price series "useable" is to take the first difference of the prices; such series very often gives us a "constant property" series as time goes by.

Another question that economists like to ask is the following: is there a "long-run relationship" between the price of crude oil and the price of natural gas? As both crude oil and natural gas are important sources of energy for the United States and the rest of the world, one might think that their prices could have a long-term association. In economic techno-speak, we say that, if such a far-reaching relationship does exist, then the two price series are "co-integrated." Economic science, again, gives us some statistical tests to examine such long-term relationships; some first round checks performed by the Technology Assessment Division indicate that such long-term associations may not exist. In other words, the price of crude oil and the price of natural gas do not seem to "move together" in an economically meaningful way over the long-run (evidence of this can be seen already in the figures above). The prices, and their ratio, seem to be determined by other factors that need further study.

ENERGY EFFICIENT ROOFING

by

Jerry Heinberg, AIA, Architect

The Florida Solar Energy Center performed a real world study of the heat gains in houses with different roofing materials. The experiment monitored indoor cooling energy usage for seven side-by-side virtually identical houses except for roofing material in Ft. Myers during the summer of 2000. The homes were operated identically unoccupied and occupied to ensure study accuracy. Thermostats were set at a constant 77º F.

The dark gray roofs reflect a mere eight percent of the heat associated with sunlight, while white shingle and terra cotta tile roofs reflect 25 and 34 percent, respectively. The study showed that white S-tile produced the lowest attic heat gain, but the home with the white metal roof posted the lowest overall cooling cost. Compared to a dark gray shingle roof, the study reported, "a white, galvanized metal roof should save a customer who lives in an average-size 1,770 square foot home approximately $128 or 23 percent annually in cooling costs."
Tables 1 and 2 below show the results of the different roofing types tested.

Table 1. COOLING PERFORMANCE DURING UNOCCUPIED PERIOD JULY, 2000

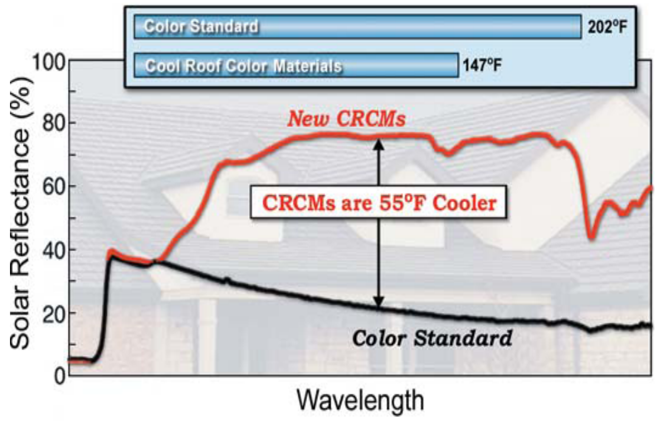
Site	Total kWh	Savings kWh	Save Percent	Demand kW	Savings kW	Saved Percent
Standard dark shingles (control)	17.03	0.00	0.0%	1.63	0.00	----
Above with sealed attic, R19 roof deck insulation	14.73	2.30	13.5%	1.63	0.01	0.30%
Terra cotta S-tile roof	16.02	1.01	5.9%	1.57	0.06	3.70%
White shingles	15.29	1.74	10.2%	1.44	0.19	11.80%
White "Barrel" S-tile roof	13.32	3.71	21.8%	1.07	0.56	34.20%
White flat tile roof	13.20	3.83	22.5%	1.02	0.61	37.50%
White metal roof	12.03	5.00	29.4%	0.98	0.65	39.70%

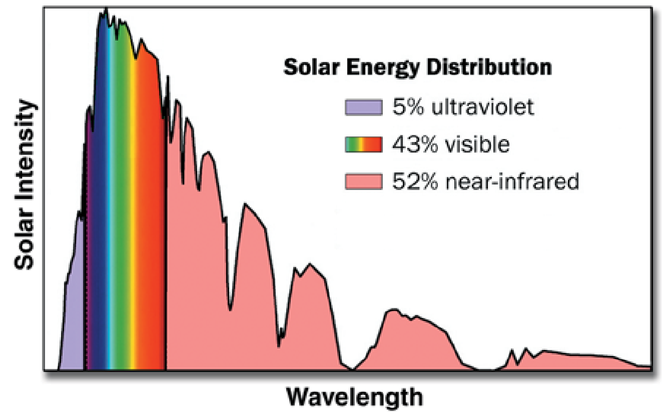
Table 2. NORMALIZED SAVINGS & DEMAND REDUCTIONS ESTIMATES

Case Description	Cooling Savings		Peak Demand Reduction	
	kWh	Percent	kW	Percent
Standard dark shingle (control)	0	0%	0	0%
Above with sealed attic, R19 roof deck insulation	620	9%	0.13	5%
Terra cotta S-tile roof	180	3%	0.36	13%
White shingles	300	4%	0.48	17%
White "Barrel" S-tile roof	1,380	20%	0.92	32%
White flat tile roof	1,200	17%	0.98	34%
White metal roof	1,610	23%	0.79	28%

Source: Parker, D.S., J.K. Sonne, J.R. Sherwin, and N. Moyer, November 2000. "Comparative Evaluation of the Impact of Roofing Systems on Residential Cooling Energy Demand." Contract Report FSEC-CR-1220-00, Florida Solar Energy Center, Cocoa, FL.

COOL ROOF COLOR PIGMENTS: Cool roof color materials (CRCMs) made of complex inorganic color pigments reduce the energy needed to cool buildings, and reduce hot-weather strain on electrical grids by reducing summer peak loads. These CRCMs compare favorably to the "white metal" in the tables above.





The style of the structure will dictate roof type sometimes. Other factors are the slope of the roof deck, the annual rainfall, the high/low seasonal temperatures, the cost, or the presence of trees nearby.

MATERIALS: Climate and techniques of installation are two factors which will lead to success or failure of roofing choices. Shingles which may often fail in our climate have been identified the hard way. For example, split-cedar wood "shakes" which look great and may work well in Oklahoma or New England fail prematurely in Louisiana. The materials discussed below are suitable for Louisiana.

ROOF SLOPES: Manufacturers usually specifies a minimum slope for which they will warrant their product. For asphalt composition shingles that minimum slope is usually 3:12. Some will only warrant this low slope if two layers of asphalt saturated felt (so called "tar paper") are used as underlayment. It is a good idea in Louisiana to get the water off the roof quickly. Increased slope of the roof minimizes the chance of wind being able to blow water under shingles or flashing. For slopes 3:12 or less consider one of the types of metal roofs such as standing seam, or lock seam. When the slope is even less like 1/2:12 or 1/4:12 a membrane type roof is a better choice. Membrane roofs, often referred to as a "low slope roof," are available in a number of different materials (see below).

COMPOSITION SHINGLES: (also called asphalt shingles) are either organic-based or fiberglass-based. Fiberglass shingles are more flexible and durable than organic. Fiberglass composition shingles are made of tiny glass fibers of varying lengths and then covered with a layer of asphalt and weather-resistant mineral granules. At present Energy Star certifies only two shingle roofs, both white, but other colors are becoming available with highly reflective exposed surfaces.

Laminated Shingles

Strip Shingles - Are made to be three times as long as they are wide. These are distinguished by the number of tabs they have. The most common type of strip shingle is the "three-tab" shingle. Different textural and lighting/shadowing effects can be achieved with strip shingles depending on the number, shape and alignment of the cutouts. There are Energy Star certified shingles available.

Laminated Shingles - These special shingles are made with two layers of tabs to create extra thickness. They are also referred to as architectural shingles because they create visual depth on a roof and impart a custom look. Laminated shingles are a favorite among builders, roofing contractors and homebuyers.

Interlocking Shingles - as the name suggests, interlocking asphalt shingles are individual shingles that mechanically fasten to each other, and are used to provide greater wind resistance. They come in various shapes and sizes providing a wide range of design possibilities.

SLATE TILE SHINGLES: - Traditionally, slate roofing tiles were hand cut and sized, but now manufacturers pre-cut the slate roofing tile to assure exact measurements. Nail holes are also pre-drilled and countersunk to speed construction. The countersunk holes allow the roof tile to lie flat for longest possible lifetime. Because of the weight of slate roofing material; the manufacturers require an architect's certification of adequate roof structural strength before installing them.

CONCRETE TILE SHINGLES: -
Concrete tiles are very wind resistant, long lasting, energy efficient and fire resistant. They can be cast and dyed to look like slate or clay tile. Their weight <u>does</u> require a stronger structure and roof deck.

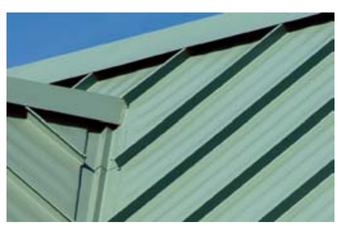
Concrete "S" Tile

Concrete Flat "slate" Tile

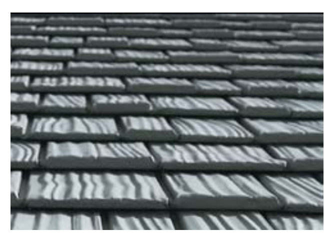
METAL ROOFING: EPA's Energy Star certifies many metal roofing products.

- Energy Star rated, coated metal roofs have a high reflectance and a high emissivity. The former helps reflect infrared energy back to the sky before it can penetrate the structure, and the latter helps rapidly cool the metal by releasing absorbed energy to the night sky.
- Metal roofing is long lasting: 30 years or more with minimal maintenance.
- Metal roofing is environmentally friendly and is 100% Recyclable.
- A lightweight metal roof can be installed over an existing roof saving removal and landfill costs.
- Metal roofing readily adapts to photovoltaic installations.
- Several methods of insulating are available, to any R factor.
- Forms can vary from shingles, corrugated sheets, or a variety of standing seams.
- Materials are copper (expensive), aluminum: coated or uncoated, galvanized (zinc coated) steel, aluminized steel and galvalume (55% zinc-45% aluminum alloy coated steel).
- The better coatings have a twenty to fifty year warranty. Kynar 500 and Hylar 5000 are trade names for two of these fluropolymer coatings.

Copper Shingles



Standing Seam Metal



Metal Shakes

LOW SLOPE ROOFS: For this type of roof, a membrane system is applicable. For low slope roofs (so called "flat roofs") the roofing manufacturer will not usually warrant the roof membrane unless the roof deck has a minimum slope of ¼" per foot of run to minimize ponding of water which may cause deterioration. From an energy conservation standpoint, the membrane is almost always applied over insulation which may be flat on a sloped roof deck, or may be tapered to provide the required slope on a flat roof deck. Continuous insulation over the roof deck is far more effective than if the insulation were placed in the cavities between the roof joists below the roof deck.

Membrane roofs fall into the following categories: Built-up roofs (BUR) are multi-ply roofs which may have a base sheet and a cap sheet. The membrane layers are asphalt hot mopped over organic or fiberglass felt. The edges overlap and multiple layers are installed. One of the best membrane roofs was the coal tar pitch built-up roof. It was self-healing in hot weather. These roofs often lasted for 50 plus years without problems or failures. Installation was very labor intensive. The final blow to this type of roof was that the coal tar pitch was determined to be a carcinogen. Thus, these gravel topped roofs have largely been replaced by the "single" ply roofs. Each has different properties which make it appropriate for a particular application.

MODIFIED BITUMEN ROOFING: APP (Atactic Polypropylene): Coal tar pitch roofs became inflexible in very cold weather, and tended to crack. The modified bitumen roofs today are chemically formulated to eliminate this to a large degree. There are several varieties of an APP modified bitumen sheet, which incorporate the features of a tough, non-woven, polyester mat saturated and coated with a blend of **APP** polymer, a by-product from the manufacture of polypropylene, and high quality asphalt. Low Temperature Flexibility is maintained to 14°F (-10°C). A white acrylic coating can give a roof reflectance of 0.83 and an emissivity of 0.94. applied over modified bituminous and built-up roofs.

SBS (Styrene-Butadiene-Styrene) MODIFIED BITUMEN ROOFING: More resilient is another type of modified bitumen sheet incorporating the features of a strong fiber glass mat with a blend of **SBS** rubber, high-quality asphalt and fire-retardant additives. The elastomeric asphalt blend has full recovery properties after 100% elongation and provides elasticity and flexibility to the sheet. Low Temperature Flexibility is maintained to -10°F (-23°C).

EPDM (**Ethylene Propylene Diene Monomer**) **RUBBER**: A flexible, black roofing membrane available in .045; .060 and .090 inch thickness. It has superior flexibility and strength, EPDM can easily contour to unusual roof shapes. A white coated EPDM has been installed on RV's since 1983. Advantages are low maintenance, ease of repair, clean appearance, noise reduction, and thermal insulation. Now the energy efficiency of white on black EPDM is available for all sorts of roofs. It is sold in sheets up to 50' wide and 100' long. It can be seamed for wider applications. It is typically held down by mechanical fasteners or ballasted with gravel.

Hypalon® (**chlorosulfonated polyethylene):** Made in Louisiana by duPont this material has demonstrated long life in harsh environments since 1957. It is thermoplastic enabling welding by hot air or solvents. Once installed the Hypalon® polymer slowly cures in place to reach its final mechanical properties.

TPO (Thermoplastic polyolefin) is a generic group of chemicals. White and some colored TPO roofing membrane meets Energy Star Roof Requirements.

PVC (polyvinylchloride): This material is often bright white and is highly reflective making it very energy efficient roofing choice. It is most often adhered to the roof deck or insulation or mechanically fastened. Joints are glued at the head and side lap. The material can be heat welded.

Table 3. Cool Roof Rating Council Top Rated Membrane Products Typical Properties

(CRRC)	REFLECTANCE		EMISSIVITY	
Material	Initial	Weathered	Initial	Weathered
PVC	0.87	0.61	0.95	0.86
Hypalon	0.85	0.69	0.87	0.82
Modified Bitumen	0.79	0.68	0.87	0.75
TPO	0.79	0.70	0.90	0.86
EPDM	0.76	0.64	0.90	0.87

Source: http://www.coolroofs.org/products/search.php accessed 5 Nov. 2008

Green or Landscaped Roofs: These are beyond the scope of this article. EPA's Heat Island Research group has resources for this topic. Go to http://www.epa.gov/hiri/strategies/greenroofs.html

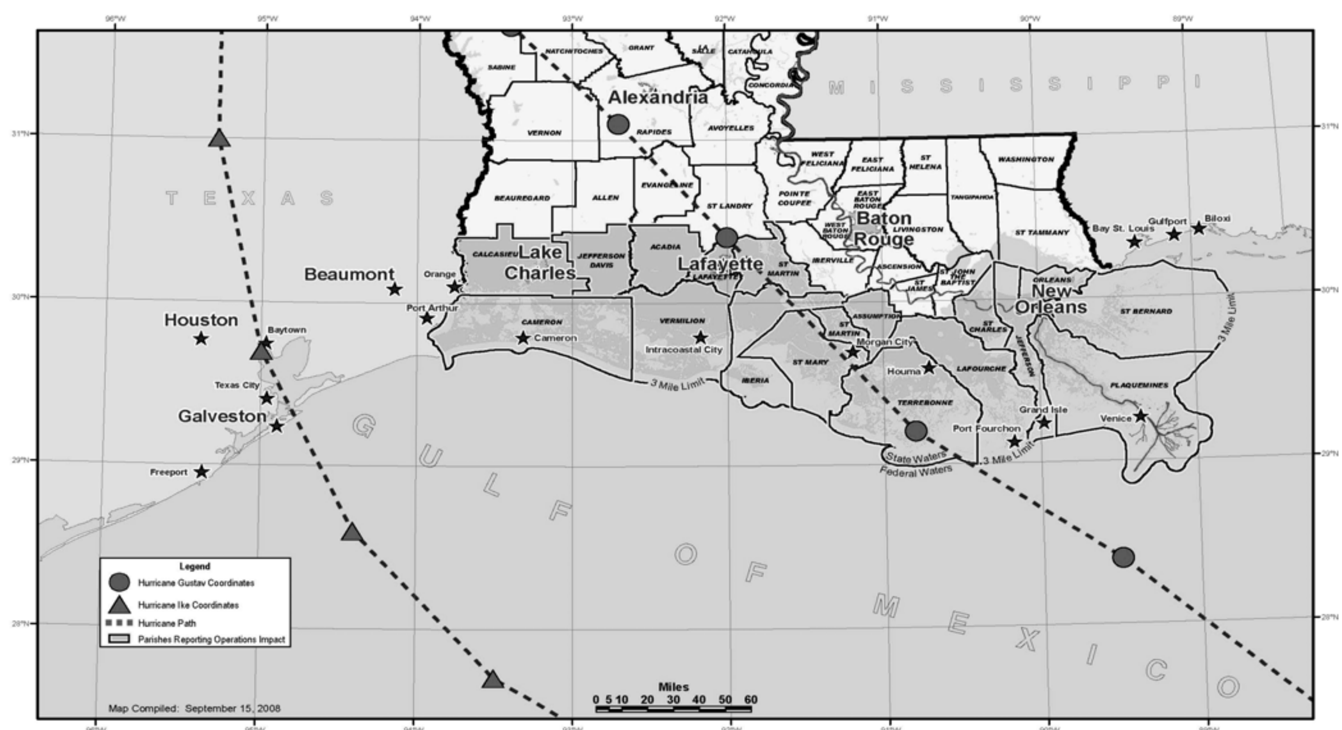
IMPACTS OF 2008 HURRICANE SEASON ON LOUISIANA'S ENERGY INDUSTRY

by
Bryan Crouch, Engineer
Manuel Lam, Senior Analyst
Patty Nussbaum, Engineer

The 2008 Atlantic hurricane season was not as active as the 2005 season, the season that spawned Hurricanes Katrina and Rita. There were 16 named storms in 2008, compared to the record high 27 in 2005, and there were 8 hurricanes, a little more than half of the record high 14 hurricanes, also set in 2005. There was not a category five hurricane in 2008, but three reached category four status. The two most intense hurricanes in the Gulf during the 2008 season were Gustav and Ike, but fortunately they weakened to category three and high category two, respectively, before landfall. Gustav made landfall near Cocodrie, and marched northwest through the state causing major damage to the south central and eastern areas of the state. Ike passed parallel to the Louisiana coast, eventually turning north and making landfall near Baytown, TX, and caused major damage to the cities and coastal oil and gas production facilities in Southwest Louisiana and Southeast Texas. See Figure 1.

Before Hurricane Gustav, there were two others storms that threatened the Gulf of Mexico. Hurricane Dolly hit the southern Texas coast on July 23, and was the first hurricane of the 2008 season to make landfall in the U.S. Hurricane Dolly caused no deaths in Texas, though three were injured, and it caused an estimated $1.2 billion dollars in damage, but no significant damage to energy infrastructure in the Gulf of Mexico. On August 3, Tropical Storm Edouard formed in the Gulf of Mexico, becoming the second storm to threaten oil and gas operations in the area. Edouard skirted the Louisiana coast on its way to Texas, raising tides and pushing water up bayous and into yards. Residents of low-lying areas south of the Intracoastal Waterway in Cameron were ordered to evacuate on Monday, August 4, but were able to return on the following day. It forced many companies to shut down their operations in the Gulf of Mexico, and inbound shipping activities in the area were curtailed. Fortunately, the shutdowns were short-lived. Edouard did not cause any significant damage to oil and gas structures or the shipping industry.

Figure 1. Paths of Hurricanes Gustav and Ike.



Hurricane Gustav was the second major hurricane of the 2008 Atlantic hurricane season. Gustav caused $18 billion damage in Haiti, the Dominican Republic, Jamaica, the Cayman Islands, Cuba, and the United States. It formed on the morning of August 25, 2008 southeast of Port-au-Prince, Haiti, and rapidly strengthened into a hurricane early on August 26. On that same day it made landfall at Jacmel, Haiti. Later, it inundated the Dominican Republic, Jamaica, the Cayman Island and ravaged Western Cuba, and then steadily moved across the Gulf of Mexico. On September 1, the center of Gustav made landfall in Louisiana coast near Cocodrie as a strong Category Two hurricane and was downgraded to category one status four hours later, and then to a tropical depression the following day. Gustav continued moving northwest through Louisiana, before slowing down significantly as it moved through Arkansas on September 3. Gustav was not the strongest or costliest hurricane to ever strike Louisiana, but it was the one of the most destructive and disruptive to the citizens of Louisiana. Gustav affected all major cities in Louisiana with the exception of Lake Charles. The damage to oil and gas infrastructure is listed below in combination with the damage caused by Hurricane Ike due the short time period between the two storms.

Hurricane Ike was the third most destructive hurricane to ever make landfall in the United States. It was the third major hurricane of the 2008 Atlantic hurricane. Ike became a tropical storm west of the Cape Verde islands as hurricane Gustav was making landfall in Louisiana. By September 5, Ike was a category four hurricane, with maximum sustained winds of 145 mph and a pressure of 935 mbar. That made it the most intense storm in the 2008 Atlantic hurricane season. At one point, the diameter of Ike's tropical storm and hurricane force winds were 600 and 240 miles, respectively, making Ike the largest Atlantic hurricane ever recorded. Ike weakened to a category two hurricane before making landfall in Baytown, Texas on September 13, 2008. Hurricane Ike has been blamed for 82 deaths, and a few people are still missing. Damages from Hurricane Ike in U.S. coastal areas are estimated at $27 billion, the third costliest U.S. hurricane of all time, behind Hurricane Andrew in 1992 and Hurricane Katrina in 2005.

Oil and Gas Production and Transportation in the Gulf of Mexico

Offshore Gulf of Mexico

The Gulf of Mexico is a major center for crude oil and gas production; it produces about 25 percent of the crude oil and 15 percent of the natural gas produced in the U.S. As of August 2008, there were more than 3,800 production platforms in the Gulf of Mexico; these structures range in size from single well caissons in water depths of ten feet, to large complex facilities in water depths of over 7,000 feet. When tropical storms enter or are formed in the Gulf of Mexico, mandatory evacuations and shutdowns occur causing a disruption of oil and gas production. When damage from storms occurs, disruptions can be substantial.

The U.S. Department of the Interior’s Minerals Management Service (MMS) Gulf of Mexico Regional Office reported Hurricanes Gustav and Ike damage to oil and gas operations in the Gulf of Mexico. It was estimated that approximately 1,450 oil and gas production platforms in the Gulf of Mexico were exposed to hurricane conditions from either Hurricane Gustav or Hurricane Ike.

As of November 26, 2008, sixty of the 3,800 offshore oil and gas production platforms have been confirmed as destroyed. The 60 destroyed production platforms produced a total of 13,657 barrels of oil per day or 1.05 percent of the oil produced daily in the Gulf of Mexico, and 96 million cubic feet of gas per day or 1.3 percent of the gas produced daily in the Gulf of Mexico. Currently, MMS has no information on whether any of the destroyed platforms will be rebuilt. Thirty-one platforms sustained extensive damage requiring three to six months to repair. Examples of damage that would be considered extensive could include underwater structural damage or major damage to pipelines carrying the oil or natural gas to shore. Ninety-three platforms sustained moderate damage requiring one to three months to repair. Damage that would be considered moderate may include major topside damage to critical process equipment such as the platform’s compressor, or damaged risers or flex joints where pipelines connect to the platforms. MMS has also confirmed a report of one jack-up drilling rig with extensive damage.

MMS reported on September 2, 2008, the day after Hurricane Gustav made landfall, that oil production was completely shut down and gas production was reduced by 7.06 billion cubic feet per day or 95.4 percent of daily Gulf of Mexico natural gas production. A total of 632 production platforms, or 88.2 percent of the Gulf's 717 manned platforms, were evacuated. Personnel from 110 drilling rigs, representing 90.9 percent of those operating in the region, were also evacuated.

When Hurricane Ike made landfall on September 13, MMS reported that nearly 7.3 billion cubic feet per day (nearly 100 percent) of the federal portion of the Gulf of Mexico's natural gas production was shut-in and oil production was completely shut down.

The latest report from MMS showed a total of 58 production platforms are still evacuated, equivalent to 8.4 percent of the 694 manned platforms in the Gulf of Mexico. There are no longer any evacuated drilling rigs in the Gulf. From the operator's reports, it is estimated that 16.3 percent of the oil production in the Gulf is still shut in, and 24.4 percent of the natural gas production in the Gulf is still shut in.

Onshore Louisiana

There is no report of major oil and gas structure damage resulting from Hurricanes Gustav or Ike onshore in Louisiana. The DNR Office of Conservation, in an attempt to assess the effects of Hurricane Gustav and Hurricane Ike on oil and gas production, contacted 126 operators with producing wells in a seventeen-parish region from the southern part of the state for information regarding the status of their production operations. The survey showed that 58 percent of the oil production and 50 percent of the gas production were shut in after Hurricanes Gustav and Ike passed. As of December 2, 2008, the survey indicated that 18 percent of the oil and 23 percent of the gas is still shut in. The surveys did not indicate the reason of the shut in.

The Louisiana Offshore Oil Port (LOOP)

LOOP stopped all operations on August 28 in order to give employees time to evacuate. The facility sustained no major damage and was out of commission for two weeks due to loss of power. Typically, about 1 million barrels per day goes through the LOOP.

Liquefied Natural Gas (LNG) Import Terminals

LNG facilities in the Gulf Coast region reported no major damage upon personnel returning to the facilities. Hurricanes Gustav and Ike had little impact on receipts of LNG shipments at the LNG terminal at Lake Charles, LA. The Sabine terminal and Gulf of Mexico offshore terminal were shut down due to evacuations, lack of supplies, an inability to move stored liquids, and safety precautions. Both facilities are once again operational.

Offshore Pipeline

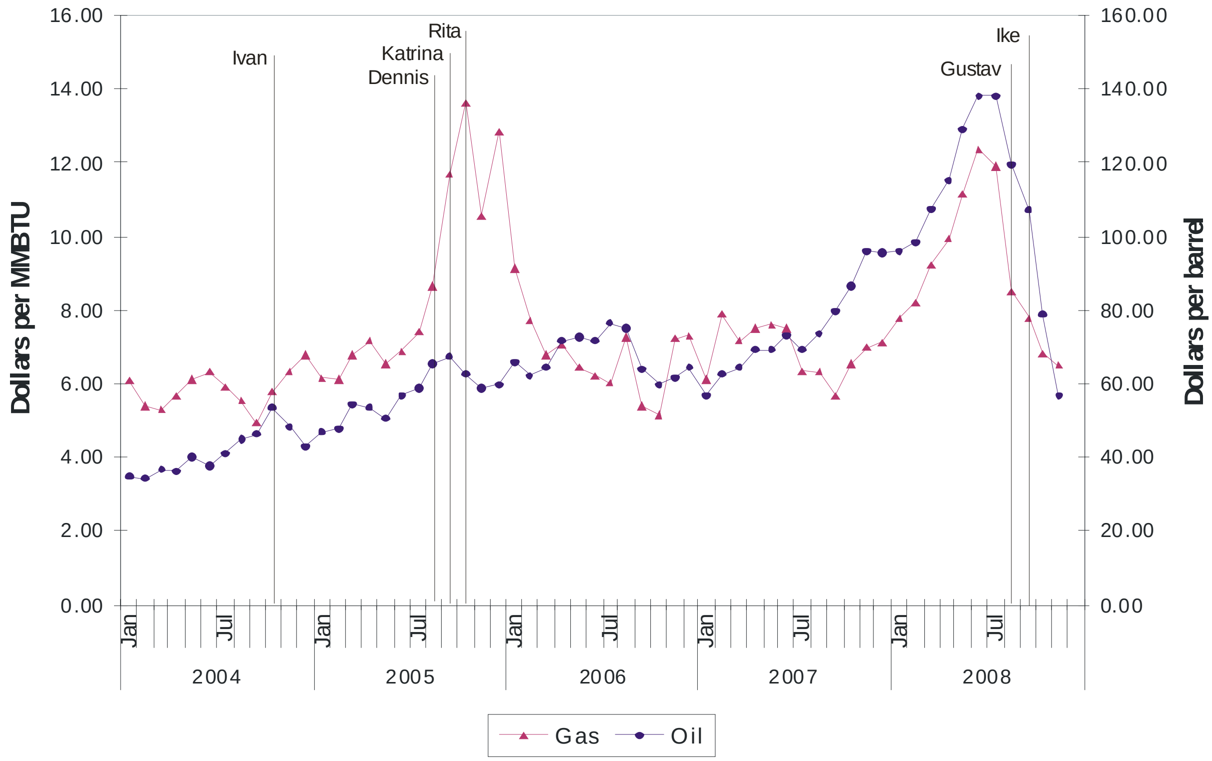
MMS has received reports of one oil pipeline system and eight gas transmission pipeline systems with damage. The analysis of the damages impact and time remaining until operations resume is continuing. Oil and gas operators and pipeline owners are testing and inspecting other pipeline systems to evaluate the full extent of any damage. Considering the large area that was impacted, it is expected to take a significant amount of time to complete the inspections. There have been no reports of oil spills in the Gulf of Mexico federal waters impacting the shoreline or affecting wildlife.

Louisiana Oil and Gas Prices

The dominance of oil and gas prices by the Gulf of Mexico stream is fading. Gas prices fell despite Hurricanes Gustav and Ike striking the region. See Figure 2 below. The Louisiana natural gas spot market price at Henry Hub was $8.20 per MMBTU on Friday before Hurricane Gustav hit and fell to $7.24 per MMBTU with 74.1 percent of the natural gas production in the Gulf was shut in. Two weeks later, Hurricane Ike crossed the Gulf before making landfall in Baytown, TX shutting down 98.5 percent of the gas production in the Gulf, but the gas price did not go higher than $8.20 per MMBTU. The gas production from the Gulf is over 7.0 billion cubic feet per day. Energy analysts are saying that Gulf production is not as important as it used to be due to an 11 percent (more than 6 billion cubic per day) increase in production from unconventional gas plays.

Oil prices had begun falling before, and continued to fall after, Hurricanes Gustav and Ike struck due to a decrease in demand brought on by the current financial crisis. Oil prices continued falling despite LOOP being out of commission for several weeks, Gulf oil production decreasing more than 40 percent for a month, and major refineries in south east Texas and south west Louisiana being shutdown (see the section on refineries for more information).

Figure 2. Louisiana Oil and Gas Spot Market Prices



Refineries

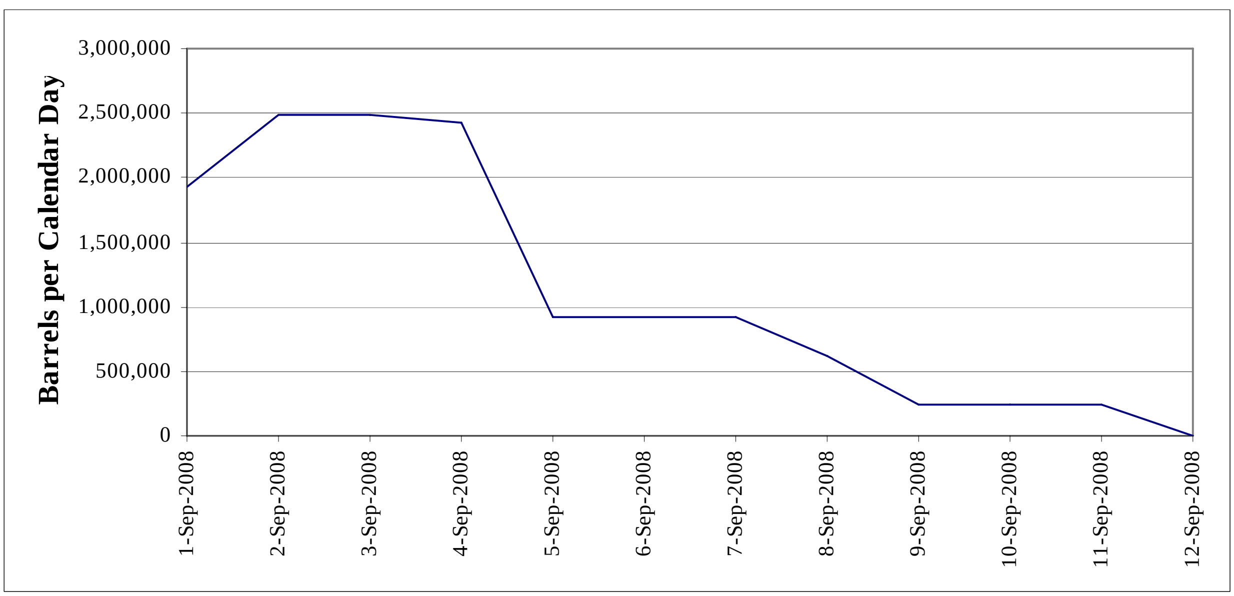
The only 2008 storm to impact Louisiana refineries was Hurricane Gustav which affected 14 of the 17 operating refineries in Louisiana. On September 1st, in anticipation of Gustav, 11 Louisiana refineries with a total capacity of 1.9 million bcd were shutdown. ExxonMobil in Baton Rouge, and Citgo in Lake Charles remained in operation, but with reduced runs. As Gustav moved through the area, ExxonMobil in Baton Rouge and Placid in Port Allen shutdown, bringing the total shutdown capacity to 2.5 million bcd, which is approximately 83 percent of the total Louisiana capacity. Citgo in Lake Charles continued reduced runs. Table 1 lists the Louisiana refineries that were affected by Gustav.

Table 1. Louisiana Refineries Affected by Hurricane Gustav

Refinery	Location	Capacity (bcd)
Calcasieu Refining	Lake Charles	78,000
Chalmette Refining	Chalmette	192,760
Citgo Petroleum	Lake Charles	429,500
ConocoPhillips	Belle Chasse	247,000
ConocoPhillips	Westlake	239,400
ExxonMobil	Baton Rouge	503,000
Marathon Petroleum	Garyville	256,000
Motiva Enterprises	Convent	235,000
Motiva Enterprises	Norco	236,400
Murphy Oil USA	Meraux	120,000
Placid Refining	Port Allen	56,000
Shell Chemical	Saint Rose	55,000
Valero Refining	Krotz Springs	80,000
Valero Refining	Norco	185,000

Gustav caused only minor damage to area refineries, so outages did not last long. By September 13th, most refineries were back to normal operation with a few operating with reduced runs or in start-up procedures. See Figure 3 for a timeline of shutdown refinery capacity.

Figure 3. Louisiana Refinery Capacity Shut Down Due To Hurricane Gustav



Electricity Generation and Transmission

On Labor Day Hurricane Gustav caused blackouts in Louisiana. The 2003 blackout in the northeast focused attention on the national importance of the transmission grid. The 2008 hurricanes focused similar attention on the importance of the transmission grid in Louisiana. The hurricane damaged the major transmission lines running between Baton Rouge and New Orleans. While Baton Rouge received most of the damage, the power was off in New Orleans as well. About 829,000 customers were without power immediately after Hurricane Gustav passed through the state. Damage, as reported on the Entergy website, included 241 transmission lines and 354 substations out of service. These outages were second only to the outages during Hurricane Katrina in 2005.

Hurricane Katrina was an unprecedented event for electricity in Louisiana. Katrina was a large storm which impacted many utilities and caused major damage to property. Both the generating plants and the transmission infrastructure were affected. In addition, the flooding that accompanied the storm further worsened conditions by impeding access needed for recovery and restoration and damaging equipment that was sitting in the water. Difficulty in getting fuel, as well as the logistics of feeding and housing restoration crews in areas that were evacuated, compounded the problems.

Baton Rouge took the brunt of Gustav. Seven days after the hurricane struck Louisiana, about 40 percent of Baton Rouge was still affected by widespread power blackouts. The transmission system sustained a great deal of damage as the hurricane's path paralleled the major transmission lines between Baton Rouge and New Orleans, taking out the power lines. Most of the poles and the steel transmission towers carrying aboveground wire, were pushed to the ground. The resulting power outages hindered the state's storm recovery efforts. Storm debris and downed trees made access difficult for repair crews.

Hurricane Ike passed Louisiana before making landfall at Galveston, TX on September 13, 2008, causing additional power outages in Louisiana. The damage was not near the level of Rita in 2005.

Governor Bobby Jindal wants to reduce our vulnerability to natural disasters or intentional acts. He would like to add redundancies or harden these relatively few critical transmission lines to avoid future blackouts. Senator Mary Landrieu is working on legislation to give the federal government a role in strengthening the transmission lines in Louisiana. The Federal Power Act requires the Department of Energy to complete a study of electric transmission congestion every three years. The preparation of the 2009 Congestion Study is now underway.

The Louisiana Public Service Commission is conducting a post-storm review to determine what caused the outages and what can be done to minimize the effects of future storms. A review is part of the process of determining which storm related costs are recoverable from the ratepayers. Because the power outages were widespread and prolonged the review will include an inquiry into how the system maintenance dollars were spent. Recommendations will be forthcoming on how to reduce the possibility of future outages, as well as, recommendations to reduce their scope and duration.

The reliability of the electricity is important. As far as practical, safeguards should be put in place. Ultimately the customers will be shouldering the burden of paying for the upgrades. The costs and benefits will need to be balanced.

CHANGES TO ENERGY CODES COULD AFFECT LOUISIANA

by
Billy Williamson, Engineer Intern

The International Codes Council began Final Action Hearings on proposed changes to the ICC codes September 17 in the Minneapolis Convention Center. Discussion of proposed changes to the energy efficiency requirements was scheduled for September 21. Lengthy discussions on several unrelated changes delayed the start until after 9:00 p.m. During the proceedings, a total of 37 energy code changes which might affect Louisiana were passed. These changes, along with brief summaries for each, are listed in the table on the following page. Separate proposals which made similar changes to the IECC and IRC are grouped together. Proposals beginning with "RE" affect the energy efficiency provisions of the IRC. Proposals beginning with "EC" either affect the IECC or both the IECC and the IRC energy conservation provisions. Of the proposals passed, a few made very significant changes affecting possible future codes in Louisiana.

During the proceedings, a total of 37 energy code changes which might affect Louisiana were passed. These changes, along with brief summaries for each, are listed in the table on the following page. Separate proposals which made similar changes to the IECC and IRC were grouped. Of the proposals which were passed, a few made very significant changes affecting possible future codes in Louisiana.

EC 22 part 2 and EC 26 make similar changes to the IRC and IECC. EC 22 part 2 updates the IRC, reducing the allowable solar heat gain coefficient (SHGC) in climate zones 1, 2, and 3 from 0.40 to 0.35. It also allows a SHGC of 0.40 to be used for impact-rated fenestration (windows and doors). EC 26 updates the IECC, reducing the allowable SHGC in the same climate zones from 0.40 to 0.30 and does not allow higher SHGC for impact-rated fenestration. These changes mark a significant difference between the two codes. Instead of the two codes being consistent, SHGC requirements of the IECC are more stringent than those of the IRC. This could lead to confusion in compliance and enforcement. EC 18, parts 1 and 2, reduce the allowable U-factors for fenestration to 0.65 and 0.50 for climate zones 2 and 3, respectively, and allows U-factors of 0.75 and 0.65 in those zones for impact-rated fenestration.

Several changes also affected the performance path of compliance. EC 91 removes the references to federal minimum appliance efficiencies from the performance path. Instead of comparing efficiencies to minimum levels, the IECC now references the IRC for proper sizing of mechanical equipment. Also dealing with the performance path, EC 92 reduces the amount of glazing area in the standard reference design from 18% to 15%, which was considered a more accurate estimate. EC 99 disallows the use of site energy and allows source energy for performance calculations. This eliminates problems associated with the use of mixed fuel sources in performance calculations.

The changes made to the IECC and IRC will be included in the 2009 versions of both codes. The Louisiana State Uniform Construction Code Council then has 2 years to review the updated codes. After this time, the state can either adopt the new codes or continue using the present statewide codes. If the new codes are adopted, they will represent significant increase in stringency of the statewide energy codes. They will also present new challenges to the officials tasked with enforcing the codes.

Energy Code Changes Affecting Louisiana

Proposal	Summary	CODE
RE 6	Moves equivalent U-factors and mass-wall R factors into tables	IRC
RE 8	Requires that all recessed luminaries be IC-rated	IRC
EC 84 pt 2	Requires that at least 50% of all luminaries must be high-efficacy; defines high-efficacy lamps	IRC
EC 15 pt 1	Requires that R-19 batts be labeled with full R-value and R-value if compressed into 5-1/2 inch cavity depth.	IECC
EC 15 pt 2		IRC
EC 18 pt 1	Reduces U-factor allowances to 0.65, 0.50, and 0.35 for zones 2, 3, and 4, respectively and allows impact rated fenestration u-factors of 0.75 and 0.65 in zones 2 and 3	IECC
EC 18 pt 2		IRC
EC 22 pt 2	Reduces SHGC from 0.40 to 0.35 in climate zones 1, 2, and 3. Allows SHGC of 0.40 for impact rated fenestration	IRC
EC 26	Reduces SHGC from 0.40 to 0.30 in climate zones 1, 2, and 3.	IECC
EC 36 pt 1	Adds basement wall insulation of R-5/13 for climate zone 3. Adds exception to the requirement for warm, humid climates	IECC
EC 36 pt 2		IRC
EC 37 pt 1	Limits the R-5 requirement for heated slab insulation to 2 ft or the depth of the footing, which ever is less.	IECC
EC 37 pt 2		IRC
EC 50 pt 1	Reduces requirement for continuous insulation to R-3 in climate zones 1 & 2 for steel-framed buildings.	IECC
EC 50 pt 2		IRC
EC 51 pt 1	Adds the option for 0 cavity insulation and R-10 continuous insulation in steel framed buildings where R-13 is required for wood frames.	IECC
EC 51 pt 2		IRC
EC 58 pt 1	Limits the opaque door exemption to one side-hinged, opaque door assembly up to 24 square feet.	IECC
EC 58 pt 2		IRC
EC 60 pt 1	Adds rim joist junctions to the list of sealing requirements	IECC
EC 60 pt 2		IRC
EC 64 pt 1	Adds air barrier and insulation inspection checklist and testing definition	IECC
EC 64 pt 2		IRC
EC 67	Requires a minimum R-6 duct insulation when using the performance path	IECC
EC 68 pt 1	Requires the installation of a programmable thermostat where primary heating is from a forced air furnace.	IECC
EC 68 pt 2		IRC
EC 71 pt 1	Requires that duct tightness be verified by testing at rough-in stage or during post-construction. Maximum leakage rates are specified.	IECC
EC 71 pt 2		IRC
EC 74 pt 1	Increases the minimum mechanical system piping insulation to R-3 from R-2.	IECC
EC 74 pt 2		IRC
EC 81 pt 2	Requires pool heaters to have readily accessible on-off switch and time switches. Also requires vapor-retarder pool covers for heated pools including solar heated	IRC
EC 82		IECC
EC 86	Modifies thermostat setpoints for performance calculations to 75/72 from 78/68	IECC
EC 91	Removes reference to federal minimum appliance efficiencies from the performance path. Makes the IECC reference the IRC for sizing.	IECC
EC 92	Reduces the glazing amount in the standard reference design to 15% from 18%	IECC
EC 99	Disallows the use of site energy and allows "source energy" for performance calculation.	IECC
EC 101	Permits code officials to require documentation of values used in software calculations for proposed design.	IECC

Louisiana Department of Natural Resources

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