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Energy Rush

Shale Production and U.S. National Security

By Elizabeth Rosenberg

Report of the Unconventional Energy and U.S. National Security Task Force, co-chaired by Ambassador Paula J. Dobriansky, Governor Bill Richardson and Senator John Warner

Center for a New American Security

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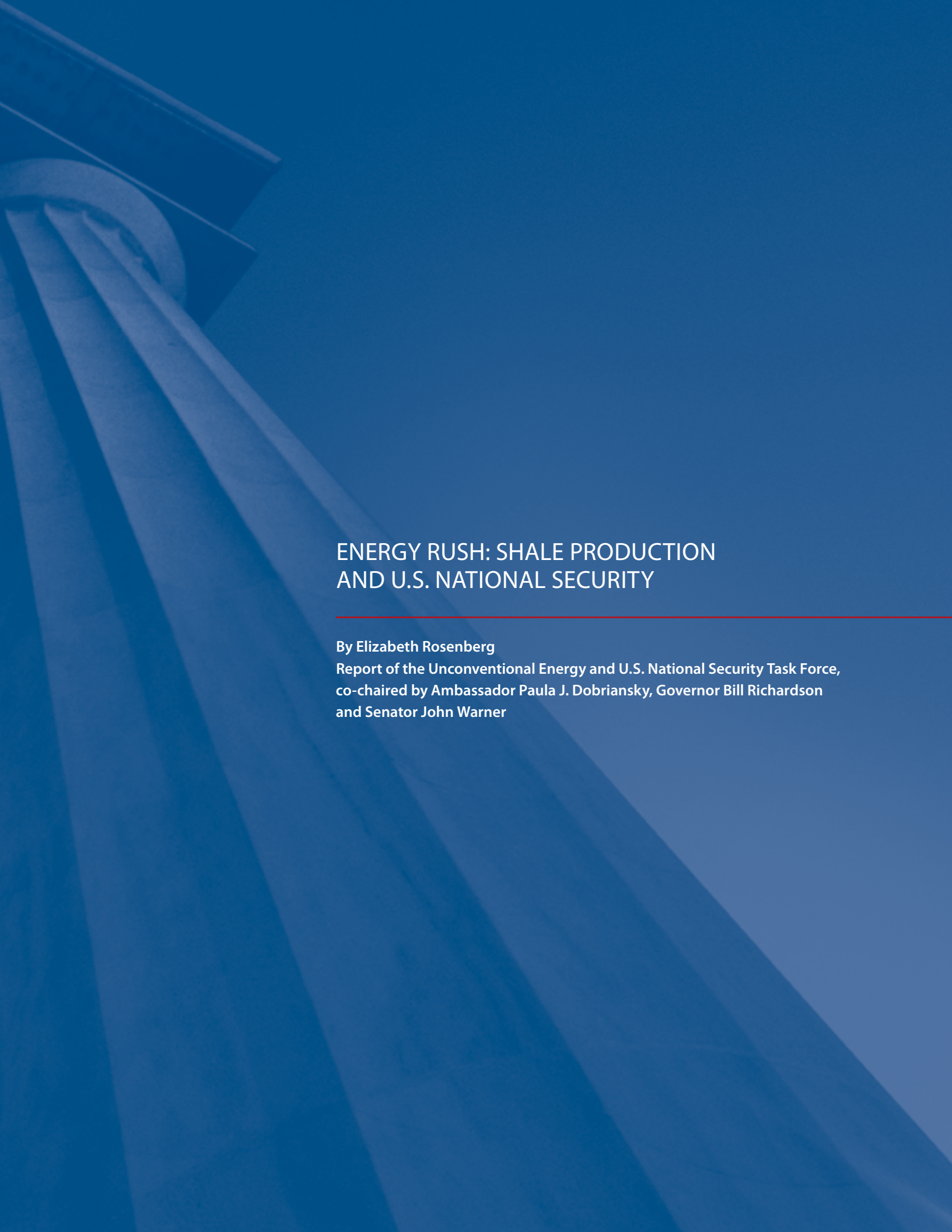

ENERGY RUSH: SHALE PRODUCTION AND U.S. NATIONAL SECURITY

By Elizabeth Rosenberg

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Energy Rush

Shale Production and U.S. National Security

I. EXECUTIVE SUMMARY

By Elizabeth Rosenberg
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This report investigates the ongoing shale boom in the United States and its implications for U.S. energy and national security. To date, the debate about the energy boom has been oversimplified. Some people argue that the boom will make the United States self-sufficient in energy, permitting the nation to retreat from its commitments overseas. Other analysts argue that nothing has changed and that the United States remains dangerously vulnerable to global energy-market dynamics. The reality is more complex: The energy boom will have profound implications on energy markets and political relationships between major consumers and producers. Furthermore, energy security will remain a key concern for U.S. foreign policy. These factors call for a reassessment of U.S. strategy to seize opportunities and manage challenges associated with maintaining energy security.

This report interprets energy security for the United States to mean reliable access to sufficient, affordable energy supplies to fuel economic growth. The three key factors in the promotion of energy security are increasing energy efficiency, diversifying supply and investing in energy production for the future. The United States is currently taking a major step forward in energy production as a result of the shale energy boom, a development that will contribute to, but not ensure, energy security.

The application of sophisticated, "unconventional" oil and gas extractive technology to shale rock formations over the past five years has precipitated a dramatic increase in U.S. energy production. A glut of gas has flooded the U.S. market and caused prices to plummet from historical levels. Unconventional oil production, moreover, led to the largest annual production increase in U.S. history in 2012 and substantially reduced the need for oil imports. Internationally, new U.S. oil supplies have helped to cap the price spikes caused by severe global supply disruptions and to moderate oil prices for consumers.

The unconventional energy boom is also helping to jumpstart the broader U.S. economy. Prolific natural gas supplies have reduced electric power costs and are fueling a renaissance in industrial manufacturing of energy-intensive goods. Meanwhile, new domestic oil supplies have supported a surge in the refining sector, and the United States is now a net exporter of refined petroleum products for the first time in over 60 years.

Although the effect of new U.S. energy supplies on the global energy market is significant, it is only one of the major trends reshaping the global energy system. Other substantial influences on the global energy market include the massive growth in Asian demand for energy to fuel its industrial revolution and the likelihood that recent profound, prolonged global oil supply disruptions will continue.

As a result of these major trends – and the potential for future game-changing energy production technology – a dynamic new map of energy trading partners and supply routes is emerging. The changes are more significant for oil than for natural gas because of the large, globally integrated nature of the oil market and the relative ease of transporting oil. A reformulation of political relationships is also taking place alongside the physical market changes and new supply chain relationships. Russia is seeking stronger strategic ties with growing Asian consumer economies, while Asian and Middle Eastern leaders are laying the diplomatic groundwork for a more interconnected future.

In the United States, leaders are contemplating the possible use of new energy supplies to pressure or support international actors and underscore strategic policy. They are also considering how political relationships, and associated security commitments, with traditional oil suppliers should adapt to the changing energy market.

As the United States imports less energy, some policy leaders hope that a push toward energy isolationism will insulate the country from instability in the global energy market. Such hopes are unfounded. Hoarding energy at home, neglecting bilateral relationships with major global energy players and forfeiting economic opportunities to export energy would leave the United States less secure. Moreover, policymakers would then be unable to use energy as a tool of economic statecraft to coerce or benefit other countries.

Hoarding energy at home, neglecting bilateral relationships with major global energy players and forfeiting economic opportunities to export energy would leave the United States less secure.

Instead, the United States should accept the reality of energy interdependence, take steps to decrease domestic consumption and diversify supplies, facilitate broader energy exports, and more deeply and creatively integrate energy security into strategic policy and military planning.

To manage the challenges of the emerging new energy order, and to leverage the opportunities presented by surging U.S. unconventional energy resources, the United States will need to be a fully engaged participant in the relationships, institutions and foreign policy that are important to promoting well-supplied global markets. Playing a strong international leadership role is

essential to ensure continued free trade in basic energy commodities and to promote global oil market stability, both of which are crucial for U.S. energy security. Such a role would also facilitate the international coordination needed to successfully implement tough energy-related sanctions or punitive financial measures targeted at major energy producers.

Civilian and military policymakers must adapt policies and recast strategic relationships and military commitments to better fit complex and volatile global energy markets. They must also make decisions about how to balance the new economic and political alliances that are forming between other producers and consumers, particularly Russia and states in the Middle East, North and West Africa and the Asia-Pacific region.

Policymakers are beginning to grasp the new economic and security implications of the boom, and the time is right to explore new strategies to safeguard the physical oil trade, new criteria for the use of strategic reserves, new potential energy export opportunities and new possibilities for energy-focused trade arrangements. Executive-branch policymakers, legislators and military personnel will all have roles to play in policy and planning in these arenas and will be key to securing and advancing U.S. economic and security interests in the decades ahead.

II. INTRODUCTION

Recent technological developments have transformed the production of oil and natural gas from shale rock formations in the United States, leading to massive production growth, market transformations and domestic and international implications that civilian and military leaders are just beginning to assess. Policy and thought leaders will need to determine which foreign trade options, political relationships and security commitments will best ensure energy security and leverage the economic benefits of the shale boom in an increasingly high-tech, complex and volatile energy market.

Long-held perceptions of energy scarcity dating to the oil embargo implemented by Arab members of the Organization of Petroleum Exporting Countries (OPEC) 40 years ago – as well as anxiety about an imminent peak in production of finite oil and gas resources – are now giving way to an optimistic belief in the technological promise of unconventional shale production and a sense of resource abundance.[1] Consumers in global demand centers are keenly interested in imitating the U.S. shale phenomenon, in hopes of securing new, stable supply alternatives for their markets. A variety of policy, regulatory and logistical challenges must be overcome for this to occur.

A struggling natural gas industry has completely reversed its prospects and has increased production by roughly 20 percent in the past five years. Oil production has also seen impressive growth in this period, with the largest annual production increase in U.S. history in 2012.[2] Estimates for U.S. energy reserves in the ground have grown in the past five years by roughly 41 percent for oil and 37 percent for gas, and a new map of infrastructure, supply chains and trading counterparties both at home and abroad is emerging.[3]

Producer countries, such as Saudi Arabia, Russia and Qatar, have felt the reverberations of the U.S. shale boom. Despite uncertainties about how abundant or widespread shale production may ultimately be, they are reevaluating their production plans to account for – and compete with – surging U.S. supplies.

One of the most profound effects of the shale boom has been its role in bringing down prices over the past several years. New volumes of energy resources from the United States have fundamentally changed energy markets, pricing and forecasts. In the United States, domestic natural gas prices have fallen sharply from historical levels. In international oil markets, U.S. shale production has helped to hold down prices, resulting in a decreased likelihood of dramatic price spikes.

Nevertheless, the United States remains vulnerable to fluctuations in the global energy market. The United States is importing less oil because of new domestic supplies. Yet because oil prices are effectively set globally for all consumers and global economies are deeply interconnected, U.S. consumers will continue to live by global oil – and gasoline – prices for the foreseeable future. Although bilateral energy trade with some countries may be on the decline, the United States is still inextricably linked to the global oil trading system and its price fluctuations.

This enduring economic connection means that U.S. policy and military leaders can ill afford to disengage politically with energy partners abroad or to cease worrying about the security of global oil markets. A security crisis in the Suez Canal, Strait of Hormuz, South China Sea or other critical node in energy supply lines would spike oil prices around the world and cause pain in the domestic fuel and gasoline markets as well. As Secretary of Energy Ernest Moniz said, "we will not be independent of world energy markets."[4] Managing and mitigating U.S. energy vulnerability will require good communication and a sense of common

U.S. Energy Security and the Unconventional Energy Boom

Energy security for the United States can be understood as reliable access to sufficient, affordable energy supplies to fuel economic growth. Several key principles of energy security should guide U.S. leaders in formulating policy in response to the unconventional energy boom and leveraging its advantages. Of foremost importance is the principle that stable and well-supplied global energy markets are in the economic and national security interest of the United States. These conditions will facilitate the accessibility and affordability of energy for the United States and other consumers. Furthermore, simply reducing oil imports will not completely insulate the United States from energy-related vulnerabilities. As a result, any reductions should not diminish the policy imperative to expand efficiency. Doing so would reduce the effect of supply volatility on the U.S. economy by reducing the energy intensity of the U.S. gross domestic product. New policy also should not diminish the imperative to diversify supply sources and invest in future supply to reduce the effects of price volatility of any single energy source.

When considering U.S. energy security for at least the rest of this decade, shale oil – not shale gas – will be most important for managing challenges to energy security. This is a result of the global, interconnected nature of the oil market and oil price, as well as the inevitable reliance of the United States on some amount of imported oil for the foreseeable future. Thus, the United States is vulnerable to shifts and spikes in the global oil market.

An important second-order energy security concern is the pass-through effect of higher energy prices into prices for manufactured goods, agricultural commodities and other products and services. High or spiking energy prices could drive up prices throughout the global economy, with negative effects on economic growth or performance.

Using less energy and fewer energy-intensive products insulates consumers from the full effects of shifting or spiking energy prices. Diversifying energy supply sources also helps to spread risk exposure and vulnerability to energy market shocks. Using more of the surging domestic shale gas, often in tandem with renewable energy, could displace some oil use, primarily as a transport fuel but also for some power, heat and manufacturing purposes. This displacement could compound the decrease in oil imports caused by greater domestic shale oil production. Notably, however, such a displacement is unlikely to come close to eliminating U.S. demand for oil. Barring game-changing moves in public policy, it also will not help all that much in making the United States less reliant on energy and energy-intensive products overall.

Integration into a global oil market, including some reliance on oil imports, is a source of both energy security vulnerability and economic opportunity. Steps to minimize vulnerability are best achieved through energy efficiency and source diversification – not energy isolationism. Leveraging shale production to become a self-sufficient energy island would force the United States to forgo the major economic and strategic benefits of competitive and free trade in energy. It would also invoke ire, and possibly punitive countermeasures, from the most important global energy players. The United States can best promote energy security by advocating for and enabling stable, well-supplied global energy markets for all global players. Furthermore, the United States can promote its energy security by actively engaging with international producer and consumer countries on issues such as shale resource sustainability and replication, as well as a collective commitment to market integration and free trade.

In an austere budget environment and a period of striking market changes, when many conventional measures for safeguarding the transit of oil tankers are expensive and calibrated for different market conditions, policies in many areas will have to be adjusted.

cause with other major energy producers and consumers to promote stability in the global energy market.

The U.S. unconventional energy boom presents both challenges and opportunities. Policymakers can expand and optimize this resource for managing global disruptions and U.S. economic growth and competitiveness. They can also leverage the newfound supply to establish and build trading and strategic relationships, as well as to promote environmental policies that could mitigate the effects of climate change. In addition, this energy supply could become a source of coercive political influence. Specifically, policymakers could leverage the market conditions of the energy boom to impose energy sanctions on specific targets and release strategic oil reserves to benefit key allies or manage markets during crises.

In an austere budget environment and a period of striking market changes, when many conventional measures for safeguarding the transit of oil tankers are expensive and calibrated for different market conditions, policies in many areas will have to be adjusted. Policymakers and the analytic community need to explore new thinking about U.S. energy exports, the use of strategic reserves, energy-focused trade agreements to promote market stability and U.S. strategic interests, and international security commitments to safeguard the physical oil trade.

Actors in the public and private sectors, however, might well lose the new opportunities because of political disagreements, fiscal challenges or other reasons. This paper will describe the unconventional energy boom (Section III), the transformation of the global energy market and its broader consequences (Section IV), the ways that global energy markets will continue to change (Section V) and the potential sources of instability that may occur as a result of the boom (Section VI). Finally, it will offer policy recommendations for U.S. decisionmakers to safeguard U.S. interests and mitigate the challenges associated with this new resource endowment (Section VII).

III. A DYNAMIC ENERGY LANDSCAPE

New Production, New Perceptions

Spurred by the high energy prices of last decade, sophisticated, unconventional, horizontal well drilling and hydraulic fracturing have been broadly embraced by U.S. energy producers. These technologies enable drillers to extract both oil and gas from shale rock formations and "tight" hydrocarbon-filled sub-surface rocks (see figure 1). Fundamental to the success of this production has been the comparatively easy access to financial and skilled human capital in the United States, as well as relatively easy-to-navigate private land issues, mineral rights and regulatory conditions.

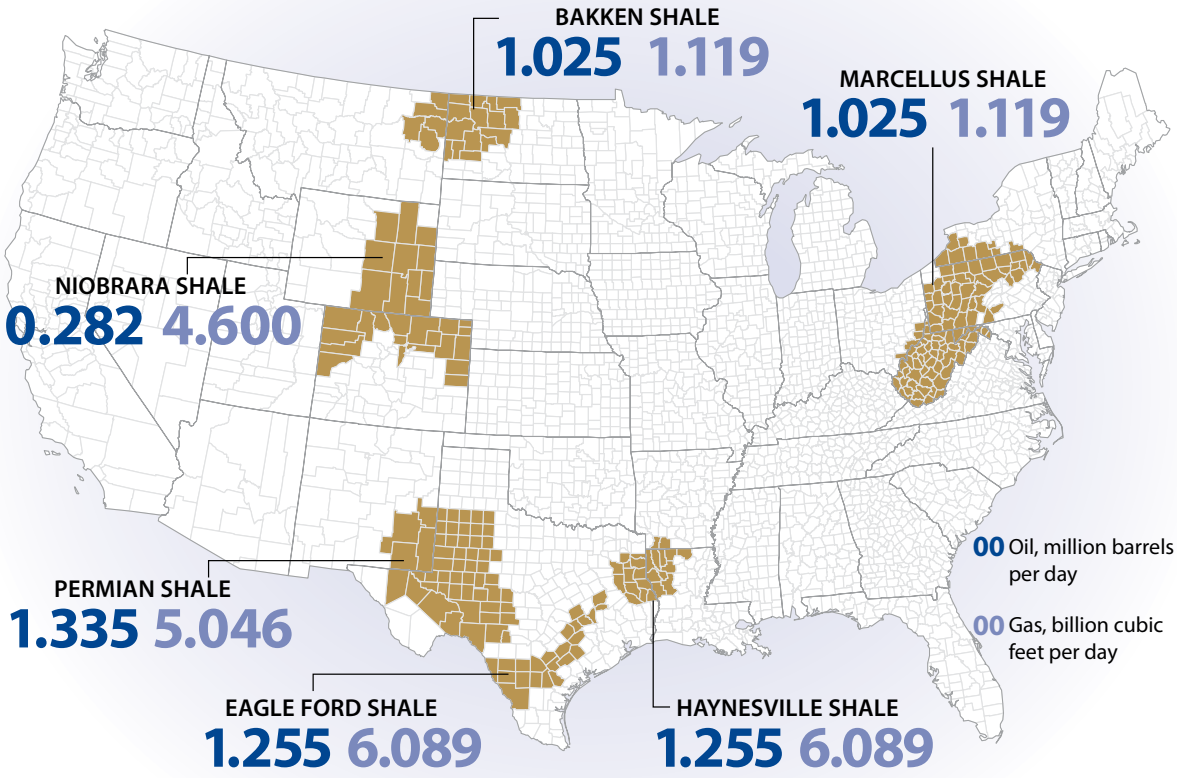
In the past five years, the production of U.S. oil rose from 5.0 million barrels per day to 7.5 million barrels per day, an increase of 50 percent (see figure 2).[5] The United States is projected to surpass Saudi Arabia as the world's biggest oil producer in 2015.[6] For natural gas, production has flooded the domestic market, with growth from 57.7 billion cubic feet per day to 70.2 billion cubic feet per day over the past five years, an increase of 22 percent.[7] The United States could produce more gas than it consumes by 2017[8] and could increase its crude production to rank as the world's largest oil producer from 2015 to at least 2030.[9]

The trajectory of U.S. imports is just as impressive.[10] In 2008, the United States imported over 65 percent of its oil and 17 percent of its gas and was planning to build substantial liquefied natural gas (LNG) import capacity to meet domestic gas needs.[11] Today, oil and gas net imports have dropped dramatically, decreasing over the past five years by 44 percent for oil[12] and 58 percent for gas.[13] In October 2013, net oil imports reached their lowest point in the shale era.[14] Terminals originally built for receiving LNG are undergoing conversion to accommodate export activity, with a provisional permitted capacity of 7 billion cubic feet per day, and more LNG export projects are lining up to try and gain a market toehold.[15] Looking forward, net energy imports may fall to 4 percent by 2040 (in comparison to 16 percent in 2012 and 30 percent in 2005), according to the U.S. Energy Information Administration (EIA).[16] The International Energy Agency (IEA) estimates that the United States could "meet all of its energy needs from domestic sources by 2035."[17] And BP projects that the nation will be "nearly self-sufficient" by 2030.[18]

The success of shale production in the United States has caused geologists to revise their views about accessible underground oil and gas reserves. The EIA estimates that technically recoverable global shale gas reserves amount to 7,299 trillion cubic feet, of which more than 75 percent lies outside North America.[19] Meanwhile, global reserves of shale oil (also called tight oil) are estimated by the EIA at 345 billion barrels, of which more than 75 percent lies outside North America.[20] Politicians and financiers abroad are catching up to the science and are contemplating the potential for expansion of shale production in new areas. Exploratory drilling is occurring in a number of countries, and government authorities are beginning to establish the commercial and regulatory terms necessary to tap this resource.

Particularly in the United States, decades-old perceptions of scarcity are now giving way to relieved, even exuberant, feelings of abundance. Yet because of the nation's deep ties to global oil markets, a reduced reliance on foreign oil will not eliminate vulnerabilities in the U.S. energy sector. Energy self-sufficiency or "independence" is neither the most economically advantageous nor the strategically optimal policy objective for U.S. policymakers seeking to enhance U.S. energy security, whether by ensuring reliable supplies or by reducing U.S. vulnerability to shifts and spikes in the global energy trade. The continued use of, and fixation on, energy independence terminology in the political debate is holding back a more informed

FIGURE 1. MAJOR U.S. SHALE OIL AND GAS PRODUCTION AREAS



Note: According to the EIA, the six key shale producing regions featured on this map "accounted for nearly 90 percent of domestic oil production growth and virtually all domestic natural gas production growth during 2011-2012."

Source: U.S. Energy Information Administration, Drilling Productivity Report (December 2013).

public conversation about the actual energy market vulnerabilities faced by the United States and effective strategies to promote energy security.

Increasing American Economic Competitiveness

The increase in U.S. oil and gas supplies has brought major economic benefits to the United States. Unconventional energy production and the energy-intensive industries that benefitted from this boom supported 2.1 million jobs in 2012, and government revenue from these activities increased by $74 billion in that year.[21] The boom has revitalized many rural and economically depressed regions and contributed to a drop in the trade deficit to $534.7 billion in 2012, down by $164.4 billion over the past five years.[22] Estimates from IHS and McKinsey and Company suggest that the unconventional boom could boost the U.S. gross domestic product by an impressive $380 billion to $690 billion annually and create up to 1.7 million permanent jobs by 2020.[23]

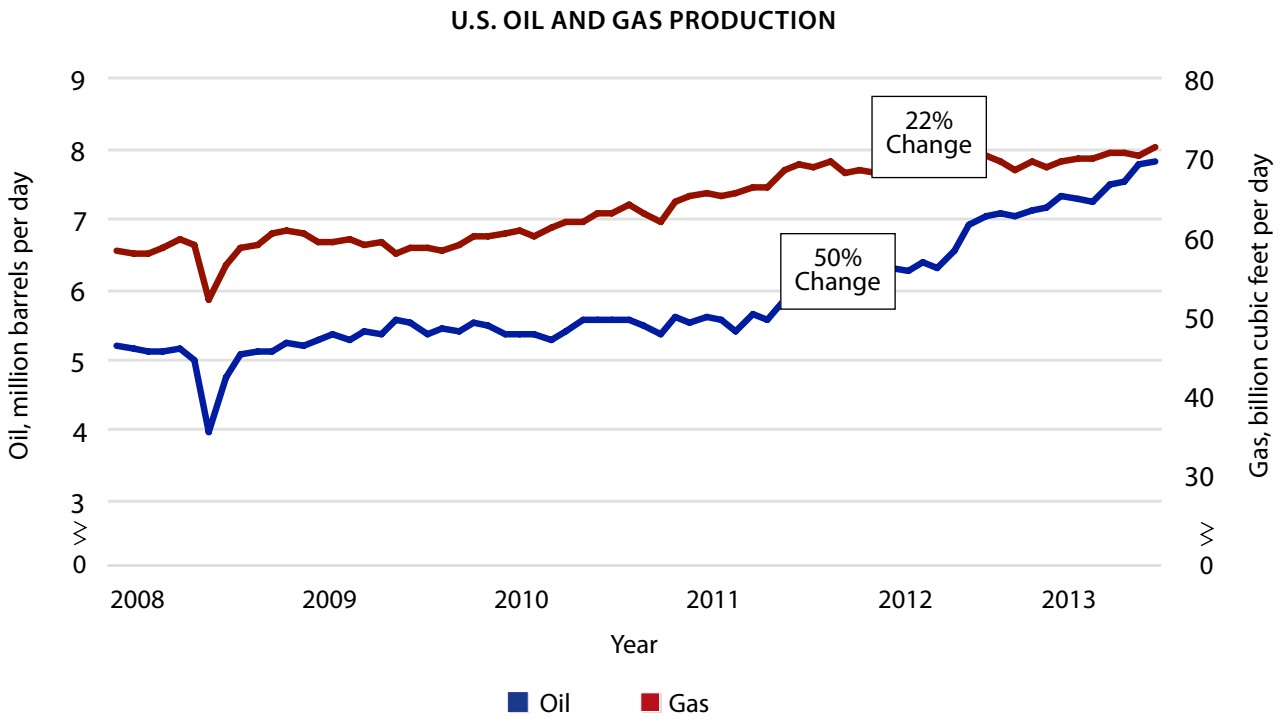
The energy boom also brings a substantial increase in global economic competitiveness for energy-intensive industries and manufacturing in the United States, particularly for gas-intensive industries, such as petrochemicals, fertilizers and certain

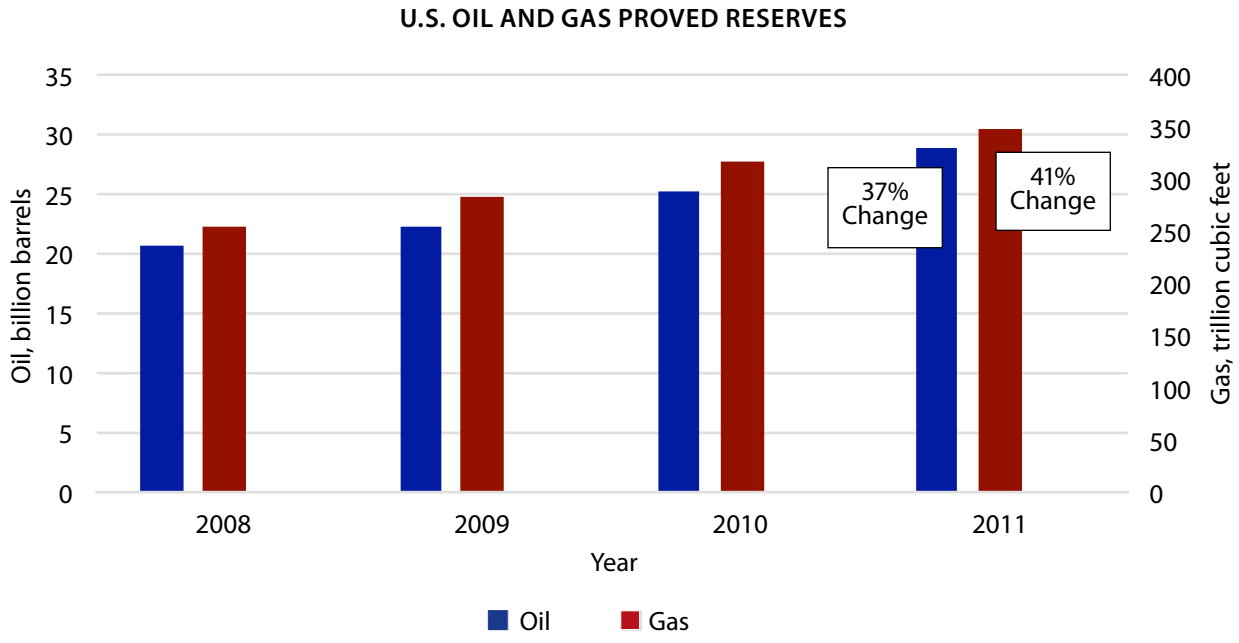
industrial manufacturing businesses.[24] This force is contributing significantly to what President Barack Obama has called "a renaissance of American manufacturing"[25] and may, in the view of the IEA, offer energy-intensive firms in the United States a cost advantage of 5 percent to 25 percent over rivals in other developed countries, particularly Europe.[26] The head of the Italian energy company Eni suggests that "the U.S. will become a formidable industrial power in the near future."[27]

The unconventional boom has also given the U.S. refined-product sector a competitive global edge, particularly over Europe. Shale oil produces plentiful light grades of oil, which, when refined, deliver greater gasoline and diesel supplies than do heavier grades of crude. The new shale oil produced in the United States is refined into more gasoline and diesel at home, which reduces the need to import these products from abroad. Also, U.S. refineries configured to handle heavier, imported crude from Canada, Mexico and Venezuela are sending more of their refined products abroad because domestic refined product needs are increasingly met by oil drilled and refined at home. After more than 60 years as a net importer, the United States became a net exporter of refined products in 2011,[28] and exports,[29] along with demand for the ships to transport them, are surging.[30]

For the global economy broadly, the U.S. unconventional energy boom is beneficial. It has dampened the impact of oil price spikes and provided more affordable oil for struggling economies. Slow recovery in many regions would likely have been even slower without the added supplies from the United States. These supplies also made the sanctions placed on Libya, Iran and Syria over the past several years less expensive and more palatable, particularly for major Asian consumers of Iranian oil.

FIGURE 2: U.S. OIL AND GAS PRODUCTION AND RESERVES





Note: Oil includes crude oil plus lease condensate. Natural gas data is for wet gas.

Source: U.S. Energy Information Administration, Short-Term Energy Outlook (January 2014) and U.S. Crude Oil and Natural Gas Proved Reserves, 2011 (August 2013).

IV. EMERGENCE OF A NEW GLOBAL ENERGY ORDER

Although the effect of the U.S. unconventional energy boom on U.S. and global markets has been profound, two other major dynamics are also influencing energy markets: robust global demand (particularly in rising Asian economies) and significant and prolonged disruptions in the oil supply.

Shifting Patterns of Global Demand for Energy

The IEA projects that global energy demand will increase by 43 percent between 2011 and 2035 and that China and India will account for 33 percent and 16 percent of that growth, respectively.[31] China will consume almost twice as much energy as the United States in 2035 and will account for 25 percent of the total world energy demand in 2035.[32] Asia, notably including growing Southeast Asian economies, is becoming "the unrivalled centre of global oil trade," underpinning an unequivocal shift in broader global energy trade eastward in the coming decades (see figure 3).[33]

By contrast, energy demand growth is dwindling in Organization of Economic Co-operation and Development (OECD) countries, largely because of continued slow economic growth combined with declining population growth and increased efficiency.[34] By 2035, overall energy demand is projected to increase by 10 percent in the United States and drop by 1 percent in the European Union (see figure 3).[35]

Oil Supply Disruptions

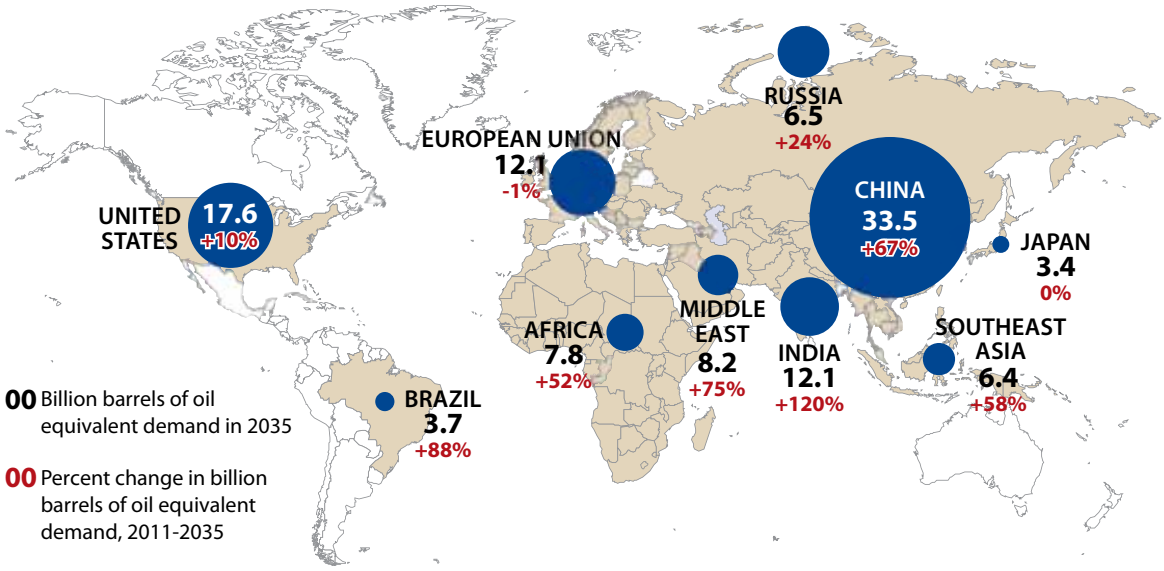
Significant, prolonged oil supply disruptions and outages are other key features that have shaped energy markets over the past several years (see figure 4). Over 3 million barrels per day of oil production capacity was off the market in late 2013 as a result of conflict, political instability, production problems and international sanctions.[36] Libya produced roughly 1.6 million barrels per day before conflict broke out in 2011; this production fell to zero during the period of most intense conflict and transition.[37] Libya has struggled to bring production back online and produced 210,000 barrels per day in late 2013 – just over 10 percent of the pre-2011 level.[38] Meanwhile, European and U.S. sanctions on Iran's energy sales and ability to remit payment reduced Iran's export volumes to approximately 1.5 million barrels per day in 2012.[39] Syria, Nigeria, Iraq and Sudan have also experienced export disruptions in recent years. Market volatility associated with such disruptions is unlikely to diminish.[40] Potential conflict in key Asian choke points and waterways, especially in the East China Sea and the South China Sea, is also a growing concern.

Changing Oil Trade Patterns

Given the strong strategic and economic relationships that have developed around, and as a result of, longstanding international oil supply lines, some realignment will inevitably occur as powerful new demand trends and supply sources reorganize the international oil trade. The U.S. shale oil boom has had a marked effect on some traditional energy trade routes, particularly those linking Middle Eastern and African producers to North American and European consumers. These changes have already been traced out in diplomatic and strategic developments, although their ultimate impact has yet to be realized.

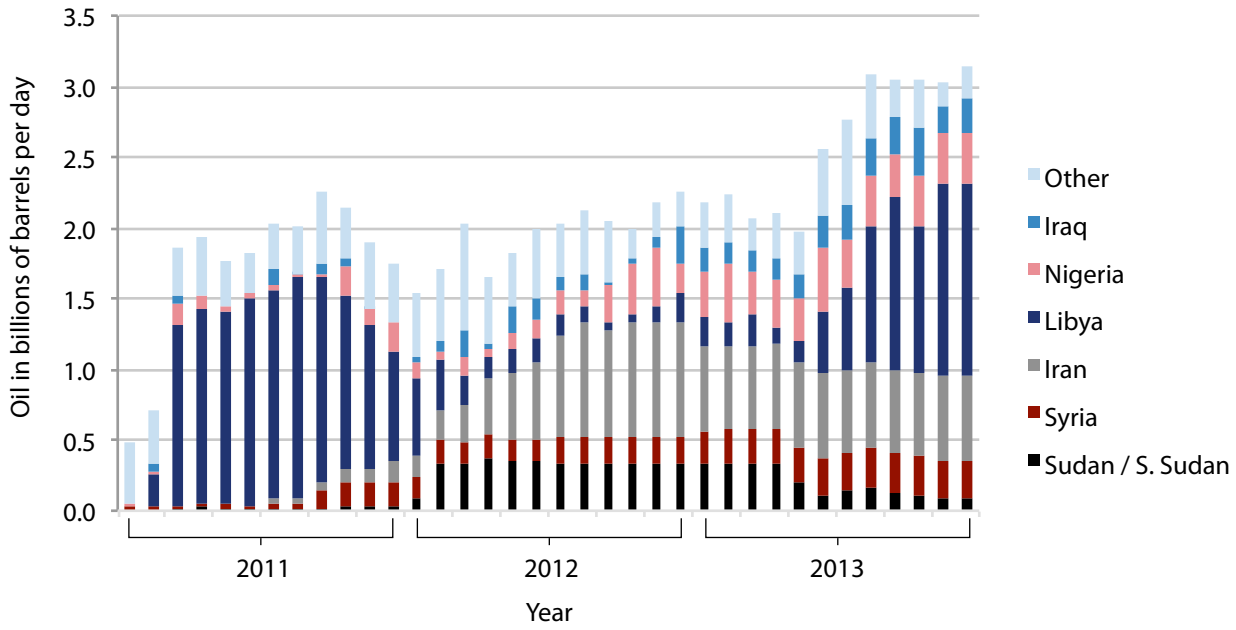
As a result of new U.S. shale oil production, the United States has substantially cut imports of similar kinds of light crude coming from Nigeria, Angola, Libya and Algeria. These African oil producers have historically been important suppliers of light crude oil to the U.S. market, exporting 1.8 million barrels per day of crude in 2008; five years later, these exports have shrunk to roughly 600,000 barrels per day, a 67 percent decrease.[41] For these countries, the realignment of their trading partners is very significant. In 2008, they sent 24 percent of their crude output to the United States; in 2013, they sent only 9 percent.[42]

FIGURE 3: GLOBAL ENERGY DEMAND GROWTH SHIFTS EASTWARD



Source: International Energy Agency, World Energy Outlook (2013) and Southeast Asia Energy Outlook (2013).

FIGURE 4: UNPLANNED OIL PRODUCTION OUTAGES



Note: Data for January 2011 through December 2011 are from the December 2013 Short-Term Energy Outlook. Data for January 2012 through December 2013 are from the January 2014 Short-Term Energy Outlook. Other includes Australia, Argentina, Columbia, Mexico, the United States, Gabon, Indonesia, China, Yemen, the North Sea, Canada and Brazil.

Source: Energy Information Administration, Short-Term Energy Outlook (December 2013, January 2014).

Other global consumers have absorbed, and will continue to absorb, African oil exports, although in some cases at discounted prices. So although oil export revenues seem safely assured to Lagos, Luanda, Tripoli and Algiers, their trading partners are likely to become more concentrated in growing Asian nations over time (see figure 5). This concentration is likely to be both good – because demand from this region looks robust and growing for some time to come – and bad – because Africa's trading partners will not be as broadly diversified.

U.S. oil imports from trading partners in the Middle Eastern Gulf have declined by 16 percent since 2008.[43] One reason this number is not higher is that the Gulf sends the United States plenty of heavier grade crude, well suited for many U.S. refineries. U.S. shale oil is a light grade of crude and not a direct substitute. Thus, the U.S. demand for heavier grade crude to run through its refineries continues. In addition, some long-term supply relationships and investments will ensure oil trade between the Gulf and the United States for some time. This includes contracts that supply refined products from Gulf producers to U.S. military installations in the Gulf.

Gulf producers have seen a drop in the prices that they are able to fetch for crude sold to the United States because U.S. refineries have been able to substitute domestically drilled supplies for some heavier crude imports.[44] This hasn't stopped key Gulf suppliers from selling oil to the United States, but it may make producers that supply U.S. markets only intermittently – such as Iraq and Kuwait – less inclined to sell oil to the United States. Overall, Gulf producers have not struggled to find oil consumers interested in absorbing crude that might have otherwise been sent to the United States.

Over time, with additional shale oil resources and anticipated production efficiency gains, U.S. oil imports will be less substantial, changing the global trade in oil even more fundamentally. So far, this has been most profound for light grades of oil traded across the Atlantic, as well as for the U.S.-Canada energy trade. However, heavier grades of crude from other foreign suppliers are likely be affected in the future if the United States adapts its refining capacity to better match domestically produced crude grades. This will have far-reaching implications for a variety of other global producers of heavier grades of crude.

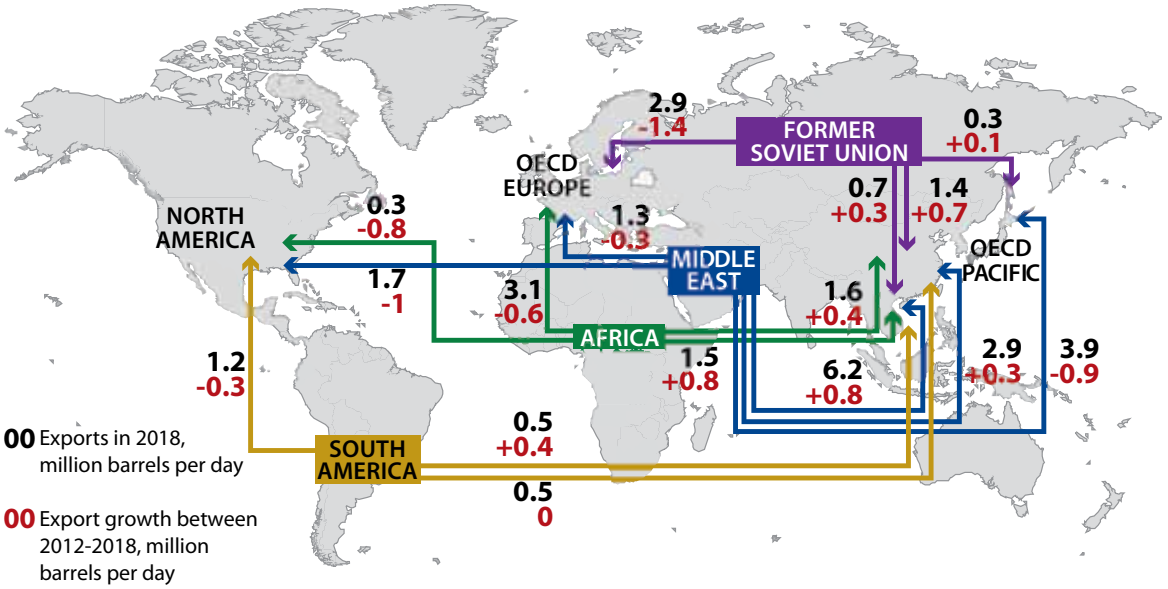
A Globalized Gas Market?

For natural gas, the tremendous promise of U.S. unconventional drilling has raised hopes that abundant new sources will be tapped and that infrastructure will be built to move LNG to demand centers beyond the current markets of the United States and Mexico. There is great ambiguity regarding the degree to which U.S. LNG exports will change complex natural gas markets, making them less regional and more global. There is also confusion and disagreement about whether LNG exports could, in turn, align gas prices in some markets more closely with gas supply and demand rather than with oil contract prices, which consumer markets have traditionally relied on to set natural gas prices.

Such a shift would constitute a sea change for import-dependent gas consumers, such as the Japanese and the Europeans, who are now paying many multiples of the cheapest global gas benchmark price, and it could untether some captive consumer markets, specifically Europe, from traditional pipeline suppliers. At a gas forum in Moscow last summer, President Vladimir Putin offered the view that "as LNG trade increases, the situation in the gas market will change too, and it will globalize along the oil market's lines."[45]

U.S. LNG exports would contribute to supply and price diversification for LNG importers, which is particularly important for East Asian consumers reliant on limited, expensive supply sources.[46]

FIGURE 5: OIL EXPORTS TO ASIA EXPAND THROUGH 2018



Note: Map excludes intra-regional trade.

Source: International Energy Agency, Medium-Term Oil Market Report (2013)

Greater U.S. LNG trade with this region could also help to facilitate the establishment of a new East Asian benchmark for natural gas.[47] U.S. LNG exports to Europe could reduce the region's dependence on Russian pipeline gas and mean lower contract prices from Gazprom. Australian, Indonesian, Qatari and other LNG exporters could suffer in terms of reduced market share and more competitively priced contracts. Furthermore, plans for Brazilian, Turkmen, African and Arctic gas development projects could slow amid reevaluations of their commercial viability.

So far, only a few notable changes are occurring in gas markets abroad as a result of the U.S. unconventional gas boom. At this point, they are very far from constituting profound, structural changes. Examples include the use of U.S. benchmark natural gas prices in a few LNG deals outside the United States, a notable deviation from the norm for foreign LNG contracts. In Europe – where the population is dependent on Russian Gazprom for roughly 25 percent of its gas needs at prices three times higher than U.S. gas prices – consumers have seen some limited downward revisions of high Russian gas price contracts.[48] This was substantially tied to an influx into Europe of LNG supplies from the Gulf that were not needed in the United States because of the shale gas boom, as well as imports of comparatively inexpensive North American coal to displace Russian pipeline gas for European power generation needs. These factors precipitate the belief that the growth and export of U.S. shale gas will continue to contribute to more favorable Russian gas contracts for Europe in the future and may remove some of the political strings attached to this energy supply line.

Asia's Energy Strategy: More Supply from More Sources

For the growing economies in South and East Asia, access to resources, markets and foreign exchange

ranks high among priorities for strategic partnerships. Gaining access to energy supplies is worth the expenditure of substantial political capital and the discomfort and uncertainty of navigating uncharted commercial relationships. India and China, as well as growing South East Asian nations, are importing more oil and gas from the Gulf and Africa and are investing in production there to help facilitate greater global supply and meet growing demand.[49]

Asian consumers are also seeking new supplies from producers outside the Middle East and Africa. Australian, Caspian, Russian, East African, Latin American and even North American supplies are all attractive new or growing energy sources for developing Asia. Importing from these various regions would provide East Asian consumers with supply diversity to help spread and mitigate risk. Threats to Middle Eastern stability and confrontations in specific sea lines of communication will be less significant to consumers if energy supply sources and modes of transportation are numerous and diverse. Broad source diversification will also provide consumers with greater counterparty diversification as deals are made with both independent and national oil companies.[50]

Changing East Asian-Middle East Energy Ties

As a result of both growing demand for energy in Asia and newly available Middle Eastern oil supplies freed up by reduced U.S. oil imports, stronger trading ties are emerging between the Gulf and Asia. These ties exist primarily between public actors, as the producing companies and procurement entities and policies are run by, or linked to, the governments.

Political and diplomatic ties are also growing to underscore and shape this extremely important economic relationship. But the importance of energy in the overall relationship between these two regions will change over time and in different circumstances. The best way to gauge the significance of energy interests in strategic relationships between East Asian countries and Gulf energy states will be to examine the terms of the deals between powerful consumer and producer economies. Analysts should also examine the nature and location of the foreign energy investments made by countries from these regions, as well as how leaders from these two regions negotiate energy issues in trade treaties and strategic dialogues. Activities in all of these areas may have a bearing on U.S. energy security, particularly if they result in dynamics that distort supply or pricing in global energy trading.

Testing OPEC

The U.S. unconventional energy boom is the source of an important new global oil supply and has the potential to test OPEC's tolerance for maintaining a smaller market share or sustained lower prices. The cartel has consistently downplayed the significance of U.S. shale oil in long-term global oil market dynamics and prices, and OPEC Secretary General Abdulla al-Badri recently offered the view that shale will "not affect" OPEC.[51] OPEC's estimate projects a peak in shale oil supplies in 2017 or 2018 of 4.9 million barrels per day, with a subsequent decline to 2.7 million barrels per day by 2035.[52] OPEC acknowledges that its market share will drop from historical levels of about 40 percent and estimates that it will account for 38 percent of global supply through 2018.[53] Regardless of this dip, OPEC's substantial share of global production, along with its ability to make short-term output changes, will maintain the organization's substantial market pricing power.

A variety of disruptive market factors could keep oil prices at or above the $100 per barrel price that OPEC has offered as an ideal target.[54] If such disruptions do not occur and supplies – including those from constrained OPEC producers Iran, Libya and Iraq and from greater U.S. oil production – ramp up, prices could sink lower for sustained periods. This would cause OPEC

The U.S. unconventional energy boom is the source of an important new global oil supply and has the potential to test OPEC's tolerance for maintaining a smaller market share or sustained lower prices.

to struggle to maintain the discipline needed to collectively hold output down to its production ceiling. Some analysts believe that the organization will, either intentionally or by a failure to achieve consensus on production quotas, flood the market with supply to maintain market share and capture more revenue. The BP 2013 energy outlook calls OPEC cohesion "a key oil market uncertainty, especially in the current decade."[55] Unconstrained OPEC production would cause a drop in global oil prices and shut down some of the more costly oil production operations globally, including some shale oil drilling in the United States.

Price Matters in Policy Formation

The price and affordability of energy fundamentally affect domestic and foreign policy. Countries such as Japan and Korea that are extremely vulnerable to high and volatile oil prices because of their dependence on expensive imported energy tend to aggressively pursue energy efficiency, as well as diplomatic and commercial strategies to secure energy contracts with stable suppliers. Given the recent shift away from nuclear energy in both of these countries, the push toward efficiency and diversified source relationships is of particular significance.

Energy-rich producer countries, such as Russia, Venezuela and Egypt, have become accustomed to historically high prices, particularly over the last decade. These nations often have expansive spending programs, including demand-distorting, massive domestic energy subsidies, and place tremendous value on trade contracts with energy clients and existing supply chain dynamics. Few of these states are well prepared for demand disruptions or the fiscal impacts of a prolonged price slide.

Russia had to tap its rainy day fund of oil revenue in 2008 and 2009 to prop up its economy. With current financial pressures and the prospect of declining oil markets, it may need to do so again.[56] The Venezuelan government under Hugo Chavez drained what had amounted to a $6 billion rainy day fund in 2001 to a meager $3 million in 2012.[57]

The U.S. unconventional energy boom has contributed substantially to mitigating the oil price shock impact of disruptions over the past several years. The increased supplies have alleviated anxiety about how tight the balance between global demand and supply will be in the years to come, particularly as the global economy recovers. The supplies have also led investors to reevaluate new energy projects that would add more oil to the market, as they are unsure that their investments will be as lucrative in a market awash with oil. Projects under development in Brazil, the North Sea and the Middle East have slowed, and plans for expensive, complex Arctic energy development look less lucrative, and less likely, for the near term. State planners in nations with economies dependent on hydrocarbon revenues are considering how to manage their budgets in a future without these revenues.

These state planners are also considering how to adjust to lower contract prices for the energy that they *already* have flowing. Not only are oil producers commanding lower prices now for oil than they might have otherwise as a result of the shale boom, but the expectation of more shale oil and

more LNG exports – from U.S. shale production and elsewhere – is also driving down expectations for future prices. This is the case even within the terms of long-term supply contracts. A number of supplier states, including those in the Middle East and Russia, may need to revisit their pricing policies with key consumers to retain market share and long-term relationships; otherwise, they may risk standoff and contract cancellation.

Can Alternative Energy Compete?

Although new U.S. unconventional oil supplies have helped to push down oil prices and cap price spikes, the global market is still relatively tight, and oil prices remain relatively high. In this context, energy efficiency and certain alternative energy technologies represent cost savings and attractive insulation from high and volatile oil markets.

For U.S. natural gas, however, prices are at historic low levels and have precipitated a major shift toward gas. Five years ago, 48 percent of electric power generation in the United States was fueled by coal and 21 percent was fueled by natural gas.[58] Today, those proportions have changed to 39 percent and 28 percent, respectively.[59] Relatively cheap gas prices have propelled plans for expanded fleets of natural gas-powered heavy-duty vehicles and even LNG-powered rail systems.[60]

Relatively cheap natural gas prices, however, contribute to making other alternative and renewable energy sources less competitive. This may be exacerbated if proposed changes to the tax code promote gas and remove incentives for some renewable energy technologies, a possibility that some leaders in Congress are considering.[61] The amount of renewable energy sidelined by cheap natural gas accounts for a small share of the overall U.S. power and transport fuels market. However, cheap natural gas has had a substantial effect on renewable energy production and has undercut more expensive alternative energy technologies that could not compete financially. For renewable energy sources to sustain and expand commercial viability and market share, policy and regulation must play a role in demanding even lower emissions from energy sources. This will be a formidable policy challenge given the tremendous vested interests in coal, oil and natural gas production and the lack of broad public support for a market-based carbon-pricing scheme.[62]

Emissions Decline

Largely as a result of the substantial shift to shale gas in power generation and the economic slowdown, the United States reduced emissions in four out of the past five years, following a historic high in 2007.[63] The United States will likely see further emissions reductions caused by even greater penetration of shale gas as a power source and fuel for industry. President Obama has praised the ability of natural gas to lower emissions, calling for the United States to "strengthen our position as the top natural gas producer" to extend these benefits.[64]

Given the difficulty for renewable energy sources to compete with the flood of U.S. unconventional gas, market penetration of these alternatives will be limited until technology, mandate or subsidy makes them commercially competitive. Substantial additional U.S. emissions reductions will hinge on the commercial penetration of these alternatives, not merely on increased natural gas use for power and transport fuels.

V. WHAT WILL HAPPEN NEXT? PROJECTIONS AND QUESTIONS

Significant future unconventional oil and gas drilling in the United States looks highly likely, but several variables will influence its sustainability and the potential for replication elsewhere. Geology and technology, as well as energy prices, are the fundamental factors. Regulatory and tax conditions – and uncertainty and variability in these conditions – can also hinder or support energy extraction in important ways. Although the EIA and IEA predict a peak and plateau for unconventional U.S. oil drilling between the end of this decade and the middle of the next, the capacity for technological innovation to change the production picture is vast, and predictions have been famously wrong before.[65] Nevertheless, the projections from these institutions introduce doubt about the sustainability of the tight oil phenomenon.

Technological and Environmental Factors

A key technology variable is the relatively high rate of well production decline – perhaps as high as 50 percent to 70 percent in the first year for shale oil wells[66] and 60 percent to 81 percent for shale gas wells.[67] New wells with similar or better efficiency rates and commercial terms will be required to sustain unconventional production volumes. An estimated 10,173 shale oil and gas wells were drilled in the United States in 2011, up from 7,077 in 2010 and 5,531 in 2009.[68] Producers say that they have many thousands more wells to drill. In addition, efficiency is on the rise, a factor that will help to reduce the costs of unconventional drilling.[69]

Emerging technologies may be able to capture more benefit from some of the lower-value natural gas produced in the United States. By converting such gas to liquids, producers can boost commercial production, enhance the estimates of commercially recoverable energy reserves and drive new financing for gas producers in the United States. Other technologies and infrastructure innovations could also enhance production and enable new financing for the energy industry and energy-intensive manufacturing.

Community opposition to the environmental and social effects of unconventional drilling is another factor influencing the future of shale production in the United States. States are writing new regulations to supplement the relatively modest requirements currently applicable to shale production on largely private lands. Federal regulators are also considering the appropriate role for shale production regulation in the clean air and clean water oversight regimes.

Community opposition and concern about oil and gas production, and its environmental impact, have played out in a vocal and high profile way in the public debate about pipelines. This issue has become a lightning rod in the national debate about clean energy and climate change, as well as a proxy fight about the role of nonrenewable hydrocarbon resources in the U.S. energy diet. Pipeline politics have not dimmed the promise of shale production too much, instead shifting the transport of energy toward rail and barge where feasible.

Access to Capital

Another important variable influencing the sustainability of U.S. production is the access of drillers and producers to capital. Unconventional drilling is costly, and wells have a huge range of so-called break-even prices (the price of oil or gas at which drilling will pay off). Break-even price estimates for unconventional wells range from $40 to $140 per barrel of oil, and technological improvements are rapidly increasing both break-even rates and the accessibility of new shale resources. Roughly 50 percent of U.S. shale oil production comes from 10 percent of U.S. wells, and this production will be profitable at oil prices under $80 per barrel.[70] The IEA pegs shale oil as competitive at prices ranging from $60 to $80 per barrel, and other analysts see profitability at even lower prices

for some prolific drilling locations.[71] For natural gas, break-even prices are between $2 and $3 per million cubic feet for the most active drilling areas, with the large majority of shale gas resources available for less than $6 per million cubic feet.[72]

The independent energy producers who have built and sustained the unconventional production boom have done so overwhelmingly on borrowed funds and remain quite highly leveraged.[73] If access to capital becomes more constrained, shareholders become less tolerant of relatively high debt loads, or borrowing rates rise meaningfully, the pace and scale of unconventional production may decline. There is a realistic possibility that these factors could emerge. For example, if the U.S. economy resumes healthy growth and the Federal Reserve Board phases out quantitative easing, interest rates will rise. Fiscal constraints or economic expansion could constrain the availability of private financing.

Energy Price Movement

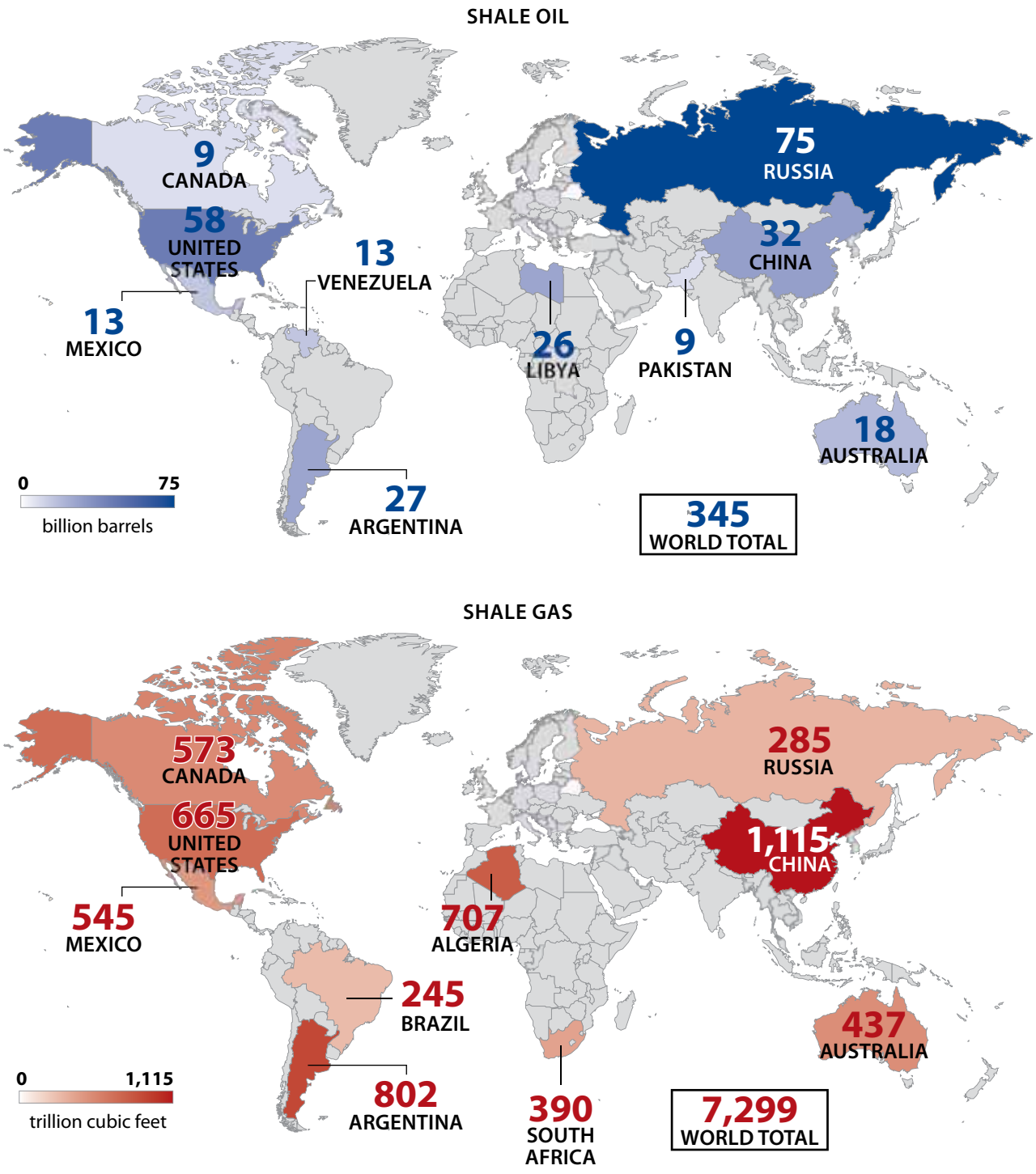
Another financial variable relevant to the sustainability of unconventional drilling is the movement of oil and gas prices. Oil prices could sink and remain low as a result of a supply glut caused by the détente between Iran and the international community, the return of oil supplies to the global market from conflict-prone production regions, such as Libya, Syria or Iraq, or consumer demand constraints caused by a bleak economic outlook. In such scenarios, unconventional oil that can only be commercially produced at relatively high oil price points could be shut down. Another production-constraining factor is the possibility of a sustained price collapse for oil in parts of the U.S. market where a local glut of oil cannot make its way further afield. U.S. oil could get "stuck" in pockets of the domestic market if exports are not permitted to move it elsewhere or if demand cannot keep up with supply. To maintain a high demand, U.S. refineries will need to be reconfigured to accommodate more light grades of crude, which would be an expensive and long-term infrastructure investment.

As a result of the shale gas boom, a glut of natural gas exists in the U.S. market and has been a significant factor in depressing prices. This price fall is one of the factors that, over the past several years, pushed unconventional gas producers to apply unconventional drilling techniques to the production of oil and natural gas liquids, where the returns are very lucrative. With European gas prices three times higher than U.S. prices, and Asian prices five times higher, a cost of roughly $6 per million cubic feet to liquefy and transport LNG is commercially attractive.[74] A report sanctioned by the Department of Energy found that at export levels of 12 billion cubic feet per day (the upper bound of the study), the United States would reap a net economic benefit from liquefying and exporting natural gas. Furthermore, the study found that with no export ceiling, the U.S. economy would still benefit, although domestic natural gas prices would rise.[75] However, U.S. natural gas prices are unsustainably low, and the degree of their rise will have an important bearing on the future commercial viability of U.S. LNG exports. The new supplies of LNG that are expected to enter the global market from Australia, East Africa, Russia, the eastern Mediterranean and elsewhere will also have an effect.

Expansion Abroad?

These and other factors influence whether unconventional oil and gas production can be sustained and replicated globally. Geologic features make shale oil and gas abundant and production technically feasible in a variety of global locations (see figure 6). Service providers capable of this drilling are available to work in remote areas. However, a lack of the water and infrastructure needed for unconventional drilling abroad is a challenge, as is a shortage of clear legal, investment and regulatory schemes surrounding oil and gas production in many countries. Contractual terms for profit

FIGURE 6: TECHNICALLY RECOVERABLE GLOBAL SHALE RESERVES



Source: Energy Information Administration, Technically Recoverable Shale Oil and Shale Gas Resources: An Assessment of 137 Shale Formations in 41 Countries Outside the United States (2013).

sharing and resource ownership are also stumbling blocks.

Community and environmental opposition have proven to be formidable impediments to the exploration for shale resources in much of Europe, most notably in France and Germany. Even in parts of Europe such as Poland, Lithuania and Ukraine that are more favorably disposed to unconventional drilling and are intent on reducing their dependence on expensive Russian gas, various geologic, fiscal, bureaucratic and regulatory factors hamper production plans.

Many analysts believe that Canada, Argentina and the United Kingdom will be among the next generation of unconventional producers.[76] The urgent demand for energy and the political will of the Chinese government is also expected to deliver unconventional drilling there in the medium term, despite tremendous logistical challenges. Tentative steps by these and other countries are already occurring. About 400 shale wells will be drilled in 2014 outside of the United States, with many in China and Russia, and more drilling rigs capable of shale production are moving to Europe and the Asia-Pacific region.[77] The United States is in a position to help accelerate shale production in certain partner countries through technology transfer and technical assistance programs and the facilitation of private-sector partnerships.

VI. POTENTIAL SOURCES OF INSTABILITY IN THE NEW GLOBAL ENERGY ORDER

A variety of potential crisis scenarios linked to shifts in global energy market dynamics may emerge in the future. U.S. unconventional energy production would play a direct or indirect role in all of these scenarios. In turn, these scenarios would have bearing on the commercial viability and sustainability of shale production, and indeed on global oil and gas production in broad terms. The sampling of scenarios outlined below is not an exhaustive list of potential fracture points for the global energy market in the years to come. This report merely points out some possibilities in order to help policymakers and other stakeholders consider the appropriate measures to anticipate and manage the resulting economic and strategic conditions.

Upholding Security Commitments

An important potential fracture point could arise around the possible modification of the terms of the so-called Carter Doctrine, the U.S. commitment to protect the physical flow of energy transports from the Middle East and to repel hostile action "by any means necessary, including military force."[78] In light of declining U.S. defense budgets, a strategic rebalance to Asia and diminishing U.S. reliance on the 17mn b/d of oil flowing through the Straits of Hormuz,[79] some analysts have questioned the degree to which the United States should continue to regard an infringement on Gulf oil shipping "as an assault on the vital interests of the United States" demanding forceful military engagement by the United States alone.[80]

The tremendous expense of maintaining a year-round U.S. military presence in the Middle East may cause planners to reduce military forces in the area, particularly on land, or to consider new collaborative arrangements for sharing the burden of protecting maritime security. Potential conflict in this area, possibly related to a confrontation with Iran, could present tremendous costs and challenges for a reduced U.S. military force in the Gulf. There is no doubt that the U.S. military could manage a confrontation in the region with overwhelming force and aggressively protect oil trade. However, the stark budget-cutting choices faced by the U.S. military demand the serious consideration of alternative, collaborative security arrangements and non-military strategies for securing oil flow.

The U.S. oil boom's contribution to the treasury may ease some of the fiscal pressures constraining federal, including military, spending. However, such relief may ultimately be marginal and would depend on what policy, regulatory, tax and trade choices U.S. leaders make to amplify or constrain the energy boom.

The U.S. government has made clear, at the highest level, that although the United States is importing less oil from the Middle East because of the shale boom, enduring strategic interests – linked to terrorism, proliferation, regional security, development and democratization – will tie the United States to the region in the years to come. Additionally, the United States remains firmly committed to the stable and unencumbered flow of Gulf oil to global consumers, despite the expense of this broad security commitment. At the United Nations General Assembly last fall, President Obama said that "we will ensure the free flow of energy from the region to the world. Although America is steadily reducing our own dependence on imported oil, the world still depends upon the region's energy supply, and a severe disruption could destabilize the entire global economy."[81]

Gulf leaders such as Saudi Arabia, the United Arab Emirates, Kuwait and Qatar will continue to see attractive features in a strategic partnership with the United States, despite frustration with the United States over other issues, including Iran and Syria policy. The U.S. commitment

of military and development aid to the region, security assurances, economic sanctions, counter-terrorism work and counterproliferation efforts all contribute to Gulf countries' sustained interest in strategic partnerships with the United States in order to understand, influence and leverage these U.S. policy goals in the region. Regional political upheaval will make ties to the economically powerful and globally engaged United States even more important for Gulf countries in the years to come, regardless of oil market supply trends or U.S. policymakers' attempts to modify or scale back the security commitment to protect Gulf oil flows.[82]

Falling Oil Prices Jeopardize Political Stability

Falling oil prices could bring political leaders in oil-dependent economies under serious pressure from their domestic and regional constituencies. If more oil floods the global market and depresses prices for an extended period, countries like Russia, Saudi Arabia, Venezuela and Iran will struggle to finance the social contract they maintain with elites and the general population, not to mention support and patronage payments to regional allies and proxies.

For the United States, these problems in oil revenue-dependent petro-states could be a welcome development – one that the United States might want to exploit for various reasons. For example, implementing oil-linked, coercive sanctions during a period of relative energy price moderation limits the ability of Iran to sell its oil, and it can only fetch a moderated global oil market price for the amounts it does trade. While weathering harsh sanctions over the past several years, Iran has demonstrated both regime resiliency and the major domestic economic dissatisfaction and tumult that brought its leaders to negotiate with the international community over its nuclear program in recent months. In the current market conditions, sanctions have substantial coercive power over Iran and potentially could be expanded to exact further economic harm.

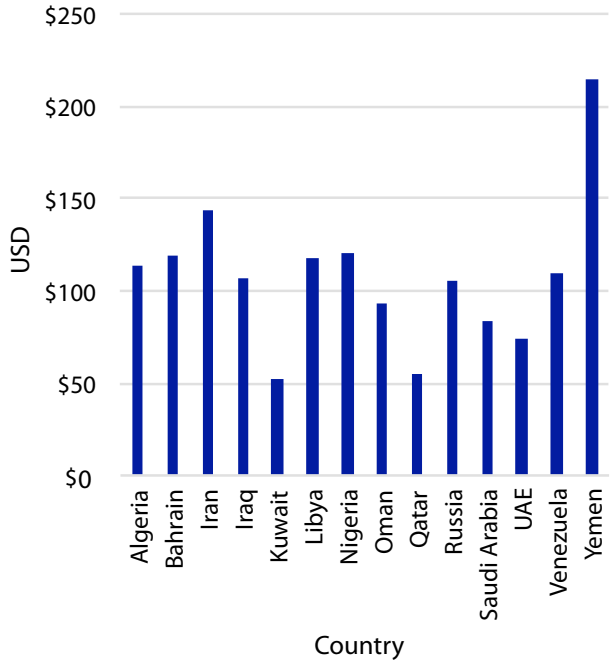
Within OPEC, the fiscal pressures of a prolonged price decline will be keenly felt, and political stability in some countries may suffer. This is a particularly pressing concern for countries with big populations, broad social spending programs and limited energy-sector upgrades to maximize output, including Iran, Venezuela and Nigeria (See figure 7). In Venezuela, where the budget-balancing break-even price for oil is around $110 per barrel, extended low prices will make it difficult for the government to manage needed energy-sector upgrades and finance domestic and regional spending programs.[83] Iran has an extreme version of this problem, with a break-even point of $144 per barrel.[84]

Outside of OPEC, new Russian energy deals minted with Asian buyers, toward whom Russia is "pivoting" in both energy and strategic terms, will not see major revenue for a number of years. Russia relies on a break-even point for oil of $105 per barrel[85] and relatively high taxes on companies in the energy sector. As it derives about 40 percent of federal revenues from oil, the ramifications of sinking oil prices are very worrisome.[86] The potential for these tensions to undermine domestic political stability and possibly spread to other regional players, as well as affect energy production, could increase oil prices.

Implications of the Changed Global Energy Regime for Strategic Relationships

Changing oil trading partners will not necessarily or dramatically change strategic relationships between the United States and key foreign counterparts. Oil trade and economic links can be an important element of bilateral relations but should not be misunderstood to constitute an untouchable or unchanging aspect of strategic ties. Broadly speaking, although substantial decreases in U.S. energy imports from Africa and the Middle East will change economic elements of bilateral relations, they hardly spell the end of strategic ties between these regions and the United States.

FIGURE 7: 2013 BREAK-EVEN OIL U.S. DOLLAR PRICES IN SELECTED COUNTRIES



Source: International Energy Agency (2013); The Telegraph (2013); and Moody's Investor Services (2013).

For East Asia, where governments are seeking diverse energy supplies to meet burgeoning demand, economic links will be an important element of developing diplomatic relationships but will not necessarily trump other competing reasons for strategic engagement. China will balance various factors when pursuing and establishing strategic relationships and will not be held hostage to energy ties or an investment with poor commercial terms. For this reason, Russia, Saudi Arabia and possibly the United States may all be leading energy exporters to China in the years to come.

For energy consumers constrained by a lack of capital or infrastructure to untether them from traditional imported supply, energy trade is a much more significant element of a strategic calculus. That is why expensive energy and heavy U.S. import dependence galvanized strategic national efforts for many years to increase efficiency, promote energy development and strengthen diplomatic ties with major energy exporters.

A Volatile Future

Continued volatility is likely to characterize global oil and gas markets in the future. This issue will be more acute for oil markets because of their integrated global nature and will have important bearing on unconventional production. Relatively high and volatile prices are the norm for both oil and gas markets globally – the U.S. gas market is a striking current exception – and are likely to persist. Even if the band of traded oil prices sinks lower over time, periodic disruptive events will spike prices and sustain anxiety in market behavior.

VII. RECOMMENDATIONS

The United States should adopt a variety of pragmatic policy measures to plan for and promote strong leadership and energy security in this era of relative resource abundance. With such measures, officials can leverage the new and unique energy, economic and political circumstances to advance security interests. Many of the recommendations discussed below would be salient even in the absence of the U.S. unconventional energy boom, but they are most feasible – or even most urgent – in market conditions of enhanced global supply and dampened prices.

Some members of the U.S. government and military already support the ideas discussed below. However, senior White House and cabinet officials, as well as senior military commanders and leaders in Congress, need to provide a formal, clearly articulated commitment. This could come in the form of major policy initiatives, executive orders, the elevation of a senior national security advisor on energy issues or the creation of a senior director for energy and national security on the National Security Council staff at the White House. These measures would help to organize the disparate and sometimes uncoordinated responsibilities for energy policy and offer a policy framework for local and regional policymakers. Additionally, a space would exist for independent thought leaders to advance discussion around these ideas, educate the public and seed public support.

Here, the paper presents a discussion of broad strategic considerations and recommendations, followed by several specific ideas to help guide civilian and military policymakers and planners.

Strategic Considerations for Energy Security

ENERGY TIES IN INTERNATIONAL ENGAGEMENT

Reduced U.S. energy imports must not diminish the imperative for U.S. policymakers to remain actively engaged on energy issues with their counterparts abroad, both where bilateral energy trade ties exist and where they do not. This will help to promote stable market conditions and to boost resiliency amid major market shifts in both consumer and producer states. Where bilateral energy trade exists, or could exist if the United States exports LNG and oil, the United States should leverage this to strengthen broader strategic ties. Hard questions must be asked and answered about how to prioritize the partner nations that could benefit from stronger energy and strategic ties – and about the best vehicles to build such ties.

The Transatlantic Trade and Investment Partnership or an alternative U.S.-EU trade framework presents opportunities for the United States and transatlantic partners to ease trading terms for energy and energy-intensive products and strengthen this key regional alliance. The facilitation of forums and partnerships for technology transfer and investment can be used to leverage the promise of shale energy and strengthen trade ties.

REBALANCE TO ASIA

In the rebalance to Asia, U.S. leaders should leverage energy ties and trade to strengthen regional relationships. This can and should include making energy a substantial focus in the Trans-Pacific Partnership trade agreement or other Asia-Pacific trade arrangements. Japan, Korea and China import 57 percent of all global LNG,[87] and developing countries in Asia will be the biggest growth markets for energy demand through 2040.[88] The United States no longer competes with these countries for Gulf and African oil, a point more symbolic than economic in the global oil market but one that nonetheless should be held up as a basis for building cooperative, rather than competitive, energy linkages.

Stronger U.S.-East Asian energy ties could include incentives and facilitation for mutual energy-sector investment, as well as energy exports from the United States to East Asia. For import-dependent

Japan, Korea and China, increased U.S. energy exports could provide a useful alternative supply source and allow these countries to diversify their trading partners away from sometimes unstable or unpredictable Russian, Gulf and African suppliers. U.S. energy exports could also contribute to more competitive energy pricing arrangements in the Asia-Pacific market, a substantial economic boon.

A stronger energy relationship linking the United States to East Asia should be bolstered by greater military-to-military cooperation to promote the maritime security necessary for the free movement of energy trade. This could include some level of U.S. military commitment or partnership to safeguard oil transit routes and key choke points in Asia. It could also involve agreements for collaboration between blue water fleets, particularly the U.S. and Chinese navies, to protect shared interests in maritime energy shipment, both in Asia and on supply routes bringing energy to Asia from Russia, Africa or the Middle East. This kind of coordination would help U.S. military and strategic planners to better match available funds to feasible goals for maritime security operations and to galvanize security commitments from Asian nations, including China, to work toward maritime security. Asian nations might then be seen less as "free riders" on U.S. military commitments to safeguard the flow of oil. Coordination with East Asian navies would also reduce the potential for misunderstanding, confrontation and conflict between U.S. and East Asian militaries and, ideally, between Asian militaries competing for energy and use of the same maritime routes.

In scenarios of extraordinary conflict or competition among Asian nations, the United States could use its energy resources to influence outcomes. For example, if China sought to limit Japan's access to maritime trade, including energy imports through a maritime blockade, the United States could release oil from its strategic reserve and send it to Japan. Such actions could offer moderate help in supplying Japan's energy needs and would demonstrate important security assistance for a key treaty ally in which the U.S. military maintains substantial installations and personnel. By planning and preparing for such a contingency with key allies, such as Japan and South Korea, the United States could demonstrate deep alliance commitments and deter potential adversaries. The current relatively moderated state of the global oil supply – due in substantial part to the U.S. boom – might make it economically and politically easier for the United States to release its strategic reserves for allies during an extraordinary crisis.

PROMOTE A COLLECTIVE COMMITMENT TO GLOBAL ENERGY MARKET STABILITY

In cases where bilateral oil or LNG trade either does not exist between U.S. and global suppliers or has decreased since the U.S. unconventional boom, U.S. policymakers should affirm the importance of bilateral ties on non-energy terms, as well as U.S. interest in overall stability of the energy market. This is particularly true for strategic partners in the Middle East. A reinvigoration of strategic relationships around these issues will clarify fundamental areas of mutual concern and collaboration. This is necessary if the United States aims to promote good governance, sustainable economic growth and human rights in these areas. In addition, sustaining close strategic ties with important energy-producing countries from which the United States is importing less than in the past will be useful when and if the U.S. shale boom tapers and imports from other oil producers begin to rise, which may occur as soon as the next decade.

In engagement with all nations, the United States should affirm a lasting commitment to stable, well supplied global oil markets. Policymakers should continue to work closely with emerging economies and producer states to craft transparent and sustainable energy policies, regulatory systems and fiscal regimes, all in support of a more interdependent and stable global energy system. The

United States can also usefully encourage states to increase and incentivize the resiliency of physical energy production and transport infrastructure around the world, including key gas or oil processing facilities, pipelines, canals and storage tanks. This will better protect against risks posed by weather events, physical violence or cyber attack. In some cases, the establishment of new supply chains, including new pipelines or maritime routes to bypass or detour around certain supply choke points, may be appropriate.

Another market measure to help manage price spikes is a strong international system for better coordination of rainy-day energy stockpiles in various countries. This would necessarily include a robust, coordinated effort among leading energy consumers – with the OECD states, China and India in the lead – to revise and formalize a coordinated strategic stocks system.[89] This process should include an evaluation by U.S. policymakers about how substantial a stockpile to hold – enough to replace imports in the case of market disruption or a greater volume to more ably prevent major producers from cutting off global oil supplies for political reasons. A larger strategic oil stockpile would also allow the United States to use these reserves to support strategic allies for political reasons or to influence global prices. A better management system for global strategic reserves would shift the burden of guaranteeing supply security away from an overreliance on military capabilities and would draw more of the biggest global energy partners into a coordinated scheme.

SHALE INVESTMENT WILL PAY COMPETITIVENESS DIVIDENDS

The shale boom is an economic success story of the combination of U.S. technology, ingenuity and seed capital. Creating the market conditions necessary to sustain and expand the boom should be a priority for economic and political leaders, both to increase revenue and to enable stronger, more assertive U.S. foreign policy and military leadership. To accomplish this, leaders must embrace pro-manufacturing policies, relatively unencumbered energy exports and relatively free trade in energy. This may involve some price rise, particularly as a result of seasonal demand trends, but will smooth refining mismatches in the U.S. market, diminish infrastructure bottlenecks and give producers greater access to competitive global markets.[90]

Roughly 20 states have financially important oil and gas production assets and should play a leadership role, together with federal authorities, in promoting energy export rather than energy isolationism. Relatively broad support already exists for natural gas exports, although federal authorities can play an important role in facilitating easier permitting for a U.S. LNG export sector. Most political leaders are far from ready to embrace oil exports and pass the policy measures necessary to enable this trade. However, they would do well to seriously consider this idea. Exporting oil would have limited impact on U.S. consumers because oil and refined product prices are set on a global market. Oil exports might also reduce the effectiveness of attempts by other producers, like Russia or OPEC, to exert new price-increasing cartel dynamics.

The United States will not have an unending economic advantage as a result of the unconventional boom, and conditions for energy exports, particularly LNG exports, will not always be as optimal as they are today. Our neighbors – particularly Canada, and to a lesser extent, Mexico – are already taking steps to capitalize on export or manufacturing opportunities, some of which may come at the expense of U.S. economic potential. Canada, awash in inexpensive gas that the United States now demands in much smaller quantities and constrained in its oil exports to the United States by pipeline politics, is considering new energy export terminals. Plans for trans-Pacific LNG export are moving relatively rapidly.[91] Even if

U.S.-incorporated companies help to export energy from Canada, or indeed build new energy and export infrastructure elsewhere, the fiscal benefit to the United States will be much less than if the terminals were located in the United States.

Specific Policy Recommendations to Address Opportunities Presented by the U.S. Unconventional Energy Boom

REFRAME AND REEVALUATE ENERGY SECURITY

- **Create New Terminology and a New Discourse.** Military and Civilian leaders, including leaders in Congress, should recast the terminology and basic concepts of the energy security debate to take into account the differences between oil and natural gas markets. They should also change the vocabulary of public policy and military planning around energy security to a focus on "vulnerability," "risk mitigation" and "interdependence." This new lexicon will urge people away from an unhelpful fixation on the concepts and terminology of "independence" or "self-sufficiency" and help facilitate a public conversation to reevaluate new and emerging energy security vulnerabilities, risks and goals.
- **Guarantee Physical Supply.** Military and national security policy leaders should initiate and lead a broad policy review of threats to the physical oil supply and U.S. strategic and military commitments to guarantee oil transit through key maritime choke points and conflict-prone areas. This process should involve input from various federal agencies, the intelligence community, the private sector, foreign governments and independent experts, and should feed into defense strategy and posture review documents, including the national security strategy, national defense strategy and national military strategy. Leaders should contemplate new partnerships to share intelligence and security responsibilities in protecting the flow of oil. Furthermore, they should evaluate threats to oil flow not only in marine transit but also in onshore transit and at key energy infrastructure or storage facilities. In addition to the risk of physical attack, the dangers posed by cyber attack and weather events should be taken into account.

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REDUCE ENERGY VULNERABILITY

- **Use Less and Diversify Supplies.** Public officials should renew and enhance commitments to increased energy efficiency, as well as alternative and renewable sources of energy. This is particularly important in the transport fuels sector and remains the most effective strategy for reducing vulnerability to high and volatile oil markets. Near-term leadership in this area should come from the administration and military leaders, through both executive authority and regulation. As much as possible, commitments in this area should embrace efficiency goals, oil consumption reduction targets and emissions reductions, and should avoid policy that is prescriptive about fuels or technologies that can become outmoded or antiquated.
- **Promote Advanced Technology.** Policy and industry leaders with exposure to, and knowledge of, sophisticated, technological production should promote technology transfer and innovative technical assistance models to replicate and amplify

energy production, particularly unconventional production, outside the United States. Information exchange, relationship building and consortium formation is occurring in various industry and state-sponsored forums. A robust commitment by U.S. policy and business leaders to further enhance these activities will help to ensure that unconventional technology can best be brought to bear internationally, diversifying supply sources and minimizing the risk associated with a unique physical supply disruption.

MINIMIZE PRICE SPIKES

- **Update the Strategic Reserves System.** U.S. national security officials, in collaboration with senior policymakers at the Departments of Energy, Treasury and State and technical experts and policy officials from major energy-consuming countries, should establish and lead a review of the global strategic reserves system, including management of the IEA strategic reserves system and the U.S. Strategic Petroleum Reserve. The review process should involve the creation of a set of principles and policies for updating reserves requirements, including an exploration of the role of regional and products reserves, the nature and placement of storage facilities, criteria for tapping reserves, and incentives for facilitating greater data transparency and sharing among global strategic reserves holders. Most important, this policy review and adoption process should create innovative mechanisms for bringing major global consumer countries into a global reserves system. This could occur by tethering favorable terms offered to U.S. trading partners on energy commodities or other strategic trade to their participation in a multilateral reserves system and public disclosure of accurate energy data.

STABILIZE VULNERABLE PETRO-STATE ALLIES

- **Implement Political, Economic and Security Reforms.** U.S. diplomatic outreach and technical assistance, as well as that of multilateral institutions and development banks, can promote political and economic reforms and stability in ally governments that are overwhelmingly dependent on energy export revenues from high oil prices. A number of allies in the Middle East, such as Saudi Arabia and Iraq, are good candidates for such reforms. A reduction in energy subsidies and domestic energy consumption, economic diversification, capitalized and diversified sovereign wealth funds, and streamlined domestic spending are all useful strategies for insulating petro-states against price dips that will eat into government revenue. For energy-endowed states with weak governance systems that suffer from substantial corruption, terrorism and problems with energy industry sabotage, the United States can offer support in governance, counterterrorism efforts, law enforcement and the security sector to help promote political stability, manage dissent in certain circumstances, and stabilize energy production and export.

ASSERT U.S. POLITICAL INFLUENCE THROUGH ENERGY STATECRAFT

- **Exert Punitive or Coercive Influence.** To achieve strategic and political aims with regard to adversarial petro-state actors, the United States can highlight poor fiscal management in these states and adopt punitive, coercive measures, such as energy sanctions, to exacerbate their economic problems and popular dissent. Additions to the oil market supply, including the U.S. boom, help to moderate prices, which makes such strategies relatively easy to pursue for the United States and other affected parties. In these market conditions, petro-states gain less revenue and face increased challenges in fiscal management and political stability. Coercive influence is the strategy of choice with regard to Iran and can be used in other contexts to compel reform or political reorientation in adversarial petro-states.
- **Support Allies in Conflict Situations.** The United States can also strategically use energy resources to benefit certain allies. During

extraordinary circumstances, such as military confrontation, a release of strategic petroleum reserves to specifically supply a key ally would have a market impact, both in meeting demand in an ally country facing conflict-related supply constraints and in influencing the broader global market. Planning for such a strategic supply release would offer reassurance to strategic allies and might provide a deterrent to those adversaries who would challenge an ally by attempting to constrain access to oil supplies.

BOOST THE U.S. ECONOMY

- **Build Domestic Industry.** Policymakers, particularly officials at the Department of the Treasury, Department of State, Office of the U.S. Trade Representative and White House, should build on the economic benefits accruing to the United States from the unconventional energy boom by facilitating and incentivizing domestic economic development associated with new U.S. shale resources. This could be accomplished through favorable tax and permitting terms and private-sector partnerships. It would attract gas-intensive industries, such as petrochemical and fertilizer production, to the United States, create jobs, enhance the balance of payments and boost U.S. economic competitiveness.
- **Facilitate Exports.** Regulators and policymakers should encourage and facilitate U.S. natural gas and oil exports, granting export permission and approving the necessary storage, processing and export infrastructure. Modifications to laws and regulations are needed to more easily move energy supplies around the United States and to and from Canada. This would include permission for pipelines, LNG rail transit and oil movement by sea. Moving substantial quantities of oil by sea would require changes to crude oil export provisions and the Jones Act, which requires that maritime energy supply movement from one U.S. port to another be on vessels built, owned, flagged and operated in the United States.

VIII. CONCLUSION

The most important aspects of the U.S. energy boom for policymakers are its substantial economic benefits and the new trade relations and strategic ties that will emerge from a reconfigured global energy map.

The unconventional energy boom, including the rapid expansion of U.S. production, took virtually everyone outside the oil industry by surprise. The effects of unconventional drilling technologies are only beginning to be felt globally and will continue to shape and change the world energy market in profound ways. The next breakthrough technology will influence supply in important ways, and the United States must be ready to adapt its policies and strategic relationships in a highly dynamic energy market.

By embracing energy isolationism and the notion that the country will be more secure if it hoards energy at home, U.S. leaders would lose the opportunity to leverage the unconventional energy boom.

By embracing energy isolationism and the notion that the country will be more secure if it hoards energy at home, U.S. leaders would lose the opportunity to leverage the unconventional energy boom. Put simply, such ideas are divorced from reality for several reasons, including the global nature of energy markets and the profound global interdependence of economies. Vulnerability to shifts in the global energy market will persist for the foreseeable future, and robust international engagement is necessary to promote energy market stability, transparency and integration. The resulting market liquidity and dynamism, together with a continued push toward greater energy efficiency, would greatly benefit U.S. security.

The United States has a tremendous opportunity to put its new unconventional energy supply into the service of strong U.S. leadership at home and abroad in the years to come. Creative trade and strategic policy should match the remarkable technological changes in the energy sector. Policy should advance U.S. interests, but even more importantly, it should build U.S. energy security and economic resiliency to weather an increasingly complex, high-tech energy market in which profound, rapid change and political brinkmanship will be more the norm than the exception.

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