The Economic and Employment Contributions of Unconventional Gas Development in State Economies

Prepared for:

AMERICA'S NATURAL GAS ALLIANCE

Submitted by:

IHS Inc.

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IHS offers an independent assessment of the importance unconventional gas to the overall US economy. This research was supported by the America's Natural Gas Alliance (ANGA). IHS is exclusively responsible for all of the analysis and content contained herein. The analyses and metrics developed during the course of this research are intended to contribute to the national dialogue on the role of unconventional gas in terms of production, employment, economic growth, and energy security.

Executive Summary: The Economic and Employment Contributions of Unconventional Gas Development in State Economies

In our 2009 study, "The Contributions of the Natural Gas Industry to the US National and State Economies," IHS examined the US economic and employment contributions of the natural gas industry's conventional and unconventional drilling and production activities. Our subsequent study released in December 2011, "The Economic and Employment Contributions of Shale Gas in the United States," furthered this research by focusing on the economic benefits to the nation of the natural gas industry's unconventional shale activity.

This study, "The Economic and Employment Contributions of Unconventional Gas Development in State Economies" examines the natural gas industry's unconventional gas activities—gas production from shale formations, tight sands and coal bed methane (CBM)—at the state level. The report assesses the economic benefits of this growth, including the employment contributions for each of the US lower 48 states and the District of Columbia through 2035. These projections are based on the assumption that there are no significant changes to the current levels of environmental regulations at the federal or state level throughout the forecast horizon.

Unconventional gas activity is having a dramatic impact on employment and economic growth across the US lower 48 states and the District of Columbia, in terms of jobs and its contribution to gross state product (GSP) and, by extension, US gross domestic product (GDP). This reflects the significant capital intensity required to develop unconventional gas resources, the ability to source inputs from a coast-to-coast network of suppliers and professional services around the United States, and the high quality of the jobs created by this activity.

Unconventional gas is expected to lead future growth in US natural gas productive capacity. By 2015, the share of US natural gas produced from unconventional sources will increase to 67% and, by 2035, will reach 79%. Increased unconventional gas activity will contribute to capital investment, job opportunities, economic growth, government revenue, and lower prices across the country including:

- Nearly $3.2 trillion in investments in the development of unconventional gas are expected to fuel the increase in production between 2010 and 2035.
- In 2010, unconventional gas activity supported 1 million jobs; this will grow to nearly 1.5 million jobs in 2015 and to over 2.4 million in 2035.
- By 2015, unconventional gas activities will contribute nearly $50 billion in federal, state and local government tax and federal royalty revenue; between 2010 and 2035, continued development of unconventional gas will generate a cumulative total of nearly $1.5 trillion in federal, state, and local tax and royalty revenue.

This study, which focuses on 58 unconventional gas plays across the lower 48 US states, assesses their economic impact on each individual state. Three types of gas plays are analyzed in this report: natural gas extracted from shale formations, tight sands, and CBM. These are referred to collectively throughout this report as "unconventional gas."[1]

The following are highlights of this study's findings regarding the economic contributions to individual states, in terms of jobs, GSP, and tax revenue paid to federal, state and local governments as a result of unconventional gas activity:

- Over the projection horizon, there are 20 "producing" states for unconventional gas—comprised of 13 states that have both existing and new well completion and production activities and seven additional states that have production activity associated with existing unconventional gas wells. Together, unconventional gas activity in these producing states contributed more than 826,000 jobs in 2010 and that number will grow to nearly 1.2 million jobs by 2015.

[1] The major distinction between conventional and unconventional natural gas has to do with the permeability (or lack thereof) of the source rock in which they are contained. In a conventional natural gas reservoir, natural gas has migrated upward from its source rock through other permeable rocks until it has become trapped by an impermeable layer of rock. Unconventional natural gas is contained in source rock of low permeability, and hence is unable to move at all out of the source rock. Given the increasingly dominant share of this type of natural gas production, the term 'unconventional' may no longer be appropriate, though it remains in common use.

- According to US Bureau of Labor Statistics data, the majority of top-producing states have shown lower unemployment than the overall national average. In 2010, the Top 5 producing states' unemployment rates were 6.9-8.9%, compared with the national average of 9.6%.
- Between 2010 and 2015, the Top 10 producing states—as ranked by employment generated by their unconventional gas activity—will experience a compound annual employment growth rate of nearly 8%. Pennsylvania and Colorado are expected to lead in employment contribution growth, experiencing compound annual growth rates of roughly 14% and 10% respectively. Total US employment is expected to grow at an average rate of 1.6% during the same time period.
- By 2015, the 20 producing states will contribute just over $41 billion in federal, state and local government tax and federal royalty revenue. By 2035, these receipts will be nearly $72 billion.
- Non-producing states—defined as the 28 states and the District of Columbia that do not include current or projected unconventional gas resource development—still benefit from their roles as suppliers in the unconventional gas expansion in the future. Together, in 2010, they contribute 18% of the total US employment generated by unconventional gas activity and 17% of the resulting tax revenue. By 2035, employment and government revenues in these states grow more than two-fold.

The dramatic impact on employment and the economy from unconventional gas activity reflects its significant capital intensity requirements, the ability to source inputs from domestic sources, the coast-to-coast structure of the supply chain, and the high quality of the jobs created.[2] These economic contributions will be largely driven by activity in the 20 producing states with both new well completion and production or existing production. However, the 28 non-producing states that do not include projected unconventional gas development will still contribute nearly one in every five jobs to the overall economy.

[2] For more information, please see "The Economic and Employment Contributions of Shale Gas in the United States:" http://www.ihs.com/info/ecc/a/shale-gas-jobs-report.aspx.

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Overview

In our 2009 study "The Contributions of the Natural Gas Industry to the US National and State Economies," IHS examined the U.S economic and employment contributions of the entire natural gas industry, which includes both conventional and unconventional activities. Our subsequent study, "The Economic and Employment Contributions of Shale Gas in the United States," furthered this research by focusing on the natural gas industry's unconventional shale activity for the nation. As a companion to that report, this study examines the natural gas industry's unconventional activities—namely gas production from shale, tight sands and CBM—at a state level to assess the economic and employment contributions in each of the lower 48 states and the District of Columbia through 2035. The projections presented within this report are based on the assumption that there are no significant changes to the current levels of environmental regulations at the federal or state level throughout the forecast horizon.

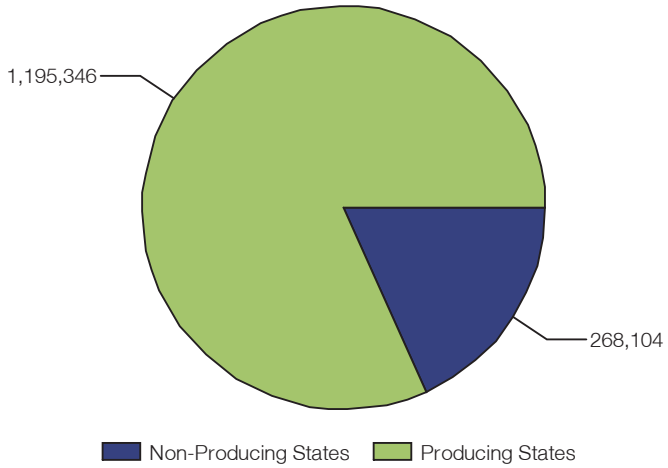
To understand the economic and employment contributions at the state level, we begin with a national perspective of the total unconventional gas activity. The economic contributions associated with all unconventional gas activities are significant. Rapid development of these unconventional resources is projected to fundamentally alter US sources of natural gas production for decades to come. In fact, in 2010 alone, unconventional gas activity already represented 53% of total US gas production and is projected to rise to 79% by 2035. Fueling this increase in the proportion of natural gas production from unconventional activity is a projected $3.2 trillion in cumulative capital investments through 2035. These massive capital outlays, along with the promise of stable low natural gas prices, will have profound national economic consequences including:

- By 2015, the employment contributed by unconventional gas activity is projected to reach nearly 1.5 million US jobs on a path to more than 2.4 million jobs by 2035.
- By 2015, the annual contribution of unconventional gas activity to GDP is projected to reach nearly $197 billion and, by 2035, is expected to more than double to nearly $332 billion.
- By 2015, government revenue provided by unconventional gas activity is projected to reach nearly $50 billion and will continue to rise to nearly $86 billion by 2035. Over the entire 25-year projected horizon of this study, this activity is expected to generate nearly $1.5 trillion in total government revenue.

In addition to its direct economic contributions, unconventional gas activity has fostered low and stable gas prices that have additional positive macroeconomic impacts. A simulation of IHS Global Insight's Macroeconomic Model of the US Economy shows that current low and stable gas prices in the near term will contribute to a 10% reduction in electricity costs, a rise in the level of GDP that peaks at a 1.1% increase by 2013, and an 809,000 rise in employment by 2015. In the long run (beyond 15 years), the equilibrating tendency of the economy will lessen the relative beneficial impacts of low gas prices, but they will continue to bring noteworthy benefits to the industrial sectors. For example, improvements in the competitiveness of domestic manufacturers, due to lower natural gas and electricity costs, will result in an initial 2.9% increase in industrial production by 2017 and 4.7% higher production by 2035 compared to the level of activity that would occur under a higher price scenario without unconventional gas.

US Employment Contribution, 2015

Unconventional Gas (Number of workers)



Source: IHS Global Insight

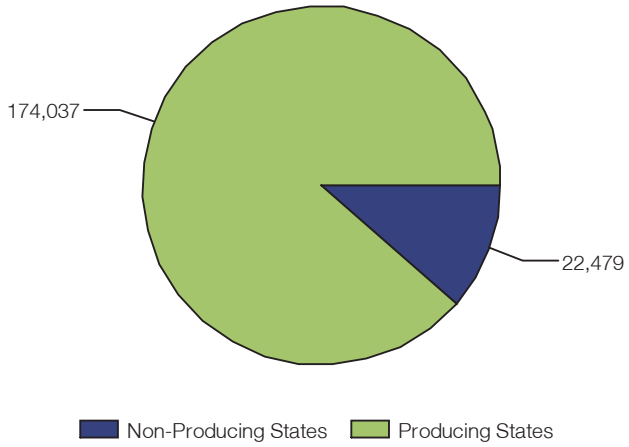
The remainder of this study examines how these national economic and employment contributions—from 58 US unconventional gas plays—are distributed across the lower 48 US States and the District of Columbia. It finds that traditional oil and gas states like Texas and Louisiana will lead the way in terms of the economic benefits they will receive from unconventional gas activity. However, by 2015, many of these economic benefits—including employment (268,000), value added to GDP ($22 billion), and tax revenue ($8 billion)—will be realized in states that do not have any unconventional gas production activity ("non-producing" states), but instead will benefit from the purchases of supplies and services from businesses across the United States.

This report provides a detailed analysis of how these economic contributions will be distributed among the various states. The ability of each state to share in the benefits of increasing production of unconventional gas will be determined by a number of critical factors, including its natural resource endowment, the regulatory environment, its underlying industrial base, its capital and labor composition, and the diversity of its overall economy.

This study was performed on a state-by-state basis and results are presented in their entirety in appendices A, B and C. However, to summarize the findings across the lower 48 states and the District of Columbia, the results are presented in two distinct groups. First are the 20 "producing" states where natural gas production is located. Of these producing states, 13 states have both existing and new well drilling and production activities, and another seven states have existing unconventional gas wells in production, but no anticipated new well drilling and development planned during the 25-year forecast horizon of this study.

US Value Added Contribution to GDP, 2015

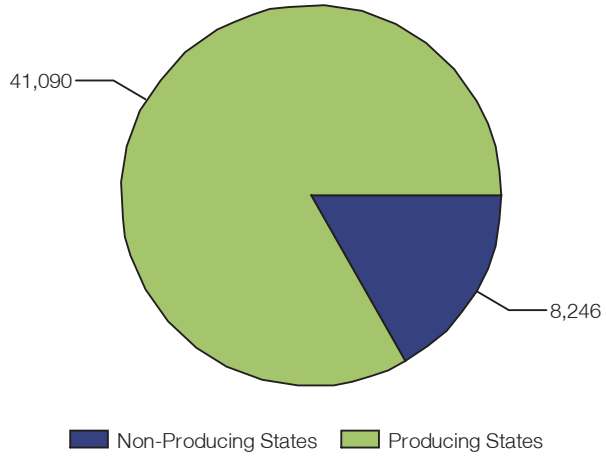
Unconventional Gas ($M)



Source: IHS Global Insight

Contribution to US Government Revenue, 2015

Unconventional Gas ($M)



Source: IHS Global Insight

Second are the 28 non-producing states and the District of Columbia. The commonality across these states is that none of them currently has unconventional gas wells, nor are they projected to engage in unconventional gas drilling and production activities during the forecast horizon of the study. It is important to note that this does not mean these states lack the potential for resource development. Rather, with the currently available information, we assume there will be no unconventional gas production occurring within these states during the forecast horizon. However, these non-producing states are expected to greatly benefit from unconventional gas development in the future through a complex network of supply chains, trade flows among the various producing states, and the income effects of earnings spent by workers benefitting directly or indirectly from natural gas production within these states.

In the following sections, the economic gains that will be generated by increased unconventional gas production in the United States will be presented in terms of their contributions to employment, GDP, and federal, state and local government revenue. For each of these categories of economic contributions, the report will break out and compare gains between the producing and non-producing states. State-by-state details supporting these aggregate data can be found in Appendices A, B, and C.

Jobs: Nearly 1.5 Million US Jobs by 2015—268,000 in Non-Producing States Alone

The majority of US economic activity generated by unconventional gas production will take place in the 20 states with natural gas resources. In these producing states, unconventional gas activity was responsible for creating more than 826,000 jobs in 2010. We project these states will add nearly 400,000 additional jobs between 2010 and 2015, growing to nearly 1.2 million.

In both 2010 and 2015, the Top 10 producing states account for approximately 84% of the employment gains that will be generated by all of the producing states, with Texas and Louisiana leading the way in terms of the absolute numbers of jobs created. Between 2010 and 2015, the overall annual growth rate in employment for unconventional gas activity will be approximately 7.7%. Pennsylvania and Colorado will lead in terms of compound annual employment growth, experiencing roughly 14% and 10% growth, respectively.

Employment Contribution of Unconventional Gas* in Producing States vs. Non-Producing States
(Number of workers)

	2010	2015	2035
Producing States**	826,355	1,195,346	2,007,90
Non-Producing States	182,303	268,104	430,975
US Total	**1,008,658**	**1,463,450**	**2,438,877**

NOTES: *Unconventional gas includes gas from shale, tight sands, and coal bed methane.
**Producing states are the 20 states that have either new well completions and production or production from existing wells.
They include Alabama, Arkansas, Colorado, Illinois, Kansas, Kentucky, Louisiana, Michigan, Mississippi, Montana, New Mexico, New York, Ohio, Oklahoma, Pennsylvania, Texas, Utah, Virginia, West Virginia, and Wyoming; the rest of the states are non-producing states.
Source: IHS Global Insight

Top 10 Unconventional Gas* Producing States: Employment Contribution**
(Number of workers)

	2010	2015	2035
Texas	288,222	385,318	682,740
Louisiana	81,022	124,782	200,555
Colorado	77,466	126,525	127,843
Pennsylvania	56,884	111,024	270,058
Arkansas	36,698	53,919	79,723
Wyoming	34,787	45,763	78,792
Ohio	31,462	41,366	81,349
Utah	30,561	36,593	50,839
Oklahoma	28,315	41,763	69,261
Michigan	28,063	37,926	63,380
Top 10 Total	**693,481**	**1,004,979**	**1,704,541**
Producing Total	**826,355**	**1,195,346**	**2,007,902**
US Total	**1,008,658**	**1,463,450**	**2,438,877**

NOTES: *Unconventional gas includes gas from shale, tight sands, and coal bed methane.
**The rank for all years are based on the 2010 ranking.
Source: IHS Global Insight

Unconventional Gas Contributes to Lower Unemployment Rate in Producing States

Based on US Bureau of Labor Statistic data, the US unemployment rate registered 9.6% in 2010. All of the top-producing states, with the exception of Michigan and Ohio, have shown lower unemployment than the national average. The Top 10 producing states' unemployment rates ranged from 0.7-2.7 percentage points lower than the national average.

One of the most important findings from this study is the fact that the economic contributions from unconventional gas activity are not limited to states endowed with the resources. For example, California does not directly produce unconventional gas, yet the economic activity associated with unconventional gas production supported nearly 23,000 jobs in California in 2010; the state's unconventional gas activity-related employment is expected to increase to more than 33,000 jobs by 2015 and will more than double to nearly 49,500 by 2035.

Top 10 Unconventional Gas* Non-Producing States: Employment Contribution**
(Number of workers)

	2010	2015	2035
California	22,773	33,265	49,494
Florida	15,758	27,402	30,903
Georgia	13,294	18,800	29,262
Missouri	12,031	17,427	30,105
North Carolina	11,377	16,570	28,271
Indiana	10,819	15,206	26,837
Wisconsin	9,608	14,285	24,871
Minnesota	9,271	14,499	22,638
Tennessee	8,519	12,323	21,487
Maryland	7,008	10,263	16,634
Top 10 Total	**120,459**	**180,042**	**280,503**
Non-Producing Total	**182,303**	**268,104**	**430,975**
US Total	**1,008,658**	**1,463,450**	**2,438,877**

NOTES: *Unconventional gas includes gas from shale, tight sands, and coal bed methane.
**The rank for all years are based on the 2010 ranking.
Source: IHS Global Insight

Unconventional Gas Fuels States' Economic Recoveries

As the nation's economic recovery continues, state labor markets are expected to exhibit different growth patterns that will be determined by their industrial initiatives. During the next few years, IHS Global Insight's outlook for state economies shows that four out of the five states with the strongest employment growth will either be unconventional gas producers or will appear on top of the list of non-producing states. The five states are North Dakota, Utah, Colorado, Florida, and Texas—all of them are expected to have annual employment growth that exceeds 2% through 2015.

While IHS Global Insight expects economic conditions to improve over the next few years, with average US unemployment falling to 6.8% by 2015, top producing states' unemployment rates will outperform the national average.

Employment Composition Varies in Producing and Non-Producing States

The employment contributions and the types of jobs created by the natural gas industry's unconventional gas activity vary between the producing and non-producing states. The main reasons for these differences are the scope of direct industrial activity, the location of capital goods that are purchased, the supply chain, and the income ramifications throughout the economy.

In the producing states, a greater proportion of the total jobs generated are found in direct production or key support industries of unconventional gas activity. In Arkansas, for example, 30% of all of employment associated with unconventional gas is found in the mining sector, followed by other key industries such as construction, trade, and manufacturing. Alternatively, in non-producing states, more employment is generated in supplier networks that support the unconventional gas activity. In California, 47% and 30% of employment, respectively, is in the service sector and in manufacturing.

Government Revenue: Nearly $50 Billion Nationwide by 2015—$8 Billion in Non-Producing States

Our study estimates nearly $34 billion in annual tax receipts in 2010 by federal, state and local governments. Total annual receipts will approach $50 billion by 2015 and exceed $85 billion by 2035—more than doubling 2010 levels. On a cumulative basis between 2010 and 2015, unconventional activity is projected to contribute nearly $208 billion in total tax revenue; over the 25-year forecast horizon, IHS projects nearly $1.5 trillion in total revenue[3].

Contribution to US Government Revenue of Unconventional Gas* in Producing States vs. Non-Producing States

($M)

	2010	2015	2035	2010-2035**
Producing States***	28,034	41,090	71,806	1,255,034
Non-Producing States	5,758	8,246	13,317	243,701
US Total	**33,793**	**49,335**	**85,123**	**1,498,734**

NOTES: *Unconventional gas includes gas from shale, tight sands, and coal bed methane.
**2010-2035 represents the total for all years including those years not reported.
***Producing states are the 20 states that have either new well completions and production or production from existing wells. They include Alabama, Arkansas, Colorado, Illinois, Kansas, Kentucky, Louisiana, Michigan, Mississippi, Montana, New Mexico, New York, Ohio, Oklahoma, Pennsylvania, Texas, Utah, Virginia, West Virginia, and Wyoming; the rest of the states are non-producing states.
Source: IHS Global Insight

The majority of the government revenue generated by unconventional gas production will occur in the 20 producing states. The revenue derives not only from personal, corporate, federal, state, and local taxes but also from severance, ad valorem, and royalty payments, which are particular to unconventional gas activity. Combined, the unconventional gas activity in these producing states is projected to contribute $41 billion in all types of government tax and related revenue by 2015 and nearly $72 billion to annual receipts by 2035.

Unconventional Gas Activity Makes Large Contributions to State Budgets

In 2010, the education budget for the state of Texas was $81 billion and healthcare spending registered $40 billion. Unconventional gas activity generated state and local revenues of $5 billion—representing 6 percent of the education and 13 percent of the healthcare budget.

Colorado allocated $12 billion to education in 2010—in comparison, the unconventional gas industry generated $1.6 billion state and local revenue, which equals 13 percent of its education budget.

The Top 10 producing states provide a substantial share of total payments to governments at the federal, state and local level. Unconventional gas activity in these 10 states will generate over $24 billion in total taxes in 2010—72% of all tax revenue generated by unconventional gas activity in all of the producing states. The producing states' share will continue to increase. By 2015, unconventional gas activity in the Top 10 states will pay about $36 billion—or nearly 73% of total tax receipts from all unconventional activity. By 2035, they will pay nearly $63 billion in taxes—or 74% of total government revenues.

While traditional energy-producing states like Texas and Louisiana will lead the way in generating government revenue from their unconventional gas activities, the non-producing states will contribute a total of nearly $6 billion in 2010 and are projected to pay over $8 billion by 2015.

Top 10 Unconventional Gas* Producing States: Contribution to US Government Revenue**

($M)

	2010	2015	2035
Texas	10,891	14,757	26,412
Colorado	3,197	4,434	4,526
Wyoming	2,247	3,362	6,243
Louisiana	2,074	3,897	7,702
Pennsylvania	1,476	3,505	8,889
Arkansas	1,193	1,792	2,775
New Mexico	1,091	1,045	914
Oklahoma	875	1,310	2,257
New York	721	1,038	1,599
Michigan	693	884	1,403
Top 10 Total	**24,458**	**36,025**	**62,720**
Producing Total	**28,034**	**41,090**	**71,806**
US Total	**33,793**	**49,335**	**85,123**

NOTES: *Unconventional gas includes gas from shale, tight sands, and coal bed methane.
**The rank for all years are based on the 2010 ranking.
Source: IHS Global Insight

[3] Tax projections were based upon current tax structures and did not consider how changes to the current tax structure might impact these projected receipts.

By 2035, receipts from all of the non-producing states will surpass $13 billion. The Top 10 non-producing states—like the producing states—also comprise a significant share of the total government revenue from all of the non-producing states. In fact, at over $4 billion, these 10 states will contribute 74% of all government revenue from non-producing states in 2010. By 2015, that share will increase to more than $6 billion, or about 75% of the total, due to the rapid expansion of support activities supplied to producing states.

Top 10 Unconventional Gas* Non-Producing States: Contribution to US Government Revenue**

($M)

	2010	2015	2035
California	1,516	2,237	3,440
Florida	536	886	1,201
Missouri	426	594	1,007
New Jersey	353	475	834
Georgia	271	364	578
Massachusetts	263	391	611
North Carolina	252	300	519
Minnesota	224	350	539
Indiana	212	275	473
Wisconsin	211	315	546
Top 10 Total	**4,263**	**6,188**	**9,748**
Non-Producing Total	**5,758**	**8,246**	**13,317**
US Total	**33,793**	**49,335**	**85,123**

NOTES: *Unconventional gas includes gas from shale, tight sands, and coal bed methane.

**The rank for all years are based on the 2010 ranking.

Source: IHS Global Insight

Unconventional Natural Gas Important To Pennsylvania State Budget

Pennsylvania's 2010 state budget included $11 billion for public transportation and $9 billion for public safety and criminal justice. A combination of corporations, businesses and individuals supporting unconventional natural gas activity paid a combined total of $641 million in taxes to Pennsylvania state and local governments that year, accounting for 6 percent of the state's transportation budget and 7 percent of spending on public safety and criminal justice.

Value Added: Nearly $197 Billion in US GDP by 2015—$22 Billion from Non-Producing States

The commonly used measure of GDP, which is simply the sum of the value added across all products and services produced in the United States, is generally considered the broadest measure of the health of the US economy. Value added to US GDP is defined as the sum of labor incomes, corporate profits, indirect business taxes paid, and depreciation.

Annual value added to GDP from unconventional gas activities was more than $133 billion in 2010 and, by 2015, is projected to approach $200 billion. The majority of the value added to GDP—nearly 90%—over the 25-year forecast horizon is generated by unconventional gas production activities that take place in the 20 producing states.

In 2010, the Top 10 producing states accounted for 78% of the US total value added to GDP by unconventional

US Value Added Contribution of Unconventional Gas* in Producing States vs. Non-Producing States

($M)

	2010	2015	2035
Producing States**	118,077	174,037	295,897
Non-Producing States	15,328	22,479	35,831
US Total	**133,405**	**196,516**	**331,728**

NOTES: *Unconventional gas includes gas from shale, tight sands, and coal bed methane.

**Producing states are the 20 states that have either new well completions and production or production from existing wells. They include Alabama, Arkansas, Colorado, Illinois, Kansas, Kentucky, Louisiana, Michigan, Mississippi, Montana, New Mexico, New York, Ohio, Oklahoma, Pennsylvania, Texas, Utah, Virginia, West Virginia, and Wyoming; the rest of the states are non-producing states.

Source: IHS Global Insight

An Economic Growth Engine in Producing States

IHS Global Insight's outlook for Texas and Utah shows that economic growth in these states will outperform all other states. From 2010 to 2015, each state's economy is expected to grow more than 3.5% annually.

In Texas and Utah, the average employee in the unconventional gas and related industries will contribute $167,000 and $94,000 in "value-added" to their respective state's economies in 2010 through 2015; this outpaces the state's average employee contributions of $111,000 and $90,000, respectively.

gas activity. By 2015, we project these Top 10 states will add another $50 billion to GDP, valued at 78% of the unconventional gas activity's total contribution to GDP. Pennsylvania and Louisiana will lead the way with annual growth in their contributions to GDP of 18.7% and 12.6%, respectively. By 2035, unconventional gas activity will add almost $332 billion to US GDP—with the Top 10 producing states accounting for 78% of the relative contributions.

Overall, the non-producing states account for about 11%, on average, of the total value to US GDP throughout the forecast horizon. While the share of labor income from the non-producing states is in line with their employment share, they do not make as large of a relative contribution to GDP as the producing states. This is attributable to the fact that producing states are heavily influenced by the Oil and Gas sector which has high value added (mostly dedicated to non-labor income).

Top 10 Unconventional Gas* Producing States: Value Added Contribution**

($M)

	2010	2015	2035
Texas	47,995	64,768	111,089
Colorado	12,258	18,162	17,485
Louisiana	11,020	20,005	37,759
Pennsylvania	7,121	16,806	42,438
Wyoming	6,760	8,815	14,735
Arkansas	4,910	7,264	10,540
Oklahoma	4,008	6,033	9,905
New Mexico	3,356	3,160	2,589
Utah	3,126	3,866	5,343
Ohio	3,045	3,942	7,921
Top 10 Total	**103,600**	**152,821**	**259,805**
Producing Total	**118,077**	**174,037**	**295,897**
US Total	**133,405**	**196,516**	**331,728**

NOTES: *Unconventional gas includes gas from shale, tight sands, and coal bed methane.

**The rank for all years are based on the 2010 ranking.

Source: IHS Global Insight

Top 10 Unconventional Gas* Non-Producing States: Value Added Contribution**

($M)

	2010	2015	2035
California	2,192	3,197	4,617
Florida	1,163	2,034	2,266
Georgia	1,147	1,622	2,398
Missouri	1,057	1,529	2,616
Indiana	957	1,326	2,331
North Carolina	909	1,318	2,185
Minnesota	796	1,272	1,937
Wisconsin	783	1,167	2,044
Tennessee	683	986	1,727
New Jersey	640	841	1,406
Top 10 Total	**10,326**	**15,291**	**23,527**
Non-Producing Total	**15,328**	**22,479**	**35,831**
US Total	**133,405**	**196,516**	**331,728**

NOTES: *Unconventional gas includes gas from shale, tight sands, and coal bed methane.

**The rank for all years are based on the 2010 ranking.

Source: IHS Global Insight

Structure of the Report

This report is a companion to the previous national level report, "The Economic and Employment Contributions of Shale Gas in the United States," published by IHS in December 2011. The remainder of this report is divided into the following four sections:

- Section 1 provides a background and reports our findings.
- Section 2 explains the methodology and approach that was used to develop the estimates economic activity generated by each state's unconventional gas activity. It is divided into two main parts—Energy and Economic Contribution Assessment—each of which describes the inputs required to develop our final estimates.
- Section 3 provides a snapshot of the results by state for 2010, 2015 and 2035 for the following four main concepts: employment, government revenue, value added to GDP, and labor income contributions.
- Section 4 wraps up the report with important conclusions from its findings.

Additionally, we provide several appendices to both present more detailed results from our report and to facilitate the readers' understanding of the methodologies, research, and data relied upon for the analyses. The appendices to the report are as follows:

- Appendix A: Economic Contributions by State and Year provides six detailed tables by state for each of the five-year increments presented. The concepts covered are employment contribution (both alphabetically and ranked by total value for that year), value-added contribution (both alphabetically and ranked by total value for that year), labor income contribution (alphabetical only), and government revenue.
- Appendix B: Economic Contributions by State, Industry and Year breaks down the three main concepts—employment, value added to GDP, and labor income contribution—even further by industry such that the final tables are by state and industry for each of the five-year increments.
- Appendix C: Economic Contributions Excluding Cross-State Contributions by State and Year provides three detailed tables by state for each of the five-year increments; however, these tables differ in that the resulting numbers do not include any cross-state contributions (this approach contrasts with Appendix A, which does include these cross-state contributions). The concepts covered are employment, value-added and labor income contribution, each of which is displayed alphabetically.
- Appendix D: Find the report, "The Economic and Employment Contributions of Non-Shale Unconventional Gas in the United States," which presents the results from our analysis of total and non-shale unconventional gas activity at the national level. It includes its own appendices (A through C) detailing the underlying methodology and detailed data related to the assumed future production profile and capital expenditure outlook for non-shale unconventional gas; the detailed results of the economic contribution assessment for non-shale unconventional gas; and the data and modeling approach underlying the economic contribution analysis for non-shale unconventional gas.

1. Background

The development of unconventional gas resources in the United States is credited with fundamentally changing the outlook for domestic natural gas supply and price, with significant contributions to employment and the economy. These have been documented in our report, "The Economic and Employment Contributions of Shale Gas in the United States."

This study provides an analysis of the distribution of these national results at the state level. The analysis takes into account the broad distribution of unconventional gas development across a wide range of states. The results reflect careful analysis of each state's production potential through 2035, based on IHS CERA's analyses of each natural gas play and calculates the investment of capital, labor, and other inputs required to produce the gas at each play. The economic effects of these investments are then calculated using IHS Global Insight's proprietary economic impact assessment and macroeconomic models, generating employment, value added to GDP, labor income, and tax revenue resulting from the growth in the coming years of unconventional gas development.

2. Methodology and Approach

Energy

IHS CERA's outlook for unconventional gas in the US lower 48 states includes production from 58 unconventional gas plays nationwide: 21 shale plays, 23 tight sands gas plays, and 14 CBM plays.

Unconventional Gas Plays	Play Type	Geographic Extent of Play*
Barnett	Shale	Texas
Eagle Ford	Shale	Texas
Fayetteville	Shale	Arkansas
Haynesville (Arkla Basin)	Shale	Louisiana
ETB Haynesville	Shale	Texas
Marcellus	Shale	Pennsylvania, West Virginia, New York, Kentucky, Virginia
Woodford	Shale	Oklahoma
Barnett-Woodford	Shale	Texas
Utica	Shale	Ohio, Pennsylvania, New York
Floyd	Shale	Mississippi , Alabama
Bossier	Shale	Texas
Antrim	Shale	Michigan
Niobrara	Shale	Colorado
Baxter	Shale	Wyoming
Pierre	Shale	Colorado, New Mexico
Mancos	Shale	Colorado, New Mexico, Utah
Mesa Verde	Shale	Colorado, New Mexico, Utah
Upper Devonian	Shale	Kentucky, New York, Ohio, Pennsylvania, Virginia, West Virginia
Ordovician	Shale	Kentucky, New York, Ohio, Pennsylvania, Virginia, West Virginia
Devonian	Shale	Kentucky, New York, Ohio, Pennsylvania, West Virginia
Jurassic-Lower Cretaceous	Shale	Texas
Big Sandy	Tight Sands	Kentucky, Virginia, West Virginia
Trenton-Black River	Tight Sands	Kentucky, New York, Ohio, Pennsylvania, Virginia, West Virginia
Cotton Valley	Tight Sands	Louisiana
Vernon/Terryville	Tight Sands	Louisiana
East Cotton Valley	Tight Sands	Texas
West Cotton Valley	Tight Sands	Texas
Deep Bossier	Tight Sands	Texas
Wilcox (Lobo)	Tight Sands	Texas
Granite Wash	Tight Sands	Texas, Oklahoma
Sahara	Tight Sands	Oklahoma
Colony Wash	Tight Sands	Arkansas
Hartshorne	Tight Sands	Oklahoma
Haley Deep	Tight Sands	Texas
Wattenberg-Niobrara-Codell	Tight Sands	Colorado
Piceance Emerging	Tight Sands	Colorado
Lower Cretaceous-Mesozoic	Tight Sands	Colorado
Natural Buttes	Tight Sands	Utah
Buttes Deep	Tight Sands	Utah
Lance	Tight Sands	Wyoming
Appalachian, avg	Coal Bed Methane (CBM)	Pennsylvania, Virginia, West Virginia

Unconventional Gas Plays	Play Type	Geographic Extent of Play*
Black Warrior - Pottsville	CBM	Alabama
Arkoma - Hartshorne	CBM	Oklahoma
Chatauqua	CBM	Oklahoma
Cherokee	CBM	Kansas
East Green River	CBM	Wyoming
LV Raton	CBM	Colorado, New Mexico
Piceance	CBM	Colorado
Big George	CBM	Wyoming, Montana
Wyodak	CBM	Wyoming, Montana
Canyon	CBM	Wyoming, Montana
Anderson	CBM	Wyoming, Montana
Uinta	CBM	Utah
San Juan	CBM	New Mexico, Colorado

*The list of gas plays provides the state location or locations of the full extent of the underground gas play. However, states containing part of a play do not necessarily have production from that play. For example, the Marcellus play extends into Virginia and Kentucky, but no extractions of Marcellus gas take place in those states at present or in the outlook for this study. This study also assumes that no Marcellus production is forthcoming from New York. A table on capital expenditures found in the next section on Economic Contribution Assessment provides a more important guide for how the impacts of US unconventional gas development flow to different states.

The cost of drilling and constructing a well and putting it into operation is a critical component of the economic viability of developing any unconventional gas play, and costs to the industry vary. An unconventional gas well in a shale or tight sands target may cost anywhere between $3.5 million and $12 million, while a well targeting CBM may cost between $500,000 and $1.5 million. The cost of the well depends on several factors such as the vertical depth of the well bore, its lateral length, reservoir pressure, rock characteristics, and the number of fracture stages, as well as commercial factors such as ease of access to materials and services, such as supplies of water, proppant, drilling and completion services. Capital expenditures are undertaken for land, drilling, completion, facilities, gathering, processing, and compression. The development of a major play also requires the addition of pipeline capacity to get the gas to market.

IHS CERA has estimated the costs associated with the production outlook for unconventional gas, which are based on IHS databases and proprietary models detailed in our prior report, "The Economic and Employment Contributions of Shale Gas in the United States." In this report, the production profiles were developed based on detailed analyses of each unconventional gas play. The production possibilities were constrained to be consistent with IHS CERA's outlook for natural gas demand, price, and infrastructure, as reported in its "North American Natural Gas Market Briefing" in September 2011. Well counts were estimated for each play consistent with the play-level production outlook, and capital expenditures associated with the well counts were estimated.

IHS CERA initially allocated the capital expenditures to individual states according to the geographic locations of each play. For plays that cross state boundaries, the capital expenditures were prorated to provide allocations among the states involved. The initial set of capital expenditures were further distributed to states where purchases are actually undertaken. This methodology is described in the next section.

Infrastructure capital expenditures include expenditures for gathering lines and processing plants, as well as the pipeline expansions required to connect new supply areas to consumers. Gathering and processing expenditures were allocated to the states in the same way that well expenditures were allocated. Pipeline expansion costs and allocations were based on the expansion requirements indicated by the Gas Pipeline Competition Model™, which was used for the market analysis in the study.

Economic Contribution Assessment

Data Requirements and Assumptions

In this economic contribution assessment, IHS Global Insight, with support from IHS CERA, compiled state-level data of unconventional gas activity in the 20 US states (13 of which have current and future development) that contain plays that extract natural gas from shale, tight sands, and CBM. Both the value of production and capital expenditures were input, by state, into the model to conduct the economic analysis.

The following activities were determined to be major direct contributors:

- Natural gas drilling
- Natural gas extraction
- Support activities and services required for oil and natural gas drilling and extraction
- Construction of facilities, related materials and machinery for hydraulic fracturing and completions, and construction of natural gas pipeline

The primary analytical tool for this multi-state study is the same IMPLAN Input-Output model used, with the IHS US Macroeconomic Model, in the overall US analysis. However, the architecture of the existing IMPLAN model could not efficiently handle the computational complexity of a multi-state analysis in which each state is, within IMPLAN, effectively an independent geographic region. To adjust for this limitation, IHS Global Insight ran multiple, alternative versions of the IMPLAN multi-regional model and integrated the output with in-house proprietary database to assess the indirect and induced economic contribution by industry and state. This fine-tuned methodology ensures that inputs that are not locally produced—or do not have a competitive advantage locally—are sourced from other states creating economic "leakage" from one state to another. In the broader context, economic "leakage" is explained as inter-regional activity in which the production requirements of a commodity (or a service) use inputs produced in other states thus causing the economic impact to "leak" to other states and introducing a regional ripple effect.

The model framework used here was set up as a system of linked state economies. As a result, the sourcing of inputs for the development of unconventional gas activity will impact those states that do not have an unconventional gas play within their borders. For example, the development of unconventional gas wells in Arkansas relies on bank, insurance and securities services in New York and professional services primarily located in Texas. Capturing these connections highlights the indirect economic contribution even in states that lack unconventional gas plays. The leakages also impact US GDP and employment multipliers, making them more accurate for states that do have unconventional gas plays.

The IMPLAN model also produces "own-state" multipliers—that is, the indirect and induced impact that flow from direct activity as a result of that state's unconventional gas development but exclude any impact from the supplier states providing services or products. Appendix C provides the results of this analysis, when cross-state ramifications are excluded.

In a given year, the volume of natural gas produced in each state is impacted by both the wells drilled during the course of the year and by wells drilled in previous years that remained in operation. The monetary value of gas production volumes was calculated using the Henry Hub price. These values served as inputs to the oil and gas extraction industry in the corresponding states in the IMPLAN model.

Capital Expenditures

While the value of gas production is attributed only to states with unconventional gas plays, the allocation of capital expenditures among the 48 producing and non-producing states is more involved. Capital expenditures act as direct impacts at both the state and industry levels. The complexity lies in the fact that a portion of that spending

may be allocated to states that do not have unconventional gas plays. This spending will trigger indirect and induced impacts in these states as they provide goods and services. To ensure that these effects are included in the economic analysis, IHS Global Insight used industry input, IHS Global Insight's in-house expertise and proprietary databases, and extensive additional research to arrive at the best possible methodology for allocating capital expenditures among different states.

The first step, as in the national study, was to map the capital expenditure breakdown for the categories specified by the IMPLAN model. Capital expenditure and support services for natural gas drilling correspond to industry sectors within the IMPLAN model. However, the breakdowns for drilling, completion, facilities, gathering, processing, pipeline construction, and liquid natural gas exports were mapped to many other categories of the model.

The research, expertise and input from industry sources were integrated with an interstate trade-flow database to determine the sources of various products and services by state. For example, it is evident that unconventional gas extraction requires special sand for hydraulic fracturing that is produced primarily in Wisconsin, Minnesota, Ohio, and Arkansas. Since not all states with unconventional gas plays produce these unusual sands, they must import them from other states and are assumed to do so in the model. IHS's trade-flow database was one of many sources used to determine the origin and destination of the various materials and equipment on a state level basis.

This process was undertaken for all the products in the 13 states with current and future drilling in unconventional gas plays. The final set of capital expenditures, by various products and services, and, if applicable the value of production, was input into 44 IMPLAN state models to assess the contribution on each individual state's economy.

The following table presents the distribution of capital expenditures, by state, for all unconventional gas.

US State-Level Annual Capital Expenditures: Unconventional Gas*

($Th)

	2010	2015	2020	2025	2030	2035
Alabama	88,198	298,134	211,635	123,635	258,901	97,145
Arizona	92	110	25,457	67,596	175	200
Arkansas	1,674,752	2,476,340	3,085,442	3,624,901	4,372,585	5,270,629
California	1,792,229	2,766,315	3,301,097	3,611,178	4,218,463	4,860,867
Colorado	4,326,768	10,110,603	11,969,358	11,463,671	12,026,623	13,361,154
Connecticut	2,199	3,067	5,260	5,484	7,652	11,980
Delaware	87,721	112,401	188,339	195,549	269,226	415,616
Florida	474,246	1,289,315	732,600	311,469	1,389,372	357,554
Georgia	273,702	374,289	243,848	83,628	388,887	55,700
Idaho	2,929	7,544	8,978	12,169	15,959	19,849
Illinois	789,017	1,089,138	1,630,895	1,769,409	2,310,066	3,222,471
Indiana	183,532	226,242	374,257	390,165	533,868	817,060
Iowa	78,210	180,845	229,437	278,192	358,615	464,589
Kansas	168,896	355,504	429,051	482,980	571,271	673,717
Kentucky	302,190	310,017	433,158	479,157	599,869	793,877
Louisiana	5,261,222	6,772,454	6,298,067	7,076,555	7,954,937	9,164,785
Maryland	2,084	2,808	4,769	4,989	6,931	10,788
Massachusetts	40,153	54,355	92,443	96,653	134,356	209,295
Michigan	1,100,916	1,749,145	2,643,963	2,843,977	3,675,159	5,009,391
Minnesota	80,105	215,268	252,339	250,066	270,750	307,869
Mississippi	11,572	450,321	246,439	160,795	165,182	148,872
Missouri	1,396,689	2,276,124	3,265,169	3,814,038	4,818,032	5,972,064
Montana	326	1,562	3,952	4,167	4,360	4,789
Nebraska	41,164	112,785	133,865	172,504	221,395	274,189
Nevada	261,370	21,791	90,592	33,285	41,055	51,288
New Hampshire	11,524	15,960	27,318	28,499	39,728	62,128
New Jersey	227,351	230,677	371,154	375,067	500,846	751,713
New Mexico	507,570	657,168	803,839	1,073,100	1,193,464	1,392,301
New York	111,869	122,330	204,222	207,597	281,826	427,600
North Carolina	13,220	0	36,564	0	0	0
Ohio	1,749,294	2,176,777	3,551,881	3,687,076	4,974,479	7,416,145
Oklahoma	2,034,698	3,635,595	4,852,863	5,646,081	7,074,172	8,725,802
Oregon	147,021	100,742	111,455	96,564	92,235	96,491
Pennsylvania	3,137,275	4,493,278	7,655,977	7,949,314	11,025,053	17,034,074
South Carolina	9,243	2,469	21,222	8,340	12,151	6,837
South Dakota	3,106	8,949	10,666	14,653	19,439	24,460
Tennessee	50,525	27,384	55,263	43,331	52,480	50,297
Texas	20,985,288	31,831,564	46,217,167	53,187,694	67,419,993	82,530,724
Utah	2,189,541	2,885,964	3,381,468	4,033,959	4,730,273	5,223,302
Virginia	238,551	261,814	416,916	446,013	601,777	898,362
Washington	18	52	131	138	144	158
West Virginia	1,181,468	1,643,809	2,696,010	2,854,824	3,904,395	5,944,282
Wisconsin	45,641	85,488	121,625	140,719	187,488	259,761
Wyoming	1,488,366	3,525,542	4,178,904	5,552,087	7,222,197	8,968,134
US Total	**52,571,853**	**82,962,040**	**110,615,055**	**122,701,270**	**153,945,828**	**191,388,309**

NOTE: *Unconventional gas includes gas from shale, tight sands, and coal bed methane.

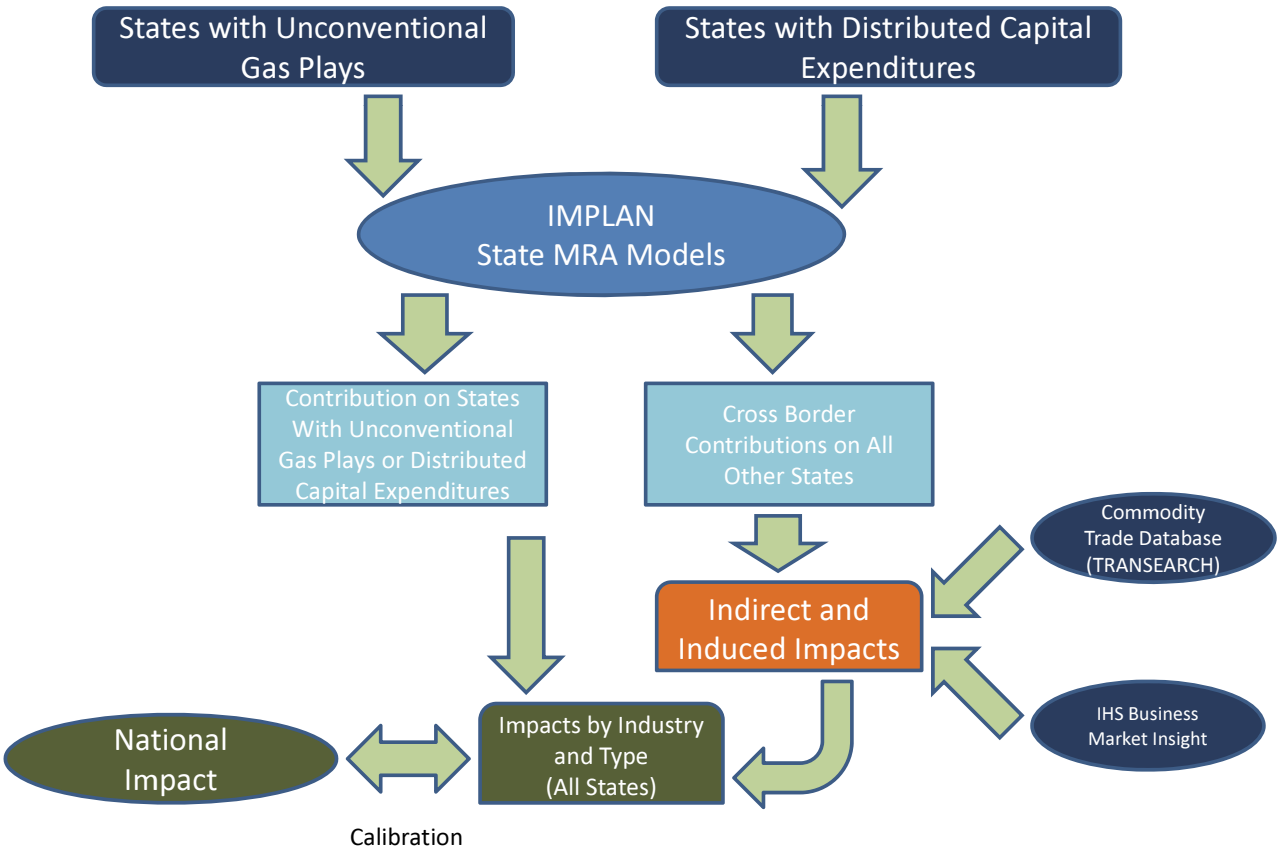
Source: IHS Global Insight

Modeling the State Economic Contribution

The multi-regional capability of the IMPLAN model estimated the economic contributions of unconventional gas production and capital spending at the state level. The methodology assessed not only the contribution to states with unconventional gas production but also non-producing states affected directly (via capital expenditures) or indirectly (via cross-state trade flows) by the producing states' activity. The IMPLAN model calculated the contribution to states with unconventional gas production and/or allocated direct capital spending. However, indirect and induced impacts were determined using various analytical tools: the IMPLAN model, IHS Global Insight's trade-flow databases for product groupings, and IHS Business Market Insight for services categories. The process was repeated for each state with unconventional gas production and for those states affected by direct capital spending (a subset of non-producing states). Finally, all of the state-by-industry direct, indirect and induced contributions to employment, value added to GDP, labor income, and government revenue were calibrated with the national results.

Starting with the IMPLAN Multi Regional Analysis (MRA) capability, each of the state models were simulated using production and/or capital expenditures depending on whether the state is a producing state or not. The MRA results were obtained for each state with direct production and/or capital expenditures as well as for all states that experience cross border impacts (leakages). The cross border contributions on the other states include both supply chain (indirect) and income (induced) effects. To ensure these impacts were traced to the best possible source location, IHS used its point-to-point commodity trade database (Transearch) and establishment location database (Business Market Insight) to determine the distribution of cross border contributions by state and industry. Finally, all of the state-by-state level results were calibrated with the national results to report a consistent and cohesive set of contributions by state and industry.

State-Level Enhanced Economic Contribution Methodology Schematic



3. Results

The analysis of unconventional gas development and its contribution to the US regional economies was conducted using a top-down/bottom-up approach. The contribution was assessed separately for direct, indirect, and induced contributions defined as follow:

- Direct contributions of unconventional gas are those activities required to explore, produce, transport, and deliver natural gas to consumers or to provide critical supplies or onsite services that support unconventional gas activity.
- Indirect contributions are defined as activities in outside industries that supply equipment, material and services for the development of unconventional gas and its tier suppliers.
- Induced contributions are the economic effects caused by workers spending their wages and salaries on consumer goods and household items.

This IHS Global Insight study was performed on a state-by-state basis. However, to summarize the findings across the lower 48 states and the District of Columbia, the results are presented in two distinct groups.

First are the 20 so-called "producing" states. Of these, 13 states have both existing and new well drilling and production activities, and another seven states have economic activity from their existing unconventional gas wells, but no new well drilling and development is anticipated over the course of our forecast horizon.

Second are the "non-producing" states, of which there are 28 in the lower 48 states; our analysis also includes the District of Columbia. These states benefit from unconventional gas development through supply chains, trade flows with the various producing and non-producing states, and the income effects of earnings spent within these states.

Direct activity in the producing states includes new well drilling and completion, unconventional gas production, and spending on various capital equipment and commodities for unconventional gas activity. Many of these states have built strong support industries, and they participate in the unconventional gas supply chain. The direct contribution from direct and indirect activity associated with unconventional gas production is further amplified on income and will fuel consumer expenditures—the induced impact.

Employment Contribution of Unconventional Gas* in Producing States vs. Non-Producing States: 2015**
(Number of workers)

	Producing States	Non-Producing States	All States
Direct	309,070	24,709	333,779
Indirect	374,296	105,191	479,487
Induced	511,980	138,204	650,184
Total	1,195,346	268,104	1,463,450

NOTES: *Unconventional gas includes gas from shale, tight sands, and coal bed methane.
**Producing states are the 20 states that have either new well completions and production or production from existing wells. They include Alabama, Arkansas, Colorado, Illinois, Kansas, Kentucky, Louisiana, Michigan, Mississippi, Montana, New Mexico, New York, Ohio, Oklahoma, Pennsylvania, Texas, Utah, Virginia, West Virginia, and Wyoming; the rest of the states are non-producing states.
Source: IHS Global Insight

While most of the capital spending is undertaken in the producing states, non-producing states will benefit directly from purchases of goods and services that constitute the capital spending that supports unconventional gas activity. Some of the capital goods industries in the non-producing states will have competitive advantages over the producing states, which will cause spending to leak out to those states. In addition, non-producing states actively participate in the supply chain and will contribute to the indirect impact and expenditure induced impact.

The tables on the following pages show the state-by-state results for employment, value added to GDP and government revenue for all 48 states and the District of Columbia in the primary forecast years: 2010, 2015, and 2035. More detailed tables are provided in the appendices.

US State-Level Employment Contribution of Unconventional Gas* Summary

(Number of workers)

	2010	2015	2035
Alabama	8,675	12,673	15,866
Arizona	6,918	10,364	19,737
Arkansas	36,698	53,919	79,723
California	22,773	33,265	49,494
Colorado	77,466	126,525	127,843
Connecticut	5,017	7,015	10,380
Delaware	1,681	2,362	4,770
District of Columbia	905	1,348	2,294
Florida	15,758	27,402	30,903
Georgia	13,294	18,800	29,262
Idaho	1,841	2,766	4,818
Illinois	25,773	36,387	61,657
Indiana	10,819	15,206	26,837
Iowa	5,183	8,095	14,526
Kansas	5,353	7,594	12,470
Kentucky	10,870	14,252	21,825
Louisiana	81,022	124,782	200,555
Maine	1,666	2,390	3,774
Maryland	7,008	10,263	16,634
Massachusetts	4,968	7,220	11,356
Michigan	28,063	37,926	63,380
Minnesota	9,271	14,499	22,638
Mississippi	3,259	9,428	8,768
Missouri	12,031	17,427	30,105
Montana	1,591	2,236	3,582
Nebraska	3,199	5,142	9,216
Nevada	2,153	1,743	3,278
New Hampshire	647	938	1,576
New Jersey	6,865	9,271	15,064
New Mexico	20,417	19,617	18,462
New York	26,887	39,047	58,377
North Carolina	11,377	16,570	28,271
North Dakota	1,141	1,867	3,645
Ohio	31,462	41,366	81,349
Oklahoma	28,315	41,763	69,261
Oregon	6,756	8,516	14,107
Pennsylvania	56,884	111,024	270,058
Rhode Island	1,368	1,968	2,904
South Carolina	5,607	8,227	14,368
South Dakota	1,176	1,770	2,959
Tennessee	8,519	12,323	21,487
Texas	288,222	385,318	682,740
Utah	30,561	36,593	50,839
Vermont	848	1,261	1,922
Virginia	13,162	17,753	30,732
Washington	3,904	5,797	9,777
West Virginia	16,888	31,380	71,620
Wisconsin	9,608	14,285	24,871
Wyoming	34,787	45,763	78,792
US Total	**1,008,658**	**1,463,450**	**2,438,877**

NOTE: *Unconventional gas includes gas from shale, tight sands, and coal bed methane.

Source: IHS Global Insight

US State-Level Government Revenue Contribution of Unconventional Gas* Summary

($M)

	2010	2015	2035
Alabama	240	263	295
Arizona	136	203	385
Arkansas	1,193	1,792	2,775
California	1,516	2,237	3,440
Colorado	3,197	4,434	4,526
Connecticut	116	163	237
Delaware	39	54	110
District of Columbia	15	23	40
Florida	536	886	1,201
Georgia	271	364	578
Idaho	31	48	87
Illinois	630	865	1,467
Indiana	212	275	473
Iowa	97	153	278
Kansas	120	155	251
Kentucky	291	356	473
Louisiana	2,074	3,897	7,702
Maine	26	38	60
Maryland	152	226	357
Massachusetts	263	391	611
Michigan	693	884	1,403
Minnesota	224	350	539
Mississippi	67	153	172
Missouri	426	594	1,007
Montana	44	58	85
Nebraska	61	99	185
Nevada	139	94	173
New Hampshire	46	68	118
New Jersey	353	475	834
New Mexico	1,091	1,045	914
New York	721	1,038	1,599
North Carolina	252	300	519
North Dakota	22	41	85
Ohio	688	885	1,719
Oklahoma	875	1,310	2,257
Oregon	143	192	319
Pennsylvania	1,476	3,505	8,889
Rhode Island	23	33	48
South Carolina	114	136	240
South Dakota	18	27	46
Tennessee	140	196	348
Texas	10,891	14,757	26,412
Utah	662	818	1,190
Vermont	14	22	33
Virginia	321	401	685
Washington	161	242	421
West Virginia	514	1,111	2,749
Wisconsin	211	315	546
Wyoming	2,247	3,362	6,243
US Total	**33,793**	**49,335**	**85,123**

NOTE: *Unconventional gas includes gas from shale, tight sands, and coal bed methane.

Source: IHS Global Insight

US State-Level Value Added Contribution of Unconventional Gas* Summary

($M)

	2010	2015	2035
Alabama	952	1,183	1,405
Arizona	529	791	1,509
Arkansas	4,910	7,264	10,540
California	2,192	3,197	4,617
Colorado	12,258	18,162	17,485
Connecticut	422	587	865
Delaware	163	226	482
District of Columbia	72	108	186
Florida	1,163	2,034	2,266
Georgia	1,147	1,622	2,398
Idaho	142	214	375
Illinois	2,560	3,555	6,178
Indiana	957	1,326	2,331
Iowa	420	665	1,189
Kansas	512	702	1,135
Kentucky	1,234	1,572	2,174
Louisiana	11,020	20,005	37,759
Maine	124	177	282
Maryland	555	814	1,281
Massachusetts	423	613	981
Michigan	2,966	3,794	6,096
Minnesota	796	1,272	1,937
Mississippi	264	675	685
Missouri	1,057	1,529	2,616
Montana	162	214	318
Nebraska	265	429	791
Nevada	180	128	237
New Hampshire	52	75	128
New Jersey	640	841	1,406
New Mexico	3,356	3,160	2,589
New York	2,316	3,325	5,000
North Carolina	909	1,318	2,185
North Dakota	105	190	390
Ohio	3,045	3,942	7,921
Oklahoma	4,008	6,033	9,905
Oregon	548	689	1,093
Pennsylvania	7,121	16,806	42,438
Rhode Island	107	153	225
South Carolina	444	655	1,155
South Dakota	88	132	220
Tennessee	683	986	1,727
Texas	47,995	64,768	111,089
Utah	3,126	3,866	5,343
Vermont	68	101	152
Virginia	1,273	1,634	2,789
Washington	298	441	761
West Virginia	2,239	4,563	10,313
Wisconsin	783	1,167	2,044
Wyoming	6,760	8,815	14,735
US Total	**133,405**	**196,516**	**331,728**

NOTE: *Unconventional gas includes gas from shale, tight sands, and coal bed methane.

Source: IHS Global Insight

US State-Level Labor Income Contribution of Unconventional Gas* Summary

($M)

	2010	2015	2035
Alabama	583	801	1,069
Arizona	430	643	1,241
Arkansas	2,314	3,407	5,020
California	1,553	2,295	3,397
Colorado	5,958	9,258	9,236
Connecticut	344	479	702
Delaware	116	164	334
District of Columbia	61	91	158
Florida	912	1,564	1,860
Georgia	860	1,226	1,943
Idaho	113	169	295
Illinois	1,828	2,562	4,374
Indiana	716	999	1,734
Iowa	321	499	892
Kansas	347	491	819
Kentucky	708	930	1,396
Louisiana	5,492	9,238	16,361
Maine	100	143	227
Maryland	460	674	1,064
Massachusetts	343	498	791
Michigan	1,851	2,483	4,135
Minnesota	616	963	1,500
Mississippi	206	497	534
Missouri	724	1,049	1,794
Montana	104	146	230
Nebraska	207	329	606
Nevada	133	101	189
New Hampshire	41	59	99
New Jersey	497	662	1,097
New Mexico	1,461	1,407	1,277
New York	1,871	2,710	4,075
North Carolina	731	1,061	1,775
North Dakota	79	138	282
Ohio	2,031	2,684	5,225
Oklahoma	1,993	2,961	4,885
Oregon	406	524	856
Pennsylvania	3,975	8,351	20,349
Rhode Island	87	125	184
South Carolina	353	521	921
South Dakota	70	104	173
Tennessee	537	782	1,371
Texas	22,840	30,769	53,427
Utah	1,710	2,098	2,952
Vermont	54	81	122
Virginia	889	1,191	2,086
Washington	243	360	617
West Virginia	1,091	2,088	4,697
Wisconsin	611	906	1,590
Wyoming	2,753	3,669	6,196
US Total	**71,727**	**104,951**	**176,154**

NOTE: *Unconventional gas includes gas from shale, tight sands, and coal bed methane.

Source: IHS Global Insight

4. Conclusion

Unconventional gas activity is expected to make a significant contribution to all of the economies of the lower 48 states over the next 25 years. Traditional oil and gas producing states like Texas and Louisiana will continue to lead the way in terms of their absolute contributions to the US economy. But many new and emerging energy states will drive much of the growth in the coming years, and the economic activity generated by this increase in unconventional gas activity will also reach well beyond the traditional unconventional producing states.