2017 UPDATE
ECONOMIC IMPACT STUDY
OF THE CALCASIEU SHIP CHANNEL

PREPARED FOR:

LAKE CHARLES HARBOR &
TERMINAL DISTRICT

NOVEMBER 2017

PORT OF LAKE CHARLES

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FOREWORD

The Calcasieu Ship Channel ("Channel") is the life-blood for economic development within the Lake Charles MSA and Southwest Louisiana Region ("Region"). The economic benefits and opportunities also extend throughout the State of Louisiana and the U.S.

"Global investors have announced more than $110 billion of investment in the Region that is directly tied to the Channel with $40 billion announced since the completion of the 2015 study. Many of the newly announced projects are LNG export terminals."

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In 2016, U.S. refiners became the world's top exporter of fuel. Lake Charles refineries exported 215,000 barrels per day of refined products in 2016—over 8 percent of the national total. Exports from the Channel have grown from less than 7 million metric tons in 2011 to nearly 13 million metric tons in 2016. The economic impacts of refiners and petrochemical companies along the Channel are enhanced by the growing share of production that is exported through the Channel.

Maintaining the Channel at congressionally authorized dimensions (400 feet wide for a full depth of 40 feet) is critical to meet the 2023 projected export growth of more than 36 million metric tons of LNG. Poor channel maintenance will constrain and impair refineries and chemical plants in Lake Charles from supplying export customers in the future. The economic consequences of proper channel design and maintenance are crucial to the future growth of the national export economy.

The trend of LNG exports within the Region and the significant national changes in the refining and petrochemical industry warrant an update of the 2015 Economic Impact Study commissioned by the Lake Charles Harbor and Terminal District ("LCHTD"). The 2017 update to the Study evaluates these national trends along with current and 2023 economic impacts of the Channel for the Lake Charles MSA, the State of Louisiana, and the U.S.

William J. Rase III, Executive Director
Lake Charles Harbor & Terminal District

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2017 UPDATE JUSTIFICATION

Significant changes in the refining and petrochemical industry since 2015, combined with the enhanced opportunities for exports of LNG, warrant an update of the Economic Impact Study of the Calcasieu Ship Channel (Channel) for the Lake Charles Harbor and Terminal District (LCHTD). These national changes are having impacts on the Lake Charles region and export-import shipments on the Channel. Gulf coast ports, including the LCHTD, have shifted from an import orientation to an export orientation because of rising production of domestic shale oil. The key changes that affect economic impacts for the Lake Charles region include:

- **Continued substitution of Eagle Ford shale for imported crude oil in Lake Charles refineries.** Oil imports have dropped from 21.0 million metric tons in 2011 to 14.7 million metric tons in 2016, while refinery output has grown. The national and local economic impact of refining have changed as a result of this trend.

- **The surge in liquid bulk exports from the Calcasieu Ship Channel.** U.S. refiners became the world's top exporter of fuel in 2016. Lake Charles refineries exported 215,000 barrels per day of refined products in 2016 – over 8 percent of the national total. Exports from the Channel have grown from less than 7 million metric tons in 2011 to nearly 13 million metric tons in 2016. The economic impacts of refiners and petrochemical companies along the ship channel are enhanced by the growing share of production that is exported through the ship channel.

- **Gulf coast ports, including LCHTD, are shifting from an import to an export orientation.** Limits on channel maintenance now affect national exports more than national imports. Poor channel maintenance now increases, rather than reduces, the current account deficit, reduces national GDP, and reduces federal, state and local taxes. Poor channel maintenance also reduces the economic impacts of the refining and petrochemical industry on the Lake Charles economy.

- **The growing volume of announced industrial projects along the Channel since the 2015 study.** Global investors have announced more than $110 billion of investment in the Lake Charles region that is directly tied to the Channel and $40 billion of the announcements have occurred since the completion of the 2015 study. Many of the newly announced projects are LNG export terminals.

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- **The growing importance of LNG to national economic development and the growing role that it will play in the Lake Charles Region.** The LNG industry is the largest new export product from the United States since the 1970s. Export volume through the Channel will increase by 36 million metric tons per year when shipments begin from Cameron LNG, Magnolia LNG, and Lake Charles LNG. If all 12 of the announced LNG projects along the Channel become operational, the volume increases by 143 million metric tons. LCHTD and the Channel will move into one of the nation's top 5 ports by 2023. A tripling of export volumes cannot occur without a channel that is consistently maintained at project depths.

These economic shifts make the Calcasieu Ship Channel a vital national asset for increasing exports, tax revenues, and jobs. Poor channel maintenance has become a constraint that impairs refineries and chemical plants in Lake Charles from supplying export customers. The economic consequences of proper channel design and maintenance of Gulf Coast ports, such as Lake Charles, are critical to the future growth of the national export economy.

The above changes affect the future economic impacts more than the current impacts of the Channel. Some of the current estimates in the 2017 update, however, have changed from the 2015 report. The drop in prices of oil, LNG, and petrochemical products since 2015 have affected the estimates of economic impacts in refining and petrochemicals. A new source of data on regional employment also affects some of the estimates since the multiplier effects change when the employment structure in the petrochemical industry shifts between products. Other changes are due to differences in output and earnings, which are the base data for most of the calculations. See the Methodology Appendix for details.

FINDINGS FROM THE 2015 ECONOMIC IMPACT STUDY WITH 2017 UPDATES

- **The Channel drives Southwest Louisiana's oil, gas, and chemical industries.** Which means it drives SWLA's economy. As a result of the Channel, economic forecasts show that the LNG and petrochemical industries will substantially grow, generating significant economic impacts locally, regionally, and nationally by 2023.

- **This industrial growth will generate a substantial increase in traffic along the Channel providing a positive impact to the local parishes, state, and national economies.** In 2013, maritime activities in the Channel accounted for nearly 40% of all materials processed in the Lake Charles Metropolitan Statistical Area (MSA), handling 56.5 million tons of cargo.

- **Between thirty-seven (37) and forty-six (46) percent of GDP in the Lake Charles metro area depends on the health of the channel.** The estimate for 2017 from the impact model shows that the percent has increased since 2015 due to the completion of petrochemical projects along the channel. The exact change will not be known until the Commodity Flow Survey for 2017 is released by the Bureau of the Census. Considering the major tax implications, maintenance of the Channel at the congressionally authorized draft and width (40 foot by 400 feet) is critical to support the anticipated expansions.

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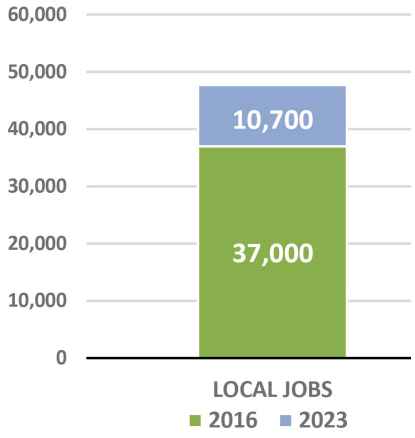
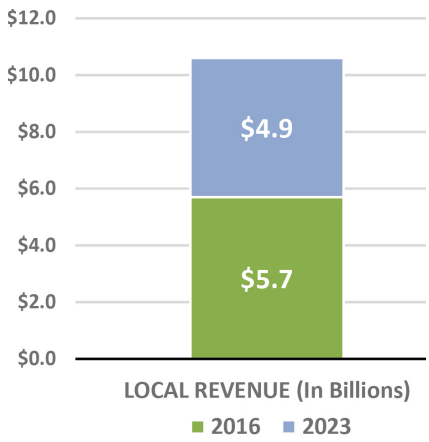
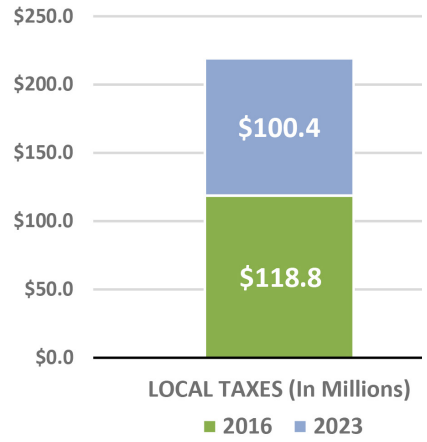
- **Industrial expansion is dependent on the Channel and the overall impacts of the forecasted 2023 growth to the economy is enormous.** Maritime commerce tied to industry expansion forecasts significant economic growth indicators to jobs, local revenue, and tax collection at the local, state, and federal levels. This Study evaluates those activities and analyzes the economic impacts.

Calcasieu Ship Channel - Local Economic Impact

The current regional impact of industry tied to the Channel is the direct employment of over 37,000 workers, or 35% of Lake Charles MSA employment, which is generating more than $5.7 billion for the local economy. Channel-dependent industrial expansion and investment projects will generate a 29% increase in employment and add an additional $5 billion in local annual revenue for a total of over $10.7 billion by 2023, accounting for 40% of the Lake Charles metro area economy. Additionally, Channel-dependent companies generate $119 million in annual tax revenue or, 50% of the local taxes collected in Calcasieu Parish in 2016. By 2023, the industrial expansion will reflect an increase of 84.5% in local tax revenue or $219 million annually.







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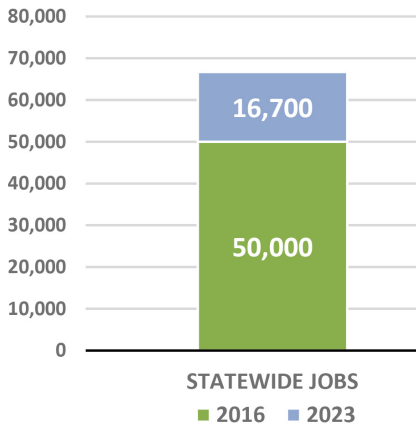
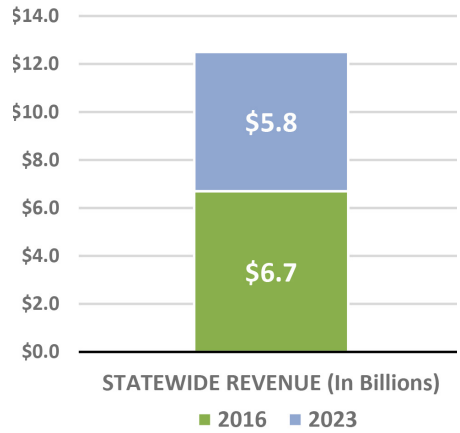
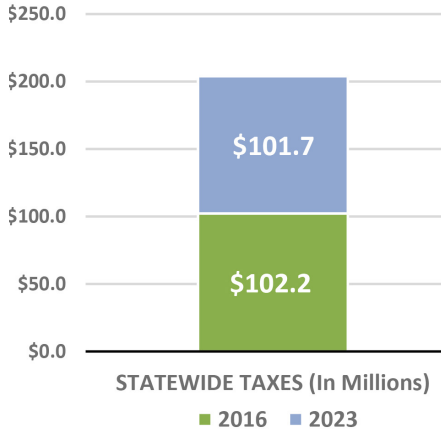
Calcasieu Ship Channel - Statewide Economic Impact

Moreover, the annual impacts of the Channel extend beyond the Lake Charles metro area which accounts for over 50,000 jobs in Louisiana of which 25% are outside the Lake Charles MSA. Industrial expansion and investment projects tied to the Channel are anticipating a 33% increase in employment, generating an additional 16,700 jobs statewide by 2023. This growth is also expected to generate an additional $5.8 billion in annual statewide revenue and an additional $101.7 million in annual taxes, accounting for a statewide increase of 86% and 99.5% respectively. The aggregate impact to Louisiana of the Channel's existing and new investments will be 66,700 jobs statewide, $12.5 billion in Louisiana revenue, and nearly $204 million of state taxes in 2023.







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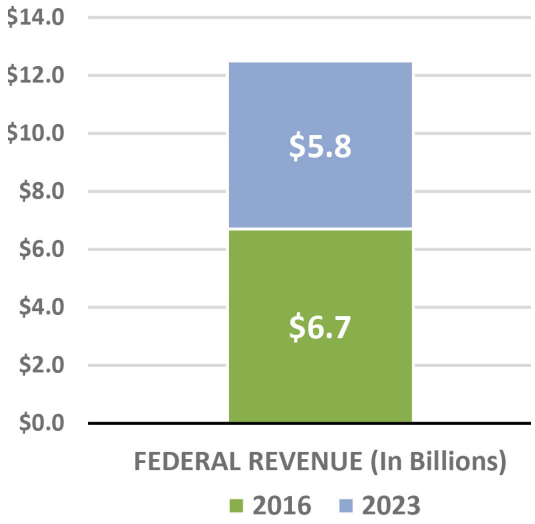
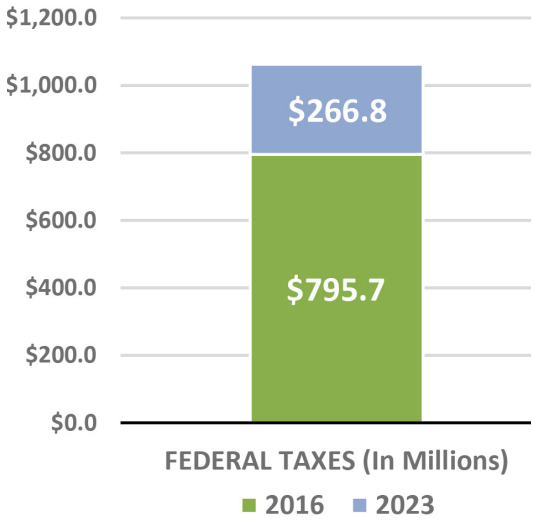
Calcasieu Ship Channel - Federal Economic Impact

Currently the 12th busiest port in the U.S. by tonnage, the Channel's industrial investments also have strategic national implications. The annual federal tax revenue generated by the Channel is substantially larger than the tax revenue at the state and local levels. Federal impacts from tax revenue in 2016 were an estimated $795.7 million; the federal impact of future investments is anticipated to net nearly $1.1 billion of additional tax revenue in 2023.





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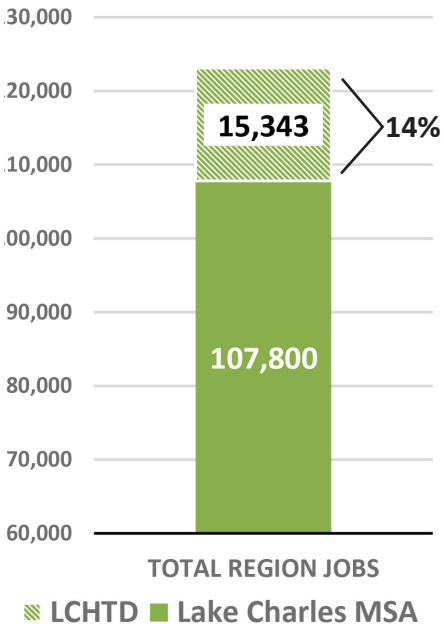
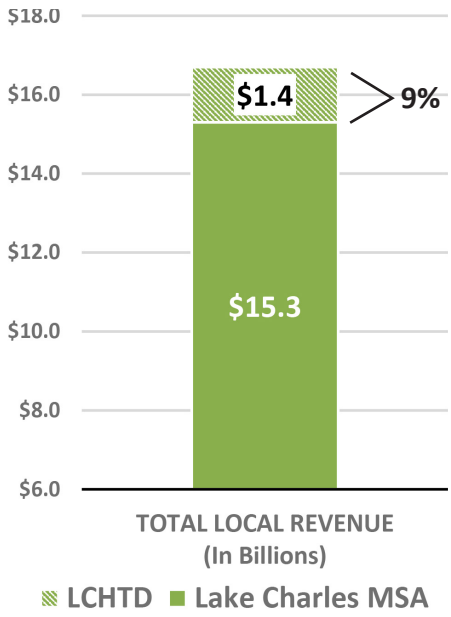
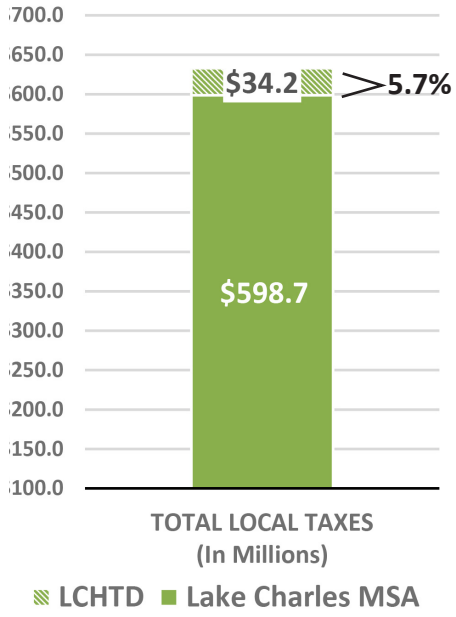
Calcasieu Ship Channel - Lake Charles Harbor and Terminal District Economic Impact

Furthermore, the report analyzes the economic impact of the LCHTD tied to the Channel in the Manufacturing and Production Sector and the Maritime Services Sector, as well as its non-maritime business activity including industrial, retail, gaming, hotel, and entertainment activity on land leased from LCHTD. The local economic impacts of the LCHTD are substantial even when the impacts from private terminals and other port authorities are excluded. The aggregated impacts of the LCHTD are 14% of local jobs, 9% of local economic revenue, and 5.7% of tax revenue for the Lake Charles MSA.



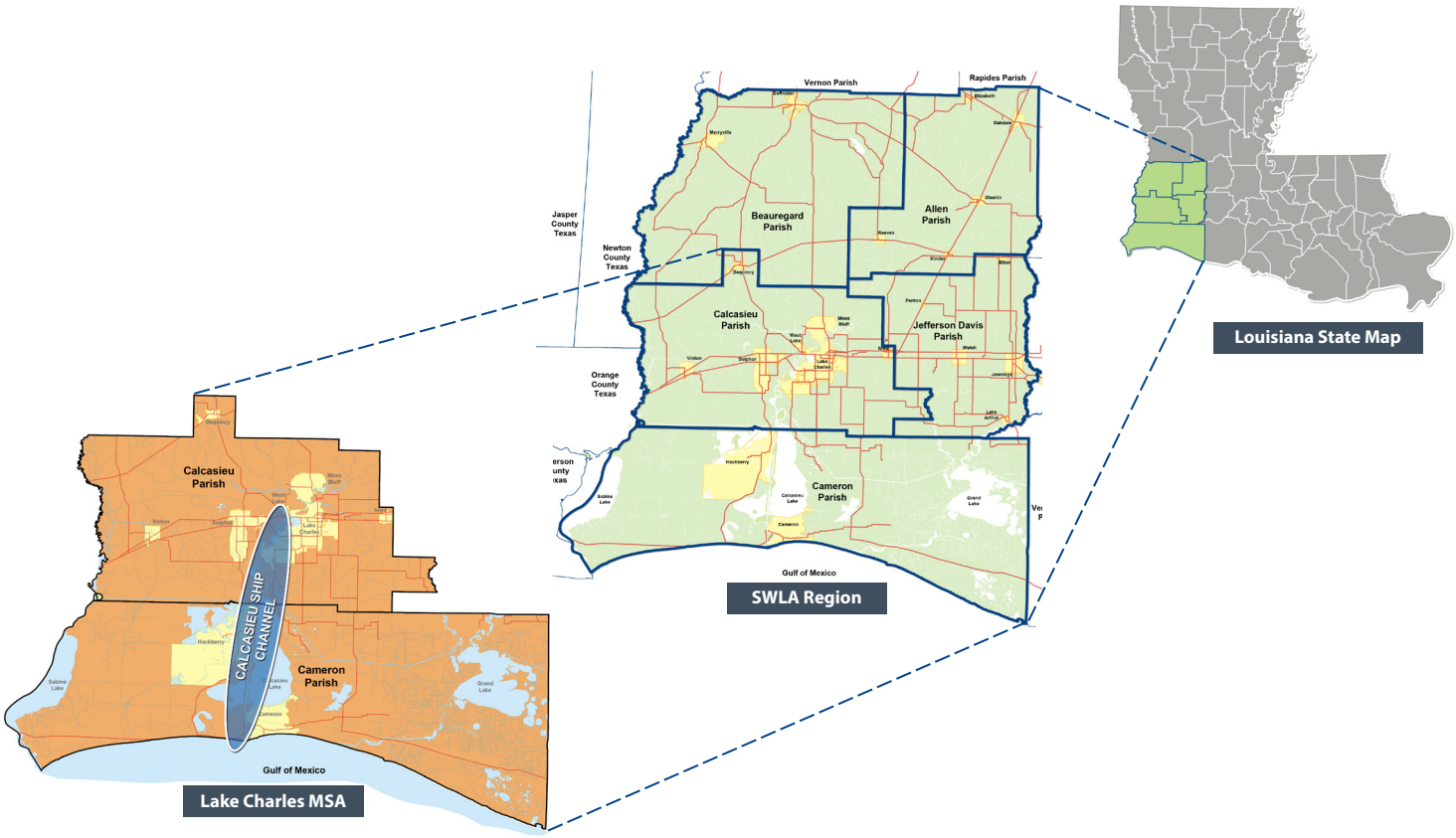




INTRODUCTION

OVERVIEW

Located in the Southwest Region of Louisiana (SWLA), the Calcasieu Ship Channel (Channel), also known as the Port of Lake Charles, was the 12th busiest port in the U.S. by tonnage in 2015. This ranking, based on Waterborne Commerce of the United States published by the U.S. Army Corps of Engineers (USACE) for 2015 (the latest year available as of this writing), will greatly increase in the very near future. Unprecedented growth and new economic development opportunities are on the horizon for the Lake Charles Metropolitan Statistical Area (MSA) as this Region is the epicenter for the renaissance of the nation's energy and petrochemical industries.



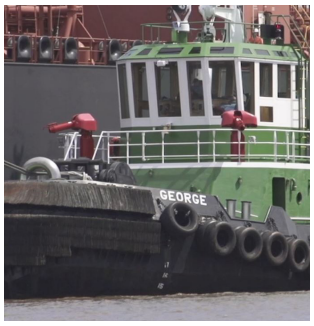
Lake Charles MSA within the SWLA Regional Map

The Channel, the facilities that depend on the Channel, and the LCHTD are the key drivers of the Region's economic activity as is true of many Gulf port locations. Ports provide economic impacts through two mechanisms. First, the ports provide infrastructure for the transfer of export and import of cargo from rail, pipelines, barges, and trucks to ocean going vessels and vice versa. Secondly, the ports provide a locational asset for companies that produce manufactured products with global raw material sources, especially for materials that move in large volumes and have a low value per unit of weight.

As of April 2017, over $117 billion in private capital improvement projects have been started or announced in the SWLA Region, the vast majority of which is in the Lake Charles MSA. The Channel serves as the principal transportation artery for economic activity in the Lake Charles MSA and as a major transportation artery for the entire Louisiana economy. The Channel will become home to 19 top economic development projects in the Region. In 2015, the Channel handled 56.7 million tons of cargo, including 19.5 million tons of imports, 9.7 million tons of exports, and 27.4 million tons of coastwise marine trade.[2]

"Because of the massive influx of investment coming to the Region, the Port and the Calcasieu Ship Channel are seen as the gateways to the Region's thriving energy corridor. We have always facilitated economic growth, but now it's on an even bigger scale."

William J. Rase III, Executive Director
Lake Charles Harbor & Terminal District



Photos provided courtesy of the Lake Charles Harbor & Terminal District

[2]US Army Corps of Engineers, 2015 Waterway Data. 2015 is the latest year for which data is available.

The principal raw material used in the Lake Charles MSA is crude petroleum. Approximately 29 million tons of crude petroleum was processed in 2013, of which 19 million tons were imported from outside the U.S. The import volume of crude oil was 390,000 barrels per day. With the accelerating output of domestic crude oil from shale formations since 2012, the volume of imports dropped to 288,000 barrels per day in 2016, but were offset completely by shipments of domestic crude oil. In other words, refineries in Lake Charles are using more domestic and less imported raw material. Since crude oil from the Eagle Ford Shale Region in South Texas is shipped by ocean barge, the share of crude moving by water has not changed.

An important trend in the refining-petrochemical-polymer complex is a jump in the export of refined petroleum products from Lake Charles refineries. While exports of refined products were negligible before 2010, they have risen substantially. In 2016, 11 million tons of oil products valued at $3.5 billion were exported via the Channel. That volume is up from 2.8 million tons in 2011 valued at $2.7 billion.

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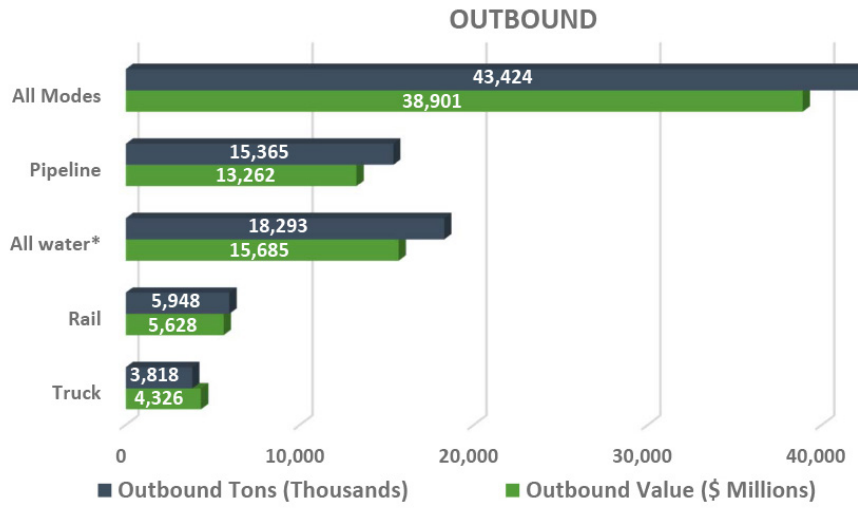
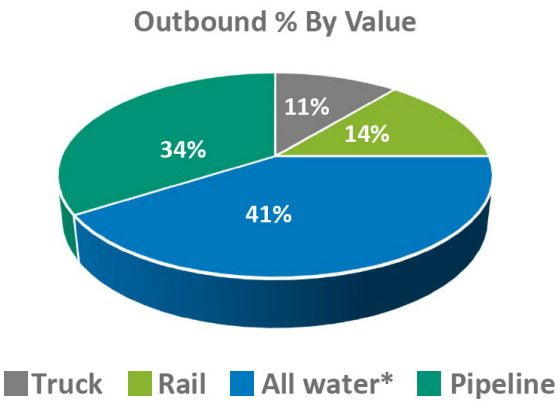
Manufacturing industries may be Channel dependent for receipt of raw materials or for export and domestic delivery of finished products, or for both. If an industry receives more than 50% of its raw materials by water, or ships more than 20% of its finished product by water, its viability hinges on access to waterways. Our analysis indicates that over 80% of the manufacturing employment in Lake Charles is strongly tied to waterway channel-dependent industries.

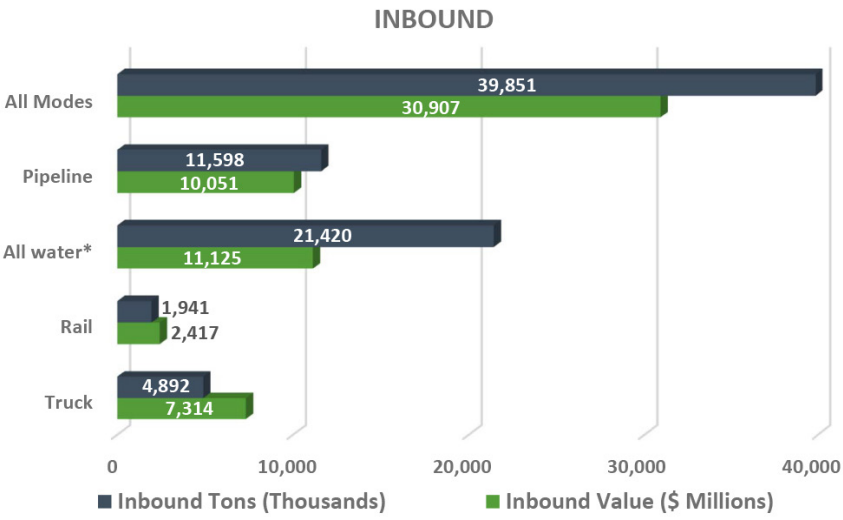
Photos provided courtesy of the Lake Charles Harbor & Terminal District

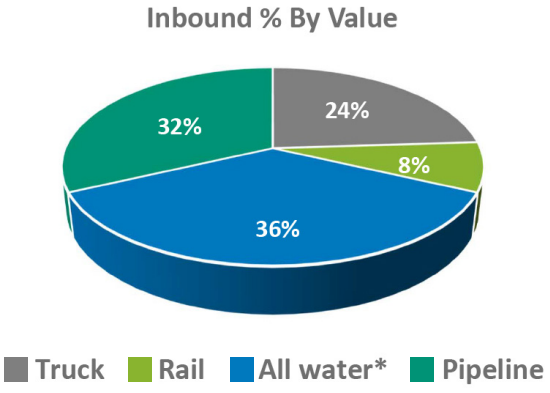
While other transportation modes provide some of the movement, the industrial complex in Lake Charles relies heavily on water transportation for receipt of raw materials (see Table 1). We estimate that 40% to 46% of the GDP in Lake Charles directly depends on maritime commerce for either raw material receipt or for the shipment of finished product. This estimate does not include the economic impact of maritime commerce where the manufacturing production is outside of the Lake Charles MSA.

Table 1: Lake Charles MSA Manufacturing Production by Transportation Mode (2012)







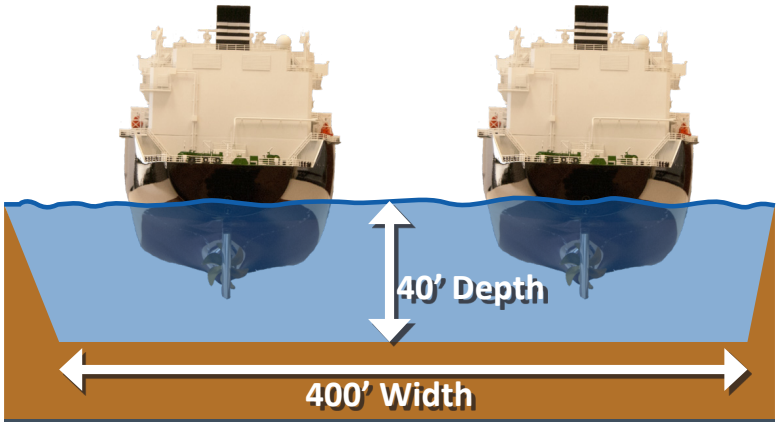


*All Water includes Deepwater and Inland Water. Inland Water Outbound ($5,6 Million, 7,474 Thousand Tons) at a Value of 14%.
Source: Commodity Flow Survey 2012 & USA Trade Online for imports.

PURPOSE OF THE REPORT

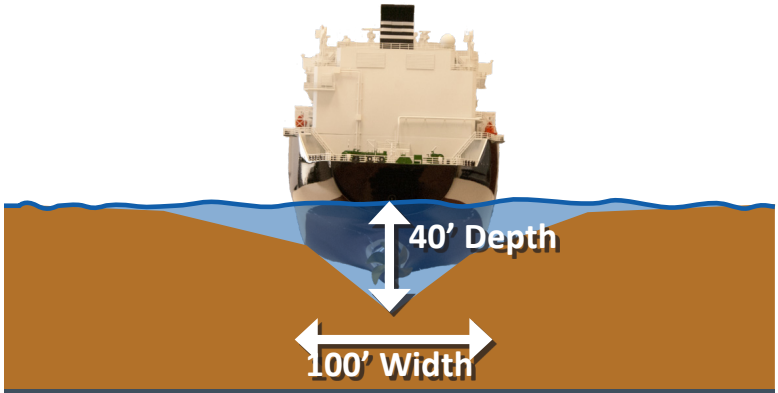
Findings according to a 2015 Calcasieu Ship Channel Traffic Study indicate that without maintaining the Channel to the congressionally authorized dimensions, delayed deliveries and shipments at the terminals could severely impact the Channel's ability to handle fully laden vessels.[3] This restriction would have a catastrophic economic impact on the local, regional, state, and federal economies.

Therefore, understanding the role that the Channel and the facilities along the waterway play in the economic future for the Lake Charles region and the State of Louisiana is critical. The purpose of this Economic Impact Study is to assess the current drivers and impacts of economic activity along the Channel as a substantial share of the nation's refining, petrochemical and polymer production is dependent on the Channel for the receipt of raw materials as well as the shipment of final products.



Calcasieu Ship Channel - Congressionally Authorized Dimensions

Likewise, major portions of the nation's basic chemical production move outbound from Lake Charles by marine vessel. Other manufacturing exports, such as petroleum coke, agricultural products, including milled rice, also move by water through the Channel to waiting customers. The economic impacts of these and other industries will be presented at the local, regional, state, and federal levels.



Calcasieu Ship Channel - Poorly Maintained Channel

[3]Calcasieu Chip Channel Traffic Study prepared by Ausenco, January 6, 2015.

NATIONAL AND REGIONAL CHANGES SINCE 2015

Significant changes in the refining and petrochemical industry since 2015, combined with the enhanced opportunities for exports of LNG, warrant an update of the economic impact study for the Port of Lake Charles. These national changes are having impacts on the Lake Charles MSA and export-import shipments on the Calcasieu Ship Channel. Gulf coast ports, including the Port of Lake Charles, have shifted from import orientation to export orientation because of rising production of domestic shale oil.

The earnings, GDP, and tax estimates in the 2017 update differ somewhat from those in the 2015 report. Some of the changes are due to the use of new employment and earnings data on the Lake Charles MSA economy by Economic Modeling Systems, Inc (EMSI). The EMSI data provides better estimates of employment within the chemical sector in the Lake Charles economy than the previous source. The overall employment within the sector is equal to the employment estimate used in the 2015 report, but the distribution of employment within specific chemical industries differs, as do the earnings per employee. Since the different industries have different multiplier effects, the aggregate earnings, GDP and tax revenues generated from these numbers differ as well. See the methodology appendix for more information about how the estimates are calculated.

Causes of Change within the Refining and Petrochemical Industry

- ***Gulf Coast Ports have shifted from import to export orientation;***
- ***Commodity prices for oil, LNG, and petrochemical products have dropped significantly since 2014; and***
- ***Assumptions about future economic impacts of the LNG industry.***

A second explanation for the shifts in these industries is that commodity prices for oil, LNG, and petrochemical products have dropped significantly since 2014. The lower prices affect many of the impacts of the industries that consume and produce these products.

The assumptions about the future economic impacts of the LNG industry are yet another cause for the changes. The estimates in the 2015 report were constructed by modifying operating costs for the industrial gas industry. The 2015 estimates assumed that LNG exports would add $7.40 per million BTUs to national and regional GDP while the 2017 estimates assume that such exports will only add $4.47 per million BTUs. The cost structure of the industry also was revised by using actual operating costs published by Cheniere Energy rather than estimates made using costs in the industrial gas industry.

The 2015 estimates assumed that LNG exports would add $7.40 per million BTUs to national and regional GDP while the 2017 estimates assume that such exports will only add $4.47 per million BTUs.

An additional driver of change is that three of the projects identified in the 2015 report (Westlake Chemical, Matheson Trigas, and IFG) are now completed. They affect the current economic impacts of the channel but no longer are part of the future impacts. An additional six projects have been announced since 2015 and these new projects have increased the future economic impacts of the ship channel.

Many of the changes in impacts are due to national rather than regional trends. Among the key national changes that affect the estimates of the economic impacts of the ship channel on the Lake Charles region are:

- **Continued substitution of Eagle Ford shale for imported crude oil in Lake Charles refineries.** Oil imports have dropped from 21.0 million metric tons in 2011 to 14.7 million metric tons in 2016, while refinery output has grown. The national and local economic impact of refining have changed as a result of this trend.

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Limits on channel maintenance now affect national exports more than national imports.

- **The growing volume of announced industrial projects along the Calcasieu Ship Channel since the 2015 study.** Global investors have announced more than $110 billion of investment in the Lake Charles region that is directly tied to the Channel and $40 billion of the announcements have occurred since the completion of the 2015 study. Many of the newly announced projects are LNG export terminals.

- **The growing importance of LNG to national economic development and the growing role that it will play in the Lake Charles Region.** The LNG industry is the largest new export product from the United States since the 1970s. Export volume through the Channel will increase by 36 million metric tons per year when shipments begin from Cameron LNG, Magnolia LNG, and Lake Charles LNG. If all 12 of the announced LNG projects along the Channel become operational, the volume increases by 143 million metric tons. LCHTD and the Channel will move into one of the nation's top 5 ports by 2023. The increase in ship traffic needed to handle a tripling of export volume cannot occur without a channel maintained at congressionally authorized dimensions of 400-feet wide by 40-feet deep.

Export volume through the Channel will increase by 36 million metric tons per year when shipments begin from Cameron LNG, Magnolia LNG, and Lake Charles LNG. If all 12 of the announced LNG projects along the Channel become operational, the volume increases by 143 million metric tons. LCHTD and the Channel will move into one of the nation's top 5 ports by 2023.

These economic shifts make the Channel a vital national asset for increasing U.S. exports. Poor channel maintenance constrains refineries and chemical plants in Lake Charles from supplying export customers. The economic consequences of proper channel maintenance and deepening in Lake Charles is critical to the future growth of the national export economy.

SCOPE

SCOPE AND TIME PERIOD OF INVESTIGATION

Our Study update provides estimates of the economic impacts of the Channel on the Lake Charles metro area, the State of Louisiana, and the national economy. Estimates herein are specific to economic activity in calendar year 2016 and to the additional economic activity expected by calendar year 2023 from more than 19 announced industrial projects in Southwest Louisiana. Anticipated future economic activity is based on information provided as of April 2017.

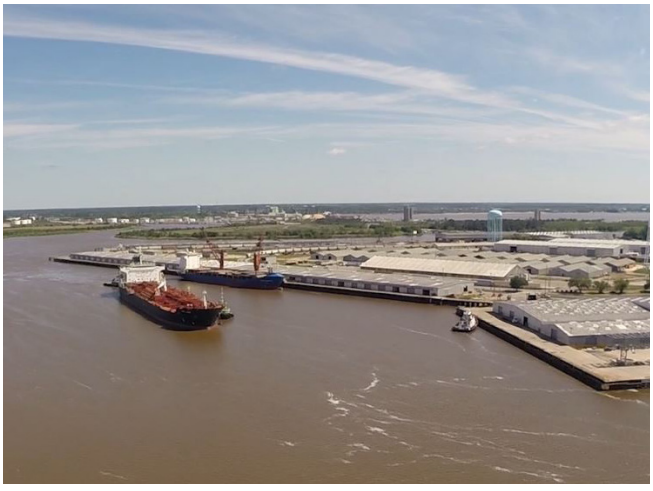
Data sources utilized include confidential interviews with major shippers and maritime companies, surveys from maritime companies, and published statistical reports. Published data for 2016 and/or extrapolated data from previous years were used as the basis for current estimates. Future estimates are based on the Regional Impact Study (RIS) produced in 2014 for Sasol SA, along with more recently announced projects.

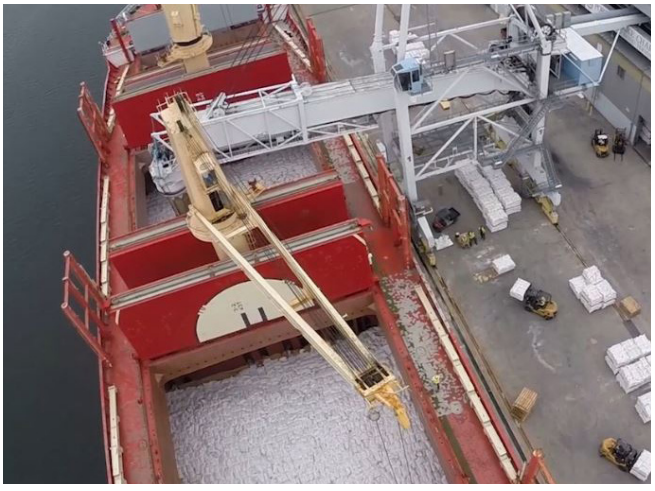
The economic impacts modeled include all operations of every port authority and terminal, not just LCHTD operations. Also included are manufacturing operations of industries that own private terminals along the Channel and are directly tied to maritime transportation as recipients of raw materials or shippers of final product. The local impacts for the LCHTD include maritime activity on the Channel plus industrial, retail, gaming, hotel, and entertainment activity on land leased from LCHTD.

The geographic study area consists of the two (2) parishes that comprise the Lake Charles MSA. The multipliers used to model local impacts encompass all of the business-to-business and payroll spending within this two-parish region that defines part of the SW Louisiana Alliance and that encompasses the SWLA labor market.[4]

While the impacts for the five-parish region are somewhat larger than for the Lake Charles metro area, studies conducted as part of the Sasol RIS suggest that Calcasieu Parish accounts for 75% of current economic activity within the five parishes, with a higher proportion of the economic activity projected for 2023.

Ports serve multiple functions in a local or national economy, including production of GDP by serving as gateways for the interchange of domestic and foreign merchandise. Almost all imports and exports move inland by truck, rail, barge, or pipeline – but move outside the U.S. on ocean vessels. Efficient ports are the critical economic assets of these transactions. Vessel services, cargo handling, ship supplies, warehousing and temporary storage, cargo packing, and inland movements of cargoes are significant economic transactions provided by ports. The construction and maintenance of port terminals and channels are a second source of economic impacts from cargo movements.





Photos provided courtesy of the Lake Charles Harbor & Terminal District

[4]Multipliers used are from the Bureau of Economic Analysis, U.S. Department of Commerce.

Ports along the Gulf Coast also serve as locations for transportation-sensitive manufacturing.[5] Transportation-sensitive industries must be located near sources of raw materials to avoid double handling of cargoes as operational efficiency cannot be achieved without immediate access to marine terminals. A significant share of the world's heavy industry, and virtually all of the manufacturing in the Lake Charles economy, fits the definition of transportation-sensitive industry. Financial viability of these companies depends on access to efficient marine transportation.

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This Study models both types of port impacts for the Lake Charles MSA. Industries are identified as "channel-dependent" if they receive a significant share of raw materials by water transportation or if they ship a substantial share of finished products by water transportation. The Commodity Flow Survey (CFS) from the Bureau of Transportation Statistics and US Trade Online are the sources of data for identifying the mode of trade flows (both sources were used because the CFS does not capture data on imported materials).

Although refining, petrochemicals and polymers are separate industries for statistical purposes, they are a single economic cluster, where the byproducts of refining of crude oil are used to produce petrochemicals and polymers. The products in these different manufacturing categories are typically manufactured in the same or adjacent plants, and therefore, are treated as a single industry. Major companies included in the local refining-petrochemical-polymer cluster are Citgo, Phillips, Sasol, Firestone, and Westlake Chemicals.

Table 2: Lake Charles MSA Industries Directly Connected to Marine Transportation

NAICS	Name	Inbound Materials	Outbound Product
3241-52	Refining-Petrochemical-Polymers	X	X
3251	Basic Chemicals		X
3259	Other Chemicals Including Pigments	X	
3273	Cement and Concrete	X	
4889	LNG Plants		X

[5]These are industries such as oil refining that consume large quantities of raw materials of low unit value or for industries where the volume of finished products is much denser than its raw materials such as iron and steel. Some industries, such as pulp and basic chemicals, cannot serve customers efficiently without access to low cost water transportation.

Basic chemicals are an important industry in Lake Charles, with Axiall the largest basic chemical company that produces chlorine, vinyl chloride monomer (VCM) and caustic soda from subsurface salt formations. The local presence of raw materials explains why marine transportation for inbound materials is not used by Axiall or the entire basic chemical industry; however, the basic chemical industry is still port-dependent.

REGIONAL AERIAL VIEW

Other chemicals include drilling fluids and pigments. Leading companies in this industry include Lyondell Basell Industries, Newpark Drilling Fluids, Francis Drilling Fluids, Chemtura, and Louisiana Pigment Company.

Cement and aggregate are largely imported materials along the Gulf Coast. Limestone and aggregates used in Louisiana are primarily imported from Mexico. The leading local companies in this industry are Port Aggregates, Dunham Price, Halliburton, and Holnam.

Collectively these manufacturing industries represent 80% of the manufacturing employment in the Lake Charles MSA.

FINDINGS

LOCAL IMPACTS

Current production and maritime impacts of the Channel, except for shipbuilding, occur in Calcasieu Parish, even though personal income generated by these activities is dispersed throughout the Region. Because the tax revenue impacts of direct and indirect jobs occur near the place of work rather than the place of residence, tax revenue impacts of the Channel also occur almost exclusively in Calcasieu Parish. Since 96% of wages and salaries earned in the metro area and 96% of jobs are generated in Calcasieu Parish, the assumption is that metro area impacts and Calcasieu impacts are virtually the same.

Future industrial expansion economic impacts, however, will not be as concentrated in Calcasieu Parish as compared to current impacts, as several proposed and a few approved, LNG terminals are located either in all or a part of Cameron Parish (see Table 3).

Table 3: Announced Ship Channel Related Industrial Projects in Lake Charles MSA as of April 2017

NAICS	Parish	Industry	Name	Employment in 2023
325110	Calcasieu	Petrochemicals	Axiall	250
325120	Calcasieu	Petrochemicals	Big Lake Fuels (G2X)	243
325120	Calcasieu	Petrochemicals	Juniper	29
325120	Calcasieu	LNG	Magnolia	70
325110	Calcasieu	Petrochemicals	Sasol-Ethane Cracker	500
325120	Calcasieu	Petrochemicals	Sasol GTL	200
488999	Cameron / Calcasieu	LNG	Cameron LNG	190
488999	Calcasieu	LNG	Lake Charles LNG/BG Group	250
488999	Calcasieu	LNG	Live Oak LNG	100
488999	Cameron	LNG	Venture Global LNG	100
488999	Cameron	LNG	SCT&E LNG	200
336611	Cameron	LNG	Waller Point Terminal	45
325120	Calcasieu	Petrochemicals	Advanced Refining Technologies	30
326150	Calcasieu	Cryogenic Insulation	Dongsung	250
325110	Calcasieu	Ethane Cracker	Indorama	125
325110	Calcasieu	Methanol/Carbon Capture	Lake Charles Methanol	200
488999	Cameron	LNG	Delfin Floating LNG	100
488999	Cameron	LNG	G2	250
488999	Cameron	LNG	Driftwood LNG	250
			Calcasieu Total	2,247
			Cameron Total	1,135
			MSA Total	3,382

Current and future local impacts of the Channel and of the LCHTD are summarized below. Impacts of the Channel consist of combined impacts of maritime commerce plus industrial production tied to maritime commerce.

CURRENT TRENDS

Industries tied specifically to the Channel directly employed 9,883 workers in 2016, with an estimated 7,831 jobs in manufacturing production and an additional 2,052 estimated jobs in maritime services (see Table 4). Economic Modeling Specialist, Inc. (EMSI) identifies 45 companies within the industrial production sector and 120 within the maritime and transportation sector.[6] Tenants of the LCHTD contribute an additional 3,555 estimated jobs.

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The total employment impact of the Channel is estimated at 37,000 jobs (see Table 4), which comprises one-third of total employment in the metro area.

Table 4: Calcasieu Ship Channel - Current Impacts in 2016

Industrial Production	Industry	Direct Jobs	Total Jobs
Refining	324110	2,263	9,634
Petrochemicals and Polymers	325110	2,505	14,627
Rice Milling (Not Farming)	311210	63	248
Inorganic Chemicals	325181	1,707	6,077
Metal Fabrication	332410	682	1,398
Aggregate and Cement	212320	376	834
Shipbuilding	336611	235	335
TOTAL PRODUCTION SECTOR		7,831	33,153
MARITIME TRANSPORTATION		2,052	4,006
CALCASIEU SHIP CHANNEL DEPENDENT		9,883	37,159
Lake Charles MSA			107,800
Ship Channel Dependent as % of Total			34%

[6]Source: EMSI (direct employment), BEA (multipliers & total employment)

Impacts calculated by employment understate overall economic impact of the Channel because RIMS multipliers treat full-time and part-time jobs equally. Direct jobs within industrial production and maritime services are largely full-time, while spin-off jobs in other sectors are part-time. GDP impacts calculated are 37% of the economic activity in the Region (see Table 5), while 50% of local tax revenue is generated directly or indirectly from industrial production or maritime services tied directly to the LCHTD and the Channel. Local taxes included in the calculation are sales and property taxes. The methodology used to estimate tax revenues, as well as the tax breakout, is shown in Appendix B - Methodology. All estimates in this report include direct, indirect (business-to-business purchases) and induced (payroll spending) impacts.

Table 5: Calcasieu Ship Channel - Impacts in 2016 Measured in Regional Jobs, Earnings, Local GDP, and Local Taxes

	Total Regional Jobs	Local Earnings	Output To Final Demand (GDP)[1]	Local Taxes
TOTAL PRODUCTION SECTOR	33,153	$1,602,532,000	$5,386,096,790	$105,749,059
Maritime Services	4,006	$188,101,000	$336,754,739	$13,107,081
TOTAL CALCASIEU SHIP CHANNEL	37,159	$1,790,633,000	$5,722,851,529	$118,856,140
TOTAL Lake Charles MSA	107,800	$5,743,868,000	$15,353,000,000	$238,160,594
Ship Channel Percent	35%	31%	37%[2]	50%

Source: Lake Charles MSA data obtained from the Louisiana Workforce Commission (LWC)
Notes:
1. GDP Expressed in 2016 Dollars
2. This is the estimate from the impact model, up slightly since 2015. The actual share of GDP tied to the ship channel depends on raw material imports and domestic and export shipments by water. The range of estimates based on the 2012 Commodity Flow Survey is 37 to 46 percent. The actual figure lies within this range.

FUTURE IMPACTS

Future impacts from the production sector will increase substantially because of the expansion of the petrochemical industry and the development of the LNG export industry. These activities are expected to expand direct employment by 3,382 jobs in 2023, with a total impact of over 10,000 permanent jobs (see Table 6 below).

Table 6: Calcasieu Ship Channel - Additional Jobs Impacts in 2023

	Regional
Direct	3,382
Indirect	4,815
Induced	2,532
Total	10,729

The 19 industrial projects tied to maritime commerce, if all are completed and operational in 2023, will generate an additional annual $4.9 billion GDP, $1.7 billion of local earnings and an additional $100 million local sales and property taxes (see Table 7 below).

Table 7: Calcasieu Ship Channel - Additional Local Impacts in 2023 *(in 2016 Dollars)*

	Regional
Total Earnings	$1,758,152,400
Output to Final Demand (Local GDP)	$4,974,040,000
Personal Income	$2,225,509,367
TAXES	
Sales Taxes	$48,359,400
Property Taxes	$52,088,000
TOTAL TAXES	$100,447,400

Note: Changes include drop in LNG export price - from $7.40 to $4.47/MBTU and utilization of Cheniere 2016 annual report sales and operating cost rather than theoretical estimates.

These expansions represent a 29% increase in port-dependent jobs, 87% expansion in port-dependent GDP, and more than double the local tax revenues generated from channel-dependent companies. Channel-dependent expansions in 2023 represent almost 90% of the total regional impacts during that year, as estimated in the 2014 Sasol RIS. The economic health of the Lake Charles MSA will become even more dependent on the Channel in the future (see Table 8 below).

The economic health of the Lake Charles MSA will become even more dependent on the Channel in the future.

Table 8: Calcasieu Ship Channel - Impacts in 2023 *(in 2016 Dollars)*

	Impacts in 2016	Planned Expansion 2023	Aggregate in 2023	% Growth
Total Jobs	37,159	10,719	47,878	29%
GDP	$5,722,851,529	$4,974,040,000	$10,696,891,529	87%
Local Taxes	$118,856,140	$100,447,316	$219,303,456	85%

STATEWIDE IMPACTS

Economic impacts from the Channel have a larger impact on the Louisiana economy because more of the business-to-business transactions occur within the State than occur within the metro area. A significant component of raw materials and maintenance services used in refining and petrochemicals, for instance, are supplied by companies located outside of the Lake Charles metro area but within Louisiana. The percentage of impacts that occur outside the local economy but within the balance of Louisiana can be calculated from RIMS II multipliers used in this study.

In terms of employment, industries dependent on the Channel produce 13,000 jobs outside the local economy.

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More than 50,000 total jobs in the statewide economy, almost 2% of the state total, are generated by Channel activities (see Table 9).

Table 9: Calcasieu Ship Channel - Statewide Jobs Impact in 2016

	Region	Louisiana	Outside Region	Outside Region %
Direct	9,884	9,884	0	0
Indirect	16,047	21,376	5,329	25%
Induced	11,228	18,901	7,673	41%
TOTAL	37,159	50,161	13,002	26%

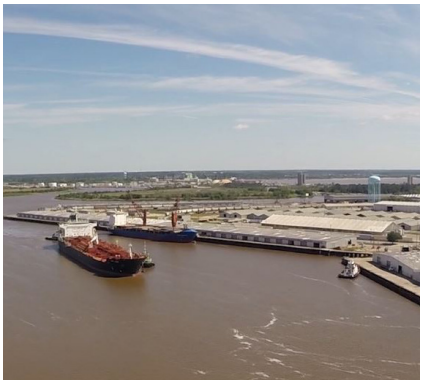
Because the additional impacts within Louisiana stem from production of raw materials and intermediate inputs, output to final demand from ship channel dependency is the same at the state and metro area levels (intermediate inputs are not counted in final demand or GDP). Additional inputs into manufacturing and maritime services do, however, increase earnings and personal income within the statewide economy. An additional $870 million of earnings and $1.1 billion of personal income is generated outside of the Lake Charles economy from the Channel's production and services (see Table 10).

Table 10: Calcasieu Ship Channel - Other Statewide Impacts in 2016

	Region	Louisiana	Outside Region
Output To Final Demand	$5,722,851,529	$6,752,965,000	0
Earning	$1,790,633,000	$2,662,868,000	$872,235,000
Personal Income	$2,266,624,051	$3,370,719,000	$1,104,094,949
TAXES			
Sales Taxes	$49,242,000	$53,237,000	$3,896,000
Property Taxes	$53,039,000	0	0
Other Production Taxes		$85,410,000	0
Income Taxes		$49,194,000	0
TOTAL TAXES	$102,281,000	$187,841,000	$3,896,000

Note: Property tax estimates are based on output levels, which have declined since 2015 due to lower prices for chemical and refined products.

The Louisiana tax structure generates more tax revenue at the state level than at the local level. Production taxes (such as severance taxes) and personal income taxes generate most of the statewide taxes.



Photos provided courtesy of the Lake Charles Harbor & Terminal District

STATEWIDE ECONOMIC IMPACTS IN 2023

Announced industrial projects tied to the Channel are shown in Table 4, which appears earlier in this report. These projects will also have statewide impacts outside of the metro area economy. In particular, the LNG industry will have a disproportionate impact on the economy because all of its output is exported.

The announced expansions tied to the Channel will generate an additional 16,600 jobs in Louisiana, of which over one-third are outside of the Lake Charles metro area (see Table 11). Moreover, $2 billion of earnings and $2.5 billion of personal income in Louisiana will be generated from the announced projects (see Table 12). Parishes outside of the Lake Charles metro area will benefit from $246 million of new earnings and $312 million of additional personal income (see Table 12). Additional spending from these incomes will generate $102 million in additional state tax revenue.[7]

Table 11: Calcasieu Ship Channel - Additional Jobs Impact in 2023

	Region	Louisiana	Outside Region
Direct	3,382	3,382	0
Indirect	4,815	6,856	2,041
Induced	2,532	6,445	3,913
TOTAL	10,729	16,683	5,954

Table 12: Calcasieu Ship Channel - Additional Impacts in 2023 from Announced Projects *(in 2016 Dollars)*

	Region	Louisiana	Outside Region
Total Earnings	$1,758,152,400	$2,004,722,000	$246,569,600
Output to Final Demand	$4,974,040,000	$5,869,367,200	$895,327,2000
Personal Income	$2,225,509,000	$2,537,622,785	$312,113,785
TAXES			
Sales Taxes	$48,359,000	$35,170,000	
Property Taxes	$52,088,000	-	
Other Production Taxes	-	$34,112,000	
Income Taxes		$32,499,000	
TOTAL TAXES	$100,447,000	$101,781,000	

[7]Production Taxes were estimated at the average of production taxes for refining and petrochemicals.

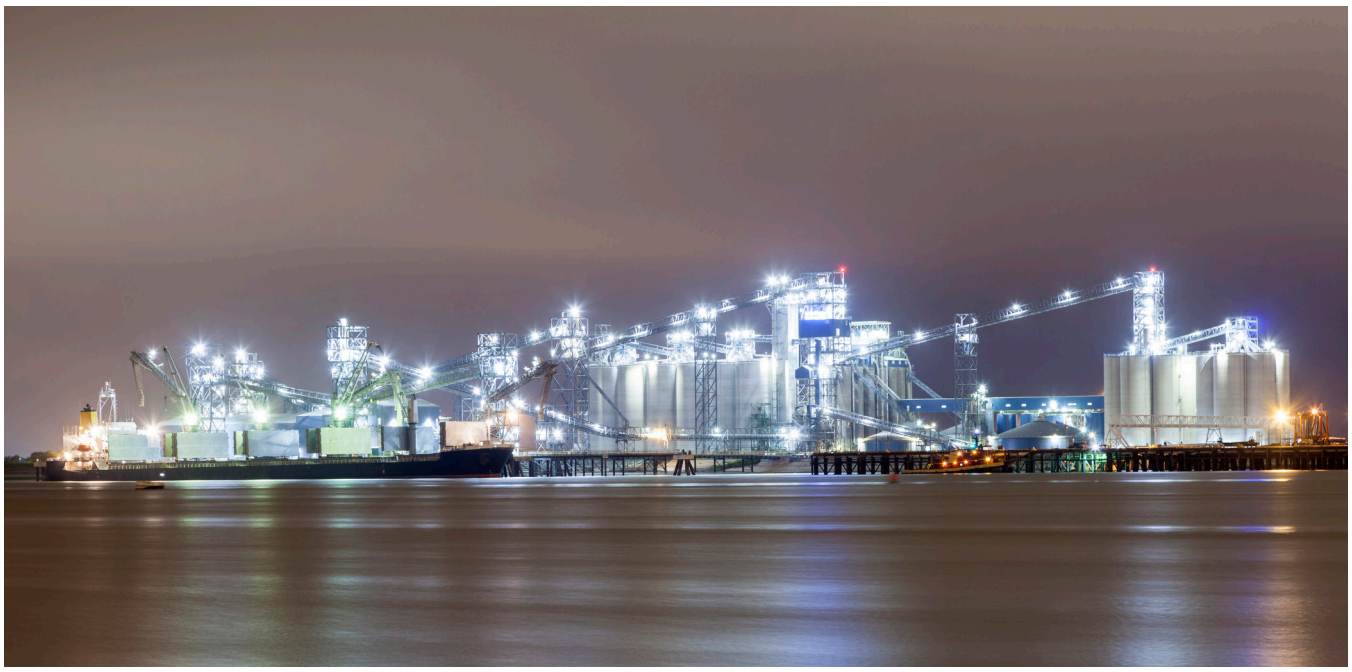
The Channel, after completion of industrial expansion projects, will generate an even larger portion of state employment, GDP and tax revenues, based on historic growth rates for the Louisiana economy (see Table 13).

The Channel, after completion of industrial expansion projects, will generate an even larger portion of state employment, GDP and tax revenues, based on historic growth rates for the Louisiana economy.

The announced expansions, if fully executed, will generate 33% more jobs and 87% more tax revenue statewide than the operations tied to the Channel in 2016.

Table 13: Statewide Calcasieu Ship Channel Impacts in 2023 *(in 2016 Dollars)*

	Impacts in 2016	Planned Expansion 2023	Aggregate in 2023	% Growth
Total Jobs	50,161	16,683	66,844	33%
GDP	$6,752,964,804	$5,869,367,200	$12,622,332,004	87%
State Taxes	$162,286,011	$101,781,000	$264,067,011	63%



FEDERAL IMPACTS

Federal revenues generated by the Channel are substantially larger than the tax revenue at the state and local levels because federal tax rates are higher than state or local tax rates, and the federal government levies more types of taxes than state and local governments. The tax revenue of the Channel on the federal budget is consequently much larger in absolute terms than the impact on either the state or local government budgets. The following information focuses on tax revenue impacts, since the other economic impacts are fully captured in the "State Impacts" section of this report.

Federal revenues from the Channel and associated industrial production consist of personal and corporate income taxes, customs duties on crude oil imports, and a harbor maintenance tax levied on all imports moving from deepwater ports. The methodology used to calculate taxes is shown in Appendix B - Methodology.

Photo provided courtesy of the Lake Charles Harbor & Terminal District

Current fiscal impacts of the Channel and associated industrial production was $795 million in 2016 (see Table 14). Fiscal impacts will expand by an additional $266 million to $1,062 billion in 2023, provided all of the announced LNG and petrochemical projects become operational. These numbers assume that the percentage of crude oil refined in the U.S. does not change between 2016 and 2023.

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Table 14: Calcasieu Ship Channel - Federal Fiscal Impacts *(in 2016 Dollars)*

	Federal Impacts		
	2016	2023 Projects	2023 Total
Output To Final Demand	$6,752,965,000	$5,869,367,000	$12,622,332,000
Earning	$2,662,868,000	$2,004,722,000	$4,667,590,000
Personal Income	$3,370,719,000	$2,537,623,000	$5,908,342,000
TAXES			
Sales Taxes			
Property Taxes			
Other Production Taxes			
Income Taxes	$780,500,000	$266,831,000	$1,047,0331,000
Customs	$10,796,000	-	$10,796,097
Harbor Maintenance Tax (FY 13)	$4,465,705	-	$4,465,705
TOTAL TAXES	$795,761,705	$266,831,000	$1,062,592,802

IMPACTS OF THE LAKE CHARLES HARBOR AND TERMINAL DISTRICT

Impacts of the LCHTD include additional activities not tied to the Channel and a portion of the production sector and maritime services impacts. Hospitality and entertainment complexes (hotels and casinos) on land leased by the LCHTD should be included when measuring impacts of the LCHTD.

Port-dependent production that utilizes port-owned terminals, or private terminals on land leased from the LCHTD, are also included in measuring the impacts of the LCHTD. Companies with these ties are Axiall (uses LCHTD terminals for vessel cleaning which increases productivity of their terminals); Alcoa (which handles calcined coke and green petroleum coke on leased land); Halliburton (which receives barite ore through BT-1); Louisiana Pigments (which handles titanium sludge and rutile at BT-1); and Port Aggregates (which handles aggregates over port-owned docks). The industries served by these companies represent 29% of the total employment impacts from the production sector that is port-dependent.

Maritime services that utilize LCHTD terminals, or terminals on land leased from the LCHTD, are included in the estimates of the impacts of the district. Vessel services and chandler services are proportional to the number of vessel calls. For these services, it is estimated that 30% is tied to the LCHTD, since break bulk and dry bulk vessels

calling at LCHTD terminals represent 30% of Channel traffic. For cargo handling, it is estimated that all of break bulk and a portion of dry bulk cargo should be included in the district impacts. Approximately 44% of employment in loading/discharge, cleaning, and stevedoring is tied to LCHTD docks. In aggregate, 80% of maritime services employment is tied to the LCHTD.

Local economic impacts of the LCHTD are substantial, even when the impacts from private terminals and other port authorities are excluded (see Table 15). Aggregate impacts of the LCHTD are 14% of local jobs, 9% of local GDP and 6% of local tax revenues.

Table 15: Total Regional Impacts of the Lake Charles Harbor & Terminal District in 2016

	Total Regional Jobs	Local Earnings	Output To Final Demand (Local GDP)	Local Taxes
Manufacturing and Production Sector	9,614	$338,355,000	$1,162,127,000	$25,767,000
Maritime Services	1,162	$60,903,000	$89,380,000	$2,879,000
Hospitality and Entertainment	4,767	$98,030,949	$191,351,000	$5,600,000
Total for Lake Charles Harbor & Terminal District	**15,343**	**$497,288,949**	**$1,442,858,000**	**$34,246,000**
Lake Charles MSA	107,800	$7,160,653,000	$15,353,000,000	$598,770,000
Lake Charles Harbor & Terminal District as % of MSA	14%	7%	9%	6%

Note: Taxes are sales tax for Calcasieu Parish and property tax for Calcasieu and Cameron Parishes in 2016.

Statewide impacts are less than local impacts in hospitality and entertainment industries because some of the revenue collected in Lake Charles would have been spent in other parishes if the casinos had not collected it. Without a market study, we cannot estimate how much of it is being diverted.

CONCLUSION

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This Economic Impact Study concludes that the Calcasieu Ship Channel is the main marine transportation corridor and infrastructure for sustained economic development in the SWLA Region. The importance of the Channel and terminal facilities to the overall economic impact in 2016 for the SWLA Region is evidenced by the 37,159 direct, indirect, and induced jobs; $5.7 billion of GDP; and $118.8 million generated in local sales and property taxes. The Calcasieu Ship Channel is truly the heart of the SWLA Region's economy.

The 2023 completed ship channel related economic development expansion projects measured in 2016 dollars will facilitate an additional 10,729 jobs, add $4.9 billion of GDP, and contribute an additional $100.4 million in local sales and property taxes.

The Channel's impact reaches beyond the Lake Charles metro area. In 2016, over 50,000 Louisiana jobs and $187.8 million of Louisiana production, state sales and production taxes were generated by channel-dependent businesses. The aggregate statewide will grow by more than $101.7 million in new state sales and income taxes generated from these new economic drivers.

All of these impacts are conditioned upon the Channel's ability to meet the needs of business and industry, now and in the future. The Channel can only meet these needs if it is consistently maintained at the congressionally authorized dimensions of 400 feet wide by 40 feet deep.

APPENDIX A
DATA TABLE SUMMARY COMPARISON

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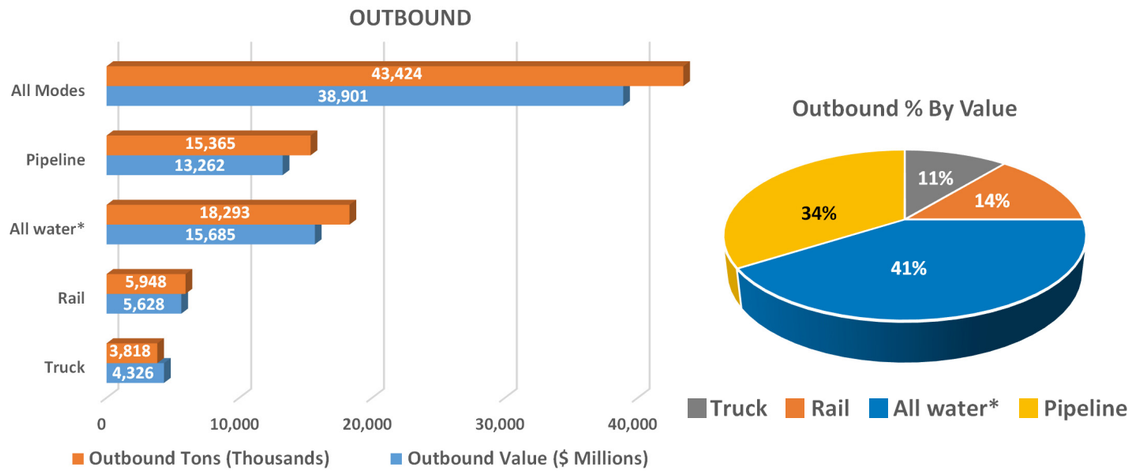
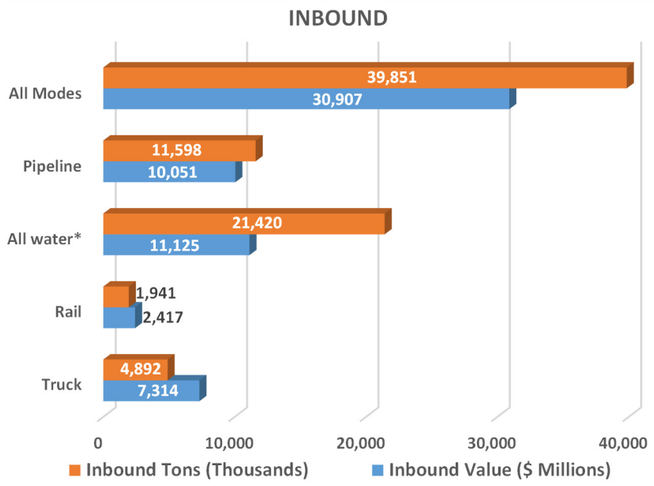
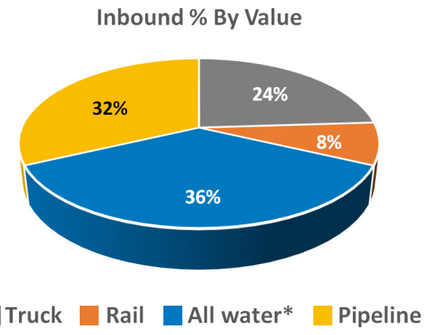
2015 AND 2017 UPDATE - ECONOMIC IMPACT STUDY OF THE CALCASIEU SHIP CHANNEL

2015 Economic Impact Study

Table 1: Lake Charles MSA Manufacturing Production by Transportation Mode (2012)







2017 Update - Economic Impact Study

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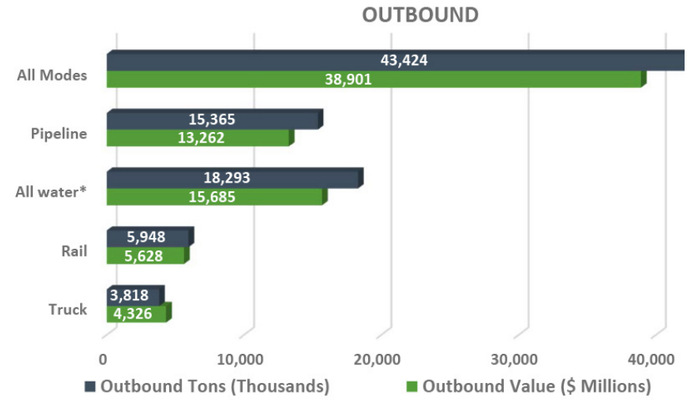

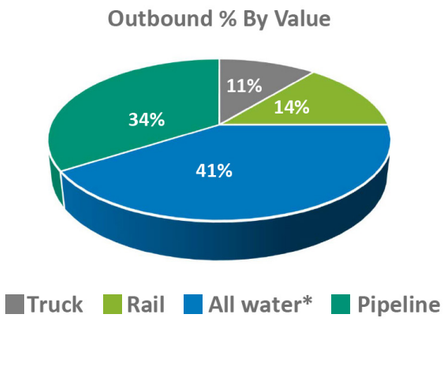

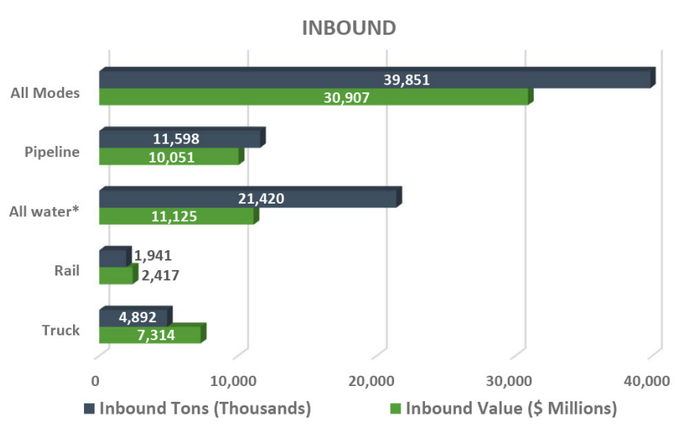

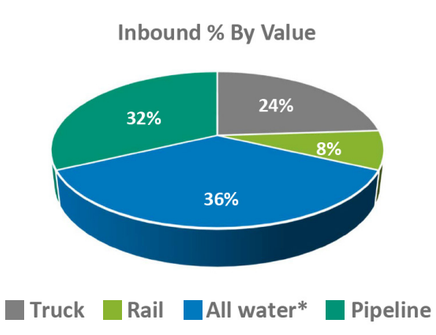

Table 1. No Change

APPENDIX A - DATA TABLE SUMMARY COMPARISON
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Table 2: Lake Charles MSA Industries Directly Connected to Marine Transportation

NAICS	Name	Inbound Materials	Outbound Product
3241-52	Refining-Petrochemical-Polymers	X	X
3251	Basic Chemicals		X
3259	Other Chemicals Including Pigments	X	
3273	Cement and Concrete	X	

Table 3: Announced Ship Channel Related Industrial Projects in Lake Charles MSA as of July 2015

NAICS	Parish	Industry	Name	Employment in 2023
325110	Calcasieu	Petrochemicals	Axiall	250
325120	Calcasieu	Petrochemicals	Big Lake Fuels (G2X)	243
325120	Calcasieu	Petrochemicals	Juniper	29
325120	Calcasieu	LNG	Magnolia	70
325110	Calcasieu	Petrochemicals	Sasol-Ethane Cracker	500
325120	Calcasieu	Petrochemicals	Sasol GTL	200
488999	Cameron / Calcasieu	LNG	Cameron LNG	190
488999	Calcasieu	LNG	Lake Charles LNG/BG Group	250
325110	Calcasieu	Petrochemicals	Westlake Chemical	25
488999	Calcasieu	LNG	Live Oak LNG	100
325110	Calcasieu	Petrochemicals	Matheson Trigas	27
488999	Cameron	LNG	Venture Global LNG	100
488999	Cameron	LNG	SCT&E LNG	200
336611	Cameron	LNG	Waller Point Terminal	45
	Calcasieu	Petrochemicals	Advanced Refining Technologies	30
	Calcasieu	Grain and Grain Products	IFG	36
			Calcasieu Total	1,760
			Cameron Total	535
			MSA Total	2,295

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Table 2: Lake Charles MSA Industries Directly Connected to Marine Transportation

NAICS	Name	Inbound Materials	Outbound Product
3241-52	Refining-Petrochemical-Polymers	X	X
3251	Basic Chemicals		X
3259	Other Chemicals Including Pigments	X	
3273	Cement and Concrete	X	
4889	LNG Plants		X

Added LNG Plants to Table

Table 3: Announced Ship Channel Related Industrial Projects in Lake Charles MSA as of April 2017

NAICS	Parish	Industry	Name	Employment in 2023
325110	Calcasieu	Petrochemicals	Axiall	250
325120	Calcasieu	Petrochemicals	Big Lake Fuels (G2X)	243
325120	Calcasieu	Petrochemicals	Juniper	29
325120	Calcasieu	LNG	Magnolia	70
325110	Calcasieu	Petrochemicals	Sasol-Ethane Cracker	500
325120	Calcasieu	Petrochemicals	Sasol GTL	200
488999	Cameron / Calcasieu	LNG	Cameron LNG	190
488999	Calcasieu	LNG	Lake Charles LNG/BG Group	250
488999	Calcasieu	LNG	Live Oak LNG	100
488999	Cameron	LNG	Venture Global LNG	100
488999	Cameron	LNG	SCT&E LNG	200
336611	Cameron	LNG	Waller Point Terminal	45
325120	Calcasieu	Petrochemicals	Advanced Refining Technologies	30
326150	Calcasieu	Cryogenic Insulation	Dongsung Finetec America	250
325110	Calcasieu	Ethane Cracker	Indorama	125
325110	Calcasieu	Methanol/Carbon Capture	Lake Charles Methanol	200
488999	Cameron	LNG	Delfin Floating LNG	100
488999	Cameron	LNG	G2	250
488999	Cameron	LNG	Driftwood LNG	250
			Calcasieu Total	2,247
			Cameron Total	1,135
			MSA Total	3,382

Removed these projects due to completion:

- Westlake Chemical
- Matheson Trigas
- IFG

Added these projects:

- Dongsun Finetec America
- Indorama
- Lake Charles Methanol
- Delfin Floating LNG
- G2
- Driftwood LNG

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Table 4: Calcasieu Ship Channel - Current Impacts

Industrial Production	Industry	Direct Jobs	Total Jobs
Refining	324110	2,289	9,745
Petrochemicals and Polymers	325110	845	4,934
Rice	311210	89	351
Inorganic Chemicals	325181	3,558	12,666
Metal Fabrication	332410	1,214	2,488
Aggregate and Cement	212320	299	662
Shipbuilding	336611	260	370
TOTAL PRODUCTION SECTOR		8,554	31,216
MARITIME TRANSPORTATION		2,332	4,552
CALCASIEU SHIP CHANNEL DEPENDENT		10,886	35,768
Lake Charles MSA			115,788
Ship Channel Dependent as % of Total			31%

[6]County Business Patterns is an annual publication that lists the number of companies by detailed industry classification with their respective employment and payroll.

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Table 4: Calcasieu Ship Channel - Current Impacts in 2016[1]

Industrial Production	Industry	Direct Jobs	Total Jobs	
Refining	324110	2,263	9,634	← Lower
Petrochemicals and Polymers	325110	2,505	14,627	← Higher
Rice	311210	63	248	← Lower
Inorganic Chemicals	325181	1,707	6,077	← Lower
Metal Fabrication	332410	682	1,398	← Lower
Aggregate and Cement	212320	376	834	← Higher
Shipbuilding	336611	235	335	← Lower
TOTAL PRODUCTION SECTOR		7,831	33,153	
MARITIME TRANSPORTATION		2,052	4,006	
CALCASIEU SHIP CHANNEL DEPENDENT		9,883	37,159	← Higher
Lake Charles MSA			107,800	← Lower
Ship Channel Dependent as % of Total			34%	← Higher

1. These differences are due to the use of the EMSI data source that was not available in 2015. Some businesses are classified in different industries. The production sector is about the same size, but the distribution of jobs by specific industry has changed. The lower employment for the MSA is the figure for 2016 as reported by the Louisiana Workforce Commission.

NOTE:

- **The large differences between 2015 and 2017 are the shift of employment between petrochemicals and inorganic chemicals from the use of a new data source. The combined employment level is the same but the estimates differ for local earnings, GDP and local taxes because the multiplier effects differ between petrochemicals and inorganic chemicals. The other big difference is due to the drop-in employment in metal fabrication. Shaw industries reduced employment in metal fabrication because of an unexpected decline in nuclear equipment. Other reductions are due to a slowdown in the Louisiana manufacturing sector that reduces the demand for industrial equipment.**

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2015 Economic Impact Study

Table 5: Calcasieu Ship Channel - Impacts in 2014 Measured in Regional Jobs, Earnings, Local GDP, and Local Taxes

	Total Regional Jobs	Local Earnings	Output To Final Demand (GDP)	Local Taxes
TOTAL PRODUCTION SECTOR	31,216	$1,851,340,867	$5,386,096,790	$105,749,059
Maritime Services	4,552	$229,464,679	$336,754,739	$13,107,081
TOTAL CALCASIEU SHIP CHANNEL	35,768	$2,080,805,546	$5,722,851,529	$118,856,140
TOTAL Lake Charles MSA	115,788	$5,832,972,000	$14,858,000,000	$238,160,594
Ship Channel Percent	31%	36%	39%	50%

Note: GDP Expressed in 2014 Dollars

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Table 5: Calcasieu Ship Channel - Impacts in 2016 Measured in Regional Jobs, Earnings, Local GDP, and Local Taxes

Higher

Lower [1]

	Total Regional Jobs	Local Earnings	Output To Final Demand (GDP)	Local Taxes
TOTAL PRODUCTION SECTOR	33,153	$1,602,532,000	$5,386,096,790	$105,749,059
Maritime Services	4,006	$188,101,000	$336,754,739	$13,107,081
TOTAL CALCASIEU SHIP CHANNEL	37,159	$1,790,633,000	$5,722,851,529	$118,856,140
TOTAL Lake Charles MSA	107,800	$5,743,868,000	$15,353,000,000	$238,160,594
Ship Channel Percent	35%	31%	37% [3]	50%

Lower

Higher [2]

Note: GDP Expressed in 2016 Dollars
Source: Lake Charles MSA data obtained from the Louisiana Workforce Commission (LWC)

1. These represent differences in the earnings per industry. The shift is due to the different employment distribution by industry in Table 4 above.

2. This is the regional GDP for Lake Charles MSA reported by the Bureau of Economic Analysis. It is higher while employment is stable because productivity is increasing in the region: more output per unit of labor.

3. This is the estimate from the impact model, up slightly since 2015. The actual share of GDP tied to the ship channel depends on raw material imports and domestic and export shipments by water. The range of estimates based on the 2012 Commodity Flow Survey is 37 to 46 percent. The actual figure lies within this range.

NOTE:

- **The large differences between 2015 and 2017 are the shift of employment between petrochemicals and inorganic chemicals from the use of a new data source. The combined employment level is the same but the estimates differ for local earnings, GDP and local taxes because the multiplier effects differ between petrochemicals and inorganic chemicals. The other big difference is due to the drop-in employment in metal fabrication. Shaw industries reduced employment in metal fabrication because of an unexpected decline in nuclear equipment. Other reductions are due to a slowdown in the Louisiana manufacturing sector that reduces the demand for industrial equipment.**

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Table 6: Calcasieu Ship Channel - Additional Jobs Impacts in 2023

	Regional
Direct	2,295
Indirect	3,533
Induced	3,047
Total	8,875

Table 7: Calcasieu Ship Channel - Additional Local Impacts in 2023 *(in 2014 Dollars)*

	Regional
Total Earnings	$2,716,137,895
Output to Final Demand (Local GDP)	$4,470,198,395
Personal Income	$3,438,149,234
TAXES	
Sales Taxes	$74,693,792
Property Taxes	$80,452,692
TOTAL TAXES	$155,146,484

Table 8: Calcasieu Ship Channel - Impacts in 2023 *(in 2014 Dollars)*

	Impacts in 2014	Planned Expansion 2023	Aggregate in 2023	% Growth
Total Jobs	35,768	8,875	44,643	25%
GDP	$5,722,851,529	$4,470,198,395	$10,193,049,924	78%
Local Taxes	$118,856,140	$155,146,484	$274,002,624	131%

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Table 6: Calcasieu Ship Channel - Additional Jobs Impacts in 2023

	Regional	
Direct	3,382	Higher
Indirect	4,815	Higher
Induced	2,532	Lower
Total	10,729	Higher

Table 7: Calcasieu Ship Channel - Additional Local Impacts in 2023 *(in 2016 Dollars)*

	Regional	
Total Earnings	$1,758,152,400	Lower
Output to Final Demand (Local GDP)	$4,974,040,000	Higher
Personal Income	$2,225,509,367	Lower
TAXES		
Sales Taxes	$48,359,400	
Property Taxes	$52,088,000	
TOTAL TAXES	$100,447,400	Lower [1]

1. This number reflects differences in earnings due to the use of Cheniere's financials rather than the estimate made in 2015 from census data (because actual data for the LNG export terminals was not yet available).

NOTE:

- **Changes include drop in LNG export price - from $7.40 to $4.47/MBTU and utilization of Cheniere 2016 annual report sales and operating cost rather than theoretical estimates.**

Table 8: Calcasieu Ship Channel - Impacts in 2023 *(in 2016 Dollars)*

	Impacts in 2016	Planned Expansion 2023	Aggregate in 2023	% Growth	
Total Jobs	37,159	10,719	47,878	29%	Higher
GDP	$5,722,851,529	$4,974,040,000	$10,696,891,529	87%	Higher
Local Taxes	$118,856,140	$100,447,316	$219,303,456	85%	Lower [2]

2. The formula used for taxes estimates from sales. Since sales estimate has changed due to the drop in LNG export price, the tax estimate has also dropped.

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Table 9: Calcasieu Ship Channel - Statewide Jobs Impact in 2014

	Region	Louisiana	Outside Region	Outside Region %
Direct	10,886	10,886	0	0
Indirect	13,157	19,599	6,443	33%
Induced	11,726	18,185	6,459	36%
TOTAL	35,769	48,670	12,902	27%

Table 10: Calcasieu Ship Channel - Other Statewide Impacts in 2014

	Region	Louisiana	Outside Region
Output To Final Demand	$5,722,851,529	$6,727,522,522	0
Earning	$2,080,805,546	$3,085,476,540	$1,004,670,994
Personal Income	$2,633,931,071	$3,905,666,506	$1,271,735,435
TAXES			
Sales Taxes	$57,222,153	$61,709,531	$4,487,378
Property Taxes	$61,633,987	0	0
Other Production Taxes		$36,937,787	0
Income Taxes		$57,022,731	0
TOTAL TAXES	$118,856,140	$155,670,049	$4,487,378

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Table 9: Calcasieu Ship Channel - Statewide Jobs Impact in 2016

	Region	Louisiana	Outside Region	Outside Region %	
Direct	9,884	9,884	0	0	← Lower
Indirect	16,047	21,376	5,329	25%	← Lower
Induced	11,228	18,901	7,673	41%	← Higher
TOTAL	37,159	50,161	13,002	26%	
	Higher	Higher	Higher		

Table 10: Calcasieu Ship Channel - Other Statewide Impacts in 2016

	Region	Louisiana	Outside Region	
Output To Final Demand	$5,722,851,529	$6,752,965,000	0	
Earning	$1,790,633,000	$2,662,868,000	$872,235,000	← Lower
Personal Income	$2,266,624,051	$3,370,719,000	$1,104,094,949	← Lower
TAXES				
Sales Taxes	$49,242,000	$53,237,000	$3,896,000	← Lower
Property Taxes	$53,039,000	0	0	← Lower
Other Production Taxes		$85,410,000	0	← Higher [1]
Income Taxes		$49,194,000	0	
TOTAL TAXES	$102,281,000	$187,841,000	$3,896,000	
	Lower	Higher	Lower	

NOTE:

- **The large differences between 2015 and 2017 are the shift of employment between petrochemicals and inorganic chemicals from the use of a new data source. The combined employment level is the same but the estimates differ for local earnings, GDP and local taxes because the multiplier effects differ between petrochemicals and inorganic chemicals. The other big difference is due to the drop-in employment in metal fabrication. Shaw industries reduced employment in metal fabrication because of an unexpected decline in nuclear equipment. Other reductions are due to a slowdown in the Louisiana manufacturing sector that reduces the demand for industrial equipment.**

1. Differences in Other Production taxes in Louisiana are due to higher production tax rates in petrochemicals and polymers than in inorganic chemicals. The shift in employment recorded between 2015 and 2017 allocates more of regional output to petrochemicals and polymers, at higher tax rates, and lower output to inorganic chemicals.

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Table 11: Calcasieu Ship Channel - Additional Jobs Impact in 2023

	Region	Louisiana	Outside Region
Direct	2,295	2,295	0
Indirect	3,533	5,057	1,524
Induced	3,047	4,647	1,600
TOTAL	8,875	11,999	3,124

Table 12: Calcasieu Ship Channel - Additional Impacts in 2023 from Announced Projects *(in 2014 Dollars)*

	Region	Louisiana	Outside Region
Total Earnings	$2,716,137,895	$3,054,205,113	$338,067,218
Output to Final Demand	$4,470,198,395	$4,808,265,613	0
Personal Income	$3,438,149,234	$3,866,082,422	$427,933,188
TAXES			
Sales Taxes	$74,693,792	$54,322,758	
Property Taxes	$80,452,692	-	
Other Production Taxes	-	$38,827,207	
Income Taxes		$50,196,979	
TOTAL TAXES	$155,146,484	$143,346,943	

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Table 11: Calcasieu Ship Channel - Additional Jobs Impact in 2023

	Region	Louisiana	Outside Region
Direct	3,382	3,382	0
Indirect	4,815	6,856	2,041
Induced	2,532	6,445	3,913
TOTAL	10,729	16,683	5,954

Higher

NOTE:

- **Revisions in Table 11 reflect addition of the newly announced LNG terminals.**

Table 12: Calcasieu Ship Channel - Additional Impacts in 2023 from Announced Projects *(in 2016 Dollars)*

	Region	Louisiana	Outside Region	
Total Earnings	$1,758,152,400	$2,004,722,000	$246,569,600	← Lower [1]
Output to Final Demand	$4,974,040,000	$5,869,367,200	$895,327,2000	← New
Personal Income	$2,225,509,000	$2,537,622,785	$312,113,785	← Lower
TAXES				
Sales Taxes	$48,359,000	$35,170,000		
Property Taxes	$52,088,000	-		
Other Production Taxes	-	$34,112,000		
Income Taxes		$32,499,000		
TOTAL TAXES	$100,447,000	$101,781,000		
	Lower [2]	Lower [2]		

1. This number reflects differences in earnings due to the use of Cheniere's financials rather than the estimate made in 2015 from census data (because actual data for the LNG export terminals was not yet available). In Addition, changes include drop in LNG export price - from $7.40 to $4.47/MBTU and utilization of Cheniere 2016 annual report sales and operating cost rather than theoretical estimates.

2. The formula used for taxes estimates from sales. Since sales estimate has changed due to the drop in LNG export price, the tax estimate has also dropped.

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Table 13: Statewide Calcasieu Ship Channel Impacts in 2023 *(in 2014 Dollars)*

	Impacts in 2014	Planned Expansion 2023	Aggregate in 2023	% Growth
Total Jobs	48,670	11,999	60,669	25%
GDP	$6,727,522,522	$4,808,265,613	$11,535,788,135	71%
State Taxes	$155,607,049	$143,346,943	$299,016,993	92%

Table 14: Calcasieu Ship Channel - Federal Fiscal Impacts *(in 2014 Dollars)*

	Federal Impacts		
	2014	2023 Projects	2023 Total
Output To Final Demand	$6,727,522,522	$4,808,265,613	$11,535,788,135
Earning	$3,085,476,540	$3,054,205,113	$6,139,681,653
Personal Income	$3,905,666,506	$3,866,082,422	$7,771,748,928
TAXES			
Sales Taxes			
Property Taxes			
Other Production Taxes			
Income Taxes	$892,334,360	$407,965,724	$1,300,300,084
Customs	$10,796,097	-	$10,796,097
Harbor Maintenance Tax	$13,549,838	-	$13,549,838
TOTAL TAXES	$916,680,295	$407,965,724	$1,324,646,019

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Table 13: Statewide Calcasieu Ship Channel Impacts in 2023 *(in 2016 Dollars)*

	Impacts in 2016	Planned Expansion 2023	Aggregate in 2023	% Growth	
Total Jobs	50,161	16,683	66,844	33%	← Higher
GDP	$6,752,964,804	$5,869,367,200	$12,622,332,004	87%	← Higher
State Taxes	$162,286,011	$101,781,000	$264,067,011	63%	← Lower
	Higher				

NOTES:

- **Numbers reflects differences in earnings due to the use of Cheniere's financials rather than the estimate made in 2015 from census data (because actual data for the LNG export terminals was not yet available). In Addition, changes include drop in LNG export price - from $7.40 to $4.47/MBTU and utilization of Cheniere 2016 annual report sales and operating cost rather than theoretical estimates.**
- **The formula used for taxes estimates from sales. Since sales estimate has changed due to the drop in LNG export price, the tax estimate has also dropped.**

Table 14: Calcasieu Ship Channel - Federal Fiscal Impacts *(in 2016 Dollars)*

	Federal Impacts			
	2016	2023 Projects	2023 Total	
Output To Final Demand	$6,752,965,000	$5,869,367,000	$12,622,332,000	← Higher
Earning	$2,662,868,000	$2,004,722,000	$4,667,590,000	← Lower
Personal Income	$3,370,719,000	$2,537,623,000	$5,908,342,000	← Lower
TAXES				
Sales Taxes				
Property Taxes				
Other Production Taxes				
Income Taxes	$780,500,000	$266,831,000	$1,047,0331,000	
Customs	$10,796,000	-	$10,796,097	
Harbor Maintenance Tax (FY 13)	$4,465,705	-	$4,465,705	
TOTAL TAXES	$795,761,705	$266,831,000	$1,062,592,802	
	Lower	Lower	Lower	

NOTE:

- **2016 changes are due to distribution of employment by industry changes. 2023 changes due largely to drop in LNG export price between 2015 and 2017.**

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Table 15: Total Regional Impacts of the Lake Charles Harbor & Terminal District in 2014

	Total Regional Jobs	Local Earnings	Output To Final Demand (Local GDP)	Local Taxes
Manufacturing and Production Sector	9,053	$582,560,976	$2,338,098,678	$51,748,873
Maritime Services	1,092	$55,071,523	$80,821,137	$3,145,699
Hospitality and Entertainment	6,246	$123,533,578	$239,871,026	$7,056,269
Total for Lake Charles Harbor & Terminal District	**16,391**	**$761,166,077**	**$2,658,790,841**	**$61,950,841**
Lake Charles MSA	115,788	$5,832,972,000	$14,858,000,000	$238,160,594
Lake Charles Harbor & Terminal District as % of MSA	14%	13%	18%	26%

Note: The $238 million represents all local taxes in the Calcasieu metro area, not the taxes generated by Channel activities.

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Table 15: Total Regional Impacts of the Lake Charles Harbor & Terminal District in 2016

	Total Regional Jobs	Local Earnings	Output To Final Demand (Local GDP)	Local Taxes	
Manufacturing and Production Sector	9,614	$338,355,000	$1,162,127,000	$25,767,000	← Lower
Maritime Services	1,162	$60,903,000	$89,380,000	$2,879,000	← Lower
Hospitality and Entertainment	4,767	$98,030,949	$191,351,000	$5,600,000	← Lower
Total for Lake Charles Harbor & Terminal District	**15,343**	**$497,288,949**	**$1,442,858,000**	**$34,246,000**	← Lower
Lake Charles MSA	107,800	$7,160,653,000	$15,353,000,000	$598,770,000	
Lake Charles Harbor & Terminal District as % of MSA	14%	7%	9%	6%	

Note: Taxes are sales tax for Calcasieu Parish and property tax for Calcasieu and Cameron Parishes in 2016.

NOTES:

- **These numbers shifted because of the drop in imported crude and the rise in chemical exports. The number of ship calls is down which increases the percent of maritime services from dry bulk and break bulk cargoes. Hospitality and Entertainment numbers are different due to the change in reported employment in the gaming sector. The Port's annual report was used as the source for the Hospitality and Entertainment sector.**
- **Commodity price changes since 2014 have lowered the Output to Final Demand or GDP. Refineries and petrochemical plants might operate at the same levels as in 2014 but sales in 2016 dropped from 2014 levels because of drops in product prices. The increase in local earnings and GDP from maritime services is due largely to a shift in commodities handled in the ship channel. More of the total cargo moves over docks controlled by the Port of Lake Charles authority. While overall tonnages have not changed, the percent of tonnage moving over facilities owned or leased from the Port of Lake Charles have increased. The drop in local taxes is due to the lower earnings in the manufacturing sector, due partly to shifts in industrial employment reported in the EMSI data source.**

APPENDIX B
DEFINITIONS OF TERMS

DEVELOPMENT PROJECT

An investment by a private firm that generates new jobs and earnings from sales outside of the local economy.

DIRECT EFFECT

A change in economic activity resulting from the initial round of a development project. Economic activity consists of output to final demand, earnings, and employment.

DIRECT JOB

A full-time or part-time job generated by a development project.

LOCAL EARNINGS

Wages and salaries, employer contributions to social security and retirement plans, plus net earnings of partnerships and self-employment.

GROSS DOMESTIC PRODUCT (GDP)

The value of goods and services sold to households and governments, new investments in buildings and equipment, and net exports. Within the local economy, GDP is the same as value-added. It is equivalent to sales outside of the local economy less the cost of intermediate materials used in producing a product. In the case of Lake Charles, GDP produced in the refining industry consists of sales to customers outside of the Lake Charles Region less the costs of crude oil and process energy. Wages and salaries paid to workers are part of GDP, together with profits earned on sales and taxes paid on production.

INDIRECT EFFECT

Changes in economic activity in the local economy in other companies that supply inputs to the development project. Indirect effects are commonly called business-to-business transactions.

INDIRECT JOB

Full-time or part-time jobs in companies supplying local inputs to the development project.

INDUCED EFFECT

Changes in economic activity in the local company from payroll spending by workers employed in the development project or in local companies supplying inputs to the development project.

INDUCED JOB

Jobs in the local economy due to payroll spending. Most of these jobs are in retailing and personal services.

INTERMEDIATE MATERIALS

Goods and services used to produce output. GDP and output to final demand are used in impact studies rather than sales to avoid double counting of intermediate production. As an example, the output in the Lake Charles economy in 2012 was $44 billion, but the GDP, or output to final demand, was $14.69 billion. Intermediate materials consumed in production, such as crude oil, must be subtracted from output to arrive at GDP in the local economy.

LAKE CHARLES MSA

The metropolitan statistical area that is comprised by Cameron and Calcasieu Parishes.

OUTPUT TO FINAL DEMAND

Sales to customers outside of the local economy plus investments in new buildings, equipment and software, purchases by governments, and purchases by households.

PERSONAL INCOME

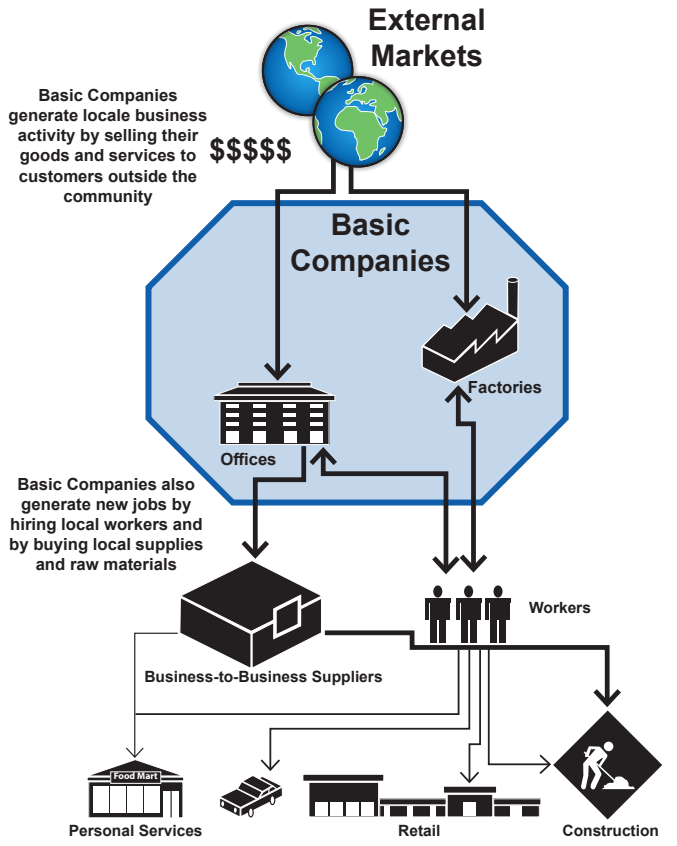
Earnings plus financial income generated from earnings plus transfer payment such as social security payments to individuals.

APPENDIX C METHODOLOGY

WHAT DRIVES ECONOMIC ACTIVITY?

John Donne said something relevant to measuring economic impacts: "No man is an island, entire of himself. Every man is a piece of the continent, a part of the main." Donne's sonnet describes perfectly the structure of regional economies. Individual companies, even large ones like Phillips, Sasol, or Axiall, are not economic islands. The majority of the value of the products that these companies make consists of supplies and materials purchased from other companies or labor services bought from local citizens.

Business-to-business services and raw materials bought locally generate additional rounds of local purchases. Payroll dollars spent locally generate additional economic activity in the local economy. Collectively, these many rounds of economic transactions generate local taxes that support government and educational services.



How Local Economies Work

Every dollar spent in the local economy has the ability to multiply itself through this network of local business-to-business and payroll transactions. The size of the multiplier depends on how many of these transactions originate inside the local economy.

The multiplier chain originates through sales in external markets. The income generated in the local economy is the product of sales to customers outside the local market. The old English adage, "We can't take in each other's laundry," describes the relationship: If I charge you for doing your laundry, but then contract with you to do mine, the net effect is that neither of us has any new income to spend from our labor. External customers are the fundamental ingredient needed to generate local economic activity.

The magnitude of the total economic impact is measured using multipliers of the initial round of economic spending. A multiplier expresses how much additional output, earnings, or jobs occur in an economy from an investment in a new business or a new industry with external markets (industries with local markets do not have a multiplier effect). Multipliers are specific to the industry and to the local economy. Multipliers for Lake Charles do not measure accurately the economic impacts of an identical project in Lafayette; for example, multipliers for petrochemicals do not accurately measure the impacts of maritime transportation.

Since the size of the economic impact depends on how many of the business-to-business transactions are made in the local economy, bigger economies have larger multipliers. The multiplier effect in the Lake Charles Region is therefore smaller than the multiplier effect in the State of Louisiana for the same industry or investment project. The national multiplier effect is only somewhat larger than the statewide multiplier; however, because almost all of the business-to-business transactions are made within the State of Louisiana, the important issue for the reader is to understand that the economic impacts in this report depend on the geographic unit of the economic activity.

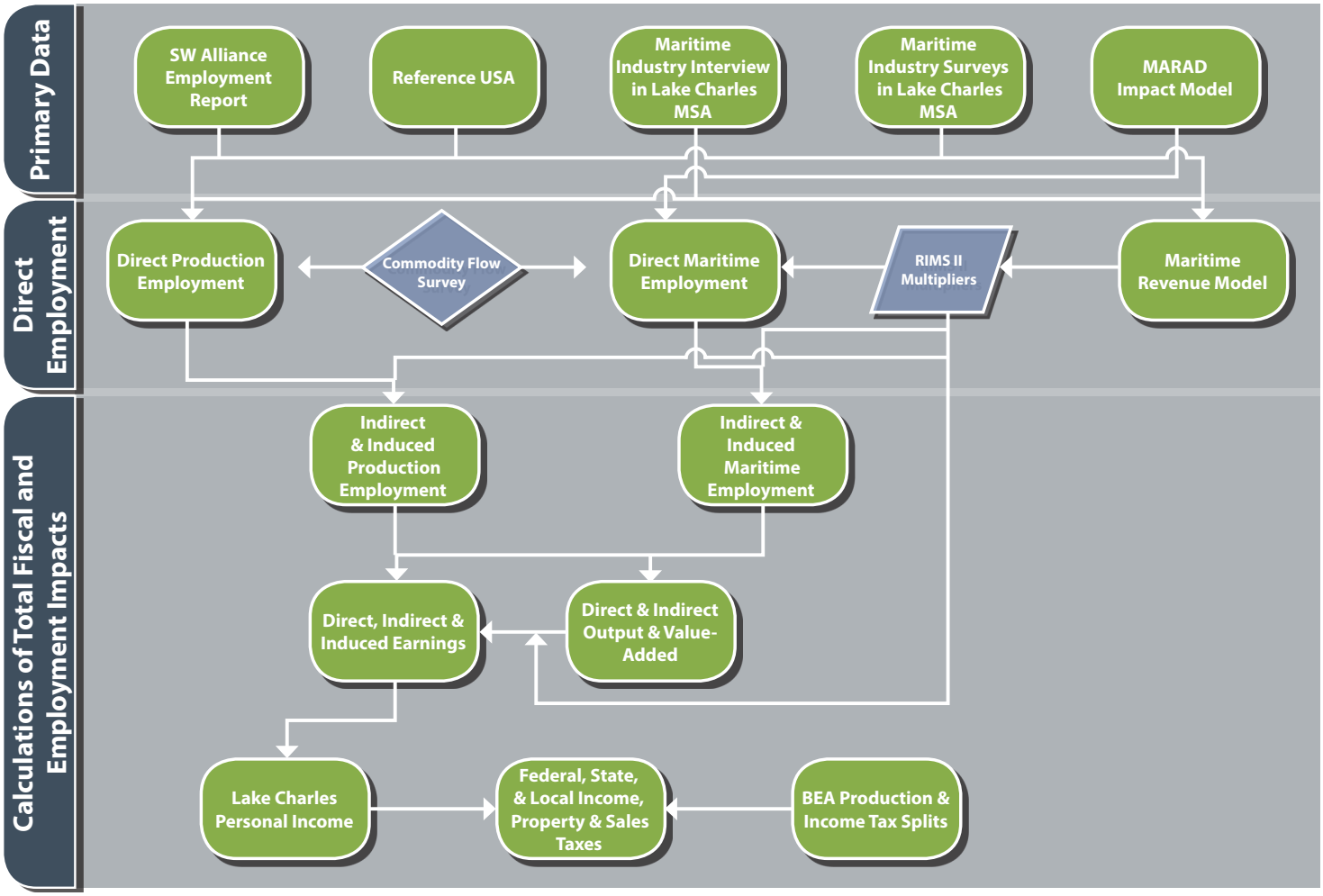
Impacts consist of several types. Indirect impacts are those from the business-to-business transactions in the regional and statewide economies. Induced impacts consist of economic activity due to payroll spending in the local and statewide economies. Total impacts consist of the combined direct, indirect, and induced impacts.

Impacts can be estimated using one of three methods: (1) multiples of direct output, (2) direct earnings, and (3) direct jobs. Impacts in this study were estimated from the employment multipliers, rather than from output or earnings multipliers. The reason for this choice is that a complete set of employment figures was available for every company included in the study. The output multipliers cannot be used to estimate total impacts without access to the local sales figures of individual companies. Earnings are difficult to use since they include company payrolls, self-employment earnings in the industry, and employer contributions for health insurance, data that are subject to large measurement error when collected by survey.

Since a one-to-one correspondence exists between industry output, industry earnings, and industry jobs, the output and earnings impacts can be calculated from the employment impacts. Manufacturing payroll, jobs, and output numbers for the Lake Charles metro area, published in the Census of Manufacturing, are a method of validating and adjusting the estimates from the RIMS II method.

Economic impacts from ports consist of impacts from inter-modal cargo movements and manufacturing production that is tied directly to international movements of raw materials and finished products. Production impacts are especially large in Gulf Coast ports due to the presence of refining, petrochemical, and polymer manufacturing. The economic viability of these activities is tied directly to port infrastructure since the majority of raw materials used in the production process are imported into the U.S. on vessels that are too large to navigate inland waterways. Lake Charles also has a significant production industry tied to locally mined salt that is transformed into caustic soda, chlorine, and vinyl chloride monomer. The economics of transporting these materials requires they be moved in large quantities at low shipping costs. Port locations are the only sites that are economically viable for this production activity.

The methodology for this impact study is divided into three phases:



PRIMARY DATA COLLECTION

The primary data for this study consists of employment estimates from five sources. These sources were reconciled with the primary data from *County Business Patterns* and other federal government sources to estimate direct employment by manufacturing industry and by maritime service. The U.S. Maritime Administration (MARAD) provides a model for estimating employment in Louisiana from cargo flows in Louisiana ports. The model includes revenues disaggregated for vessel services, cargo loading/discharge, supplies, warehousing, and dockage per short-term of liquid bulk, dry bulk, and general cargo. A comparison of revenue collected from our interviews in Lake Charles were close to those reported in the MARAD model. The close correlation between these sources confirms the accuracy of our methodology.

DIRECT EMPLOYMENT ESTIMATION

The second step in producing the estimates entailed calculating direct employment in both the maritime and production industries. The detailed industries involved in the production industries and the maritime industries are shown as follows:

Maritime employment can be calculated in two manners. Since the primary data provided a means of estimating all of the revenue in the maritime industry, figures from the Maritime Revenue Model can be transformed into employment estimates using ratios of output to employment for the national industry, as well as from the local employment multipliers supplied by the Bureau of Economic Analysis (BEA) - Regional Input-Output Modeling System (RIMS II). RIMS II input-output multipliers illustrate how major changes in local demand affect total gross output, value added, earnings, and employment in the Region.

Almost all of the manufacturing employment in the Lake Charles metro area is port dependent. Since the RIMS II multipliers furnished by the U.S. Department of Commerce (DOC) for this study exclude imported materials, the impacts in Lake Charles for manufacturing production exclude the transactions involved with imported materials. The total impacts of the Channel therefore include the aggregate of maritime impacts from imported materials plus impacts from manufacturing production.

Production Industries (NAICS Code)

NAICS	Industry
311219	Rice Milling
324110	Refining
325110	Petrochemicals and Polymers
325120	Industrial Gases
325181	Inorganic Chemicals and Dyes
332410	Metal Fabrication
212320	Aggregate & Cement
336611	Ship Building
488999	LNG

Maritime Services	
Government Agencies	Port Authorities
	Customs & Border Patrol
	USDA
Vessel Services	Ship Agents
	Tugs
	Pilots
	Line Handling
	Launch
Loading and Discharge	Stevedores
	ILA
Supplies	Bunkers
	Chandlers
	Laundry & Waste Disposal
	Security
Cargo Packing	
In-Transit Storage	Drayage
	Warehousing & Grain Storage

CALCULATION OF TOTAL FISCAL AND EMPLOYMENT IMPACTS

The final step in the methodology consisted of calculating total employment, total earnings, and tax impacts from the combined maritime and production industries. RIMS II multipliers based on the national input-output table, furnished by the BEA and DOC, provide the means of transforming direct employment into total employment, total earnings and output, to final demand. Because input-output tables assume fixed inputs, estimates of output to final demand and earnings can be calculated from direct employment (and vice-versa). Employment multipliers were the method used to estimate total employment, output, and total earnings within the Lake Charles metro area and the State of Louisiana. A comparison of Louisiana multipliers with the national input-output table confirmed that virtually all of the impacts from production and maritime commerce on the Channel occur within the Lake Charles metro area or within the rest of Louisiana. The multiplier at the federal level was not significant therefore it can be ignored.

The fiscal impacts of port-dependent economic activities were estimated by transforming total earnings into personal income within the Lake Charles metro area and Louisiana economies. BEA data was used to calculate federal and state income taxes. Local taxes were calculated based on total property and sales taxes collected in Calcasieu and Cameron Parishes in 2016 (Louisiana Department of Revenue Annual Report). The percentage of personal income in Calcasieu from production and maritime activities spent on transactions subject to sales tax (39.5%) was multiplied by the local tax rate to arrive at the sales tax estimate. Property tax generation was calculated by multiplying total property taxes by the proportion of personal income in Calcasieu Parish generated from production and maritime activities.

The estimates for 2023 were generated by adding announced new projects in Cameron and Calcasieu Parishes that are tied to maritime commerce for the 2016 estimates. The primary data for the 2023 estimates was the employment data collected for the 2014 Sasol RIS plus employment data on projects announced after the RIS that were furnished by the SWLA Alliance. An implicit assumption in the methodology is that all of current production remains and all announced projects are constructed and enter production prior to 2023. Both of these assumptions are valid as of April 2017.

Additional federal tax revenues from the Channel are customs duties and port harbor maintenance taxes. The harbor maintenance tax for 2016 was estimated from customs reports. The customs duties were calculated by the consultants from imports by commodity and the U.S. Tariff Schedule.

Two estimates are given for local impacts: The first impact is for all of the activities on the Channel. The LCHTD estimate includes the ship channel impacts but also includes activities from companies that lease land from the LCHTD and are not included in the production or maritime economies, such as L'auberge Lake Charles and Golden Nugget casinos.

GDP CALCULATIONS

Gross domestic product (GDP) is different than economic output. The economic output in the Lake Charles region is about $45 billion while GDP was $14.9 billion in 2014. GDP is defined as goods and services sold to ultimate customers. GDP has 4 components: personal consumption, investment, government spending and net exports. One can see from the definition that business-to-business transactions, except for investment, are excluded from the calculation of GDP.

Statewide GDP in 2014 for the Channel, when calculated using statewide RIMS multipliers, is $379 million or 7% lower than GDP calculated for the Lake Charles region, using the local version of the RIMS II multipliers. Statewide earnings, however, are $1.0 billion larger than local earnings when calculated using the RIMS earnings multipliers. The RIMS multipliers appear to be underestimating statewide GDP since earnings are completely within the consumption and tax components of GDP. The estimate of statewide GDP was adjusted by adding earnings outside of Lake Charles to the calculated GDP for the Lake Charles region. Taxes were not added as the government portion of GDP since taxes are paid out of earnings. Taxes added to GDP estimates would therefore double count the government increase in GDP. The same formula and methodology was used in the 2017 update since these ratios change little over a period of 2 years.

TAX EQUATIONS

This study assumes that the incidence of taxes on producers falls totally on producers and the incidence of taxes on consumers falls totally on consumers. The tax on producer income is calculated separately from taxes on production and assets.

For purposes of this study, production taxes are the percent of industry value added paid in production taxes. The BEA accounts provide estimates for federal, state, and local taxes. The state and local level is adjusted from the national rate by the Louisiana factor. Consumer taxes are the federal tax as a percent of personal income for Louisiana.

Local taxes in Calcasieu Parish consist of sales and property taxes. These taxes are calculated from local tax records. Sales taxes are based on the local sales tax rate multiplied by the proportion of personal income spent at the retail level (40%). Property taxes are total property taxes multiplied by the proportion of industrial and commercial property dependent on maritime commerce, plus the proportion of earnings in Calcasieu Parish dependent on maritime commerce, multiplied by the personal property subject to property tax.

The BEA estimates for 2015 of federal, state, and local taxes as a percent of personal income are the basis of calculation of consumer taxes on income (BEA Table AS50 Personal Current Taxes for Louisiana).

The tax rate for federal income taxes for 2015 is 7.94% of personal income in 2015. The rate of state income tax is 1.46%, with all state taxes comprising 1.51% of personal income. The calculation of local taxes is 0.01% of personal income, but this rate does not include local personal property taxes.

Production taxes are available for two-digit NAICS codes for 2013 from the BEA Components of Value Added by Industry. The line item is "Taxes on Production and Imports Less Subsidies." The calculation used in this model is taxes on production as a proportion of industry value added.

Taxes on corporate income are calculated from two BEA Tables: Table 6.16D – Taxes on Corporate Income by Industry and National Value Added by Industry.

The Louisiana Department of Revenue Annual Report provides individual federal and state income taxes and corporate income taxes by parish. This source provides a triangulation of the BEA data estimates.

Photo provided courtesy of the Lake Charles Harbor & Terminal District

The BEA now has state tables that show personal consumption expenditures and disposable personal income. The personal consumption is broken into the categories of food and beverage, gasoline and energy, housing, health care, and other. For Louisiana, the other and food categories represent a proxy for personal income subject to sales tax. In 2013, these two categories represented 63% of personal consumption. Personal consumption in Louisiana is 63% of personal income. The product of these two numbers represents the percent of personal income that is subject to sales taxes: 39.5%. This is close to the estimated 40% in other Louisiana impact studies. The methodology for the 2017 update used the same formula as the 2014 estimates since the ratios change little over a period of 2 years.

One data difference is important in calculations. The earnings estimates made from the RIMS II multipliers exclude financial income and transfer payments, while gross personal income estimates include both. The transfer payment issue is irrelevant for economic estimates based on employment; the financial income is not. Items in financial income, including transfer payments and financial income, is available from the BEA regional data web site. For the Lake Charles MSA, personal income was $7.8 billion in 2013, of which financial income was $1.3 billion and transfer payments were $1.5 billion. Wages and salaries were $4.2 billion with supplements to wages and salaries of $1 billion. Proprietors' income was $636.8 million. RIMS II earnings and personal income can be reconciled using these data. The reconciliation is that earnings are 79% of personal income for 2013. The same estimates are used in the 2017 update since these ratios changed little over the course of 2 years.

Property taxes and local sales taxes for the City of Lake Charles are calculated using Type II earnings estimates for Lake Charles. The formula is earnings/.79 *.395 (portion of PI subject to sales tax)* .055 (sales tax rate). Property taxes likewise are based on the personal income to property tax ratio for 2013. The formula is earnings/.79*.0234. The ratio was calculated by dividing 2014 property tax collections of $181 million (State Tax Commission) in Calcasieu by $7.8 billion in personal income (BEA). The same formula is used in the 2017 update for reasons repeated several times earlier in this methodology.

The calculation of state sales tax is similar except for the use of Louisiana Type II earnings rather than Lake Charles metro area. The income tax rates are 7.94% of personal income for Federal income tax and .0146% for Louisiana personal income tax. The corporate income tax rate comes from BEA state tax tables. The corporate income tax rate is the national average of income tax as a percentage of output for each specific industry.

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