

**THE ENERGY SECTOR: STILL A GIANT ECONOMIC
ENGINE FOR THE LOUISIANA ECONOMY---AN UPDATE**

by

**Loren C. Scott, Ph.D.
Loren C. Scott and Associates, Inc.
743 Woodview Court
Baton Rouge, Louisiana 70810
lorencscott@aol.com**

April 2014

For

**Mid-Continent Oil and Gas Association
730 North Boulevard
Baton Rouge, Louisiana 70802**

TABLE OF CONTENTS

	Page
I. Introduction: It's the Engine That Matters	1
Louisiana Was Lucky	1
Refineries	3
Pipelines	4
The Trip Ahead	5
II. The Direct Employment and Income Impacts	6
Covered Employment and Wages	6
Covered Employment	7
Covered Annual Wages	7
Comparative Weekly Wage Rates	8
Job Distribution across the State	9
Distribution across the State: Annual Wages	14
A Broader Income Measure: Value Added.....	16
III. Indirect or Multiplier Effects of the Industry	18
Ripples in the Pond: The Multiplier Effects	18
Ripple Effects of the Extraction Industry	19
Ripple Effects of the Refining Industry	22
Ripple Effects of the Pipeline Industry	26
The Total Impact: More Than Ripples	27
IV. Tax Impacts of the Energy Industry	29
Direct State Taxes	30
Ad Valorem Taxes to Local Governments	31
Indirect Taxes Generated	40
Total Taxes Generated	41
V. Technological Changes	42
VI. Summary and Conclusions	48

This study is an update of a study done for Mid-Continent Oil and Gas in 1996, and updated in 2002, 2007 and 2010 entitled, "The Energy Sector: A Giant Economic Engine for the Louisiana Economy." Our conclusions from this review of the impact of the extraction, refining, and pipeline industries can be summarized in a series of bullet points:

- Louisiana, through the luck of natural resource distribution, is the nation's **number two producer of crude oil and the number two producer of natural gas** among the 50 states.
- Louisiana ranks **number two among the states in petroleum refining** capacity.
- There are nearly **112,000 miles of pipelines** transporting crude petroleum and natural gas within the state and in its offshore area of the Gulf of Mexico.
- Through both their direct and multiplier effects **these three industries supported \$73.8 billion in sales in Louisiana firms, generated over \$20.5 billion in household earnings for Louisianans, and supported 287,008 jobs in the state in 2011.** The \$20.5 billion in earnings represented 11.6 percent of total earnings in Louisiana in that year. Personal income in not a single parish in Louisiana reaches this level. Eighty-six of the 185 countries ranked by the World Bank in 2012 have smaller gross domestic products than \$20.5 billion.
- On average **the job multiplier for these three industries was 4.4.** That is, for every job created in these sectors 3.4 additional jobs are created in other sectors in the state. The job multiplier for the oil and gas extraction industry is about 3.6 and for the very capital-intensive refinery industry it is about 9.0.
- These three industries directly **paid nearly \$1.5 billion in state taxes and fees** in FY13, or about 14.6 percent of total state taxes, licenses, and fees collected. Through the \$20.5 billion in household earnings generated by these three industries, state government indirectly was able to collect an additional \$1,438,000,000 in taxes, **for a total boost to the state treasury of \$2.9 billion.**
- A very conservative estimate is that these three industries directly paid **\$410 million in ad valorem taxes to local governments** in the state in 2013---a 37.5% increase over 2009. In 43 of the state's 64 parishes, these ad valorem taxes exceeded \$1 million. In 22 parishes the number exceeded \$5 million. Dramatic increases in property tax receipts occurred in Caddo, Bossier, Desoto and Red River Parishes as a result of the new activity in the Haynesville Shale. The \$20.5 billion in household earnings generated by these three industries added approximately **\$903,900,000---nearly a billion dollars---indirectly** to the treasuries of local governments, for a total of just over **\$1.3 billion contributed to local government treasuries.**

- In 2013, there were **64,669 workers employed** in the extraction, pipeline, and refining industries---a number approximately equivalent to the 2012 population of Acadia Parish, the 18th most populous parish in the state. Fifty-six of Louisiana's 64 parishes had total covered employment smaller than this number in February 2014.
- These three industries paid nearly **\$5.9 billion in wages** for Louisiana households in 2013---a figure equivalent to 7.2 percent of total covered wages in the state that year.
- In the second quarter of 2013, the average weekly wage in Louisiana's manufacturing sector was \$1,207. **In refining it was 68 percent higher at \$2,026 and the extraction sector paid \$2,140 weekly---77.3% higher than the average in manufacturing. Weekly wages in the pipeline industry were \$1,640---36 percent higher than the average manufacturing wage.**
- **Energy jobs and earnings are found in all of Louisiana's 64 parishes in 2013.** There were 17 parishes where more than 1,000 workers were employed in these three industries. In Lafayette Parish (the highest employment parish), 16,179 workers were directly employed in these energy sectors.
- Value added is a broader measure of the total income created directly in an industry. In 2011 (latest data available), **Louisiana's oil and gas extraction sector produced nearly \$23 billion in total income.** That figure exceeds the **sum** of all the state's manufacturing sectors except chemicals.
- The refining sector's value added in 2011 was \$18 billion. That figure was 29.3 percent of the total value added the state's manufacturing sectors.

THE ENERGY SECTOR: STILL A GIANT ECONOMIC ENGINE FOR THE LOUISIANA ECONOMY---AN UPDATE

I. Introduction: It's the Engine That Matters

Survey car owners and you will find a consensus on one issue: It is the engine that makes the difference. A weak, undependable engine gets you nowhere. It is a drag on your attempts to get things done. On the other hand a strong, powerful engine gets you where you need to go quickly and dependably. Much gets accomplished.

In the world of economics, some states have only weak engines for economic growth. Their basic industries are either non-existent or are made up of slow-growing, low-wage manufacturing firms. These states are doomed to remain at the bottom rung of the economic ladder, and their prospects for growth are lackluster at best. Examples would be the states of Arkansas and West Virginia.

Other states, either because of the sheer luck of the draw in resource distribution and/or because of innovative development policies, have attracted industries that are veritable dynamos of energy---creating high-wage jobs and spillover business for all kinds of firms. These states not only enjoy the benefits of healthy jobs and income, but also state and local government treasuries get a boost from taxes and fees these industries generate both directly and indirectly.

Louisiana Was Lucky

When it came to the geographical distribution of natural resources, Louisiana won the flip, so to speak. Below her borders, and in the waters of the adjoining Gulf of Mexico, lies a virtual mother-lode of oil and natural gas. Table 1 details Louisiana's oil production relative to her sister states. **Louisiana is the nation's number two producer of oil, producing nearly 1.45 million**

barrels a day in 2013 (this figure includes the federal outer continental shelf production). This represents 19.5 percent of the nation's crude oil production, just behind Texas, with North Dakota in third place.¹

Comparisons of the data in Table 1 with the same table generated back in 2010 reveals the remarkable effect that the **fracking technology** has had on oil production in the U.S. In 2010, Texas ranked second behind Louisiana in total production. Application of the fracking technique in the Eagle Ford and Permian Basin areas of Texas caused an astounding 120% increase in Texas crude production since 2010. North Dakota's Bakken Play went from producing 310 mb/d in 2010 to pass (then third place) Alaska and produced 858 mb/d in 2013---and in early 2014 has passed the 1,100 mb/d mark. Louisiana has its large shale play---the Tuscaloosa Marine Shale---but exploration companies have struggled to break the code on how to efficiently harvest this "mushy" shale.

Table 1
Crude Oil & Lease Condensate Production in U.S.: 2013
(1,000 Barrels per Day)

Area	Production	Percent U.S.
United States	7,441	100.0%
Texas	2,561	34.4%
<i>Louisiana*</i>	<i>1,449</i>	<i>19.5%</i>
North Dakota	858	11.5%
California	548	7.4%

*Includes Federal offshore production

The U.S. is also heavily reliant on Louisiana as a source of natural gas, although the full impact of the state in this arena is somewhat hidden in the data. As Table 2 shows, Louisiana ranks second in the U.S. in natural gas production when the federal Gulf of Mexico data are included. Louisiana accounted for almost a fifth of the nation's natural gas production in 2013, generating a total of over 3.7 trillion cubic feet of production.

Table 2
Gross Withdrawals & Production of Natural Gas in U.S.: 2013
(Billions of Cubic Feet)

Area	Production	Percent U.S.
United States	30,171	100.0%
Texas	8,211	27.2%
<i>Louisiana*</i>	3,704	12.3%
Alaska	3,215	10.7%
Oklahoma	2,144	7.1%
Wyoming	2,074	6.9%
New Mexico	1,307	4.3%

*Includes Federal offshore production.

Source: http://www.eia.gov/dnav/ng/ng_prod_sum_dcu_NUS_a.htm

Refineries

The tasks of exploring for and lifting these two resources to the surface---what economists label oil and gas extraction---have created thousands of jobs and billions in household income for Louisianans each year. It has also attracted closely related industries to the state as well. For example, **Louisiana ranks number two among the 50 states in petroleum refining capacity** (see Table 3). Louisiana ranks below Texas and ahead of California by this measure.

It is interesting to note that our refining industry is quite different from that of California. California uses 16 refineries to refine its 1.955 million barrels of crude a day. Louisiana, on the other hand, uses just three more refineries---19---to handle 67 percent more crude per day (3.273 million barrels). California refines its crude in relatively small refineries. Louisiana uses much larger refineries. Indeed, the Marathon Refinery in Garyville is the second largest refinery in the country and the eleventh largest in the world, the ExxonMobil refinery in Baton Rouge is the third largest in the country and the twelfth largest in the world, and the Citgo Refinery in Lake Charles is

the fifth largest in the nation and the 16th largest in the world.² In addition, California refineries serve only California, while Louisiana refineries serve Louisiana, Texas, Mississippi, Illinois and the eastern seaboard.

Table 3
Petroleum Refining Operating Capacity: 2013
(Millions of Barrels per Calendar Day)

Area	Refinery Capacity	Number	Percent U.S. Capacity
United States	17.824	139	100.0%
Texas	5.128	27	28.8%
<i>Louisiana</i>	<i>3.273</i>	<i>19</i>	<i>18.4%</i>
California	1.955	16	11.0%
Illinois	0.952	4	5.3%

Source: [www.eia.gov/dnav/pet/pet_pnp_cap1_a_\(na\)_8D0_BpCD_a.htm](http://www.eia.gov/dnav/pet/pet_pnp_cap1_a_(na)_8D0_BpCD_a.htm)

Pipelines

A second closely related industry to oil and gas extraction is the **pipeline industry**. Because pipelines are effectively hidden from view, Louisianans are little aware of the massive amount of oil and gas products that move underground in this state. Consider these figures:

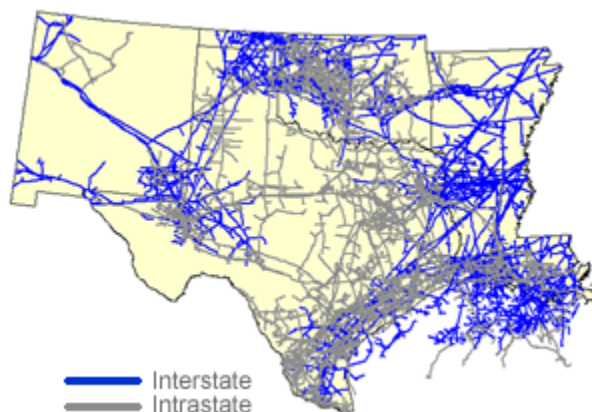
- There were 79,289 miles of pipelines in onshore Louisiana in 2014.³ These pipelines carry crude oil, natural gas, petrochemical products, LPG/NGL, gasoline, jet fuel, and refined products.
- In 2014, there were 37,554 miles of active and proposed pipelines in offshore Louisiana, outside the state's jurisdictional boundaries.⁴

These 111,843 miles of pipelines are the ones for which reasonable data are available because they fall under direct state or federal regulation. These are not pipelines transporting chemical products with no petroleum base. This is enough miles of pipeline to circle the earth 4.5

times. Figure 1 gives readers a sense of just how intensively the industry is concentrated in our state.

Figure 1

Map of Interstate and Intrastate Natural gas Pipelines: Southwest Region



Source: www.eia.doe.gov. Natural Gas Pipelines in the Southwest Region

The Trip Ahead

How has such a massive industry affected the economic lives of Louisiana citizens? If the extraction, refining, and pipeline industries are lumped under one heading---the energy industry---has it been a weak or powerful economic engine? Has the whole state benefited from its presence, or have any economic effects been limited to only a few parishes? Are the multiplier effects on other industries in Louisiana small or large? Has the industry's impact on state and local treasuries been trivial or significant?

These are the topics covered in the sections to follow. Section II is devoted to the direct income and employment effects of the energy industry. How many people are employed in it and what is the nature of the wages paid its employees? Section III uses an input/output table to estimate

the multiplier impacts of the energy industry. In which sectors are employees benefiting the most from these possible spillover effects? In section IV, the contribution to state and local treasuries is measured along with a discussion of the ten-year industrial tax exemption program. Section V presents tantalizing evidence about remarkable technological changes in these industries. Section VI contains the summary and conclusions. Appendix A contains an analysis of the impact of the BP oil spill on the first anniversary of that event.

II. The Direct Employment and Income Impacts

A helpful way to think about an industry's impact on a state is to think of the state's economy like a large economic pond. Into this pond we are going to drop a rock labeled "oil and gas extraction, refining and pipeline industries". Would such a rock make much of a splash in the pond? It is these **direct impacts** that we attempt to measure in this section. In section III, we will examine the extent of the ripples (the multiplier effects) this rock makes in the pond as the ripples work their way to the shore.

Covered Employment and Wages

By far the most detailed and reliable information on employment and wages in these three industries are the data gathered by the Louisiana Workforce Commission on **covered employees**, i.e., covered by unemployment compensation regulations. Because of legal reporting requirements, detailed data are available down to the parish level in most cases.

Covered Employment

Table 4 contains information on covered employment and annual wages paid in these four energy industries. **In 2010, there were 64,669 covered workers employed in the oil and gas extraction, support activities for mining, refining, and pipeline industries.**⁵ To get some idea of the relative size of this number, in February 2014 fifty-six of Louisiana's 64 parishes had total covered employment less than 64,669.⁶ Total employment in the two-parish Alexandria MSA was 62,260 in that month. **The number of persons employed in these industries is approximately equivalent to the 2012 population of Acadia Parish (61,912), the 18th most populous parish in the state.**⁷

Table 4
Employment and Annual Wages Paid
in Petroleum-Related Industries: Louisiana
2013-II

Sector	Employment ^a	Annual Wages Paid ^b
Oil & Gas Extraction	9,711	\$1,080,669,304
Support Activities for Mining	40,577	3,336,315,256
Petroleum Refining ^c	11,496	1,211,366,376
Pipelines	2,885	245,981,648
TOTAL	64,669	\$5,874,332,584

Source: www.Laworks.net. Go to LMI section. ^a Second quarter data. ^b Annual estimate based on 2013-II data. ^c Data are for "petroleum & coal products" sector, which is 98 percent petroleum refining.

Covered Annual Wages

What is more remarkable is the impact of these three industries on the incomes of Louisianans who work in these four sectors. According to the data in Table 4, **these three industries generated nearly \$5.9 billion in covered wages for these workers in 2013.** These four industries, through their direct effects alone, **generated 7.2 percent of the total covered wages earned in Louisiana in 2013.**⁸

Comparative Weekly Wage Rates

One reason these annual wage numbers are so large is because these four sectors are among the highest wage industries in the state. Table 5 provides data on the average weekly earnings in these four sectors and Louisiana's manufacturing industries in the second quarter of 2013.

Table 5
Average Weekly Wage – Second Quarter 2013
Louisiana Petroleum-Related Industries & Manufacturing

Sector	Average Weekly Wage
<i>Oil & Gas Extraction</i>	\$2,140
<i>Petroleum & Coal Products(98% Refinery)</i>	2,026
Chemicals & Allied Products	1,804
<i>Pipeline Transportation</i>	1,640
<i>Support Activities for Mining</i>	1,581
Paper Manufacturing	1,331
Primary Metals Manufacturing	1,197
Computers & Electronics	1,274
Machinery Manufacturing	1,160
Transportation Equipment	1,110
Fabricated Metals	1,030
Non-metallic Minerals	931
Plastics & Rubber Products	917
Beverage & Tobacco Products	897
Wood Products	855
Food manufacturing	719
Miscellaneous Manufacturing	712
Printing & Related Products	688
Furniture Manufacturing	663
Textile Products	590
Apparel Products	496
Average Manufacturing Wage	\$1,207
Average Wage in All Sectors	\$824

Source: www.Laworks.net. Go to LMI section. Louisiana Statewide Employment and Total Wages, Second Quarter 2013.

Note that the oil and gas extraction and refining sectors rank #1 and #2, respectively among the industries listed, with pipeline wages ranking #4 and support activities for mining ranking #5.

Oil and gas extraction's weekly wage of \$2,140 is a whopping 77.3 percent higher than the average wage in manufacturing (\$1,207). Even more telling is that oil and gas extraction wages are two and a half times larger than the average wage earned by a Louisiana worker (\$824 per week). Refining wages are 68 percent higher than the average manufacturing wage. Both oil and gas extraction and refining are unusually capital-intensive industries requiring very skilled labor for their operations.

Our review of the direct wage and employment impacts of these industries reveal something important about the energy sector. This economic engine is far from small. **It has been a powerful factor for creating thousands of high-wage jobs in Louisiana.**

Job Distribution across the State

Have the benefits of these excellent jobs been narrowly confined to just one area of the state, or have they been more widely distributed across Louisiana? One advantage of the covered employment data is they are available by parish, except where disclosure rules prevent their release.

Table 6 contains the distribution of reporting units, employment, and annual wages paid in the three energy industries by parish for the second quarter of 2013. The data to construct this table were provided by the Research and Statistics Unit of the Louisiana Workforce Commission. The Department cannot release data at the parish level unless there are a minimal number of reporting units. Too few a number of reporting units kicks in disclosure rules which ensure that an individual firm's employment and wage data cannot be identified.

The most important message from Table 6 is that the benefits of the energy sector are widespread across Louisiana. **Energy jobs and income were found in all of Louisiana's 64 parishes in 2013.** There were 17 parishes where more than 1,000 persons were employed in the

energy sector, and in the largest---Lafayette Parish---there were 16,179 persons working directly in the energy sector. There were 21 parishes where between 100 and 999 persons were directly employed in the energy sector.

Table 6

Number of Reporting Units, Employment, and Annual Wages in Oil and Gas Extraction, Support Activities for Mining, Refining and Pipeline Industries by Parish:
Third Quarter 2013

Parish	Units	Average Employment	Annual Wages
ACADIA	47	536	\$33,892,016
ALLEN	5	63	\$3,958,440
ASCENSION	22	915	\$93,207,288
ASSUMPTION	11	63	\$5,493,100
AVOYELLES	18	246	\$25,220,328
BEAUREGARD	11	45	\$3,286,936
BIENVILLE	28	444	\$34,825,868
BOSSIER	90	1591	\$124,449,104
CADDO	254	2359	\$156,833,868
CALCASIEU	59	2843	\$272,238,252
CALDWELL	8	71	\$5,100,456
CAMERON	27	265	\$18,187,012
CATAHOULA	10	57	\$2,123,208
CLAIBORNE	25	422	\$28,996,196
CONCORDIA	18	234	\$12,446,148
DESOTO	30	610	\$50,090,908
E. BATON ROUGE	65	2207	\$219,970,096
E. CARROLL	2		
E. FELICIANA	6	83	\$7,494,056
EVANGELINE	9	41	\$2,193,580
FRANKLIN	4		
GRANT	5	14	\$838,744
IBERIA	65	3951	\$284,000,360

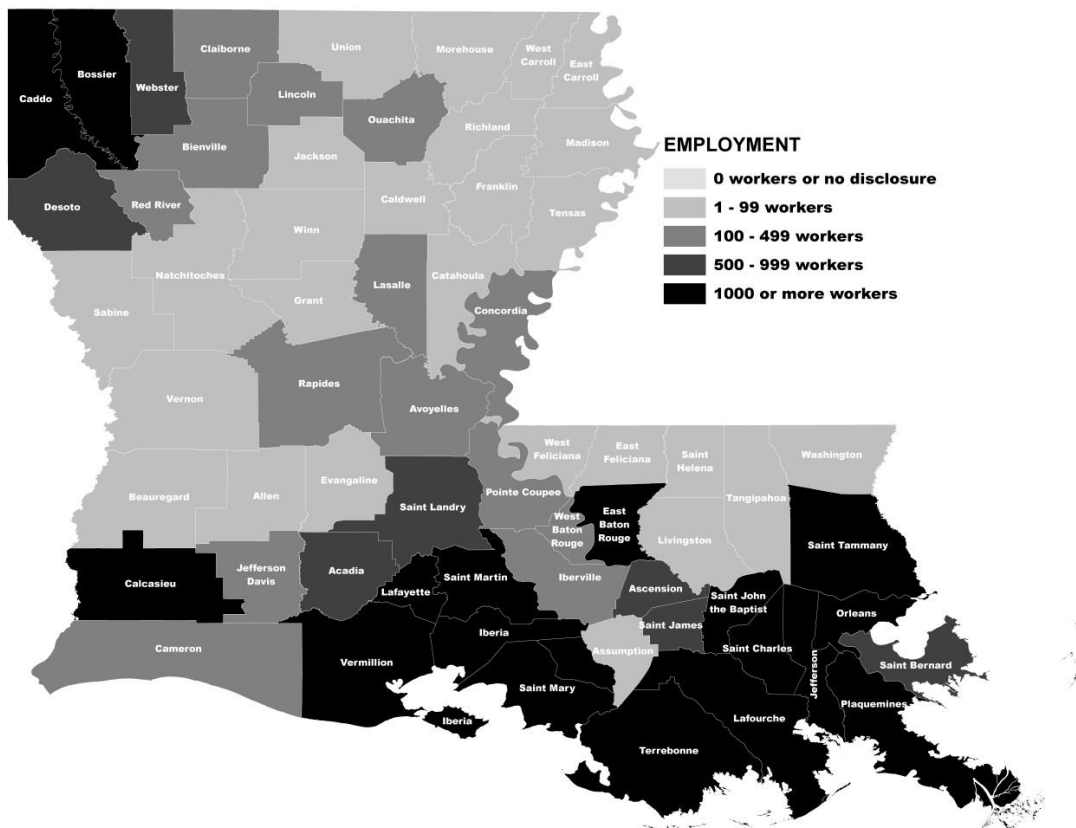
IBERVILLE	10	188	\$11,481,856
JACKSON	4		
JEFFERSON	77	1619	\$165,467,184
JEFF. DAVIS	21	365	\$21,048,820
LAFAYETTE	376	16179	\$1,359,952,928
LAFOURCHE	76	1511	\$130,613,948
LASALLE	35	389	\$24,203,756
LINCOLN	17	264	\$19,191,852
LIVINGSTON	8	50	\$1,870,580
MADISON	1		
MOREHOUSE	3		
NATCHITOCHE	9	49	\$2,887,432
ORLEANS	62	2583	\$361,460,312
OUACHITA	37	133	\$7,970,588
PLAQUEMINES	46	1965	\$196,510,772
POINTE COUPEE	7	123	\$8,790,364
RAPIDES	15	214	\$23,952,300
RED RIVER	6	126	\$10,222,944
RICHLAND	8	80	\$3,957,076
SABINE	17	57	\$3,159,356
ST. BERNARD	14	715	\$83,360,456
ST. CHARLES	11	1575	\$167,166,060
ST. HELENA	2		
ST. JAMES	6	657	\$79,396,580
ST. JOHN	10	1550	\$127,120,388
ST. LANDRY	30	673	\$58,815,656
ST. MARTIN	31	1140	\$93,130,828
ST. MARY	44	2661	\$235,872,092
ST. TAMMANY	56	1598	\$217,067,860
TANGIPAHOA	8	83	\$5,990,836
TENSAS	2		
TERREBONNE	123	6070	\$558,113,320
UNION	7	20	\$1,092,748
VERMILION	54	1342	\$115,969,032
VERNON	7	50	\$2,030,852
WASHINGTON	5	23	\$1,254,324

WEBSTER	35	691	\$48,013,632
W. BATON ROUGE	7	250	\$23,666,020
W. CARROLL	4		
W. FELICIANA	1		
WINN	9	73	\$4,876,544

Source: Louisiana Workforce Commission

Map 1 provides a visual illustration of the distribution of energy jobs across the 64 parishes. From this map it appears there is some concentration of the energy sector in the southern portion of the state, but there are still several parishes in the northern and central regions with 100 or more energy employees. For example, Caddo Parish employed 2,359 people in these three industries, while Bossier Parish employed 1,591.

Map 1
Distribution Across Louisiana Parishes of Covered Employment in the Oil & Gas Extraction, Refining, Pipeline, and Support Activities for Mining Industries: 2013



Distribution across the State: Annual Wages

The last column of Table 6 contains annual covered wage data by parish. Map 2 provides a visual illustration of the distribution of covered wages. These data detail what is in some cases a massive injection of earnings into a parish's economy. Note for example that in 2013-II:

- There were 57 parishes where energy wages exceeded \$1 million a year.
- There were 16 parishes where energy wages exceeded \$100 million.
- In Lafayette Parish energy wages were almost \$1.4 billion dollars, and in Orleans and Terrebonne

Parishes, annual energy wages totaled over \$350 million dollars.

Clearly, the energy sector is vitally important to the economic health of these parishes. It is also important to note that these are only the **direct** effects of the energy sector on these economies. They do not include the additional multiplier or spillover effects that will be estimated later in this report.

A Broader Income Measure: Value Added

Care has been taken in the material above to describe the wage data as pertaining to covered employment in the three energy industries. While this measure will fairly comprehensively include most wage and salary workers, it will not include wages and salaries paid to self-employed individuals or unpaid family members---probably a small set within total wage and salary workers in these industries.

However, it is important to realize that wages and salaries are only one component of the income generated for Louisiana citizens by these industries. Not included in the tables above are other labor income, rental incomes, profits, and interest earnings.

One of the best measures of the **total income** created by an industry is its **value added**. Unfortunately, value added data by industry are rather scarce. One useful source is the various industrial censuses and surveys that are taken by the U.S. Bureau of the Census. The Bureau of the Census conducted an **Annual Survey of Manufactures** in 2011 which provides value added data for all of the state's manufacturing sectors for that year. Unfortunately, the Bureau does not conduct an annual survey of the mining sector. The agency does conduct a census of the mining sector every five years. In Table 7 we use the estimated value added for oil and gas extraction and support activities for mining from the Bureau of Economic Analysis's Louisiana gross state product calculations. Unfortunately, though there is a census of transportation specifically for Louisiana, value added data are not provided specifically for the pipeline industry.

Table 7

Value Added in Louisiana Manufacturing Sectors
And in Support Activities for Mining & Oil and Gas Extraction in 2011

Sector	Value Added (Millions)	Percent of Manufacturing Total
Chemicals	27,058.8	44.0
Petroleum & Coal Products	\$18,043.9	29.3
Food Manufacturing	3,546.6	5.8
Paper Manufacturing	2,618.6	4.3
Fabricated Metals	2,439.8	4.0
Transportation Equipment	2,344.9	3.8
Machinery Manufacturing	1,442.2	2.3
Primary Metals	805.0	1.3
Nonmetallic Mineral Products	679.1	1.1
Plastics & Rubber Products	615.2	1.0
Wood Products	528.9	0.9
Furniture	314.6	0.5
Printing & Related Products	228.7	0.4
Electrical Equipment	238.3	0.4
Beverage & Tobacco	217.5	0.4
Textile Products	D	NA
Apparel Manufacturing	D	NA
Computers & Electronics	D	NA
Total Manufacturing	\$61,560.6	100
Oil & Gas Extraction	\$16,351.0	NA
Support Activities for Mining	6,416.0	NA

Source: 2011 Survey of Manufactures, U.S. Bureau of Census and www.bea.gov.

D = not shown due to disclosure rules. NA = Not Applicable. The petroleum & coal products sector is 98 percent refining and support activities for mining is 99.9 percent associated with the oil and gas extraction sector.

There are several striking conclusions that arise from examining these data.

- Note in the bottom line of Table 7 **that in 2011 nearly \$22.8 billion in income was created by Louisiana's oil and gas extraction sector and its associated "support activities for mining" sector.** This figure exceeds that of every manufacturing sector in Louisiana except chemicals. It exceeds the sum of all the other manufacturing sectors listed below petroleum refining in Table 7.

- **With over \$18 billion in value added, petroleum refining is the second largest source of income in Louisiana's manufacturing sector.** Indeed, over one-quarter (29.3 percent) of Louisiana's value added in manufacturing is derived from the refining sector.
- In 2011, **the oil and gas industry and the refining sectors combined created a remarkable \$40.8 billion of income in Louisiana.**

III. Indirect or Multiplier Effects of the Industry

Earlier in this report it was mentioned that a helpful way to think of the energy sector's impact on the Louisiana economy was to think of the state as one large economic pond. Into this pond a rock is dropped labeled "energy industries". Section II of this report has provided estimates of the effect on the state of the initial splash made when the rock hit the pond---what has been referred to as the **direct** impacts of the industry.

Ripples in the Pond: The Multiplier Effect

However, when this rock hits it will also send out ripples to the edge of the pond---what are called the **multiplier** or indirect effects of the industry. For example, the extraction industry will order offshore platforms from a Louisiana fabricator such as Gulf Island Fabricators. This creates sales, income, and jobs in that firm, which in turn calls their suppliers and orders sheet steel, pipes, electrical generators, etc., which creates sales, income, and jobs in those firms, and so on. The employees that are hired in the extraction industry are paid wages and salaries which they then spend at car dealerships, grocery stores, eating establishments, etc., which generates new sales, income, and jobs there, etc., etc.

As it turns out, there is a useful tool for measuring these multiplier effects for the industries. It is called an **input-output (I/O) table**. Such a table has been constructed for the Louisiana economy by the U.S. Bureau of Economic Analysis (BEA) in the U.S. Department of Commerce.

To use the I/O table we went to the 2011 Louisiana gross state product (GSP) statistics provided by the BEA. The BEA estimated the contribution made by the oil and gas exploration industry, the refining industry and the pipeline industry to state GSP. These were the figures we inserted into the I/O tables. The multiplier effects on business sales, household earnings, and jobs in Louisiana are documented for the oil and gas extraction sector in Table 8, for the refining sector in Table 9 and for the pipeline industry in Table 10.

Ripple Effects of the Extraction Industry

Table 8 contains the estimated multiplier effects of the extraction industry from the I/O table. The I/O table enables one to estimate the impact of an industry on three key variables in the state: (1) sales at firms; (2) household incomes; and (3) jobs.

Any question about whether or not the extraction industry is a weak or strong engine for economic activity in Louisiana should be completely answered by the numbers in this table. By any reasonable measure, these spillover impacts are huge. **According to the I/O table, extraction industry activity in 2011 created nearly \$41.8 billion in sales at Louisiana firms** (up from \$39.3 billion in 2009).

Table 8

Direct and Multiplier Effects of Oil and Gas Extraction Sector: 2011

Category	Business Sales (Millions)	Earnings (Millions)	Jobs
Agriculture, forestry, fishing, and hunting	\$76.3	\$34.0	791
Mining	\$25,768.2	\$6,305.3	65,776
Utilities	\$623.0	\$182.3	1,367
Construction	\$948.9	\$409.4	8,097
Manufacturing	\$3,162.1	\$1,072.6	9,051
Wholesale trade	\$884.0	\$479.1	4,541
Retail trade	\$1,008.6	\$563.1	13,284
Transportation and warehousing	\$767.0	\$429.1	4,485
Information	\$423.4	\$141.2	1,723
Finance and insurance	\$938.1	\$362.9	5,089
Real estate and rental and leasing	\$2,045.2	\$368.3	9,728
Professional, scientific, and technical services	\$1,341.3	\$1,217.4	11,100
Management of companies and enterprises	\$741.8	\$541.7	5,203
Administrative and waste management services	\$441.5	\$328.9	7,140
Educational services	\$161.5	\$128.7	2,719
Health care and social assistance	\$1,236.0	\$943.9	13,843
Arts, entertainment, and recreation	\$119.9	\$75.1	1,778
Accommodation	\$163.9	\$76.9	1,390
Food services and drinking places	\$415.0	\$219.9	7,182
Other services*	\$503.4	\$354.0	5,555
Households		\$14.3	822
Totals	\$41,768.8	\$14,248.2	180,665

Source: Louisiana Input-Output Table, Bureau of Economic Analysis, U.S. Department of Commerce, Washington, D.C.

Table 8 provides details on how these sales are distributed across firms in different industries. The greatest beneficiary is the crude petroleum and natural gas industry---where the "rock" is, so to speak. But notice that multi-millions of dollars in sales are enjoyed by firms in many

other sectors of the Louisiana economy. The manufacturing industry does particularly well (nearly \$3.2 billion) as this capital-intensive industry provides fabricators, shipbuilders, and other manufacturers with huge amounts of business. Firms in the real estate sector also do well (\$2 billion) not only because the earnings created by this industry allows Louisianans to purchase homes and boosts the demand for shopping centers and other business establishments, but also because the extraction industry purchases a lot of property for drilling and production purposes. Over one billion dollars in sales are created in each of the following industries: professional/scientific/technical services (\$1.3 billion), health care (\$1.2 billion), and retail trade (\$1.0 billion).

For most citizens, the key numbers in Table 8 are the ones in the middle column---the ones dealing with household income. **According to the I/O table, the extraction industry pumped over \$14.2 billion into the bank accounts of Louisiana citizens in 2011---a marked increase over the comparable 2009 number of \$9.3 billion.** Persons that worked in the extraction industry earned the biggest fraction of this money---over \$6.3 billion---but note that there were 17 sectors of the economy where household earnings exceeded \$100 million in 2011. Employees in the professional/scientific/technical services sector were the second largest gainers (\$1.2 billion), followed by manufacturing (\$1.1 billion) and employees in healthcare (\$943.9 million).

Finally, the last column of Table 8 provides the jobs impact of the oil and gas extraction sector. Here, the numbers are particularly impressive. According to the I/O table **a total of 180,665 jobs in Louisiana in 2011 could be traced directly or indirectly to the presence of the extraction industry.** While this is only a 2.5% increase over 2009, to have this number increase at all (it declined between 2005 and 2009) is remarkable given that (1) the industry has been steadily

becoming more capital intensive and (2) there has been a major decline in activity in the Haynesville Shale.

The creation of 180,665 jobs in total implies a job multiplier for this industry of 3.6.

That is, for every new job created in this sector, there are 2.6 jobs created in other sectors of the Louisiana economy via the multiplier effect. Notice that thousands of jobs are supported in many other sectors of the Louisiana economy because of extraction's presence here. The retail trade, health care, and professional/scientific/technical services sectors especially benefit from these spillover impacts with 13,284, 13,843, and 11,100 jobs created, respectively.

Finally, the jobs created both directly and indirectly via the multiplier effect from the oil and gas industry are particularly high paying jobs. They average **\$78,865 a year** (\$14,248.29 million divided by 180,665). By way of comparison, the average annual wage in all sectors of the Louisiana economy is right at \$42,848 (see Table 5).

Ripple Effects of the Refining Industry

The existence of a mother lode of petroleum beneath our borders, and beneath the waters in our coastal Gulf of Mexico, has attracted to Louisiana an industry that operates immediately downstream from oil and gas production---**refineries**. Table 9 contains the I/O estimates of the spillover effects of this industry. It is important to note that we were careful not to double count the impact of this industry by including the extraction sector effects. That is why the “mining” sector in Table 9 contains zeroes.

Table 9

**Direct and Multiplier Effects of the
Refinery Sector in Louisiana: 2011**

Category	Sales	Earnings	Jobs
Agriculture, forestry, fishing, and hunting	\$51.2	\$12.8	514
Mining	\$0.0	\$0.0	0
Utilities*	\$317.6	\$57.6	697
Construction	\$321.9	\$127.9	2750
Manufacturing	\$23,885.0	\$3,664.6	38104
Wholesale trade	\$718.4	\$221.7	3692
Retail trade	\$737.6	\$253.7	9717
Transportation and warehousing*	\$560.7	\$208.9	3260
Information	\$240.9	\$46.9	985
Finance and insurance	\$481.8	\$106.6	2601
Real estate and rental and leasing	\$1,142.7	\$91.7	5782
Professional, scientific, and technical services	\$394.4	\$189.7	3269
Management of companies and enterprises	\$208.9	\$95.9	1466
Administrative and waste management services	\$217.4	\$91.7	3542
Educational services	\$121.5	\$59.7	2049
Health care and social assistance	\$948.7	\$441.3	10644
Arts, entertainment, and recreation	\$81.0	\$29.8	1211
Accommodation	\$102.3	\$27.7	861
Food services and drinking places	\$294.2	\$91.7	5090
Other services*	\$343.2	\$142.8	3783
Households		\$6.4	637
Totals	\$31,169.5	\$5,969.1	100,654

Source: Louisiana Input-Output Table, Bureau of Economic Analysis, U.S. Department of Commerce, Washington, D.C.

Note the bottom line of the first column of Table 9. **The existence of the refining industry in Louisiana created \$31 billion in sales at Louisiana firms in 2011.** Clearly, this industry has had a very powerful economic effect on the Louisiana economy. Almost two-thirds of these sales (\$23.9 billion) occurred in the manufacturing sector---a sector which includes the refinery sales in that year associated with "dropping the rock in the pond".

There were four other sectors where over \$1700 million in sales could be traced back to the refining industry: real estate (\$1.1 billion), healthcare (\$948.7 million) retail trade (\$737.6 million), and wholesale trade (\$718.4 million).

Column two of Table 9 reveals the impact of the refining industry on household incomes of Louisianans in 2011. **Nearly \$6.0 billion in earnings were injected into the Louisiana economy through both the direct and indirect effects of the refining industry in that year.** That is about 3.4 percent of Louisiana's \$176 billion in personal income earned in that year.⁹ Almost \$3.7 billion of this income went to workers in the manufacturing sector where the refineries are located. Note that there were nine other sectors in Louisiana that saw their workers' earnings boosted in excess of \$100 million in 2011 through spillover effects of the refining industry.

The jobs impacts were equally impressive. According to the last column in Table 9, **there were 100,654 jobs in Louisiana in 2011 that could be traced directly or indirectly to the refining industry.** Some 38,104 of those jobs were in the manufacturing sector, which includes the direct jobs in the refining industry. In excess of 10,000 jobs were supported in health care (11,644), with the retail trade sector coming close to the 10,000 mark with 9,717 jobs traceable to the refining industry. There were 12 other sectors where more than 1,000 jobs were related to refining activities in 2011.

Those familiar with input-output multiplier estimates may raise their eyebrows at the size of the total employment effect of the refining sector of 100,654 jobs. In 2011, the Louisiana Workforce Commission reported there were 11,200 people employed at the state's refineries. This implies a job multiplier of 9.0---a number so high that one might question the credibility of the estimate.

However, there is a key nuance about this industry that lends credence to the job multiplier estimate. The 11,200 in direct employment is the number of people working for the refinery owners, like Citgo, ConocoPhillips, ExxonMobil, etc. In reality, the number of people working at a refinery is much larger than the direct payroll of these firms because a significant amount of work---especially maintenance and repairs---is subcontracted to other firms.

Readers who make a comparison of Table 9 in this year's report with the same table in the earlier 2009 report will notice a very significant decline in the estimated employment effects of the refinery sector----from 128,259 to 100,654. In reality, there was no decline in this industry's job impact between the two periods **because of a radical over-estimation of the impacts in 2009**. Our estimates in that year were based on preliminary estimates of just over \$21 billion in value added in this sector. When the actual number was fully reported there had been an unprecedented decline in refinery value added in 2009 to only \$13.1 billion---a level not seen in Louisiana since the early part of the turn of the century. This means that in reality, the refinery impact on the state in 2009 was only 79,520 jobs in total. Of course, in 2009 the national economy was in the second year of the worst recession the economy had suffered since the Great Depression and gasoline sales nation-wide had experienced a two-year decline of 13.6%. It was a very bad time for refineries, and a decline that we badly under-estimated given the data available at the time. The point is that since 2009, refinery's impact on jobs in the state actually jumped from 79,520 to 100,654---a 27% improvement.

Ripple Effects of the Pipeline Industry

As mentioned in the introductory section of this report there are approximately 112,000 miles of pipelines crisscrossing Louisiana, vividly shown back in Figure 1. The industry directly supports

2,885 jobs and generates almost \$246 million in wages and salaries for its employees (Table 4). The I/O table estimates of the total impact of the industry are shown in Table 10.

The mass of pipelines shown in Figure 1 should have been a sort of early warning signal that this industry's impact---though not as large as extraction and refining---is still non-trivial. According to the I/O table, the pipeline industry was responsible for almost \$1 billion in sales at Louisiana businesses, almost a quarter of a billion dollars in earnings for Louisiana households, and 5,606 jobs for Louisianans.

Table 10

Direct and Multiplier Effects of the Pipeline Sector in Louisiana: 2009

Category	Output	Earnings	Jobs
Agriculture, forestry, fishing, and hunting	\$2.6	\$0.4	20
Mining	0	0	0
Utilities*	\$17.2	\$3.5	41
Construction	\$29.6	\$11.1	308
Manufacturing	\$109.3	\$17.5	286
Wholesale trade	\$26.8	\$8.5	160
Retail trade	\$32.4	\$11.2	486

Transportation and warehousing*	\$451.5	\$97.7	1,288
Information	\$14.2	\$3.1	67
Finance and insurance	\$29.4	\$8.0	180
Real estate and rental and leasing	\$51.9	\$3.3	159
Professional, scientific, and technical services	\$59.1	\$27.3	493
Management of companies and enterprises	\$6.9	\$2.9	50
Administrative and waste management services	\$38.0	\$18.8	931
Educational services	\$3.8	\$1.6	68
Health care and social assistance	\$32.1	\$15.1	413
Arts, entertainment, and recreation	\$3.0	\$1.2	52
Accommodation	\$3.9	\$1.2	43
Food services and drinking places	\$12.1	\$3.9	267
Other services*	\$21.3	\$6.6	253
Households		\$0.3	40
Totals	\$945.2	\$243.1	5,606

The Total Impact: More than "Ripples"

A large number of figures are contained in Tables 8, 9 and 10. Table 11 presents a handy summary of the bottom line from those three tables. According to the I/O table, **the energy industry in Louisiana supports \$77.3 billion in sales at firms in the state, over \$20.5 billion in household earnings for Louisianans, and 287,008 jobs.** The term "ripple" hardly does justice to the magnitude of these impacts. These are more like small waves.

Table 11

Summary of Input-Output Results Across Industries: 2011

Industry	Direct and Multiplier Effects on:		
	Sales (millions)	Household Income (millions)	Jobs
Oil & Natural Gas Extraction	\$41,768.8	\$14,248.2	180,665
	\$31,169.5	\$5,969.1	100,654

Refineries			
Pipelines	\$863.2	\$325.8	5,689
Totals	\$73,801.5	\$20,543.1	287,008

Source: Louisiana Input-Output Table

Numbers in the billions are used so frequently in society today that it is difficult to get a grasp on what they really mean. Table 11 shows that the industry created \$20.5 billion in household earnings for Louisianans in 2011. Perhaps a few comparisons will put these numbers in perspective.

- That is 11.6 percent of the total earnings of Louisianans in that year.¹⁰
- This number exceeds the total earnings of persons in each of every single parish in the state in 2011. The parish that came closest to matching this total was Jefferson Parish at \$19.0 billion.¹¹
- The United Nations has generated a table listing the gross domestic product (GDP) of 193 countries in the world in 2012.¹² Eighty six of those countries have gross domestic products smaller than \$20.5 billion.

Table 10 shows that the jobs of 287,008 Louisianans are dependent on the presence of the energy industry in this state. By way of reference:

- This number represented 15 1% of non-agricultural wage and salary employment in 2011 in Louisiana.¹³
- Recall from Table 4 that 64,669 people are employed directly in the energy industries in the state. **This means the job multiplier for these three industries is 4.4**, a figure which includes the direct jobs. **This means for each job created in these three industries, 3.4 additional jobs are created elsewhere in the state.**

What these numbers reveal is that the economic impact of the energy industry is both huge and widespread. Clearly, it has been a powerful influence for economic growth in Louisiana.

IV. Tax Impacts of the Energy Industry

Our analysis of the employment and earnings impacts of these energy industries reveals an economic engine with extensive job and income creating powers. It should come as no surprise then that both state and local governments enjoy a nice boost to their treasuries from the presence of the extraction, refining and pipeline industries in our state.

These industries influence tax payments to these two governmental units in two ways. First, there are the taxes paid **directly** by the industry to state and local governments in the form of corporate income and franchise taxes, sales taxes, royalties, rentals, bonuses, property taxes, fees, etc. However, there is a second major source of revenues generated by the industries' presence--- **indirect taxes**. Recall that in section III, it was determined that \$20.5 billion in household earnings was created in the state both directly and through the multiplier effects of these industries' activities (see Table 11). State and local governments collect additional taxes via these earnings as well.

Direct State Taxes

Table 12 documents the direct state taxes and fees paid by the extraction, refining, and pipeline industries in fiscal year 2012-13 (FY13). **The energy industry paid \$1,497.0 in state taxes in FY13 or about 14.6 percent of total taxes, licenses, and fees collected by the state.** Clearly, if this sector did not exist in Louisiana, our citizens would be able to do far less in terms of infrastructure, education, care for the poor, etc., than it is doing today. Nearly one point five billion dollars can correct a lot of social problems.

By far the largest portion of these tax collections are mineral taxes and payments such as severance taxes, royalties, rentals, and bonuses. Counting payments to the 8g fund, these mineral taxes totaled nearly \$1.4 billion or 93 percent of total direct taxes paid by this sector. The next biggest set of taxes was the corporate franchise and income taxes and sales taxes which came to \$82.2 million in FY13. Note that this latter number was held down in FY13 by the fact that many corporations had loss-carry-forwards resulting from the Great Recession.

Table 12
Direct State Taxes Collected From Oil & Gas Extraction, Refining,
And Pipeline Industries: Fiscal Year 2012-13

Tax Category	Taxes Paid Millions of Dollars
Severance Taxes	\$847.1
Royalties, Rentals, Bonuses, Leases	526.9
Corporate Income & Franchise & Sales Taxes	82.2
Direct Fees to Dept. of Natural Resources	8.4
Royalties Paid to 8g Fund	22.9
Fees Paid to Dept. of Environmental Quality	9.5
TOTAL DIRECT TAXES PAID	\$1,497.0
Total State Taxes, Licenses & Fees	\$10,233.1
Total Direct Taxes as Percent of Total State Taxes, Licenses, Fees	14.6%

Source: Departments of Revenue, Environmental Quality, Natural Resources, and Legislative Fiscal Office. Total State Taxes, Licenses, and Fees do not include some agency receipts included in direct taxes paid by the industry.

Ad Valorem Taxes to Local Governments

From data tabulated by the Louisiana Tax Commission it is possible to derive a very conservative estimate of the property taxes collected from the energy industries by local governments in Louisiana. The phrase "very conservative" was used in that last sentence because the Tax Commission has reliable data on the assessed value of pipelines, drilling rigs, oil and gas surface equipment, and oil and gas wells from which property tax payments can be derived. In

addition, a survey was conducted of the 16 largest refineries in the state to obtain their property tax payments in 2013.

However, what is not available are data on the assessed value of business furniture and fixtures, leased equipment, buildings and land, machinery and equipment owned, and inventories in all of the pipeline and extraction companies. This would no doubt be quite a large figure. Because these items cannot be isolated from the Tax Commission data, our property tax numbers for the industry will be at the very lower limit of total property taxes paid.

Table 13 contains a wealth of data on ad valorem taxes paid in Louisiana. This table shows total ad valorem taxes paid, our very conservative estimate of taxes paid by the extraction, refining, and pipeline industries, and what percent of total ad valorem taxes in each parish was paid by these three energy industries.

Table 13

Ad Valorem Taxes Paid by Parish and Amount Paid
By Oil & Gas, Refining, and Pipeline Industries: 2013

Parish	Ad Valorem	Taxes Paid by Oil/Gas Refining, & Pipelines	Percent of Total Paid by Oil/Gas Refining, Pipelines
	Taxes		
Acadia	\$ 28,539,004	\$4,346,765	15.2
Allen	\$ 13,094,692	1,400,602	10.7
Ascension	\$ 112,775,997	787,107	0.7
Assumption	\$ 17,543,056	1,184,091	6.7
Avoyelles	\$ 9,110,230	448,745	4.9
Beauregard	\$ 27,125,250	5,929,467	21.9
Bienville	\$ 41,604,457	16,104,907	38.7
Bossier	\$ 97,054,727	15,668,943	16.1
Caddo	\$ 230,350,740	24,092,046	10.5
Calcasieu	\$ 188,491,178	23,080,358	12.2

Caldwell	\$ 8,494,576	3,804,974	44.8
Cameron	\$ 33,867,278	10,424,857	30.8
Catahoula	\$ 3,352,979	132,347	3.9
Claiborne	\$ 11,110,840	3,482,028	31.3
Concordia	\$ 13,675,977	363,706	2.7
Desoto	\$ 78,432,531	48,970,063	62.4
E. Baton Rouge	\$ 418,982,999	20,106,487	4.8
E. Carroll	\$ 5,003,198	16,092	0.3
E. Feliciana	\$ 6,531,501	199,546	3.1
Evangeline	\$ 18,623,776	2,814,350	15.4
Franklin	\$ 7,640,968	1,643,401	21.5
Grant	\$ 7,836,045	112,261	1.4
Iberia	\$ 40,014,359	3,688,914	9.2
Iberville	\$ 53,921,421	2,575,995	4.8
Jackson	\$ 25,203,599	11,207,018	44.5
Jefferson	\$ 347,807,922	3,814,912	1.1
Jefferson Davis	\$ 21,230,293	2,749,064	12.9
Lafayette	\$ 155,214,148	1,107,051	0.7
Lafourche	\$ 112,452,755	16,059,487	14.3
LaSalle	\$ 11,390,552	1,679,164	14.7
Lincoln	\$ 31,798,080	4,767,257	15.0
Livingston	\$ 51,432,465	967,736	1.9
Madison	\$ 11,681,983	39,568	0.3
Morehouse	\$ 12,739,394	284,946	2.2
Natchitoches	\$ 29,224,016	859,801	2.9
Orleans	\$ 465,719,466	0	0.0
Ouachita	\$ 92,846,864	809,359	0.9
Plaquemines	\$ 66,159,622	23,293,968	35.2
Pointe Coupee	\$ 21,571,686	2,680,679	12.4
Rapides	\$ 84,482,432	1,198,525	1.4
Red River	\$ 21,927,425	10,476,899	47.8
Richland	\$ 16,771,344	514,825	3.1
Sabine	\$ 14,886,236	6,173,530	41.5
St. Bernard	\$ 41,874,418	14,842,544	35.4
St. Charles	\$ 136,517,151	15,766,824	11.5
St. Helena	\$ 6,372,169	1,031,409	16.2
St. James	\$ 57,626,234	22,414,622	38.9
St. John	\$ 54,276,082	25,301,099	46.6
St. Landry	\$ 35,812,088	3,774,916	10.5
St. Martin	\$ 32,208,383	2,656,587	8.2
St. Mary	\$ 58,640,933	7,912,830	13.5
St. Tammany	\$ 257,072,124	0	0.0
Tangipahoa	\$ 40,765,335	263	0.0
Tensas	\$ 5,479,914	225,954	4.1
Terrebonne	\$ 84,326,224	11,521,670	13.7

Union	\$ 13,545,905	1,422,742	10.5
Vermillion	\$ 31,926,061	6,402,068	20.1
Vernon	\$ 17,325,858	3,733,268	21.5
Washington	\$ 18,764,330	31,582	0.2
Webster	\$ 25,342,948	6,587,071	26.0
W. Baton Rouge	\$ 32,437,345	5,618,236	17.3
W. Carroll	\$ 3,943,376	0	0.0
W. Feliciana	\$ 21,407,045	148,641	0.7
Winn	\$ 6,771,383	232,029	3.4
Total	\$ 4,050,128,418	\$409,686,16	10.1

Source: Louisiana Tax Commission Annual Report, 2013 & industry survey. Taxes paid by Chalmette Refinery in St. Bernard Parish not included.

According to these data:

- The extraction, refining, and pipeline industries **paid right at \$409.7 million in ad valorem taxes to local governments in 2013**---a 37.5 percent increase over the 2009 number we reported in our last impact study.
- In 43 of the 64 parishes, ad valorem taxes paid by the industries exceeded \$1 million. In 22 parishes, the figure exceeded \$5 million.
- The distribution of high-tax-collection parishes for these industries correlates closely with the distribution of earnings and employment shown back in Maps 1 and 2.
- **Parishes with refineries within their boundaries enjoy a special largess in property taxes as seen in Table 13.** St. John Parish---home of the huge Marathon Refinery---had the second highest energy-related property taxes in the state at \$25.3 million. Calcasieu Parish, home to three refineries---ranked 5th with \$23.1 million, followed by St. James Parish (Motive and Valero Refineries) in 6th place with \$22.4 million in collections. These very capital intensive industries have an abundance of property subject to the ad valorem tax.

- **A total of 10.1 percent of property taxes collected by local governments in 2013 came from the energy sector.** Clearly, local governments are getting even more dependent on the energy sector for property taxes since this number was 5.7 percent in 1999 and 7.1 percent in 2005.
- It is apparent from the numbers in the last column of Table 13 that some parishes would face some very serious financial problems if for some reason these energy industries vanished from their borders. There were 35 parishes where over ten percent of property taxes came from the energy sector, and there were 13 parishes where energy sector property taxes made up a quarter of property taxes collected.

The Haynesville Play Effect. What is not readily apparent from the data in Table 13 is the impact on certain local governments of the new **Haynesville Shale play** in northwestern Louisiana. This new play did not really become a serious factor in the economy until late 2008 when a great deal of money was spent buying mineral leases in the area. There was then a boom in exploration in the play, with the rig count in the northern part of the state leaping from an average of 48 rigs in 2005 to a high of 140 in April 2010. Because of a diversion of rigs from this “dry” play to “wet” plays in Texas, North Dakota and Pennsylvania that rig count has dropped to a fairly stationary level of about 25. Still, as shown in Table 14 the impact on property tax collections has been dramatic in the five parishes where activity in the Haynesville Play action was concentrated.

Table 14

Energy-Related Property Tax Collections in Northwestern Parishes:
2005 Versus 2013

Parish	Property Taxes 2005	Property Taxes 2013	% Energy- Related 2005	% Energy- Related 2013
Desoto	\$22,395,351	\$78,432,531	18.9%	62.4%
Red River	\$3,549,617	\$21,927,425	3.6%	47.8%
Webster	\$15,728,690	\$25,342,948	17.1%	26.0%
Bossier	\$52,449,881	\$97,054,727	8.5%	16.1%
Caddo	\$158,347,601	\$230,350,740	2.8%	10.5%

Desoto Parish is now the largest source of energy-related property taxes in the state with over \$78.4 million (see Table 13 as well) ---a figure that is three and a half times higher than the pre-Haynesville period in 2005. Over 62% of this parish's property taxes come from energy-related industries, a percentage that is the highest in the state. A similarly dramatic change took place over 2005-13 in Red River Parish, where energy-related property taxes jumped over six and a half times to \$21.9 million in 2013. Energy's share of this parish's property taxes rose from only 3.6% in 2005 to 47.8% in 2013. Smaller, but still very significant boosts also occurred in Caddo and Bossier Parishes, with eastern-most Webster Parish also participating in the largess from this play. Luckily, these increases occurred right in the middle of the "Great Recession", making it much easier for these parishes to weather that economic storm.

The Industrial Tax Exemption. Some readers may be surprised at the numbers back in Table 13. They believe that the 10-year industrial tax exemption (TYITE) protected these

industries from paying much in the way of property taxes. First of all, the TYITE applies for the most part only to **manufacturing firms**. Thus, while it would apply to refineries, it is not available to pipelines or to the extraction industry.

Secondly, it is a **ten year** exemption. At the end of that 10-year period, the property rolls off the exemption schedule and onto the taxable rolls. Table 15 provides data by parish on the value of TYITE in force as of 2012 and the portion of that which applies to refineries. Of the \$70.3 billion in exemptions in force as of that date, about \$10.1 billion, or only 14.3 percent of the total, was for refineries.

Table 15

Total Value of 10-Year Industrial Tax Exemptions in Force in 2012, Value for Refineries, and Amount of Refinery Exemptions Expiring over 2013-17

Parish	Investment	Oil Refining Contracts	Oil Refining Contracts
	In Force 2012	In Force 2012	Expiring 2013-2017
Acadia	\$684,431,281		
Allen	\$321,375,141		
Ascension	\$5,589,585,307	\$687,836,716	\$74,288,294
Assumption	\$162,829,241		
Avoyelles	\$9,629,572		
Beauregard	\$277,774,586		
Bienville	\$190,088,632		
Bossier	\$116,090,819	\$19,379,037	\$6,786,356
Caddo	\$1,923,369,145	\$585,514,233	\$107,186,195
Calcasieu	\$3,702,208,558	\$652,742,725	\$550,434,924
Caldwell	\$157,385		
Cameron	\$16,929,514,910		
Catahoula	\$159,947		
Claiborne	\$127,722		
Concordia	\$16,684,751		

DeSoto	\$667,513,525		
East Baton Rouge	\$4,390,833,765	\$668,816,416	\$419,475,513
East Carroll	\$640,000		
East Feliciana	\$141,688,206	\$140,000,000	
Evangeline	\$153,339,450		
Franklin	\$2,057,586		
Grant	\$16,208,627		
Iberia	\$188,176,189		
Iberville	\$6,064,050,557		
Jackson	\$175,583,720		
Jefferson	\$640,419,993		
Jefferson Davis	\$226,733,782		
LaSalle	\$294,369,689		
Lafayette	\$286,461,945		
Lafourche	\$191,916,388		
Lincoln	\$215,533,559		
Livingston	\$53,208,382		
Morehouse	\$13,197,420		
Natchitoches	\$482,231,270		
Orleans	\$629,322,989	\$28,373,492	
Ouachita	\$1,835,128,783		
Plaquemines	\$827,905,647		
Pointe Coupee	\$173,099,536		
Rapides	\$1,878,840,068		
Red River	\$321,000,071		
Richland	\$175,526,565		
Sabine	\$68,597,697		
St. Bernard	\$928,498,273	\$566,684,466	\$294,978,425
St. Charles	\$6,667,998,552	\$2,270,118,280	\$53,695,988
St. Helena	\$22,808,221		
St. James	\$3,365,297,758	\$160,522,221	
St. John the Baptist	\$4,302,216,740	\$3,875,234,019	\$398,501,263
St. Landry	\$160,374,866	\$117,667,637	\$77,270,056
St. Martin	\$115,663,323		

St. Mary	\$603,540,491		
St. Tammany	\$77,758,582		
Tangipahoa	\$170,323,908		
Terrebonne	\$393,669,335		
Union	\$41,901,136		
Vermilion	\$33,784,866		
Vernon	\$4,008,250		
Washington	\$143,237,661		
Webster	\$86,336,076	\$12,193,708	\$7,659,885
West Baton Rouge	\$2,812,313,317	\$271,321,429	\$31,239,654
West Carroll	\$506,831		
West Feliciana	\$334,147,406		
Winn	\$33,977,643		
State Totals	\$70,335,975,641	\$10,056,404,379	\$2,021,516,553

Source: Louisiana Department of Economic Development

The last column of Table 15 indicates that exemptions on over \$2 billion of refinery property will expire over the five-year period from 2013-17. Calcasieu Parish, in particular, will experience a taxable property bonanza during this period as over \$550 million in refinery property becomes taxable. East Baton Rouge Parish is next at nearly one half billion dollars (\$419 million), followed by St. John the Baptist Parish at over \$398 million dollars in new property that will come on the taxable rolls over 2013-17. In St. Charles Parish the figure is approximately one-quarter of a billion dollars (\$295 million).

The local taxes paid by these three energy industries that are listed in the third column back in Table 13 are very conservative for two reasons. First, they include only **parish** property taxes. They do not include (1) **municipal property taxes** or (2) **local sales taxes** paid by these industries when they buy products in the parishes. Unfortunately, neither of these taxes paid to local governments are tabulated by industry group.

Indirect Taxes Generated

The taxes detailed in Tables 12-13 are only those for which firms in these industries have to write out a check. But the presence of the extraction, refining, and pipeline industries generated \$20,543,100,000 in household earnings in 2011 through both the direct salaries paid and indirect earning produced through the multiplier effects (see Table 11). These earnings are subject to the state income tax. When spent, these household earnings generate gasoline taxes, sales taxes (both state and local), beer/soft drink/tobacco taxes, etc.

According to the Legislative Fiscal Office, the state of Louisiana collects seven cents in revenues (excluding mineral revenues) for every dollar earned by households in the state. **Thus the extraction, refining, and pipeline industries---through the direct and indirect creation of household earnings---were responsible for generating an estimated \$1,438,017,000---well over a billion dollars---in tax collections for the state of Louisiana in 2011.**

What about local taxes paid via these household earnings? Local governments collect approximately 4.4 cents for every dollar earned by a Louisiana household. **Thus, the \$20.5 billion in household earnings generated by the three energy industries through direct and multiplier effects added approximately \$903,896,400---nearly a billion dollars---to the coffers of local governments in 2011.**

Total Taxes Generated

A lot of ground has been covered to this point in documenting the amount of taxes---both directly and indirectly---generated by these three energy-related sectors. Table 16 handily summarizes our findings.

Table 16

Total State and Local Taxes Generated by the Energy Sector:
(Millions)

Tax Source	State Government	Local Government
Direct	\$1,497.0	\$409.7
Indirect	1,438.0	903.9
Total	\$2,935.0	\$1,313.6

The numbers are eye-popping, but not unexpected given our documentation of the size of this sector of the Louisiana economy. Note that nearly **\$3 billion of state government revenues can trace their origins back to the energy sector. For local governments, over \$1.3 billion dollars that were pumped into their treasuries is due to the presence of this industry.**

State and local tax dollars in Louisiana support a wide variety of social goods and services, such as elementary, secondary, and higher education, highways, the charity hospital system, economic development efforts, tourism promotion, public safety, and many others. If the extraction, refining, and pipeline industries suddenly vanished from our borders, the provision of these social goods and services would have to be dramatically retrenched. The impact of these three industries goes far beyond just jobs and incomes.

V. Technological Changes

What is truly exciting about this industry are the **technological changes** which are dramatically improving the success rate in wildcat drilling and significantly boosting the total recovery from a field once the petroleum is found. Among these advances are **3-D and 4-D** (i.e.,

tracking a field with 3-D over time) **seismic** techniques which allow explorers to see what is below the surface much more efficiently. Back in the early 80s, drillers might have to drill 10 wells to hit a producer; using 3-D and 4-D, only three wells are needed. Thus, the risk factor in this business has been significantly reduced. Also, recent advances in computing power have made seismic surveys easier and more accurate, allowing firms to see pockets of oil and natural gas at great depths. This advancement was crucial in the discovery of the lower tertiary formation associated with the initial deep water “Jack” Field, and others like Mad Dog, Tahiti, Perdido, Buckskin, and Big Foot.

Once the fields are discovered, **horizontal drilling** permits much more oil to be lifted from a discovery than in the past. For example, using older seismic and drilling techniques exploration companies were able to lift only about 35 percent of the oil in place. Adding 3-D and horizontal drilling raised that percentage to 40-50 percent. Then using 4-D there is a further improvement in some cases to 65-75 percent. Recently, ExxonMobil drilled what is called an "extended reach" horizontal well in Russia in the Odoptu Field where the horizontal portion of the well was 37,648 feet long (almost 7.3 miles), a new world record.¹⁴

A third major technological advance has been in **drilling and producing in great water depths**. Deepwater drillships are now capable of drilling in water depths in excess of 10,000 feet. In 2006, Chevron successfully completed a then record setting production test in the Gulf of Mexico in its “Jack Field”. This well was drilled in 7,000 feet of water and more than 20,000 feet under the ocean floor. Noble's Jim Day semi-submersible can drill in 12,000 feet of water. In late 2009, Chevron's Tahiti platform drilled the deepest producing well in the Gulf of Mexico at 26,700 feet---over five miles deep---4,000 of those feet being before hitting the floor of the Gulf. In January 2010,

McMoran Exploration, operating in only 20 feet of water, used a gorilla-class rig to drill through 28,263 feet below sea level (about as deep as Mount Everest is high) in the Davy Jones Prospect.

Ingenious developments in production platforms have further enhanced the ability of exploration companies to plumb the depths of the very productive Gulf of Mexico. In 1996, Shell Oil put in place the Mars platform in 2,940 feet of water, another new record for production platforms. Mars is a **tension leg platform** (tlp) rather than a fixed leg platform. Mars is basically tethered to the ocean bottom by very large metal tendons. From ocean bottom to the crown of the platform it was the tallest man-made structure ever built, equivalent to two Sears Towers end-to-end.

The Mars field is projected to yield 700 million barrels of oil, the largest domestic find since Alaska's Prudhoe Bay discovery 30 years ago.

Serious advancements are being made in drill pipes---a crucial step if drilling is to take place in very deep waters and at very great depths. The Department of Energy has announced the development of **IntelliPipe**, a drill pipe with built in telemetry that can operate thousands of feet below the surface via a coupler embedded in connections between pipe sections. The coupler permits data to be sent across small gaps between pipe sections through a cable attached to an inner pipe wall. The DOE also announced the development of a new **composite drill pipe** made from carbon fiber resins that are lighter, stronger, and more flexible than steel.¹⁵ **Composite tendons** have also been developed which are used to tether tension leg platforms and spars to the ocean floor. These too are lighter and stronger than tendons made with steel.¹⁶

ExxonMobil announced recently another technological advancement that will help speed up the drilling process. The optimization process---deemed the "**Fast Drill Process**"---uses real-time computer analysis of the drilling system's energy consumption, which helps improve the

management of factors that determine the drilling rate, such as weight on the drill bit, rotary speed, and torque.¹⁷

Another interesting aspect of exploration in the Gulf is how **productive the fields are**. We have already referenced the projected output from Mars. By way of comparison, the onshore record for a single gas well is one in the Sweet Lake Field near Lake Charles, producing 50-55 million cubic feet (mmcf) per day. One well in the Gulf last year was producing at three times that rate. Oil production rates are also huge and the oil is flowing unusually fast. In many of these fields the oil is in **sheet sand** as opposed to sand stone. The former is much more porous, so the oil flows out easier and faster.

In early 2002, the Minerals Management Service approved the use of **Floating Production Storage Offloading** (FPSOs) vessels in the Gulf of Mexico. Rather than using a platform to produce oil, with pipelines tied back to the shore, these FPSOs lift the oil to the surface to a large ship. The oil is stored there and then offloaded on to a barge which can take the oil ashore to the port paying the highest price. These FPSOs are typically "dynamically positioned". That is, there are thrusters on the sides of the ship controlled by satellites that keep the ship within a small movement area, even in hurricane force winds.

At least one major technological change is enabling pipe to be laid much more efficiently in the Gulf---the **spool ship**. A spool ship designed by Global Industries has a 110 foot diameter spool of pipe on it that it simply reels off the pipe into the ocean. Welding the spool on shore is much cheaper than welding at sea, and a strand of pipe that took eight days to lay, may now take only one day.

Lastly, a major technological advance since our last report was **hydraulic fracking of shale** to release both natural gas and oil from shale deposits. In the case of the Haynesville Shale, this involves drilling down vertically about two miles then horizontally about 5,000 feet. Holes are blown in the horizontal portion of the drill pipe; then a solution of water, sand, and chemicals is sent into the horizontal section under high pressure. The water/sand/chemical solution frac's the shale, releasing the natural gas and/or oil. This advancement has taken the U.S. from a position of a shortage of natural gas to one where prices are being held down by an abundance of this fossil fuel.

Super large plays in the Bakken Play in North Dakota, the Eagle Ford in South Texas, and parts of the Marcellus Play in Pennsylvania have resulted in a huge increase in U.S. oil production due to this new technological advancement. In 2003, only 10,000 b/d of oil was being harvested from the Bakken Play and North Dakota was only a minor player in U.S. oil production.. In 2014, that North Dakota will produce at least 1.1 million b/d and is now the third largest producer of oil in the U.S.

Table 17 illustrates the impact that fracking applied to oil shale has had on U.S. imports of oil. Note that as early as 2008, the U.S. was importing 9.8 mmb/d of crude or 66% of the nation's total consumption. As of 2013 imports are down to 7.6 mmb/d and represent only 47% of consumption. That import reduction was made possible by a 70% increase in domestic crude oil--- the largest increase of any country over that time period.

Table 17

U.S. Crude Oil Production and Imports: 2008 Versus 2013

2013:	
U.S. Production	8.5 mmb/d
U.S. Imports	7.6 mmb/d (47%)

2008:	
U.S. Production	5.0 mmb/d
U.S. Imports	9.8 mmb/d (66%)

As it turns out Louisiana has its own significant oil shale play---the Tuscaloosa Marine Shale (TMS)---which is shown in Map 3. This play runs right through the center of Louisiana and into the southwestern corner of Mississippi, and is estimated to contain about 7 billion barrels of oil. This play has some major advantages compared to many others including: (1) abundant supplies of water nearby, (2) a vast infrastructure of pipelines already in place (a distinct disadvantage of North Dakota's Bakken Play), (3) a close proximity to the refinery market, and (4) an oil-friendly environment.

Map 3

The Tuscaloosa Marine Shale



Unfortunately, the TMS has one major disadvantage. Its shale rock is rather “mushy”, much more like clay than more solid rock. The result is that when it is fracked, the cracks do not tend to stay open but collapse too soon to harvest the oil profitably. Recently, Goodrich Resources has apparently cracked the code on harvesting oil in the TMS and is expected to spend \$150 million drilling in this play in 2014. However, as the data in Table 18 show, the TMS has a way to go technologically before it can compete for rig activity effectively against other oil shale plays in the U.S.

Table 18

Breakeven Oil Prices by Play

Oil Shale Play	Breakeven Price
Monterey (CA)	\$36
Eagle Ford (TX)	\$49
Bakken (ND)	\$50
Granite Wash (OK)	\$57
Niobrara (CO)	\$66
Tuscaloosa (MS)	\$69
Tuscaloosa (LA)	\$92

Source: Rodgers Oil & Gas Consulting

VI. Summary and Conclusions

This study is an update of a study done for Mid-Continent Oil and Gas in 1996, and updated in 2002, 2007 and 2010 entitled, "The Energy Sector: A Giant Economic Engine for the Louisiana Economy." Our conclusions from this review of the impact of the extraction, refining, and pipeline industries can be summarized in a series of bullet points:

- Louisiana, through the luck of natural resource distribution, is the nation's **number two producer of crude oil and the number two producer of natural gas** among the 50 states.
- Louisiana ranks **number two among the states in petroleum refining** capacity.
- There are nearly **112,000 miles of pipelines** transporting crude petroleum and natural gas within the state and in its offshore area of the Gulf of Mexico.
- Through both their direct and multiplier effects **these three industries supported \$73.8 billion in sales in Louisiana firms, generated over \$20.5 billion in household earnings for Louisianans, and supported 287,008 jobs in the state in 2011.** The \$20.5 billion in earnings represented 11.6 percent of total earnings in Louisiana in that year. Personal income in not a single parish in Louisiana reaches this level. Eighty-six of the 185 countries ranked by the World Bank in 2012 have smaller gross domestic products than \$20.5 billion.
- On average **the job multiplier for these three industries was 4.4.** That is, for every job created in these sectors 3.4 additional jobs are created in other sectors in the state. The job multiplier for the oil and gas extraction industry is about 3.6 and for the very capital-intensive refinery industry it is about 9.0.
- These three industries directly **paid nearly \$1.5 billion in state taxes and fees** in FY13, or about 14.6 percent of total state taxes, licenses, and fees collected. Through the \$20.5 billion in household earnings generated by these three industries, state government indirectly was able to

collect an additional \$1,438,000,000 in taxes, **for a total boost to the state treasury of \$2.9 billion**.

- A very conservative estimate is that these three industries directly paid **\$410 million in ad valorem taxes to local governments** in the state in 2013---a 37.5% increase over 2009. In 43 of the state's 64 parishes, these ad valorem taxes exceeded \$1 million. In 22 parishes the number exceeded \$5 million. Dramatic increases in property tax receipts occurred in Caddo, Bossier, Desoto and Red River Parishes as a result of the new activity in the Haynesville Shale. The \$20.5 billion in household earnings generated by these three industries added approximately **\$903,900,000---nearly a billion dollars---indirectly** to the treasuries of local governments, for a total of just over **\$1.3 billion contributed to local government treasuries**.
- In 2013, there were **64,669 workers employed** in the extraction, pipeline, and refining industries---a number approximately equivalent to the 2012 population of Acadia Parish, the 18th most populous parish in the state. Fifty-six of Louisiana's 64 parishes had total covered employment smaller than this number in February 2014.
- These three industries paid nearly **\$5.9 billion in wages** for Louisiana households in 2013---a figure equivalent to 7.2 percent of total covered wages in the state that year.
- In the second quarter of 2013, the average weekly wage in Louisiana's manufacturing sector was \$1,207. **In refining it was 68 percent higher at \$2,026 and the extraction sector paid \$2,140 weekly---77.3% higher than the average in manufacturing. Weekly wages in the pipeline industry were \$1,640---36 percent higher than the average manufacturing wage.**
- **Energy jobs and earnings are found in all of Louisiana's 64 parishes in 2013.** There were 17 parishes where more than 1,000 workers were employed in these three industries. In Lafayette Parish (the highest employment parish), 16,179 workers were directly employed in these energy sectors.
- Value added is a broader measure of the total income created directly in an industry. In 2011 (latest data available), **Louisiana's oil and gas extraction sector produced nearly \$23 billion in total income.** That figure exceeds the **sum** of all the state's manufacturing sectors except chemicals.
- The refining sector's value added in 2011 was \$18 billion. That figure was 29.3 percent of the total value added the state's manufacturing sectors.

This report began with the statement: "It is the engine that makes the difference." For Louisiana, the presence of the extraction, refining, and pipeline industries have indeed made all the

difference. The energy industry, and its accompanying multiplier effects, has been a powerful engine for economic growth in Louisiana.

ENDNOTES

¹ www.eia.gov/dnav/pet/pet_crd_crdpn_adc_mbbldp_a.htm. We include federal offshore production in the Gulf in Louisiana's total because the great majority of the offshore production is serviced out of Louisiana ports. For example, the Lafourche Port Commission---which has regulatory authority over Port Fourchon---estimates that that port services over 90% of the offshore exploration/production activity in the Gulf.

²Oil and Gas Journal, December 2, 2013, p. 40.

³ James Mergist, Director of Pipeline Division, Louisiana Department of natural Resources, email April 2014.

⁴Ibid.

⁵ Note that the category "support activities for mining" contains companies that drill for oil and provide service work (seismic, well servicing, etc.) to the industry.

⁶www.Laworks.net. Go to monthly employment data, "Louisiana Workforce at a Glance", March 28, 2014, p.16.

⁷ www.bea.gov/regiona/reis/drill.cfm.

⁸www.Laworks.net/Downloads/LMI.

⁹ www.bea.gov/regiona/spi

¹⁰Ibid. Total earnings by place of work in Louisiana in 2011 was \$125.3 billion.

¹¹www.bea.gov/regiona/reis/drill.

¹²[http://en.wikipedia.org/wiki/List_of_countries_by_gdp\(nominal\)](http://en.wikipedia.org/wiki/List_of_countries_by_gdp(nominal)).

¹³www.bls.gov

¹⁴ Offshore Engineer, March 2011, p.10.

¹⁷ Oil and Gas Journal, July 18, 2005, p.17.

¹⁸Oil and gas Journal, August 15, 2005, p. 39.

¹⁹Go Gulf Magazine, 2005, p. 24.

