



Oil & Natural Gas Transportation & Storage Infrastructure: Status, Trends, & Economic Benefits

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EXECUTIVE SUMMARY

Over the past five years, unconventional oil and gas activity has thrust the nation into an unexpected position. The U.S. is now the global growth leader in crude oil production capacity growth, adding nearly 1.2 million barrels per day (mbd) of capacity over the 2008 – 2012 time period¹. In addition, the U.S. is now the largest natural gas producer, at 65 billion cubic feet (Bcf) per day². At the same time, unconventional activity is spurring the growth of natural gas liquids (NGLs) production, adding over 500,000 barrels of oil equivalent (boe) per day since 2008³. This has brought the total increase in liquids production capacity to some 1.7 mbd since 2008.

Driven by growth in U.S. natural gas, natural gas liquids, and crude oil, the past 2 years have witnessed rapid growth in direct capital investment toward oil and gas infrastructure assets. IHS estimates that capital spending in oil and gas midstream and downstream infrastructure has increased by 60 percent, from \$56.3 billion in 2010 to \$89.6 billion in 2013. This increase in capital spending has provided both an economic stimulus and an incisive data point into how shale driven oil and gas production is reshaping the U.S. oil and gas infrastructure landscape.

As this period of high infrastructure investment, which began after the 2008-2009 financial recession, continues to progress it will largely reverse a macro energy infrastructure trend that began taking shape in the early 1970's. Many of the major oil and gas infrastructure investments made for the past 30 years have been premised under the assumption of decreasing domestic production, increasing energy imports, and the need to move imported energy from coastal receiving ports to inland demand centers. A large portion of the projects being developed during this sustained infrastructure investment period will shift the U.S. towards being energy trade balanced and add key infrastructure segments that enable growing energy production in the Midcontinent region to reach demand centers on the US Gulf Coast and Eastern seaboard.

The purpose of this study is two-fold: (1) to provide a comprehensive assessment of required investment in oil and gas transportation and storage infrastructure through 2025; and (2) to assess the economic impacts associated with this investment, in terms of employment, contribution to GDP (Value Added), labor income, and tax revenues. The analysis of infrastructure investments examines significant trends both during an historical period – 2010 through 2013 – and on a forecast basis, 2014 – 2025. It focuses on energy types supported by investment, including Natural Gas, NGLs and LPG, Oil and Condensate, Refineries and Refined Products, and Common Infrastructure. The economic impact assessment is developed on the basis of average annual investments from 2014 through 2025. Both the analysis of infrastructure spending and the resultant economic impact assessment are developed under

¹ EIA – Monthly Energy Review https://www.eia.gov/totalenergy/data/monthly/pdf/sec3_3.pdf

² BP Statistical Review of World Energy 2012

³ EIA – Monthly Energy Review https://www.eia.gov/totalenergy/data/monthly/pdf/sec3_3.pdf

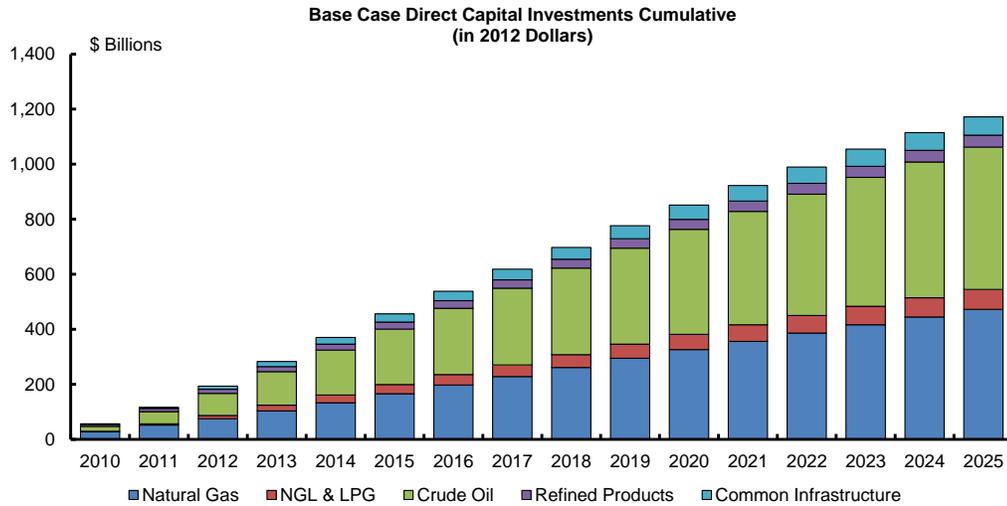
two scenarios – a base case, reflecting the IHS view of the most likely path of oil and gas production over the 2014-2025 time frame, and a high production case, reflecting a 20 percent increase in natural gas, natural gas liquids, and crude oil production above the base case that could be associated with expanded access to current off limit areas in Atlantic, Eastern GOM, Pacific and Alaska⁴.

Capital Investment in Oil and Gas Transportation & Storage Infrastructure

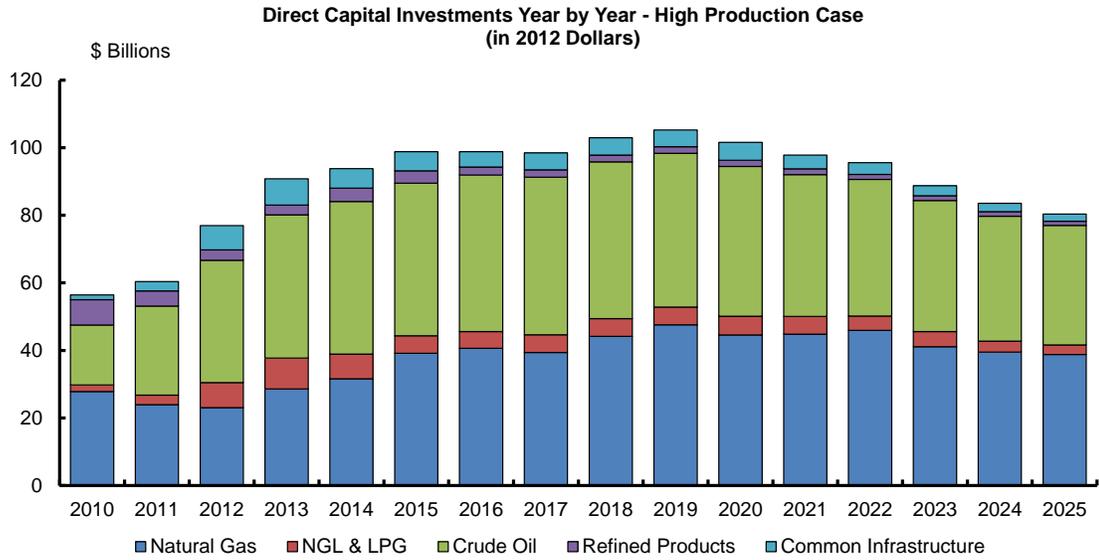
There are several themes and forward looking changes that are major factors affecting both the level and composition of oil and gas infrastructure spending. These can be summarized as follows:

- An incisive example of the structural shift from import to export oriented infrastructure assets is provided with liquefied natural gas (LNG) facilities. By the late 1990s, it appeared that the U.S. would need to supplement domestic natural gas production with imported LNG, and starting in 2000, LNG regasification (import) facilities were re-commissioned, expanded, or constructed. As the last of these import facilities were placed into service, the full potential of the shale gas resource was just being understood by the marketplace, largely making billions of dollars in import investment unnecessary. Fortunately, these import facilities can be repurposed with additional investment as dual purpose import and export LNG facilities.
- The results of the IHS analysis determine that this recent surge in oil and gas transportation and storage infrastructure investment is not a short lived phenomenon. Rather, we find that a sustained period of high levels of oil and gas infrastructure investment will continue through the end of the decade. The IHS analysis estimates that between \$85 – \$90 billion of direct capital will be allocated toward oil and gas infrastructure in 2014. Between 2014 and 2020, IHS projects that an average of greater than \$80 billion will be invested annually in U.S. midstream and downstream petroleum infrastructure. After 2020, IHS expects that pace of investment to curtail moderately from this sustained period of high investment, declining gradually to an infrastructure direct capital investment of just under \$60 billion by 2025.

⁴ Source: *IHS Downstream Energy Expanded Production Case*, April 2013. The IHS Downstream Energy Practice utilizes a 20 percent increase for all high production scenarios.



- The IHS forecast of oil and gas infrastructure investment over the next 12 years (2014 – 2025) estimates a cumulative spending of \$890 billion (in 2012 Dollars), with crude oil and natural gas gathering systems and direct production support facilities receiving the largest share of the investment at 60% of total. The IHS analysis forecasts a heavy weighting of investments towards liquids (crude oil and NGL’s) over the next 5 years driven by wide oil-to-gas price spreads, but expects the investment trend to shift back towards a higher percentage of natural gas investment in the second half of the forecast horizon as natural gas prices recover. Pipelines and related investments will remain the primary mover of oil and gas production despite a near term shift towards the use of rail and marine as major modes of oil and gas production transportation. As major pipeline corridors and projects are completed, the efficiency and economics of long distance pipeline movements will shift the logistics weighting back towards its historical distribution pattern.
- In addition to the IHS base case forecast, a high production case capital investment outlook has also been developed which assumes a 20 percent increase in oil and gas production relative to the base case over the forecast period. In the high production case, total oil and gas transportation and storage infrastructure investment increases to \$1.15 trillion over the 2014-2025 period, a 29% increase over the base production case. In the high production case, IHS forecasts that significant additional growth will occur in asset classes such as LNG liquefaction facilities, gas processing capacity, natural gas underground storage formations, and crude oil pipelines. The high production case is highlighted by a doubling of U.S. LNG exports and the construction of a second major North-South crude oil pipeline transportation corridor.



Economic Impact Results

IHS assessed the economic contributions attributable to increased investments in oil and natural gas transportation and storage infrastructure under both the base case and high production scenarios. The objective was to fully capture the influence of each scenario's infrastructure investment on the US economy and the four US Census Regions through direct spending, supply-chain activity and the effects of workers' spending portions of their incomes in the general economy.

The economic impact analysis was generated based on average annual investment levels over the 2014-2025 forecast horizon.

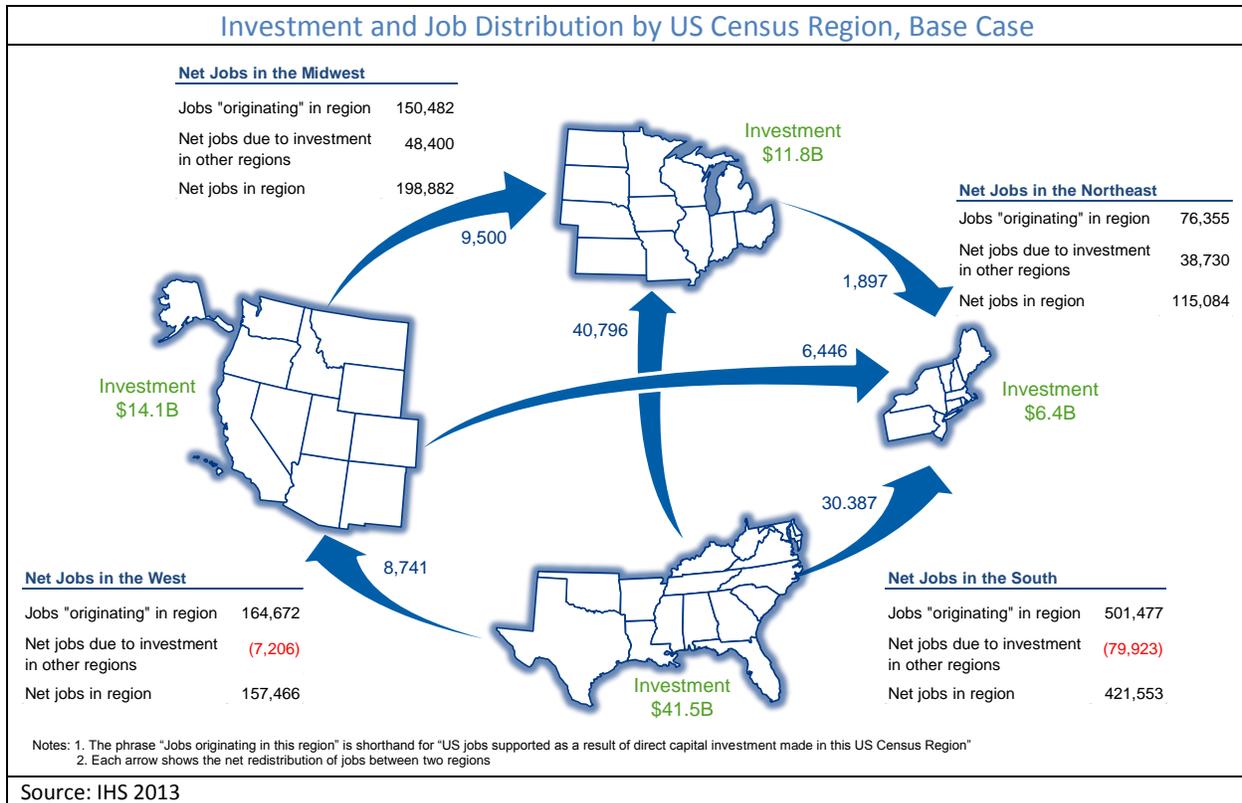
IHS anticipates that, under the base case scenario, the infrastructure investment will lead to average annual economic contributions over the 2014 to 2025 period of:

- Support for almost 900,000 jobs;
- Contribution to US GDP of \$94 billion;
- Labor Income of \$59 billion;
- Government Revenues in excess of \$21 billion.

Under the high production scenario these contributions will increase to:

- Support for almost 1,147,000 jobs;
- Contribution to US GDP of \$120 billion;
- Labor Income of \$75 billion;
- Government Revenues in excess of \$27 billion.

IHS also examined the effects of regional infrastructure and storage investment on the US economy. In the base case scenario, the \$73.8 billion of overall average annual investment was distributed across the four US Census Regions. Approximately \$41.5 billion of the investment went to the South, \$14.1 billion to the West, \$11.8 billion to the Midwest and \$6.4 billion to the Northeast. Based on these direct investments, IHS determined the jobs contribution to the US economy and each of the four US Census Regions. This analysis reflects the indirect and induced jobs that are contributed in regions other than a region in which the direct investment occurs. For example, as highlighted in the figure below, the Northeast gains 38,730 net new jobs as a result of investments made in the other 3 US Census Regions.



Conclusion

A significant finding of this study is the **staying power** of capital expenditure levels throughout the 2014-2025 forecast period. While investment declines after the build out in the first half of the forecast period, even by 2025 investment amounts remain at a robust \$60 billion in the base case and over \$80 billion in the high production case. This is an indication of continuing investment at fairly steady levels beyond 2025.

While the economic contribution of oil and gas transportation and storage infrastructure investment is significant, we are mindful that these investment levels are clearly not as large as the capital expenditure elements related to the upstream unconventional oil and gas sector. It should be remembered that these infrastructure investments facilitate the ultimate economic benefits flowing from unconventional oil and natural gas development. While we have assessed the stand-alone economic contribution of these investments⁵, it is necessary to take into account the infrastructure necessary to bring the upstream products to market and thus allow the significant economic benefits from those products to come to fruition. Economic impacts resulting from capital expenditure elements related to the upstream unconventional oil and gas sector are detailed in volume 3 of the IHS study "America's New Energy Future: A Manufacturing Renaissance".

⁵ See *America's New Energy Future: A Manufacturing Renaissance (Volume 3)* – September 2013

1. INTRODUCTION

Over the past five years, unconventional oil and gas activity has thrust the nation into an unexpected position. The U.S. is now the global growth leader in crude oil production capacity growth, adding nearly 1.2 million barrels per day (mbd) of capacity over the 2008 – 2012 time period⁶. In addition, the U.S. is now the largest natural gas producer, at 65 billion cubic feet (Bcf) per day⁷. At the same time, unconventional activity is spurring the growth of natural gas liquids (NGLs) production, adding over 500,000 barrels of oil equivalent (boe) per day since 2008⁸. This has brought the total increase in liquids production capacity to 1.7 mbd since 2008.

In the face of these historic changes in U.S. oil and natural gas production patterns the need for and benefits from additional oil and gas infrastructure in the U.S. and Canada is becoming increasingly apparent.

The purpose of this report is to provide critical information in the following areas:

- Characterization of the current state of the oil and gas related transportation infrastructure.
- Provision of a comprehensive overview and estimates of the (emerging) infrastructure investments needed for the transportation and storage of crude oil, NGL's, refined product, and natural gas reported as cumulative investment from the present to 2025.
- Assessment of the associated employment, GDP and tax revenue impacts associated with such infrastructure investments reported as average annual impacts over the study horizon.
- Incorporation of a potential high production growth scenario to estimate infrastructure and economic impacts associated with expanded access to current off limit areas in Atlantic, Eastern GOM, Pacific and Alaska. The time frame for this additional scenario would also be through 2025.

Twenty asset classes are examined in the assessment of oil and gas transportation and storage infrastructure investment. These include the following:

- (1) Natural Gas Gathering
- (2) Gas Processing
- (3) Natural Gas Pipelines
- (4) Natural Gas Storage
- (5) LNG Processing

⁶ EIA – Monthly Energy Review https://www.eia.gov/totalenergy/data/monthly/pdf/sec3_3.pdf

⁷ BP Statistical Review of World Energy 2012

⁸ EIA – Monthly Energy Review https://www.eia.gov/totalenergy/data/monthly/pdf/sec3_3.pdf

- (6) LNG Marine
- (7) NGL & LPG Processing
- (8) NGL & LPG Pipelines
- (9) NGL & LPG Storage and Rail
- (10) NGL & LPG Marine
- (11) Crude Oil Gathering
- (12) Crude Oil Pipelines
- (13) Crude Oil Storage
- (14) Crude Oil Marine
- (15) Crude Oil Rail
- (16) Refineries
- (17) Refined Product Pipelines
- (18) Refined Product Storage
- (19) Refined Product Marine
- (20) Common Infrastructure

Section Two describes the current state of the oil and gas transportation and storage infrastructure and provides capital addition estimates over the past four years, 2010-2013. This is a retrospective look at investments that have already been made and specific key capital projects that are operating. *Section Three* provides a forecast of direct capital investments and capacity additions over the 2014-2025 time frame required to support our base case of expected natural gas, natural gas liquids, crude oil, and refined product production.

Infrastructure forecasts are also presented in *Section Three* for the potential high production case, which assumes a 20 percent increase in natural gas, natural gas liquids, and crude oil production above the base case⁹. *Section Four* presents the economic impact assessment related to infrastructure investment for both the base case and high production cases. The direct capital investment forecasts taken from section three are used as the primary modeling inputs into the IMPLAN modeling structure (modified to incorporate the IHS Macro-Economic Model configuration in estimating induced effects). The investments over the 2014-2025 timeframe are incorporated into the IMPLAN structure as annual averages. The analysis is conducted at both a national level and on a nine Census Division basis, aggregated up to the four U.S. Census Regions. Relevant metrics include direct, indirect, induced and total effects on an employment, value added (contribution to GDP), labor income, and government revenue basis. *Section Five* provides the final conclusions of this study.

Finally Appendix A provides additional details underlying the oil and natural gas transportation and storage infrastructure investment estimates, and Appendix B presents additional details underlying the economic impact results and modelling approach.

⁹ Source: *IHS Downstream Energy Expanded Production Case*, April 2013. The IHS Downstream Energy Practice utilizes a 20 percent increase for all high production scenarios.

2. CURRENT STATE OF THE US OIL & GAS INFRASTRUCTURE

The emergence of the U.S. from the 2008-2009 recession has been underpinned by rapid growth in domestic infrastructure investment that supports the production and processing of natural gas, natural gas liquids, and crude oil. Our analysis indicates that the direct capital investment in U.S. oil and gas infrastructure has increased over the past 4 years by 60 percent, from \$56.3 billion in 2010 to \$89.6 billion in 2013¹⁰. This increase in capital spending has both provided an economic stimulus and provides an incisive data point into how shale driven oil and gas production is reshaping U.S. oil and gas infrastructure.

For the purposes of this report, infrastructure refers to the physical assets starting at the production wellhead necessary to transport and convert produced hydrocarbons into both semi-finished and finished products and deliver those products to market. In conventional oil and gas vernacular this covers the assets typically classified as “Midstream” and “Downstream” assets, and includes gathering, stabilization, and supporting assets typically installed in the direct vicinity of the production well. The analysis contained in this report covers the following three distinct hydrocarbon value segments; **natural gas, natural gas liquids (NGL)¹¹, and crude oil¹²**. Across each hydrocarbon value chain the assets can further be categorized by functionality and logistics transportation mode. Common asset sectors across the three hydrocarbon segments include the following:

- **Pipelines** includes both long distance inter and intrastate transmissions systems and the local or regional gathering systems which aggregate production for delivery into the common carrier transmission systems. The assessment of the gathering system direct capital investment contains the group of assets typically found in the direct vicinity of the production well. This includes both the collection pipelines and associated pumping and compression facilities, and also supporting assets necessary to stabilize, condition, and perform bulk separation from the as-produced hydrocarbons.
- **Rail** infrastructure includes direct capital investment in loading and unloading facilities, additional railroad tank cars used in the transportation of increased liquids production, and direct investment in railroad tracks to establish new routes or enhance existing lines associated with delivering increased volumes of hydrocarbon liquids.
- **Marine** infrastructure includes direct capital investment in both new build vessels¹³ required to transport incremental production and specially designed marine loading and unloading facilities. The classes of marine vessels covered include tankers, ocean-going barges, and inland transport barges. The growth in capital investment in fit-for-purpose is particularly strong for dedicated NGL export facilities and liquefied natural gas (LNG) bunkering facilities to support marine vessel refuelling along U.S. waterways.

¹⁰ 2013 value reflects a current year estimate and may vary slightly as end of the year data is compiled.

¹¹ Includes natural gasoline or pentane plus typically contained in the raw NGL mixture.

¹² Includes stabilized condensate or very light crude oil, API greater than 50.

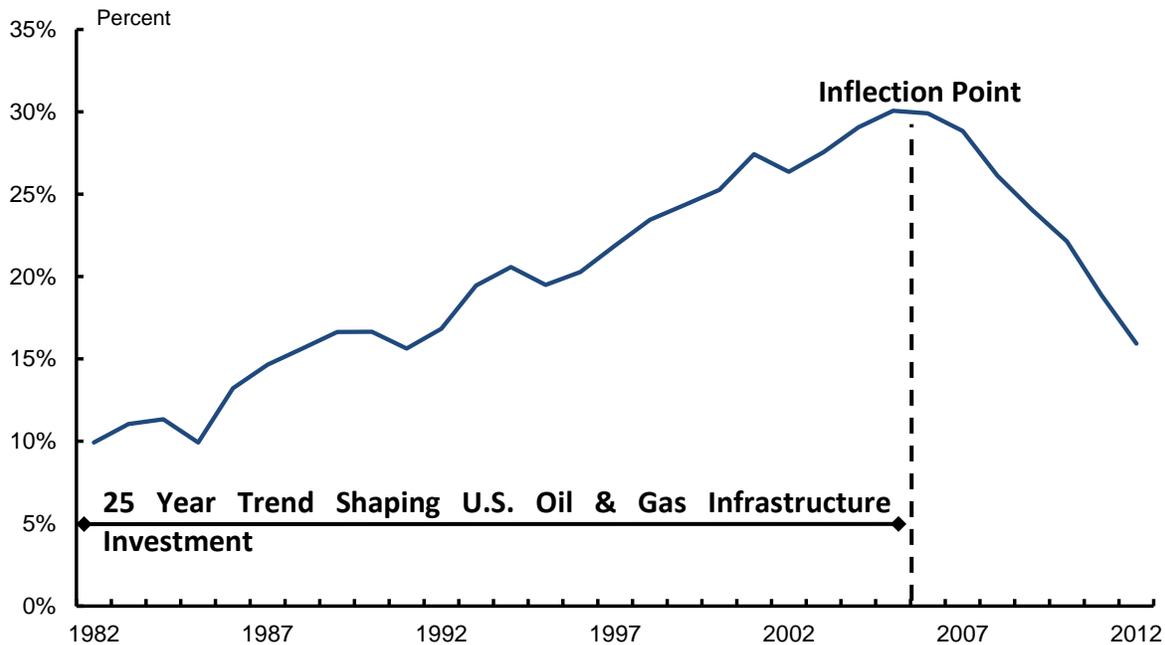
¹³ All new build marine vessels assumed to conform to requirements of the Jones Act.

- **Processing & Storage** infrastructure is typically referred to as the “Downstream” sector of the petroleum industry, and includes those facilities involved in the physical storage of hydrocarbons. Also any asset group whose function is to process, separate, or liquefy raw hydrocarbons into higher value intermediates and finished products. These facilities include raw or rich natural gas processing plants, natural gas liquefaction facilities (or LNG export facilities), NGL fractionators, and crude oil refinery investments. Not included in the processing and storage sector are secondary processing facilities such as petrochemical, fertilizer plants, and gas-to-liquids (GTL) investments.
- **Common Infrastructure** covers key enabling pieces of infrastructure that are typically common to all three hydrocarbon value chains and are not classified as one of the primary transportation modes. This includes investment in roads to handle increased heavy duty vehicle traffic for both production operations and logistics functions, port facilities specific to increased oil and gas production, new U.S. mines for hydraulic fracturing sand, and large scale investment in cross-continental infrastructure to support the use of liquefied and compressed natural gas (LNG-CNG) as a petroleum diesel alternative in long distance heavy duty trucking.

The investment pattern in U.S. oil and gas infrastructure over the past four years is largely a continuation of a macro trend that began in the mid-to-late 2000s, that was unfortunately disrupted by the financial recession, and recently took a sharp pivot away from gas oriented investment towards investment in liquids related infrastructure. The short term pivot away from natural gas related infrastructure, particularly pipelines and gathering systems, is a function of an extended period of historically low U.S. natural gas prices (less than \$4.00 per MMBTU) due to general market oversupply facilitated by the natural gas shale production revolution.

The macro trend that began just before the recession reversed a multi-decade long infrastructure trend in the U.S., one based upon the presumption that the U.S. would be importing an ever increasing percentage of its energy demand in the form of crude oil, refined products, natural gas liquids, and liquefied natural gas. The investments over this period (nominally the period between 1975 and 2005) in the major pieces of oil and gas infrastructure largely support this now increasingly incorrect outlook of an ever increasing energy trade imbalance.

US Oil & Natural Gas Consumption Supplied by Imports¹⁴



As an example of the infrastructure investment spending trend of the preceding three decades consider the types of investments made in several key asset classes. For crude oil pipeline, the major investments made during the late 1970s and early 1980s were largely made to move crude oil from the coastal regions of the country to the midcontinent where crude oil production was in decline. This included major investments such as the Louisiana Offshore Oil Platform (LOOP), which finished construction in 1981 and its conjoining pipeline Capline¹⁵, constructed a decade earlier. At the time this was the largest crude oil pipeline in the world. With these systems combined, the capability existed to receive a very large crude carrier (VLCC) vessel¹⁶ at a US Gulf Coast marine berth, and transport up to 1.2 million B/D of crude oil from the Gulf Coast to the Midwest.

In similar fashion, the Seaway pipeline finished in 1976 was envisioned as a major corridor for moving crude oil from the deep-water port of Freeport, Texas to Midwest refineries through Cushing, Oklahoma. These investments in conjunction with a series of expansions of the Canadian Interprovincial Pipeline System (now Enbridge Mainline) through the 1980s and 1990s are all indicative of a U.S. petroleum industry anticipating an ever increasing percentage of

¹⁴ While these estimates include coal, the major component is oil and natural gas. There have been virtually no coal imports (just exports) in the recent past due to significantly lower natural gas prices.

¹⁵ Capline finished construction in 1969 and was originally envisioned as a means of moving Louisiana offshore Gulf Coast production to the U.S. Midwest. By the 1980s and 1990s it was largely being used to move imported crude oil barrels to those same refineries.

¹⁶ A VLCC marine vessel holds approximately 2 million barrels of crude oil.

Unfortunately, from an investment perspective, seven of these facilities were not finished with commissioning until 2008 or later, with two of them not commissioned until as late as 2011. Just as many of these facilities were ready to accept their first cargos of LNG, the full potential of the U.S. shale gas resource was being realized. This ultimately reduced the operating utilization to lower than expected levels for billions of dollars in natural gas infrastructure investment. As an example of how energy fortunes can change over the multi-decade investment horizon of major oil and gas projects, Indonesia, the largest producer and exporter of LNG for several decades, signed in December of 2013 its first contract for the importation of LNG (starting in 2018). A portion of the volumes that Indonesia will be importing are anticipated to be supplied by LNG liquefaction terminals located on the U.S. Gulf Coast supplied with domestic natural gas.

As is now well acknowledged, the story of what changed is the story of the U.S. shale oil and gas revolution. The combination of horizontal drilling and hydraulic fracturing technologies enable oil and gas companies to tap a large new source of oil and gas production held in shale and other low porosity or tight geologic formations using these techniques. In the beginning the impact of the shale shift on U.S. oil and gas infrastructure was primarily a natural gas story or, more specifically, a dry natural gas story¹⁹. The initial impact of shale gas on infrastructure development was largely focused on natural gas gathering systems, natural gas interstate pipelines, and natural gas storage. “More recently, the development of the shale basins in the southeast U.S. has spawned a boom in transmission pipeline construction in that part of the country. Shale gas supplies were connected, via new pipelines, to the traditional long-line pipelines that transported natural gas from the Gulf of Mexico to the mid-Atlantic and northeast U.S. Over 3,000 miles of interstate pipeline has been approved and has gone into service to haul southeast U.S. shale gas.”²⁰ This statement from the National Petroleum Council reflects the state of infrastructure development to support shale gas that was occurring in the 2008 – 2010 timeframe.

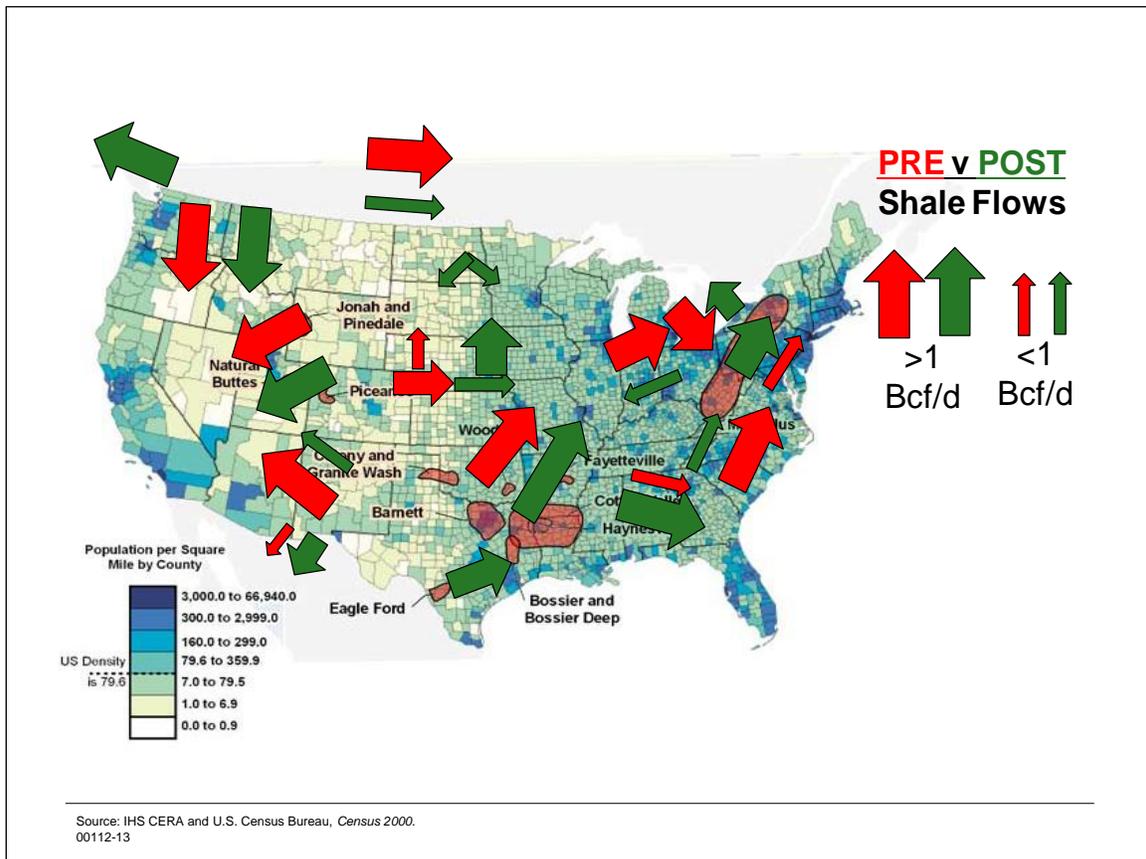
The second half of the natural gas infrastructure development story centers on the prolific production from the Marcellus shale development. Large scale development in the Marcellus aided in sustaining natural gas investment through the 2010 – 2013 period, despite historically low natural gas prices, and reduced natural gas drilling activity across the U.S. As of September 2011 and based on data from the FERC, “over 70 miles of interstate pipeline to transport Marcellus Shale basin gas have gone into service, 319 miles of interstate pipeline are approved and under construction, 116 miles are pending, and almost 5,000 miles of potential projects have been announced. An interesting characteristic of the Marcellus Basin area pipelines is that while total capacity proposed will be large, the mileage will be seemingly small when compared to long haul pipelines in the west. This is primarily due to the proximity of this supply to highly populated east coast markets.”²¹ Both of these major infrastructure

¹⁹ Natural gas that does not contain a high percentage of natural gas liquids that can be further extracted in a natural gas processing plant.

²⁰ National Petroleum Council, North American Resource Development Study, made available September 15, 2011.

²¹ National Petroleum Council, North American Resource Development Study, made available September 15, 2011.

developments in the U.S. natural gas markets have had a profound impact over the past 5 years in shifting the traditional flow patterns of natural gas in the U.S.



As natural gas production from shale has developed, particularly in areas of non-traditional production, the demand for underground²² natural gas storage has grown as well, both to manage seasonal demand swings and to buffer the market from rapid changes in production. Since 2009, U.S. domestic total natural gas storage²³ has increased by 500 billion cubic feet to a total storage capacity of 9,100 billion cubic feet. This 6% increase seems small unless placed into the context that in the preceding 20 years, underground natural gas storage in the U.S. had only grown by the same 500 billion cubic feet.

Another key theme in the recent development of U.S. oil and gas infrastructure has been the migration of techniques originally developed for shale gas to liquids rich production plays. Particularly in light of depressed natural gas prices the ability to adopt these techniques in oil and wet gas²⁴ rich basins has been critical to keeping the U.S. drilling rig fleet fully utilized. This near term shift in production focus away from natural gas towards liquids is evident in both the number of crude oil versus natural gas wells completed and in the investment in crude oil

²² Underground storage constitutes storage in depleted oil / gas reservoirs, salt caverns, and aquifers.

²³ Total natural gas storage to be differentiated from working gas capacity.

²⁴ Raw natural gas with a high concentration of natural gas liquids.

gathering systems. Based on IHS analysis the direct capital investment in crude oil gathering and support facilities has doubled since 2010, increasing from \$15 billion to just under \$30 billion by 2013. However, in a classic case of outrunning the supply lines, the pace of drilling and production in crude oil and other liquids rich plays has far outpaced the ability of the downstream supporting infrastructure to be added.

In 2010 and 2011 calculated direct capital investment in crude oil and NGL's logistics and processing²⁵ averaged just under \$8 billion annually. As the need for supporting infrastructure became self-evident, the direct capital investment in liquids logistics and processing increased by over 260 percent, jumping to \$22 billion in 2012, and then increasing by another 32 percent to just under \$29 billion in 2013²⁶. This almost quadrupling of direct investment has stimulated almost every aspect of U.S. domestic oil and gas infrastructure, creating a construction and development surge not experienced in the U.S. petroleum industry in 25 years. Detailed below are examples of the scale and development acceleration experienced for specific asset classes of oil and gas infrastructure.

- Driven by the economics of extracting NGL's over the present day value of natural gas, the investment in gas processing has increased from \$2 billion in 2010 to \$7.5 billion in 2013. In 2012 and 2013 alone an estimated 12 BCF/D of natural gas processing was added or restarted in the U.S. This capacity surge represents almost 20% of total U.S. natural gas demand.
- Heavily concentrated in Mont Belvieu, Texas, the main NGL fractionation hub in the U.S., the investment in NGL fractionation has increased from just under \$1 billion per year to over \$4.5 billion per year. In 2012 and 2013, IHS estimates that just over 1 million B/D of NGL fractionation capacity had been added. This represents fractionation capacity for nearly one-third of total U.S. NGL production.
- NGL pipelines, which serve as the key connector between the gas processing plants and the large NGL fractionating hubs, have increased investment from under \$1 billion per year to over \$3 billion per year in 2013.
- Starting with the original Keystone pipeline commissioned in 2010 and the reversal of several other exiting pipelines between the Upper Midwest and Midcontinent, a large scale reshaping of domestic crude oil flow patterns is under way. Investments in U.S. crude oil pipelines have increased from \$1.6 billion in 2010 to \$6.6 billion in 2013. With many pipelines under development, the investment in crude oil pipelines is projected to be sustaining for the next half decade. By 2015, just 2 years from now, the landscape of major U.S. crude oil pipelines will have almost no resemblance to the picture that existed in 2005.

²⁵ Including natural gas processing for NGL production but excluding crude oil refining.

²⁶ Estimated current year projection.



Expected North American Major Crude Oil Pipelines (2015)



- Even with the large increase and investment in pipelines the completion of infrastructure projects has not been able to keep pace with the rapid increase in production. This has created the opportunity for marine, both river and ocean going, and particularly rail to inhabit a much larger role in the movement of production than they have played in many years. Crude oil movements by rail have increased from less than 50,000 B/D in 2010 to 800,000 B/D in 2013, driving capital investment in rail tracks, rail loading and unloading facilities, and tank cars used in the transportation of crude oil. At present the backlog for tank cars in the U.S. stands at just under 60,000, representing over 20% of the entire tank car fleet²⁷. Driven by rail, both figuratively and literally, the investment in rail and marine logistics for transporting crude oil and NGL's has increased from less than \$0.5 billion in 2010 to over \$5 billion by 2013.
- In support of oil and gas production across all three value chains, investment in common infrastructure has also increased significantly, from \$1.3 billion in 2010 to \$7.7 billion in 2013. This investment is heavily concentrated in additional highway and local road construction to support higher traffic flows, but also includes port investment for new high traffic crude oil marine centers such as Corpus Christi, TX.

During this period of rapid growth in U.S. oil and gas infrastructure one segment of the industry has experienced the reverse trend from the other asset classes detailed above, and that is

²⁷ Railway Supply Institute, September 2013 Data.

refining. The period of 2005 – 2010 represented a relatively large and sustained investment period for the U.S. refining industry. This was driven by investment to produce cleaner fuels, reduce criteria emissions, improve process safety standards, and by several large investment decisions made during the relatively high refining margin period that existed from 2005 – 2007.

During this period of high margins and growing U.S. refined product demand, investment decisions were made to expand two already very large refineries, Marathon Petroleum Garyville, LA and Motiva Port Arthur, TX. Although these investments will be technically classified as expansion projects, in reality these represent the construction of two world scale grass root refineries inside the fence line of existing refineries, totalling over 600,000 B/D of new high complexity refining capacity. These investments were being constructed and completed during 2010 and drove a high direct capital investment for that year. Since those investment decisions were made, the demand in the U.S. for refined petroleum products has not increased as predicted, but actually decreased, curtailing the need for additional large scale investment in U.S. refining capacity. Since 2010, calculated, non-sustaining capital investment in refining has decreased from \$7.5 billion in 2010 to just under \$3 billion in 2013.

SECTION II TABLE 1

U.S OIL & GAS DIRECT CAPITAL INVESTMENTS IN RECENT HISTORY (2010-2013)

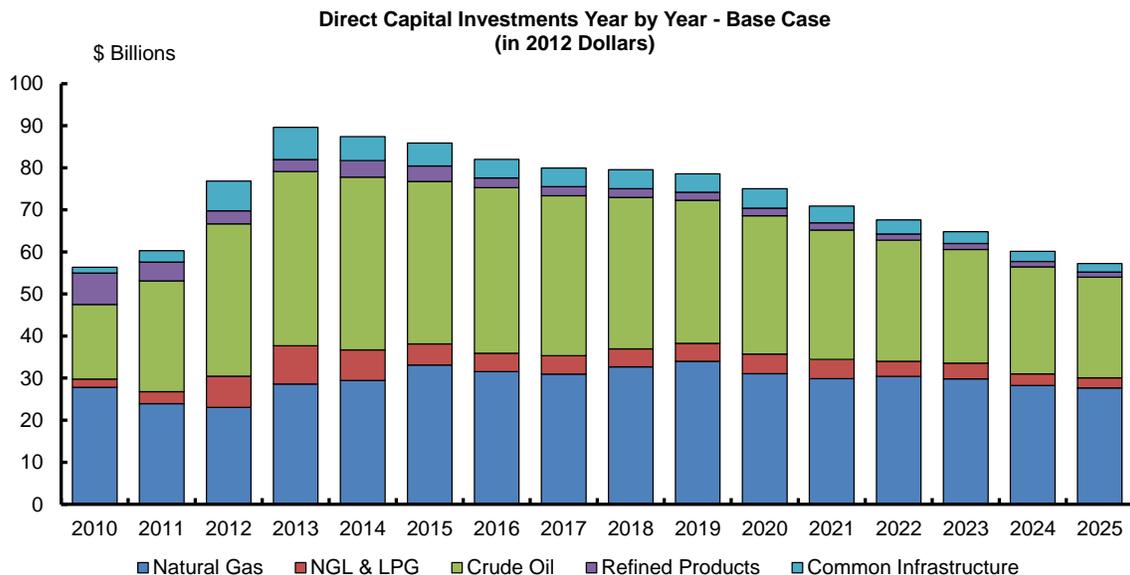
(Million 2012 Dollars)

	2010	2011	2012	2013
Natural Gas Gathering, Pipelines & Storage	25,014	20,841	15,585	17,760
Crude Oil & NGL Gathering, Pipelines & Storage	18,283	26,347	36,326	40,464
Natural Gas & NGL Processing	3,707	4,436	11,260	15,578
Natural Gas / NGL / Crude Oil Rail & Marine Logistics	496	1,477	3,518	5,284
Refineries & Refined Product Infrastructure	7,496	4,489	3,085	2,887
Common Infrastructure	1,340	2,681	7,050	7,651

3. FORECASTED TRENDS IN U.S. OIL & GAS INFRASTRUCTURE DEVELOPMENT (2014-2025)

The momentum generated from 2013, a banner year for U.S. oil and gas investment, will extend into 2014 and sustain a high level of infrastructure investment through the next decade. With many projects currently progressed to the construction phase and a full backlog of projects under development, the majority of U.S. oil and gas infrastructure sectors are experiencing a period of booming investment and construction. The IHS analysis developed for this study estimates that between \$85 – \$90 billion of direct capital will go towards oil and gas infrastructure in 2014. Between 2014 and 2020, IHS projects that an average of greater than \$80 billion will be invested annually in U.S. midstream and downstream petroleum infrastructure.

After 2020, IHS expects the pace of investment to curtail moderately from this sustained growth period, declining gradually to an infrastructure direct capital investment of just under \$60 billion by 2025. Towards the second half of the investment forecast, IHS also anticipates that the weighting of investment will shift towards a higher percentage of natural gas related investments. This reflects both the high capital requirements associated with LNG liquefaction facilities, as well as a larger macro-energy trend for the U.S. where natural gas represents an ever increasing share of the U.S. energy supply portfolio. IHS forecasts that U.S. natural gas demand will grow by 30% between 2014 and 2025, from 69.3 BCF/D²⁸ in 2013 to 88.2 BCF/D in 2025. During the same time frame natural gas production will increase by almost 40%, growing to 91 BCF/D by 2025.



²⁸ Total U.S. natural gas demand, includes Alaska and Hawaii.

Direct Capital Investment Assessment Methodology

For the assessment on U.S. direct capital investment in oil and gas transportation and storage infrastructure over the next 12 years, IHS has applied a methodology based on a zero based build-up of announced, planned, and probable projects calibrated against the need for infrastructure in a given industry sector using IHS base case production forecasts. These methods are identical to those used to develop the assessment of recent investment in U.S. oil and gas infrastructure (Section 2). IHS constructed a project-by-project database for each hydrocarbon value chain and asset segment. Data for individual projects were sourced from the public domain based on details provided in individual company 10-K statements, investor presentations, press releases, regulatory filings, permit applications, and other publicly available sources. An assessment was then made on whether the project is probable or speculative with all probable projects assumed to proceed through construction and placed into service. The IHS methodology used for this assessment acknowledges that not all projects classified as “probable” will ultimately be funded and constructed. However, based on the given need for specific asset classes of infrastructure, IHS concludes that there is sufficient probability to reasonably assume that a given project will be constructed or potentially be replaced with a similar project attempting to satisfy the identified market need. Entities that are developing oil and gas infrastructure projects which are private, who do not provide public data, are not included in this assessment. However, this investment total is expected to be relatively small, as few private entities possess the capital resources to develop large scale oil and gas infrastructure projects.

In cases where budgets are provided for a given project, IHS typically incorporated the company provided figure but includes a planning level contingency to cover cost escalation, inflation, and uncertainty. For announced and probable infrastructure projects where capital budgets are not provided, IHS applies an in-house proprietary screening level capital estimation method, based on comparable projects of a given asset class and location, to provide a screening level estimate of investment. The capital investment for each project is distributed over a typical project development and construction cycle, with adjustments made based on project size and complexity. Projects with a high degree of complexity, highly engineered components such as high horsepower turbo machinery, or large regulatory or permitting burdens were assumed to have a 4-6 year development schedule. LNG liquefaction or long distance oil and gas transmission pipelines are typical projects with these extended development cycles. Smaller projects, where the engineering is largely off-the shelf and many of the components can be pre-fabricated or modularized, were assumed to have a shorter development cycle, typically on the order of 2-3 years. Oil and gas gathering systems and gas processing facilities are examples of projects that normally fall under this shortened development cycle. The individual projects are then aggregated to provide a total investment and capacity being added per asset class with a distribution of the investment over the set forecast horizon.

The next step in the assessment process is a comparison of the announced capacity being added in a given asset class against the expected need for a certain type of asset based on projected peak production and the location of that production. IHS annually develops a detailed outlook for production and demand across all of the hydrocarbon value chains. Details

are provided at a granular level including the hydrocarbon mix of that production (crude oil versus NGL's versus gas) and the development of which locations or basins will result in that production. This level of specificity is necessary for IHS to evaluate the incremental infrastructure need, above what already exists, for a given formation or field. For example, if IHS forecasts that natural gas production is expected to increase by 24.4 million BCF/D²⁹ by 2025, then IHS can reasonably assert that a minimum of 31 BCF/D³⁰ of gas processing capacity needs to be installed to adequately manage and condition this anticipated increase in natural gas production. Based on announced projects under development with details in the public domain, IHS has determined that there is currently 10 BCF/D of gas processing capacity scheduled for construction between 2014 and 2016. Using the IHS production forecast, it is then calculated that a minimum of 20 BCF/D of unannounced projects remain to be developed between 2017 and 2025. It is assumed that these projects are in the nascent stage of development and insufficient clarity about the specific nature of the projects exists for the development company to begin providing public details. For this assessment, IHS will then add sufficient undefined placeholder projects to ensure that sufficient gas processing capacity is added between 2017 and 2025, to match the expected increase in production.

However, in reality additional gas processing capacity is required to be added above the bare minimum, as additional capacity should be added both to cover the expected growth in production-demand and to offset natural production declines for existing mature fields, potentially located in geographically unrelated regions of the country. Using this method, IHS conservatively assumes that 25 BCF/D of unannounced but probable projects are likely to be developed for the gas processing asset class between 2017 and 2025. These methods are then applied across the 20 asset classes of oil and gas infrastructure which IHS has identified, making asset class specific adjustments based on the projected production growth and the incremental need for additional oil and gas infrastructure.

The production and demand forecasts for natural gas, natural gas liquids, and crude oil become a key input in assessing the cumulative investment in U.S. oil and gas infrastructure using the IHS methodology. Given the inherent uncertainty of any forecast and that the annual update of IHS forecasts typically occurs during the May/April timeframe³¹ an alternate scenario (to the base case) was also developed. This alternate case is labeled as the "high production" case and evaluates the direct capital investment forecast for an alternate scenario with a notional 20 percent increase in production. This could be associated with expanded access to current off limit areas in Atlantic, Eastern GOM, Pacific and Alaska.³² For both natural gas and natural gas liquids, this 20% increase is a top line increase by the end of the forecast period, i.e. production

²⁹ Increase in production from 66.6 BCF/D in 2013 to 91.0 BCF/D in 2025.

³⁰ The gas processing capacity added is quoted in terms of rich gas or inlet gas capacity; with the extraction of NGL's the remaining dry gas is a smaller volume than the inlet rich gas. This is known as shrinkage. To produce a given volume of dry gas typically the inlet gas is 25% higher than the expected product dry gas, although this varies greatly depending on gas composition.

³¹ The IHS production forecast used for this analysis is dated by 7 months.

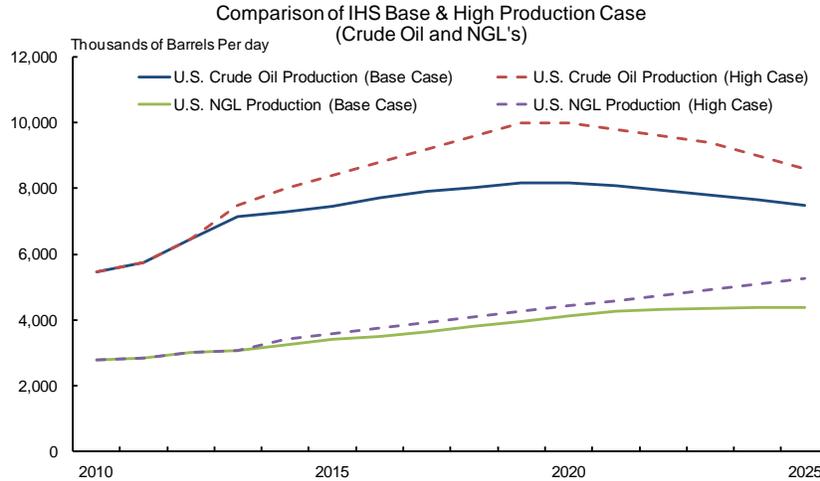
³² Source: *IHS Downstream Energy Expanded Production Case*, April 2013. The IHS Downstream Energy Practice utilizes a 20 percent increase for all high production scenarios.

in 2025 is 20% higher than in the base case. For crude oil, a slightly different high production case was evaluated, one in which total production (total barrels produced) is 20% higher than in the base production case. This is due to an expected peak production of crude oil being reached around 2020 followed by a production plateau, and gradual decline in both the base and high production case. No anticipation of peak production is expected for either natural gas or natural gas liquids over the forecast.

For this analysis, IHS has not performed an in depth analysis of the specific sequence of events that would transition the base production case into the high production case. However, like similar alternate scenarios, this high production case would evolve over time and be caused by a multitude of factors such as increased production recovery rates, increased drilling efficiency, an overall lowering of drilling costs, or an opening of access to geographic regions that have previously been unavailable for exploration and production³³. Additionally, as has historically been the case, a key driver in determining the development level of oil and gas resources is the absolute or benchmark global pricing for either natural gas or crude oil. A period of elevated prices, above those experienced during the past two years, caused by either a supply demand imbalance or a set of geopolitical externalities, would provide additional financial incentive for resource development or push currently non-economic plays to become economically feasible.

The development and results from a high production case are particularly relevant in that the growth in U.S. oil and gas production since the recession has been so rapid, that in many cases the high case forecasts, developed by both the IEA, EIA, and industry consultants are regularly being adopted as the base case only several months after forecasts are released. The IHS U.S. crude oil production forecast for 2013 of 7.2 million B/D, developed in February and March 2013, already appears dated in lieu of recently released EIA production data showing September production of 7.8 million B/D and expected October production of 8.0 million B/D. Full year 2013 U.S. crude oil production is now projected at 7.5 million B/D, a full 300,000 B/D higher than projections from one year ago. The rapid growth in U.S. oil and gas production turns the high production case into not just an academic exercise but a credible alternative providing a snapshot of growth and investment upside potential.

³³ This could occur on either public or private land.



Direct Capital Investment Forecast Base Case Results

The evaluation of the base case direct capital investment result is the cumulative investment forecast from 2014–2025 of \$890 billion in oil and gas transportation and storage infrastructure. Performing a deeper analysis of the results yields several important conclusions that can be drawn on infrastructure investment trends and specific target asset segments.

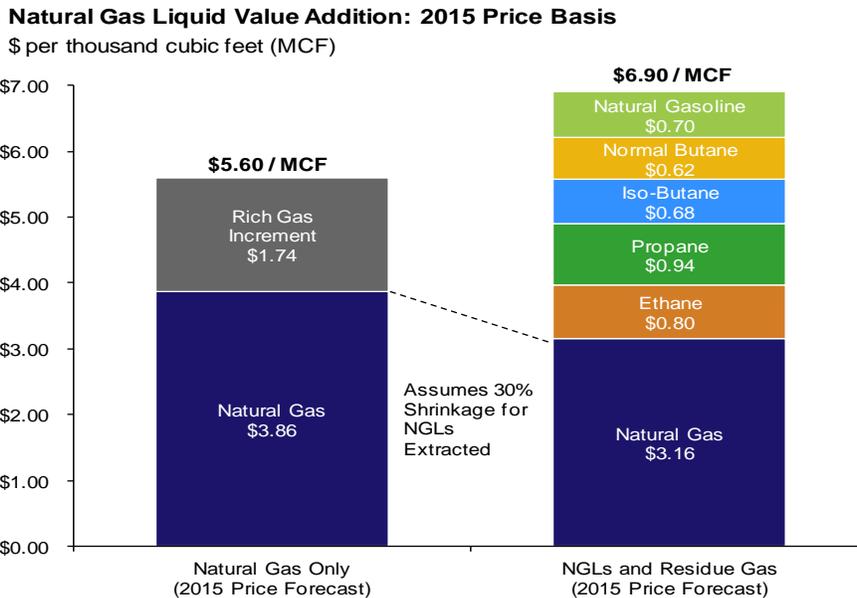
Crude oil and natural gas gathering and support facilities represent the largest investment asset segment through the forecast period with just under 60% or \$526 billion in direct capital investment projected. The investment trend in gathering systems and support facilities has a strong correlation to overall drilling activity and is expected to ebb and flow with the pace of well completions. Slight adjustments have been applied to account for more mature production areas such as the Permian Basin of West Texas, which requires less new investment in gathering facilities due to the longevity of the region and the number of assets that can be repurposed for increasing production. New development areas such the Bakken and Eagle Ford production regions will require extensive investments in gathering and support facilities as both regions have not been historic production regions and are starting from a point of low existing infrastructure. Even some new and emerging shale producing regions such as the Mississippi Lime or SCOOP³⁴ region, although undeveloped, will require less investment in gathering and support facilities than for example the Bakken formation because it has been an historic producing region and already has a relatively large base of major infrastructure assets. This is due to its proximity half way between the Permian Basin and the oil storage hub of Cushing, Oklahoma.

The period of 2012 -2015 has and will witness a period of reduced capital investment in natural gas gathering systems, as rigs and completions have focused on liquid rich and crude oil plays. Average investment over this period of reduced activity is expected to average less than \$10 billion annually. As natural gas demand recovers and grows in response to reduced prices, IHS forecasts that natural gas prices will recover, which will in turn prompt a shift back towards gas

³⁴ South Central Oklahoma Oil Province.

based drilling. This natural gas demand recovery will be further supported by the step change increase in demand from new sources such as natural gas liquefaction and the use of natural gas as a transportation fuel in long distance trucking. From 2019 – 2025 natural gas oriented gathering and support facilities are projected to average over \$16 billion annually of direct capital investments.

Driven by the value added economics of NGL extraction, the period of extensive growth that began in 2012 will extend through 2019, with an average of \$4 billion in annual gas processing investment from the period of 2014 – 2019.



Source: IHS

The past 2 years have seen a proliferation of new gas processing additions. Once these under construction facilities are commissioned, there could be a period of relatively low utilization for these new plants. Many gas processing plants are being designed and constructed with excess capacity, resulting in ample processing capacity on the ground when supply responds to the recovery in natural gas demand anticipated in the 2015 – 2016 time frame. During the forecast period IHS estimates that approximately 30 BCF/D of gas processing capacity will be added, above the 8.5 billion BCF/D slated for completion in 2013 and 2014.

Similar to natural gas gathering investments, the period 2013 – 2015 is projected as a period of muted investment in natural gas pipelines and natural gas underground storage. With the recovery in natural gas pricing, both of these asset classes are projected to see a recovery in their investment profiles with natural gas pipelines and storage facilities averaging just under \$10 billion annually after 2018.

The asset class at the forefront of natural gas growth recovery and development will be natural gas liquefaction facilities, which other than a small facility located in Kenai, Alaska have no history of development in the U.S. The unconventional oil and gas revolution has led many

investors to actively pursue LNG export projects. IHS assumes that several of the LNG export projects now under development are likely to be completed. The expected total investment for these natural gas liquefaction projects over the 12-year forecast period will be \$45.1 billion, based on the assumption of \$550 - 850 per metric ton of annual capacity, depending on brownfield versus greenfield development.

As of November 2013, there were 25 LNG export projects – representing a total of 56 individual LNG production trains – under development in the US, 23 of which are located in the US lower 48 and 2 in Alaska. If all of these proposed projects were to progress through permitting, funding, construction, and start-up, they would increase US natural gas liquefaction capacity to over 32 billion cubic feet per day, which represents 35% of the projected US natural gas demand in 2025.

The IHS forecast for US LNG development takes a conservative approach, assuming that a total of 6 projects will become operational. These 6 projects represent 12 individual liquefaction trains with a total capacity of 7.3 BCF per day. Based on natural gas producing regions and existing infrastructure, these LNG facilities are likely to be located in the US Gulf Coast and involve the retrofitting of existing LNG import terminals into dual purpose import-export facilities. The approach of adding liquefaction trains to existing import terminals is a preferred strategy by developers as it reduces total project investment cost by reusing existing LNG storage tanks and marine facilities.

The conservatism in the IHS forecast is based on significant development challenges still facing many LNG projects, including export license approval, environmental impact reviews, local and state regulatory approval, capital availability, cost escalation, competition from other global LNG developments (in areas such as Australia, East Africa, and British Columbia), costs, and standard construction and engineering challenges associated with projects of this scale. Successful execution of the LNG projects at the head of the export license approval queue could allow the industry to exceed the 6 projects that IHS forecasts to be completed. However, many key development checkpoints have yet to be crossed.

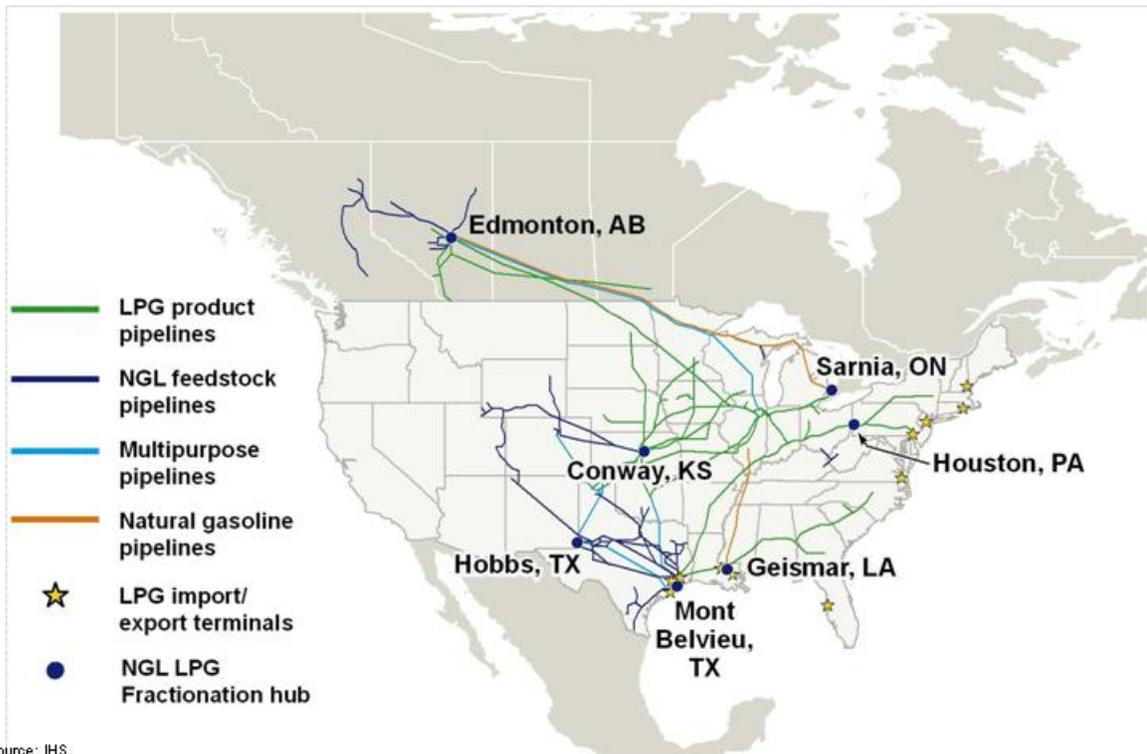
An alternate use of LNG that could potentially emerge over the coming decade is the use of LNG as an alternative to marine fuel oil for bunkering purposes. This investment in marine tankers and cargo ships with capability to consume LNG as fuel will be driven both by the economics of bountiful natural gas and by benefits associated with reduced sulfur oxide and other criteria pollutants. For ships that operate between the U.S. mainland, Alaska, Hawaii, and Puerto Rico these are likely to be constructed in U.S. Jones Act shipyards. Allowance in this IHS analysis has been made for this type of investment, although this type of investment is relatively small compared to typical oil and gas infrastructure investments.

The fractionation of NGL's into individual components such as ethane, propane, butane, and iso-butane is another asset segment that has experienced large growth investment in 2012 and 2013, and is projected to continue over the next couple of years. Two NGL fractionator hubs in particular are experiencing tremendous growth in NGL fractionation capacity. The long

established fractionation hub of Mont Belvieu, Texas currently has 8 major expansion projects under development with completion slated for the 2013 – 2015 time frame and an expected capacity addition of almost 700,000 B/D of fractionation capacity. The second major area is an emerging hub located at the intersection of the Pennsylvania, Ohio, and West Virginia borders located in the heart of the Marcellus and Utica shale development. Notionally identified as the Houston, Pennsylvania hub this is actually a complex of some 16 de-ethanizer and de-propanizer plants which will likely grow to an interconnecting network of 25 individual facilities involved in the fractionation of NGL's. Smaller debottlenecks are under way at the traditional fractionation hubs of Conway, Kansas and Geismar, Louisiana.

The second major piece of NGL infrastructure development is the long distance, typically interstate, transmission lines connecting the gas processing facilities to the NGL fractionation hubs. These long distance pipelines are usually common carrier systems which aggregate the NGL extraction from dozens of individual gas processing plants. Several large projects are currently under construction linking the gas processing facilities of Western Pennsylvania and Ohio to both the Gulf Coast and marine terminals along the Delaware River. Additional corridors are being expanded or established between West Texas and East Texas picking up NGL production from Eagle Ford along the way and between gas processing in the Rocky Mountains and the U.S. Gulf Coast. As additional natural gas is recovered from the Bakken, production investment in NGL development will be made there as well. Total investment in NGL pipelines over the forecast period is projected at \$23.9 billion.

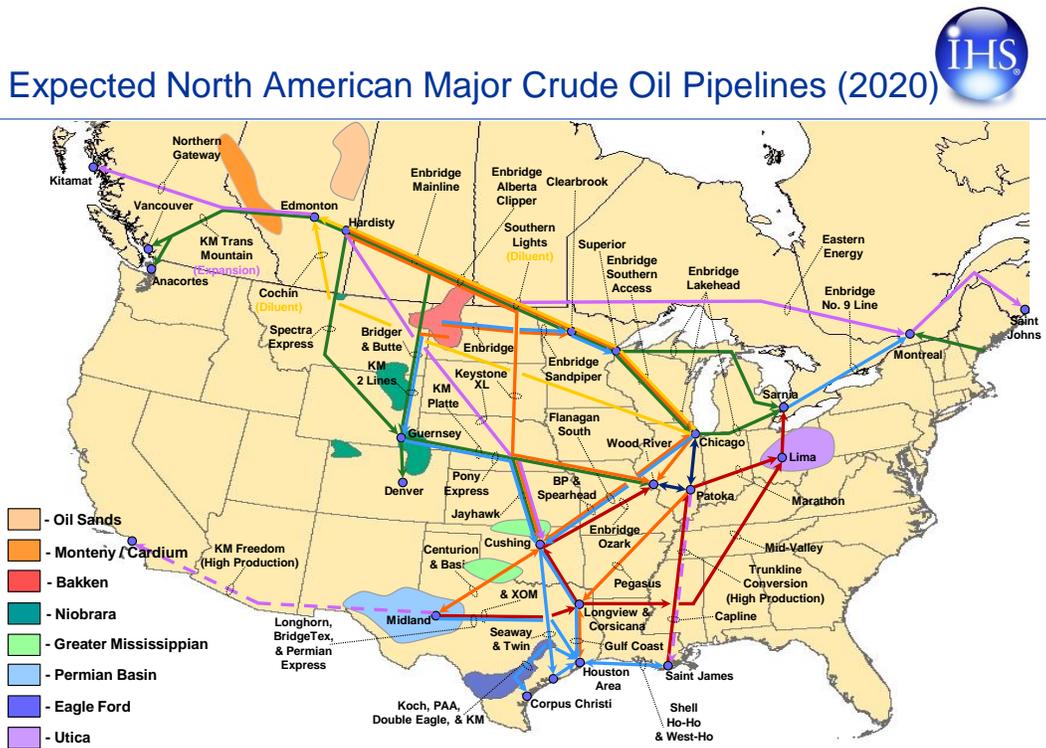
North America NGL Pipeline Infrastructure – 2013



Source: IHS.
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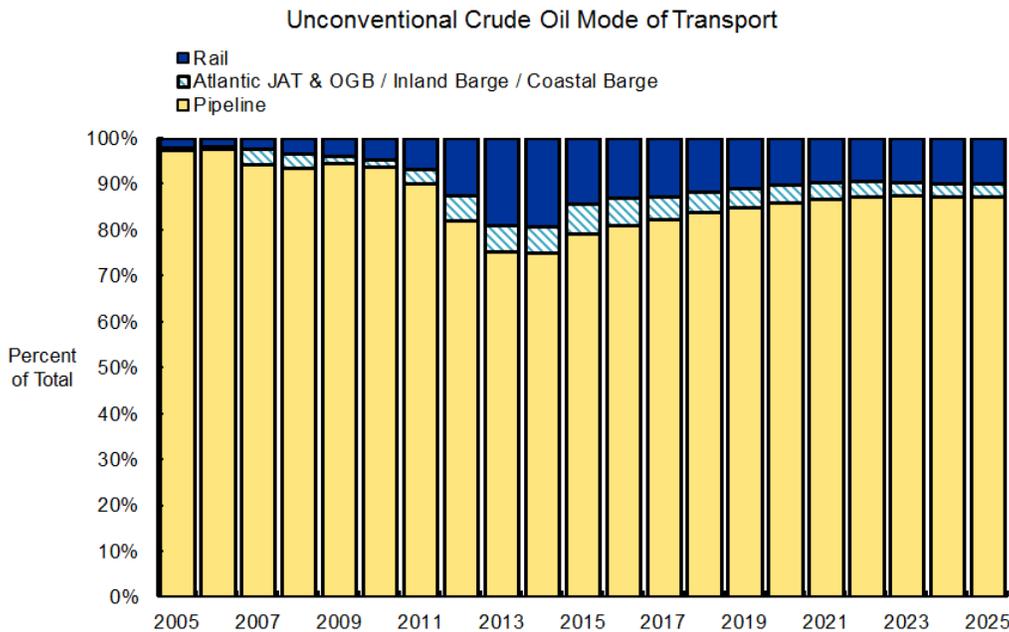
An area of infrastructure investment that is NGL specific is the construction of multiple dedicated NGL export terminals located in either the Gulf Coast or along the Delaware River in Pennsylvania. The growth in NGL fractionation capacity is projected to far outpace the growth in NGL demand. The majority of U.S. NGL demand is as petrochemical feedstock. Several large petrochemical steam crackers have been proposed and are currently under development but are likely to not be completed until the end of the decade. In the interim, the U.S. will emerge as a large exporter of NGL's, primarily ethane and propane, through purpose built NGL marine terminals. The IHS analysis assumes that as many as 10 of these facilities could ultimately be constructed at a project investment of \$4 billion over the forecast period.

Starting in 2012 and continuing through 2018, crude oil pipelines are receiving a large infusion and major build-out of both larger interstate systems and smaller intrastate systems. The IHS analysis projects that over 18,000 miles of major crude oil pipelines will be constructed, expanded, reversed, or converted from natural gas or other pipeline service. The trend in crude oil pipeline development will be the continued development of a large central transportation corridor running from North to South through the Midcontinent region. Smaller systems will connect geographically peripheral regions such as the Bakken development to this large central transportation corridor. A second major corridor will be operated as a continuous line of several different systems running horizontally from West Texas to refineries in the Texas and Louisiana Gulf Coast, with production from Eagle Ford on ramping to this Texas longitudinal corridor.



IHS forecasts cumulative investment in U.S. crude oil pipelines of \$37.8 billion between 2014 and 2025, with the majority being invested during the first 6 years of the forecast period. Over the first half of the investment period annual average investment is expected to exceed \$5 billion.

A significant theme that has emerged during the shale crude oil growth era has been the reemergence of using rail as a logistical alternative to long distance pipeline movements. The rapid growth in crude-by-rail movements is reflective of both the rapid growth in production but also the longer development schedule associated with long distance pipeline systems. Rail has stepped in to provide a key interim logistics solution as pipeline construction progresses. 2013 represents a milestone year for investment in crude dedicated rail cars and both crude loading and unloading facilities, with total investment of \$3.6 billion. This will likely represent the peak investment year for dedicated crude-by-rail infrastructure. Although 2014 is still forecasted at over \$2.4 billion of direct capital investment, remaining investment over the forecast period will average approximately \$600 million annually. This curtailed investment in dedicated crude by rail facilities is a function of the over-build from 2012 – 2014 and the lower need for rail once pipeline infrastructure is sufficiently developed. By the end of 2014 crude oil loading and unloading capacity in the US will exceed 3 million B/D despite a forecast of peak crude oil rail movements of between 1.2 and 1.5 million B/D. Additionally, the construction backlog for new dedicated crude oil tank cars has reached a sufficient enough level that the placement of new orders has curtailed substantially in the past 6 months.

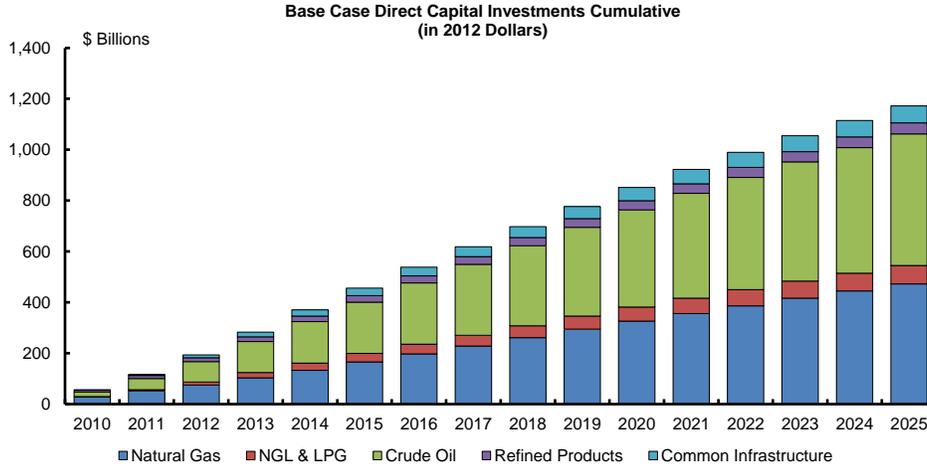


The segment of the industry that will receive the lower proportional direct capital investment associated with the growth of unconventional oil and gas will be the U.S. refining system. Total investment in all refined product asset groups (refineries, pipelines, logistics, and storage) is

forecasted at just over \$25 billion between 2014 and 2015, with 75% of this investment directed toward refineries. The major cause-and-effect investment from the growth in shale crude oil production will be US refineries in the Midwest and Gulf Coast debottlenecking their facilities, to enable the flexibility to process increasing volumes of light sweet crude oil, the quality of crude produced from shale formations. Major fuels refineries in the U.S. Gulf Coast and Midwest have invested heavily over the past 20 years to process increasing volumes of heavy sour crude oil from regions such as Canada, Venezuela, and Mexico. The conventional wisdom of the time was that these investments would be necessary to stay long-term competitive and that global crude oil production growth would largely be of the heavy sour variant. In another ironic twist produced from the unconventional era, those same facilities have shifted their investment strategy 180 degrees and are now investing capital to increase capacity to process the top or light portion of the barrel. The scale of investment required to process the top of the crude oil barrel is an order of magnitude smaller than the investment necessary to process the bottom of the barrel. Numerous investments are under development to add simple atmospheric fractionation, light ends (essentially NGL) handling, and hydro-treating capacity for light liquids fractions. In addition to the investment refineries are making to process increasing volumes of unconventional crude oil, many billions of capital investment will be allocated to projects that allow refiners to produce Tier III compliant gasoline, lower sulfur distillate and heavier fuel oils, reduce criteria emissions, and even potentially reduce carbon dioxide greenhouse gas emissions from stationary point sources. As these investments are driven by regulatory initiatives independent of the increased production of U.S. crude oil, they have not been included in the refinery capital investment forecast developed for this analysis.

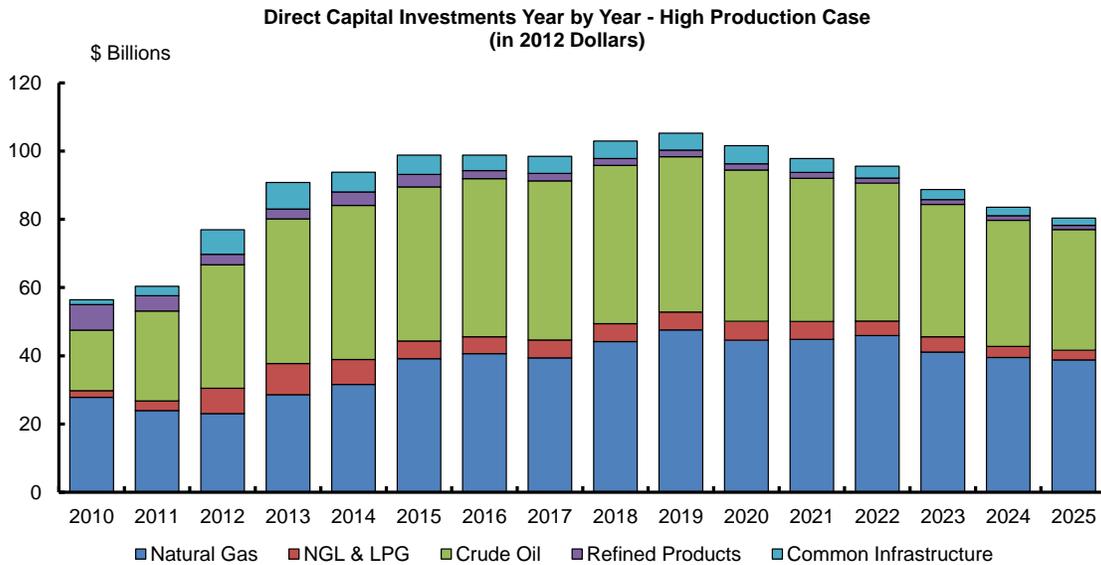
Outside of the additional investment in road, class 1 rail lines, and marine port dredging, two main asset types are expected to receive investment in the common infrastructure category. The first is investment in new greenfield mines for the extraction and production of silica and sand with properties determined to be beneficial for use in hydraulic fracturing. The second and more important development is the establishment of at least one, but likely several, LNG and CNG trucking corridors. IHS anticipates that these shipping corridors will receive primarily private capital investment, with public support coming in the form of fiscal and tax incentives associated with dual fuel heavy duty vehicles that can consume both diesel fuel and either CNG or LNG. In that 65% of U.S. diesel fuel consumption is for long distance heavy duty trucking³⁵, the establishment of continental shipping corridors would have a material impact on both petroleum diesel and natural gas demand, but could also provide a significant logistics and economic advantage for the U.S., not experienced by non-North American countries. Investment in common infrastructure to support oil and gas development is forecast at just under \$50 billion over the forecast period.

³⁵ DOT Class I Vehicles.



Direct Capital Investment Forecast High Case Results

As detailed earlier in Section 3, the high production case provides an assessment of the additional direct capital investment associated with a notional 20 percent increase in natural gas, NGL, and crude oil production. The results from the high production assessment lead to an increase of direct capital investment from \$890 billion for the base case forecast to an investment of \$1.15 trillion or an increase of 29% over the period of 2014 – 2025. For the high investment case oil and gas transportation and storage infrastructure peaks at \$105 billion in 2019, before declining moderately to just over \$80 billion in 2025.



The shift in investment should be characterized by one of three trends: asset classes where the increase in investment grows proportionally to production, asset classes where the increase in production results in a disproportionate increase in investment, and asset classes where the growth in production has no impact on investment. The results of the high case analysis can be summarized as follows:

- Asset classes that result in no or de minimus investment in the high production case are all of the refining asset classes and the investments directly associated with rail logistics movements. This is largely due to additional production in crude oil backing-out additional imports but not requiring an increase in U.S. refining capacity. Furthermore, the overbuild in crude oil rail logistics is sufficient enough that even a 20% increase in production would increase utilization of existing facilities but not require any new facilities.
- Asset classes that result in proportional investment based on the high production case include the gathering and support facilities for both natural gas and crude oil wells, pipelines, the assets directly associated with NGL production, and common infrastructure. The base case analysis projects that a moderate overbuild of NGL processing and transportation capacity is occurring. As a result, only an average of a 15% increase in direct capital investment is required for a 20% increase in production.
- Crude oil pipelines will require a slightly higher than proportional investment in infrastructure in the event of a 20% increase in production. This assessment is based on the assumption that in the high production case a second major North-South corridor would need to be developed, notionally running from the Midwest to the Louisiana Gulf Coast. In addition, in the high production case a major horizontally oriented pipeline project would be justifiable to move increased production to either Coast. In this analysis, this is assumed to be an investment similar to the proposed Kinder Morgan Freedom pipeline, running from production in West Texas to refineries in Southern California.
- Asset classes that would result in a disproportionate increase in investment associated with a production increase of 20% include natural gas processing, natural gas storage, LNG processing, and dedicated crude oil marine vessels.
- In the base case a large increase in both natural gas storage and natural gas processing has occurred over the past 5 years, and as such the investment needed over the next decade is reduced as surplus capacity exists to absorb anticipated increases. The projected increase associated with the high production case would overtake the surplus production of the base case and trigger another period of high investment and rapid expansion, hence the 20 percent increase in production resulting in a 60 plus percent increase in direct capital investment.
- Similarly for LNG processing, with such a large increase in production it is unlikely that supply side capacity could react swiftly enough to absorb the swell in production. LNG liquefaction facilities would prove critical in alleviating demand constraints and providing a shock absorber to moderate short term differences between supply and demand growth. In the high production case the expected volume of LNG exports from the U.S. increases by 100 percent, notionally from 5 BCF/D to 10 BCF/D.
- Although smaller in absolute terms, the high production case would result in a disproportionate increase in investment in marine inland barges, ocean going barges, and marine tankers as a third logistics option in the movement of crude oil. Again, in absolute terms this is a relatively small asset class.

Summary of Direct Capital Investment (2014 - 2025)

Tab Number	Petroleum Infrastructure Investment	BASE CASE	HIGH CASE	Percent Change
		Direct Capital Investment (\$MM)	Direct Capital Investment (\$MM)	
1	Natural Gas Gathering	177,705	215,490	21%
2	Gas Processing	32,327	60,992	89%
3	Natural Gas Pipelines	84,060	101,610	21%
4	Natural Gas Storage	23,784	37,869	59%
5	LNG Processing	41,913	68,909	64%
6	LNG Marine	9,092	12,342	36%
7	NGL & LPG Processing	14,781	17,024	15%
8	NGL & LPG Pipelines	21,058	23,866	13%
9	NGL & LPG Storage & Rail	12,412	13,909	12%
10	NGL & LPG Marine	3,002	3,973	32%
11	Crude Oil Gathering	348,447	448,393	29%
12	Crude Oil Pipelines	27,393	37,848	38%
13	Crude Oil Storage	4,071	6,062	49%
14	Crude Oil Marine	6,657	11,519	73%
15	Crude Oil Rail	9,267	9,267	0%
16	Refineries	19,113	19,113	0%
17	Refined Product Pipelines	2,000	2,000	0%
18	Refined Product Storage	2,063	2,063	0%
19	Refined Product Marine	1,935	1,935	0%
20	Roads & Common Infrastructure	48,030	51,496	7%
	Total DCI (\$MM)	889,110	1,145,681	29%

4. ECONOMIC IMPACT ASSESSMENT OF INFRASTRUCTURE INVESTMENT

IHS assessed the economic contributions attributable to increased investments in oil and natural gas transportation and storage infrastructure under both the base case and high production scenarios. The objective was to fully capture the influence of each scenario's infrastructure investment on the US economy and the four US Census Regions through direct spending, supply-chain activity and the effects of workers' spending portions of their incomes in the general economy. To capture these effects, the capital expenditure analyses forecasts presented in Section 3 were integrated into our modeling system.

IHS anticipates that, under the base case scenario, the infrastructure investment will lead to an average annual economic contribution over the 2014 to 2025 period of:

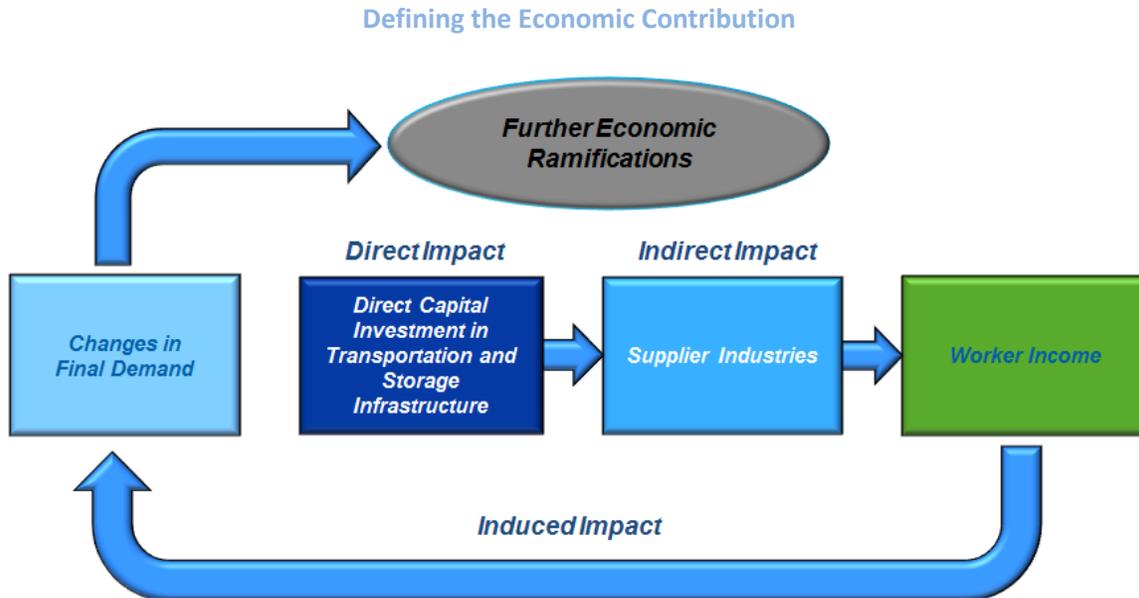
- Support for almost 900,000 jobs;
- Contribution to US GDP of \$94 billion;
- Labor Income of \$59 billion;
- Government Revenues in excess of \$21 billion.

Under the high production scenario these contributions will increase to:

- Support for almost 1,147,000 jobs;
- Contribution to US GDP of \$120 billion;
- Labor Income of \$75 billion;
- Government Revenues in excess of \$27 billion.

The economic impact results, focusing on employment, are also presented in this section. The complete set of average annual economic impact results by US Census Region, as measured by jobs, value added contribution to GDP, labor income and government revenues are presented in Appendix B1 for both the base case and high production case. Jobs, value added (contribution to GDP) and labor income are broken out by two direct investment strategy categorizations (target energy type and transport mode), by industry super-sector and by direct, indirect and induced economic contribution (as defined below). Federal and State & Local taxes, broken out by personal and corporate taxes, are reported by US Census Region and by the target energy type and transport mode investment strategies.

Appendix B2 expands the reported results to the nine US Census Divisions, by each of the investment strategies by industry super-sector and direct/indirect/induced economic contribution. Results are presented for both the base case and high production case.



Referring to the graphic above, the steps used to derive the economic contribution of any industry can be summarized as follows:

- Any dollar of industrial expenditure, in this case capital investment, results in direct benefits to the economy (dark blue box).
- The capital investment triggers activity within the supply chain (medium blue box). An increase in direct capital investment, with all else constant, will lead to more revenue and output among supplier industries, such as steel, machinery and engineering services. This will lead to higher US demand for manufactured products such as pumps and compressors, which in turn require more fabricated metal and steel, and so on, thereby magnifying the indirect contribution. Thus, the initial direct capital investment triggers numerous indirect reverberations within the extended supply chain.
- To meet the increased demand, suppliers will also need to hire and compensate workers (green box). These workers then spend a portion of their income on consumer goods and services (light blue box), inducing another round of economic contribution.
- Finally, the changes in direct, indirect and induced activity can lead to other economic ramifications (gray box), including, but not limited to, policy issues, regulatory concerns and trade imbalances.

For this study, IHS traced the subsequent changes in demand caused by the direct capital investment on the US national and US census division level. The direct, indirect and induced impacts were assessed along the following four dimensions.

- **Employment** includes wage, salary and self-employment jobs within the economy.
- **Value Added (contribution to GDP)** is an industry's or an establishment's total output less the cost of intermediate inputs.

- **Labor Income** captures all forms of employment income, including Employee Compensation (wages and benefits, employer-paid payroll taxes, unemployment taxes, etc.) and Proprietor Income (payments received by self-employed individuals and unincorporated business owners).
- **Government Revenue** includes taxes and other related revenues on Federal, and state and local levels.

Underlying Assumptions

IHS Energy researched the capital requirements necessary to support the overall transportation and storage infrastructure investment needed to support the growth in natural gas and oil production. The midstream elements consist of natural gas, natural gas liquids (NGL), and oil gathering systems, pipelines and storage, while the downstream elements include natural gas processing plants, liquefied petroleum gas (LPG) and NGL processing, and refineries. In addition, capital requirements for common infrastructure elements, such as roads and rail, were determined.

Detailed capital requirements were forecast for the following 20 asset classes:

- | | |
|-----------------------------|-------------------------------|
| 1. Natural Gas Gathering | 11. Crude Oil Gathering |
| 2. Gas Processing | 12. Crude Oil Pipelines |
| 3. Natural Gas Pipelines | 13. Crude Oil Storage |
| 4. Natural Gas Storage | 14. Crude Oil Marine |
| 5. LNG Processing | 15. Crude Oil Rail |
| 6. LNG Marine | 16. Refineries |
| 7. NGL & LPG Processing | 17. Refined Product Pipelines |
| 8. NGL & LPG Pipelines | 18. Refined Product Storage |
| 9. NGL & LPG Storage & Rail | 19. Refined Product Marine |
| 10. NGL & LPG Marine | 20. Common Infrastructure |

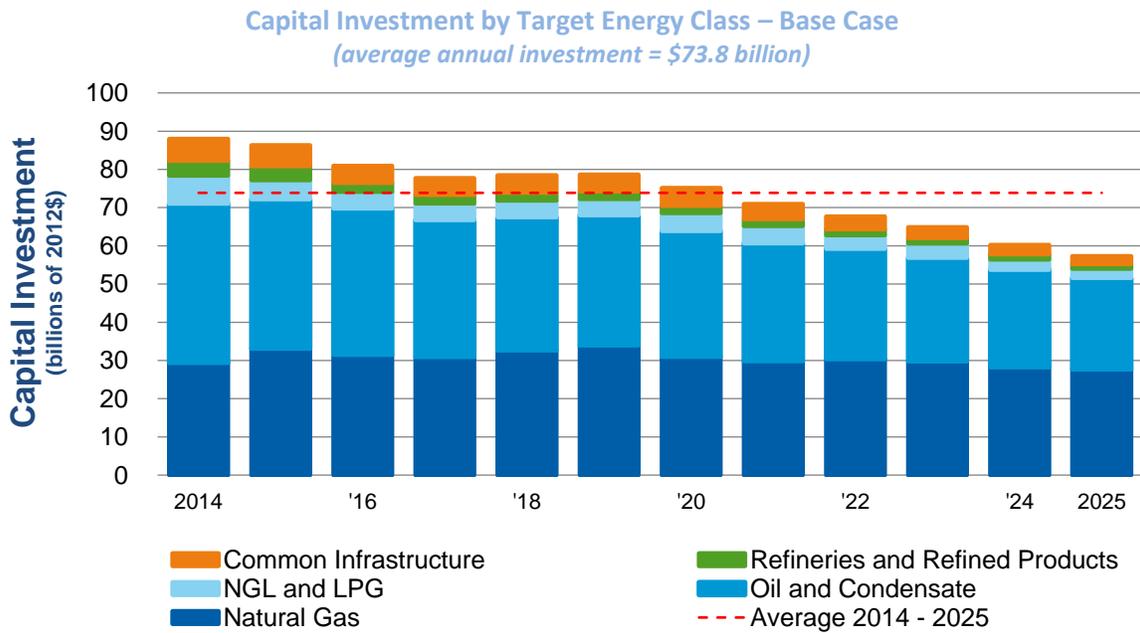
IHS assessed the economic contribution of each asset class. The results were then consolidated using two different aggregation schemes. The first scheme consolidated the results based on the target energy type supported by the investment (Natural Gas, NGLs and LPG, Oil and Condensate, Refineries and Refined Products and Common Infrastructure). The second aggregation grouped the results based on transport mode (Pipelines, Processing and Storage, Rail, Marine, and Common Infrastructure, Excluding Rail). The following graphic shows how the asset classes were mapped to the two aggregations.

Mapping of Asset Classes to Aggregation Schemes³⁶

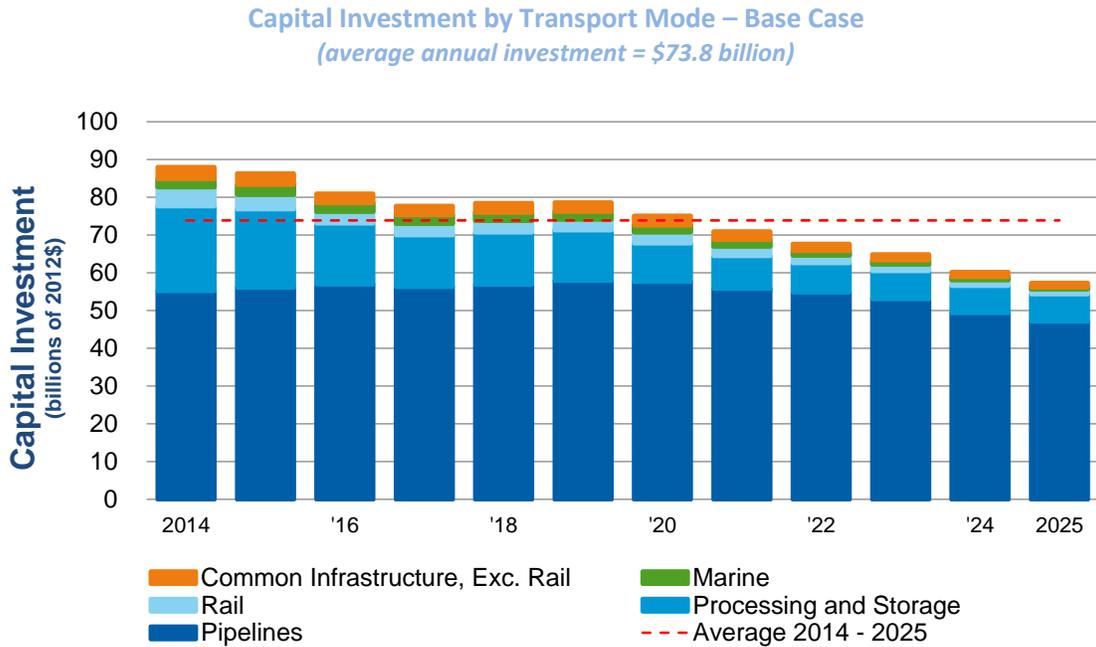
Asset Class	Target Energy Type	Asset Class	Transport Mode
1_Natural Gas Gathering	Natural Gas	1_Natural Gas Gathering	Pipelines
2_Gas Processing			
3_Natural Gas Pipelines			
4_Natural Gas Storage			
5_LNG Processing			
6_LNG Marine			
7_NGL & LPG Processing	NGL & LPG	9_NGL & LPG Storage & Rail (18%)	Rail
8_NGL & LPG Pipelines			
9_NGL & LPG Storage & Rail			
10_NGL & LPG Marine	Oil and Condensate	20_Common Infrastructure (45%)	Marine
11_Crude Oil Gathering			
12_Crude Oil Pipelines			
13_Crude Oil Storage			
14_Crude Oil Marine			
15_Crude Oil Rail	Refineries & RP	6_LNG Marine	Processing and Storage
16_Refineries			
17_Refined Product Pipelines			
18_Refined Product Storage			
19_Refined Product Marine			
20_Common Infrastructure	Common Infrastructure	2_Gas Processing	Processing and Storage
		4_Natural Gas Storage	
		5_LNG Processing	
		7_NGL & LPG Processing	
		9_NGL & LPG Storage & Rail (82%)	
		13_Crude Oil Storage	
		16_Refineries	
		18_Refined Product Storage	
		20_Common Infrastructure (55%)	Common Infra., Exc. Rail

The following pages show the forecast annual transportation and storage infrastructure investment for the two aggregations under both the base case and high production scenarios. Under the Energy Type aggregation, investment in infrastructure dedicated to Natural Gas, Oil and Condensate dominate the spending over the entire forecast period. Likewise, under the Transport Mode aggregation, investment in pipelines receives the bulk of the investment, followed closely by processing and storage.

³⁶ IHS determined that approximately 18% of Asset Class #2 direct investment and 45% of Asset Class #20 direct investment are dedicated to Rail projects. Therefore, these Asset Classes were proportioned accordingly when creating the Transport Mode aggregation.

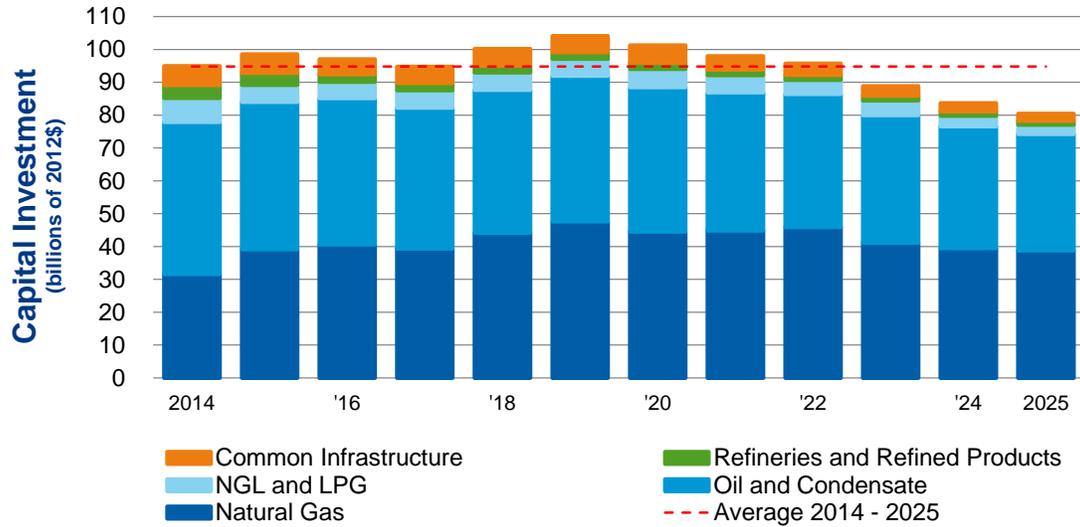


Source: IHS 2013



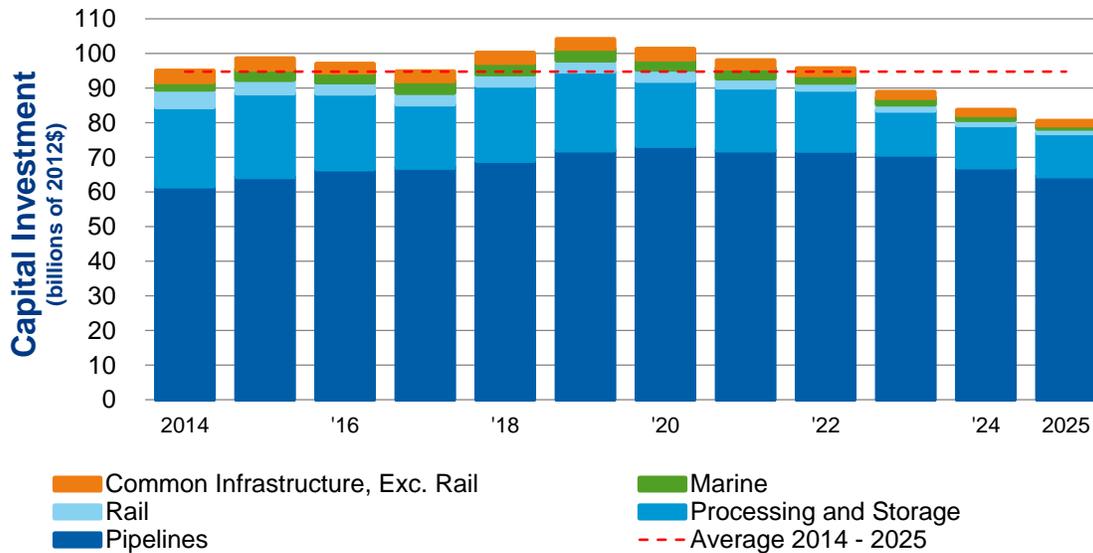
Source: IHS 2013

Capital Investment by Target Energy Class – High Production Case
(average annual investment = \$94.8 billion)



Source: IHS 2013

Capital Investment by Transport Mode – High Production Case
(average annual investment = \$94.8 billion)



Source: IHS 2013

Overall National Level Results

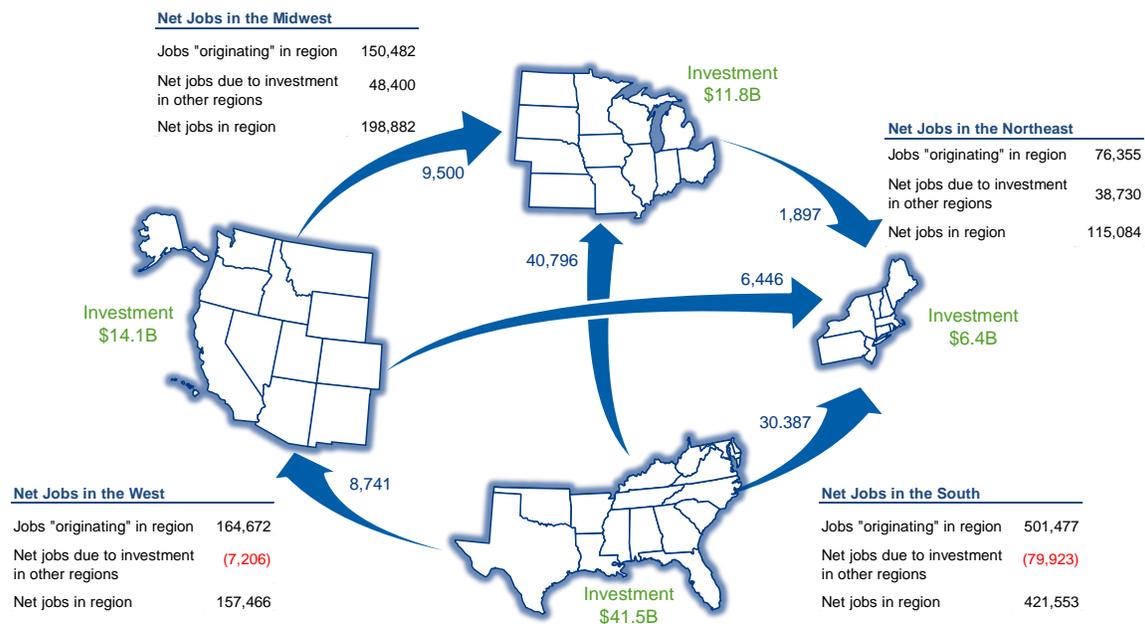
The table below presents the national economic contribution for both the base case and the high production case scenario. The direct, indirect, and induced impacts are presented for employment, value added (contribution to GDP), and labor income. Government revenues generated are also presented for both cases.

Economic Metric and Impact Type	Base Case	High Production Case
Employment		
Direct	258,719	333,882
Indirect	300,380	384,066
Induced	333,887	428,956
Total	892,986	1,146,904
Value Added (\$M)		
Direct	22,742	29,435
Indirect	35,754	45,723
Induced	35,358	45,425
Total	93,853	120,583
Labor Income (\$M)		
Direct	16,252	21,016
Indirect	22,424	28,674
Induced	19,967	25,652
Total	58,643	75,343
Government Revenues (\$M)		
Federal	12,914	16,590
State and Local	8,458	10,863
Total	21,373	27,453

Employment Contribution by US Census Region

IHS examined the effects of regional infrastructure and storage investment on the US economy. In the base case scenario, the \$73.8 billion of overall average annual investment was distributed across the four US Census Regions. Approximately \$41.5 billion of the investment went to the South, \$14.1 billion to the West, \$11.8 billion to the Midwest and \$6.4 billion to the Northeast. Based on these direct investments, IHS determined the jobs contribution to the US economy and each of the four US Census Regions. This analysis reflects the indirect and induced jobs that are contributed in regions other than a region in which the direct investment occurs. For example, the Northeast gains 38,730 net new jobs as a result of investment made in the other 3 US Census Regions.

Distribution of Investment and Economic Contribution by US Census Region, Base Case
(Dollars are in billions)



Notes: 1. The phrase "Jobs originating in this region" is shorthand for "US jobs supported as a result of direct capital investment made in this US Census Region"
2. Each arrow shows the net redistribution of jobs between two regions

Source: IHS 2013

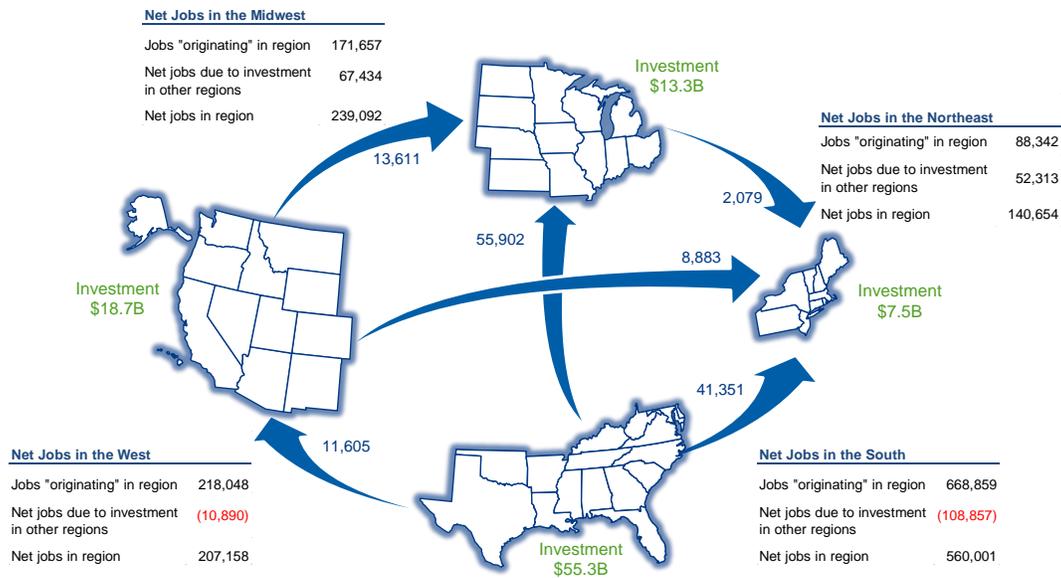
The following table provides the distributions of net new jobs by US Census Regions under the base case.

Inter-Census Region Job Creation	Distribution of Jobs Across US Census Regions			
	Northeast	South	Midwest	West
Jobs due to investment in the Census Region	76,355	501,477	150,482	164,672
Jobs supported in other Census Regions¹	(18,421)	(118,272)	(31,424)	(41,169)
Northeast		(38,301)	(9,730)	(9,120)
South	(7,915)		(14,790)	(15,644)
Midwest	(7,833)	(55,586)		(16,405)
West	(2,673)	(24,385)	(6,905)	
Jobs supported from other Census Regions²	57,151	38,348	79,823	33,963
Northeast		7,915	7,833	2,673
South	38,301		55,586	24,385
Midwest	9,730	14,790		6,905
West	9,120	15,644	16,405	
Net additional jobs supported in the Census Region	38,730	(79,923)	48,400	(7,206)
Northeast		(30,387)	(1,897)	(6,446)
South	30,387		40,796	8,741
Midwest	1,897	(40,796)		(9,500)
West	6,446	(8,741)	9,500	
Total jobs created in the Census Region	115,084	421,553	198,882	157,466

Notes: 1. Jobs supported in other US Census Regions due to investment in a given US Census Region
 2. Jobs supported in a given US Census Region due to investment in other US Census Regions

The following figure extends the analysis to the high production case.

Distribution of Investment and Economic Contribution by US Census Region, High Production Case
 (Dollars are in billions)



Notes: 1. The phrase "Jobs originating in this region" is shorthand for "US jobs supported as a result of direct capital investment made in this US Census Region"
 2. Each arrow shows the net redistribution of jobs between two regions

Source: IHS 2013

The following table provides the distributions of net new jobs by US Census Regions under the high production case.

Inter-Census Region Job Creation	Distribution of Jobs Across US Census Regions			
	Northeast	South	Midwest	West
Jobs due to investment in the Census Region	88,342	668,859	171,657	218,048
Jobs supported in other Census Regions¹	(21,503)	(155,701)	(36,211)	(54,104)
Northeast		(50,560)	(11,269)	(11,987)
South	(9,209)		(17,036)	(20,599)
Midwest	(9,190)	(72,937)		(21,518)
West	(3,103)	(32,204)	(7,907)	
Jobs supported from other Census Regions²	73,815	46,844	103,646	43,214
Northeast		9,209	9,190	3,103
South	50,560		72,937	32,204
Midwest	11,269	17,036		7,907
West	11,987	20,599	21,518	
Net additional jobs supported in the Census Region	52,313	(108,857)	67,434	(10,890)
Northeast		(41,351)	(2,079)	(8,883)
South	41,351		55,902	11,605
Midwest	2,079	(55,902)		(13,611)
West	8,883	(11,605)	13,611	
Total jobs created in the Census Region	140,654	560,001	239,092	207,158

Notes: 1. Jobs supported in other US Census Regions due to investment in a given US Census Region
 2. Jobs supported in a given US Census Region due to investment in other US Census Regions

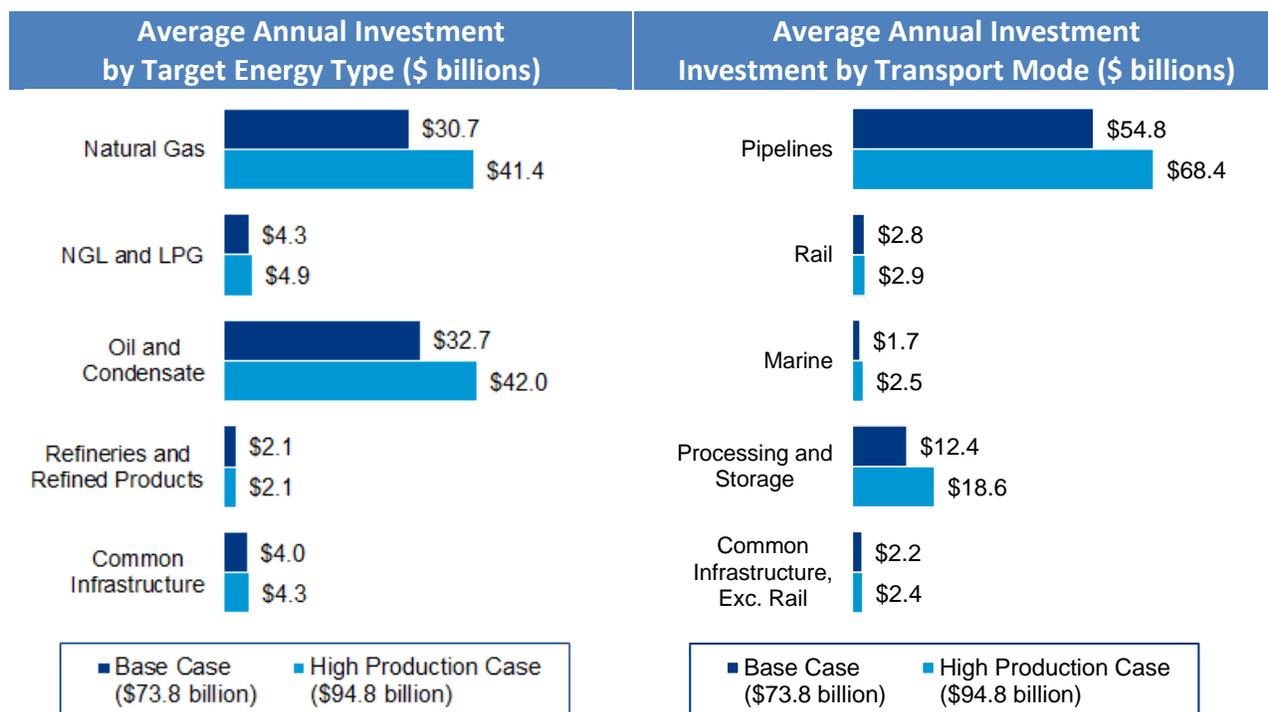
5. CONCLUSION

The results of this study indicate that overall transportation and storage infrastructure investment needed to support the growth in natural gas and oil production is expected to reach \$89.3 billion in 2013 after experiencing \$56.3 billion in 2010, \$60.3 billion in 2011 and \$76.6 billion in 2012.

The average annual investment, \$81.7 billion per year from 2014 through 2019, will moderate to \$66.0 billion per year over the 2020-2025 timeframe. Over the entire forecast period (2014 – 2025) the average investment is expected to be \$73.8 billion.

Should the high production scenario take effect, those estimates would be revised upward to \$98.3 billion per year from 2014 through 2019 and \$91.3 billion per year from 2020 through 2025. Over the entire forecast period, annual investment levels would average \$94.8 billion.

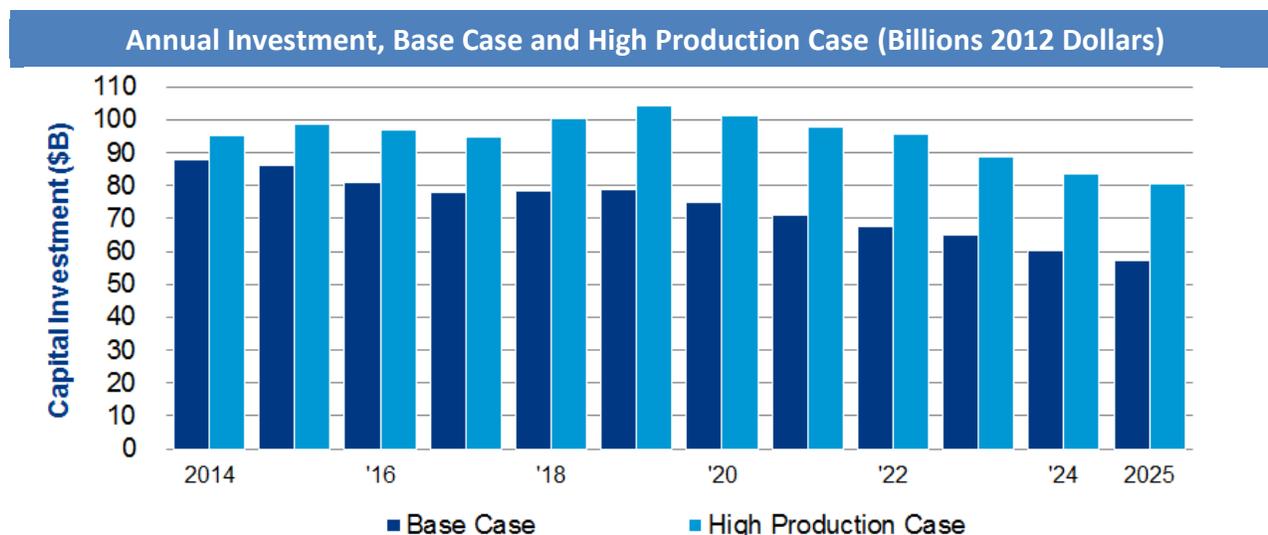
Below, these investments are broken down by both the Target Energy Type and by Transport Mode. In the former, the lion's share of investment goes to Oil and Condensate, closely followed by Natural Gas. When viewed by Transport Mode nearly three-quarters of investment will be dedicated to pipelines, especially gathering infrastructure.



Source: IHS 2013

What is significant about the infrastructure investment trends is the **staying power** of capital expenditure levels throughout the 2014-2025 forecast period. While investment declines after

the build out in the first half of the forecast period, even by 2025, investment amounts remain at a robust \$60 billion in the base case and over \$80 billion in the high production case. This is an indication of continuing investment at fairly steady levels beyond 2025.



Source: IHS 2013

The capital investment required will generate jobs, contributions to GDP (Value Added), labor income and government revenues. On a national basis, the employment supported by additional infrastructure capital investment will average 893,000 jobs over the entire 2014-2025 forecast horizon; value added contribution to GDP will average \$93.9 billion over that same period, while government revenues will reach, on an annual average basis, \$21.4 billion. The latter is comprised of \$12.9 billion in Federal receipts, and \$8.5 billion in state and local receipts.

For the high production scenario, the comparable measures are: average employment over the forecast interval of 1,147,000; average value added contribution to GDP of \$120.6 billion; and average annual tax revenues of \$27.5 billion.

Economic Metric and Impact Type	Base Case	High Production Case
Employment		
Direct	258,719	333,882
Indirect	300,380	384,066
Induced	333,887	428,956
Total	892,986	1,146,904
Value Added (\$M)		
Direct	22,742	29,435
Indirect	35,754	45,723
Induced	35,358	45,425
Total	93,853	120,583
Labor Income (\$M)		
Direct	16,252	21,016
Indirect	22,424	28,674
Induced	19,967	25,652
Total	58,643	75,343
Government Revenues (\$M)		
Federal	12,914	16,590
State and Local	8,458	10,863
Total	21,373	27,453

Source: IHS 2013

While the economic contribution of oil and gas transportation and storage infrastructure investment is significant, we are mindful that these investment levels are clearly not as large as other capital expenditure elements related to the unconventional oil and gas development sector. It should be remembered that these infrastructure investments facilitate the ultimate economic benefits flowing from unconventional oil and natural gas development.

While we have assessed the stand-alone economic contribution of these investments³⁷, it is necessary to take into account the infrastructure necessary to bring the upstream products to market and thus allow the significant economic benefits from those products to come to fruition. Economic impacts resulting from capital expenditure elements related to the upstream unconventional oil and gas sector are detailed in volume 3 of the IHS study “America’s New Energy Future: A Manufacturing Renaissance”.

³⁷ See *America’s New Energy Future: A Manufacturing Renaissance (Volume 3)* – September 2013

APPENDIX A
Assumptions and Underlying Details
Related to Oil & Natural Gas Transportation &
Storage Infrastructure Investments

TABLE A1 BASE CASE

API Infrastructure Assessment Production Basis

(All Units in Thousands of Barrels Per Day Except Natural Gas Which is in Billions of Cubic Feet Per Day)

	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022	2023	2024	2025
Natural Gas Production - Total US	58.4	62.8	65.8	66.6	67.1	69.2	72.9	77.2	81.4	83.0	83.6	85.9	89.4	91.0	90.8	91.0
Natural Gas Demand -Total US	64.9	66.0	68.8	69.3	69.4	71.7	73.5	77.5	79.9	80.7	80.8	82.9	85.6	87.3	88.0	88.2
Natural Gas Liquids Production - Total US	2,777	2,853	3,002	3,078	3,242	3,417	3,490	3,651	3,802	3,954	4,132	4,262	4,309	4,362	4,387	4,388
Natural Gas Liquids Production - Gas Processing	2,074	2,183	2,309	2,380	2,540	2,715	2,790	2,955	3,113	3,269	3,451	3,585	3,637	3,694	3,723	3,728
Natural Gas Liquids Demand - Total US	2,296	2,320	2,338	2,369	2,422	2,463	2,572	2,813	2,960	3,038	3,145	3,219	3,313	3,352	3,365	3,385
Crude Oil Production - Total US	5,450	5,738	6,456	7,150	7,276	7,472	7,706	7,919	8,028	8,171	8,163	8,081	7,947	7,801	7,651	7,484
Crude Oil Production - Unconventional Oil	755	1,138	2,081	3,076	3,353	3,537	3,805	4,069	4,246	4,363	4,433	4,467	4,502	4,535	4,550	4,528
US Refinery Crude Runs	14,724	14,806	15,020	15,264	15,548	15,715	15,848	15,896	15,929	15,935	15,860	15,756	15,652	15,547	15,443	15,338
US Refined Product Demand	15,793	15,438	15,073	15,131	15,236	15,358	15,483	15,520	15,535	15,537	15,506	15,489	15,448	15,412	15,360	15,305

Source: IHS 2013

TABLE A2 HIGH CASE

API Infrastructure Assessment Production Basis

(All Units in Thousands of Barrels Per Day Except Natural Gas Which is in Billions of Cubic Feet Per Day)

	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022	2023	2024	2025
Natural Gas Production - Total US	58.4	62.8	65.8	66.6	70.7	74.2	77.8	81.3	84.8	88.4	91.9	95.5	99.0	102.6	106.1	109.7
Natural Gas Demand -Total US	64.9	66.0	68.8	69.3	72.7	75.6	77.9	79.7	81.8	83.4	84.7	86.5	88.2	90.3	92.0	93.3
Natural Gas Liquids Production - Total US	2,777	2,853	3,002	3,078	3,411	3,579	3,748	3,917	4,085	4,254	4,423	4,591	4,760	4,929	5,097	5,266
Natural Gas Liquids Production - Gas Processing	2,074	2,183	2,309	2,380	2,709	2,877	3,048	3,221	3,396	3,569	3,742	3,915	4,088	4,261	4,433	4,606
Natural Gas Liquids Demand - Total US	2,296	2,320	2,338	2,369	2,517	2,594	2,736	3,024	3,207	3,332	3,470	3,600	3,745	3,827	3,876	3,933
Crude Oil Production - Total US	5,450	5,738	6,456	7,300	7,700	8,100	8,500	9,000	9,500	10,000	10,250	10,400	10,600	10,700	10,650	10,600
Crude Oil Production - Unconventional Oil	755	1,138	2,081	3,076	3,429	3,785	4,126	4,552	4,977	5,401	5,633	5,765	6,045	6,199	6,202	5,980
US Refinery Crude Runs	14,724	14,806	15,020	15,264	15,548	15,715	15,848	15,896	15,929	15,935	15,860	15,756	15,652	15,547	15,443	15,338
US Refined Product Demand	15,793	15,438	15,073	15,131	15,236	15,358	15,483	15,520	15,535	15,537	15,506	15,489	15,448	15,412	15,360	15,305

Source: IHS 2013

TABLE A3. BASE CASE

U.S OIL & GAS DIRECT CAPITAL INVESTMENTS FORECAST (2014-2025)

(Millions of 2012 Dollars)

	2014	2015	2016	2017	2018	2019	2020	2021	2022	2023	2024	2025
Natural Gas Gathering, Pipelines & Storage	17,149	18,726	20,493	22,202	23,658	25,221	25,704	26,114	27,386	27,111	25,970	25,815
Crude Oil & NGL Gathering, Pipelines & Storage	39,773	38,064	38,976	38,060	36,129	34,614	33,891	31,841	29,990	28,621	26,277	24,732
Natural Gas & NGL Processing	16,019	15,625	11,802	9,028	9,163	8,570	5,119	3,387	2,907	2,686	2,467	2,250
Natural Gas / NGL / Crude Oil Rail & Marine Logistics	4,849	4,347	3,987	4,063	4,031	3,850	3,859	3,865	2,494	2,177	1,719	1,189
Refineries & Refined Product Infrastructure	3,920	3,676	2,343	2,179	2,032	1,949	1,856	1,706	1,496	1,407	1,318	1,230
Common Infrastructure	5,705	5,437	4,421	4,392	4,546	4,337	4,605	3,976	3,345	2,825	2,397	2,043
Total	87,416	85,875	82,022	79,923	79,559	78,540	75,032	70,889	67,618	64,829	60,149	57,259
Cummulative Total	87,416	173,290	255,312	335,235	414,795	493,335	568,367	639,256	706,874	771,703	831,851	889,110

Source: IHS 2013

TABLE A4. HIGH CASE.

U.S OIL & GAS DIRECT CAPITAL INVESTMENTS FORECASTS (2014-2025)

(Millions of 2012 Dollars)

	2014	2015	2016	2017	2018	2019	2020	2021	2022	2023	2024	2025
Natural Gas Gathering, Pipelines & Storage	18,911	22,781	25,039	27,053	28,406	30,486	32,071	33,157	34,518	34,293	34,038	34,218
Crude Oil & NGL Gathering, Pipelines & Storage	43,879	44,510	45,761	46,409	46,263	45,833	45,165	42,711	41,474	40,411	37,679	36,074
Natural Gas & NGL Processing	16,409	17,447	16,418	12,523	15,850	16,726	12,106	10,998	11,127	6,608	5,615	5,098
Natural Gas / NGL / Crude Oil Rail & Marine Logistics	4,895	4,743	4,697	5,295	5,260	5,284	5,104	5,172	3,481	3,082	2,396	1,603
Refineries & Refined Product Infrastructure	3,920	3,676	2,343	2,179	2,032	1,949	1,856	1,706	1,496	1,407	1,318	1,230
Common Infrastructure	5,814	5,654	4,530	4,988	5,142	4,933	5,309	4,084	3,453	2,934	2,506	2,152
Total	93,828	98,810	98,786	98,446	102,952	105,211	101,611	97,828	95,549	88,735	83,551	80,374
Cumulative Total	93,828	192,638	291,424	389,870	492,822	598,032	699,644	797,472	893,020	981,756	1,065,307	1,145,681

Source: IHS 2013

APPENDIX B
**Detailed Economic Impact Results &
Underlying Modeling Approach**

Appendix B1: Detailed Economic Impact Assessment Results by Census Region

The following tables represent the economic contribution to the US economy *originating* from investments made in each of the four US Census Regions as determined by IHS. While much of the contribution will stay within the region of origin, some of the contribution will flow amongst the other regions. In contrast to the employment statistics provided in the Executive Summary and Section 4 of the report, these data represent the national impacts due to investment in each of the regions, and do not reflect the specific economic impacts *to* each region. The totals from each approach, however, are consistent.

Employment Economic Impact, Base Case

Employment - Base Case	Northeast	South	Midwest	West	Total US
Aggregation A: Energy Type					
Natural Gas	55,522	226,233	53,266	38,609	373,630
NGL & LPG	9,211	30,329	9,676	2,014	51,230
Crude Oil and Condensate	4,454	218,309	53,650	119,802	396,215
Refineries and Refined Products	1,177	16,249	5,503	2,458	25,387
Common Infrastructure	5,991	10,356	28,388	1,789	46,524
Total	76,355	501,476	150,483	164,672	892,986
Aggregation B: Transport Mode					
Pipelines	51,905	362,043	105,548	145,938	665,434
Rail	5,179	9,307	13,940	3,543	31,969
Marine	5,300	7,274	1,353	5,297	19,224
Processing & Storage	10,675	117,159	14,029	8,909	150,772
Common Infrastructure, Exc. Rail	3,296	5,693	15,613	985	25,587
Total	76,355	501,476	150,483	164,672	892,986

Employment by Industry - Base Case	Northeast	South	Midwest	West	Total US
Construction	8,086	42,778	20,805	8,073	79,742
Financial Services	2,948	21,316	6,319	7,563	38,146
Information & Professional Services	20,824	123,096	40,078	42,835	226,833
Leisure & Other Services	8,109	57,513	16,794	19,796	102,212
Manufacturing	24,018	174,159	42,622	59,542	300,341
Natural Resources	962	8,659	2,072	1,855	13,548
Transportation & Utilities	2,831	18,674	5,900	5,929	33,334
Wholesale & Retail Trade	7,083	48,955	13,856	16,570	86,464
Misc.	1,494	6,326	2,037	2,509	12,366
Total	76,355	501,476	150,483	164,672	892,986

Employment by Type - Base Case	Northeast	South	Midwest	West	Total US
Direct	21,873	145,317	44,147	47,382	258,719
Indirect	24,539	169,247	48,039	58,555	300,380
Induced	29,943	186,912	58,297	58,735	333,887
Total	76,355	501,476	150,483	164,672	892,986

Source: IHS 2013

Value Added Contribution to GDP, Base Case

Value Added (\$M) - Base Case	Northeast	South	Midwest	West	Total US
Aggregation A: Energy Type					
Natural Gas	6,593	23,459	5,434	3,864	39,350
NGL & LPG	1,075	3,206	1,030	215	5,526
Crude Oil and Condensate	528	23,287	5,443	11,767	41,025
Refineries and Refined Products	140	1,795	559	276	2,770
Common Infrastructure	794	1,195	2,978	214	5,182
Total	9,130	52,943	15,443	16,337	93,853
Aggregation B: Transport Mode					
Pipelines	6,145	37,870	10,750	14,247	69,013
Rail	652	1,027	1,458	406	3,543
Marine	629	777	145	609	2,159
Processing & Storage	1,267	12,611	1,453	958	16,288
Common Infrastructure, Exc. Rail	437	657	1,638	118	2,850
Total	9,130	52,943	15,443	16,337	93,853

Value Added by Industry (\$M) - Base Case	Northeast	South	Midwest	West	Total US
Construction	723	3,222	1,639	733	6,318
Financial Services	1,581	8,327	2,329	2,721	14,959
Information & Professional Services	2,367	11,693	3,792	4,126	21,978
Leisure & Other Services	435	2,519	715	991	4,661
Manufacturing	2,262	15,692	3,812	4,393	26,159
Natural Resources	148	1,422	286	287	2,142
Transportation & Utilities	643	4,065	1,231	1,006	6,944
Wholesale & Retail Trade	916	5,765	1,553	1,960	10,194
Misc.	54	237	86	122	499
Total	9,130	52,943	15,443	16,337	93,853

Value Added by Type (\$M) - Base Case	Northeast	South	Midwest	West	Total US
Direct	2,090	13,189	3,966	3,497	22,742
Indirect	3,385	20,107	5,567	6,694	35,754
Induced	3,654	19,647	5,910	6,146	35,358
Total	9,130	52,943	15,443	16,337	93,853

Source: IHS 2013

Labor Income Impact, Base Case

Labor Income (\$M) - Base Case	Northeast	South	Midwest	West	Total US
Aggregation A: Energy Type					
Natural Gas	4,185	14,598	3,437	2,431	24,651
NGL & LPG	693	2,041	666	141	3,541
Crude Oil and Condensate	334	14,295	3,459	7,305	25,393
Refineries and Refined Products	89	1,124	359	175	1,747
Common Infrastructure	511	743	1,920	137	3,312
Total	5,811	32,802	9,842	10,188	58,643
Aggregation B: Transport Mode					
Pipelines	3,898	23,308	6,826	8,839	42,870
Rail	421	644	940	263	2,268
Marine	396	493	93	387	1,369
Processing & Storage	815	7,949	927	624	10,314
Common Infrastructure, Exc. Rail	281	409	1,056	75	1,822
Total	5,811	32,802	9,842	10,188	58,643

Labor Income by Industry (\$M) - Base Case	Northeast	South	Midwest	West	Total US
Construction	604	2,685	1,365	616	5,270
Financial Services	630	2,768	819	938	5,154
Information & Professional Services	1,837	9,085	3,006	3,103	17,030
Leisure & Other Services	301	1,726	494	668	3,190
Manufacturing	1,471	10,387	2,495	2,958	17,311
Natural Resources	67	576	110	118	870
Transportation & Utilities	303	1,933	562	538	3,336
Wholesale & Retail Trade	537	3,418	917	1,150	6,022
Misc.	62	224	74	100	460
Total	5,811	32,802	9,842	10,188	58,643

Labor Income by Type (\$M) - Base Case	Northeast	South	Midwest	West	Total US
Direct	1,518	9,360	2,913	2,461	16,252
Indirect	2,166	12,469	3,551	4,238	22,424
Induced	2,127	10,973	3,378	3,489	19,967
Total	5,811	32,802	9,842	10,188	58,643

Source: IHS 2013

Government Revenues, Base Case

Government Revenues by Census Region (\$M)	Northeast	South	Midwest	West	Total US
Federal Taxes	1,426.5	7,138.9	2,135.6	2,213.4	12,914.4
Personal	1,225.7	5,874.9	1,791.7	1,845.1	10,737.3
Corporate	200.8	1,264.0	343.9	368.3	2,177.0
State & Local Taxes	1,042.6	4,358.4	1,509.0	1,548.5	8,458.5
Personal	339.2	689.5	402.9	364.9	1,796.5
Corporate	703.4	3,668.8	1,106.1	1,183.5	6,661.9
Total Government Revenues	2,469.1	11,497.2	3,644.6	3,761.9	21,372.8

Government Revenues by Energy Type (\$M)	Natural Gas	NGL & LPG	Oil and Condensate	Refined	Common Infrastructure	Total US
Federal	5,414.8	765.0	5,638.0	380.5	716.0	12,914.4
Personal	4,507.2	641.8	4,672.3	317.2	598.9	10,737.3
Corporate	907.7	123.2	965.7	63.3	117.2	2,177.0
State & Local	3,523.1	489.4	3,726.2	247.3	472.6	8,458.5
Personal	755.1	108.4	778.3	53.5	101.3	1,796.5
Corporate	2,768.0	381.0	2,947.9	193.8	371.2	6,661.9
Total Government Revenues	8,937.9	1,254.4	9,364.1	627.8	1,188.6	21,372.8

Government Revenues by Transport Mode	Pipelines	Processing & Storage	Marine	Rail	Common Infra., Exc. Rail	Total US
Federal	9,491.5	2,241.3	297.6	490.1	393.8	12,914.4
Personal	7,877.2	1,872.2	248.2	410.4	329.4	10,737.3
Corporate	1,614.3	369.0	49.4	79.8	64.4	2,177.0
State & Local	6,236.8	1,442.5	198.0	321.3	259.9	8,458.5
Personal	1,313.8	315.7	41.9	69.4	55.7	1,796.5
Corporate	4,923.0	1,126.8	156.1	251.9	204.2	6,661.9
Total Government Revenues	15,728.4	3,683.7	495.6	811.4	653.7	21,372.8

Source: IHS 2013

Employment Economic Impact, High Production Case

Employment - High Prod Case	Northeast	South	Midwest	West	Total US
Aggregation A: Energy Type					
Natural Gas	64,048	325,386	61,069	53,431	503,934
NGL & LPG	10,111	35,265	11,074	2,282	58,732
Crude Oil and Condensate	6,933	281,091	64,128	156,818	508,970
Refineries and Refined Products	1,177	16,249	5,503	2,458	25,387
Common Infrastructure	6,074	10,865	29,883	3,059	49,881
Total	88,343	668,856	171,657	218,048	1,146,904
Aggregation B: Transport Mode					
Pipelines	58,263	465,838	120,873	185,795	830,769
Rail	5,350	9,629	14,652	4,112	33,743
Marine	7,777	10,065	2,029	7,692	27,563
Processing & Storage	13,615	177,349	17,667	18,769	227,400
Common Infrastructure, Exc. Rail	3,338	5,975	16,436	1,680	27,429
Total	88,343	668,856	171,657	218,048	1,146,904

Employment - High Prod Case	Northeast	South	Midwest	West	Total US
Construction	8,870	60,666	22,051	11,809	103,396
Financial Services	3,407	28,420	7,170	9,962	48,959
Information & Professional Services	24,010	165,604	45,371	56,942	291,927
Leisure & Other Services	9,363	76,681	19,025	26,152	131,221
Manufacturing	28,308	227,665	50,835	77,698	384,506
Natural Resources	1,111	11,448	2,352	2,493	17,404
Transportation & Utilities	3,304	25,009	6,705	7,871	42,889
Wholesale & Retail Trade	8,228	64,919	15,819	21,773	110,739
Misc.	1,742	8,444	2,329	3,348	15,863
Total	88,343	668,856	171,657	218,048	1,146,904

Employment - High Prod Case	Northeast	South	Midwest	West	Total US
Direct	25,125	196,087	49,632	63,038	333,882
Indirect	28,666	222,803	55,780	76,817	384,066
Induced	34,552	249,966	66,245	78,193	428,956
Total	88,343	668,856	171,657	218,048	1,146,904

Source: IHS 2013

Value Added Contribution to GDP, High Production Case

Value Added (\$M) - High Prod Case	Northeast	South	Midwest	West	Total US
Aggregation A: Energy Type					
Natural Gas	7,598	33,917	6,242	5,452	53,208
NGL & LPG	1,183	3,731	1,178	244	6,337
Crude Oil and Condensate	817	29,977	6,488	15,430	52,712
Refineries and Refined Products	140	1,795	559	276	2,770
Common Infrastructure	805	1,249	3,130	372	5,556
Total	10,543	70,669	17,596	21,774	120,583
Aggregation B: Transport Mode					
Pipelines	6,886	48,797	12,295	18,155	86,133
Rail	673	1,060	1,529	477	3,740
Marine	918	1,081	218	883	3,100
Processing & Storage	1,623	19,044	1,833	2,054	24,554
Common Infrastructure, Exc. Rail	443	687	1,722	205	3,056
Total	10,543	70,669	17,596	21,774	120,583

Value Added (\$M) - High Prod Case	Northeast	South	Midwest	West	Total US
Construction	791	4,578	1,741	1,079	8,189
Financial Services	1,827	11,112	2,650	3,612	19,201
Information & Professional Services	2,724	15,756	4,296	5,513	28,289
Leisure & Other Services	501	3,361	807	1,313	5,982
Manufacturing	2,659	20,539	4,523	5,767	33,489
Natural Resources	173	1,874	327	381	2,755
Transportation & Utilities	743	5,502	1,381	1,364	8,991
Wholesale & Retail Trade	1,063	7,631	1,774	2,580	13,048
Misc.	63	316	98	163	640
Total	10,543	70,669	17,596	21,774	120,583

Value Added (\$M) - High Prod Case	Northeast	South	Midwest	West	Total US
Direct	2,385	17,882	4,420	4,748	29,435
Indirect	3,949	26,508	6,458	8,808	45,723
Induced	4,209	26,279	6,719	8,218	45,425
Total	10,543	70,669	17,596	21,774	120,583

Source: IHS 2013

Labor Income Impact, High Production Case

Labor Income (\$M) - High Prod Case	Northeast	South	Midwest	West	Total US
Aggregation A: Energy Type					
Natural Gas	4,821	21,156	3,947	3,444	33,367
NGL & LPG	763	2,376	762	159	4,060
Crude Oil and Condensate	515	18,405	4,113	9,586	32,618
Refineries and Refined Products	89	1,124	359	175	1,747
Common Infrastructure	518	777	2,018	238	3,551
Total	6,704	43,837	11,200	13,601	75,343
Aggregation B: Transport Mode					
Pipelines	4,365	30,054	7,795	11,270	53,483
Rail	434	665	986	308	2,394
Marine	578	685	140	561	1,964
Processing & Storage	1,043	12,006	1,168	1,331	15,549
Common Infrastructure, Exc. Rail	285	427	1,110	131	1,953
Total	6,704	43,837	11,200	13,601	75,343

Labor Income (\$M) - High Prod Case	Northeast	South	Midwest	West	Total US
Construction	661	3,813	1,450	906	6,830
Financial Services	731	3,697	939	1,246	6,613
Information & Professional Services	2,111	12,277	3,398	4,158	21,944
Leisure & Other Services	347	2,304	558	885	4,094
Manufacturing	1,730	13,572	2,962	3,880	22,145
Natural Resources	78	760	124	157	1,119
Transportation & Utilities	351	2,592	636	720	4,299
Wholesale & Retail Trade	623	4,525	1,047	1,514	7,709
Misc.	72	298	85	135	590
Total	6,704	43,837	11,200	13,601	75,343

Labor Income (\$M) - High Prod Case	Northeast	South	Midwest	West	Total US
Direct	1,725	12,709	3,232	3,351	21,016
Indirect	2,527	16,442	4,124	5,580	28,674
Induced	2,452	14,686	3,844	4,670	25,652
Total	6,704	43,837	11,200	13,601	75,343

Source: IHS 2013

Government Revenues, High Production Case

Government Revenues by Census Region (\$M)	Northeast	South	Midwest	West	Total US
Federal Taxes	1,759.0	9,481.8	2,394.8	2,954.6	16,590.1
Personal	1,509.5	7,810.6	2,007.4	2,465.9	13,793.4
Corporate	249.4	1,671.3	387.4	488.7	2,796.7
State & Local Taxes	1,285.0	5,806.7	1,699.1	2,071.9	10,862.6
Personal	415.4	940.7	453.0	498.9	2,308.1
Corporate	869.6	4,865.9	1,246.1	1,572.9	8,554.5
Total Government Revenues	3,043.9	15,288.5	4,093.9	5,026.4	27,452.8

Government Revenues by Energy Type (\$M)	Natural Gas	NGL & LPG	Oil	Refined	Common Infrastructure	Total US
Federal	7,321.4	877.2	7,243.3	380.5	767.7	16,590.1
Personal	6,096.2	735.9	6,002.0	317.2	642.1	13,793.4
Corporate	1,225.2	141.3	1,241.3	63.3	125.6	2,796.7
State & Local	4,758.4	561.2	4,789.0	247.3	506.7	10,862.6
Personal	1,022.0	124.2	999.8	53.5	108.6	2,308.1
Corporate	3,736.5	436.9	3,789.3	193.8	398.0	8,554.5
Total Government Revenues	12,079.9	1,438.4	12,032.3	627.8	1,274.4	27,452.8

Government Revenues by Transport Mode	Pipelines	Processing & Storage	Marine	Rail	Common Infra, Exc. Rail	Total US
Federal	11,844.9	3,378.5	427.1	517.3	422.3	16,590.1
Personal	9,828.8	2,822.3	356.0	433.1	353.2	13,793.4
Corporate	2,016.1	556.3	71.1	84.2	69.1	2,796.7
State & Local	7,786.5	2,173.7	284.5	339.2	278.7	10,862.6
Personal	1,639.1	475.9	60.1	73.2	59.8	2,308.1
Corporate	6,147.4	1,697.8	224.4	265.9	218.9	8,554.5
Total Government Revenues	19,631.4	5,552.3	711.7	856.5	700.9	27,452.8

Source: IHS 2013

Appendix B2: Detailed Economic Impact Assessment Results by Census Division

The following tables represent the economic contribution to the US economy ***originating*** from investments made in each of the nine US Census Divisions as determined by IHS. While much of the contribution will stay within the division of origin, some of the contribution will flow amongst the other divisions. In contrast to the employment statistics provided in the Executive Summary and Section 4 of the report, these data represent the national impacts due to investment in each of the divisions, and do not reflect the specific economic impacts **to** each division. The totals from each approach, however, are consistent.

**Base Case by Energy Class:
Employment Impact by Industry and US Census Division**

Employment	Northeast		South			Midwest		West		Total US
	New England	Mid-Atlantic	South Atlantic	East South Central	West South Central	East North Central	West North Central	Mountain	Pacific	
Natural Gas	4,722	50,796	45,252	17,164	163,829	38,057	15,207	31,634	6,979	373,640
Construction	982	2,830	6,197	4,548	14,883	4,377	1,573	2,937	1,314	39,641
Financial Services	183	1,916	1,975	639	7,078	1,603	668	1,508	289	15,859
Information & Professional Services	1,393	13,276	12,498	4,300	40,870	9,916	3,858	8,372	1,918	96,401
Leisure & Other Services	499	5,253	5,413	1,848	18,914	4,307	1,661	3,893	804	42,592
Manufacturing	983	19,373	11,912	3,154	55,343	11,913	4,969	9,851	1,571	119,069
Natural Resources	42	587	804	350	2,717	556	183	329	126	5,694
Transportation & Utilities	141	1,800	1,761	621	6,192	1,487	558	1,155	248	13,963
Wholesale & Retail Trade	416	4,725	4,108	1,451	15,889	3,477	1,494	3,153	591	35,304
Misc.	83	1,036	584	253	1,943	421	243	436	118	5,117
NGL and LPG	14	9,197	2,669	6,256	21,404	7,255	2,421	2,014	-	51,230
Construction	3	1,852	482	2,052	4,654	1,407	643	573	-	11,666
Financial Services	-	375	114	235	928	307	108	95	-	2,162
Information & Professional Services	6	2,665	798	1,632	5,855	2,101	672	600	-	14,329
Leisure & Other Services	1	1,035	317	686	2,499	837	279	259	-	5,913
Manufacturing	3	1,778	535	687	4,060	1,480	329	176	-	9,048
Natural Resources	-	131	49	112	389	102	33	22	-	838
Transportation & Utilities	-	366	113	219	819	304	95	76	-	1,992
Wholesale & Retail Trade	1	837	223	538	1,948	629	225	186	-	4,587
Misc.	-	158	38	95	252	88	37	27	-	695
Crude Oil and Condensate	-	4,454	226	3,272	214,811	29,576	24,074	105,457	14,345	396,215
Construction	-	896	53	51	4,617	1,645	3,359	1,411	1,108	13,140
Financial Services	-	188	10	116	9,078	1,139	1,009	4,909	576	17,025
Information & Professional Services	-	1,258	66	682	48,766	7,044	6,160	27,178	3,515	94,669
Leisure & Other Services	-	508	27	327	24,323	3,113	2,582	12,731	1,582	45,193
Manufacturing	-	777	32	1,517	91,790	12,198	7,103	41,835	5,260	160,512
Natural Resources	-	74	5	92	3,618	436	285	1,036	256	5,802
Transportation & Utilities	-	213	9	104	7,760	1,019	843	3,785	486	14,219
Wholesale & Retail Trade	-	460	21	310	22,081	2,630	2,317	10,985	1,288	40,092
Misc.	-	80	3	73	2,778	352	416	1,587	274	5,563
Refineries and Refined Products	-	1,177	324	126	15,799	1,317	4,186	729	1,729	25,387
Construction	-	228	95	44	2,645	364	689	113	252	4,430
Financial Services	-	49	14	5	672	56	175	33	74	1,078
Information & Professional Services	-	332	90	31	4,514	363	1,272	230	478	7,310
Leisure & Other Services	-	134	38	13	1,840	152	456	92	208	2,933
Manufacturing	-	216	37	13	3,641	180	917	142	429	5,575
Natural Resources	-	20	6	3	273	19	49	12	35	417
Transportation & Utilities	-	56	11	4	635	47	209	37	70	1,069
Wholesale & Retail Trade	-	120	29	11	1,389	119	350	60	153	2,231
Misc.	-	22	4	2	190	17	69	10	30	344
Common Infrastructure	-	5,991	195	365	9,796	8,407	19,981	557	1,232	46,524
Construction	-	1,295	42	97	2,318	1,701	5,050	132	233	10,868
Financial Services	-	235	9	14	433	364	889	26	51	2,021
Information & Professional Services	-	1,894	58	103	2,832	2,529	6,163	179	364	14,122
Leisure & Other Services	-	679	25	41	1,201	1,031	2,376	76	154	5,583
Manufacturing	-	887	28	43	1,370	1,400	2,132	49	228	6,137
Natural Resources	-	107	5	12	227	147	264	10	30	802
Transportation & Utilities	-	254	8	17	402	383	953	27	47	2,091
Wholesale & Retail Trade	-	524	17	31	911	759	1,853	51	104	4,250
Misc.	-	116	3	7	102	93	301	7	21	650
Total	4,736	71,615	48,666	27,183	425,639	84,612	65,869	140,391	24,285	892,996
Construction	985	7,101	6,869	6,792	29,117	9,494	11,314	5,166	2,907	79,745
Financial Services	183	2,763	2,122	1,009	18,189	3,469	2,849	6,571	990	38,145
Information & Professional Services	1,399	19,425	13,510	6,748	102,837	21,953	18,125	36,559	6,275	226,831
Leisure & Other Services	500	7,609	5,820	2,915	48,777	9,440	7,354	17,051	2,748	102,214
Manufacturing	986	23,031	12,544	5,414	156,204	27,171	15,450	52,053	7,488	300,341
Natural Resources	42	919	869	569	7,224	1,260	814	1,409	447	13,553
Transportation & Utilities	141	2,689	1,902	965	15,808	3,240	2,658	5,080	851	33,334
Wholesale & Retail Trade	417	6,666	4,398	2,341	42,218	7,614	6,239	14,435	2,136	86,464
Misc.	83	1,412	632	430	5,265	971	1,066	2,067	443	12,369

Source: IHS 2013

**Base Case by Energy Class:
GDP Contribution by Industry and US Census Division**

Value Added (\$M)	Northeast		South			Midwest		West		Total US
	New England	Mid-Atlantic	South Atlantic	East South Central	West South Central	East North Central	West North Central	Mountain	Pacific	
Natural Gas	564.9	6,028.0	4,549.1	1,570.7	17,339.2	4,019.1	1,415.0	3,032.3	832.0	39,350.3
Construction	83.9	272.1	451.3	292.0	1,166.8	363.2	118.7	245.1	132.0	3,125.0
Financial Services	93.5	1,066.4	741.3	220.5	2,672.0	604.9	207.9	494.0	124.3	6,224.8
Information & Professional Services	148.7	1,549.5	1,191.7	372.4	3,841.5	939.8	342.9	754.9	207.3	9,348.6
Leisure & Other Services	25.2	287.3	252.7	74.5	817.6	183.6	66.4	189.4	42.9	1,939.6
Manufacturing	107.7	1,735.4	987.4	281.9	4,968.9	1,117.3	372.4	702.1	158.4	10,431.4
Natural Resources	7.9	84.5	76.1	37.6	501.3	97.5	23.3	62.3	20.2	910.6
Transportation & Utilities	40.8	374.3	362.6	126.6	1,440.8	306.4	106.9	201.4	65.1	3,025.0
Wholesale & Retail Trade	54.3	620.9	459.5	152.6	1,860.0	390.3	164.5	361.1	75.7	4,139.0
Misc.	3.0	37.5	26.6	12.6	70.5	16.1	11.9	22.0	6.1	206.2
NGL and LPG	2.0	1,072.6	275.7	590.3	2,340.4	798.6	231.1	215.5	-	5,526.0
Construction	0.3	158.5	35.8	138.2	357.3	121.4	47.2	48.9	-	907.5
Financial Services	0.3	175.2	44.2	86.9	355.1	123.8	33.0	35.2	-	853.8
Information & Professional Services	0.6	280.9	77.7	146.5	566.5	207.3	58.3	57.3	-	1,395.0
Leisure & Other Services	0.1	52.4	15.4	29.5	110.8	37.4	11.2	13.4	-	270.2
Manufacturing	0.4	190.4	45.1	70.9	400.5	151.3	31.2	17.5	-	907.3
Natural Resources	0.0	19.8	4.6	10.9	87.3	15.0	4.3	3.9	-	145.8
Transportation & Utilities	0.1	87.4	26.2	45.2	228.1	67.9	20.0	16.4	-	491.3
Wholesale & Retail Trade	0.2	102.0	24.8	57.9	225.7	71.0	23.9	21.6	-	527.1
Misc.	0.0	5.9	2.0	4.4	9.0	3.5	1.9	1.1	-	27.9
Crude Oil and Condensate	-	527.8	22.5	287.1	22,977.0	3,112.3	2,330.7	10,163.7	1,603.8	41,024.9
Construction	-	70.7	3.5	3.7	378.9	140.9	255.4	137.6	102.5	1,093.2
Financial Services	-	86.3	3.6	41.6	3,704.0	477.1	354.4	1,745.3	247.9	6,660.3
Information & Professional Services	-	128.4	6.0	59.3	4,680.2	704.6	578.0	2,590.1	387.1	9,133.7
Leisure & Other Services	-	24.5	1.2	13.4	1,061.4	136.5	108.8	632.7	84.6	2,063.1
Manufacturing	-	94.3	3.4	108.5	8,311.6	1,103.6	565.6	2,954.1	475.0	13,616.0
Natural Resources	-	14.5	0.4	5.8	578.4	52.2	30.9	158.2	29.6	870.1
Transportation & Utilities	-	51.0	1.9	14.7	1,495.5	179.4	157.9	581.3	96.1	2,577.9
Wholesale & Retail Trade	-	55.5	2.3	33.8	2,672.2	304.1	261.0	1,292.0	164.7	4,785.6
Misc.	-	2.7	0.1	6.2	94.9	13.9	18.8	72.3	16.3	225.0
Refineries and Refined Products	-	140.2	33.1	11.3	1,751.0	141.6	417.0	75.9	199.8	2,769.9
Construction	-	18.2	6.8	2.8	203.6	29.6	52.5	9.3	23.3	346.1
Financial Services	-	22.8	5.4	1.6	269.8	22.1	60.2	11.9	29.7	423.4
Information & Professional Services	-	34.3	8.8	2.7	444.5	35.2	116.8	21.5	50.0	713.8
Leisure & Other Services	-	6.5	1.9	0.6	82.6	6.9	19.0	4.7	10.8	133.0
Manufacturing	-	25.8	3.7	1.2	348.2	19.2	77.2	11.4	43.4	530.2
Natural Resources	-	3.9	0.6	0.3	51.6	3.3	5.6	2.1	4.7	72.0
Transportation & Utilities	-	13.3	2.6	0.9	184.2	11.1	45.2	7.8	17.4	282.5
Wholesale & Retail Trade	-	14.5	3.2	1.1	159.8	13.7	37.3	6.8	18.7	255.1
Misc.	-	0.8	0.2	0.1	6.7	0.6	3.1	0.5	1.8	13.8
Common Infrastructure	-	794.1	20.5	35.3	1,139.5	944.3	2,033.8	60.1	154.2	5,181.9
Construction	-	119.9	3.0	6.1	172.8	139.0	371.2	10.4	23.6	845.8
Financial Services	-	136.6	3.3	4.9	172.8	146.9	298.7	9.6	23.4	796.2
Information & Professional Services	-	224.3	5.7	9.1	280.6	247.6	562.1	16.6	40.7	1,386.6
Leisure & Other Services	-	39.2	1.2	1.7	54.2	46.1	99.6	3.9	8.7	254.5
Manufacturing	-	108.0	2.8	4.5	153.9	155.5	219.0	5.2	25.6	674.4
Natural Resources	-	17.6	0.5	1.2	65.1	24.2	29.7	1.8	3.7	143.7
Transportation & Utilities	-	76.2	2.1	3.9	129.5	96.3	239.4	6.5	13.7	567.6
Wholesale & Retail Trade	-	68.3	1.9	3.2	107.2	85.4	201.6	5.8	13.5	486.9
Misc.	-	4.1	0.1	0.6	3.4	3.5	12.7	0.3	1.3	26.0
Total	566.9	8,562.7	4,900.9	2,494.7	45,547.1	9,015.9	6,427.6	13,547.5	2,789.8	93,853.0
Construction	84.1	639.3	500.4	442.8	2,279.3	794.1	845.1	451.4	281.3	6,317.7
Financial Services	93.8	1,487.4	797.9	355.4	7,173.7	1,374.9	954.1	2,295.9	425.4	14,958.5
Information & Professional Services	149.3	2,217.4	1,289.9	590.0	9,813.3	2,134.3	1,658.0	3,440.4	685.1	21,977.8
Leisure & Other Services	25.3	410.0	272.4	119.7	2,126.5	410.5	305.0	844.2	147.1	4,660.5
Manufacturing	108.0	2,154.0	1,042.3	467.0	14,183.1	2,546.8	1,265.4	3,690.2	702.5	26,159.2
Natural Resources	7.9	140.3	82.2	55.7	1,283.8	192.1	93.7	228.4	58.2	2,142.3
Transportation & Utilities	41.0	602.3	395.3	191.4	3,478.0	661.1	569.5	813.5	192.3	6,944.3
Wholesale & Retail Trade	54.5	861.2	491.6	248.7	5,024.8	864.5	688.4	1,687.4	272.5	10,193.7
Misc.	3.0	51.0	28.9	23.9	184.5	37.6	48.4	96.2	25.5	498.9

Source: IHS 2013

**Base Case by Energy Class:
Labor Income Impact by Industry and US Census Division**

Labor Income (\$M)	Northeast		South			Midwest		West		Total US
	New England	Mid-Atlantic	South Atlantic	East South Central	West South Central	East North Central	West North Central	Mountain	Pacific	
Natural Gas	367.1	3,818.0	2,852.1	1,023.7	10,722.3	2,541.9	894.7	1,894.1	537.0	24,650.9
Construction	70.0	228.2	375.3	242.9	971.3	302.6	99.0	204.3	109.8	2,603.4
Financial Services	35.4	438.3	241.2	67.5	869.2	207.3	72.7	159.7	42.1	2,133.6
Information & Professional Services	118.8	1,182.2	938.7	309.5	3,010.6	746.3	264.4	576.8	163.4	7,310.7
Leisure & Other Services	17.8	199.0	172.1	51.6	559.2	126.1	46.1	127.6	28.5	1,328.0
Manufacturing	69.2	1,134.9	633.9	180.1	3,283.8	734.2	245.9	470.6	104.5	6,857.0
Natural Resources	3.3	38.6	36.2	16.1	198.0	37.4	7.6	23.7	8.8	369.8
Transportation & Utilities	17.2	188.8	161.9	56.1	660.6	143.6	52.1	102.9	29.0	1,412.3
Wholesale & Retail Trade	32.0	363.6	271.8	90.8	1,103.5	230.8	97.1	212.0	44.7	2,446.3
Misc.	3.4	44.3	20.8	9.0	66.2	13.6	9.8	16.5	6.0	189.6
NGL and LPG	1.3	691.3	174.3	392.2	1,475.0	515.2	151.2	140.5	-	3,541.1
Construction	0.2	131.7	29.7	114.9	296.5	100.9	39.2	40.5	-	753.7
Financial Services	0.1	63.3	14.6	27.2	113.6	43.6	11.1	11.3	-	284.8
Information & Professional Services	0.4	224.9	62.5	121.3	459.7	167.9	46.9	45.5	-	1,129.2
Leisure & Other Services	0.1	36.2	10.5	20.4	75.4	25.7	7.7	9.0	-	185.0
Manufacturing	0.2	121.8	28.1	45.7	257.0	97.1	20.5	11.7	-	582.1
Natural Resources	0.0	8.9	2.3	4.9	34.1	6.0	1.4	1.6	-	59.3
Transportation & Utilities	0.1	38.5	10.5	20.0	95.8	29.0	8.8	7.3	-	209.8
Wholesale & Retail Trade	0.1	60.0	14.6	34.4	134.1	41.9	14.1	12.7	-	312.0
Misc.	0.0	6.0	1.5	3.3	8.8	3.1	1.6	0.9	-	25.3
Crude Oil and Condensate	-	333.6	14.4	178.2	14,102.2	1,969.2	1,490.3	6,283.3	1,021.4	25,392.6
Construction	-	58.8	2.9	3.2	320.5	118.2	212.7	120.1	85.9	922.3
Financial Services	-	31.7	1.2	14.4	1,273.5	178.5	130.0	609.0	91.1	2,329.4
Information & Professional Services	-	101.7	4.8	45.5	3,515.7	543.5	446.7	1,925.0	289.7	6,872.8
Leisure & Other Services	-	17.0	0.9	9.4	729.5	94.3	75.9	428.2	56.4	1,411.5
Manufacturing	-	60.6	2.1	69.9	5,557.3	727.2	364.7	1,993.0	321.5	9,096.4
Natural Resources	-	6.2	0.2	2.8	234.3	21.1	11.0	64.3	13.7	353.6
Transportation & Utilities	-	22.3	0.8	8.9	788.4	94.7	78.3	329.5	50.3	1,373.2
Wholesale & Retail Trade	-	32.6	1.3	20.0	1,583.4	179.3	153.8	757.0	97.0	2,824.5
Misc.	-	2.6	0.1	4.1	99.7	12.3	17.1	57.2	15.8	208.8
Refineries and Refined Products	-	88.6	21.4	7.5	1,095.5	92.6	266.8	47.8	126.8	1,746.9
Construction	-	15.2	5.6	2.3	169.1	24.6	43.7	7.8	19.4	287.7
Financial Services	-	8.5	1.7	0.5	88.2	7.5	21.5	3.9	10.1	141.9
Information & Professional Services	-	27.1	7.0	2.3	363.7	28.4	95.5	17.4	39.2	580.6
Leisure & Other Services	-	4.5	1.3	0.4	56.6	4.7	13.3	3.2	7.2	91.2
Manufacturing	-	16.5	2.3	0.8	221.7	12.5	48.4	7.3	28.7	338.2
Natural Resources	-	1.7	0.3	0.1	20.9	1.3	2.0	0.9	2.0	29.2
Transportation & Utilities	-	5.8	1.1	0.4	74.0	5.0	17.7	3.1	7.6	114.6
Wholesale & Retail Trade	-	8.5	1.9	0.7	94.9	8.1	22.0	4.0	11.0	151.1
Misc.	-	0.8	0.2	0.1	6.3	0.6	2.7	0.4	1.6	12.6
Common Infrastructure	-	511.0	13.0	22.8	707.5	603.0	1,317.4	38.2	99.0	3,311.8
Construction	-	99.6	2.5	5.1	143.3	115.5	308.3	8.7	19.6	702.6
Financial Services	-	52.2	1.0	1.5	52.6	48.3	98.4	2.9	7.7	264.5
Information & Professional Services	-	181.3	4.6	7.7	231.3	203.6	462.6	13.6	32.3	1,137.0
Leisure & Other Services	-	26.9	0.8	1.2	36.7	31.5	68.9	2.6	5.7	174.2
Manufacturing	-	67.5	1.8	3.0	99.1	101.0	144.0	3.5	17.1	436.9
Natural Resources	-	8.1	0.2	0.5	25.3	10.2	11.7	0.7	1.8	58.5
Transportation & Utilities	-	30.6	0.8	1.5	52.1	39.4	93.5	2.6	5.7	226.2
Wholesale & Retail Trade	-	40.1	1.1	1.9	63.9	50.6	119.3	3.4	8.0	288.3
Misc.	-	4.8	0.1	0.4	3.2	3.0	10.8	0.2	1.2	23.6
Total	368.4	5,442.5	3,075.2	1,624.4	28,102.5	5,721.9	4,120.3	8,403.9	1,784.2	58,643.3
Construction	70.2	533.5	416.0	368.5	1,900.7	661.9	702.9	381.3	234.7	5,269.7
Financial Services	35.5	594.0	259.7	111.0	2,397.1	485.2	333.7	786.8	151.1	5,154.2
Information & Professional Services	119.3	1,717.3	1,017.7	486.3	7,581.0	1,689.7	1,316.1	2,578.3	524.6	17,030.2
Leisure & Other Services	17.8	283.6	185.6	83.0	1,457.3	282.3	211.8	570.6	97.8	3,189.9
Manufacturing	69.4	1,401.3	668.3	299.4	9,418.8	1,672.0	823.5	2,486.1	471.8	17,310.6
Natural Resources	3.4	63.5	39.2	24.5	512.6	76.0	33.7	91.2	26.3	870.4
Transportation & Utilities	17.2	285.9	175.2	87.0	1,670.8	311.6	250.4	445.4	92.7	3,336.2
Wholesale & Retail Trade	32.1	504.9	290.8	147.8	2,979.8	510.7	406.3	989.1	160.6	6,022.2
Misc.	3.4	58.5	22.7	16.9	184.2	32.5	41.9	75.2	24.6	459.9

Source: IHS 2013

**Base Case by Energy Class:
Direct, Indirect, and Induced Employment by US Census Division**

Employment	Northeast		South			Midwest		West		Total US
	New England	Mid-Atlantic	South Atlantic	East South Central	West South Central	East North Central	West North Central	Mountain	Pacific	
Natural Gas	4,722	50,796	45,252	17,164	163,829	38,057	15,207	31,634	6,979	373,640
Direct	1,635	13,879	13,881	7,005	49,457	10,229	5,038	10,068	2,098	113,290
Indirect	1,206	17,471	13,616	4,306	53,573	12,634	4,790	10,425	2,001	120,022
Induced	1,881	19,446	17,755	5,853	60,799	15,194	5,379	11,141	2,880	140,328
NGL and LPG	14	9,197	2,669	6,256	21,404	7,255	2,421	2,014	-	51,230
Direct	5	2,921	914	2,484	7,385	2,212	875	704	-	17,500
Indirect	3	2,529	685	1,543	5,772	1,944	606	493	-	13,575
Induced	6	3,747	1,070	2,229	8,247	3,099	940	817	-	20,155
Crude Oil and Condensate	-	4,454	226	3,272	214,811	29,576	24,074	105,457	14,345	396,215
Direct	-	1,265	70	994	54,167	6,394	7,742	29,871	3,370	103,873
Indirect	-	1,373	63	1,232	81,219	11,811	7,602	38,970	5,453	147,723
Induced	-	1,816	93	1,046	79,425	11,371	8,730	36,616	5,522	144,619
Refineries and Refined Products	-	1,177	324	126	15,799	1,317	4,186	729	1,729	25,387
Direct	-	333	115	54	5,419	441	1,596	268	479	8,705
Indirect	-	362	82	31	4,230	343	981	182	529	6,740
Induced	-	482	127	41	6,150	533	1,609	279	721	9,942
Common Infrastructure	-	5,991	195	365	9,796	8,407	19,981	557	1,232	46,524
Direct	-	1,834	57	137	3,178	2,405	7,212	190	334	15,347
Indirect	-	1,593	55	97	2,751	2,388	4,944	146	358	12,332
Induced	-	2,564	83	131	3,867	3,614	7,825	221	540	18,845
Total	4,736	71,615	48,666	27,183	425,639	84,612	65,869	140,391	24,285	892,996
Direct	1,640	20,232	15,037	10,674	119,606	21,681	22,463	41,101	6,281	258,715
Indirect	1,209	23,328	14,501	7,209	147,545	29,120	18,923	50,216	8,341	300,392
Induced	1,887	28,055	19,128	9,300	158,488	33,811	24,483	49,074	9,663	333,889

Source: IHS 2013

**Base Case by Energy Class:
Direct, Indirect, and Induced GDP Contribution by US Census Division**

Value Added Contribution to GDP (\$M)	Northeast		South			Midwest		West		Total US
	New England	Mid-Atlantic	South Atlantic	East South Central	West South Central	East North Central	West North Central	Mountain	Pacific	
Natural Gas	565	6,028	4,549	1,571	17,339	4,019	1,415	3,032	832	39,350
Direct	171	1,223	1,188	563	4,639	969	387	762	241	10,145
Indirect	169	2,395	1,547	470	6,347	1,490	521	1,149	257	14,346
Induced	224	2,410	1,814	538	6,352	1,560	506	1,120	334	14,859
NGL and LPG	2	1,073	276	590	2,340	799	231	215	-	5,526
Direct	1	304	83	205	728	230	77	69	-	1,698
Indirect	1	339	80	172	738	239	66	60	-	1,696
Induced	1	430	112	213	874	329	87	87	-	2,133
Crude Oil and Condensate	-	528	23	287	22,977	3,112	2,331	10,164	1,604	41,025
Direct	-	132	6	60	4,781	524	602	1,976	304	8,384
Indirect	-	192	7	128	9,679	1,381	857	4,407	671	17,322
Induced	-	204	9	100	8,517	1,208	872	3,780	629	15,319
Refineries and Refined Products	-	140	33	11	1,751	142	417	76	200	2,770
Direct	-	35	10	4	563	43	149	26	54	883
Indirect	-	51	10	3	531	43	111	21	66	835
Induced	-	55	13	4	658	56	158	29	80	1,052
Common Infrastructure	-	794	21	35	1,140	944	2,034	60	154	5,182
Direct	-	225	6	12	340	266	719	20	44	1,632
Indirect	-	239	6	11	377	298	561	17	46	1,555
Induced	-	331	8	12	422	380	754	23	64	1,994
Total	567	8,563	4,901	2,495	45,547	9,016	6,428	13,547	2,790	93,853
Direct	172	1,918	1,294	844	11,051	2,032	1,935	2,853	644	22,742
Indirect	170	3,216	1,651	784	17,672	3,452	2,116	5,655	1,039	35,754
Induced	225	3,429	1,957	867	16,824	3,532	2,377	5,039	1,107	35,358

Source: IHS 2013

**Base Case by Energy Class:
Direct, Indirect, and Induced Labor Income by US Census Division**

Labor Income (\$M)	Northeast		South			Midwest		West		Total US
	New England	Mid-Atlantic	South Atlantic	East South Central	West South Central	East North Central	West North Central	Mountain	Pacific	
Natural Gas	367	3,818	2,852	1,024	10,722	2,542	895	1,894	537	24,651
Direct	128	865	863	425	3,274	705	279	549	183	7,271
Indirect	107	1,544	969	297	3,915	946	330	718	162	8,988
Induced	131	1,409	1,020	302	3,533	891	286	627	192	8,391
NGL and LPG	1	691	174	392	1,475	515	151	141	-	3,541
Direct	0	231	60	161	542	173	60	54	-	1,281
Indirect	0	214	51	110	448	153	42	37	-	1,055
Induced	1	247	63	121	485	190	49	49	-	1,204
Crude Oil and Condensate	-	334	14	178	14,102	1,969	1,490	6,283	1,021	25,393
Direct	-	99	5	41	3,309	376	447	1,348	221	5,846
Indirect	-	118	5	82	6,024	891	549	2,792	434	10,895
Induced	-	117	5	56	4,768	702	494	2,143	366	8,651
Refineries and Refined Products	-	89	21	8	1,095	93	267	48	127	1,747
Direct	-	26	8	3	401	34	105	18	39	634
Indirect	-	31	6	2	326	27	71	13	41	519
Induced	-	31	7	2	368	32	90	16	46	594
Common Infrastructure	-	511	13	23	707	603	1,317	38	99	3,312
Direct	-	169	4	9	254	199	536	15	33	1,219
Indirect	-	150	4	7	223	187	355	11	29	966
Induced	-	192	5	7	230	217	426	13	37	1,126
Total	368	5,442	3,075	1,624	28,102	5,722	4,120	8,404	1,784	58,643
Direct	129	1,389	941	639	7,781	1,486	1,427	1,985	476	16,252
Indirect	108	2,058	1,034	498	10,937	2,204	1,347	3,571	667	22,424
Induced	132	1,995	1,100	488	9,385	2,031	1,346	2,848	641	19,967

Source: IHS 2013

**Base Case by Energy Class:
Government Revenues**

Government Revenues by Energy Type (\$M)	Natural Gas	NGL & LPG	Oil and Condensate	Refined	Common Infrastructure	Total US
Federal	5,414.8	765.0	5,638.0	380.5	716.0	12,914.4
Personal	4,507.2	641.8	4,672.3	317.2	598.9	10,737.3
Corporate	907.7	123.2	965.7	63.3	117.2	2,177.0
						0.0
State & Local	3,523.1	489.4	3,726.2	247.3	472.6	8,458.5
Personal	755.1	108.4	778.3	53.5	101.3	1,796.5
Corporate	2,768.0	381.0	2,947.9	193.8	371.2	6,661.9
Total Government Revenue	8,937.9	1,254.4	9,364.1	627.8	1,188.6	21,372.8

Source: IHS 2013

**Base Case by Transport Mode:
Employment Impact by Industry and US Census Division**

Employment	Northeast		South			Midwest		West		Total US
	New England	Mid-Atlantic	South Atlantic	East South Central	West South Central	East North Central	West North Central	Mountain	Pacific	
Pipelines	4,722	47,181	32,936	22,597	306,508	65,919	39,631	133,187	12,757	665,438
Construction	982	2,269	4,022	5,295	6,214	6,181	5,122	3,289	737	34,111
Financial Services	183	1,781	1,456	846	13,108	2,669	1,694	6,246	491	28,474
Information & Professional Services	1,393	12,141	8,771	5,591	69,215	16,355	10,105	34,426	3,019	161,016
Leisure & Other Services	499	4,875	3,961	2,440	34,978	7,218	4,283	16,163	1,344	75,761
Manufacturing	983	18,547	9,427	4,794	131,268	23,440	12,040	51,168	5,208	256,875
Natural Resources	42	540	577	483	5,172	961	471	1,325	232	9,803
Transportation & Utilities	141	1,637	1,216	812	11,050	2,371	1,404	4,791	394	23,816
Wholesale & Retail Trade	416	4,431	3,096	1,976	31,673	5,972	3,848	13,808	1,088	66,308
Misc.	83	960	410	360	3,830	752	664	1,971	244	9,274
Rail	-	5,179	311	260	8,736	4,552	9,388	1,010	2,533	31,969
Construction	-	1,117	71	71	2,118	929	2,371	253	514	7,444
Financial Services	-	206	13	9	386	197	418	49	108	1,386
Information & Professional Services	-	1,582	92	72	2,440	1,357	2,884	311	728	9,466
Leisure & Other Services	-	582	39	29	1,058	555	1,116	131	307	3,817
Manufacturing	-	832	44	31	1,262	764	1,016	95	462	4,506
Natural Resources	-	83	7	8	187	78	125	14	47	549
Transportation & Utilities	-	214	13	12	355	206	445	45	94	1,384
Wholesale & Retail Trade	-	466	28	23	836	415	872	98	228	2,966
Misc.	-	97	4	5	94	51	141	14	45	451
Marine	14	5,286	2,180	-	5,094	1,353	-	-	5,297	19,224
Construction	3	1,049	522	-	1,185	296	-	-	997	4,052
Financial Services	-	225	97	-	223	59	-	-	242	846
Information & Professional Services	6	1,500	679	-	1,442	410	-	-	1,479	5,516
Leisure & Other Services	1	604	269	-	605	161	-	-	667	2,307
Manufacturing	3	920	245	-	793	198	-	-	975	3,134
Natural Resources	-	89	40	-	92	21	-	-	101	343
Transportation & Utilities	-	260	102	-	210	68	-	-	232	872
Wholesale & Retail Trade	1	545	198	-	481	124	-	-	519	1,868
Misc.	-	94	28	-	63	16	-	-	85	286
Processing and Storage	-	10,675	13,124	4,126	99,909	8,166	5,863	5,890	3,019	150,772
Construction	-	1,954	2,230	1,373	18,325	1,152	1,042	1,552	529	28,157
Financial Services	-	424	549	144	4,231	343	250	263	121	6,325
Information & Professional Services	-	3,161	3,935	1,029	28,183	2,438	1,746	1,726	849	43,067
Leisure & Other Services	-	1,174	1,538	424	11,477	941	648	714	344	17,260
Manufacturing	-	2,244	2,812	564	22,126	1,999	1,223	763	719	32,450
Natural Resources	-	148	242	73	1,649	117	73	63	51	2,416
Transportation & Utilities	-	438	567	134	3,969	387	285	227	106	6,113
Wholesale & Retail Trade	-	936	1,064	324	8,727	688	501	502	244	12,986
Misc.	-	196	187	61	1,222	101	95	80	56	1,998
Common Infrastructure, Exc. Rail	-	3,296	105	201	5,387	4,623	10,990	305	680	25,587
Construction	-	712	22	54	1,275	935	2,778	72	128	5,976
Financial Services	-	130	4	8	237	201	489	15	29	1,113
Information & Professional Services	-	1,042	32	57	1,557	1,391	3,390	98	201	7,768
Leisure & Other Services	-	374	13	23	661	567	1,306	42	84	3,070
Manufacturing	-	487	15	24	753	770	1,173	26	126	3,374
Natural Resources	-	59	3	6	125	81	145	6	17	442
Transportation & Utilities	-	140	5	9	221	210	524	14	26	1,149
Wholesale & Retail Trade	-	288	10	16	501	417	1,019	28	57	2,336
Misc.	-	64	1	4	57	51	166	4	12	359
Total	4,736	71,615	48,666	27,183	425,639	84,612	65,869	140,391	24,285	892,996
Construction	985	7,101	6,867	6,793	29,117	9,493	11,313	5,166	2,905	79,740
Financial Services	183	2,766	2,119	1,007	18,185	3,469	2,851	6,573	991	38,144
Information & Professional Services	1,399	19,426	13,509	6,749	102,837	21,951	18,125	36,561	6,276	226,833
Leisure & Other Services	500	7,609	5,820	2,916	48,779	9,442	7,353	17,050	2,746	102,215
Manufacturing	986	23,030	12,543	5,413	156,202	27,171	15,452	52,052	7,490	300,339
Natural Resources	42	919	869	570	7,225	1,258	814	1,408	448	13,553
Transportation & Utilities	141	2,689	1,903	967	15,805	3,242	2,658	5,077	852	33,334
Wholesale & Retail Trade	417	6,666	4,396	2,339	42,218	7,616	6,240	14,436	2,136	86,464
Misc.	83	1,411	630	430	5,266	971	1,066	2,069	442	12,368

Source: IHS 2013

**Base Case by Transport Mode:
GDP Contribution by Industry and US Census Division**

Value Added (\$M)	Northeast		South			Midwest		West		Total US
	New England	Mid-Atlantic	South Atlantic	East South Central	West South Central	East North Central	West North Central	Mountain	Pacific	
Pipelines	564.9	5,580.4	3,289.0	2,079.4	32,502.1	6,965.2	3,784.8	12,809.1	1,438.2	69,012.9
Construction	83.9	220.8	293.3	344.5	530.9	523.7	390.0	296.9	77.1	2,761.1
Financial Services	93.5	991.5	542.5	296.2	5,194.7	1,061.5	568.8	2,178.4	222.1	11,149.2
Information & Professional Services	148.7	1,420.2	832.6	487.7	6,542.5	1,593.7	930.0	3,242.5	348.2	15,546.2
Leisure & Other Services	25.2	266.6	183.9	100.0	1,516.7	313.2	177.1	800.1	74.7	3,457.5
Manufacturing	107.7	1,654.6	775.5	411.3	11,794.2	2,159.4	937.5	3,615.0	450.8	21,906.1
Natural Resources	7.9	77.8	54.0	48.2	856.9	146.3	54.6	214.1	28.2	1,488.0
Transportation & Utilities	40.8	330.4	239.9	160.7	2,117.3	456.0	265.9	753.6	79.2	4,443.8
Wholesale & Retail Trade	54.3	583.8	349.3	210.8	3,815.6	682.4	430.0	1,616.6	143.4	7,886.2
Misc.	3.0	34.7	18.0	20.2	133.1	29.1	30.7	91.8	14.4	374.9
Rail	-	652.2	31.8	24.5	970.9	505.9	951.8	103.4	302.3	3,542.7
Construction	-	99.6	4.9	4.3	153.1	75.1	173.7	19.3	49.5	579.5
Financial Services	-	110.5	5.1	3.4	147.1	78.5	139.5	16.4	46.3	546.8
Information & Professional Services	-	178.6	8.6	6.2	234.0	131.7	262.1	27.6	77.2	926.0
Leisure & Other Services	-	31.7	1.8	1.2	46.1	24.5	46.6	6.3	16.4	174.7
Manufacturing	-	97.9	4.6	3.3	139.8	85.0	103.9	10.2	53.0	498.0
Natural Resources	-	13.3	0.7	0.8	48.7	12.8	14.1	2.6	5.7	98.8
Transportation & Utilities	-	57.9	2.9	2.5	102.5	50.1	111.1	9.6	23.1	359.7
Wholesale & Retail Trade	-	59.0	3.1	2.3	96.4	46.3	94.6	10.8	28.6	341.1
Misc.	-	3.5	0.2	0.4	3.1	1.9	6.0	0.6	2.6	18.2
Marine	2.0	626.6	223.0	-	554.1	144.8	-	-	608.9	2,159.3
Construction	0.3	82.3	35.3	-	87.3	22.9	-	-	88.0	316.2
Financial Services	0.3	101.7	35.6	-	83.6	21.9	-	-	90.0	333.2
Information & Professional Services	0.6	152.8	63.2	-	137.4	38.4	-	-	143.7	536.0
Leisure & Other Services	0.1	29.0	12.1	-	26.3	6.6	-	-	32.3	106.3
Manufacturing	0.4	110.8	25.3	-	83.9	21.7	-	-	114.5	356.6
Natural Resources	0.0	17.8	4.2	-	21.2	3.5	-	-	16.5	63.2
Transportation & Utilities	0.1	63.5	24.9	-	57.4	15.8	-	-	57.1	218.8
Wholesale & Retail Trade	0.2	65.6	21.3	-	54.9	13.4	-	-	62.2	217.6
Misc.	0.0	3.1	1.1	-	2.2	0.5	-	-	4.6	11.6
Processing and Storage	-	1,266.8	1,345.8	371.4	10,893.3	880.7	572.4	602.0	355.6	16,288.1
Construction	-	170.7	165.2	90.6	1,412.9	96.0	77.1	129.4	53.7	2,195.7
Financial Services	-	208.4	212.7	53.2	1,653.2	132.3	81.5	95.8	54.2	2,491.4
Information & Professional Services	-	342.4	382.4	91.1	2,745.1	234.5	156.7	161.1	93.7	4,207.0
Leisure & Other Services	-	61.2	74.0	17.5	507.6	40.7	26.5	35.6	18.9	782.0
Manufacturing	-	231.2	235.3	49.9	2,080.5	195.2	103.5	62.1	70.1	3,027.8
Natural Resources	-	21.7	23.2	6.1	321.1	16.2	8.7	10.7	5.6	413.3
Transportation & Utilities	-	108.5	126.5	26.0	1,129.7	86.3	60.8	46.8	25.3	1,609.8
Wholesale & Retail Trade	-	115.3	116.9	33.9	998.9	75.5	52.9	56.8	30.9	1,481.0
Misc.	-	7.5	9.7	3.0	44.2	4.1	4.7	3.7	3.2	80.0
Common Infrastructure, Exc. Rail	-	436.8	11.3	19.4	626.8	519.4	1,118.6	33.1	84.8	2,850.0
Construction	-	65.9	1.6	3.3	95.0	76.4	204.2	5.7	13.0	465.2
Financial Services	-	75.2	1.8	2.7	95.0	80.8	164.3	5.3	12.9	437.9
Information & Professional Services	-	123.3	3.1	5.0	154.4	136.2	309.1	9.1	22.4	762.6
Leisure & Other Services	-	21.6	0.7	1.0	29.8	25.3	54.8	2.1	4.8	140.0
Manufacturing	-	59.4	1.5	2.5	84.7	85.5	120.4	2.9	14.1	370.9
Natural Resources	-	9.7	0.3	0.6	35.8	13.3	16.3	1.0	2.0	79.0
Transportation & Utilities	-	41.9	1.2	2.2	71.2	52.9	131.7	3.6	7.6	312.2
Wholesale & Retail Trade	-	37.6	1.0	1.8	59.0	47.0	110.9	3.2	7.4	267.8
Misc.	-	2.2	0.1	0.3	1.9	1.9	7.0	0.2	0.7	14.3
Total	566.9	8,562.7	4,900.9	2,494.7	45,547.1	9,015.9	6,427.6	13,547.5	2,789.8	93,853.0
Construction	84.1	639.3	500.4	442.8	2,279.3	794.1	845.1	451.4	281.3	6,317.7
Financial Services	93.8	1,487.4	797.9	355.4	7,173.7	1,374.9	954.1	2,295.9	425.4	14,958.5
Information & Professional Services	149.3	2,217.4	1,289.9	590.0	9,813.3	2,134.3	1,658.0	3,440.4	685.1	21,977.8
Leisure & Other Services	25.3	410.0	272.4	119.7	2,126.5	410.5	305.0	844.2	147.1	4,660.5
Manufacturing	108.0	2,154.0	1,042.3	467.0	14,183.1	2,546.8	1,265.4	3,690.2	702.5	26,159.2
Natural Resources	7.9	140.3	82.2	55.7	1,283.8	192.1	93.7	228.4	58.2	2,142.3
Transportation & Utilities	41.0	602.3	395.3	191.4	3,478.0	661.1	569.5	813.5	192.3	6,944.3
Wholesale & Retail Trade	54.5	861.2	491.6	248.7	5,024.8	864.5	688.4	1,687.4	272.5	10,193.7
Misc.	3.0	51.0	28.9	23.9	184.5	37.6	48.4	96.2	25.5	498.9

Source: IHS 2013

**Base Case by Transport Mode:
Labor Income Impact by Industry and US Census Division**

Labor Income (\$M)	Northeast		South			Midwest		West		Total US
	New England	Mid-Atlantic	South Atlantic	East South Central	West South Central	East North Central	West North Central	Mountain	Pacific	
Pipelines	367.1	3,530.6	2,055.1	1,348.0	19,905.1	4,413.1	2,412.5	7,923.8	915.1	42,870.3
Construction	70.0	185.5	244.0	286.7	449.0	436.8	324.9	253.2	64.7	2,314.7
Financial Services	35.4	408.2	175.0	92.3	1,755.1	379.3	205.1	748.9	82.7	3,882.1
Information & Professional Services	118.8	1,077.5	648.1	401.0	4,905.6	1,246.0	718.2	2,419.1	258.5	11,792.9
Leisure & Other Services	17.8	184.6	125.1	69.3	1,040.0	215.5	123.3	540.8	49.7	2,365.9
Manufacturing	69.2	1,084.8	503.1	264.5	7,894.3	1,421.9	610.5	2,437.3	304.3	14,589.9
Natural Resources	3.3	35.4	25.6	21.2	344.1	57.4	18.8	85.4	13.4	604.6
Transportation & Utilities	17.2	171.5	113.2	73.6	1,120.2	227.8	131.3	419.8	42.7	2,317.3
Wholesale & Retail Trade	32.0	341.9	206.7	125.3	2,261.5	403.0	253.5	947.5	84.4	4,655.8
Misc.	3.4	41.1	14.2	14.2	135.4	25.4	27.0	71.8	14.7	347.2
Rail	-	420.7	20.3	15.9	607.8	323.6	616.6	66.6	196.3	2,267.8
Construction	-	82.8	4.0	3.6	127.0	62.4	144.3	16.0	41.2	481.4
Financial Services	-	41.7	1.6	1.0	45.3	25.9	45.9	5.1	15.6	182.2
Information & Professional Services	-	143.9	6.9	5.2	191.6	108.1	215.6	22.4	61.0	754.7
Leisure & Other Services	-	21.9	1.2	0.8	31.4	16.8	32.2	4.3	10.9	119.5
Manufacturing	-	61.7	3.0	2.2	90.6	55.3	68.4	6.9	34.4	323.3
Natural Resources	-	6.1	0.3	0.4	18.9	5.3	5.5	1.1	2.6	40.2
Transportation & Utilities	-	24.2	1.2	1.0	42.8	20.8	43.6	4.1	10.4	148.1
Wholesale & Retail Trade	-	34.7	1.8	1.4	57.4	27.4	56.0	6.3	16.9	201.9
Misc.	-	3.8	0.1	0.3	2.8	1.6	5.1	0.4	2.3	16.4
Marine	1.3	395.0	142.1	-	350.5	93.1	-	-	387.2	1,369.2
Construction	0.2	68.4	29.3	-	72.5	19.0	-	-	73.3	262.8
Financial Services	0.1	37.3	11.3	-	26.8	7.4	-	-	29.1	112.0
Information & Professional Services	0.4	121.3	51.8	-	112.2	31.8	-	-	113.8	431.3
Leisure & Other Services	0.1	20.2	8.3	-	18.0	4.6	-	-	21.5	72.6
Manufacturing	0.2	71.3	16.1	-	54.3	14.1	-	-	77.1	233.3
Natural Resources	0.0	7.6	2.0	-	8.2	1.4	-	-	6.6	25.7
Transportation & Utilities	0.1	27.2	9.7	-	23.9	6.4	-	-	25.1	92.4
Wholesale & Retail Trade	0.1	38.6	12.6	-	32.6	7.9	-	-	36.8	128.7
Misc.	0.0	3.1	0.9	-	2.0	0.5	-	-	3.9	10.4
Processing and Storage	-	815.1	850.6	248.0	6,849.9	560.4	366.7	392.5	231.2	10,314.5
Construction	-	142.0	137.4	75.4	1,173.4	80.0	64.1	107.3	44.7	1,824.4
Financial Services	-	78.1	71.2	16.9	541.0	46.0	28.5	31.2	19.5	832.4
Information & Professional Services	-	274.8	308.3	75.9	2,244.3	191.8	127.9	129.3	73.6	3,425.9
Leisure & Other Services	-	42.2	50.5	12.3	347.8	28.1	18.4	24.1	12.6	536.1
Manufacturing	-	146.4	145.1	31.1	1,325.1	125.1	65.5	40.0	45.6	1,923.8
Natural Resources	-	9.9	11.2	2.7	127.5	6.4	3.0	4.3	2.7	167.7
Transportation & Utilities	-	46.1	50.6	11.5	455.2	35.0	24.1	20.1	11.3	654.0
Wholesale & Retail Trade	-	67.7	69.0	20.1	593.2	44.5	31.2	33.3	18.2	877.2
Misc.	-	7.9	7.4	2.2	42.2	3.5	3.9	2.9	3.0	73.0
Common Infrastructure, Exc. Rail	-	281.0	7.1	12.5	389.1	331.6	724.6	21.0	54.5	1,821.5
Construction	-	54.8	1.4	2.8	78.8	63.5	169.6	4.8	10.8	386.4
Financial Services	-	28.7	0.6	0.8	28.9	26.6	54.1	1.6	4.2	145.5
Information & Professional Services	-	99.7	2.5	4.2	127.2	112.0	254.4	7.5	17.8	625.3
Leisure & Other Services	-	14.8	0.4	0.7	20.2	17.3	37.9	1.4	3.1	95.8
Manufacturing	-	37.1	1.0	1.6	54.5	55.5	79.2	1.9	9.4	240.3
Natural Resources	-	4.5	0.1	0.3	13.9	5.6	6.4	0.4	1.0	32.2
Transportation & Utilities	-	16.8	0.5	0.8	28.6	21.6	51.4	1.4	3.2	124.4
Wholesale & Retail Trade	-	22.1	0.6	1.1	35.1	27.8	65.6	1.9	4.4	158.6
Misc.	-	2.6	0.0	0.2	1.8	1.6	6.0	0.1	0.6	13.0
Total	368.4	5,442.5	3,075.2	1,624.4	28,102.5	5,721.9	4,120.3	8,403.9	1,784.2	58,643.3
Construction	70.2	533.5	416.0	368.5	1,900.7	661.9	702.9	381.3	234.7	5,269.7
Financial Services	35.5	594.0	259.7	111.0	2,397.1	485.2	333.7	786.8	151.1	5,154.2
Information & Professional Services	119.3	1,717.3	1,017.7	486.3	7,581.0	1,689.7	1,316.1	2,578.3	524.6	17,030.2
Leisure & Other Services	17.8	283.6	185.6	83.0	1,457.3	282.3	211.8	570.6	97.8	3,189.9
Manufacturing	69.4	1,401.3	668.3	299.4	9,418.8	1,672.0	823.5	2,486.1	471.8	17,310.6
Natural Resources	3.4	63.5	39.2	24.5	512.6	76.0	33.7	91.2	26.3	870.4
Transportation & Utilities	17.2	285.9	175.2	87.0	1,670.8	311.6	250.4	445.4	92.7	3,336.2
Wholesale & Retail Trade	32.1	504.9	290.8	147.8	2,979.8	510.7	406.3	989.1	160.6	6,022.2
Misc.	3.4	58.5	22.7	16.9	184.2	32.5	41.9	75.2	24.6	459.9

Source: IHS 2013

**Base Case by Transport Mode:
Direct, Indirect and Induced Employment by US Census Division**

Employment	Northeast		South			Midwest		West		Total US
	New England	Mid-Atlantic	South Atlantic	East South Central	West South Central	East North Central	West North Central	Mountain	Pacific	
Pipelines	4,722	47,179	32,946	22,596	306,513	65,918	39,628	133,186	12,756	665,444
Direct	1,635	12,624	9,680	8,742	77,845	16,046	12,886	38,413	3,062	180,933
Indirect	1,206	16,575	10,466	6,152	116,088	23,985	12,476	48,517	4,908	240,373
Induced	1,881	17,980	12,800	7,702	112,580	25,887	14,266	46,256	4,786	244,138
Rail	-	5,179	311	260	8,736	4,552	9,388	1,010	2,533	31,969
Direct	-	1,600	96	98	2,858	1,300	3,388	348	703	10,391
Indirect	-	1,403	86	69	2,477	1,300	2,327	268	743	8,673
Induced	-	2,176	129	93	3,401	1,952	3,673	394	1,087	12,905
Marine	14	5,286	2,180	-	5,094	1,353	-	-	5,297	19,224
Direct	5	1,512	733	-	1,719	422	-	-	1,438	5,829
Indirect	3	1,623	569	-	1,396	362	-	-	1,642	5,595
Induced	6	2,151	878	-	1,979	569	-	-	2,217	7,800
Processing and Storage	-	10,675	13,124	4,126	99,909	8,166	5,863	5,890	3,019	150,772
Direct	-	3,487	4,497	1,759	35,436	2,590	2,222	2,237	894	53,122
Indirect	-	2,850	3,351	934	26,070	2,161	1,401	1,350	850	38,967
Induced	-	4,338	5,276	1,433	38,403	3,415	2,240	2,303	1,275	58,683
Common Infrastructure, Exc. Rail	-	3,296	105	201	5,387	4,623	10,990	305	680	25,587
Direct	-	1,009	31	75	1,748	1,323	3,967	103	184	8,440
Indirect	-	877	29	54	1,514	1,312	2,719	81	198	6,784
Induced	-	1,410	45	72	2,125	1,988	4,304	121	298	10,363
Total	4,736	71,615	48,666	27,183	425,639	84,612	65,869	140,391	24,285	892,996
Direct	1,640	20,232	15,037	10,674	119,606	21,681	22,463	41,101	6,281	258,715
Indirect	1,209	23,328	14,501	7,209	147,545	29,120	18,923	50,216	8,341	300,392
Induced	1,887	28,055	19,128	9,300	158,488	33,811	24,483	49,074	9,663	333,889

Source: IHS 2013

**Base Case by Transport Mode:
Direct, Indirect and Induced GDP Contribution by US Census Division**

Value Added	Northeast		South			Midwest		West		Total US
	New England	Mid-Atlantic	South Atlantic	East South Central	West South Central	East North Central	West North Central	Mountain	Pacific	
Pipelines	565	5,580	3,289	2,079	32,502	6,965	3,785	12,809	1,438	69,013
Direct	171	1,085	806	693	6,825	1,427	1,000	2,604	262	14,873
Indirect	169	2,267	1,182	669	13,711	2,826	1,390	5,457	611	28,282
Induced	224	2,228	1,301	717	11,965	2,712	1,396	4,749	565	25,858
Rail	-	652	32	24	971	506	952	103	302	3,543
Direct	-	182	9	8	285	141	336	33	85	1,079
Indirect	-	202	10	8	328	162	263	31	94	1,098
Induced	-	268	13	8	358	203	353	39	123	1,366
Marine	2	627	223	-	554	145	-	-	609	2,159
Direct	1	159	70	-	170	44	-	-	173	617
Indirect	1	227	66	-	179	44	-	-	201	717
Induced	1	241	87	-	205	57	-	-	235	825
Processing and Storage	-	1,267	1,346	371	10,893	881	572	602	356	16,288
Direct	-	368	406	135	3,584	274	203	206	99	5,275
Indirect	-	388	390	101	3,247	256	155	158	108	4,802
Induced	-	510	550	135	4,063	351	214	239	149	6,211
Common Infrastructure, Exc. Rail	-	437	11	19	627	519	1,119	33	85	2,850
Direct	-	124	3	7	187	146	396	11	24	898
Indirect	-	131	3	6	207	164	308	10	26	855
Induced	-	182	5	7	232	209	415	13	35	1,097
Total	567	8,563	4,901	2,495	45,547	9,016	6,428	13,547	2,790	93,853
Direct	172	1,918	1,294	844	11,051	2,032	1,935	2,853	644	22,742
Indirect	170	3,216	1,651	784	17,672	3,452	2,116	5,655	1,039	35,754
Induced	225	3,429	1,957	867	16,824	3,532	2,377	5,039	1,107	35,358

Source: IHS 2013

**Base Case by Transport Mode:
Direct, Indirect and Induced Labor Income by US Census Division**

Labor Income	Northeast		South			Midwest		West		Total US
	New England	Mid-Atlantic	South Atlantic	East South Central	West South Central	East North Central	West North Central	Mountain	Pacific	
Pipelines	367	3,531	2,055	1,348	19,905	4,413	2,412	7,924	915	42,870
Direct	128	767	588	522	4,720	1,044	736	1,794	188	10,489
Indirect	107	1,462	737	424	8,511	1,808	886	3,446	397	17,779
Induced	131	1,302	729	402	6,674	1,561	790	2,684	330	14,603
Rail	-	421	20	16	608	324	617	67	196	2,268
Direct	-	139	7	6	216	106	251	25	66	815
Indirect	-	127	6	5	196	102	167	19	60	681
Induced	-	155	7	5	196	116	199	22	71	771
Marine	1	395	142	-	351	93	-	-	387	1,369
Direct	0	118	52	-	128	33	-	-	129	460
Indirect	0	139	41	-	109	28	-	-	125	443
Induced	1	137	49	-	114	32	-	-	133	466
Processing and Storage	-	815	851	248	6,850	560	367	393	231	10,314
Direct	-	273	291	105	2,576	194	145	157	75	3,817
Indirect	-	246	247	66	1,998	164	99	100	69	2,990
Induced	-	296	312	77	2,275	203	122	135	87	3,508
Common Infrastructure, Exc. Rail	-	281	7	13	389	332	725	21	54	1,822
Direct	-	93	2	5	140	109	295	8	18	671
Indirect	-	83	2	4	123	103	195	6	16	531
Induced	-	106	3	4	127	119	235	7	20	619
Total	368	5,442	3,075	1,624	28,102	5,722	4,120	8,404	1,784	58,643
Direct	129	1,389	941	639	7,781	1,486	1,427	1,985	476	16,252
Indirect	108	2,058	1,034	498	10,937	2,204	1,347	3,571	667	22,424
Induced	132	1,995	1,100	488	9,385	2,031	1,346	2,848	641	19,967

Source: IHS 2013

**Base Case by Transport Mode:
Government Revenues**

Government Revenues by Transport Mode	Pipelines	Processing & Storage	Marine	Rail	Common Infra., Exc. Rail	Total US
Federal	9,491.5	2,241.3	297.6	490.1	393.8	12,914.4
Personal	7,877.2	1,872.2	248.2	410.4	329.4	10,737.3
Corporate	1,614.3	369.0	49.4	79.8	64.4	2,177.0
						0.0
State & Local	6,236.8	1,442.5	198.0	321.3	259.9	8,458.5
Personal	1,313.8	315.7	41.9	69.4	55.7	1,796.5
Corporate	4,923.0	1,126.8	156.1	251.9	204.2	6,661.9
Total Government Revenues	15,728.4	3,683.7	495.6	811.4	653.7	21,372.8

Source: IHS 2013

**High Production Case by Energy Class:
Employment Impact by Industry and US Census Division**

Employment	Northeast		South			Midwest		West		Total US
	New England	Mid-Atlantic	South Atlantic	East South Central	West South Central	East North Central	West North Central	Mountain	Pacific	
Natural Gas	4,626	59,418	71,786	38,373	215,236	44,028	17,037	38,617	14,822	503,943
Construction	964	2,958	11,036	8,640	21,219	4,886	1,596	3,762	2,455	57,516
Financial Services	177	2,235	3,133	1,432	9,358	1,842	747	1,832	604	21,360
Information & Professional Services	1,360	15,516	19,845	10,324	54,248	11,487	4,293	10,224	4,189	131,486
Leisure & Other Services	483	6,126	8,559	4,132	24,937	4,951	1,851	4,734	1,688	57,461
Manufacturing	974	23,038	17,797	7,755	70,565	13,979	5,764	11,893	3,610	155,375
Natural Resources	39	684	1,228	722	3,549	643	205	398	246	7,714
Transportation & Utilities	137	2,113	2,756	1,623	8,054	1,739	624	1,404	553	19,003
Wholesale & Retail Trade	407	5,527	6,527	3,147	20,812	4,008	1,681	3,836	1,211	47,156
Misc.	85	1,221	905	598	2,494	493	276	534	266	6,872
NGL and LPG	14	10,097	3,062	7,088	25,115	8,287	2,787	2,282	-	58,732
Construction	3	2,028	552	2,325	5,448	1,603	738	650	-	13,347
Financial Services	-	411	131	267	1,089	350	125	108	-	2,481
Information & Professional Services	6	2,930	916	1,849	6,877	2,401	775	679	-	16,433
Leisure & Other Services	1	1,135	364	777	2,931	957	321	293	-	6,779
Manufacturing	3	1,957	615	777	4,768	1,692	380	199	-	10,391
Natural Resources	-	143	56	128	455	116	38	25	-	961
Transportation & Utilities	-	402	129	248	962	348	109	87	-	2,285
Wholesale & Retail Trade	1	917	255	609	2,287	719	259	210	-	5,257
Misc.	-	174	44	108	298	101	42	31	-	798
Crude Oil and Condensate	-	6,933	226	4,526	276,339	36,382	27,746	137,719	19,099	508,970
Construction	-	1,373	53	171	5,843	1,712	3,330	2,423	1,547	16,452
Financial Services	-	296	10	161	11,676	1,395	1,161	6,408	772	21,879
Information & Professional Services	-	1,943	66	956	62,746	8,596	7,026	35,558	4,662	121,553
Leisure & Other Services	-	794	27	455	31,282	3,802	2,951	16,633	2,119	58,063
Manufacturing	-	1,227	32	1,989	118,181	15,429	8,809	54,007	6,912	206,586
Natural Resources	-	117	5	127	4,643	528	327	1,358	353	7,458
Transportation & Utilities	-	337	9	144	9,983	1,249	968	4,944	652	18,286
Wholesale & Retail Trade	-	724	21	424	28,404	3,237	2,691	14,319	1,721	51,541
Misc.	-	122	3	99	3,581	434	483	2,069	361	7,152
Refineries and Refined Products	-	1,177	324	126	15,799	1,317	4,186	729	1,729	25,387
Construction	-	228	95	44	2,645	364	689	113	252	4,430
Financial Services	-	49	14	5	672	56	175	33	74	1,078
Information & Professional Services	-	332	90	31	4,514	363	1,272	230	478	7,310
Leisure & Other Services	-	134	38	13	1,840	152	456	92	208	2,933
Manufacturing	-	216	37	13	3,641	180	917	142	429	5,575
Natural Resources	-	20	6	3	273	19	49	12	35	417
Transportation & Utilities	-	56	11	4	635	47	209	37	70	1,069
Wholesale & Retail Trade	-	120	29	11	1,389	119	350	60	153	2,231
Misc.	-	22	4	2	190	17	69	10	30	344
Common Infrastructure	-	6,074	197	735	9,933	8,525	21,358	565	2,494	49,881
Construction	-	1,315	43	197	2,355	1,728	5,405	134	475	11,652
Financial Services	-	238	9	28	439	371	951	28	105	2,169
Information & Professional Services	-	1,923	60	209	2,873	2,567	6,592	182	740	15,146
Leisure & Other Services	-	688	25	84	1,217	1,045	2,538	76	310	5,983
Manufacturing	-	894	27	85	1,383	1,414	2,269	49	457	6,578
Natural Resources	-	107	5	22	229	147	280	10	59	859
Transportation & Utilities	-	259	8	35	408	388	1,020	27	96	2,241
Wholesale & Retail Trade	-	533	17	62	926	772	1,984	52	211	4,557
Misc.	-	117	3	13	103	93	319	7	41	696
Total	4,640	83,699	75,595	50,848	542,422	98,539	73,114	179,912	38,144	1,146,913
Construction	967	7,902	11,779	11,377	37,510	10,293	11,758	7,082	4,729	103,397
Financial Services	177	3,229	3,297	1,893	23,234	4,014	3,159	8,409	1,555	48,967
Information & Professional Services	1,366	22,644	20,977	13,369	131,258	25,414	19,958	46,873	10,069	291,928
Leisure & Other Services	484	8,877	9,013	5,461	62,207	10,907	8,117	21,828	4,325	131,219
Manufacturing	977	27,332	18,508	10,619	198,538	32,694	18,139	66,290	11,408	384,505
Natural Resources	39	1,071	1,300	1,002	9,149	1,453	899	1,803	693	17,409
Transportation & Utilities	137	3,167	2,913	2,054	20,042	3,771	2,930	6,499	1,371	42,884
Wholesale & Retail Trade	408	7,821	6,849	4,253	53,818	8,855	6,965	18,477	3,296	110,742
Misc.	85	1,656	959	820	6,666	1,138	1,189	2,651	698	15,862

Source: IHS 2013

**High Production Case by Energy Class:
GDP Contribution by Industry and US Census Division**

Value Added (\$M)	Northeast		South			Midwest		West		Total US
	New England	Mid-Atlantic	South Atlantic	East South Central	West South Central	East North Central	West North Central	Mountain	Pacific	
Natural Gas	560.0	7,037.6	7,286.8	3,616.4	23,014.0	4,657.2	1,584.7	3,708.6	1,743.2	53,208.4
Construction	83.7	286.7	810.8	576.6	1,674.1	407.9	122.4	316.5	247.5	4,526.2
Financial Services	92.2	1,246.2	1,187.3	509.1	3,558.4	697.5	232.7	603.6	260.0	8,386.9
Information & Professional Services	145.9	1,809.8	1,899.1	915.1	5,145.3	1,088.6	382.0	924.1	452.7	12,762.5
Leisure & Other Services	24.4	334.6	398.3	171.5	1,081.2	210.1	73.8	230.5	90.6	2,615.1
Manufacturing	108.6	2,057.3	1,508.3	669.9	6,389.2	1,312.2	430.4	847.7	340.9	13,664.4
Natural Resources	8.5	97.3	122.7	77.0	684.0	115.1	26.6	75.5	35.7	1,242.6
Transportation & Utilities	40.2	435.3	588.3	335.9	1,954.3	357.4	117.8	244.5	146.9	4,220.8
Wholesale & Retail Trade	53.4	726.2	733.4	331.7	2,439.8	449.7	185.6	439.6	154.0	5,513.3
Misc.	3.0	44.1	38.6	29.7	87.8	18.7	13.4	26.5	14.9	276.8
NGL and LPG	1.9	1,181.0	316.2	669.0	2,746.0	911.8	266.3	244.2	-	6,336.5
Construction	0.3	174.2	41.0	156.6	418.4	138.3	54.3	55.4	-	1,038.5
Financial Services	0.3	193.3	50.7	98.4	417.0	141.4	38.0	39.9	-	979.0
Information & Professional Services	0.6	309.8	89.1	166.1	665.3	236.7	67.2	64.9	-	1,599.8
Leisure & Other Services	0.1	57.7	17.7	33.4	130.1	42.7	12.9	15.2	-	309.9
Manufacturing	0.4	209.7	51.7	80.3	471.0	172.9	36.1	19.9	-	1,042.1
Natural Resources	0.0	21.6	5.3	12.3	101.5	17.1	4.9	4.5	-	167.2
Transportation & Utilities	0.1	96.1	30.0	51.2	267.0	77.7	23.1	18.6	-	563.8
Wholesale & Retail Trade	0.2	112.1	28.4	65.6	265.0	81.1	27.5	24.5	-	604.4
Misc.	0.0	6.6	2.2	5.0	10.7	4.0	2.2	1.3	-	32.0
Crude Oil and Condensate	-	817.3	22.5	399.1	29,555.0	3,816.9	2,670.8	13,290.3	2,139.9	52,711.8
Construction	-	106.8	3.5	11.5	482.1	146.8	251.9	225.9	143.0	1,371.5
Financial Services	-	132.9	3.6	57.8	4,764.2	583.4	405.7	2,280.8	329.3	8,557.8
Information & Professional Services	-	196.2	6.0	83.5	6,021.8	859.4	658.9	3,388.6	512.3	11,726.6
Leisure & Other Services	-	37.9	1.2	18.7	1,364.7	165.7	122.7	826.7	113.1	2,650.8
Manufacturing	-	148.4	3.4	143.5	10,700.9	1,390.5	694.3	3,818.8	629.0	17,528.9
Natural Resources	-	23.4	0.4	8.2	739.3	62.6	35.5	207.5	41.8	1,118.7
Transportation & Utilities	-	80.7	1.9	21.2	1,922.4	217.3	177.3	764.2	130.1	3,315.1
Wholesale & Retail Trade	-	87.0	2.3	46.3	3,437.2	374.1	302.8	1,683.8	219.7	6,153.1
Misc.	-	4.1	0.1	8.4	122.4	17.1	21.7	94.0	21.6	289.3
Refineries and Refined Products	-	140.2	33.1	11.3	1,751.0	141.6	417.0	75.9	199.8	2,769.9
Construction	-	18.2	6.8	2.8	203.6	29.6	52.5	9.3	23.3	346.1
Financial Services	-	22.8	5.4	1.6	269.8	22.1	60.2	11.9	29.7	423.4
Information & Professional Services	-	34.3	8.8	2.7	444.5	35.2	116.8	21.5	50.0	713.8
Leisure & Other Services	-	6.5	1.9	0.6	82.6	6.9	19.0	4.7	10.8	133.0
Manufacturing	-	25.8	3.7	1.2	348.2	19.2	77.2	11.4	43.4	530.2
Natural Resources	-	3.9	0.6	0.3	51.6	3.3	5.6	2.1	4.7	72.0
Transportation & Utilities	-	13.3	2.6	0.9	184.2	11.1	45.2	7.8	17.4	282.5
Wholesale & Retail Trade	-	14.5	3.2	1.1	159.8	13.7	37.3	6.8	18.7	255.1
Misc.	-	0.8	0.2	0.1	6.7	0.6	3.1	0.5	1.8	13.8
Common Infrastructure	-	804.8	20.8	71.2	1,156.9	957.5	2,172.6	60.9	311.3	5,555.9
Construction	-	121.4	3.0	12.3	175.0	140.7	396.2	10.6	47.7	906.9
Financial Services	-	138.8	3.4	10.0	175.4	149.1	319.7	9.7	47.5	853.7
Information & Professional Services	-	227.1	5.8	18.4	284.6	250.9	600.7	16.8	82.3	1,486.7
Leisure & Other Services	-	39.5	1.2	3.5	54.7	46.5	106.0	3.9	17.5	272.9
Manufacturing	-	109.0	2.8	9.1	155.7	157.2	232.9	5.2	51.2	723.1
Natural Resources	-	18.0	0.5	2.4	67.5	24.8	31.8	1.8	7.4	154.1
Transportation & Utilities	-	77.5	2.2	8.0	131.8	98.0	256.6	6.6	27.9	608.6
Wholesale & Retail Trade	-	69.3	1.9	6.6	108.8	86.7	215.6	5.9	27.3	522.1
Misc.	-	4.1	0.1	0.9	3.4	3.5	13.2	0.3	2.4	27.9
Total	561.9	9,980.9	7,679.4	4,766.9	58,223.0	10,485.2	7,111.3	17,379.9	4,394.1	120,582.6
Construction	84.0	707.3	865.0	759.8	2,953.1	863.3	877.3	617.8	461.5	8,189.1
Financial Services	92.5	1,734.0	1,250.4	676.9	9,184.8	1,593.6	1,056.3	2,945.9	666.5	19,200.8
Information & Professional Services	146.4	2,577.2	2,008.7	1,185.8	12,561.5	2,470.8	1,825.6	4,416.0	1,097.3	28,289.4
Leisure & Other Services	24.5	476.2	420.3	227.6	2,713.3	471.9	334.6	1,081.1	232.1	5,981.6
Manufacturing	108.9	2,550.3	1,569.9	904.1	18,065.1	3,052.1	1,470.8	4,702.9	1,064.5	33,488.7
Natural Resources	8.5	164.2	129.5	100.1	1,644.0	222.9	104.3	291.4	89.6	2,754.6
Transportation & Utilities	40.3	703.0	625.0	417.2	4,459.7	761.4	620.0	1,041.7	322.3	8,990.7
Wholesale & Retail Trade	53.6	1,009.1	769.2	451.3	6,410.6	1,005.2	768.8	2,160.6	419.7	13,048.0
Misc.	3.0	59.6	41.3	44.2	230.9	43.9	53.6	122.6	40.7	639.8

Source: IHS 2013

**High Production Case by Energy Class:
Labor Income Impact by Industry and US Census Division**

Labor Income (\$M)	Northeast		South			Midwest		West		Total US
	New England	Mid-Atlantic	South Atlantic	East South Central	West South Central	East North Central	West North Central	Mountain	Pacific	
Natural Gas	364.8	4,456.0	4,585.2	2,341.2	14,229.5	2,946.1	1,000.8	2,321.6	1,122.0	33,367.2
Construction	69.9	240.9	673.8	480.1	1,392.4	339.9	102.1	263.8	206.1	3,769.0
Financial Services	35.6	515.1	386.2	161.8	1,159.6	241.1	82.0	195.9	89.8	2,867.1
Information & Professional Services	116.8	1,379.9	1,501.6	763.8	4,041.7	865.5	293.7	706.7	358.7	10,028.4
Leisure & Other Services	17.3	231.9	271.6	119.3	739.1	144.5	51.3	155.4	60.4	1,790.8
Manufacturing	69.7	1,346.1	968.2	425.7	4,210.3	862.8	284.4	568.1	223.4	8,958.8
Natural Resources	3.5	44.5	57.5	33.2	269.0	43.7	8.6	28.7	15.8	504.5
Transportation & Utilities	16.9	220.0	261.4	138.8	885.0	166.8	58.1	125.0	62.8	1,934.9
Wholesale & Retail Trade	31.5	425.1	434.0	196.8	1,447.8	265.8	109.4	258.0	90.8	3,259.2
Misc.	3.6	52.4	31.0	21.6	84.5	15.9	11.1	20.0	14.2	254.4
NGL and LPG	1.3	761.3	199.9	444.5	1,731.2	588.3	174.2	159.3	-	4,060.0
Construction	0.2	144.8	34.0	130.2	347.2	115.0	45.1	45.9	-	862.4
Financial Services	0.1	70.0	16.7	30.9	133.6	49.8	12.7	12.8	-	326.6
Information & Professional Services	0.4	248.0	71.7	137.5	539.9	191.7	54.1	51.6	-	1,294.9
Leisure & Other Services	0.1	39.8	12.0	23.2	88.6	29.4	8.9	10.2	-	212.1
Manufacturing	0.2	134.1	32.3	51.8	302.3	111.0	23.7	13.3	-	668.6
Natural Resources	0.0	9.7	2.6	5.6	39.7	6.9	1.6	1.8	-	67.9
Transportation & Utilities	0.1	42.3	12.1	22.7	112.2	33.2	10.1	8.2	-	240.7
Wholesale & Retail Trade	0.1	66.0	16.8	39.0	157.5	47.8	16.3	14.4	-	357.8
Misc.	0.0	6.7	1.7	3.8	10.4	3.5	1.8	1.1	-	29.0
Crude Oil and Condensate	-	514.7	14.4	248.9	18,141.4	2,412.2	1,700.3	8,223.8	1,361.7	32,617.6
Construction	-	88.8	2.9	9.8	407.9	123.4	210.0	195.1	119.7	1,157.7
Financial Services	-	48.4	1.2	19.8	1,639.1	219.5	150.6	794.7	120.3	2,993.6
Information & Professional Services	-	155.2	4.8	64.5	4,523.3	661.4	506.6	2,521.8	383.1	8,820.9
Leisure & Other Services	-	26.4	0.9	13.1	938.0	114.6	85.8	559.5	75.3	1,813.6
Manufacturing	-	95.6	2.1	92.5	7,154.6	916.8	447.4	2,576.2	425.8	11,711.0
Natural Resources	-	10.0	0.2	3.9	299.5	25.1	12.3	84.4	19.2	454.7
Transportation & Utilities	-	35.2	0.8	12.4	1,013.7	115.7	89.4	431.2	67.8	1,766.1
Wholesale & Retail Trade	-	51.2	1.3	27.4	2,036.7	220.6	178.4	986.5	129.4	3,631.6
Misc.	-	3.9	0.1	5.6	128.6	15.1	19.8	74.4	20.9	268.4
Refineries and Refined Products	-	88.6	21.4	7.5	1,095.5	92.6	266.8	47.8	126.8	1,746.9
Construction	-	15.2	5.6	2.3	169.1	24.6	43.7	7.8	19.4	287.7
Financial Services	-	8.5	1.7	0.5	88.2	7.5	21.5	3.9	10.1	141.9
Information & Professional Services	-	27.1	7.0	2.3	363.7	28.4	95.5	17.4	39.2	580.6
Leisure & Other Services	-	4.5	1.3	0.4	56.6	4.7	13.3	3.2	7.2	91.2
Manufacturing	-	16.5	2.3	0.8	221.7	12.5	48.4	7.3	28.7	338.2
Natural Resources	-	1.7	0.3	0.1	20.9	1.3	2.0	0.9	2.0	29.2
Transportation & Utilities	-	5.8	1.1	0.4	74.0	5.0	17.7	3.1	7.6	114.6
Wholesale & Retail Trade	-	8.5	1.9	0.7	94.9	8.1	22.0	4.0	11.0	151.1
Misc.	-	0.8	0.2	0.1	6.3	0.6	2.7	0.4	1.6	12.6
Common Infrastructure	-	517.7	13.1	46.0	717.5	611.3	1,406.9	38.7	199.8	3,550.9
Construction	-	100.9	2.5	10.3	145.2	117.0	329.0	8.8	39.7	753.3
Financial Services	-	53.1	1.1	3.0	53.4	49.1	105.4	2.9	15.6	283.6
Information & Professional Services	-	183.8	4.7	15.6	234.7	206.5	494.6	13.7	65.4	1,219.0
Leisure & Other Services	-	27.1	0.8	2.4	37.1	31.8	73.4	2.6	11.5	186.8
Manufacturing	-	68.0	1.8	5.9	100.0	102.1	153.0	3.5	34.1	468.4
Natural Resources	-	8.3	0.2	1.1	26.1	10.4	12.5	0.7	3.5	62.8
Transportation & Utilities	-	31.1	0.9	3.1	53.0	40.0	100.2	2.6	11.7	242.5
Wholesale & Retail Trade	-	40.7	1.1	3.9	64.8	51.4	127.6	3.5	16.1	309.1
Misc.	-	4.7	0.1	0.6	3.2	3.0	11.3	0.2	2.2	25.4
Total	366.1	6,338.3	4,834.1	3,088.1	35,915.1	6,650.5	4,549.1	10,791.1	2,810.3	75,342.7
Construction	70.1	590.6	718.8	632.7	2,461.8	720.0	729.9	521.2	385.0	6,830.2
Financial Services	35.8	695.0	406.8	216.0	3,073.9	566.9	372.3	1,010.3	235.8	6,612.8
Information & Professional Services	117.2	1,994.0	1,589.8	983.7	9,703.3	1,953.6	1,444.5	3,311.3	846.4	21,943.8
Leisure & Other Services	17.3	329.8	286.5	158.3	1,859.4	325.1	232.7	730.8	154.4	4,094.4
Manufacturing	70.0	1,660.3	1,006.7	576.6	11,988.9	2,005.1	956.8	3,168.3	712.1	22,145.0
Natural Resources	3.6	74.1	60.9	44.0	655.2	87.4	37.0	116.5	40.5	1,119.1
Transportation & Utilities	17.0	334.3	276.3	177.4	2,137.9	360.6	275.4	570.1	149.9	4,298.9
Wholesale & Retail Trade	31.6	591.5	455.2	267.8	3,801.7	593.7	453.6	1,266.4	247.3	7,708.8
Misc.	3.6	68.5	33.0	31.6	233.1	38.1	46.7	96.1	38.9	589.7

Source: IHS 2013

**High Production Case by Energy Class:
Direct, Indirect and Induced Employment by US Census Division**

Employment	Northeast		South			Midwest		West		Total US
	New England	Mid-Atlantic	South Atlantic	East South Central	West South Central	East North Central	West North Central	Mountain	Pacific	
Natural Gas	4,626	59,418	71,786	38,373	215,236	44,028	17,037	38,617	14,822	503,943
Direct	1,607	16,161	22,538	15,539	65,214	11,832	5,588	12,347	4,634	155,460
Indirect	1,179	20,567	21,059	9,417	69,422	14,656	5,454	12,638	4,157	158,549
Induced	1,840	22,690	28,189	13,417	80,600	17,540	5,995	13,632	6,031	189,934
NGL and LPG	14	10,097	3,062	7,088	25,115	8,287	2,787	2,282	-	58,732
Direct	5	3,206	1,047	2,813	8,652	2,528	1,007	799	-	20,057
Indirect	3	2,774	788	1,749	6,780	2,220	698	557	-	15,569
Induced	6	4,117	1,227	2,526	9,683	3,539	1,082	926	-	23,106
Crude Oil and Condensate	-	6,933	226	4,526	276,339	36,382	27,746	137,719	19,099	508,970
Direct	-	1,952	70	1,405	69,659	7,732	8,748	39,175	4,464	133,205
Indirect	-	2,164	63	1,664	104,485	14,729	9,003	50,636	7,250	189,994
Induced	-	2,817	93	1,457	102,195	13,921	9,995	47,908	7,385	185,771
Refineries and Refined Products	-	1,177	324	126	15,799	1,317	4,186	729	1,729	25,387
Direct	-	333	115	54	5,419	441	1,596	268	479	8,705
Indirect	-	362	82	31	4,230	343	981	182	529	6,740
Induced	-	482	127	41	6,150	533	1,609	279	721	9,942
Common Infrastructure	-	6,074	197	735	9,933	8,525	21,358	565	2,494	49,881
Direct	-	1,862	59	278	3,227	2,441	7,716	193	680	16,456
Indirect	-	1,614	55	193	2,787	2,420	5,279	147	725	13,220
Induced	-	2,598	83	264	3,919	3,664	8,363	225	1,089	20,205
Total	4,640	83,699	75,595	50,848	542,422	98,539	73,114	179,912	38,144	1,146,913
Direct	1,612	23,514	23,829	20,089	152,171	24,974	24,655	52,782	10,257	333,883
Indirect	1,182	27,481	22,047	13,054	187,704	34,368	21,415	64,160	12,661	384,072
Induced	1,846	32,704	29,719	17,705	202,547	39,197	27,044	62,970	15,226	428,958

Source: IHS 2013

**High Production Case by Energy Class:
Direct, Indirect and Induced GDP Contribution by US Census Division**

Value Added Contribution to GDP (\$M)	Northeast		South			Midwest		West		Total US
	New England	Mid-Atlantic	South Atlantic	East South Central	West South Central	East North Central	West North Central	Mountain	Pacific	
Natural Gas	560	7,038	7,287	3,616	23,014	4,657	1,585	3,709	1,743	53,208
Direct	171	1,415	1,966	1,322	6,218	1,126	426	939	519	14,103
Indirect	168	2,813	2,426	1,033	8,311	1,730	593	1,396	526	18,995
Induced	222	2,810	2,894	1,262	8,485	1,802	565	1,374	698	20,111
NGL and LPG	2	1,181	316	669	2,746	912	266	244	-	6,337
Direct	1	334	96	232	853	263	89	78	-	1,946
Indirect	1	373	92	195	866	273	76	67	-	1,945
Induced	1	474	128	241	1,027	375	101	98	-	2,445
Crude Oil and Condensate	-	817	23	399	29,555	3,817	2,671	13,290	2,140	52,712
Direct	-	203	6	87	6,150	623	663	2,612	409	10,753
Indirect	-	301	7	173	12,448	1,718	1,012	5,730	891	22,280
Induced	-	313	9	139	10,957	1,476	996	4,948	840	19,678
Refineries and Refined Products	-	140	33	11	1,751	142	417	76	200	2,770
Direct	-	35	10	4	563	43	149	26	54	883
Indirect	-	51	10	3	531	43	111	21	66	835
Induced	-	55	13	4	658	56	158	29	80	1,052
Common Infrastructure	-	805	21	71	1,157	958	2,173	61	311	5,556
Direct	-	228	6	25	345	269	768	20	89	1,750
Indirect	-	242	6	22	384	303	599	18	94	1,668
Induced	-	335	9	24	428	385	805	23	128	2,138
Total	562	9,981	7,679	4,767	58,223	10,485	7,111	17,380	4,394	120,583
Direct	171	2,214	2,084	1,670	14,129	2,324	2,095	3,676	1,072	29,435
Indirect	168	3,781	2,542	1,426	22,540	4,067	2,391	7,232	1,576	45,723
Induced	222	3,986	3,054	1,671	21,555	4,094	2,625	6,472	1,746	45,425

Source: IHS 2013

**High Production Case by Energy Class:
Direct, Indirect and Induced Labor Income by US Census Division**

Labor Income (\$M)	Northeast		South			Midwest		West		Total US
	New England	Mid-Atlantic	South Atlantic	East South Central	West South Central	East North Central	West North Central	Mountain	Pacific	
Natural Gas	365	4,456	4,585	2,341	14,229	2,946	1,001	2,322	1,122	33,367
Direct	128	995	1,441	965	4,401	815	305	679	384	10,114
Indirect	107	1,817	1,517	659	5,113	1,100	376	873	335	11,896
Induced	130	1,644	1,627	717	4,715	1,031	320	770	403	11,357
NGL and LPG	1	761	200	444	1,731	588	174	159	-	4,060
Direct	0	254	69	183	635	197	69	62	-	1,469
Indirect	0	235	58	125	526	174	48	42	-	1,210
Induced	0	273	72	137	570	217	57	55	-	1,381
Crude Oil and Condensate	-	515	14	249	18,141	2,412	1,700	8,224	1,362	32,618
Direct	-	151	5	60	4,256	445	488	1,789	297	7,492
Indirect	-	185	5	111	7,749	1,109	648	3,630	576	14,013
Induced	-	179	5	78	6,136	858	564	2,805	488	11,113
Refineries and Refined Products	-	89	21	8	1,095	93	267	48	127	1,747
Direct	-	26	8	3	401	34	105	18	39	634
Indirect	-	31	6	2	326	27	71	13	41	519
Induced	-	31	7	2	368	32	90	16	46	594
Common Infrastructure	-	518	13	46	717	611	1,407	39	200	3,551
Direct	-	171	4	19	257	202	572	15	67	1,307
Indirect	-	152	4	14	227	190	379	11	59	1,036
Induced	-	194	5	14	233	220	455	13	73	1,207
Total	366	6,338	4,834	3,088	35,915	6,650	4,549	10,791	2,810	75,343
Direct	129	1,597	1,527	1,230	9,951	1,692	1,540	2,563	788	21,016
Indirect	107	2,420	1,590	910	13,942	2,600	1,523	4,569	1,012	28,674
Induced	131	2,321	1,717	947	12,022	2,358	1,486	3,659	1,011	25,652

Source: IHS 2013

**High Production Case by Energy Class:
Government Revenues**

Government Revenues by Energy Type (\$M)	Natural Gas	NGL & LPG	Oil	Refined	Common Infrastructure	Total US
Federal	7,321.4	877.2	7,243.3	380.5	767.7	16,590.1
Personal	6,096.2	735.9	6,002.0	317.2	642.1	13,793.4
Corporate	1,225.2	141.3	1,241.3	63.3	125.6	2,796.7
						0.0
State & Local	4,758.4	561.2	4,789.0	247.3	506.7	10,862.6
Personal	1,022.0	124.2	999.8	53.5	108.6	2,308.1
Corporate	3,736.5	436.9	3,789.3	193.8	398.0	8,554.5
Total Government Revenue	12,079.9	1,438.4	12,032.3	627.8	1,274.4	27,452.8

Source: IHS 2013

**High Production Case by Transport Mode:
Employment Impact by Industry and US Census Division**

Employment	Northeast		South			Midwest		West		Total US
	New England	Mid-Atlantic	South Atlantic	East South Central	West South Central	East North Central	West North Central	Mountain	Pacific	
Pipelines	4,626	53,633	56,054	24,408	385,385	75,771	45,098	169,843	15,960	830,778
Construction	964	2,058	8,136	5,627	7,327	6,326	5,126	4,383	924	40,871
Financial Services	177	2,017	2,464	908	16,473	3,040	1,922	7,955	610	35,566
Information & Professional Services	1,360	13,702	15,089	5,998	86,954	18,588	11,395	43,910	3,760	200,756
Leisure & Other Services	483	5,523	6,688	2,615	43,947	8,210	4,839	20,596	1,673	94,574
Manufacturing	974	21,715	14,732	5,327	165,628	28,085	14,523	65,078	6,546	322,608
Natural Resources	39	609	952	525	6,491	1,096	534	1,692	291	12,229
Transportation & Utilities	137	1,851	2,080	872	13,895	2,700	1,591	6,110	486	29,722
Wholesale & Retail Trade	407	5,055	5,212	2,136	39,841	6,854	4,405	17,602	1,359	82,871
Misc.	85	1,103	701	400	4,829	872	763	2,517	311	11,581
Rail	-	5,350	312	427	8,890	4,605	10,047	1,013	3,099	33,743
Construction	-	1,153	71	116	2,155	941	2,540	254	623	7,853
Financial Services	-	213	13	16	393	200	448	49	132	1,464
Information & Professional Services	-	1,633	92	120	2,482	1,374	3,087	312	897	9,997
Leisure & Other Services	-	601	39	49	1,077	561	1,193	132	378	4,030
Manufacturing	-	861	44	50	1,285	771	1,083	95	564	4,753
Natural Resources	-	85	7	12	190	79	133	14	59	579
Transportation & Utilities	-	222	13	19	362	208	478	45	117	1,464
Wholesale & Retail Trade	-	482	29	37	851	420	935	98	275	3,127
Misc.	-	100	4	8	95	51	150	14	54	476
Marine	14	7,763	2,836	-	7,229	2,029	-	-	7,692	27,563
Construction	3	1,524	678	-	1,687	442	-	-	1,432	5,766
Financial Services	-	332	126	-	316	88	-	-	353	1,215
Information & Professional Services	6	2,185	886	-	2,054	618	-	-	2,137	7,886
Leisure & Other Services	1	891	349	-	858	241	-	-	970	3,310
Manufacturing	3	1,370	318	-	1,114	297	-	-	1,433	4,535
Natural Resources	-	132	51	-	130	31	-	-	148	492
Transportation & Utilities	-	384	133	-	298	101	-	-	337	1,253
Wholesale & Retail Trade	1	808	258	-	682	187	-	-	758	2,694
Misc.	-	137	37	-	90	24	-	-	124	412
Processing and Storage	-	13,615	16,286	25,610	135,453	11,443	6,224	8,747	10,022	227,400
Construction	-	2,444	2,871	5,525	25,045	1,634	1,119	2,372	1,489	42,499
Financial Services	-	536	690	954	5,811	483	266	390	402	9,532
Information & Professional Services	-	4,067	4,878	7,136	38,187	3,422	1,851	2,551	2,868	64,960
Leisure & Other Services	-	1,484	1,923	2,751	15,655	1,320	689	1,058	1,134	26,014
Manufacturing	-	2,895	3,399	5,195	29,750	2,763	1,286	1,091	2,613	48,992
Natural Resources	-	186	287	453	2,213	165	78	91	163	3,636
Transportation & Utilities	-	568	682	1,145	5,262	547	301	330	378	9,213
Wholesale & Retail Trade	-	1,183	1,340	2,046	11,935	970	534	748	789	19,545
Misc.	-	252	216	405	1,595	139	100	116	186	3,009
Common Infrastructure, Exc. Rail	-	3,338	107	403	5,465	4,691	11,745	309	1,371	27,429
Construction	-	723	23	109	1,296	950	2,973	73	261	6,408
Financial Services	-	131	4	15	241	203	523	15	58	1,190
Information & Professional Services	-	1,057	32	115	1,581	1,412	3,625	100	407	8,329
Leisure & Other Services	-	378	14	46	670	575	1,396	42	170	3,291
Manufacturing	-	491	15	47	761	778	1,247	26	252	3,617
Natural Resources	-	59	3	12	125	82	154	6	32	473
Transportation & Utilities	-	142	5	18	225	215	560	14	53	1,232
Wholesale & Retail Trade	-	293	10	34	509	424	1,091	29	115	2,505
Misc.	-	64	1	7	57	52	176	4	23	384
Total	4,640	83,699	75,595	50,848	542,422	98,539	73,114	179,912	38,144	1,146,913
Construction	967	7,902	11,779	11,377	37,510	10,293	11,758	7,082	4,729	103,397
Financial Services	177	3,229	3,297	1,893	23,234	4,014	3,159	8,409	1,555	48,967
Information & Professional Services	1,366	22,644	20,977	13,369	131,258	25,414	19,958	46,873	10,069	291,928
Leisure & Other Services	484	8,877	9,013	5,461	62,207	10,907	8,117	21,828	4,325	131,219
Manufacturing	977	27,332	18,508	10,619	198,538	32,694	18,139	66,290	11,408	384,505
Natural Resources	39	1,071	1,300	1,002	9,149	1,453	899	1,803	693	17,409
Transportation & Utilities	137	3,167	2,913	2,054	20,042	3,771	2,930	6,499	1,371	42,884
Wholesale & Retail Trade	408	7,821	6,849	4,253	53,818	8,855	6,965	18,477	3,296	110,742
Misc.	85	1,656	959	820	6,666	1,138	1,189	2,651	698	15,862

Source: IHS 2013

**High Production Case by Transport Mode:
GDP Contribution by Industry and US Census Division**

Value Added (\$M)	Northeast		South			Midwest		West		Total US
	New England	Mid-Atlantic	South Atlantic	East South Central	West South Central	East North Central	West North Central	Mountain	Pacific	
Pipelines	560.0	6,325.9	5,670.3	2,258.7	40,867.9	8,001.8	4,293.2	16,349.8	1,805.7	86,133.3
Construction	83.7	205.6	600.2	370.4	629.2	541.8	391.4	394.9	97.6	3,314.8
Financial Services	92.2	1,126.4	928.4	320.5	6,534.3	1,214.4	644.8	2,781.6	278.6	13,921.1
Information & Professional Services	145.9	1,605.4	1,439.6	526.4	8,221.8	1,815.8	1,049.5	4,140.9	436.8	19,382.1
Leisure & Other Services	24.4	302.1	310.2	107.5	1,905.0	355.2	198.6	1,019.9	93.3	4,316.2
Manufacturing	108.6	1,927.3	1,245.0	456.9	14,881.7	2,576.4	1,123.0	4,600.5	568.5	27,487.9
Natural Resources	8.5	86.4	95.9	53.1	1,070.7	167.9	62.4	272.4	35.3	1,852.8
Transportation & Utilities	40.2	365.7	431.3	171.7	2,656.9	511.4	295.5	960.5	97.7	5,530.9
Wholesale & Retail Trade	53.4	667.1	589.9	229.0	4,800.6	785.1	492.8	2,062.0	179.5	9,859.3
Misc.	3.0	39.9	29.9	23.3	167.6	33.8	35.3	117.0	18.4	468.2
Rail	-	672.9	31.9	40.6	987.9	511.8	1,017.7	103.7	373.0	3,739.5
Construction	-	102.7	4.9	7.2	155.4	75.9	185.6	19.3	60.4	611.3
Financial Services	-	114.1	5.2	5.7	149.6	79.5	149.4	16.5	57.1	577.1
Information & Professional Services	-	184.1	8.6	10.4	237.8	133.2	280.4	27.7	95.9	978.1
Leisure & Other Services	-	32.6	1.8	2.0	46.8	24.7	49.7	6.4	20.3	184.3
Manufacturing	-	101.2	4.6	5.4	142.4	85.8	110.8	10.3	64.6	525.0
Natural Resources	-	13.8	0.7	1.3	50.2	13.0	15.1	2.6	7.4	104.2
Transportation & Utilities	-	59.8	2.9	4.3	104.4	50.9	119.2	9.6	29.5	380.6
Wholesale & Retail Trade	-	61.0	3.1	3.8	98.1	46.9	101.3	10.8	34.8	359.8
Misc.	-	3.6	0.2	0.5	3.1	1.9	6.3	0.6	3.0	19.2
Marine	1.9	916.3	291.7	-	789.0	217.8	-	-	883.1	3,099.8
Construction	0.3	118.4	46.1	-	124.8	34.5	-	-	126.1	450.1
Financial Services	0.3	148.4	46.7	-	119.4	33.1	-	-	130.4	478.3
Information & Professional Services	0.6	220.8	82.8	-	196.6	58.0	-	-	206.8	765.5
Leisure & Other Services	0.1	42.4	15.8	-	37.4	10.0	-	-	47.0	152.7
Manufacturing	0.4	165.1	33.2	-	118.1	32.5	-	-	168.7	517.9
Natural Resources	0.0	26.6	5.4	-	29.6	5.1	-	-	24.3	91.2
Transportation & Utilities	0.1	93.1	32.4	-	82.1	23.6	-	-	82.4	313.7
Wholesale & Retail Trade	0.2	97.1	27.8	-	78.0	20.1	-	-	90.7	313.8
Misc.	0.0	4.5	1.4	-	3.2	0.8	-	-	6.7	16.7
Processing and Storage	-	1,623.1	1,674.0	2,428.5	14,941.8	1,227.1	605.5	892.9	1,161.2	24,554.2
Construction	-	214.0	212.2	375.5	1,947.4	133.7	82.4	197.8	151.2	3,314.2
Financial Services	-	268.7	268.3	345.3	2,285.0	184.6	86.2	142.5	174.2	3,754.8
Information & Professional Services	-	442.0	474.6	638.9	3,748.8	325.8	165.4	238.0	312.5	6,346.0
Leisure & Other Services	-	77.3	91.9	116.3	694.1	56.4	28.0	52.6	61.8	1,178.3
Manufacturing	-	296.8	285.5	436.8	2,837.3	270.9	109.0	89.3	234.6	4,560.1
Natural Resources	-	27.4	27.3	44.4	456.3	23.1	9.3	15.3	18.5	621.7
Transportation & Utilities	-	141.7	157.2	236.8	1,543.8	121.6	64.2	67.9	97.4	2,430.7
Wholesale & Retail Trade	-	145.8	147.3	214.9	1,374.1	105.5	56.2	84.5	99.6	2,227.9
Misc.	-	9.4	9.7	19.8	55.1	5.4	4.8	4.9	11.3	120.4
Common Infrastructure, Exc. Rail	-	442.6	11.4	39.2	636.3	526.6	1,194.9	33.5	171.2	3,055.8
Construction	-	66.8	1.7	6.8	96.2	77.4	217.9	5.8	26.2	498.8
Financial Services	-	76.3	1.9	5.5	96.5	82.0	175.8	5.4	26.1	469.5
Information & Professional Services	-	124.9	3.2	10.1	156.5	138.0	330.4	9.3	45.3	817.7
Leisure & Other Services	-	21.7	0.7	1.9	30.1	25.6	58.3	2.2	9.6	150.1
Manufacturing	-	59.9	1.5	5.0	85.6	86.5	128.1	2.9	28.2	397.7
Natural Resources	-	9.9	0.3	1.3	37.1	13.6	17.5	1.0	4.1	84.8
Transportation & Utilities	-	42.6	1.2	4.4	72.5	53.9	141.1	3.6	15.4	334.7
Wholesale & Retail Trade	-	38.1	1.0	3.6	59.9	47.7	118.6	3.2	15.0	287.1
Misc.	-	2.2	0.1	0.5	1.9	1.9	7.3	0.2	1.3	15.3
Total	561.9	9,980.9	7,679.4	4,766.9	58,223.0	10,485.2	7,111.3	17,379.9	4,394.1	120,582.6
Construction	84.0	707.3	865.0	759.8	2,953.1	863.3	877.3	617.8	461.5	8,189.1
Financial Services	92.5	1,734.0	1,250.4	676.9	9,184.8	1,593.6	1,056.3	2,945.9	666.5	19,200.8
Information & Professional Services	146.4	2,577.2	2,008.7	1,185.8	12,561.5	2,470.8	1,825.6	4,416.0	1,097.3	28,289.4
Leisure & Other Services	24.5	476.2	420.3	227.6	2,713.3	471.9	334.6	1,081.1	232.1	5,981.6
Manufacturing	108.9	2,550.3	1,569.9	904.1	18,065.1	3,052.1	1,470.8	4,702.9	1,064.5	33,488.7
Natural Resources	8.5	164.2	129.5	100.1	1,644.0	222.9	104.3	291.4	89.6	2,754.6
Transportation & Utilities	40.3	703.0	625.0	417.2	4,459.7	761.4	620.0	1,041.7	322.3	8,990.7
Wholesale & Retail Trade	53.6	1,009.1	769.2	451.3	6,410.6	1,005.2	768.8	2,160.6	419.7	13,048.0
Misc.	3.0	59.6	41.3	44.2	230.9	43.9	53.6	122.6	40.7	639.8

Source: IHS 2013

**High Production Case by Transport Mode:
Labor Income Impact by Industry and US Census Division**

Labor Income (\$M)	Northeast		South			Midwest		West		Total US
	New England	Mid-Atlantic	South Atlantic	East South Central	West South Central	East North Central	West North Central	Mountain	Pacific	
Pipelines	364.8	3,999.9	3,562.0	1,464.6	25,027.0	5,066.7	2,728.2	10,119.5	1,150.6	53,483.3
Construction	69.9	173.4	498.8	308.3	532.8	452.5	326.3	336.4	81.9	2,780.3
Financial Services	35.6	466.9	300.2	100.8	2,210.8	438.4	235.0	957.2	104.6	4,849.5
Information & Professional Services	116.8	1,214.0	1,130.2	432.2	6,162.2	1,415.5	806.7	3,090.2	323.9	14,691.7
Leisure & Other Services	17.3	209.3	211.3	74.5	1,306.4	244.7	138.5	689.5	62.2	2,953.5
Manufacturing	69.7	1,266.0	804.7	294.0	9,961.4	1,698.5	730.9	3,102.1	383.9	18,311.2
Natural Resources	3.5	39.4	44.7	23.1	430.1	65.3	21.0	108.8	16.7	752.8
Transportation & Utilities	16.9	192.6	198.9	79.3	1,407.4	258.8	148.1	535.2	52.9	2,890.1
Wholesale & Retail Trade	31.5	390.6	349.2	136.0	2,845.2	463.5	290.4	1,208.5	105.6	5,820.5
Misc.	3.6	47.7	24.0	16.3	170.8	29.6	31.2	91.6	19.0	433.7
Rail	-	434.0	20.3	26.3	618.1	327.4	659.1	66.8	241.7	2,393.6
Construction	-	85.3	4.1	6.0	128.9	63.1	154.1	16.0	50.3	507.8
Financial Services	-	43.1	1.6	1.7	46.1	26.3	49.3	5.1	19.2	192.3
Information & Professional Services	-	148.4	7.0	8.8	194.8	109.4	230.7	22.5	75.9	797.4
Leisure & Other Services	-	22.5	1.2	1.4	31.9	17.0	34.4	4.3	13.5	126.1
Manufacturing	-	63.7	3.0	3.5	92.1	55.8	72.8	6.9	43.0	340.8
Natural Resources	-	6.3	0.3	0.6	19.4	5.4	5.9	1.1	3.4	42.4
Transportation & Utilities	-	25.0	1.2	1.7	43.6	21.1	46.7	4.1	13.1	156.6
Wholesale & Retail Trade	-	35.8	1.8	2.3	58.4	27.8	59.9	6.4	20.6	212.9
Misc.	-	3.9	0.1	0.3	2.9	1.6	5.4	0.4	2.7	17.3
Marine	1.3	576.2	185.9	-	499.5	140.1	-	-	561.0	1,964.1
Construction	0.2	98.4	38.3	-	103.6	28.7	-	-	105.0	374.2
Financial Services	0.1	54.0	14.9	-	38.4	11.2	-	-	42.2	160.9
Information & Professional Services	0.4	174.9	67.9	-	160.7	48.0	-	-	163.4	615.2
Leisure & Other Services	0.1	29.6	10.9	-	25.6	6.9	-	-	31.2	104.2
Manufacturing	0.2	106.3	21.1	-	76.5	21.2	-	-	113.8	339.1
Natural Resources	0.0	11.4	2.6	-	11.5	2.0	-	-	9.7	37.1
Transportation & Utilities	0.1	40.1	12.6	-	34.1	9.5	-	-	36.4	132.8
Wholesale & Retail Trade	0.1	57.1	16.5	-	46.3	11.9	-	-	53.7	185.6
Misc.	0.0	4.4	1.1	-	2.9	0.7	-	-	5.7	14.9
Processing and Storage	-	1,043.5	1,058.7	1,571.9	9,375.9	780.1	388.0	583.6	747.1	15,548.7
Construction	-	178.0	176.3	312.8	1,616.6	111.4	68.5	163.9	126.1	2,753.6
Financial Services	-	101.9	89.4	111.9	749.3	64.0	30.1	46.4	61.3	1,254.2
Information & Professional Services	-	355.6	382.3	534.1	3,056.6	267.2	135.0	191.0	247.3	5,169.0
Leisure & Other Services	-	53.5	62.7	81.1	475.1	39.0	19.5	35.6	41.2	807.8
Manufacturing	-	186.9	177.0	275.8	1,803.9	173.5	69.0	57.4	152.6	2,896.2
Natural Resources	-	12.5	13.1	19.6	179.8	9.1	3.2	6.2	8.7	252.3
Transportation & Utilities	-	59.5	63.0	94.7	623.7	49.2	25.5	29.4	41.0	986.0
Wholesale & Retail Trade	-	85.6	87.0	127.3	816.1	62.2	33.1	49.6	58.6	1,319.7
Misc.	-	9.9	7.7	14.6	54.7	4.6	4.0	4.0	10.3	109.8
Common Infrastructure, Exc. Rail	-	284.7	7.2	25.3	394.6	336.2	773.8	21.3	109.9	1,953.0
Construction	-	55.5	1.4	5.6	79.8	64.4	181.0	4.8	21.8	414.3
Financial Services	-	29.2	0.6	1.6	29.4	27.0	58.0	1.6	8.6	156.0
Information & Professional Services	-	101.1	2.6	8.6	129.1	113.6	272.0	7.6	36.0	670.5
Leisure & Other Services	-	14.9	0.4	1.3	20.4	17.5	40.4	1.4	6.3	102.7
Manufacturing	-	37.4	1.0	3.3	55.0	56.1	84.1	1.9	18.8	257.6
Natural Resources	-	4.5	0.1	0.6	14.4	5.7	6.9	0.4	1.9	34.5
Transportation & Utilities	-	17.1	0.5	1.7	29.1	22.0	55.1	1.4	6.4	133.4
Wholesale & Retail Trade	-	22.4	0.6	2.2	35.6	28.3	70.2	1.9	8.9	170.0
Misc.	-	2.6	0.0	0.3	1.8	1.6	6.2	0.1	1.2	13.9
Total	366.1	6,338.3	4,834.1	3,088.1	35,915.1	6,650.5	4,549.1	10,791.1	2,810.3	75,342.7
Construction	70.1	590.6	718.8	632.7	2,461.8	720.0	729.9	521.2	385.0	6,830.2
Financial Services	35.8	695.0	406.8	216.0	3,073.9	566.9	372.3	1,010.3	235.8	6,612.8
Information & Professional Services	117.2	1,994.0	1,589.8	983.7	9,703.3	1,953.6	1,444.5	3,311.3	846.4	21,943.8
Leisure & Other Services	17.3	329.8	286.5	158.3	1,859.4	325.1	232.7	730.8	154.4	4,094.4
Manufacturing	70.0	1,660.3	1,006.7	576.6	11,988.9	2,005.1	956.8	3,168.3	712.1	22,145.0
Natural Resources	3.6	74.1	60.9	44.0	655.2	87.4	37.0	116.5	40.5	1,119.1
Transportation & Utilities	17.0	334.3	276.3	177.4	2,137.9	360.6	275.4	570.1	149.9	4,298.9
Wholesale & Retail Trade	31.6	591.5	455.2	267.8	3,801.7	593.7	453.6	1,266.4	247.3	7,708.8
Misc.	3.6	68.5	33.0	31.6	233.1	38.1	46.7	96.1	38.9	589.7

Source: IHS 2013

**High Production Case by Transport Mode:
Direct, Indirect and Induced Employment by US Census Division**

Employment	Northeast		South			Midwest		West		Total US
	New England	Mid-Atlantic	South Atlantic	East South Central	West South Central	East North Central	West North Central	Mountain	Pacific	
Pipelines	4,626	53,633	56,054	24,408	385,385	75,771	45,098	169,843	15,960	830,778
Direct	1,607	14,136	17,192	9,392	97,673	18,033	14,422	48,997	3,795	225,247
Indirect	1,179	19,146	17,045	6,712	146,173	28,172	14,538	61,818	6,176	300,959
Induced	1,840	20,351	21,817	8,304	141,539	29,566	16,138	59,028	5,989	304,572
Rail	-	5,350	312	427	8,890	4,605	10,047	1,013	3,099	33,743
Direct	-	1,655	96	161	2,909	1,317	3,628	349	858	10,973
Indirect	-	1,449	86	113	2,521	1,314	2,489	268	908	9,148
Induced	-	2,246	130	153	3,460	1,974	3,930	396	1,333	13,622
Marine	14	7,763	2,836	-	7,229	2,029	-	-	7,692	27,563
Direct	5	2,196	952	-	2,444	633	-	-	2,067	8,297
Indirect	3	2,415	741	-	1,974	540	-	-	2,403	8,076
Induced	6	3,152	1,143	-	2,811	856	-	-	3,222	11,190
Processing and Storage	-	13,615	16,286	25,610	135,453	11,443	6,224	8,747	10,022	227,400
Direct	-	4,504	5,557	10,383	47,369	3,648	2,361	3,331	3,163	80,316
Indirect	-	3,583	4,146	6,123	35,503	3,010	1,487	1,993	2,777	58,622
Induced	-	5,528	6,583	9,104	52,581	4,785	2,376	3,423	4,082	88,462
Common Infrastructure, Exc. Rail	-	3,338	107	403	5,465	4,691	11,745	309	1,371	27,429
Direct	-	1,023	32	153	1,776	1,343	4,244	105	374	9,050
Indirect	-	888	29	106	1,533	1,332	2,901	81	397	7,267
Induced	-	1,427	46	144	2,156	2,016	4,600	123	600	11,112
Total	4,640	83,699	75,595	50,848	542,422	98,539	73,114	179,912	38,144	1,146,913
Direct	1,612	23,514	23,829	20,089	152,171	24,974	24,655	52,782	10,257	333,883
Indirect	1,182	27,481	22,047	13,054	187,704	34,368	21,415	64,160	12,661	384,072
Induced	1,846	32,704	29,719	17,705	202,547	39,197	27,044	62,970	15,226	428,958

Source: IHS 2013

**High Production Case by Transport Mode:
Direct, Indirect and Induced GDP Contribution by US Census Division**

Value Added Contribution to GDP (\$M)	Northeast		South			Midwest		West		Total US
	New England	Mid-Atlantic	South Atlantic	East South Central	West South Central	East North Central	West North Central	Mountain	Pacific	
Pipelines	560	6,326	5,670	2,259	40,868	8,002	4,293	16,350	1,806	86,133
Direct	171	1,194	1,476	746	8,560	1,584	1,099	3,326	325	18,480
Indirect	168	2,611	1,959	734	17,262	3,314	1,616	6,958	770	35,393
Induced	222	2,521	2,235	778	15,046	3,104	1,578	6,065	711	32,260
Rail	-	673	32	41	988	512	1,018	104	373	3,740
Direct	-	188	9	14	289	142	359	33	106	1,140
Indirect	-	209	10	12	335	164	282	31	115	1,157
Induced	-	276	13	14	364	206	377	39	152	1,442
Marine	2	916	292	-	789	218	-	-	883	3,100
Direct	1	230	91	-	243	66	-	-	248	879
Indirect	1	336	86	-	254	66	-	-	294	1,036
Induced	1	350	115	-	292	86	-	-	341	1,184
Processing and Storage	-	1,623	1,674	2,428	14,942	1,227	606	893	1,161	24,554
Direct	-	477	505	895	4,847	384	215	305	344	7,973
Indirect	-	492	484	668	4,478	356	164	233	345	7,219
Induced	-	655	686	865	5,617	487	226	355	472	9,363
Common Infrastructure, Exc. Rail	-	443	11	39	636	527	1,195	33	171	3,056
Direct	-	125	3	14	190	148	422	11	49	963
Indirect	-	133	3	12	211	167	330	10	52	917
Induced	-	184	5	13	236	212	443	13	71	1,176
Total	562	9,981	7,679	4,767	58,223	10,485	7,111	17,380	4,394	120,583
Direct	171	2,214	2,084	1,670	14,129	2,324	2,095	3,676	1,072	29,435
Indirect	168	3,781	2,542	1,426	22,540	4,067	2,391	7,232	1,576	45,723
Induced	222	3,986	3,054	1,671	21,555	4,094	2,625	6,472	1,746	45,425

Source: IHS 2013

**High Production Case by Transport Mode:
Direct, Indirect and Induced Labor Income by US Census Division**

Labor Income	Northeast		South			Midwest		West		Total US
	New England	Mid-Atlantic	South Atlantic	East South Central	West South Central	East North Central	West North Central	Mountain	Pacific	
Pipelines	365	4,000	3,562	1,465	25,027	5,067	2,728	10,120	1,151	53,483
Direct	128	838	1,087	562	5,915	1,153	803	2,294	234	13,014
Indirect	107	1,687	1,221	465	10,718	2,124	1,032	4,396	501	22,251
Induced	130	1,475	1,254	437	8,394	1,790	893	3,429	416	18,218
Rail	-	434	20	26	618	327	659	67	242	2,394
Direct	-	143	7	11	220	107	268	26	81	861
Indirect	-	131	6	8	199	103	178	19	73	718
Induced	-	160	7	8	199	117	213	22	87	814
Marine	1	576	186	-	500	140	-	-	561	1,964
Direct	0	171	68	-	183	49	-	-	185	656
Indirect	0	206	54	-	154	42	-	-	183	639
Induced	0	200	64	-	162	49	-	-	193	669
Processing and Storage	-	1,043	1,059	1,572	9,376	780	388	584	747	15,549
Direct	-	352	364	647	3,493	271	154	235	251	5,766
Indirect	-	312	306	430	2,746	227	105	148	222	4,496
Induced	-	380	389	495	3,138	281	129	201	275	5,287
Common Infrastructure, Exc. Rail	-	285	7	25	395	336	774	21	110	1,953
Direct	-	94	2	10	141	111	315	8	37	719
Indirect	-	84	2	7	125	105	209	6	32	570
Induced	-	107	3	8	128	121	250	7	40	664
Total	366	6,338	4,834	3,088	35,915	6,650	4,549	10,791	2,810	75,343
Direct	129	1,597	1,527	1,230	9,951	1,692	1,540	2,563	788	21,016
Indirect	107	2,420	1,590	910	13,942	2,600	1,523	4,569	1,012	28,674
Induced	131	2,321	1,717	947	12,022	2,358	1,486	3,659	1,011	25,652

Source: IHS 2013

**High Production Case by Transport Mode:
Government Revenues**

Government Revenues by Transport Mode	Pipelines	Processing & Storage	Marine	Rail	Common Infra, Exc. Rail	Total US
Federal	11,844.9	3,378.5	427.1	517.3	422.3	16,590.1
Personal	9,828.8	2,822.3	356.0	433.1	353.2	13,793.4
Corporate	2,016.1	556.3	71.1	84.2	69.1	2,796.7
						0.0
State & Local	7,786.5	2,173.7	284.5	339.2	278.7	10,862.6
Personal	1,639.1	475.9	60.1	73.2	59.8	2,308.1
Corporate	6,147.4	1,697.8	224.4	265.9	218.9	8,554.5
Total Government Revenues	19,631.4	5,552.3	711.7	856.5	700.9	27,452.8

Source: IHS 2013

Appendix B3 – Modeling Approach

To assess the direct, indirect, and induced economic impacts of the investment in transport and storage infrastructure, IHS used a customized version of the IMPLAN modeling environment. The base IMPLAN model closely follows the accounting conventions used in the US Bureau of Economic Analysis study, *Input-Output Study of the US Economy*, and is flexible enough to evaluate changes via the value of output or employment from the source industry. IHS customized the environment by updating worker productivity rates based on its proprietary Business Market Insights database, which IHS economists believe produces more conservative estimates of employment impacts.

As discussed in the main body of this report, IHS Energy experts developed expenditure forecasts for each of twenty asset classes, both nationally and by each of the nine US Census Divisions. These expenditures were used as the inputs to ten IMPLAN models: one for the entire US and one each for the nine US Census Divisions. The expenditures for each asset class-census region configuration were modeled independently. The results were then combined to produce the “Target Energy Type” and “Transport Mode” aggregations.

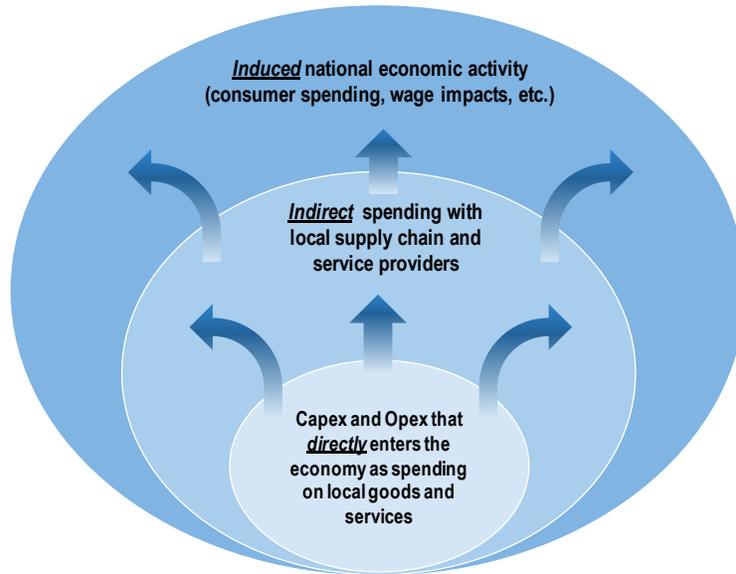
Input-Output Modeling Frameworks

IMPLAN, short for "Impact Analysis for Planning," is a widely used, commercially available model for conducting input-output analysis. Based on a social account matrix framework, IMPLAN provides a balanced set of 440-industry sector matrices that map the buy-sell dyads of inter-industry transactions and consumer-to-industry transactions. When additional transactions occur, IMPLAN rebalances the matrices, therein estimating how transactional activity ripples through the economy. The additional activity, in turn, drives changes in employment, wages, GDP contribution and government revenues.

The economic ripples fall into three main categories, as defined below:

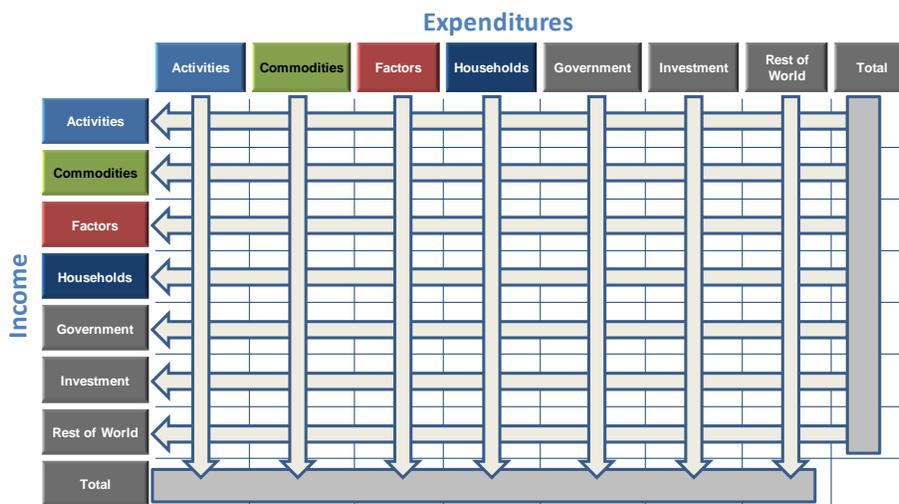
- **Direct Effects:** are the direct responses of an economy to changes in the final demand of a given industry or set of industries. In the model developed for this project, direct effects capture the impacts of direct employment and production associated with the refineries.
- **Indirect Effects** (also known as **Supplier Effects**): refer to the “ripple responses” of an economy to subsequent final demand shifts within industries that serve the direct industries. In essence, the indirect effects capture the response of extended supply chains.
- **Induced Effects** (also known as **Income Effects**): refer to the response of an economy to changes in household spending attributable to income generated by the direct and indirect effects. Employees within the direct and indirect industries also act as consumers in the general US economy. Induced effects capture the impacts of this consumer activity

Three Levels of Economic Impact



The figure below shows the structure and fiscal flows of a typical Social Account Matrix (SAM), which presents the transactions that occur within an economy as a matrix. The columns of a SAM represent expenditures (or spending), while the rows represent income. The key components (or accounts) appear in both the Columns and the Rows of the SAM, representing the dual role each account plays in the economy. As such, a SAM not only captures the transactional activity within an economy, but all of the linkages between industrial sectors, households and institutions as well.

Social Accounting Matrix Captures Expenditure-to-Income Flows



A Social Accounting Matrix (SAM) provides a complete, consistent and balanced representation of all activity within an economy. An **Expenditure** (or spending) within an economy flows down a column and then leftward along the corresponding **Income** row. For example, consider Consumer Spending. Expenditures flow down the “Household” column and then left across the appropriate “Commodity” row.

The following graphic populates the SAM framework with the classes of transactions that link expenditures (columns) to income (rows). A SAM is similar to double entry bookkeeping where each entry is a transaction that has both a price and a quantity dimension, and that identifies both its source and destination. Therefore, the total expenditures by each account must be exactly equal to the total receipts for the account, i.e. the respective row and column totals must equate. This means, for example, that total domestic demand (the commodity row) equals total domestic supply (the commodities column). It is this characteristic that makes a SAM a tool that can be used for modeling purposes.

Social Accounting Matrix Structure Transaction Classes

		Expenditures							
		Activities	Commodities	Factors	Households	Gov't	Investment	Rest of World	Total
Income	Activities		Domestic Supply						Activity Income
	Commodities	Intermediate Demand			Consumption (C)	Gov't Spending (G)	Investment (I)	Exports (E)	Total Demand
	Factors	Value-Added (GDP)							Total Factor Income
	Households			Factor Payments to Households		Social Transfers		Foreign Remittances	Total Household Income
	Government		Sales Tax and Import tariffs		Direct Taxes			Foreign Grants and Loans	Government Income
	Investment				Private Savings	Fiscal Surplus		Current Account Balance	Total Savings
	Rest of World		Imports (M)						Foreign Exchange Outflow
	Total	Gross Output	Total Supply	Total Factor Spending	Total Household Spending	Gov't Expenditure	Total Investment Spending	Foreign Exchange Inflow	

Economic impact analyses focus on inter-industry interactions (Activity-Commodity-Factors) and consumer transactions (Activity-Commodity-Factors-Households). The inter-industry interactions, which encompass direct and indirect effects, are highlighted in the purple region of the following figure. Similarly, the consumer transactions are enclosed by the red box. Ultimately, these two regions of the SAM are transformed into the core of an economic impact model such as IMPLAN.

Portions of a SAM Needed for the Economic Impact Assessment

		Expenditures							
		Activities	Commodities	Factors	Households	Gov't	Investment	Rest of World	Total
Income	Activities		Domestic Supply						Activity Income
	Commodities	Intermediate Demand			Consumption (C)	Gov't Spending (G)	Investment (I)	Exports (E)	Total Demand
	Factors	Value-Added (GDP)							Total Factor Income
	Households			Factor Payments to Households		Social Transfers		Foreign Remittances	Total Household Income
	Government		Sales Tax and Import tariffs		Direct Taxes			Foreign Grants and Loans	Government Income
	Investment				Private Savings	Fiscal Surplus		Current Account Balance	Total Savings
	Rest of World		Imports (M)						Foreign Exchange Outflow
	Total	Gross Output	Total Supply	Total Factor Spending	Total Household Spending	Gov't Expenditure	Total Investment Spending	Foreign Exchange Inflow	

IMPLAN multipliers

The notion of a multiplier rests upon the difference between the initial effect of a change in final demand and the total effects of that change. Total effects can be calculated either as direct and indirect effects or as direct, indirect, and induced effects. Direct effects are production changes associated with the immediate effects or final-demand changes. Indirect effects are production changes in backward-linked industries caused by the changing input needs of directly affected industries (for example, additional purchases to produce additional output). Induced effects are the changes in regional household spending patterns caused by changes in household income generated from the direct and indirect effects.

Type I multipliers

A Type I multiplier is the direct effect produced by a change in final demand plus the indirect effect, divided by the direct effect. Increased demands are assumed to lead to increased employment and population, with the average income level remaining constant. The Leontief inverse (Type I multipliers matrix) is derived by inverting the direct coefficients matrix. The result is a matrix of total requirement coefficients, the amount each industry must produce for the purchasing industry to deliver one dollar's worth of output to final demand.

Type SAM multipliers

Type SAM multipliers incorporate “induced” effects resulting from the household expenditures from new labor income. The linear relationship between labor income and household expenditure can be customized in the IMPLAN software. The default relationship is Personal Consumption Expenditure (PCE) and total household expenditure. Each dollar of workplace-based income is spent based on the SAM relationship generated by IMPLAN.