



STEP ON THE GAS!

How to Extend America's Energy Advantage

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EXECUTIVE SUMMARY

Now may seem an odd time to emphasize the importance of increasing U.S. oil and gas production. Domestic output has reached an all-time high,¹ prices have plummeted,² and drilling activity is slowing in response.³ Job cuts in the industry are approaching 100,000.⁴ Headlines announce that the boom has already gone bust.⁵ Observers concerned about output typically worry that it is too *high*: that drilling will damage local environments; that cheap, abundant fossil fuels will frustrate progress on limiting carbon emissions; and that prospects for electric cars and wind turbines, which had enough difficulty becoming economically viable before fuel costs fell by half, will further dim.

Yet failing to press America's current energy advantage would be an enormous mistake. Demand forecasts indicate that any oil and gas glut is temporary.⁶ Further, U.S. energy policy, still based on an assumption of resource scarcity, is ill equipped to manage the new abundance. Indeed, America's private sector has driven an oil and gas revolution in the face of, at best, ambivalent federal policy. This paper suggests 11 reforms to help craft a smarter U.S. energy policy, one that will amplify the current boom and extend it far into the future:

- 1. Amplify the Boom** (Reforms 1–5). Enact regulatory reforms to increase the efficiency and effectiveness of U.S. energy markets.
- 2. Extend the Boom** (Reforms 6–11). Open federal land and waters to energy development to replicate the extraordinary growth of tight oil.

I. INTRODUCTION: AMERICA'S ENERGY ADVANTAGE

Current U.S. energy policy was forged in the 1970s, at a time of crisis and under an assumption of crippling scarcity. “The oil and natural gas we rely on for 75 percent of our energy are running out,”⁷ warned President Carter in 1977. As recently as 2008, then-candidate Barack Obama declared that “if we opened up and drilled on every single square inch of our land and our shores, we would still find only three percent of the world’s oil reserves,” adding that “we must end the age of oil in our time.”⁸

From Scarcity to Abundance

During 2005–14, net U.S. imports of crude oil and petroleum products fell from 60 percent to 26 percent of consumption, and natural-gas imports from 16 percent to 4 percent, according to the U.S. Energy Information Administration (EIA).⁹ This revolution is not, however, a story of successful government intervention.

After 40 years of national energy policy dedicated to curbing demand for oil and gas, U.S. demand for the former remains steady and for the latter has increased.¹⁰ But new drilling technologies that release massive reserves from shale have increased production during 2005–14 by 69 percent (oil) and 42 percent (gas).¹¹ The U.S. is now the world’s largest producer of both resources (**Figure 1**).¹²

New U.S. oil production has come primarily from “tight oil” unlocked in the Bakken (North Dakota), Eagle Ford (Texas), and Permian (Texas) shale formations.

Figure I. If Recent Growth in U.S. Output Were a Country

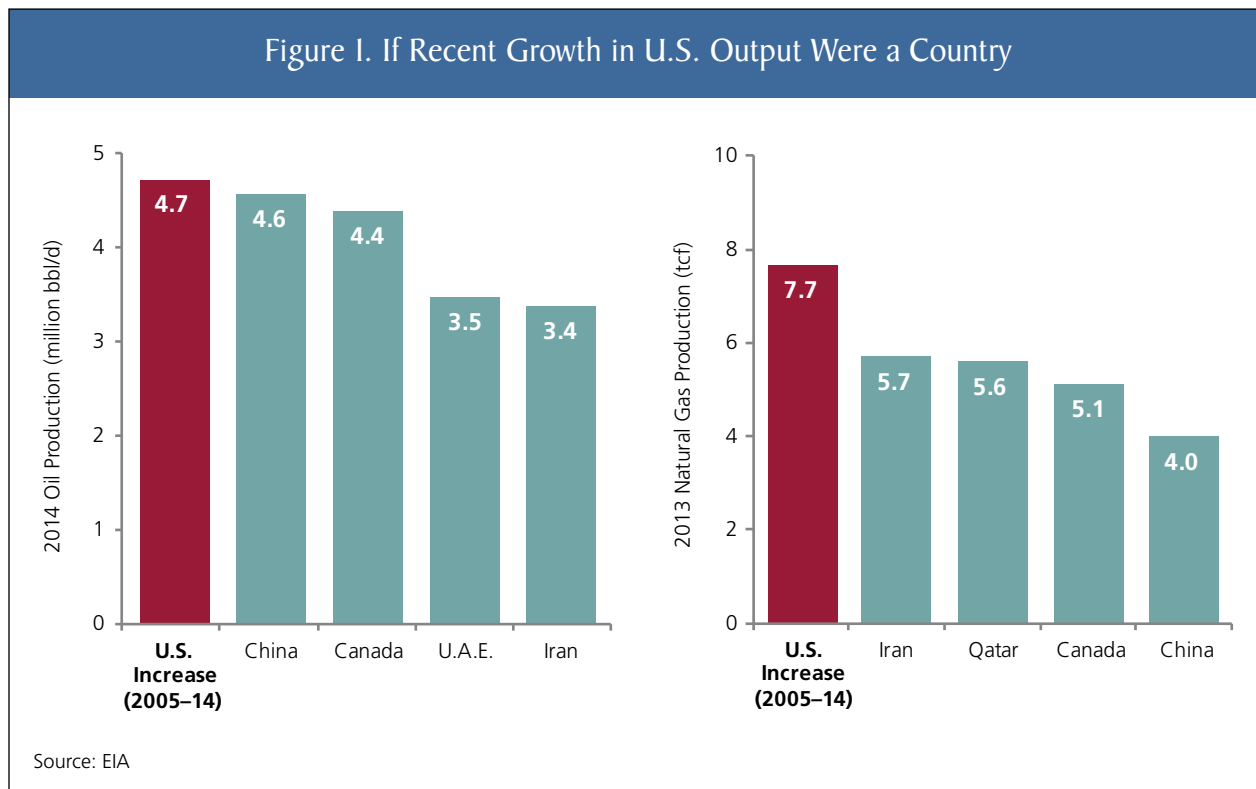
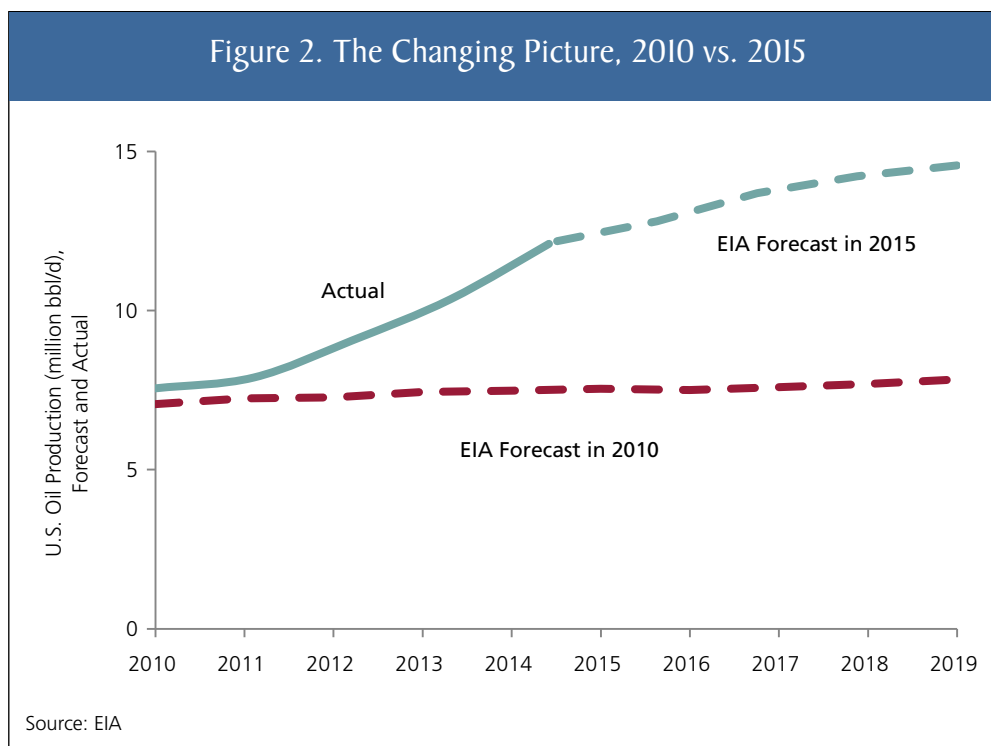


Figure 2. The Changing Picture, 2010 vs. 2015



In 2008, the Bakken produced 180,000 barrels per day (bbl/d), on average; in April 2015, it produced more than 1.3 million bbl/d. During the same period, the Eagle Ford's output soared from 55,000 bbl/d to 1.7 million bbl/d, as did the Permian's, doubling to 2 million bbl/d.¹³ New gas production has come primarily from the Marcellus shale formation, which stretches across New York, Pennsylvania, Ohio, and West Virginia. Output there leaped from 500 billion cubic feet (bcf) in 2008 to more than 5,600 bcf in the 12 months ending April 2015.¹⁴

America's shale boom took energy markets by surprise. The EIA's current projections for 2015 U.S. oil and gas output are 66 percent and 37 percent higher, respectively, than its 2015 output projections made in 2010 (**Figure 2**).¹⁵ Soaring production helped lift America's economy out of the Great Recession—boosting annual GDP by hundreds of billions of dollars and creating hundreds of thousands of shale-related jobs.¹⁶ Lower-cost

energy and petrochemical feedstock are enabling a resurgence of domestic manufacturing.¹⁷ Continued shale development could add an incremental \$380 billion—\$690 billion to annual GDP by 2020 and create 1.7 million permanent jobs, according to the McKinsey Global Institute—larger than any other U.S. growth opportunity identified by McKinsey.¹⁸

Benefits of the Energy Boom

America's new status as an energy superpower confers considerable geopolitical benefits. U.S. drillers are now the swing producers in global markets.¹⁹ Extensive spare capacity—such as the 300,000 bbl/d of tapped but not yet produced U.S. reserves²⁰—dampens price volatility and reduces the threat of supply shocks.²¹ Declining oil prices are squeezing the finances of Iran, Russia, Venezuela, and other repressive, energy-rich regimes, too.²²

The \$1,500 that the average U.S. household now saves annually from plunging energy prices—\$1,000

at the pump²³ and \$500 from lower costs for electricity, heating, and finished goods that use natural gas as an input²⁴—is larger than the total increase in median household income during 1986–2013 (**Figure 3**).²⁵ The spread of natural gas, rather than coal, to generate electricity reduces air pollution²⁶ and has lowered carbon dioxide emissions by more than 200 million metric tons annually (much larger than the reduction delivered by renewables) during 2005–13,²⁷ helping the U.S. cut emissions by more than any other country.²⁸ Given such benefits, maximizing the value of today’s boom and maintaining its momentum should be top priorities for policymakers.

Doubling Down

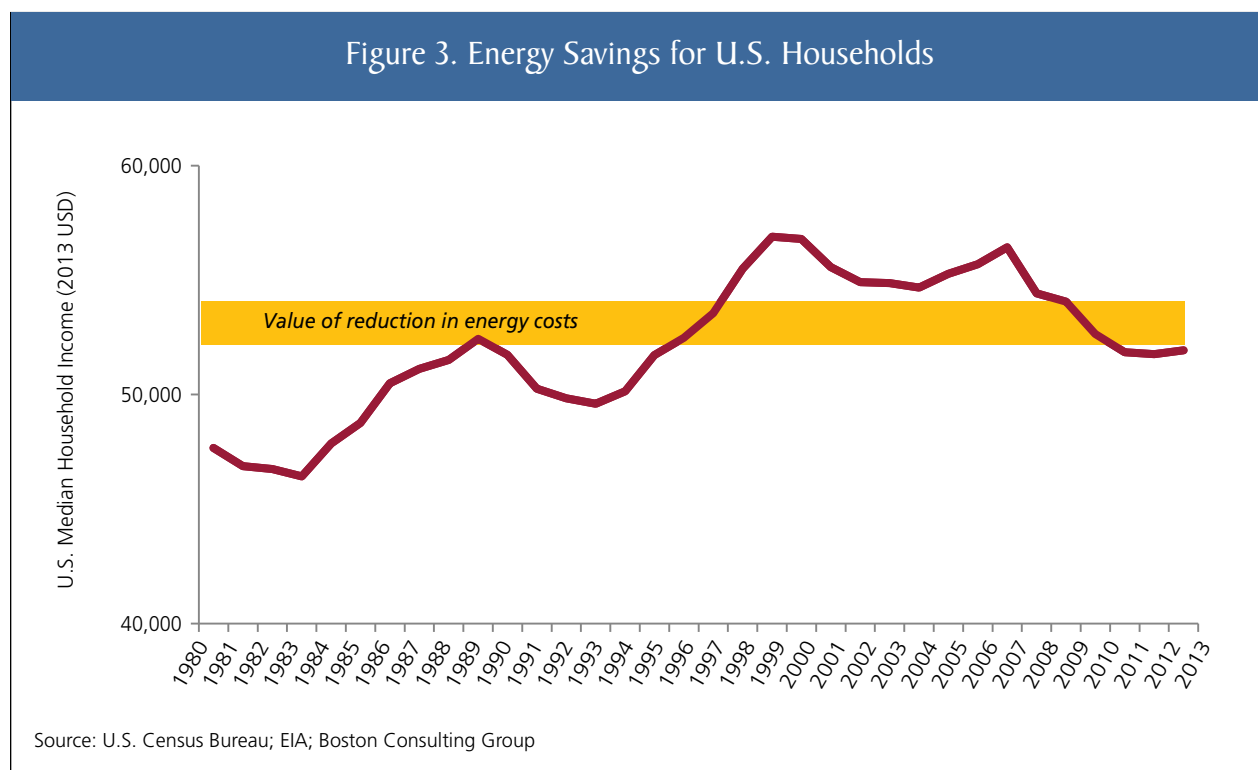
Notwithstanding the temporary energy glut, numerous long-term projections suggest that global demand for oil and gas will rise faster than U.S. output. BP estimates that oil consumption will remain flat in developed countries to 2035 but will jump by 19 million bbl/d (nearly 50 percent) in non-OECD countries, as

a billion new cars are added to the roads. Global gas demand will grow by 53 percent.²⁹ Indeed, on current trends, EIA forecasts America’s global share of production to fall for oil (15 percent to 11 percent)³⁰ and natural gas (21 percent to 19 percent);³¹ and prices to rise significantly.³² Such conditions offer enormous opportunity for U.S. producers.

Regardless of the extent to which such forecasts are accurate, there is little downside to laying the groundwork for expanded production. The U.S. government need not place industry bets but simply create an environment conducive to private investment—the private sector, best incentivized to make judgments about returns on investment, will commit the capital and accept the risk if given the opportunity to do so.

Thanks to its large domestic market, the U.S. economy faces little risk of overdependence on energy production. Whereas energy-producing nations often grow dependent on high energy prices, the relative

Figure 3. Energy Savings for U.S. Households



balance between U.S. production and consumption leaves its economy evenly exposed to both sides of the market. Likewise, the threat of “Dutch disease,” whereby resource-dependent economies lose manufacturing competitiveness as their currencies appreciate,³³ poses little risk to the United States: production helps reduce the country’s large trade deficit and its manufacturers’ energy costs.

Some environmental groups argue that any increase in oil and gas production is undesirable. Every unit of fossil fuels extracted and consumed, they note, emits carbon dioxide, increasing the threat posed by climate change. However, given that the world will consume fossil fuels for the foreseeable future, America is a better place than most to produce such fuels. A recent study reported in *Nature*, for instance, found that consumption of U.S. oil and gas reserves (excluding Arctic reserves) is consistent even with the aggressive international goal of limiting global warming to less than two degrees Celsius.³⁴

As investment continues in the capital needed to consume fossil fuels, it makes little sense to avoid capital investment in fossil-fuel production. For example, as long as American manufacturers build cars that consume gasoline, each such vehicle will burn hundreds of thousands of miles worth of gasoline in coming decades. Policies that restrict U.S. oil supply will only succeed in ensuring that oil is imported.

Stifling production also does little to advance U.S. interests in international climate negotiations. Australia, for instance, is expanding coal production;³⁵ Norway is preparing to drill for oil in the Arctic;³⁶ and Canada continues to invest in oil sands.³⁷ If the rest of the world rapidly develops its oil and gas resources and the U.S. does not, America’s economy will suffer mightily, for little environmental gain. If U.S. negotiators hope to forge an international agreement to cut carbon emissions, it will also behoove them to have chips of their own—chips such as a robust, growing domestic oil and gas industry to curtail if others do the same.

Thus, the time to invest more is now, at the very moment that more investment seems superfluous. Opponents of further exploration and development tend to cite long lead times as an argument against pursuing such a course; in this instance, however, lead times are a feature, not a bug. Further, the commercialization of new gas and oil technologies and the installation of new infrastructure take years to complete. Smart policy today can ensure that the necessary pieces are in place to sustain U.S. energy leadership for decades to come. Doubling down will require the following steps: (1) amplify the boom; and (2) extend it.

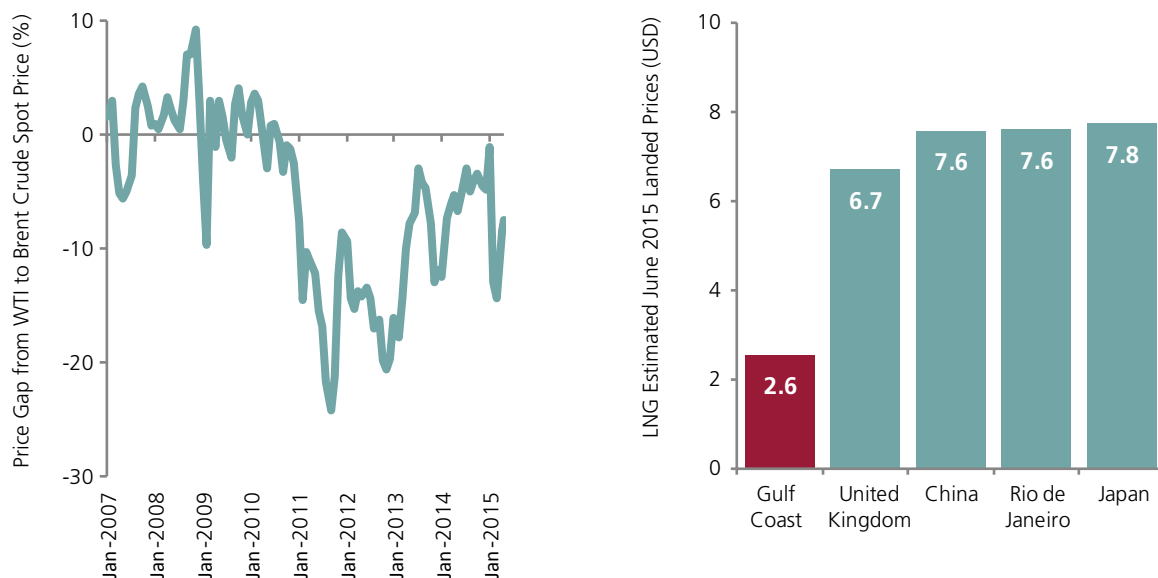
II. AMPLIFY THE BOOM

As exploration and technology advance, the majority of current forecasts for U.S. oil and natural-gas output likely understate future production. Perhaps the greatest risk to output comes not from resource scarcity but from a hostile regulatory environment. U.S. energy policy has not been updated to reflect new production realities: sometimes the result is simply wasteful, as when the government mandates the use of costly ethanol as a substitute for cheaper oil;³⁸ yet other government-imposed obstacles, such as inadequate infrastructure and excessive environmental regulation, pose a far greater long-run threat to sustaining America’s energy advantage.

Markets and Infrastructure

As surging production overwhelms current infrastructure, cracks are widening in the foundation of the U.S. energy market. The canary in the coal mine: the growing gap between the price that American oil and gas producers receive for their output domestically and the price available internationally (**Figure 4**). While the West Texas Intermediate benchmark price for crude oil has historically moved in tandem with Europe’s Brent benchmark price, WTI traded in early 2015 at a more than 10 percent discount; in 2012, WTI briefly traded 20 percent lower.³⁹ The gap for natural gas is greater still, with landed prices for liquefied natural gas (LNG) in Europe and Asia nearly three times the Gulf Coast price.⁴⁰

Figure 4. International Energy Price Gaps



Source: EIA; Federal Energy Regulatory Commission

Such gaps are the result of logistical challenges and legal restrictions. Since 2008, U.S. oil producers have increased their use of rail by a factor of 50.⁴¹ During 2012–15, rail shipments of crude leaped from roughly zero to the majority supplied to East Coast refineries.⁴² Rail transport also adds \$5–\$10/bbl in additional cost⁴³ and poses far greater environmental and safety risks.⁴⁴ The proposed Keystone XL pipeline would, however, efficiently move oil out of North Dakota, where two-thirds of oil must now leave by train.⁴⁵

Reform 1. Approve Keystone XL, establish an expedited pipeline-permitting process that deems all such infrastructure to be in the national interest, and identify a single agency to coordinate reviews and approvals on a fixed timeline.

The Jones Act, which requires products shipped between U.S. ports to travel on American-built and -crewed vessels, represents another major hurdle.

This nakedly protectionist law triples shipping costs—one can more cheaply send oil from the Gulf Coast to the East Coast, via Nigeria (<\$2/bbl to Nigeria + <\$2/bbl back across the Atlantic) than directly (\$5–\$6/bbl).⁴⁶ Supporters argue that the Jones Act is necessary to preserve a U.S. merchant marine in the event of war. Yet with little demand for shipment at such uncompetitive prices, the result has been an 80 percent decline in the number of U.S. tankers during the past 30 years.⁴⁷ Little would be lost and much gained by allowing international vessels to efficiently move U.S. fuels.

Reform 2. Repeal the Jones Act entirely—or, at a minimum, as it pertains to the transport of energy products.

U.S. crude oil exports are also banned under federal law—at great cost. Empirical studies consistently show that freeing exports would increase production, boost GDP, and lower prices for American

consumers,⁴⁸ while strengthening U.S. influence in international markets. America has long exported natural gas, via pipeline, to Mexico and Canada. Exporting to other markets will require the construction of specialized LNG terminals. Though LNG exports are not banned, the U.S. Department of Energy (DOE) must determine that LNG exports and terminals serve the “public interest.” The Federal Energy Regulatory Commission (FERC) must approve new terminals, too.⁴⁹

Such regulatory hurdles have dramatically slowed the development of America’s LNG infrastructure. As of late 2014, DOE had approved three of 35 new terminal applications submitted since 2010; FERC had approved three of 17. (FERC specifically cited the “number of permits and reviews required by federal and state law” as a cause of delays.)⁵⁰ None will begin operating before 2016.⁵¹

Reform 3. Lift restrictions on the export of oil and natural gas. Accord such products the same treatment as other American commodity exports.

Reform 4. Streamline permitting for natural-gas and crude oil export terminals. Designate such terminals in the public interest, without a need for case-by-case review. Enact a single approval process with clear timelines.

Environmental Regulation

A series of environmental regulations, some in place, some under consideration by the Obama administration, have the potential to slow U.S. production. The Clean Air Act imposes “new source performance standards” on new and renovated industrial facilities—including refineries, power plants, and drilling sites⁵²—requiring the installation of costlier pollution-control technology than used in current facilities. These heightened standards discourage refineries from retooling or expanding to accommodate new volumes and types of crude. Even though a new natural-gas plant would offer

significant environmental advantages over an existing coal-fired plant, the former faces an additional layer of costs that existing natural-gas plants do not face.

A proposed U.S. Environmental Protection Agency rule, reducing the level of acceptable ozone in the atmosphere,⁵³ would discourage drilling. The more stringent standard would cause many areas to be reclassified as overly polluted. The result: draconian restrictions on new pollution sources in such areas, including potential new oil and gas wells.⁵⁴ Investment costs for new wells would rise significantly, making fewer economically viable.

Certain environmental restrictions on heavy industry are valuable, but current standards have already helped deliver impressive improvement in U.S. air and water quality.⁵⁵ Rather than impose new, even tighter standards that weaken America’s energy advantage, existing standards should be applied to new energy projects.

Reform 5. Exempt new and expanded natural-gas plants, new and expanded refineries, and new drilling sites and export terminals from the Clean Air Act’s and Clean Water Act’s new-source requirement. Instead, apply current standards to such projects.

Updating America’s energy-policy framework will help amplify the boom under way. Yet there is an even larger opportunity, directly under the country’s feet, to extend it.

III. EXTEND THE BOOM

The federal government owns 28 percent of the land area of the U.S.⁵⁶ and controls its coastal resources in the Outer Continental Shelf. Such land and waters have historically been a significant source of oil and gas, accounting for 28 percent of U.S. production as recently as 2010.⁵⁷ Federal territory has, alas, failed to join America’s shale boom. During 2010–13, natural-gas production on private- and state-owned

lands grew by 29 percent (**Figure 5**); on federal land and waters, output fell by 24 percent. During the same period, oil production on private- and state-owned land expanded by 52 percent; on federal land and waters, output fell by 16 percent.⁵⁸

Some analysts argue that such figures are a coincidence of geology. None of the shale formations responsible for the U.S. boom, they note, falls under federal jurisdiction.⁵⁹ Yet America's shale revolution has far more to do with the ingenuity of its entrepreneurs and engineers than the peculiar properties of shale. The existence of bountiful shale oil and gas has been known for decades. The Bakken formation was described in 1953, the first oil extracted from it in 1955, and the first horizontal well drilled in 1987. Hydraulic fracturing in horizontal wells ("fracking") was made steadily more effective during the 1990s. By 2005, it was used in the Bakken.⁶⁰

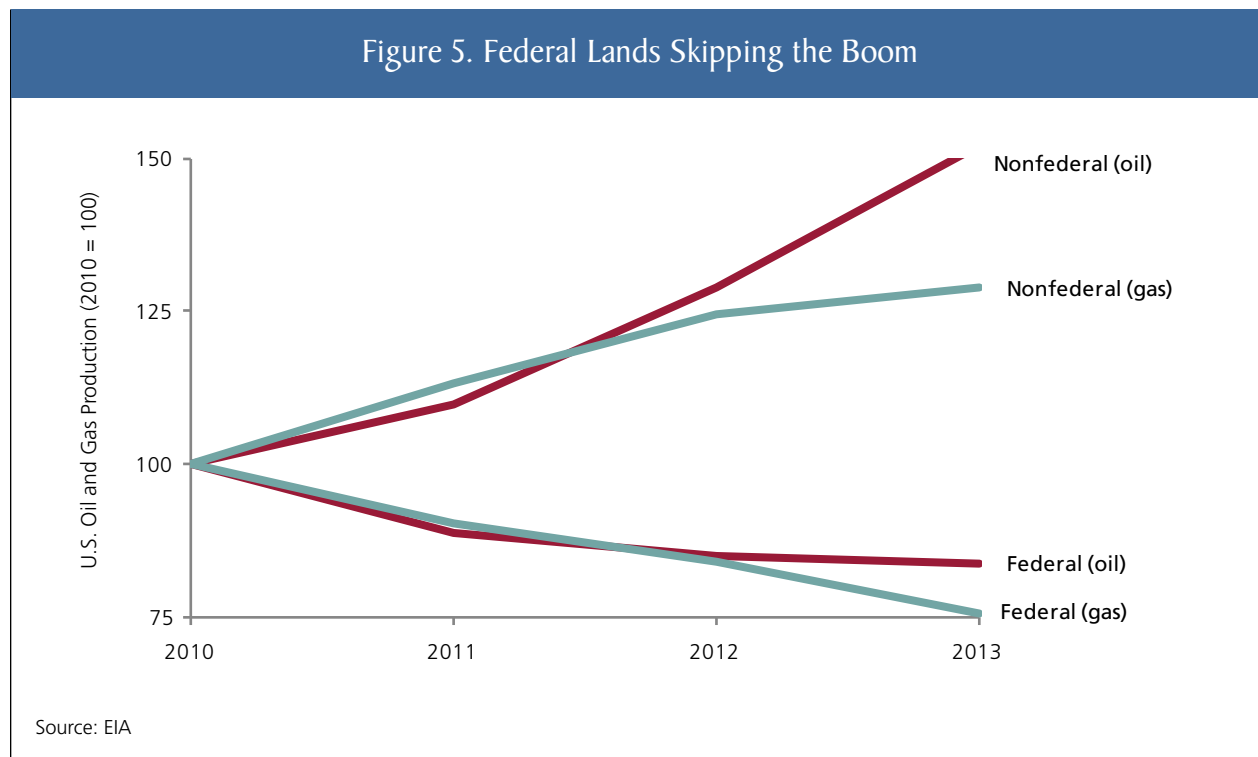
U.S. Geological Survey (USGS) estimates of the Bakken's reserves have consistently underestimated the formation's potential. Until 2008, USGS

estimated only 151 million bbl of undiscovered, technically recoverable oil resources (UTRR).⁶¹ In 2008, with production beginning to accelerate, USGS increased its estimate to 3.7 billion bbl.⁶² In 2013, USGS doubled its estimate, to 7.4 billion bbl.⁶³ (In 2011, Continental Resources, a leading producer in the Bakken, estimated that the formation might contain 24 billion bbl.)⁶⁴

In 2003, in its assessment of the Eagle Ford formation, USGS actually lowered its estimate, from 270 million bbl to 33 million bbl.⁶⁵ In 2011, USGS then raised its estimate to 1 billion bbl.⁶⁶ In 2013, the EIA, meanwhile, reported that the Eagle Ford had proved reserves of more than 3 billion bbl.⁶⁷ In the same year, the EIA estimated that the Eagle Ford would peak at 800,000 bbl/d in 2020. In 2014, the EIA revised its estimate to a peak of 1.56 million bbl/d in 2016;⁶⁸ by November 2014, production had exceeded 1.6 million bbl/d.⁶⁹

Wildly wrong official estimates are not exclusive to America's shale boom. The more that development

Figure 5. Federal Lands Skipping the Boom



occurs, the more that resources are discovered. During 1974–2006, the federal government’s estimate of UTRR natural gas in the Atlantic and Pacific Outer Continental Shelf increased by a factor of four, even as such areas remained off-limits to development; for the Gulf of Mexico, which saw active development, the government’s estimate increased by a factor of seven.⁷⁰ During 1996–2011, the government saw little change in its oil estimates for offshore areas closed to development. But its Gulf estimate increased fivefold: what had been a less than 5 percent chance of finding more than 10 billion bbl became an expectation of finding nearly 50 billion bbl.⁷¹

Today, resource endowments under federal control and largely off-limits still appear larger and more attractive than did the Bakken and Eagle Ford at comparable stages of development: reserve estimates for the former are even higher than *current* reserve estimates for the latter.

Offshore Opportunities

A 2011 U.S. Bureau of Ocean Energy Management survey identified 89 billion bbl of UTRR oil in federal waters—the majority underexplored and off-limits to development (**Figure 6**).⁷² The western and central Gulf of Mexico, where significant production occurs, are estimated to hold 43 billion bbl.

The eastern Gulf, estimated to hold 5 billion bbl, remains under congressional moratorium and is off-limits to development until at least 2022.⁷³ Another 10 billion bbl likely lie off California’s coast, where past production is petering out and no new development is under way.⁷⁴

The federal Atlantic zone, estimated to hold more than 3 billion bbl of oil, saw its one lease sale, off Virginia’s coast, canceled in 2010 by the Obama administration.⁷⁵ In 2015, the administration announced that it would put lease sales back into future development plans,⁷⁶ though no sales will occur before 2021.⁷⁷ In the federal Arctic zone off Alaska’s coast, estimated to hold 27 billion bbl of oil, only one lease has been sold, a 2008 sale to drill in the Chukchi Sea.⁷⁸ In 2015, after extensive permitting delays,⁷⁹ litigation,⁸⁰ and accidents,⁸¹ Shell finally received permission to begin drilling.⁸² While several additional leases are slated for sale in 2016–17,⁸³ the Obama administration has also announced that it will place new federal Arctic zones off-limits.⁸⁴ (Most environmental groups object to any Arctic exploration on the grounds that local climatic conditions make drilling too dangerous.)⁸⁵ Meanwhile, Russia, Canada, and Norway are all moving forward with their own Arctic development plans.⁸⁶

Figure 6. Opportunities Offshore

Area	UTRR Oil (billion bbl)	Status
Western Gulf of Mexico	12.4	Underdevelopment
Central Gulf of Mexico	30.9	Underdevelopment
Eastern Gulf of Mexico	5.1	Moratorium
Atlantic Outer Continental Shelf	3.3	No lease sales until at least 2021
Pacific Outer Continental Shelf	10.2	No lease sales planned
Alaska Outer Continental Shelf	26.6	One lease sale in 2008

Source: U.S. Bureau of Ocean Energy Management

Onshore Opportunities

In 2008, the U.S. Bureau of Land Management (BLM) estimated UTRR oil on federal lands at 31 billion bbl, with 62 percent in land entirely off-limits to development, 30 percent in land subject to restrictions, and only 8 percent in land largely open to development.⁸⁷ The off-limits Arctic National Wildlife Refuge (ANWR), the largest onshore federal play, is estimated to contain more than 10 billion bbl, significantly more than the Bakken (Figure 7).⁸⁸ Daily production at ANWR could peak well above 1 million bbl, according to EIA,⁸⁹ similar to the Bakken's current output.⁹⁰ Such estimates—forced to rely on badly outdated technology because geological research at ANWR has been banned for decades⁹¹—likely understate the reserve's potential.

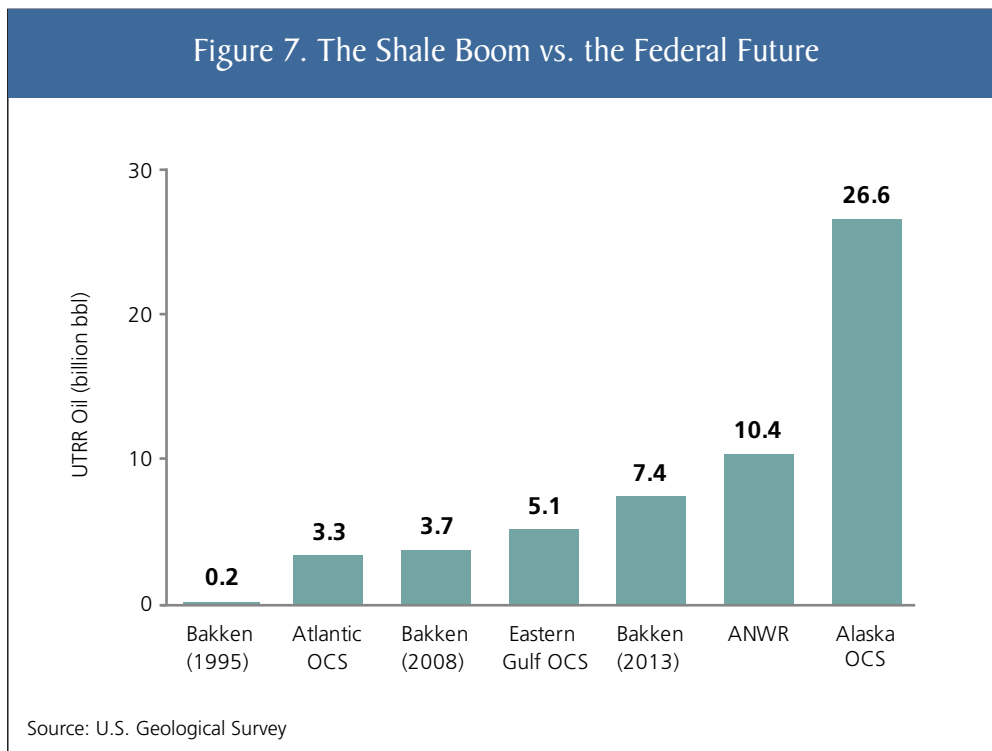
Production from ANWR would also increase the supply of oil transported via the Trans-Alaska Pipeline System (TAPS), whose dwindling flow from active Alaskan fields puts it at risk of shutting down. If TAPS is closed, it must, by law, be dismantled—a fate that would permanently strand America's Arctic resources.⁹²

Nevertheless, President Obama's recent efforts to designate large swaths of ANWR as "wilderness" would afford the reserve still greater protection.⁹³

Even where federal land is accessible in theory, it has proved difficult to access in practice. Since 2008, the number of leases, as well as acres, in effect on federal land has fallen every year; new leases and acres leased annually fell by 45 percent and 58 percent, respectively, relative to the previous six-year period.⁹⁴ This slowdown is not a result of industry attention diverted to more attractive opportunities, either: in 2013, acreage sought by industry was more than twice as high as in 2008.⁹⁵ Where leases are active, the federal permitting process is notoriously slow, too.⁹⁶ In early 2015, the Obama administration announced still more stringent regulation of fracking on federal land.⁹⁷ The result: an abject failure of federal energy-resource development.

In addition to falling output, consider the different rates at which technically recoverable resources have been converted to proved reserves. Whereas states

Figure 7. The Shale Boom vs. the Federal Future



with less than 10 percent of land federally owned saw proved reserves rise by 104 percent during 2008–13 (excluding North Dakota, which saw a tenfold increase) and states with 10–50 percent of land federally owned saw a 35 percent rise, states with more than 50 percent of land federally owned saw proved reserves drop by 7 percent (**Figure 8**).⁹⁸

Opening Access

The goal should not be to lease as much federal land as quickly as possible. Industry does not have the capacity to conduct all exploration simultaneously, nor does government have the ability to review applications overnight. Instead, the goal should be to create a transparent, predictable process that optimizes the conditions for private investment over time.

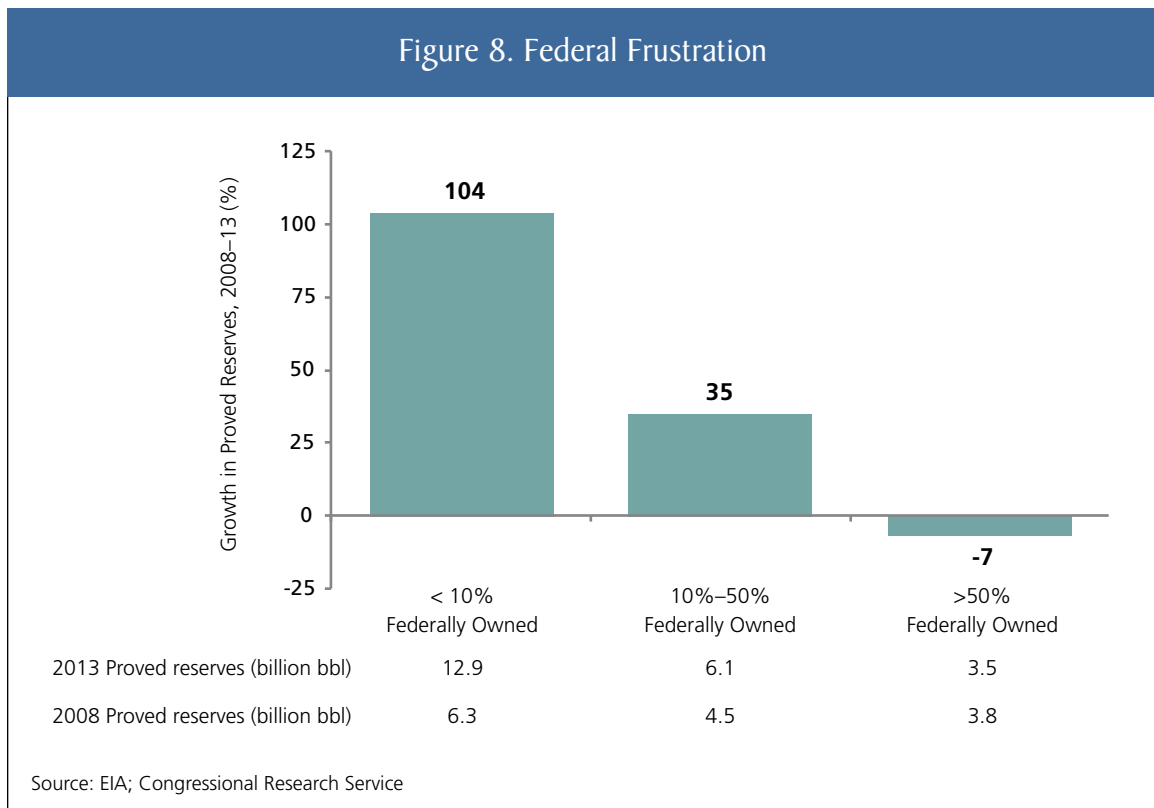
The current federal model for offshore exploration, in which the government establishes an advance five-year plan, is sensible. As part of this process, the government should establish clear annual output targets—with

scenarios tied to various price levels—for federally owned lands on- and offshore. Such targets would communicate policy goals, provide a basis on which to plan for royalties, and establish a yardstick against which to measure leasing plans. More federal lands should also be incorporated into each plan, with the goal of ramping up development, over the next ten years, of the most attractive resources.

Reform 6. Establish five-year leasing plans for federal lands—similar to those for current offshore leases and determined by the BLM—with annual price-dependent output targets. Require that plans demonstrate sufficiency to meet such targets.

Reform 7. Eliminate restrictions that prohibit development of ANWR and the Outer Continental Shelf.

Encouraging private investment and exploration of federal lands will require creating a better business



environment. Repetitive reviews, overlapping requirements, permitting delays, and political interference drive up costs and slow progress. To facilitate development of land after it is leased, the federal government should adopt an efficient regulatory process, similar to Canada's One Project, One Review system,⁹⁹ that provides clear timelines for project approval. State governments, which possess more experience regulating drilling and a better record of efficient administration,¹⁰⁰ should lead the permitting process.

Reform 8. Establish a clear process and timeline for each project type, with a single point of accountability in the federal government responsible for approval.

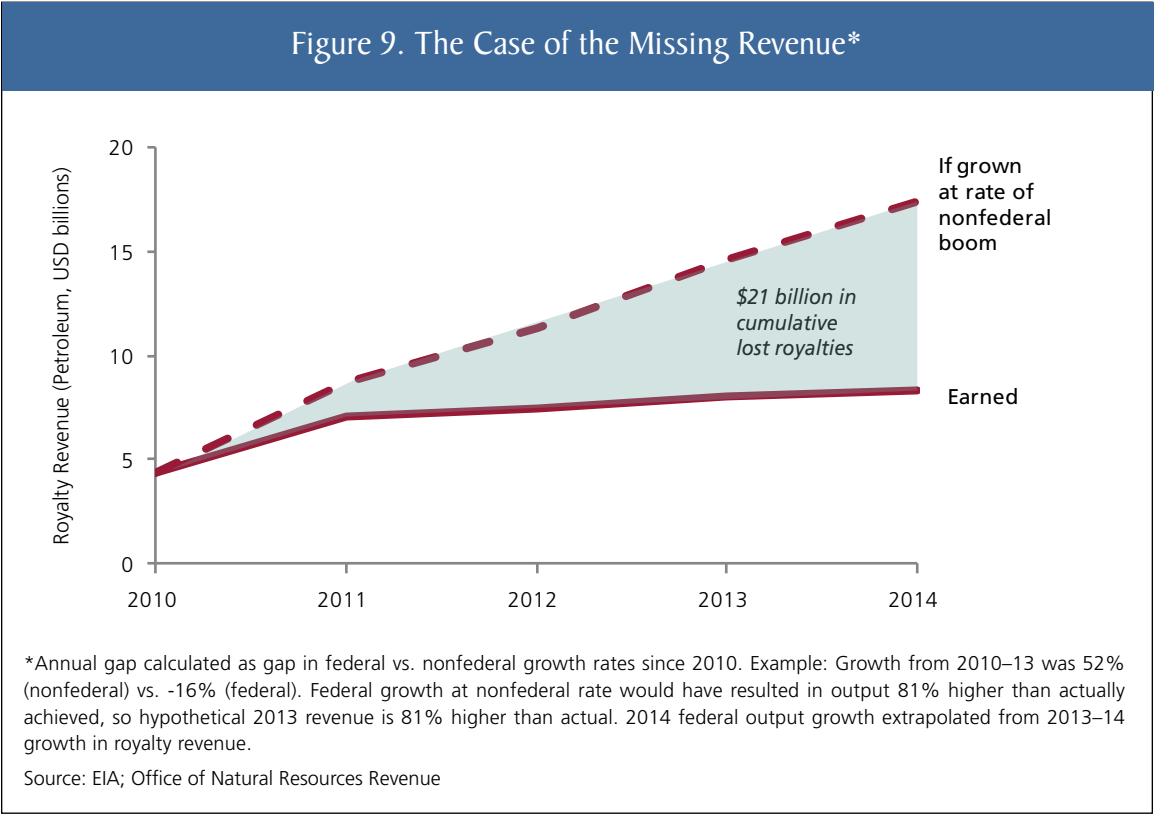
Reform 9. Allow state regulators to govern drilling activity on federal lands. Deem state project reviews sufficient to meet federal environmental review requirements.

The federal government should invest in a more robust information infrastructure that consolidates the best estimates from industry and government on the size of reserves, development time, and expected output. This information would be used to validate lease-sale plans and project revenues.

Reform 10. Regularly update USGS inventories of federal lands and waters (akin to reviews conducted under the Energy Policy and Conservation Act). Forecast development timelines and peak output. Use results as the basis for testing the sufficiency of leasing plans.

Royalties

An output boom on federally owned lands and waters would bring an influx of lease and royalty revenue (**Figure 9**). During 2011–14,¹⁰¹ as oil prices hovered at \$90–\$100/bbl¹⁰² and federal lands and waters produced approximately 2 million bbl/d,¹⁰³ producers paid \$7.0 billion–\$8.4



billion in annual oil royalties.¹⁰⁴ Had federal output grown, since 2010, by 80 percent—as it did on lands outside of federal control—royalty payments during 2011–14 could have been more than \$20 billion higher, contributing an additional \$9 billion in 2014 alone.¹⁰⁵

Performance on nonfederal lands is an imprecise proxy for federal potential. Yet, in many respects, the federal revenue opportunity going forward is significantly *greater* because the base of existing production is comparatively small. Were ANWR alone to produce 1.35 million bbl/d (a high-end EIA estimate),¹⁰⁶ federal output would rise by nearly 70 percent and federal revenue by \$4 billion annually, according to the Congressional Budget Office.¹⁰⁷

If underdeveloped areas of the Outer Continental Shelf—which hold the majority of offshore resources—simply matched current western and central Gulf output, they would deliver an additional 1.5 million bbl/d. Various studies place the production potential of the Atlantic¹⁰⁸ and eastern Gulf¹⁰⁹ zones at more than 500,000 bbl/d each and that of the Arctic at more than 1.5 million bbl/d.¹¹⁰ Federal onshore reserves, though subject to more disparate estimates, hold enormous potential as well. If prices return to \$90–\$100/bbl, an increase of 3 million bbl/d could generate \$10 billion in annual federal royalties. Though such revenue would, of course, need to be shared with states, additional lease and bonus payments and natural-gas royalties would substantially add to the total.¹¹¹

Potential federal revenue generated by oil and gas production serves as an important reminder of the benefits that America would derive from

more actively developing its collectively owned energy resources. Such revenue would also offer an opportunity to self-fund activity related to managing oil and gas production and to better align the incentives of different interest groups. Earmarking incremental royalties for investment in new energy technology research and development offers a win-win that ensures that the country is investing in economic development, for the short and long term, by guaranteeing both resource access and technology investment as two sides of the same coin.

Reform 11. Channel most federal oil and gas revenue into a separate account responsible for funding federal investment in energy research and development; channel some revenue to increased investment in inventorying U.S. energy resources. (In his 2015 budget, President Obama requested \$5.2 billion in DOE R&D funding,¹¹² while subsidies for energy technologies deployed in the market account for another \$5–\$10 billion.)¹¹³

IV. CONCLUSION

America's failure to develop federally owned lands and waters and to update its energy-policy framework represents today's low-hanging policy fruit. Untapped federal oil and natural-gas resources are estimated to be significantly larger than the shale plays that have driven the current boom—if development proceeds, such estimates will likely rise considerably higher. Improving America's energy regulatory environment will amplify today's boom by encouraging resources to be used more efficiently. Opening federal land and waters to development over the next decade will extend the boom. Together, such reforms will further the country's energy advantage and make it an enduring fixture of U.S. prosperity.

ENDNOTES

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