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WHERE THE JOBS ARE:
Small Businesses Unleash America's Energy Employment Boom

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Key Findings

America continues to suffer from a post–World War II record slow recovery in employment as well as record worker anxiety. Meanwhile, the brightest corner of the economy, the oil & gas sector, has seen stunning growth in creating jobs across the nation and in dozens of domains. With the right policies, much more is possible to encourage and accelerate the small-business-centric oil & gas revolution.

- *Overall U.S. employment has yet to return to its prerecession level, but the number of oil & gas jobs has grown 40 percent since then.*
- *In the 10 states at the epicenter of oil & gas growth, overall statewide employment gains have greatly outpaced the national average.*
- *A broad array of small and midsize oil & gas companies are propelling record economic and jobs gains—not just in the oil fields but across the economy.*
- *America's hydrocarbon revolution and its associated job creation are almost entirely the result of drilling & production by more than 20,000 small and midsize businesses, not a handful of "Big Oil" companies. In fact, the typical firm in the oil & gas industry employs fewer than 15 people.*
- *The shale oil & gas revolution has been the nation's biggest single creator of solid, middle-class jobs—throughout the economy, from construction to services to information technology.*
- *Overall, nearly 1 million Americans work directly in the oil & gas industry, and a total of 10 million jobs are associated with that industry.*
- *Oil & gas jobs are widely geographically dispersed and have already had a significant impact in more than a dozen states: 16 states have more than 150,000 jobs directly in the oil & gas sector and hundreds of thousands more jobs due to growth in that sector.*
- *In recent years, America's oil & gas boom has added $300–$400 billion annually to the economy—without this contribution, GDP growth would have been negative and the nation would have continued to be in recession.*
- *The resources, technology, infrastructure, and thousands of small and midsize businesses are capable of producing even more growth and many more jobs, so long as policymakers do not obstruct progress in the oil & gas sector.*

About the Author

MARK P. MILLS is a senior fellow of the Manhattan Institute and founder and CEO of the Digital Power Group, a tech-centric capital advisory group. He was the cofounder and former chief tech strategist for Digital Power Capital, a boutique venture fund. Mills cofounded and served as chairman and CTO of ICx Technologies, helping take it public in a 2007 IPO. He is a member of the advisory council of the McCormick School of Engineering and Applied Science at Northwestern University and serves on the board of directors of the Marshall Institute, and is a member of the Advisory Board of Notre Dame's Reilly Center for Science, Technology and Values.

Mills writes the "Energy Intelligence" column for *Forbes* and is coauthor of the book *The Bottomless Well: The Twilight of Fuel, the Virtue of Waste, and Why We Will Never Run Out of Energy* (Basic Books, 2005) which rose to #1 in Amazon.com's science and math rankings. He has been published in various popular publications, including *The Wall Street Journal* and *The New York Times Magazine*. Mills has appeared on many news and talk shows including those on CNN, FOX News, CNBC, PBS, NBC, and ABC, and on *The Daily Show with Jon Stewart*.

Mills was earlier a technology adviser for Banc of America Securities, and a coauthor of a successful energy-tech investment newsletter, the *Huber-Mills Digital Power Report*, published by Forbes and the Gilder Group. He has testified before the U.S. Congress and briefed many state public service commissions and state legislators. Mills served in the White House Science Office under President Ronald Reagan. Early in his career, he was an experimental physicist and development engineer for RCA in the fields of integrated circuits and microprocessors, and worked at Bell Northern Research (NORTEL) in fiber optics, defense, and solid-state devices—fields in which he holds several patents. Mills holds a degree in physics from Queen's University, Canada.

Acknowledgments

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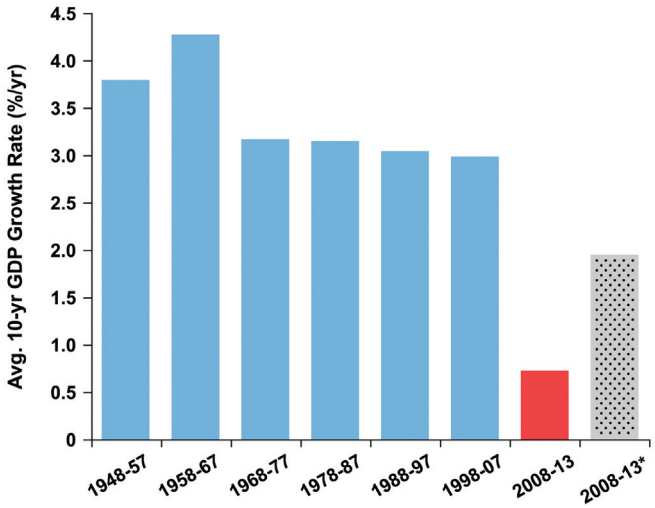
I. INTRODUCTION AND OVERVIEW

The American economy is still recovering from the 2008–09 recession, and only slowly. Overall, growth in the U.S. GDP continues to substantially lag the track record of the last half-century. GDP growth has been far too tepid to support or encourage broad-based hiring, so for many unemployed and underemployed Americans, the recession effectively continues.

POST-RECESSION ECONOMIC RECOVERY REMAINS HISTORICALLY TEPID

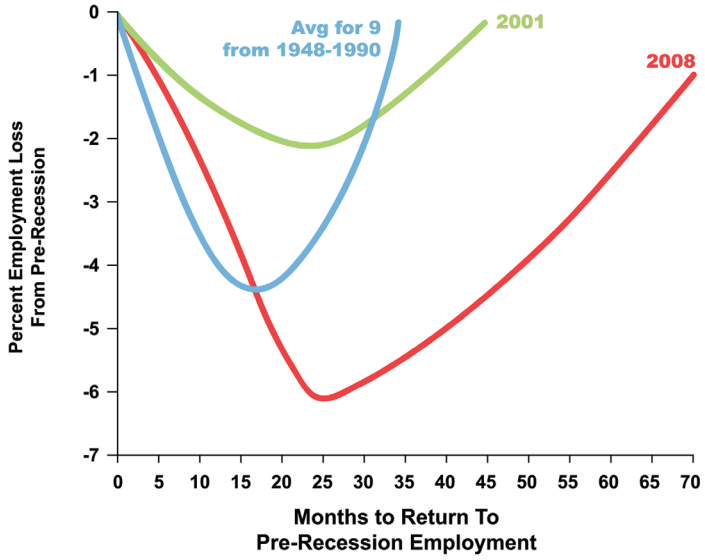


The last half-decade has shown the lowest average GDP growth rate of any decade since WWII.

** Recent GDP growth lags the historical record even if the negative GDP growth in 2008 and 2009 are not included in the average. (Note that the averages for previous decades do include years with negative growth.)*

Data source: J. T. Young, "The Worst Four Years of GDP Growth in History: Yes, We Should Be Worried," Forbes, April 12, 2013

OVERALL JOB RECOVERY FOLLOWING RECESSIONS



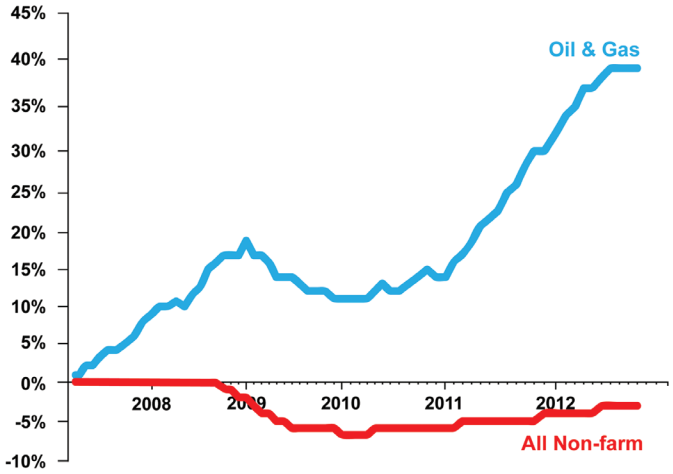
The 2008 recession caused a deeper and longer job loss than any of the ten previous recessions since 1945.

Data source: CalculatedRISK Finance & Economics

The jobs recovery since the 2008 recession has been the slowest of any post recession recovery in the U.S. since World War II. The number of people employed has yet to return to the 2007 level. The country has suffered a deeper and longer-lasting period of job loss than has followed any of the ten other recessions since 1945.[1]

There has, however, been one employment bright spot: jobs in America's oil & gas sector and related industries.

GROWTH IN OIL & GAS EMPLOYMENT OUTPACES THE REST OF THE ECONOMY



Job growth in the oil & gas sector has boomed even as the overall employment picture has lagged.

Data source: FRED Economic Data, Federal Reserve Bank of St. Louis

Since 2003, more than 400,000 jobs have been created in the direct production of oil & gas and some 2 million more in indirect employment in industries such as transportation, construction, and information services associated with finding, transporting, and storing fuels from the new shale bounty.[2]

In addition, America is seeing revitalized growth and jobs in previously stagnant sectors of the economy, from chemicals production and manufacturing to steel and even textiles because of access to lower cost and reliable energy.

The surge in American oil & gas production has become reasonably well-known; far less appreciated are two key features, which are the focus of this paper: the widespread geographic dispersion of the jobs created; and the fact that the majority of the jobs have been created not in the ranks of the "Big Oil" companies but in small businesses, even more widely dispersed.

2. THE RESURGENT AMERICAN OIL & GAS INDUSTRY

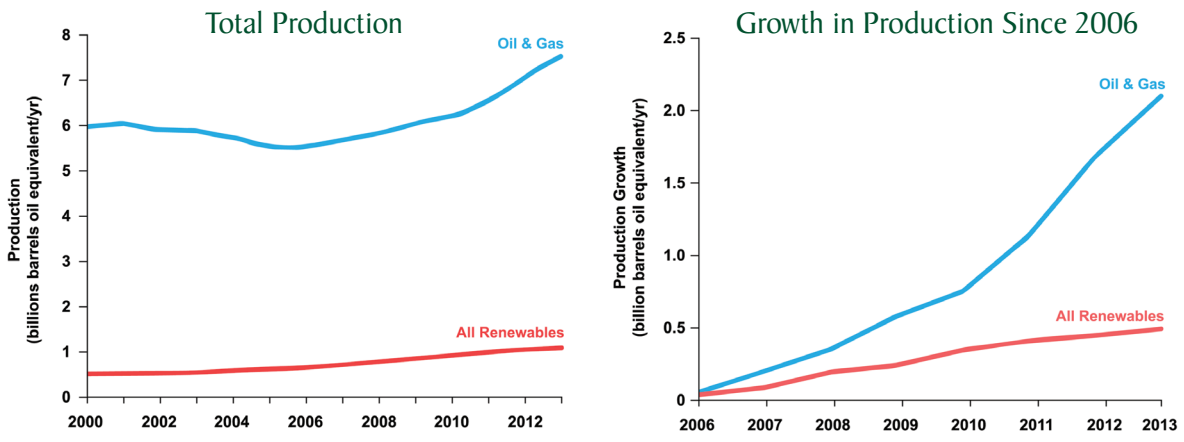
The United States is now the world's largest and fastest-growing producer of hydrocarbons. It has surpassed Saudi Arabia in combined oil and natural gas liquids output[3] and has now surpassed Russia, formerly the top producer, in natural gas.[4] The International Energy Agency (IEA) predicts that the U.S. will produce more petroleum than either Saudi Arabia or Russia by 2015.[5]

The increased production of domestic hydrocarbons not only employs people directly but also radically reduces the drag on growth and job formation associated with America's trade deficit.[6] As the White House Council of Economic Advisors noted this past summer: "Every barrel of oil or cubic foot of gas that we produce at home instead of importing abroad means more jobs, faster growth, and a lower trade deficit."[7]

Oil and gas, not alternative fuels, have been the primary drivers of growth in energy production, economic independence, and job formation. In fact, since the 2008 recession officially ended, U.S. oil production is up 60 percent, driving a 50 percent collapse in oil imports. Meanwhile, over the past four years, production of ethanol—which now consumes 40 percent of all corn grown but supplies less than 5 percent of transportation energy[8]—rose only 10 percent and has, at best, reduced U.S. oil imports by just 1 percent.[9]

The stunning recent growth in the domestic oil & gas sector is a bright spot in a still-struggling economy. In just two years, U.S. oil output has risen by 2 million

AMERICA'S SOARING OIL & GAS OUTPUT



The growth in oil & gas production from America's shale fields in the last seven years exceeds by twofold the total production of energy from all renewable sources (excluding hydro dams).

Data source: U.S. Energy Information Administration

barrels per day.[10] In just two years, U.S. oil production has grown more than it declined over the previous 20 years. Natural gas is so abundant that the U.S. now has a permanent competitive global advantage both for domestic industries and exports. And *exports* of refined petroleum products (gasoline, diesel, jet fuel) have tripled since 2006.[11] The U.S. is a net exporter of such products for the first time since 1949.

After decades of handwringing over the seemingly inexorable decline in U.S. energy production, the entire political, policy, and physical ecosystem of oil & gas has been turned upside-down. And all this new production did not arise from government programs, stimulus, or from new discoveries; the new production comes from hydrocarbon-dense shale fields that the U.S. Geological Survey mapped out a century ago, now unlocked by the modern era of smart drilling, a technological ecosystem invented in America. Smart drilling is a combination of hydraulic fracturing ("fracking") with information technology sensing and control, with steerable horizontal drilling to follow the richest seams to release tightly bound oil and gas.

While the long-term geopolitical, structural, and trade implications have yet to play out, there have already been short-term impacts. The overall impact of growth in output from America's hydrocarbon fields is contributing $300–$400 billion a year to the U.S. economy.[12] The single most important consequence of this hydrocarbon boom has been the far-reaching creation of jobs rippling through an economy where overall employment recovery is otherwise still slow.[13]

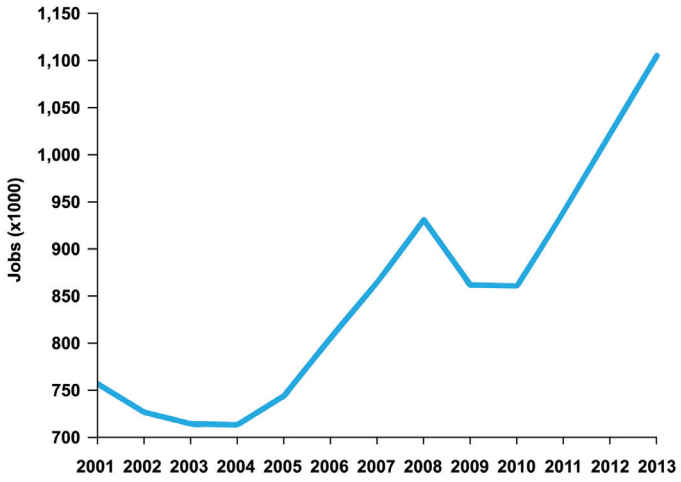
3. Jobs in America's Oil & Gas Industry

Direct employment in the oil & gas industry had been declining for 30 years but has recently reversed course, with the availability of new technologies to develop shale fields. Nearly 300,000 direct oil & gas jobs have been created following the 2003 nadir in that sector's direct employment.

Direct employment in the oil & gas industry falls into three categories: drilling, extraction, and support. As technology enables drilling to become ever more productive, employment directly related to drilling moves much more slowly than all the jobs associated with handling, delivering, and processing the rising output from the wells.

Although the hydrocarbon sector is popularly viewed as the domain of Big Oil, the vast majority of the jobs associated with oil & gas are found in small businesses.

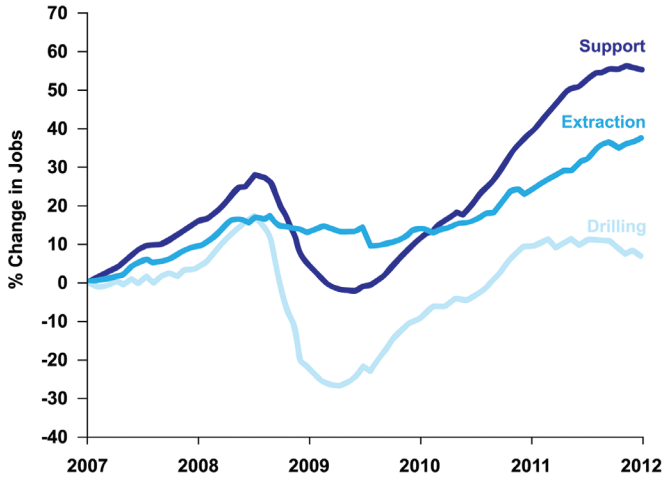
TWO DECADES OF DIRECT EMPLOYMENT IN OIL & GAS INDUSTRIES



Note: Data exclude ~1 million people employed at gasoline stations.

Data source: FRED Economic Data, Federal Reserve Bank of St. Louis; Quarterly Census of Employment and Wages

TYPES OF DIRECT OIL & GAS JOBS



Smart drilling has driven a massive resurgence in hydrocarbon output from America's shale fields.

Data source: U.S. Energy Information Administration

The five super-major oil companies—Exxon, BP, Chevron, Shell, Conoco—that operate in the U.S. account for only 10 percent of Americans working directly in the oil & gas business.[14]

Meanwhile, more than 20,000 other firms are directly involved in the oil & gas industry, and they produce over 75 percent of America's oil & gas output.[15] The median independent oil & gas firm has fewer than 15 employees. (Note that these data exclude gasoline stations, which employ nearly 1 million people and are overwhelmingly owned by individuals or small businesses.)

While many smaller oil & gas companies have grown in recent years and become quite large—call them super-minors—they are all still small by global super-major standards. Even the biggest of the super-minors—companies such as Anadarko, Apache, Pioneer, EOG, EQT, Devon, and Continental—have market capitalizations in the $20–$40 billion range, each only a fraction of the super-majors' market caps of $150–$400 billion. And the majority of the approximately 60 super-minors countable in the top 100 producers have an average market cap of about $1 billion, which is, by financial-markets definition, a "small-cap" company.[16]

The small companies work almost entirely onshore, leaving the multibillion-dollar deepwater offshore rigs in the domain of the super-majors (and a few of the super-minors).[17] The small companies on the onshore shale fields are where all the dramatic growth in production—and employment—has occurred in recent years.

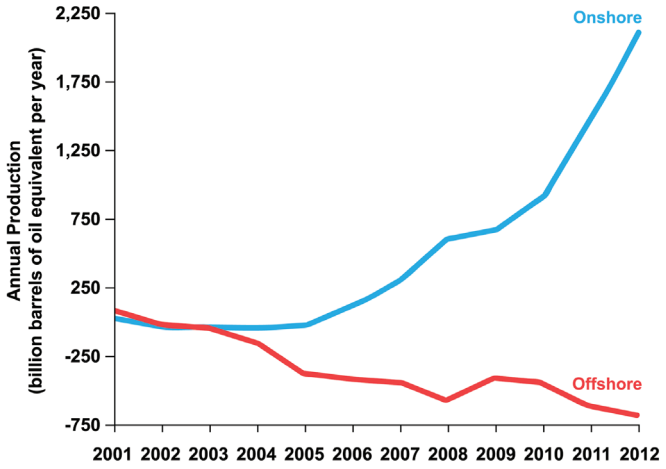
While none of the super-minors or the tens of thousands of other smaller companies—of which only one-fifth are publicly traded companies[18]—are household names, these businesses have played central roles in igniting job growth in dozens of states.

Thus, the enormous expansion in employment, exports, and tax revenues from the domestic oil & gas revolution is largely attributable to a core and defining feature of America: small businesses.

4. JOBS CREATED BY AMERICA'S OIL & GAS BOOM

The oil & gas sector boom creates "induced" and energy-related jobs. For every direct job, there are, on average, three jobs created in industries such as housing, retail, education, health care, food services, manufacturing, and construction (the last was one of

U.S. OIL & GAS PRODUCTION SINCE 2001: GROWTH COMING FROM ONSHORE AND SMALL COMPANIES



Smart drilling has driven a massive resurgence in oil & gas output from America's onshore fields, which are largely the domain of thousands of small and midsize companies.

Data source: U.S. Energy Information Administration

the hardest-hit industries during the Great Recession—and still lagging).[19]

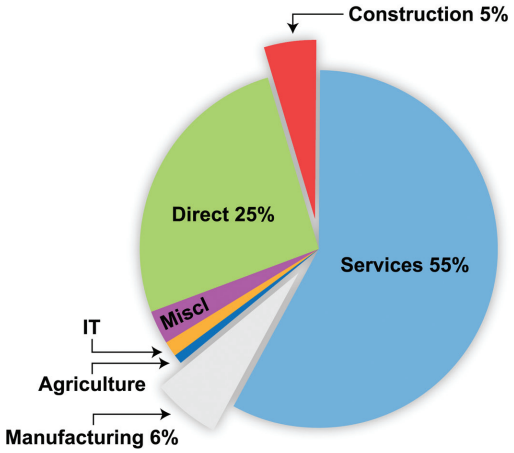
Even more jobs are being created indirectly because the availability of abundant low-cost energy sources allows businesses to expand or locate in America.[20]

The directly "induced" jobs include Americans put to work building infrastructure for the hydrocarbon extraction, transportation, and processing industries. They are erecting new steel mills for underground pipes, manufacturing thousands of new railcars, and constructing 80 major pipeline projects right now (not counting the Keystone XL from Canada). Refineries are expanding everywhere. Even shipyards are booming, with more than two dozen supertankers being built in the United States.[21] All this activity is genuinely "shovel-ready" and subsidy-free.

All told, about 10 million Americans are employed directly and indirectly in a broad range of businesses associated with hydrocarbons.[22]

In addition to the direct and induced jobs, America is beginning to see the economic and jobs impact

WHERE THE 10 MILLION HYDROCARBON-RELATED JOBS ARE FOUND



For every person working directly in the oil & gas ecosystem, three are employed in related or "induced" businesses. (Direct jobs here include gasoline stations.)

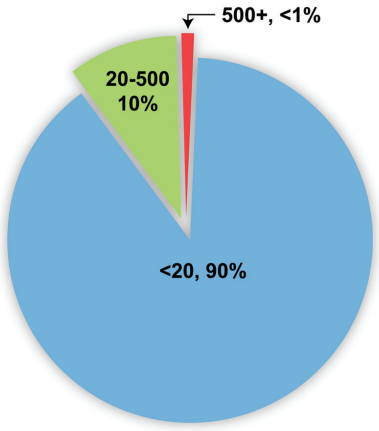
Data source: Economic Impacts of the Oil and Natural Gas Industry on the US Economy in 2011, PwC, July 2013

of a renaissance in energy-intensive parts of the manufacturing sector, from plastics and chemicals to fertilizers. Examples include an Egyptian firm planning a $1 billion fertilizer plant in Iowa and a South Korean tire company with an $800 million plan for a Tennessee plant. Germany's BASF recently announced expansion of its American investments, including production and research. BASF calculated that its German operations' energy bill would be $700 million a year lower if it could pay American prices for energy.[23] In every case, a low-cost reliable supply of energy was the clincher.

Abundant, low-cost energy has already attracted over $70 billion in new investments in 100 chemical operations, according to a 2013 American Chemistry Council survey. Those plants are expected to come online by 2017 and will create more than 1 million new jobs and add $300 billion annually to the GDP.[24]

In another recent study, the National Association of Manufacturers estimated that the shale revolution will lead to 1 million manufacturing jobs over the coming decade.[25] Manufacturing jobs pay nearly 30 percent more than the industrial average and generate $1.48 of economic activity for every $1 spent, making manufacturing the highest economic multiplier of all industrial sectors.

SHARE OF ALL U.S. FIRMS BY SIZE
(NUMBER OF EMPLOYEES)



Some 90 percent of all firms in America employ fewer than 20 people.

Data source: Bureau of Economic Analysis

All this activity catalyzes other non-energy-centric manufacturing and related businesses, from housing to health care to information technology. Even Chinese and Indian textile firms are building factories in the United States in significant measure because of low-cost (and reliable) energy supplies.[26]

As with the oil & gas industry itself, we can expect that the majority of these businesses will continue to look like existing ones: dominantly small businesses.

As in the oil & gas industry, most Americans are employed by firms with fewer than 500 employees.[27] Small businesses not only employ half of all American workers but also generate nearly half the nation's economic output.[28]

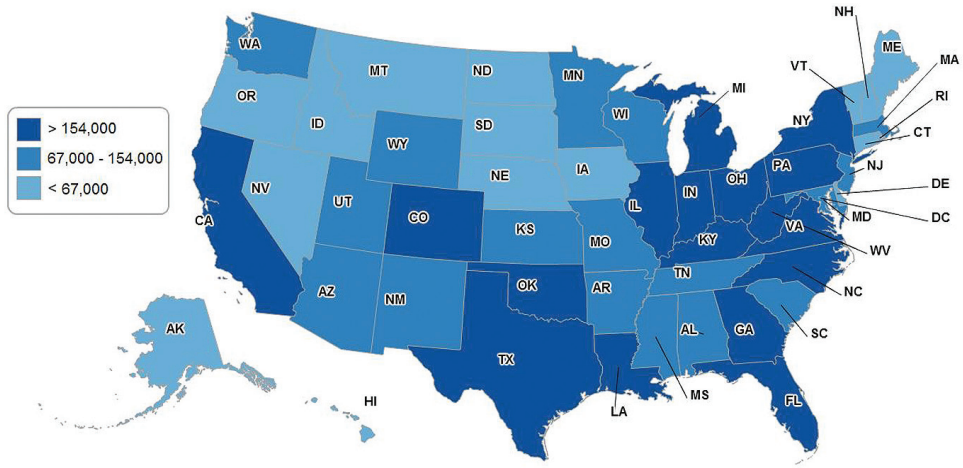
5. THE GEOGRAPHY OF JOBS FROM AMERICA'S OIL & GAS BOOM

Of the 10 million Americans employed in businesses associated with hydrocarbons, we find that the jobs are not only mainly in small businesses but are also widely distributed across the nation. There are 16 states with more than 150,000 people employed in hydrocarbon-related activities. Even New York, which continues to ban the production of shale oil & gas, is seeing job benefits in a range of support and service industries associated with shale development in adjacent Pennsylvania.

But the most interesting action has been in 10 states at the epicenter of the shale boom where recent growth in production has been the most dramatic. There we see the ripple-out effect on overall (not just oil & gas) employment. The shale boom's broad jobs benefits are most visible in North Dakota and Texas, of course, where overall state employment growth in all sectors has vastly outpaced U.S. job recovery. Similarly, in the other states that have experienced recent growth in hydrocarbon production—notably, Pennsylvania, Colorado, Louisiana, Oklahoma, Wyoming—statewide overall (again, not just oil & gas) employment growth has also outpaced the U.S. recovery.

The Marcellus shale fields in Pennsylvania were responsible for enabling statewide double-digit job

THE GEOGRAPHY OF HYDROCARBON JOBS
(NUMBER OF HYDROCARBON JOBS)



Data source: PwC and National Mining Association

TOP STATES FOR HYDROCARBON-RELATED JOBS[29] (THOUSANDS)	
Texas	1,800
California	780
Oklahoma	350
Louisiana	340
Pennsylvania	330
New York	300
Illinois	290
Florida	280
Ohio	260
Colorado	210
Virginia	190
Michigan	180
Kentucky	170
W. Virginia	170
Georgia	160
New Jersey	150

growth in 2010 and 2011 and now account for more than one-fifth of that state's manufacturing jobs.[30] For every $1 that the Marcellus industry spends in the state, $1.90 of total economic output is generated.[31]

In Ohio, where production is still at an early stage (starting up in 2011, a century after that state last produced oil & gas), the activity has already provided modest job growth in the dozens of shale-centric counties even as other Ohio counties have seen jobs shrink.[32]

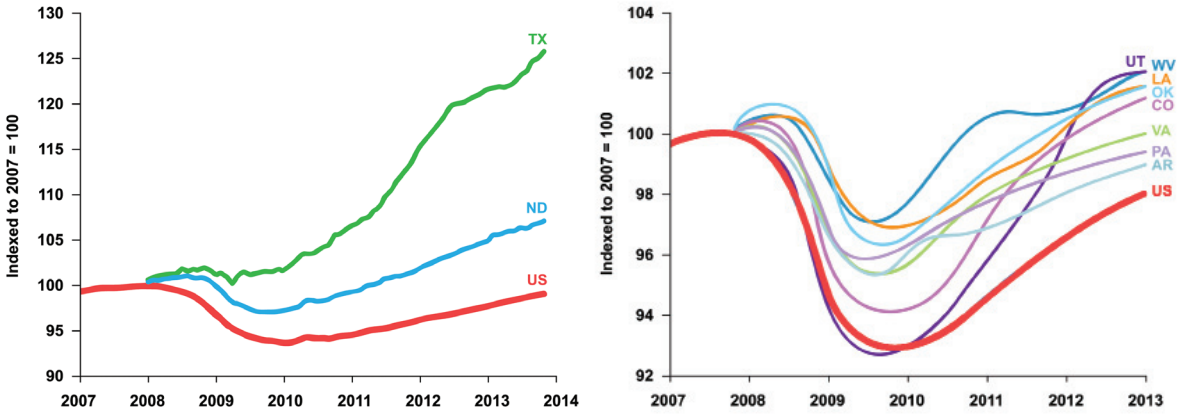
The typical wage effect of the oil & gas revolution is most clearly visible in Texas. In the 23 counties atop the Eagle Ford shale, average wages for all citizens have grown by 14.6 percent annually since 2005, compared with the 6.8 and 6.3 percent average for Texas and the U.S., respectively, over the same period. The top five counties in the Eagle Ford shale have experienced an average 63 percent annual rate of wage growth.[33] These are the kinds of wage effects sought in every state and by every worker.

6. THE JOBS IMPACT FROM SMALL BUSINESSES

Given the persistent, slow job recovery from the Great Recession, there could not be a more important time in modern history to find ways to foster more small businesses of all kinds, given that they are not only the core engine for growth but also frequently grow rapidly.

Small businesses generally, not just those in the hydrocarbon sector, have long contributed disproportionately to job growth.[34] Over the past four decades, small firms of all kinds generated more than

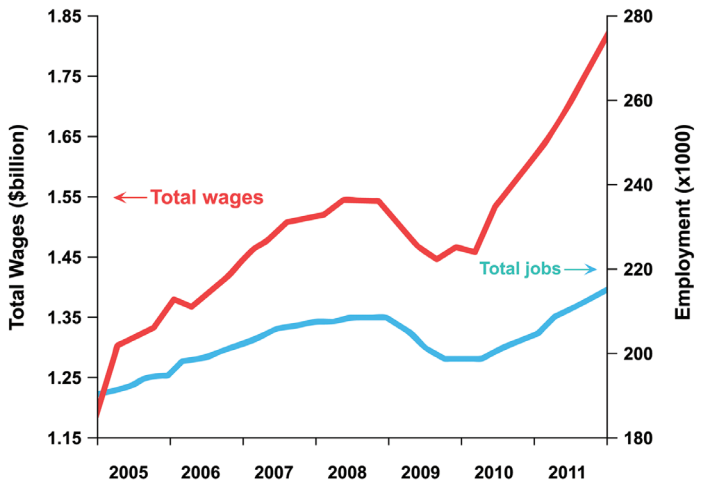
STATEWIDE OVERALL JOB GROWTH IN STATES AT THE EPICENTER OF THE SHALE BOOM



Overall statewide employment has grown faster than the national average in all ten states that have experienced increased oil & gas production. (Average U.S. trend includes the other 40 states.)

Data source: Bureau of Economic Analysis

WAGES BOOM FOR ALL JOBS IN TEXAS SHALE COUNTIES



In the 23 counties sitting atop the Eagle Ford shale, overall wages have boomed for all jobs, not just those directly in the oil-field.

Data source: Federal Reserve Bank of Dallas

60 percent of all net new jobs.[35] Research shows that small businesses exhibit not only greater flexibility but also greater innovation: according to a 2012 study by the Small Business Administration, "small businesses produce 16 times more patents per employee than large patenting firms."[36]

Recently, there has been academic debate over whether it might be mainly young firms—especially so-called gazelles, young firms that grow rapidly—rather than small firms per se that are the primary engines of job growth. But the same researchers note the obvious: young firms tend to be small firms; and young firms

tend to emerge disproportionately in areas of rapid growth or new opportunities—such as in and around America's shale fields.

While gazelles exist in all industries, researchers also noted that gazelles are not overrepresented in the tech sector but instead are overrepresented in services.[37] Notably, service businesses comprise more than 60 percent of the jobs associated with the expanding oil & gas industry.

Construction—which comprises the third-largest class of "indirect" jobs associated with the oil & gas sector—is overwhelmingly dominated by small businesses. Some 85 percent of construction firms are small or midsize, with fewer than 500 employees. According to a Goldman Sachs analysis, "roughly all of the 'missing jobs' in the small business sector (on a net basis) can be accounted for by the decline in employment among small firms in the construction industry."[38]

7. PROSPECTS FOR MORE JOBS FROM OIL & GAS GROWTH

Hydrocarbon jobs, of course, cannot be the only answer to the country's persistent jobs deficit. But they have provided a greater single boost to the U.S. economy than any other sector, without requiring any special taxpayer subsidies—instead generating tax receipts from individual incomes and business growth. (Even if tax breaks associated with hydrocarbons are counted as "subsidies"—as opposed to the direct subsidies, grants, and preferences given to renewables—hydrocarbons received collectively just 15 percent of federal subsidies in recent years.)[39]

The $300–$400 billion overall annual economic gain[40] from the oil & gas boom has been greater than the average annual GDP growth of $200–$300 billion in recent years—in other words, the economy would have continued in recession if it were not for the unplanned expansion of the oil & gas sector.[41]

Whether more jobs can yet emerge from the hydrocarbon sector will be determined by five key factors:

- Demand: Will the U.S. and world use significantly more oil and gas in the near future?
- Supply: Do enough oil and gas resources exist in America to sustain more growth?
- Technology: Is the technology that has permitted shale productivity tapped out?
- Funding: Is enough private money available to fund development?
- Policies: Will policymakers and regulators create laws and rules that encourage expansion?

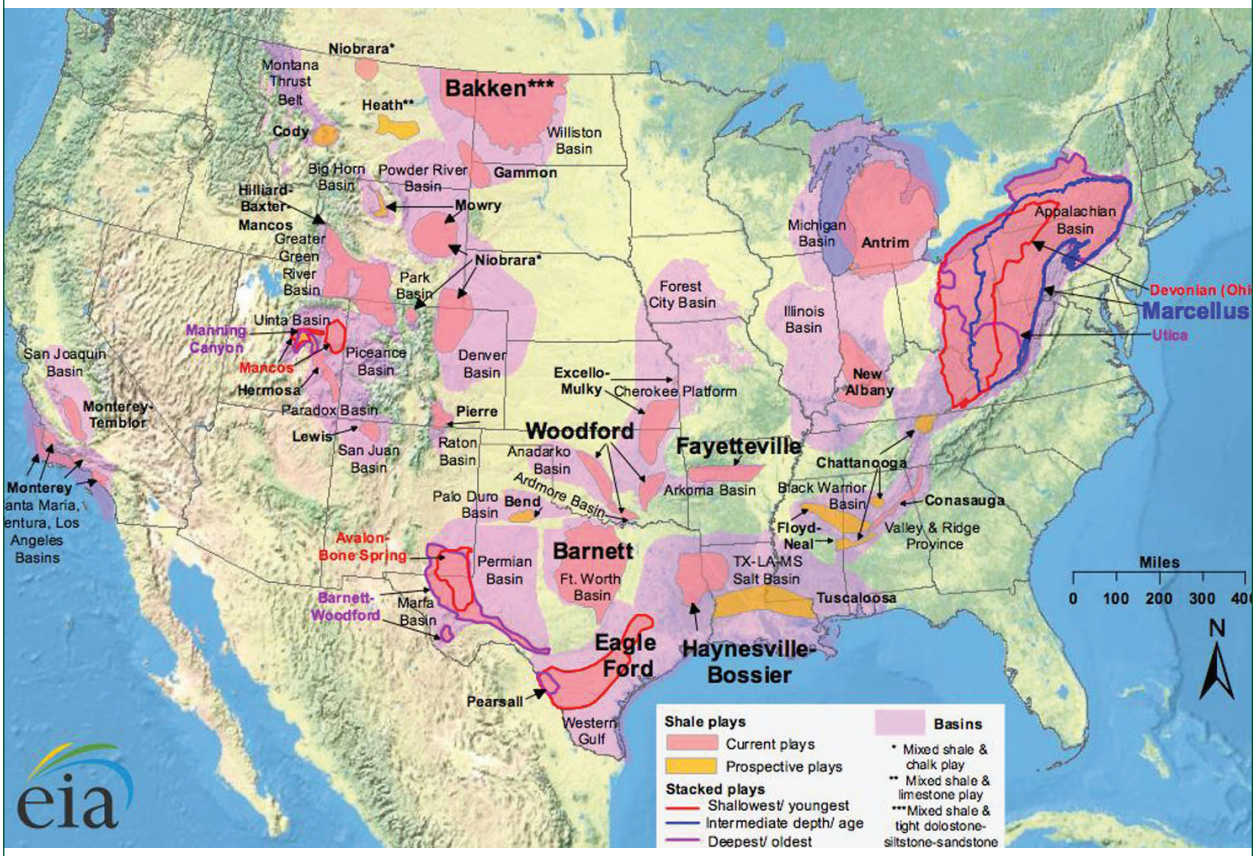
Demand: More than 80 percent of U.S. and world energy needs are met with hydrocarbons.[42] Meanwhile, 2 percent of world energy is supplied by solar, wind, and biofuels.[43] For the coming two decades, oil, gas, and coal are forecast to supply 60–80 percent of growth in world energy supplies, according to all major forecasts, from the International Energy Agency (IEA) to the U.S. Energy Information Administration (EIA).[44]

While the idea of "peak demand,"[45] particularly for oil, has been proffered by some analysts who seem to believe that slower oil-demand growth is a permanent structural and not an economic aberration, the EIA reported that by year-end 2013, U.S. oil demand had returned to the prerecession 2008 level.[46] And the year-end 2013 IEA forecast estimates that worldwide oil demand will reach a new record high in 2014.[47]

Supply: The U.S. Department of the Interior reports that the United States has enormous geological potential, with fully half the world's total hydrocarbon shale resources.[48] (Notably, more than 70 percent of those resources are on federal land.)[49] Shale fields stretch across huge areas of the continent—not just North Dakota and Texas, but areas including Virginia,[50] North Carolina,[51] New York, and California. While U.S. "reserves" of oil are reported in the 30 billion-barrel range, "reserves" are determined by business and regulatory metrics relating to decisions about price and today's technology. The physical geological resource is about a hundredfold greater than "reserves" and totals thousands of billions of barrels.[52]

The main determinants of supply are the availability of technology to access the vast resources at an affordable price and whether government entities permit access to the land where resources exist.

U.S. HYDROCARBON SHALE RESOURCES
(EXCLUDES CONVENTIONAL OIL & GAS FIELDS)



Data source: U.S. Energy Information Administration

Technology: Although horizontal drilling and hydraulic fracturing—fracking—have been widely reported as the reasons for the recent American oil & gas boom, neither of these processes is explanatory alone, since those techniques are decades old. The boom is more properly understood as emerging from technology advances in general and from "smart drilling" in particular.[53] Information technology and big data are increasingly the driving force behind every domain, including the hydrocarbon industry.[54]

Over the past five years, technology has improved the productivity of the typical oil or gas rig on America's shale fields 200–300 percent.[55] By comparison, technology has taken 20 years to improve wind turbines and solar cell productivity by 200 percent.[56] Consequently, in two years, American oil output grew fivefold more than wind production and 200-fold more than solar output over two decades (in energy-equivalent terms).[57] As technology continues its advances in smart imaging, drilling, and processing, it will unlock yet more access to tapped as well as untapped shale fields.

Funding: Technology unleashes America's abundant hydrocarbon shale fields; but it is capital investment that fuels business expansion and the essential infrastructure of the sprawling oil & gas sector. Substantial capital is invested by oil & gas firms and major banks and funds, and there has been a remarkable influx of foreign direct investment (over $200 billion in the last several years alone);[58] but an often overlooked but major source of hydrocarbon investment capital has come from individual private citizens and small investment partnerships.

Over the past five years, publicly traded limited partnerships—PTPs, or, as they are often referred to, MLPs, master limited partnerships—have put nearly $90 billion to work investing in capital projects associated with U.S. shale oil & gas production, including pipelines, processing plants, storage, terminals, and distribution facilities.[59] Energy-centric PTPs account for over 70 percent of all such investments. And 80 percent of the money in MLPs comes from individual investors.

This virtuous circle—redolent of Adam Smith's "invisible hand" of individual investors, small businesses, and innovators—is at the center of the biggest economic and job-creating revolution in oil & gas in a century.

8. POLICIES: WHAT NEEDS TO BE DONE TO CREATE MORE SMALL BUSINESSES AND JOBS?

The new American shale oil & gas boom—and the associated jobs bounty—has come mainly from small businesses using new technologies and deploying private capital, entirely on state and private lands.[60]

Recent history shows that hydrocarbon-related jobs can be created quickly. In only a few years production and employment have grown radically from marginal or near-zero in places in North Dakota, Colorado, and Pennsylvania, for example. The same could happen in many other states, including New York and California.

California, once the nation's second-largest oil producer, has slipped to fourth place as other states pull ahead. With the right policies, it could unleash between a half million and 3 million new jobs statewide and increase personal income by $40 billion.[61]

However, the remarkable gains in production across the country are not guaranteed to continue. They are at risk if new restrictions are imposed on the industry, from delays in approval of exports to opposition to expanding ports, pipelines, and refineries, to the threat of imposing redundant federal regulations on hydraulic fracturing technology.

Conversely, more jobs and more small businesses—more hydrocarbon gazelles—could arise under policies favorable to development.

Policymakers at state and federal levels do not need to fund pilot projects, raise taxes, or otherwise create government programs to stimulate yet more output and jobs from the oil & gas sector. To expand the bounty, policymakers should ameliorate, suspend, or remove regulations that create impediments to the creation, survival, and growth of small businesses generally and to domestic hydrocarbon businesses in particular.

Lower corporate tax rates: U.S. corporate and manufacturing taxation was the lowest and is now the highest among the 34 industrialized nations in the Organisation for Economic Co-operation and Development (OECD). Simply reducing corporate income tax to the OECD average—never mind making it the lowest again—would boost U.S. GDP by 2 percent and add 350,000 jobs.[62] These jobs are, as we have outlined herein, dominantly in small businesses. They are "sticky" jobs, full-time and high-value—precisely what the economy has thus far struggled to restore.

The argument that major corporations do not, as a practical matter, pay the high tax rate is misplaced. The majority of net new jobs comes from small and midsize enterprises that do not have the legal resources to game the tax code and that therefore pay the high tax rates. The only way small businesses can escape job-robbing punitive taxation is for the tax rate to be lowered.

Focus state and federal policymaking on small and midsize enterprises: Incentives for small and midsize manufacturing businesses should be at the core of a jobs and manufacturing strategy. Germany, for example, which has for years pursued a small-business policy, is the world's third-largest exporter[63] and enjoys a huge positive balance of trade, in large measure because of its Mittelstand policy to support midsize companies (100–500 workers). In America, those companies would be called small and are the engines of growth and usually the gazelles. They should be protected and incentivized in America, too.

Repatriate American capital for investment in the U.S.: About $2 trillion of America's private business capital sits un-repatriated offshore because of excessive potential domestic taxation.[64] Creative policies to unleash that tsunami of capital to return for investment in the U.S. would serve as an enormous engine for job formation. While much of that capital would flow into large corporations, the record shows that much would also flow directly and indirectly into small-business formation.

Accelerate permits associated with hydrocarbon exports: Nearly all the growth in demand for oil and natural gas is now taking place outside the United States.[65] Small businesses account for a third of all U.S. exports;[66] more important, the entire hydrocarbon ecosystem (dominated by small businesses) will be boosted by tapping into world markets hungry for refined and unrefined petroleum and liquefied natural gas.

Proposals to rescind or revise half-century-old laws restricting natural gas and oil exports have met with the trope that this "might be a win for Big Oil, but it would hurt American consumers."[67] As we have illustrated here, greater production of oil & gas benefits all Americans—particularly with the creation of more solid middle-class jobs. Even greater production would be stimulated by tapping sooner into global demand. This would mainly benefit thousands of small and midsize firms, not Big Oil.

9. CONCLUSION: THE RIGHT POLICIES CAN PROPEL NEAR-TERM JOB GROWTH

According to a recent poll from the *Washington Post* Miller Center, American workers' anxiety over jobs is at a four-decade record high.[68] Meanwhile, the hydrocarbon sector's contributions to America's job picture and the role of its small businesses in keeping the nation out of a long recession are not widely recognized. Another recent survey found that only 16 percent of people know that an oil & gas boom has increased U.S. energy production—collaterally creating jobs both directly and indirectly.[69]

America's future, of course, is not exclusively associated with hydrocarbons or energy in general. Over the long term, innovation and new technologies across all sectors of the economy will revitalize the nation and create a new cycle of job growth, almost certainly in unexpected ways.[70] But the depth and magnitude of job destruction from the Great Recession means that creating jobs in the near-term is vital. As former chair of the Council of Economic Advisers and Harvard professor Martin Feldstein recently wrote: "The United States certainly needs a new strategy to increase economic growth and employment. The U.S. growth rate has fallen to less than 2%, and total employment is a smaller share of the population now than it was five years ago."[71]

In a new report evaluating five "game changers" for growth, the McKinsey Global Institute concluded that the hydrocarbon sector has the greatest potential for increasing the U.S. GDP and adding jobs—with an impact twice as great as big data by 2020.[72] McKinsey forecasts that the expanding shale production can add nearly $700 billion to the GDP and almost 2 million jobs over the next six years.[73]

Other analysts looking out over 15 years see 3–4 million more jobs that could come from accelerating domestic hydrocarbon energy production.[74] Even these forecasts underestimate what would be possible in a political environment that embraced growth-centric policies.

In November 2013, President Obama delivered a speech in Ohio on jobs and the benefits from greater domestic energy production.[75] The president highlighted the role of improved energy efficiency and alternative fuels. But as the facts show, no part of the U.S. economy has had as dramatic an impact on short-term job creation as the small businesses at the core of the American oil & gas boom. And much more can be done.

References and Notes

[1] Bill McBride, "When Will Payroll Employment Exceed the Pre-Recession Peak?," CalculatedRISK Finance & Economics, December 12, 2013, http://www.calculatedriskblog.com/2013/12/update-when-will-payroll-employment.html

[2] U.S. Census Bureau, Statistics of U.S. Businesses, http://www.census.gov/econ/susb; FRED Economic Data, Federal Reserve Bank of St. Louis, http://research.stlouisfed.org/fred2/graph/?s%5B1%5D%5Bid%5D=CES1021100001; Institute for 21st Century Energy, U.S. Chamber of Commerce, "America's New Energy Future: The Unconventional Oil and Gas Revolution and the US Economy," September 2013, http://www.energyxxi.org/shale; and IHS Global Insight, "The Economic Contribution of the Onshore Independent Oil and Natural Gas Producers to the U.S. Economy," for Independent Petroleum Association of America, April 2011, http://www.ipaa.org/wp-content/uploads/downloads/2012/03/IHSFinalReport.pdf.

[3] "Shale Production Growth Makes US Largest Liquids Producer," *Oil & Gas Journal*, October 16, 2013, http://www.ogj.com/articles/2013/10/pira-shale-production-growth-makes-us-largest-liquids-producer.html?cmpid=EnlLNGOctober222013.

[4] Mark P. Mills, "Unleashing the North American Energy Colossus: Hydrocarbons Can Fuel Growth and Prosperity," Manhattan Institute, July 2012, http://www.manhattan-institute.org/html/pgi_01.htm.

[5] "U.S. to Be Top Oil Producer by 2015 on Shale, IEA Says," *Bloomberg*, November 12, 2013, http://www.bloomberg.com/news/2013-11-12/u-s-nears-energy-independence-by-2035-on-shale-boom-iea-says.html.

[6] Mark P. Mills, "The Case for Exports," Manhattan Institute, May 2013, http://www.manhattan-institute.org/html/pgi_03.htm#.UsxQDPbEl4w.

[7] Jason Furman and Gene Sperling, "Reducing America's Dependence on Foreign Oil as a Strategy to Increase Economic Growth and Reduce Economic Vulnerability," August 29, 2013, White House Council of Economic Advisors, http://www.whitehouse.gov/blog/2013/08/29/reducing-america-s-dependence-foreign-oil-strategy-increase-economic-growth-and-redu

[8] Colin Carter and Henry Miller, "Corn for Food, Not Fuel," *New York Times*, July 30, 2013, http://www.nytimes.com/2012/07/31/opinion/corn-for-food-not-fuel.html?_r=0.

[9] Regarding claims that improvements in energy efficiency are responsible for this transformation: Energy Information Administration (EIA) data show that oil and natural gas consumption per dollar of GDP has dropped only 5 percent in four years.

[10] EIA, "U.S. Petroleum Balance Sheet, Week Ending 12/27/2013," http://ir.eia.gov/wpsr/overview.pdf.

[11] EIA, "Petroleum & Other Liquids: Exports," http://www.eia.gov/dnav/pet/pet_move_exp_dc_NUS-Z00_mbblpd_m.htm.

[12] Farzad Taheripour, Wallace E. Tyner, and Kemal Sarica, "Assessment of the Economic Impacts of the Shale Oil and Gas Boom," U.S. Association for Energy Economics, 2013, http://dialogue.usaee.org/index.php/assessment-of-the-economic-impacts-of-the-shale-oil-and-gas-boom#_ftnref1; Tim Mullaney, "Domestic Energy Supplies Boost U.S. economy," *USA Today*, July 12, 2012: "The economic benefits of far-reaching new finds of domestic oil and natural gas are fast approaching $1 billion a day and may be keeping the U.S. out of another recession, according to a new study by Bank of America Merrill Lynch," http://usatoday30.usatoday.com/money/industries/energy/story/2012-07-11/natural-gas-finds-lower-energy-costs/56157080/1; and Institute for 21st Century Energy, "America's New Energy Future."

[13] EIA, "Oil and Gas Industry Employment Growing Much Faster than Total Private Sector Employment," August 8, 2013, http://www.eia.gov/todayinenergy/detail.cfm?id=12451.

[14] Super-major employment from each company's SEC 10k filing; total employment from Statistics of U.S. Businesses, U.S. Census Bureau, http://www.census.gov/econ/susb.

[15] Number of firms from Statistics of U.S. Businesses, U.S. Census Bureau, http://www.census.gov/econ/susb. Share total production from Independent Petroleum Association of America, "Profile of Independent Producers," 2009, http://www.ipaa.org/wp-content/uploads/downloads/2011/12/2009ProfileOfIndependentProducers.pdf.

[16] Oil Change International, http://priceofoil.org/content/uploads/2012/03/FIN.OCI-Fact-Sheet-US-Subsidy-Removal-2012.pdf.

[17] Ibid.; 10 percent of independents operate in offshore federal water, 15 percent in state waters.

[18] Independent Petroleum Association of America, "Profile of Independent Producers," 2009.
[19] Sam Ro, "The Decline of America's Job-Creating Small Businesses," *Business Insider*, July 6, 2013, http://www.businessinsider.com/citi-nathan-sheets-america-small-business-job-creation-2013-7.
[20] "American Shale & Manufacturing Partnership Launch," November 14, 2013, Carnegie Mellon Institute of Technology, http://www.cit.cmu.edu/media/press/2013/11_14_shale_partnership_launch.html.
[21] "Boom in Energy Production Sends US Shipyards into Overdrive," *Fox News*, September 20, 2013, http://www.foxnews.com/us/2013/09/20/boom-in-natural-gas-production-sends-us-shipyards-into-overdrive.
[22] PricewaterhouseCoopers, "The Economic Impacts of the Oil and Natural Gas Industry on the U.S. Economy," prepared for API, 2009; and National Mining Association, "The Economic Contributions of U.S. Mining in 2010," September 2012.
[23] William Boston, "BASF Steps Up Investment in U.S.," *Wall Street Journal*, December 17, 2013, http://online.wsj.com/news/article_email/SB10001424052702303949504579263903951305372-lMyQjAxMTAzMDEwODExNDgyWj.
[24] See http://chemistrytoenergy.com/sites/chemistrytoenergy.com/files/shale-gas-full-study.pdf.
[25] National Association of Manufacturers, "Shale Production Driving Manufacturing Renaissance," September 2013, http://www.nam.org/Communications/Articles/2013/09/Shale-Production-Driving-Manufacturing-Renaissance.aspx.
[26] Cameron McWhirter and Dinny McMahon, "Spotted Again in America: Textile Jobs," *Wall Street Journal*, December 20, 2013, http://online.wsj.com/news/articles/SB10001424052702304202204579256120230694210.
[27] U.S. Department of Commerce, Bureau of Economic Analysis, SA-25, "Total Full-Time and Part-Time Employment by Industry," and SA-27, "Full-Time and Part-Time Wage and Salary Employment by Industry."
[28] Small Business & Entrepreneurship Council, "Small Business Facts," http://www.sbecouncil.org/about-us/facts-and-data/#sthash.VYTxmYNv.dpuf, http://www.sbecouncil.org/about-us/facts-and-data.
[29] Data from PwC and National Mining Association: total is for (coal + oil + gas) and (direct + indirect) employment.
[30] IHS, "America's New Energy Future: The Unconventional Oil and Gas Revolution and the US Economy," December 2012, http://www.api.org/news-and-media/news/newsitems/2013/jan-2013/~/media/Files/Policy/SOAE-2013/Americas_New_Energy_Future_State_Highlights_Dec2012.pdf.
[31] Pennsylvania State University, "The Economic Impacts of the Pennsylvania Marcellus Shale Natural Gas Play: An Update," May 24, 2010, http://energy.wilkes.edu/PDFFiles/Library/The%20economic%20impacts%20of%20the%20PA%20marcellus%20shale%20natural.pdf.
[32] Cleveland State University, "Ohio Utica Shale Gas Monitor," August 2013, http://www.urban.csuohio.edu/publications/hill/OhioUticaShaleGasMonitor_Aug_20_2013.pdf.
[33] Federal Reserve Bank of Dallas, "Oil Boom in Eagle Ford Shale Brings New Wealth to South Texas," *Second Quarter 2012 Southwest Economy*, 2012, http://dallasfed.com/assets/documents/research/swe/2012/swe1202b.pdf.
[34] Elizabeth Laderman," Small Businesses Hit Hard by Weak Job Gains," FRBSF Economic Letter, September 9, 2013.
[35] Small Business Administration, FAQ, September 2012, http://www.sba.gov/sites/default/files/FAQ_Sept_2012.pdf; and Ro, "The Decline of America's Job-Creating Small Businesses."
[36] Small Business Administration, FAQ.
[37] Magnus Henrekson and Dan Johansson, "Gazelles as Job Creators: A Survey and Interpretation of the Evidence," *Small Business Economics*, February 6, 2009, Ratio Institute, Stockholm, Sweden, http://link.springer.com/article/10.1007/s11187-009-9172-z/fulltext.html.
[38] Sam Ro, "Actually, Small Business Is NOT the Engine of US Job Creation," *Business Insider*, August 31, 2013, http://www.businessinsider.com/goldman-small-business-not-responsible-for-job-creation-2013-8.
[39] Congressional Budget Office, "Federal Financial Support for the Development and Production of Fuels and Energy Technologies," *Issue Brief*, March 2012, http://www.cbo.gov/publication/43032.
[40] Taheripour, Tyner, and Sarica, "Assessment of the Economic Impacts of the Shale Oil and Gas Boom"; and Institute for 21st Century Energy, "America's New Energy Future."
[41] A 2 percent annual average growth in the U.S. $16 trillion GDP represents $320 billion per year. Absent the $300–$400 billion per year contribution from the oil & gas sector (per above), the U.S. would remain in a recession.
[42] Mills, "Unleashing the North American Energy Colossus."

[43] BP, "Statistical Review of World Energy 2012," June 2012, http://www.bp.com/liveassets/bp_internet/globalbp/globalbp_uk_english/reports_and_publications/statistical_energy_review_2011/STAGING/local_assets/spreadsheets/statistical_review_of_world_energy_full_report_2012.xlsx.

[44] Mills, "Unleashing the North American Energy Colossus."

[45] For an excellent summary of the "peak demand" and "peak supply" debate, see Chris Nelder, "Peak Oil Isn't Dead; It Just Smells That Way," SmartPlanet, July 2013, http://www.smartplanet.com/blog/the-take/peak-oil-isnt-dead-it-just-smells-that-way.

[46] EIA, "Weekly U.S. Product Supplied of Petroleum Products," December 2013, http://www.eia.gov/dnav/pet/hist/LeafHandler.ashx?n=PET&s=WRPUPUS2&f=W.

[47] IEA, "IEA Releases Oil Market Report for December," December 11, 2013, https://www.iea.org/newsroomandevents/news/2013/december/iearereleasesoilmarketreportfordecember.html.

[48] Bureau of Land Management, U.S. Department of the Interior, "Oil Shale Resources on Public Lands," 2008, http://www.blm.gov/wo/st/en/prog/energy/oilshale_2/background.print.html.

[49] Ibid.

[50] Virginia Department of Mines Minerals and Energy, "Hydraulic Fracturing in Virginia and the Marcellus Shale Formation," http://www.dmme.virginia.gov/dgo/HydraulicFracturing.shtml.

[51] See http://rafiusa.org/issues/landowner-rights-and-fracking/fracking-map-in-nc.

[52] See, e.g., estimate of resources in a single shale formation at 300–1,100 billion barrels of oil: U.S. Geological Survey, "In-Place Oil Shale Resources Examined by Grade in the Major Basins of the Green River Formation, Colorado, Utah, and Wyoming," USGS Fact Sheet 2012-3145, http://pubs.usgs.gov/fs/2012/3145.

[53] For an overview of the future of drilling technology, see Mark P. Mills, "Big Data and Microseismic Imaging Will Accelerate the Smart Drilling Oil and Gas Revolution, *Forbes*, May 8, 2013, http://www.forbes.com/sites/markpmills/2013/05/08/big-data-and-microseismic-imaging-will-accelerate-the-smart-drilling-oil-and-gas-revolution.

[54] Atanu Basu, "What the Frack—U.S. Energy Prowess with Shale and Big Data Analytics," *Wired Insights*, January 2, 2014, http://insights.wired.com/profiles/blogs/what-the-frack-u-s-energy-independence-with-shale-and-big-data#axzz2pgAnzcyP; and Rick Nicholson, "Big Data in the Oil & Gas Industry," 2012, IDC Energy Insights, https://www-950.ibm.com/events/wwe/grp/grp037.nsf/vLookupPDFs/RICK - IDC_Calgary_Big_Data_Oil_and-Gas/$file/RICK - IDC_Calgary_Big_Data_Oil_and-Gas.pdf.

[55] Bentek, "North American Market Overview & Outlook," Illinois State University Institute for Regulatory Policy Studies, 2012, http://irps.illinoisstate.edu/downloads/conferences/documents/MargolinPDFPPT103012.pdf.

[56] National Renewable Energy Laboratory, "The Past and Future Cost of Wind Energy," May 2012, http://www.nrel.gov/docs/fy12osti/54526.pdf; and U.S. Department of Energy, "Photovoltaic (PV) Pricing Trends," November 2012, http://www.nrel.gov/docs/fy13osti/56776.pdf.

[57] Adam Sieminski, "Outlook for Shale Gas and Tight Oil Development in the U.S.," U.S. EIA, Independent Statistics & Analysis, April 4, 2013, http://www.eia.gov/pressroom/presentations/sieminski_04042013.pdf; and EIA, "Electricity Net Generation," Monthly Energy Review, December 2013, http://www.eia.gov/totalenergy/data/monthly/pdf/sec7_5.pdf.

[58] EIA, "Foreign Investors Play Large Role in US Shale Industry," April 8, 2013, http://www.eia.gov/todayinenergy/detail.cfm?id=10711&src=email.

[59] National Association of Publicly Traded Partnerships (NAPTP), http://www.naptp.org.

[60] Congressional Research Service, "U.S. Crude Oil and Natural Gas Production in Federal and Non-Federal Areas," February 2013.

[61] University of Southern California, "The Monterey Shale & California's Economic Future," March 2013, http://isc.usc.edu/assets/001/84955.pdf#page=33.

[62] Vaclav Smil, *Made in the USA: The Rise and Retreat of American Manufacturing* (Cambridge, Mass.: MIT Press, 2013).

[63] Mills, "The Case for Exports."

[64] Lawrence Summers, "Help American Businesses—Tax Their Profits Abroad," *Financial Times*, July 7, 2013, http://www.ft.com/intl/cms/s/2/b9eaee46-e4d5-11e2-875b-00144feabdc0.html#axzz2pkT1g2AL; and Citizens for Tax

Justice, "Which Fortune 500 Companies Are Sheltering Income in Overseas Tax Havens?," October 2012, http://ctj.org/ctjreports/2012/10/which_fortune_500_companies_are_sheltering_income_in_overseas_tax_havens.php#.Uk4kSRZLdhM.

[65] Mills, "The Case for Exports."

[66] Small Business Administration, FAQ.

[67] Conway Irwin, "Energy Quote of the Day: US Crude Exports 'A Win for Big Oil,' " Breaking Energy, December 18, 2013, http://breakingenergy.com/2013/12/18/energy-quote-of-the-day-us-crude-exports-a-win-for-big-oil/?utm_source=Breaking+Energy&utm_campaign=864e2cc9ab-RSS_EMAIL_CAMPAIGN&utm_medium=email&utm_term=0_f852427a4b-864e2cc9ab-407307749.

[68] *Washington Post*, "Among American Workers, Poll Finds Unprecedented Anxiety About Jobs, Economy," November 25, 2013, http://www.washingtonpost.com/business/economy/among-american-workers-poll-finds-unprecedented-anxiety-about-jobs-economy/2013/11/25/fb6a5ac8-5145-11e3-a7f0-b790929232e1_story.html.

[69] Pew Research survey, "Continued Support for Keystone XL Pipeline," September 26, 2013, http://www.people-press.org/2013/09/26/continued-support-for-keystone-xl-pipeline; 48 percent know that U.S. energy production has grown, and of those, 34 percent know that growth came mostly from hydrocarbons.

[70] Mark P. Mills, "The Next Great Growth Cycle," *The American*, August 25, 2012, http://www.american.com/archive/2012/august/the-next-great-growth-cycle.

[71] Martin Feldstein, "How to Create a Real Economic Stimulus," *Wall Street Journal*, September 16, 2013, http://online.wsj.com/news/articles/SB10001424127887323595004579065361191486206.

[72] McKinsey, "Game Changers: Five Opportunities for US Growth and Renewal," July 2013, http://www.mckinsey.com/insights/americas/us_game_changers.

[73] Pete Sepp, "Game Changers for Job Creation," *U.S. News*, August 5, 2013, http://www.usnews.com/opinion/blogs/economic-intelligence/2013/08/05/economic-game-changers-to-create-jobs-and-energy.

[74] Citi, "ENERGY 2020: North America, the New Middle East?," Citi GPS: Global Perspectives & Solutions, March 20, 2012, http://fa.smithbarney.com/public/projectfiles/ce1d2d99-c133-4343-8ad0-43aa1da63cc2.pdf.

[75] White House Blog, "President Obama Speaks on Manufacturing in Ohio," November 14, 2013, http://www.whitehouse.gov/blog/2013/11/14/president-obama-speaks-manufacturing-ohio.

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The Power and Growth Initiative at the Manhattan Institute is focused on increasing public understanding of North America's abundant energy resources and encouraging public policies that will allow the United States to harness the benefits—for our economy and for our influence in the world—of that abundance. This effort springs from a new energy reality: technology has unlocked our vast resources of natural gas, oil, and coal for both domestic use as well as export, and can create millions of new jobs while providing affordable energy to the world.

By 2030, the International Energy Agency forecasts global energy demand to grow by about 50 percent, to some 120 billion barrels of oil equivalent per year. Of that amount, the IEA and other forecasters expect that up to 80 percent will come from oil, coal, and natural gas. The vast natural resources of the United States and its North American allies in Canada and Mexico, mean that we stand capable of supplying much of the new demand. Yet the underlying paradigms embedded in American energy policy and regulatory structures are anchored in the idea of shortages and import dependence. A reversal in thinking is needed to orient North America around hydrocarbon abundance. The United States alone has thousands of billions of barrels of oil-equivalent in the form of coal, oil and gas shales, and other non-conventional resources. Canada and Mexico also sit atop thousands of billions of barrels of hydrocarbon resources, all of which will become increasingly accessible and affordable as technology evolves.

The United States is not running out of energy. It is time to appreciate the staggering economic and geopolitical benefits that the development of our vast hydrocarbon resources can bring. It is no overstatement to say that jobs related to extraction, transport, and export of hydrocarbons can awaken the United States from its economic doldrums and produce revenue such that key national needs can be met—including renewal of infrastructure and investment in scientific research.

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