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# Benefits and Opportunities of Natural Gas Use, Transportation, and Production



# Key Observations and Findings

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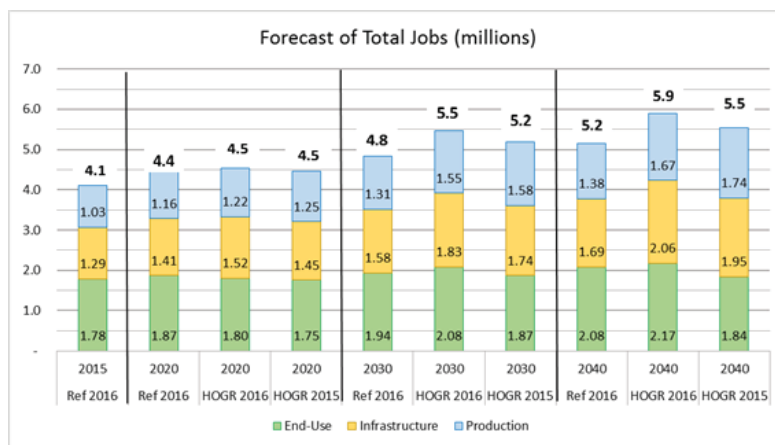
**Introduction:** This report describes how natural gas and its associated liquids (lease condensate and natural gas plant liquids) contribute to the U.S. economy both at a national level and in terms of the economies of individual states. The economic contribution is estimated for the historical year of 2015 and is projected to 2040 under three scenarios drawn from EIA's AEO.

**Scope:** Economic impacts are measured in terms of the number of jobs that are supported, the wages paid for those jobs, and the total value added (that is, the contribution to the national GDP and to its constituent state products). **A unique feature of this report is that it defines the natural gas value chain as going “all the way through consumption” to include the economic activity of converting the natural gas to other products and useful energy services.**

**Base Year Results:** Shown to the right are the job counts, wages and value added by three segments of the natural gas value chain: “end use,” “infrastructure,” and “production.” The end use segment is made up of the industries that convert natural gas and its associated liquids to electricity, petrochemical and other products and the industries that manufacture, sell, install and maintain gas-fired appliances and equipment used in the residential, commercial, vehicle and industrial sectors. The end use segment is the largest of the three with 43.6% of the total jobs. The infrastructure segment— which is made up of gatherers, gas processing, petroleum refining, natural gas distribution, and propane distribution— contributes 31.2% of the 2015 total jobs. The production segment— consisting of oil and gas production companies and their suppliers of goods and services— contributes the remaining 25.2% of 2015 total natural gas value chain jobs.

Direct, Indirect and Induced Economic Impacts: 2015			
Segment	Employment (# of Workers)	Labor Income (\$ million)	Value Added (\$ million)
End-Use	1,788,207	106,941	271,663
Infrastructure	1,282,306	84,341	167,624
Production	1,033,510	78,204	111,390
<b>All Segments</b>	<b>4,104,023</b>	<b>269,486</b>	<b>550,677</b>

**Forecast Results:** Estimates for total jobs (direct, indirect and induced) through 2040 are shown to the right for the three AEO cases. The growth rate in employment for the Reference Case is 0.91% per year from 2015 to 2040 when total jobs reach 5.15 million. Due to the increased amount of oil and gas produced and consumed in 2016 High Oil and Gas Resource Case, the rate of growth in employment is higher in that case at 1.46% per year. By 2040 there are 0.75 million more jobs compared to the Reference case. The 2015 High Oil and Gas Resource Case falls in between the other two cases with an average growth rate in total employment of 1.21% per year. The results for wages show similar trends among the three cases. The forecasted



direct, indirect and induced value added for all three segments combined grows from \$551 billion in 2015 to \$934 billion in the Reference Case, an annual growth rate of 2.14%. The 2016 High Oil and Gas Resource Case has a higher growth rate of 2.45% per year and reaches \$1,008 billion by 2040. The 2015 High Oil and Gas Resource Case also grows faster (2.28% per year) than the Reference Case and reaches \$967 billion by 2040.

**Exports:** The natural gas value chain contributes substantially to U.S. exports of commodities. In 2015 gas-related exports totaled over \$37.6 billion. This includes primary hydrocarbons, refined petroleum products, petrochemicals, fertilizers, plastics and resins. The fastest growth in natural gas value chain exports are expected to be in LNG exports and petrochemicals with substantial growth also expected in pipeline natural gas and NGLs. Such exports are expected to grow at annual rates of 3.4% to 3.8% per year, which is 60% to 70% faster than the overall natural gas value chain.

**Conclusion:** The natural gas value chain touches all states and a large number of industrial sectors supporting 2.9% of all non-farm jobs and contributing 3.1% of the national economy (GDP). These contributions to the U.S. economy are expected to grow in the future under each of the AEO scenarios examined here.

## United States Totals

### Economic Impacts of Natural Gas

As shown in Exhibit 7-1, there were 4.10 million jobs in the U.S. related to natural gas in 2015. The top three sectors with the greatest number of jobs were support activities for oil and gas operations, chemical manufacturing, and oil and gas pipeline construction. The contribution to the U.S. economy in terms of direct, indirect, and induced value added in 2015 was \$551 billion, of which \$272 billion was related to the end use segment, \$168 billion was from the infrastructure segment, and \$111 billion was from the production segment.

### Natural Gas Consumers

In 2015, the U.S. consumed 25.1 Tcf of natural gas. There were a total of 73.5 million customers. The value of natural gas delivered to consumers was \$130 billion.

The U.S. has 67.9 million residential customers who consumed 4.6 Tcf in 2015. Average consumption was 68 Mcf per household.

The U.S. has 5.4 million commercial customers who consumed 3.2 Tcf in 2015. Average consumption per commercial customer was 587 Mcf.

There are 189,000 industrial customers who consumed 7.5 Tcf. Average consumption per industrial customer was 40 MMcf.

### Natural Gas Infrastructure

In 2015, the U.S. had 595,000 producing oil wells and 574,000 producing gas wells. There were 397,000 miles of gas gathering lines, 298,000 miles of gas pipelines, 73,000 miles of crude oil pipelines, 67,000 miles of NGL pipelines, 63,000 miles of product pipelines, and 5,000 miles of CO2 pipelines. There were 1.3 million miles of gas distribution mains and 912,000 miles of service lines. .

### Natural Gas and Oil Production

In 2015, the U.S. produced 27.1 Tcf of dry natural gas, 1.2 billion barrels of gas plant liquids, 323 million barrels of lease condensate, and 3.1 billion barrels of crude.

## Exhibit 7-1: US Total Factsheet

US Total			Employment (# of Workers)			Labor Income (\$ million)			Value Added (\$ million)		
Summary	Segment	Category	Direct & Indirect	Induced	Total	Direct & Indirect	Induced	Total	Direct & Indirect	Induced	Total
	End-Use	Power Generation		147,857	258,596	406,453	11,419	12,891	24,311	42,395	22,735
Industrial			297,763	563,432	861,195	23,354	28,228	51,582	83,885	49,717	133,602
Residential/ Commercial			163,499	211,665	375,165	10,934	10,946	21,880	38,907	19,123	58,029
Export			81,532	60,548	142,080	5,965	3,075	9,040	9,076	5,396	14,471
Transportation			1,751	1,564	3,315	82	81	130	284	146	430
Infrastructure	Processing		86,951	102,342	189,293	7,211	5,296	12,508	17,856	9,327	27,183
	Pipelines		268,373	257,754	526,128	21,702	13,409	35,111	43,793	23,637	67,430
	Distribution		287,063	264,488	551,552	21,992	13,693	35,717	47,079	23,962	71,041
	Wholesalers, Marketers, Other		7,920	7,414	15,333	619	385	1,005	1,296	675	1,971
Production	Natural Gas/ NGLs		609,382	424,129	1,033,510	56,667	21,537	78,204	73,596	37,794	111,390
All Segments	Grand Total		1,952,091	2,151,932	4,104,023	159,946	109,541	269,486	358,167	192,510	550,677

Jobs by Top Industries	Rank	NAICS	Industry Sector	Direct and Indirect Jobs
	1	213112	Support Activities for Oil & Gas Operations	134,530
	2	325	Chemical Manufacturing	114,505
	3	237120	Oil & Gas Pipeline Construction	97,220
	4	211111	Crude Petroleum & Natural Gas Extraction	90,579
	5	221210	Natural Gas Distribution	84,211
	6	811310	Industrial Equip. & Machinery Repair & Maint.	54,205
	7	236210	Industrial Construction	41,651
	8	213111	Drilling Oil & Gas Wells	33,878
	9	4841	Freight Truck	33,515
	10	45431NGL	NGL Retail	27,678

Customers	Sector	Customer Count	Consumption Volume (MMcf/ year)	Value of Natural Gas Delivered to Customers (\$million)
	Residential Sector	67,873,861	4,609,672	\$46,462
	Commercial Sector	5,449,180	3,198,799	\$23,802
	Industrial Sector	188,585	7,534,588	\$27,559
	Transportation	1,821	39,377	\$353
	Power Sector	2,410	9,671,096	\$31,461
	All Sectors	73,515,857	25,053,529	\$129,637

Infrastructure	Gas Distribution Main (miles)	Gas Distribution Services (miles)	Gas Gathering (miles)	Gas Pipelines (miles)	Crude Oil Pipelines (miles)	NGL Pipelines (miles)	Oil Product Pipelines (miles)	CO2 Pipelines (miles)
		1,277,270	911,651	396,674	298,005	73,260	67,467	62,543

Production	Product	Annual Production
	Dry Natural Gas (mmcf)	27,059,503
	Gas Plant Liquids (barrels)	1,202,077,000
	Lease Condensate (barrels)	323,000,000
	Crude Oil (barrels)	3,113,515,000
	Annual Value Counted Toward Natural Gas Value Chain (\$million)	\$98,890
Annual Value of All Produced Oil, Gas, NGLs (\$million)	\$236,968	

Wells	Well Type	Operating Wells	New Wells Drilled
	Oil Wells	594,634	19,858
	Gas Wells	574,459	4,990
	All Wells	1,169,093	24,848

Annual 2015 Data for US Total  
Natural Gas Value Chain Basis