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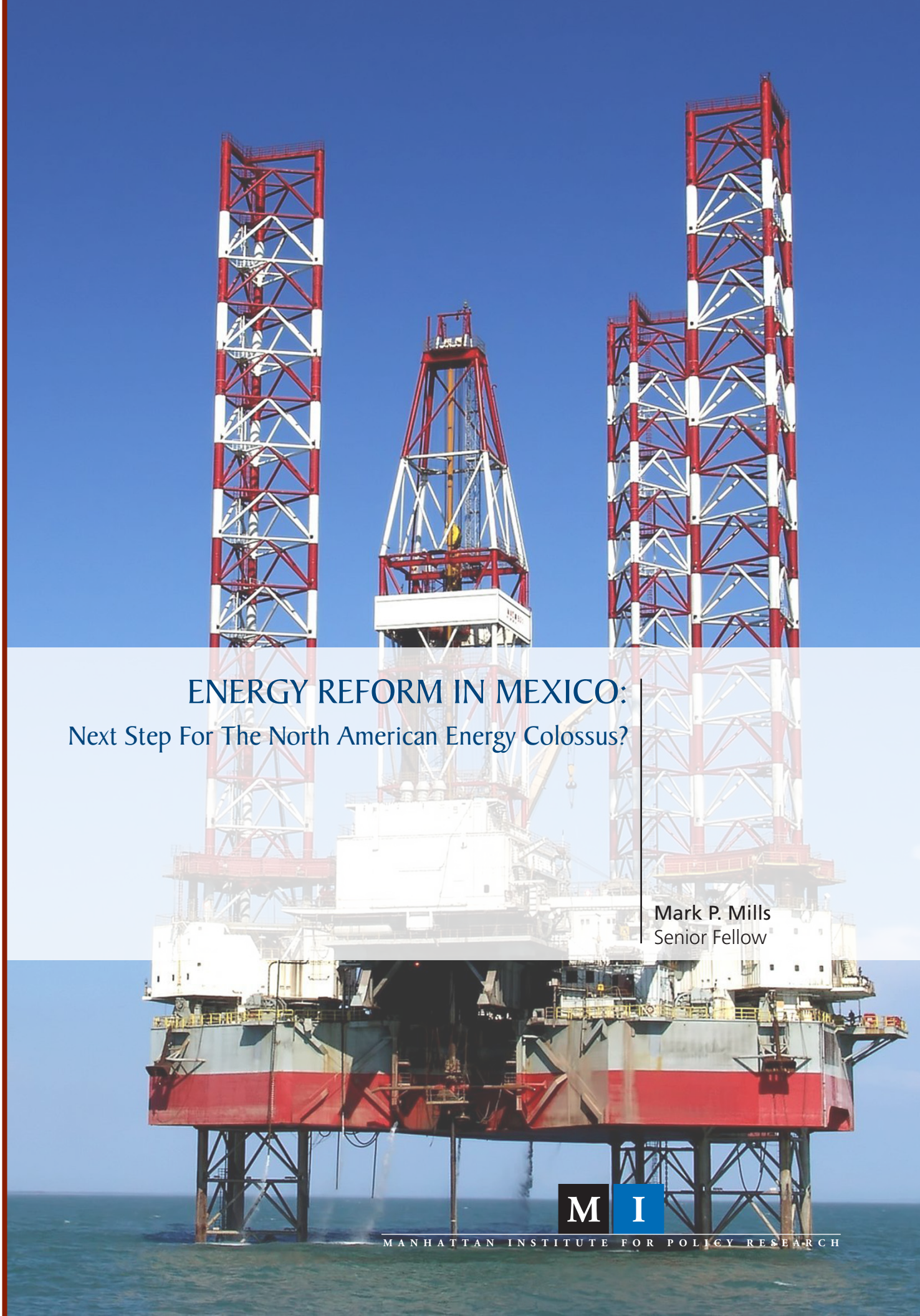

ENERGY REFORM IN MEXICO:

Next Step For The North American Energy Colossus?

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Executive Summary

Few think of Mexico in the same terms as Saudi Arabia, despite the fact that Mexico has similar quantities of hydrocarbon resources. That it is not seen this way reflects, in large measure, the decade-long decline in Mexico's oil and gas production, as overseen by the state-owned oil monopoly Petróleos Mexicanos (Pemex).

Yet Mexico's picture is about to change dramatically. The groundwork has now been laid for radical political and regulatory reform that can unlock the nation's vast hydrocarbon wealth. The reform is among the signature acts early in the six-year term of President Enrique Peña Nieto.

Reforms already enacted and others pending allow, for the first time since the 1930s, private and foreign investment in Mexico's oil and gas fields. This is intended to lead to an influx of both capital and technology that will boost domestic production, thus not only revitalizing Mexico's economy, but also setting the stage for a North America—the United States, Canada, *and* Mexico—as a rival to the Middle East and Russia in world energy markets. This outcome is not, however, inevitable. But while numerous observers weigh-in with cautionary observations, we consider here the factors which suggest that future progress could be as surprising, and fast, as has just occurred.

This paper briefly reviews recent events and the state of affairs in Mexico, as well as the implications of expanded Mexican oil and gas production for Mexico's economy, North America, and the world. Finally, it offers a few proposals that could accelerate and maximize the benefits from Mexico's rise to becoming, again, a bigger player in oil and gas.

Energy Reform In Mexico: Next Step For The North American Energy Colossus?

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INTRODUCTION

On December 20, 2013, President Peña Nieto signed into law sweeping changes to Mexico's constitution, opening up foreign access to the country's vast hydrocarbon resources for the first time since 1938.

The law's principle features include[1]: (i) mechanisms for foreigners to bid on leases to explore and drill for oil, ending the 75 year Pemex monopoly; (ii) independent regulatory bodies for licensing, safety, and the environment; (iii) new governance of Pemex, with its 15-member board reduced to 10 by stripping the powerful oil workers' union of its five seats; (iv) a sovereign hydrocarbon wealth fund, overseen by Mexico's central bank, to invest for the long-term; and (v) the opening of the nation's grid to private power-generators to compete with the state monopoly. (The electricity sector is a subject for another day, though we note for the record that the goal there is the same: increase supply and reduce energy costs.)

Mexico's historic reform arrives on the heels of another, more ignoble milestone: ten consecutive years of declining national oil and gas output. Once, long ago, Mexico was the world's second largest oil producer. Today it has slipped below tenth place.[2] This comes at a time of buoyant global petroleum prices and the take-off, next-door, of hydrocarbon production in the United States.

But with Mexico's easily accessible deposits mostly tapped out, Pemex has struggled with the capital and technological requirements needed to expand output from existing fields and to extract ever-deeper resources offshore in the Gulf. At the same time, Mexico's rich deposits in shale fields sit idle—the same geological formations which have unleashed torrid growth in jobs and wealth for Texas, and the United States at large.

The new law aims to reverse these trends by enticing foreign investment, businesses large and small, along with their know-how in everything from exploration and production, to transport and refining. The goal is to drive production back beyond previous peaks by opening up new fields, both on-and offshore.

The extraordinary nature of what has transpired, thus far, south-of-the-border may be difficult for Americans to fully grasp.

The legislation passed by Mexico's Congress would be—functionally and politically—equivalent to a hypothetical scenario in which America's Congress, with Presidential urging, passed and sent a constitutional amendment to the states returning, to the states, the authority to develop hydrocarbons on federal lands that are currently the sole purview of the U.S. Bureau of Land Management, an agency with roots dating to the 1920 U.S. Mineral Leasing Act.

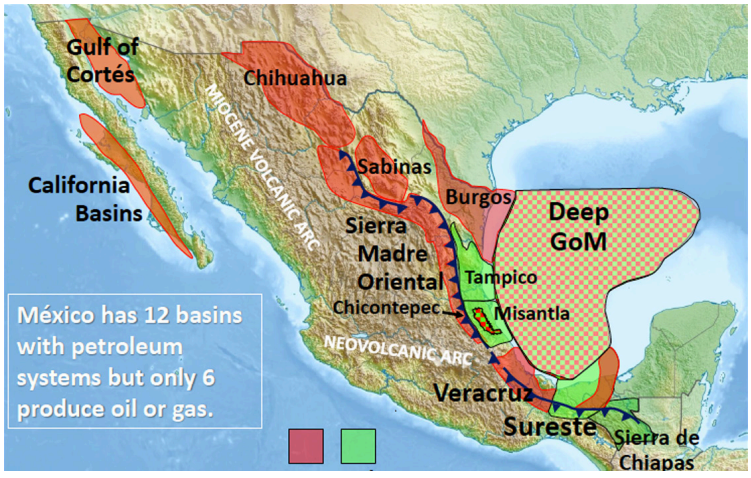
By all appearances, President Peña Nieto and Mexico's Congress have mapped out a "best practices" approach on how to separate government policy from managing industrial enterprises—one which forges a path blending what has working well in the U.S., together with elements modeled on Brazil's successful record of opening up its national oil company, Petrobras, to foreign engagement.

THE STATE OF AFFAIRS IN MEXICO

With one-third of Mexico's federal revenues coming from oil and gas production, hydrocarbons represent the single largest source of revenue gain, or loss, for the nation. Each million barrels per day of lost output represents around $30 billion a year in foregone sales.

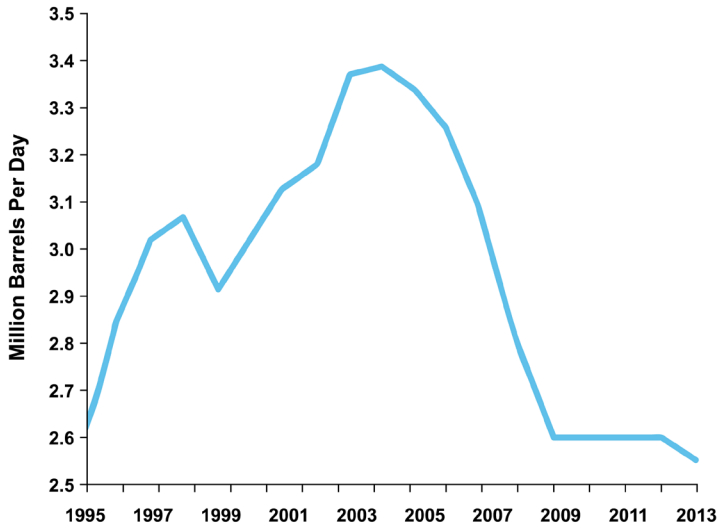
As with any nation, when federal tax receipts decline but spending stays the same, or rises, national debt grows. Possible solutions to rising debt, aside from cutting spending, include: increasing

FIGURE 1. MEXICO'S OIL AND GAS PROVINCES



Though Mexico has some of the world's largest and most accessible offshore oil fields, its shale resources are even bigger
Source: Leon Alvarez, "Mexico's Energy Reform," American Association of Petroleum Geologists, Houston TX, January 2014

FIGURE 2. MEXICO'S OIL PRODUCTION

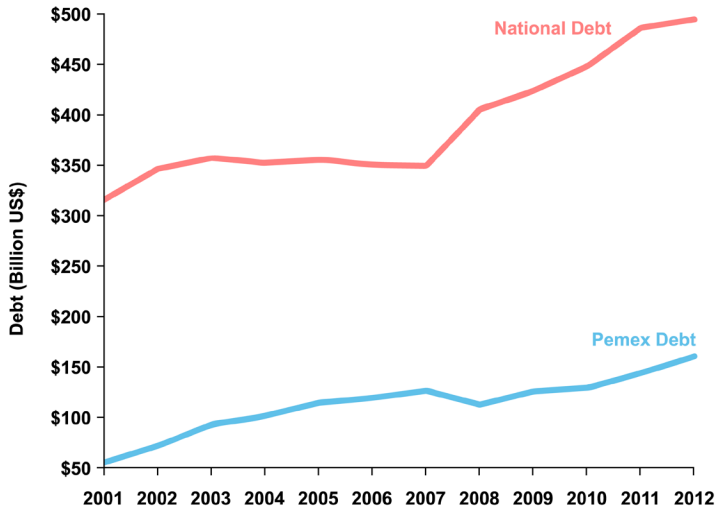


Data Source: U.S. EIA International Energy Statistics

economic growth to generate tax receipts (without increasing tax burdens); increasing domestic production of goods (especially of oil and gas) to increase federal tax royalties; boosting exports and reducing imports.

To highlight the state of affairs in Mexico, the world's 11th largest economy, we can use five metrics: federal debt, unemployment, productivity, spending on education, and spending on science & technology. The first three metrics reveal much about the current state

FIGURE 3. MEXICO'S DEBT



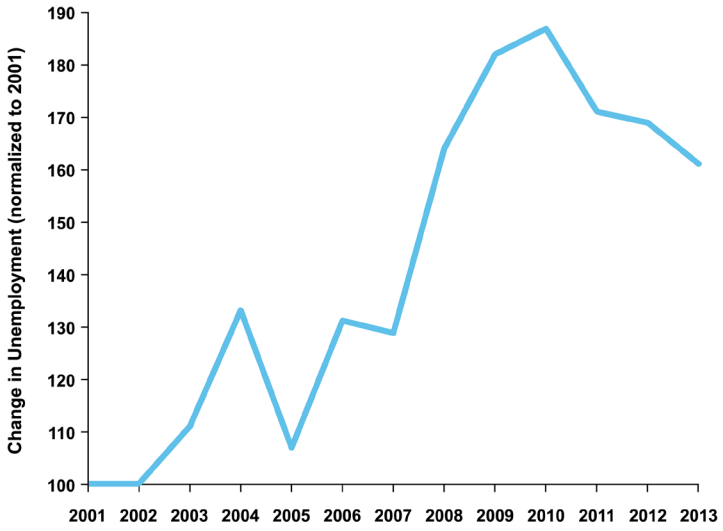
As a federal monopoly entity, Pemex's rising debt (which includes pension liabilities) represents a worrisome share of national debt

Data Sources: International Monetary Fund; PEMEX 2012 Statistical Yearbook

of affairs, while the last two offer a telling glimpse of key factors for future social and economic growth.

Like its northern neighbor, Mexico has suffered through a stubbornly long period of increased and sustained high unemployment. President Peña Nieto can expect to see a broad-based increase in employment from expanding the country's oil and gas sector—and not merely in extraction-related jobs. For every job created directly in the oil field, another three to four are created

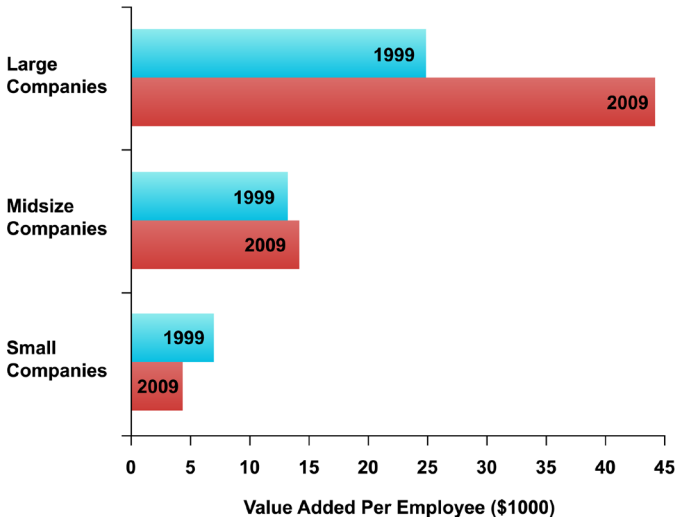
FIGURE 4. GROWTH IN MEXICO'S UNEMPLOYMENT



INEGI, Mexico's statistics agency, defines a worker as employed if he is older than 14 and works at least 6 hours per week in any job. Mexico's unemployment rate, at the time of publication, was 4.7%, with 59.1% of workers employed in the informal sector.

Data Source: Inter-American Development Bank: Latin American and Caribbean Macro Watch Data Tool

FIGURE 5. BUSINESS PRODUCTIVITY IN MEXICO



Small companies < 10 employees ; 10 ≤ Midsized ≤ 500 ; 500 < Large

Data Source: McKinsey Global Institute, "A Tale of Two Mexicos," March 2014

in everything from information services to training, health-care, housing, education, and manufacturing.[3]

While Mexico's large enterprises have seen significant improvement in productivity over the past decade (measured as value added per employee), such firms account for only 20 percent of the workforce. Productivity has been stagnant or shrinking in the businesses where 80 percent of the population works. It bears noting, too, that small and mid-sized businesses are where the majority of the job creation and productivity gains have occurred in the United States because of the shale revolution there.[4]

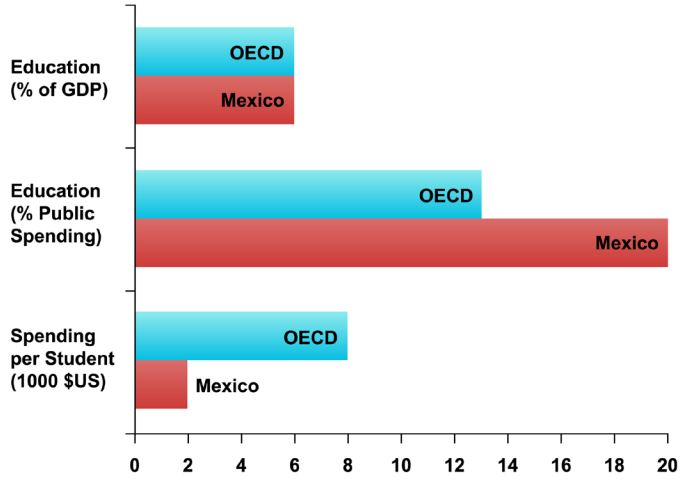
President Peña Nieto's pledge to revitalize his nation's lagging education system is both politically critical, because of Mexico's powerful unions, as well as vital for his country's future. As Figure 6 below shows, given that Mexico's education spending is already at a similar share of GDP—and at a higher share of overall public spending compared to the OECD average—the only practical way to increase the absolute amount of money available for education is to increase the size of Mexico's economy.

Finally, Mexico's spending on science and technology is among the lowest in the developed world. Though Mexico's Congress has supported President Peña Nieto's pledge to expand R&D— with 20 and 12 percent increases scheduled, respectively, for the National Council for Science and Technology and overall Mexican science budget[5]—far more is needed. Peña is also pushing for: revised intellectual-property legislation to allow scientists and universities to benefit from publicly-funded work; a reform of the academic retirement system to encourage young researchers to stay in Mexico; and tax breaks to incentivize private sector R&D. The overall goal is to lift Mexico's combined public and private R&D spending from 0.4 percent of GDP today, to a level at least similar to Brazil's 1.0 percent of GDP. This will require more money.

As for Mexico's potential to increase revenues from hydrocarbon production, three sets of facts make clear the untapped opportunity:

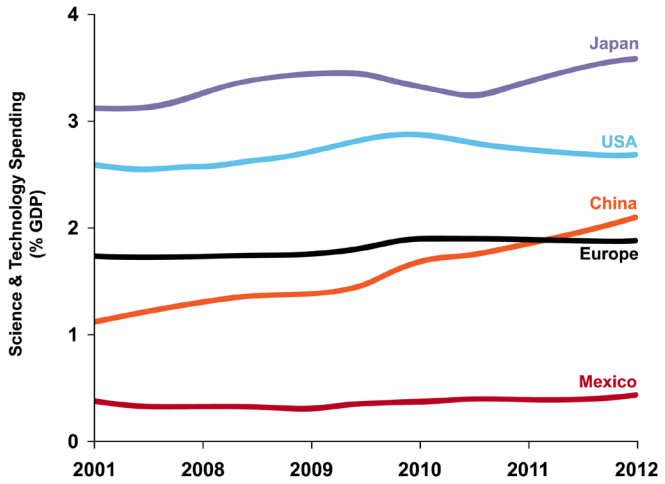
- Mexico sits atop some of the world's biggest oil and gas resources, with a total estimated 450 billion barrels of oil equivalent. This is comparable to the resource base of Saudi Arabia.[6] Mexico's offshore fields in the Gulf of Mexico also rank among the world's most accessible, while its shale fields are in the global top six for potential.

FIGURE 6. MEXICO'S EDUCATION SPENDING



Data Source: OECD Country Note: Mexico

FIGURE 7. MEXICO'S SPENDING ON SCIENCE & TECHNOLOGY



Data Source: Nature, "Mexico bolsters science funding," November 19, 2013

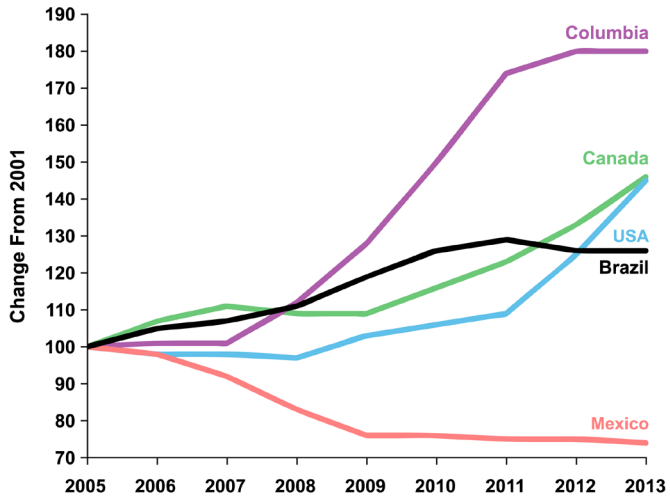
- Mexico currently operates fewer than 5 percent of the total number of offshore rigs in the Gulf of Mexico.[7]

- To date, only several dozen wells have been drilled into Mexico's shale formations; more than 40,000 wells were drilled in U.S. shales last year alone.[8]

The shale fields of west Texas—where output has soared in only a few years from nothing to $30 billion annually—do not stop at the border. At present, however, those same enormously productive geological shales produce nothing, south-of-the-border.

Soon, Mexico can replace pride in precisely which

FIGURE 8. OIL PRODUCTION GROWTH FOR SELECTED NATIONS IN THE AMERICAS



Data Source: U.S. EIA International Energy Statistics

companies produce its oil and gas, with the pride, and benefits, of joining the community of nations in North America that are seeing rising production.

HOW FAST COULD THINGS CHANGE IN MEXICO? THE POLITICS

For all the aforementioned reasons, President Peña Nieto and Mexico's Congress are backing foreign participation and investment in the country's hydrocarbon business, long a symbol of Mexican nationalism.

The keys to how fast reforms can be implemented are anchored in the pace of the legislative and regulatory process, as well as in the technologies which dictate practical production realities. Start with the politics.

Few observers expected the overall changes enacted so far to be as sweeping or swift. Consider remarks by Pemex CEO Emilio Lozoya, who enthusiastically embraced the constitutional amendment at a recent Houston oil and gas industry conference last month: "You're more than welcome," Lozoya told attendees, "to come and join the exploration opportunity."[9]

But legislative clarity is still required to enact the specifics in the omnibus guidelines. Entirely new regulatory and oversight bodies will need to be created from scratch. Mexico's Congress appears to be on schedule to soon produce the detailed legislation called for by the constitutional amendment.[10] And while it is premature to gauge whether the new rules-of-the-road will, in the end, entice or impede development, one should take encouragement from the speed of political progress thus far.

Pemex, for example, has already met one major late March deadline, set by the new law, by submitting a full list to Mexico's Energy Secretariat of hydrocarbon fields over which Pemex wishes to retain full ownership. Notably, too, the Pemex submission had to include credible plans for the financial, technical and operational capabilities necessary to produce hydrocarbons from such fields in an "efficient and competitive manner."[11]

Now, Mexico's Energy Secretariat and National Hydrocarbons Commission have until September 17, 2014 to complete evaluations to undertake on-and offshore lease auctions open to the world. First bid rounds are scheduled for, and seem likely to occur, by the third quarter of 2014.

And, in another indicator of political urgency, this June the Mexican National Hydrocarbons Commission will issue permits for seismic exploration.[12] This will, literally, prime the pump by creating an immediate area of opportunity for foreign enterprises to utilize cutting-edge seismic and other exploration technologies—the first step to entering the modern era of "smart drilling."[13]

HOW FAST COULD THINGS CHANGE IN MEXICO? THE TECHNOLOGY

Today's favorable political tailwinds and economic opportunity are unprecedented in recent Mexican history. Nonetheless, the oil and gas industry is one where forecasters and naysayers often stress that the energy industry proceeds in long, slow cycles.

While it is certainly true that politicians and regulators have a history of *creating* long, slow cycles with delays and interminable deliberations (such as those in the United States over whether to approve the Keystone pipeline and issue export permits for LNG terminals), the core question remains: is it *technically* feasible for Mexico to follow the growth trajectory experienced over the past half-dozen years in U.S. oil and gas production?

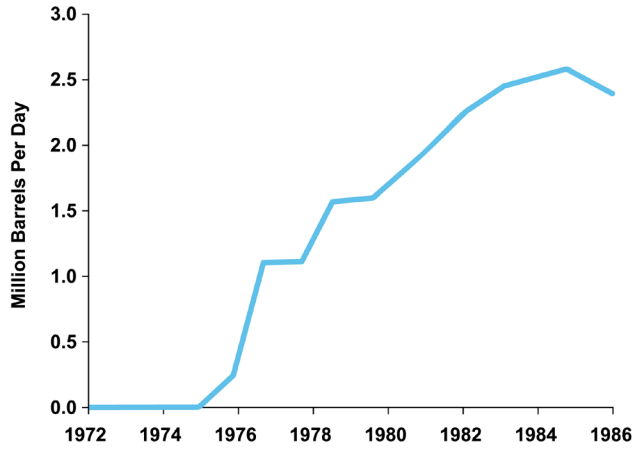
Mexico's government projects the new policy will boost production to at least 4 million barrels per day by 2024. This is a reasonable goal, according to certain analysts;[14] it is also a goal entirely consistent with what is technically achievable. Consider specifically what recent history reveals

about the speed with which engineering firms and technology can unlock resources, and thus, both wealth and jobs.

Mexico itself has, in earlier years, demonstrated that with the right technology and capital commensurate with the available resources, high velocity growth in production is possible. From 1973 to 1980, for instance, the country's oil output rose from under 0.5 to over 2.5 million barrels per day.

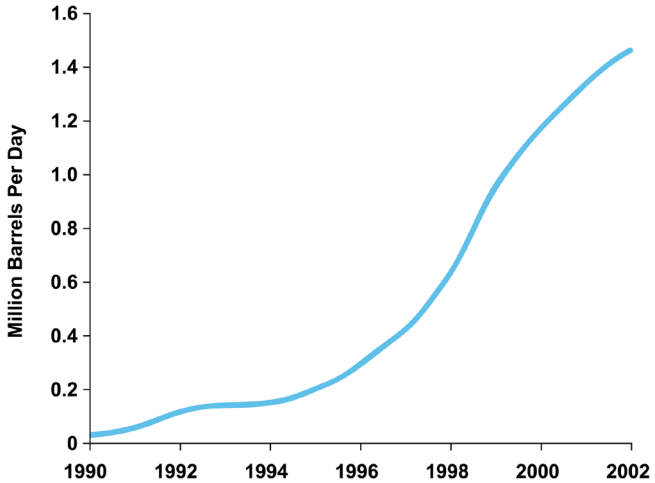
Take another example of how rapidly production can grow. The United Kingdom, around the same time as Mexico's first rise in offshore drilling, expanded output from zero to 2.5 million barrels per day, in the technically challenging North Sea, in just six years.

FIGURE 9. EARLY GROWTH IN U.K. NORTH SEA OIL PRODUCTION



Data Source: Quarterly Oil Supply, July 2, 2013

FIGURE 10. DEEPWATER OIL AND GAS PRODUCTION GROWTH IN THE U.S. GULF OF MEXICO



Data Source: PFC, "Importance of the Deepwater Gulf of Mexico," 2011

One big challenge for Mexico is that, in addition to reviving existing shallow offshore fields, nearly all the untapped new fields in the Gulf of Mexico lie in very deep water. But here too we have some recent history to illustrate the velocity of production growth; in this case, U.S. deepwater production in the Gulf of Mexico, where output rose from 0.2 to 1.5 million barrels per day in a half-dozen years (Figure 10).

It is entirely possible that a 1.5 million barrel per day increase in a half-dozen years for Mexico may, in hindsight, seem too modest a forecast (provided the right incentives are adopted). The key wildcard for radically accelerating Mexico's hydrocarbon output depends on the nation's ability to unleash its dormant shale fields.

The U.S. shale revolution is instructive: the Eagle Ford Shale in Texas, for instance, has seen production grow in just a few years, from virtually nothing to 0.7 million barrels per day. Put in economic terms, this is a skyrocketing growth in gross revenues, from zero to $25 billion annually. All this in one region, in one shale field.

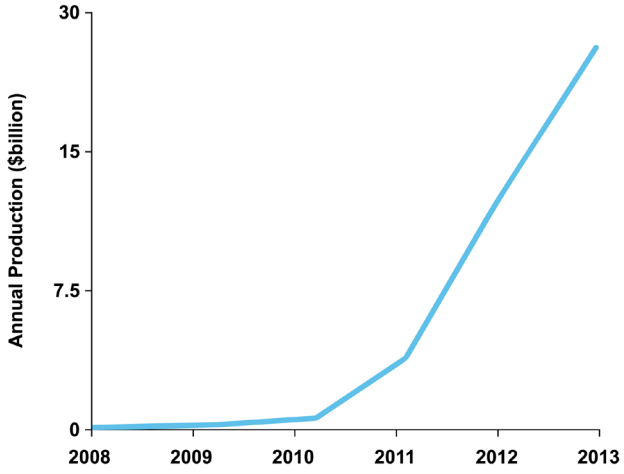
A similar story has emerged in the U.S.'s other shale fields. Examining just natural gas production, we have seen production revenues soar from zero to billions of dollars annually, over very few years, in a mere half-dozen fields. Mexico's shale gas potential offers no less cause for excitement. Faced with rising electricity demand, Mexico will benefit enormously from tapping its domestic shale fields.

Precisely how much natural gas, then, lies trapped in Mexico's shale formations? Even the best estimates might understate the bonanza. Again we see an instructive pattern in the recent U.S. experience. Once exploration and development began, estimates of the amount of recoverable natural gas in various U.S. shales increased by up to 1,000 *percent* between 2006 and 2008. Over that same short period, overall estimated U.S. recoverable shale gas reserves rose 300 percent—and have continued to rise since.[15]

In addition to the speed with which oil and gas production itself can grow, Mexico can also expect other critical precursors of the hydrocarbon business to take-off even sooner.

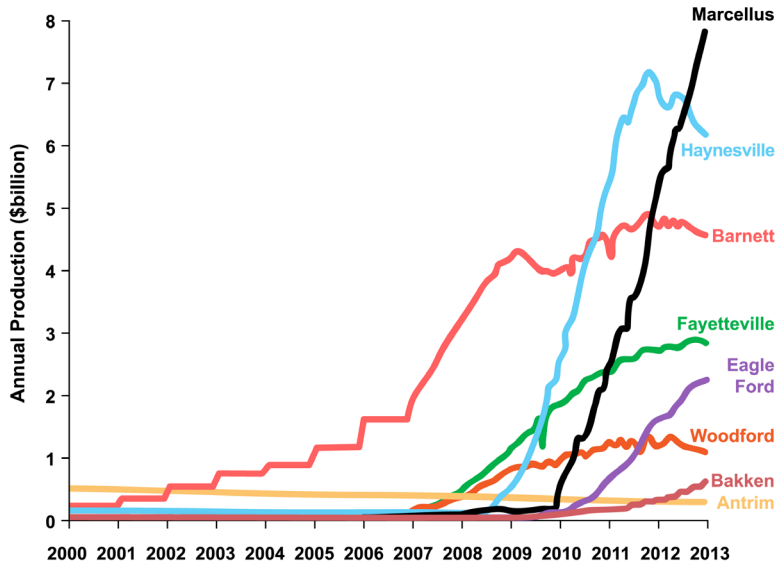
First will come auctions for the right to explore and drill. U.S. territorial waters in the Gulf of Mexico offer another bellwether: in March of this year, $1 billion in bids were filed for U.S. federal offshore leases.[16] On a GDP-parity basis, such an outcome for Mexico

FIGURE 11. OIL PRODUCTION GROWTH IN THE TEXAS EAGLE FORD SHALE



Data Source: Texas Railroad Commission

FIGURE 12. NATURAL GAS PRODUCTION GROWTH IN U.S. SHALE FIELDS



Data Source: US EIA Natural Gas Weekly, Sept. 11, 2013; http://www.eia.gov/naturalgas/weekly/

would be equivalent to the U.S. treasury receiving a roughly $8 billion windfall.

And, as exploration begins and fields are proven out, Mexico too can expect to see a flood of foreign direct investment (FDI), as previously experienced in the United States. (The U.S. has received over $200 billion of FDI in its shale ecosystem over the last several years alone.[17])

In 2012, the U.S. Energy Information Administration (EIA) forecast that "Mexican oil production [will] continue declining over the next decade assuming no dramatic changes in policy or technology."[18] How times have changed.

HOW MEXICO BENEFITS

It is as difficult today to forecast the outcome for Mexico as it was for the United States a half-dozen years ago. Nonetheless a number of analysts see energy liberalization adding one percentage point to Mexico's GDP growth.[19] Government estimates on job creation forecast 500,000 additional jobs by 2018—and a further 2.5 million by 2025. Another estimate puts a $1 trillion cumulative economic value for Mexico in developing *just* the Tampico shale region (the Eagle Ford south-of-the-border).[20] When measured against recent U.S. experience, such estimates appear reasonable.

Mexico will likely see the same kind of job-creating and GDP-boosting infrastructure build-out that has started and continues in the United States: in the coming decade alone, over $640 billion in privately-funded infrastructure investment, generating over 400,000 jobs and $300 billion in tax revenue, is expected in the U.S.[21] (The U.S. oil & gas sector has also been the single largest contributor to GDP and job growth during the country's recovery from its Great Recession.[22])

If Mexico realizes its hopes for a similar $1 trillion windfall over the same period, the relative impact on Mexico's comparatively smaller economy will be far greater.[23]

HOW THE U.S. BENEFITS

For the U.S., a vibrant Mexican hydrocarbon economy would be a boon to thousands of small and large technology-centric enterprises with expertise in the oil

and gas fields, as well as to all the associated industrial and manufacturing infrastructure. U.S. firms, after all, will likely provide much of the expertise which Mexico hopes to entice.

In general, moreover, a wealthier neighbor is a strong positive for the United States—inevitably igniting not only more high-value trade of all kinds, but also creating millions of new jobs for Mexicans. Likewise, the latter almost assuredly will help relieve tensions over illegal immigration, as many more Mexicans find jobs and opportunity nearer to home.

HOW THE WORLD BENEFITS

Most of the nations of the world will welcome having Mexico follow the same, robust energy growth path pursued by the U.S. and Canada, as U.S. production keeps expanding and many of Canada's big energy projects come on line (especially as Canadian investment shifts from metals to hydrocarbons[24]).

The International Energy Agency forecasts that world purchases of oil and gas will grow by a cumulative $30 trillion over the coming two decades. If all goes well, Mexico will produce 3 million *more* barrels per day of oil in a decade than what was anticipated under the old world order. When added to similar growth in Canada and the United States, one can expect a titanic shift in global supply and demand that will invariably roil world markets, as North America becomes a new production epicenter.

No longer does the future of world trade in hydrocarbons look to be dominated by a duopoly of the Middle East and Russia—for not only does North America possess more than double the oil and gas resources of the entire Middle East (and the technology to access it), but also now, seemingly, the necessary political will.[25]

WHAT ARE THE ROADBLOCKS?

Mexico faces numerous challenges before it can realize its transformative vision of rapidly expanding oil and gas production to drive economic growth, job creation, and greater social stability.[26]

Among the key uncertainties, many of which parallel those experienced in the United States:

- Will Mexico's terms of investment be sufficiently attractive to foreign industries?
- How eager and cooperative will Pemex be in the process?
- Can local political issues, such as sharing of benefits, be effectively managed?
- Can nagging worries about security and rule of law be reasonably and quickly addressed?
- How fast will essential infrastructure, such as pipelines and rail for shale development, get built?
- How smoothly and quickly will the newly formed regulatory agencies operate?
- How much friction will be created by local opposition?[27] (At least one anti-fracking organization, Alianza Mexicana contra el Fracking, is already mounting a campaign.[28])

Still, these are all non-technical and non-financial impediments. The world needs more oil and gas. Mexico needs more money and jobs. And the U.S. would benefit on multiple fronts. All this should stimulate creative negotiations, policies and deal-making to surmount obstacles.

Importantly, we know the benefits are no longer theoretical, but crystal clear. We know they can be realized swiftly. And we know that surprising political boldness and compromise are possible—at least in Mexico right now. For all these reasons, the odds are in favor of Mexico getting it right, and proceeding faster than pessimists expect.[29]

A FEW MODEST PROPOSALS

Mexican regulators and policymakers have set in motion the framework required to unleash their country's 21st Century energy revolution. But to accelerate and ensure its success, both Mexico and the United States should do more.

While Pemex and Mexico's National Hydrocarbons Commission begin negotiations with oil companies to resuscitate existing, and tap new, offshore fields, President Peña Nieto might consider another bold move, this time targeting the dormant shale resources.

Pemex does not have shale expertise; few companies outside the U.S. do. The handful of shale wells drilled thus far by Pemex were unproductive and expensive.[30] And while the oil majors will be front-and-center in developing Mexico's offshore resources, few of them possess the requisite shale expertise and virtually none of them were significant in bringing about the U.S. shale revolution. Instead, shale expertise is to be found almost entirely within the U.S.'s thousands of small and mid-sized firms.[31] Pemex has, in fact, already acknowledged this reality.[32]

The challenge, then, for Mexico will be to find ways to entice U.S. shale experts to enter new, politically unfamiliar territory with unknown policy risks while abundant shale territories, many untapped, remain in the United States.

To encourage enough U.S. shale expertise to quickly move south-of-the-border to prime the pump on shale fields there, Mexico should consider launching a special two-part shale initiative.

- *First, give favored benefits to early entrants in the shale fields.* Mexico will need to, temporarily, tilt the economic playing field somewhat. It will be critical to get development kick-started quickly to qualify the particularities of local shale geology. Key to this will be to offer favorable financial terms that provide greater potential profits for early development. (This is a common economic development technique—one which can take many creative forms and be restricted to a reasonable number of early winners).

- *Second, create a high-profile, tech-centric "21st Century shale initiative".* Mexico could establish a flagship partnership to attract early use of next-generation shale technology. Through additional incentives targeting new technologies and creative public-private and cross-border partnerships, Mexico might set itself up as a test-bed to stimulate the commercialization of emerging shale technologies. While this will not unlock more resources in the short-term (the aforementioned incentives should do that), it would, however, provide both a sweetener *and* position Mexico (and partners) on the leading edge of shale innovation for efficiency, speed, profitability, and environmental sustainability.

The U.S. government, for its part, should not sit idly by as Mexico lures U.S. and other foreign businesses to help fuel an energy boom on the United States' southern border.

Instead, with the arrival of the 20th anniversary of the North American Free Trade Agreement (NAFTA), the U.S. should take leadership, in partnership with Canada, to help frame a new coalition in the form of a "North American Common Energy Market"—one that would benefit all three nations' economies.

As a first step, the U.S. should call for a North American energy summit to map out a strategy for mutual benefit and economic dominance in selling hydrocarbons to the world. It seems likely that President Peña Nieto would welcome such an idea. For his part, Canadian Prime Minister Stephen Harper has already embraced expanding the economic benefits that derive from selling more Canadian hydrocarbons to the rest of the world.

The U.S. has evolved from debating the dangers of import dependence to now debating how much oil and gas to allow U.S. firms to produce and sell into global markets. Canada had that debate several years ago and made the wise decision to become a seller to the world. Mexico has joined the growth club. Together, the three nations can transform geopolitical dynamics, and do so to mutual domestic benefit.

ENDNOTES

[1] David Goldwyn, "Mexico Rising: Comprehensive Reform at Last?" Atlantic Council, December 2013, http://www.atlanticcouncil.org/images/publications/Mexico_Rising.pdf.

[2] EIA, "Country Data," http://www.eia.gov/countries/index.cfm.

[3] National Petroleum Council, "Macroeconomic Impacts of the Domestic Oil & Gas Industry," September 15, 2011, http://www.npc.org/Prudent_Development-Topic_Papers/5-1_Macroeconomic_Impacts_of%20Oil_and_Gas_Industry_Paper.pdf.

[4] Mark P. Mills, "Where The Jobs Are: Small Businesses Unleash Energy Employment Boom," Manhattan Institute, February 2014, http://www.manhattan-institute.org/html/pgi_04.htm#.UzhP_8fgX7N.

[5] Laura Vargas-Parada and Erik Vance, "Mexico bolsters science funding," *Nature*, November 19, 2013, http://www.nature.com/news/mexico-bolsters-science-funding-1.14204.

[6] Leon Alvarez, "Mexico's Energy Reform," American Association of Petroleum Geologists, Houston, Texas, January 2014. "Reserves", on the other hand, connote a more narrow set of factors, such as accessibility of resources, economic feasability of recovery, and degree of geological certainty.

[7] BBVA Research, "Opportunities from Mexico's Energy Reform," January 22, 2014, http://www.bbvaresearch.com/KETD/fbin/mult/140122_EconomicWatchEEUU_218_tcm348-419472.pdf?ts=1122014.

[8] Leonardo Maugeri, "The Shale Oil Boom: A U.S. Phenomenon," June 2013, http://belfercenter.ksg.harvard.edu/publication/23191/shale_oil_boom.html.

[9] Adam Williams, "Pemex CEO Invites World to Tap Mexico's Energy Shale Reserves," Bloomberg, March 4, 2014, http://www.bloomberg.com/news/2014-03-04/pemex-ceo-invites-world-to-tap-mexico-s-energy-shale-reserves.html.

[10] Eric Martin, "Mexico oil laws may be delayed beyond April, PAN senator says," Bloomberg, March 22, 2014, http://www.worldoil.com/Mexico-oil-laws-may-be-delayed-beyond-April-PAN-senator-says.html.

[11] Fox News, "Mexico's Pemex submits list of desired oil fields," March 22, 2014, http://latino.foxnews.com/latino/politics/2014/03/22/mexico-pemex-submits-list-desired-oil-fields/.

[12] Offshore Magazine, "Inaugural Mexican oil and gas bid round expected in June 2015," March 20, 2014, http://www.offshore-mag.com/articles/2014/03/inaugural-mexican-oil-and-gas-bid-round-expected-in-june-2015.html.

[13] 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/.

[14] Clifford Krauss, "Oil Reforms by Mexico May Upend Markets," *New York Times*, August 14, 2013, http://www.nytimes.com/2013/08/14/business/global/in-mexico-a-proposal-to-revamp-oil-policy.html?src=recpb.

[15] Matthew Robinson, "Rising Estimates of U.S. Shale Reserves May Cap Natural Gas Prices," Reuters, April 30, 2009, http://blogs.reuters.com/commodity-corner/2009/04/30/rising-estimates-of-us-shale-reserves-may-cap-natural-gas-prices/.

[16] Fuel Fix, "Oil companies bid big bucks for Gulf drilling rights," March 19, 2014, http://fuelfix.com/blog/2014/03/19/feds-cash-in-on-gulf-lease-sales/.

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

[18] EIA, "Mexico Backgrounder," October 17, 2012, http://www.eia.gov/countries/analysisbriefs/Mexico/Mexico.pdf.

[19] J.P. Morgan, "Mexico Strategy," August 23, 2013.

[20] BBVA Research.

[21] Fuel Fix, "US energy boom demands $641B in infrastructure, study finds," March 18, 2014, http://fuelfix.com/blog/2014/03/18/report-641-billion-in-infrastructure-needed-by-2035/.

[22] Mark P. Mills, "Where The Jobs Are."

[23] Adam Williams, "Pemex CEO Invites World to Tap Mexico's Energy Shale Reserves," Bloomberg, March 4, 2014, http://www.bloomberg.com/news/2014-03-04/pemex-ceo-invites-world-to-tap-mexico-s-energy-shale-reserves.html.

[24] Jim Patrick, "If Canada Opens the Spigot on Drilling, These Oil Services Companies Could Climb: Interview with Tom Varesh," The Energy Collective, March 18, 2014, http://theenergycollective.com/streetwiser/354056/tom-varesh-if-canada-opens-spigot-drilling-these-oil-services-companies-could-cli?utm_source=feedburner&utm_medium=email&utm_campaign=The+Energy+Collective+%28all+posts%29.

[25] 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.

[26] Mary O'Grady, "Don't Celebrate Mexico's Reforms Just Yet," March 16, 2014, *Wall Street Journal*, http://online.wsj.com/news/articles/SB10001424052702304914904579437392204331148.

[27] Enrique Krauze, "The Danger in Mexico's Divided House," *New York Times*, November 28, 2013, http://www.nytimes.com/2013/11/29/opinion/krauze-the-danger-in-mexicos-divided-house.html?pagewanted=all.

[28] Common Dreams, "Energy 'Reform' in Mexico Will Only Pave the Road for Fracking," December 10, 2013, https://www.commondreams.org/view/2013/12/10-5.

[29] Offshore Magazine, "Energy reforms in Mexico clear hurdle, but foreign investment could be slow to follow," December 13, 2013, http://www.offshore-mag.com/articles/2013/12/energy-reforms-in-mexico-clear-hurdle-but-foreign-investment-could-be-slow-to-follow.html.

[30] EIA "World Shale Gas and Shale Oil Resource Assessment," June 2013, http://www.eia.gov/conference/2013/pdf/presentations/kuuskraa.pdf.

[31] Mark P. Mills, "Where The Jobs Are."

[32] World Oil, "Smaller companies to dominate Shale, Pemex unit Director says," March 20, 2014, http://www.worldoil.com/Smaller-companies-to-dominate-Shale-Pemex-unit-director-says.html.

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