



MANHATTAN INSTITUTE'S **POWER & GROWTH** INITIATIVE



UNLEASHING THE
NORTH AMERICAN
ENERGY COLOSSUS:
Hydrocarbons Can
Fuel Growth
and Prosperity

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EXECUTIVE SUMMARY

The United States, Canada, and Mexico are awash in hydrocarbon resources: oil, natural gas, and coal. The total North American hydrocarbon resource base is more than four times greater than all the resources extant in the Middle East. And the United States alone is now the fastest-growing producer of oil and natural gas in the world.

The recent growth in hydrocarbons production has already generated hundreds of thousands of jobs and billions in local tax receipts by unlocking billions of barrels of oil and natural gas in the hydrocarbon-dense shales of North Dakota, Ohio, Pennsylvania, Texas, and several other states, as well as the vast resources of Canada's oil sands.

It is time to appreciate the staggering potential economic and geopolitical benefits that facilitating the development of these resources can bring to the United States. It is no overstatement to say that jobs related to extraction, transport, and trade of hydrocarbons can awaken the United States from its economic doldrums and produce revenue such that key national needs can be met—including renewal of infrastructure and investment in scientific research.

An affirmative policy to expand extraction and export capabilities for *all* hydrocarbons over the next two decades could yield as much as \$7 trillion of value to the North American economy, with \$5 trillion of that accruing to the United States, including generating \$1–\$2 trillion in tax receipts to federal and local governments. Such a policy would also create millions of jobs rippling throughout the economy. While it would require substantial capital investment, essentially all of that would come from the private sector.

The underlying paradigms embedded in American energy policy and regulatory structures are anchored in the idea of shortages and import dependence. A complete reversal in thinking is needed to orient North America around hydrocarbon abundance—and exports.

In collaboration with Canada and Mexico, the United States could—and should—forge a broad pro-development, pro-export policy to realize the benefits of our hydrocarbon resources. Such a policy could lead to North America becoming the largest supplier of fuel to the world by 2030. For the U.S., the single most effective policy change would be to emulate Canada's solution for permitting major energy projects: create a one-portal, one-permit federal policy for all permits.

The recent preoccupation with technologies directed at creating alternatives to hydrocarbons misses how technology also unleashes alternative sources of hydrocarbons themselves. A number of detailed analyses of the new hydrocarbon realities have emerged, not least of which are excellent ones from Citi, Wood Mackenzie, IHS, and the U.S. Chamber of Commerce.

The authors of Citi's detailed report "Energy 2020: North America, the New Middle East?" note that "[t]he main obstacles to developing a North American oil surplus are political rather than geological or technological."

The projected growth in total world energy demand through 2030 is equal to an additional two Americas' worth of consumption. Every credible forecast shows hydrocarbons fueling the major share of that growth, as they have in the past. While alternative energy has grown rapidly, the overall contribution to U.S. and world supply remains *de minimus* and stays that way in every credible future scenario.

There will doubtless be objections to the idea of a radical shift in policies and attitudes toward hydrocarbons. But the benefits to the U.S., to the rest of North America, and to the rest of the world are so dramatic and important that abandoning them without serious policy deliberations would be unconscionable.

ABOUT THE AUTHOR

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

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

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

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UNLEASHING THE NORTH AMERICAN ENERGY COLOSSUS: Hydrocarbons Can Fuel Growth and Prosperity

OVERVIEW

The energy world has been turned upside-down—but not in the way that many expected. While policymakers globally have focused on “alternative” forms of energy, from solar and wind to plant matter and tides, the landscape has profoundly changed on both the supply and demand sides of the equation.

The game-changing technologies that have emerged involve hydrocarbons: natural gas, oil, and coal. Technology has unleashed staggering quantities of commercially exploitable reserves of these fuels, especially in the United States and its neighbors in North America. The implications for the American economy and its role as a world leader are, if fully realized, nothing short of revolutionary.

The next two decades will echo the past 20 years. Increased global population and more wealth will dramatically drive energy growth. And it is clear that hydrocarbons will fuel the vast majority of that growth, as they have in the past.¹ Non-hydrocarbon and alternative sources have grown and are growing rapidly but can't come close to meeting global economic needs. But there is one overarching feature of the energy picture that is radically different from the past.

The United States is now the fastest-growing producer of oil and natural gas in the world. This singularly remarkable fact has been noticed and praised by observers

as disparate as Tom Friedman² and Rush Limbaugh,³ as well as by oil forecaster Daniel Yergin.⁴

A seminal March 2012 analysis on this trend from Citi presciently concluded:

With no signs of this growth trend ending over the next decade, the growing continental surplus of hydrocarbons points to North America effectively becoming the new Middle East by the next decade; a growing hydrocarbon net exporting center.⁵

This reality changes the energy and geopolitical landscape and can be enormously beneficial for the U.S. economy. The current trajectory of expanded hydrocarbon production, if unimpeded, promises hundreds of billions, likely trillions, of dollars in revenues for federal and state treasuries, as well as millions of new jobs. The employment potential is so dramatic that industry insiders no longer talk about peak oil but about peak jobs arising from a shortage of high-quality (and well-paid) hydrocarbon-related workers.⁶

But the underlying paradigms embedded in American energy policy and regulatory structures are anchored in the idea of shortages and import dependence. A complete reversal in thinking is needed to orient North America around hydrocarbon abundance.

All this begs such questions as:

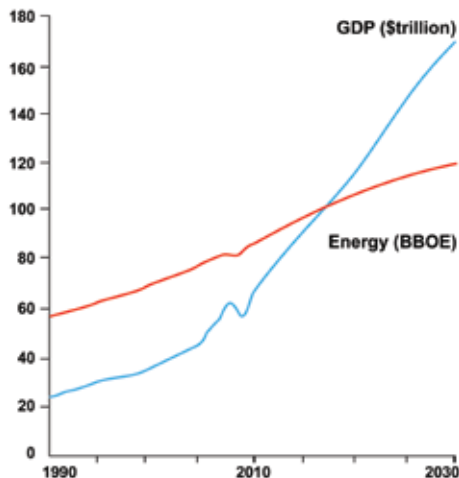
- How did this happen in an era indifferent, if not hostile, to developing hydrocarbon?
- Could this unbidden trend and all its benefits be accelerated?
- Could North America go beyond the pursuit of energy independence and become instead a major supplier of hydrocarbons to the world?

THE WORLD HAS CHANGED—TIME TO CHANGE AMERICA'S ENERGY THINKING

Every credible forecast sees the rise in the world's economies and population dramatically driving global energy use.⁷ According to forecasts from a wide variety of organizations—International Energy Agency, Energy Information Administration, BP, Exxon, and so on—annual global energy demand will grow from today's 85 billion barrels of oil equivalent (BBOE) to about 120 BBOE by 2030. Before two decades pass, the world's growth in energy consumption will be equal to adding two additional America's worth of demand.

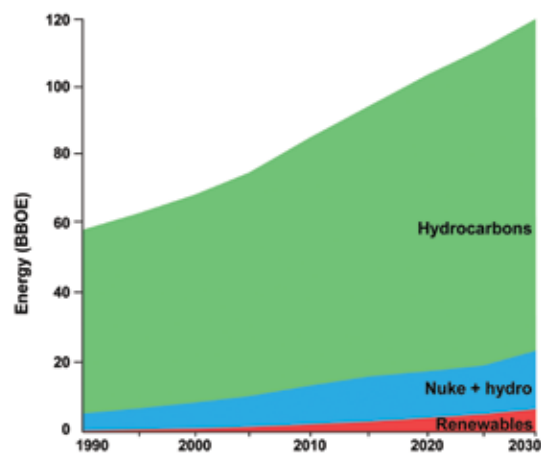
Hydrocarbons—oil, coal, and natural gas—supply over 85 percent of world energy today. And in every

Figure 1. World Energy Use and GDP

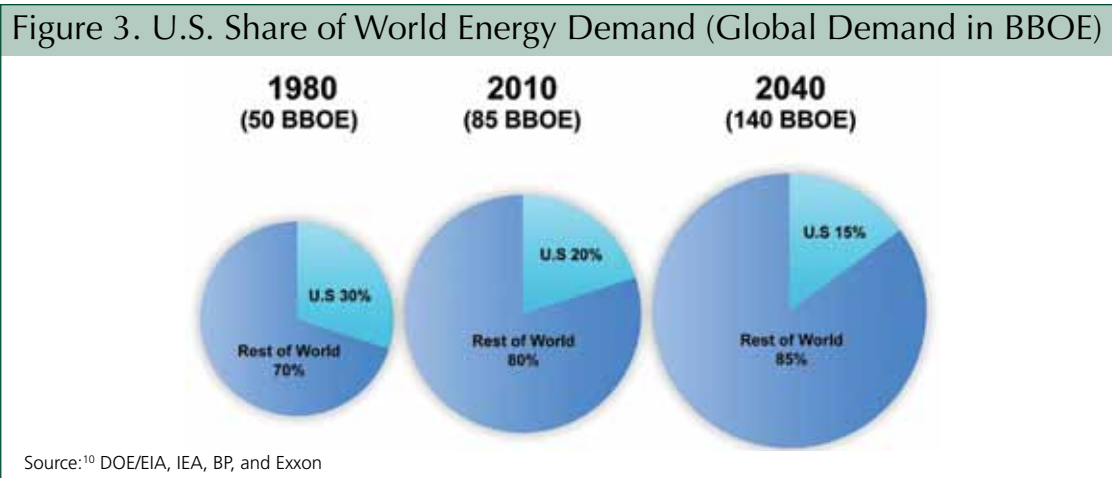


Source:⁸ DOE/EIA; International Energy Agency (IEA); BP; and Exxon. (\$constant 2010)

Figure 2. World Energy Production



Source:⁸ DOE/EIA; International Energy Agency (IEA); BP; and Exxon. (\$constant 2010)



credible forecast, hydrocarbons will provide the vast majority of the world’s energy two decades from now.

The only debatable issues are just how much hydrocarbon production will be needed to expand and who will supply it, and thus, collaterally, who will enjoy the economic benefits from providing those resources—and gain the associated geopolitical advantages.

Over the decades, demographic changes and technology progress have fundamentally altered the framework for considering U.S. energy policies. But today’s policies are still anchored in a decades-old and invalid paradigm—to wit, the idea that America is resource-poor and that changes in American energy demand can significantly alter world markets.

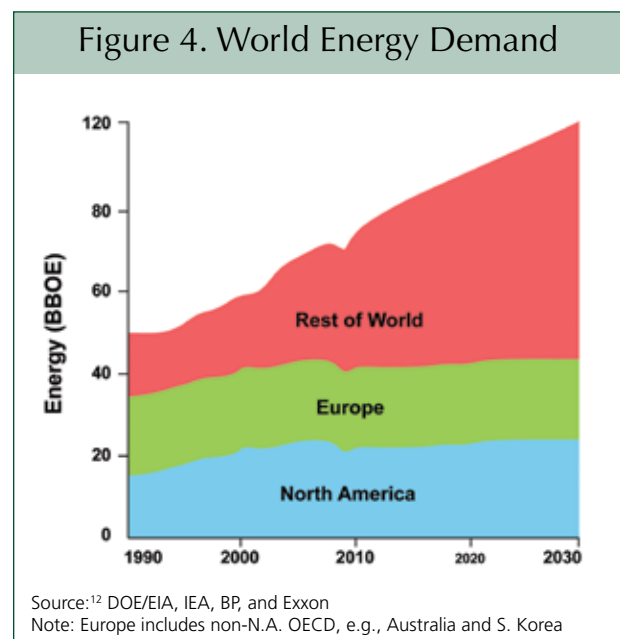
The old paradigm does not account for two facts: America is an energy-rich, not energy-poor, nation. And America is no longer the swing consumer of energy, and thus is increasingly unable to influence global markets with changes on the demand side.⁹

Thirty years ago, at the time of the second oil shock, the U.S. did consume nearly one-third of total world energy. American appetites and policies affecting domestic consumption were at that time significant determinants of global supply, demand, and prices.

Today, however, the U.S. has dropped to below 20 percent of world energy demand; and before three decades pass, it will fall to under 15 percent. As a re-

sult, going forward, global markets and prices will be increasingly disconnected from domestic U.S. energy consumption behavior, whether virtuously voluntary or punitively policy-driven.

Even with an aggressive policy to accelerate American automobile fuel efficiency (doubling the on-road fleet average over two decades) and put several million electric cars on the road, the world’s energy use would be reduced by just 1 percent and oil use by under 3 percent by 2040.¹¹ The demand side of the equation has firmly moved to the rest of the world.



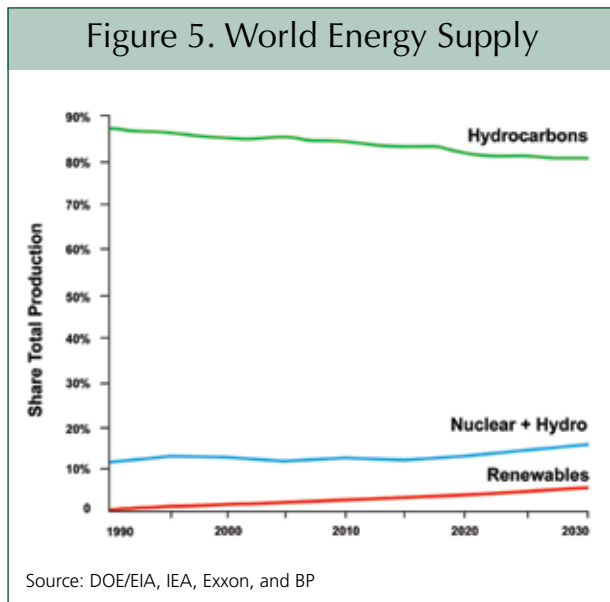
In the meantime, the energy production side of the equation has also changed because of unrelenting progress in underlying technologies.

TECHNOLOGY CHANGES THE RESOURCE REALITIES

As my colleague Peter Huber and I wrote in our book, *The Bottomless Well*, energy resources are primarily a function of technology, not of geology. Technology unleashes resources, resource wealth creates capital, and capital is reinvested in new technology that, in turn, unleashes resources. And on it goes—or it can, if we unleash it.

Governments and policies—access to land, restrictions on businesses, and so on—are the dominant constraints to this virtuous circle. The recent preoccupation with technologies directed at creating alternatives to hydrocarbons misses how technology also unleashes alternative sources of hydrocarbons themselves.

While alternative energy supplies have grown by a remarkable 500 percent over the past two decades, their overall contribution to world supply remains *de minimus* and stays that way (even though it is still growing rapidly) in every credible future scenario.



Yet many analysts and pundits behave as if the hydrocarbon industries operate in a parallel universe where the information technology (IT) and materials science revolutions never took place.

Consider patents as one indicator of technology progress. Over the past five years, more than 150,000 hydrocarbon-related patents have been granted, compared with 60,000 associated with alternative energy technologies.¹³

Technology progress in hydrocarbon exploration and development has been transformative and is ongoing, enabling the emergence of a new era of hydrocarbon production, which is, in turn, unleashing the capability to efficiently tap into North America's enormous resources of natural gas, oil, and coal.

Just as technology enables the dynamic integration of dispersed and episodic solar panels, allowing for more efficient extraction of the sun's abundant energy, technology also enables the discovery, mapping, and extraction of abundant but dispersed hydrocarbon resources. But it goes beyond that.

IT spending improves operations, logistics, and asset management. The constellation of new technologies yields profoundly better real-time information, sensors, and controls. Information-centric technologies and nano-engineered materials are also responsible for making it possible to manufacture better steel and related materials for exploration, production, and conversion. One manifestation of this progress is the technique now simply called fracking.

The technological magic in hydraulic fracturing (an important but not the sole manifestation of the aforementioned hydrocarbon tech advances) centers on the maturation of directional and steerable drilling. Today, you don't just punch a vertical hole in the ground with a dumb mechanical drill—petroleum engineers now have dynamically steerable drilling technology that permits precision snaking through meandering underground hydrocarbon-rich seams. Precision steerable drilling emerges from such advances as real-time microseismic monitoring and continuous data logging using technologies such as gamma ray and neutron

sensors that continuously analyze and report what precisely is in the ground at each point.

IT giant IBM identifies the oil and gas sector as one of 27 “Smart Planet” target markets that run the gamut from banking to water. IBM notes: “A single oil or gas field can generate a terabyte of data every day. An oil and gas engineer spends from one-third or 60 percent of his time on data mining.” The world is on track to generate exabytes per year of hydrocarbon-centric digital traffic, rivaling the total amount of global Internet data traffic of just a few years ago.¹⁴

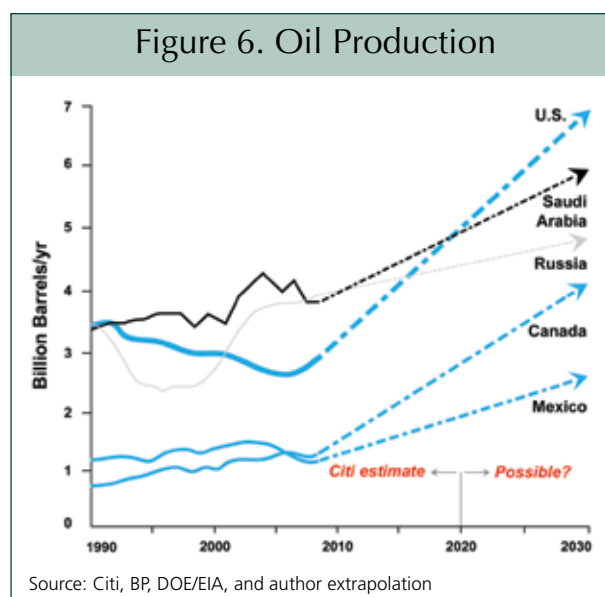
Information acquisition, processing, and rendering—putting it in a useful form—is the *sine qua non* of today’s hydrocarbon domains. We’ve gone from zero to megabytes of data processed per million BTUs of energy production. As Bill Gates recently noted: “The one thing that is different today [in energy] is software, which changes the game.”¹⁵ To which one should add communications technologies, which seamlessly link the energy world from mine mouth and wellhead to wall plug and throttle.

The deployment of new technologies across America has led not only to greater oil and gas production capabilities, but it has also driven a near doubling in the coal sector’s productivity in the past two decades, a subject to which we will return shortly.¹⁶

The U.S. and its neighbors Canada and Mexico are awash in available hydrocarbon resources, much of it at reasonable or remarkably low costs—and all of it extractable in environmentally sensible ways (again, because of the advances of technology). In the context of the economic and social value of these resources as well as the world’s unrelenting appetite for hydrocarbons and thus the collateral export and geopolitical value for America, it is remarkable how much the policy dialogue lags behind the new energy-economy reality.

Considering the lightning-rod role played by the availability and price of oil, Citi’s forecast relating to oil production is truly radical—the U.S., Citi’s analysts note, will surpass Russia to become the world’s second-largest oil producer by 2020—assuming that the current “enhanced” trajectory is permitted to continue.

Figure 6. Oil Production



But what if we look beyond 2020 to 2030, and what if those trends didn’t just continue but were accelerated, not just for oil but for all hydrocarbons? What are the implications for the U.S., the rest of North America, and the rest of the world? But first, do sufficient resources exist?

COULD NORTH AMERICA BECOME THE WORLD’S LEADING ENERGY SUPPLIER?

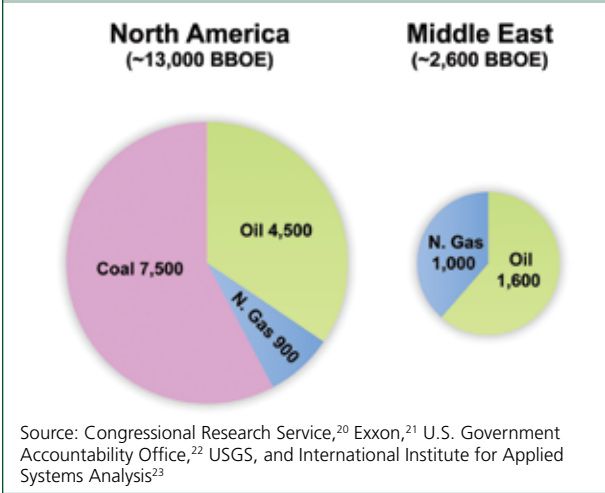
Technology unlocks resources. And North America has total hydrocarbon resources that are some four times greater than those found in the Middle East. The geology of North America is profoundly hydrocarbon-rich.

In addition to the long-recognized resource abundance for coal¹⁷—the U.S. has nearly one-fourth of global coal resources—is the reality that vast oil and natural gas resources also exist and are increasingly accessible.

Resources are distinct from “reserves,” which are based not just on geology but on factors that include available technology, land access, and market prices. Accessible reserves thus grow with time, with the advance of technology, and with the rise in prices and wealth.¹⁸

During the 1970s, policymakers assumed that North American natural gas resources were so scarce that the

Figure 7. Total Hydrocarbon Resources (BBOE—Billion Barrels Oil Equivalent)¹⁹



Carter administration and Congress passed the 1978 Fuel Use Act to ban the use of natural gas for electric generation, preserving it for heating and industrial applications. (The act was repealed under President Reagan nine years later.) And only a decade ago, regulators authorized the construction of liquefied natural gas (LNG) *import* terminals to supplement ostensible

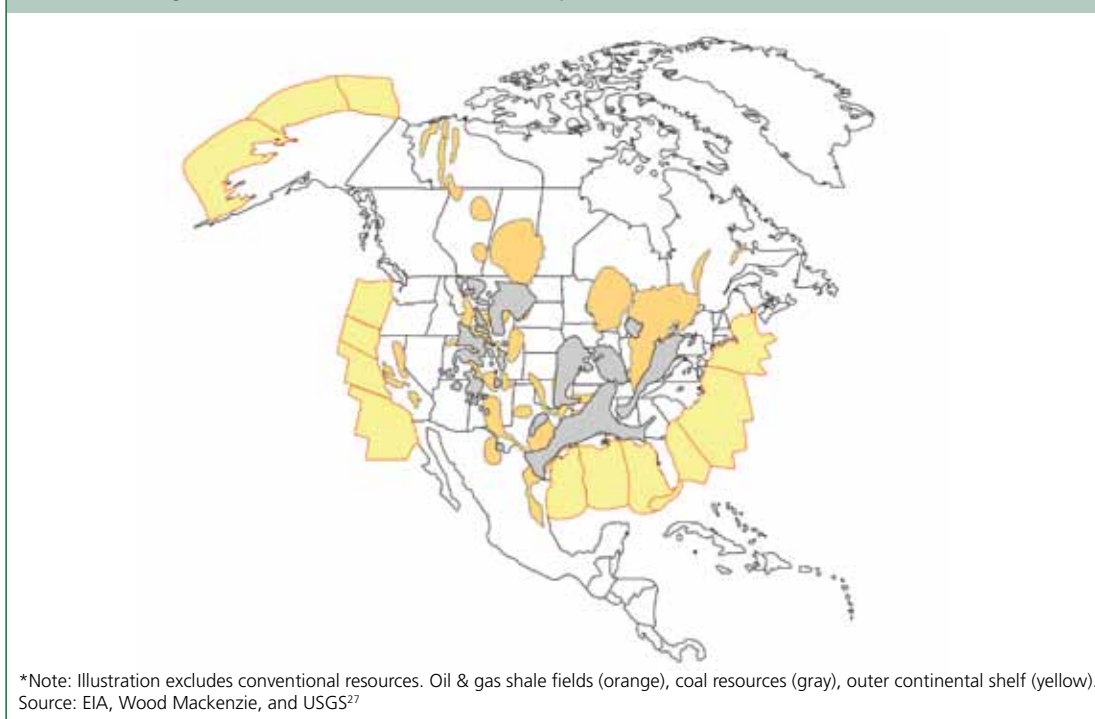
limited domestic supplies. Now those terminals would be more valuable if reversed and used to export LNG.

The U.S. oil reserve figure was about 35 billion barrels in 1980. Yet, over the ensuing three decades, over 100 billion barrels of oil have been produced from America’s oil fields, and the reserve figure still stands at about 30 billion barrels.²⁴ The resource was obviously larger than the narrowly defined reserve number.

Technology will enable yet more production from so-called conventional oil fields, and it unlocks even greater swaths of resources from, to cite just two examples, the 12 billion-plus barrels of “accessible” oil in the Bakken shale (the source of North Dakota’s boom) and a similar 20 billion barrels of oil and gas in the eastern Marcellus shale enriching Ohio and Pennsylvania. And that’s just the beginning.

The Green River Formation, for example, a shale region largely beneath Colorado, Wyoming, and Utah, contains an estimated 2,000–3,000 billion barrels of oil.²⁵ The Rand Corporation estimates that 30–60 percent of that oil is extractable with technology now available.²⁶

Figure 8. North American Hydrocarbon-Rich Resources*



In addition, technology also increasingly makes feasible access to oil in ever-deeper offshore waters, and to many other types of land-side unconventional formations where some of the richest untapped finds are in California.²⁸

In Canada, the vast oil sands in Alberta alone contain about 2,000 billion barrels of oil—the resource at the epicenter of the Keystone Pipeline project that was intended to transport some of that oil to U.S. refineries.

There are also vast unexplored, not just untapped, hydrocarbon resources in northern Canada and in the outer continental shelf of North America. The technically easy-to-access—if not politically accessible—oil in Alaska’s off-limits ANWR and the Gulf of Mexico would, in the short term, essentially triple existing U.S. oil reserves.²⁹

In addition to the “surprising” abundance of oil and natural gas, North America’s coal resources are even more abundant and typically easier and cheaper to access. With the recent exception of (likely short-lived) ultra-low-priced natural gas, coal has long been the lowest-cost primary fuel and the largest single feedstock to support global electricity supply.

Globally, most electricity is generated by burning coal. Over the next few decades, demand for coal in every corner of the world is only expected to grow. This enormous and rapidly expanding market offers a golden opportunity to expand North American coal exports.

THE BENEFITS OF HYDROCARBON ABUNDANCE

We already know that Texas and North Dakota are enjoying the economic benefits of advanced hydrocarbon technologies. The 9 trillion cubic feet of natural gas that has been produced in the Texas Barnett shale over the past decade provided \$10 billion to local counties, cities, and school districts alone.³¹ (Note that production growth across the U.S. has come almost entirely from private land and not from the vast tracks of federal lands.)³²

By 2015, oil and gas developed from Ohio’s part of the Utica shale formation will generate 200,000 new jobs, \$12 billion growth in overall wages, and increase state economic output by \$22 billion.³³

In the western states, a mere couple of dozen proposed oil and gas projects in Utah and Wyoming are expected to generate 120,000 jobs, \$139 million in government revenue, and a cumulative economic benefit of nearly \$400 billion to the region over the next 15 years.³⁴

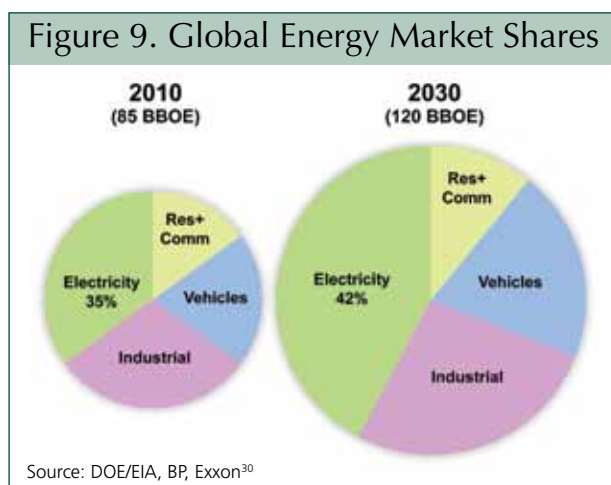
North of the border, the province of Alberta’s treasury will enjoy a three-decade aggregate of \$1.2 trillion in royalties from the expected growth in hydrocarbon production (associated with a cumulative 22 billion barrels of oil produced).³⁵

Unleashing 20 billion barrels of cumulative oil from Alaska’s ANWR and some currently off-limits regions of the outer continental shelf would bring over \$1 trillion of net benefits to the U.S. economy.³⁶

In general, both history and recent analyses show that for every billion barrels of oil produced (or oil-equivalent in natural gas, and similar range for coal), there are about \$75 billion in broad economic benefits.³⁷

A number of recent studies have explored the implications of the new hydrocarbon trajectory, should it continue unimpeded:

- o Citi’s analysis concludes that the oil and gas extraction sector could add as many as 3.6 million net new jobs by 2020 (for North America, both direct and indirect) and shrink the deficit by 60 percent.³⁸



- o Wood Mackenzie³⁹ finds in its scenario report for the American Petroleum Institute a cumulative \$800 billion in increased revenues to governments (federal, state, local) and another 1.5 million U.S. jobs, direct and indirect, over the coming two decades.
- o IHS Global Insight,⁴⁰ in its analysis for America's Natural Gas Alliance, estimates that the shale gas industry alone will add more than 1 million jobs across the U.S. economy over the coming two decades and provide over \$900 billion in cumulative additional federal, state, and local government tax revenues (\$465 federal, \$460 state and local).

While there are differences in assumptions and boundaries among these and similar analyses, the order-of-magnitude benefits are similar and similarly impressive: millions of jobs and hundreds of billions in revenues to government coffers.

None of the above accounts for the economic contributions thus far from coal, nor does it countenance expanding coal production, North America's third great hydrocarbon resource. Some 600,000 jobs are associated with the coal industry, a fuel that already contributes some \$60 billion annually to the U.S. economy, not the least of which is the increasingly vital role of low-cost electricity in an information-centric economy.⁴¹ The U.S. uses about three BBOE of coal per year, while the world consumes about 20 BBOE of coal annually. Expanding coal exports by an amount comparable with the increase in the oil and gas sectors would add several hundred thousand more jobs and several hundred billion more dollars in cumulative tax receipts.⁴²

While expanding hydrocarbon production will require significant investment, it will be supplied by the private sector, generating benefits to the public sector, to private citizens, and to businesses. These kinds of benefits, which accrue without cost to taxpayers, come at a particularly important time, considering the current state of persistent unemployment and underemployment, the losses in net worth for many citizens, and the budget deficits in most states and the federal government.

Economic benefits from expanding hydrocarbon production will be felt widely given the structural and geographic diversity of hydrocarbon resources and the associated industries. In contrast to other parts of the world, benefits here won't flow to a handful of oligarchs but will involve thousands of businesses and ripple broadly throughout the economy.

Expanding hydrocarbon production may be the single most important opportunity for near-term economic growth in North America and a beneficial resetting of energy geopolitics.

WHAT WOULD HAPPEN IF NORTH AMERICA BECAME THE LEADING ENERGY SUPPLIER?

First, let's consider the implications of the current path of hydrocarbon expansion. The team at Citi concludes:

We are contemplating hundreds of billions of dollars of new output, three or four million new jobs, a current account deficit slashed by half or more, and a strengthened dollar firmly reasserted as the reserve currency of choice. Not to mention the potential strengthening of U.S. federal and state government finances, the national security implications of improved energy independence, a resurgence of the nation's technological and manufacturing competitiveness, the social implications of new wealth and job creation, and many other silver linings.

The net effect of the trajectory that the U.S. is now on will lead to essentially net zero imports for total hydrocarbon needs (though some continuing oil imports). This by itself will have salutary effects beyond the U.S., taking pressure off world energy markets and moderating global prices and geopolitics.

But what would happen if policies were enacted to accelerate and encourage even greater expansion of North American hydrocarbon production and to expand access to the vast tracts of federal lands that sit atop staggeringly large resources? Why not push beyond self-sufficiency to energy influence, even dominance? The benefits would be even greater than those itemized above.

Such a change in policy would also bring much more of what the Citi team calls “many other silver linings,” including:

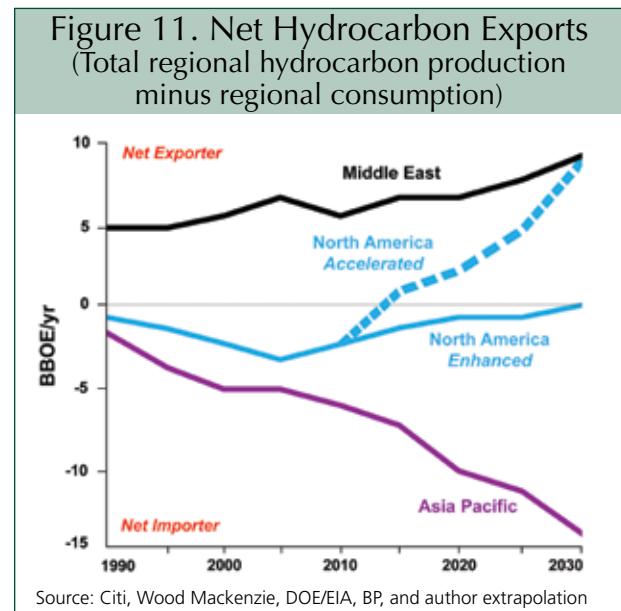
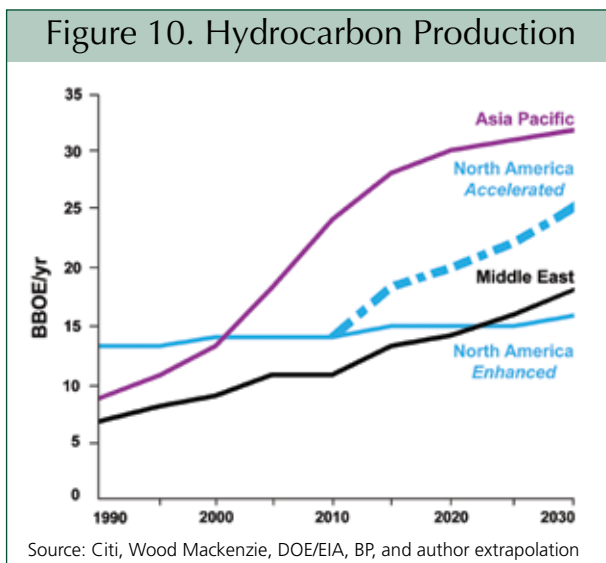
- A great expansion in the kinds of highly skilled and highly paid employment directly and indirectly associated with the hydrocarbon industry;
- State budget surpluses that inevitably lead to increased funding for the arts, universities, and social programs;
- Greater wealth and profits, which invariably spur more R&D as well as more vigorous venture investments across all sectors;
- A robust economic environment where wealth enables wider adoption of non-hydrocarbon alternatives that become more tolerable, even where expensive;
- A radical reset in the geopolitics associated with energy, with North America seen not just as the world’s fastest-growing but, in the foreseeable future, the world’s major supplier of critical fuels;
- A moderation in global energy prices and, critically, a stabilization of price swings by dramatically increasing the world’s available marginal

production capacity at any given time (marginal production capability is a primary factor in global price volatility)⁴³

Figure 10 illustrates total aggregate hydrocarbon production for the world’s three main producing zones over the past two decades, as well as forecasts for the next two. The enhanced scenario for North America assumes a continuation of the current state of the industry—essentially, the new business-as-usual for hydrocarbons.⁴⁴ The accelerated case illustrates the expanded production of all hydrocarbons using Citi’s scenario for oil and gas and then including coal for export, and it extrapolates the trend beyond Citi’s 2020 horizon.

Figure 11 illustrates the net impact of hydrocarbon production when each region’s internal consumption of those fuels is subtracted out.

Even if Middle East hydrocarbon production actually rises by the forecast 50 percent, Middle East net exports increase modestly because of growing internal consumption. Meanwhile, slow demand growth in North America enables rising production to bring North America to net zero hydrocarbon imports (in business-more-or-less-as-usual scenario, again assuming that progress is not impeded). Or, if the current trends were to be accelerated, North America could



surpass the Middle East to become a greater global energy exporter.

Notably, and unsurprisingly, the Asia Pacific region's economic and population growth creates a rapidly increasing requirement for net hydrocarbon imports.

The tantalizing possibility of North America by 2030 becoming the largest supplier of fuel to the world would require about an 80 percent increase in aggregate hydrocarbon production over two decades.⁴⁵ From a resource perspective, this does not present a challenge, as earlier illustrated. From an engineering perspective, it is unlikely to be a stretch.

Aside from considering the accelerated scenario's geopolitical implications, there would be an even greater bounty in terms of employment and economic benefits than now contemplated. Extrapolating from the analyses of Wood Mackenzie, total additional tax receipts to federal, state, and local governments could increase to an aggregate of nearly \$2 trillion by 2030, and total additions to employment could be in the range of at least 3 million more jobs. (There would be, as well, pro-rata gains for Canada and Mexico, as the Citi analysts have explored, too.)

These estimates likely understate the overall economic impact of such a grand expansion of hydrocarbon

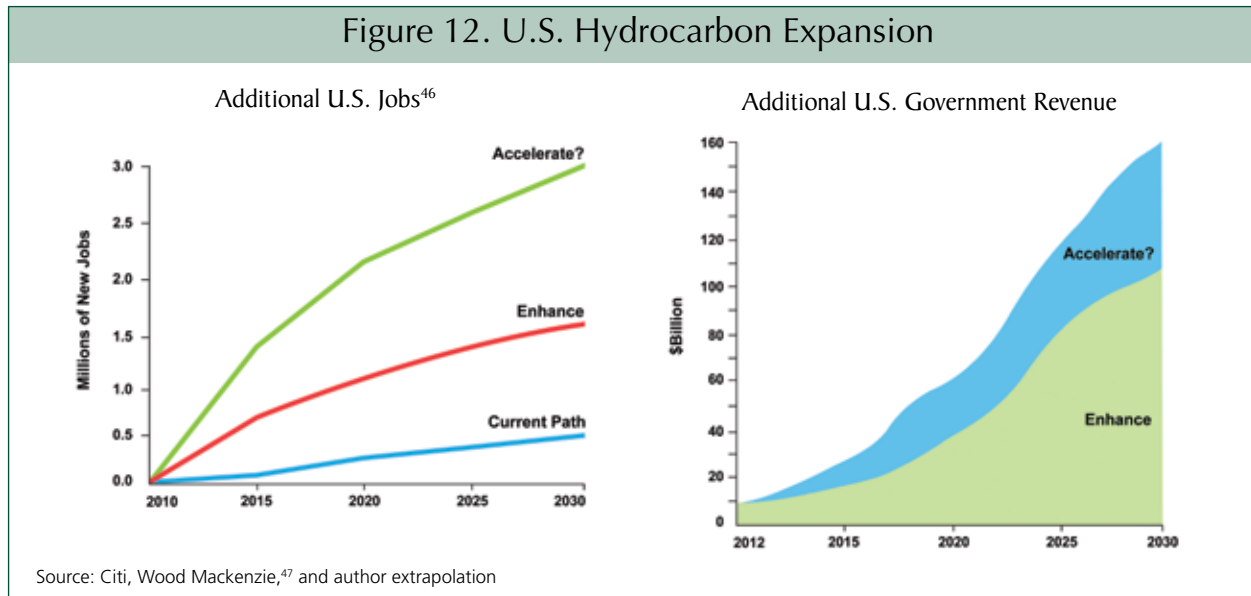
infrastructure and all the collateral benefits. Economic research noted earlier finds about \$75 billion in broad economic benefits for every billion barrels of oil produced (or oil-equivalent in hydrocarbons). This would imply that the aggregate 100 billion barrels of additional hydrocarbons extracted and sold over the next two decades in the accelerated scenario would yield over \$7 trillion of value to the North American economy, with \$5 trillion of that accruing to the U.S.⁴⁸

Exports would take many forms:

- Petroleum (requiring more pipelines)
- Coal (requiring more rail and port capabilities)
- Liquefied natural gas (requiring new LNG terminals)
- Refined petroleum products (more and expanded refineries—U.S. is already a net refined exporter)
- Methanol (produced from natural gas; useful as a flex-fuel transport substitute)
- Technologies and services to help other regions exploit similar hydrocarbon resources

The specific markets and individual product quantities exported will be determined by market forces, prices, and technology.

Figure 12. U.S. Hydrocarbon Expansion



In time, with the inexorable advance of technology, the three hydrocarbons become increasingly fungible and complementary: gas-to-liquids, coal-to-liquids, gas-to-methanol, electricity-displacing-oil, by-product CO₂ from coal used to enhance oil extraction,⁴⁹ and so on.

But for now, the hydrocarbon domains are roughly: 90 percent of coal makes electricity, 60 percent of oil is used for transportation, and about 65 percent of natural gas is used for heating and industrial processes. As technology blurs the lines between end-uses and enables each hydrocarbon to supply broader applications, it both expands opportunities and further moderates price volatility.

Technology progress has not stopped, on any front, and certainly not in hydrocarbon domains. As Bill Gates also recently observed: “In terms of energy IQ, the U.S. blows everyone else away.”⁵⁰

WHAT WOULD STOP NORTH AMERICA FROM ACCELERATING HYDROCARBON PRODUCTION?

To be a player of significance in world energy markets, you need three things: physical resources; technology to efficiently and sensibly extract them; and willingness to unleash industry. The U.S. already leads in two out of three of these.

If we might quote our colleagues at Citi again (and add that this applies to all hydrocarbons):

The main obstacles to developing a North American oil surplus are political rather than geological or technological.

Infrastructure, regulatory, and legislative constraints bottle up the capability to export all three hydrocarbons, coal and natural gas in particular. The challenges surrounding approval of the Keystone Pipeline are vividly symptomatic.

Vast tracts of hydrocarbon-rich resources are either entirely or effectively off-limits to development. Two-thirds of the enormous Green River shale formation is located under federally owned or administered land.⁵¹

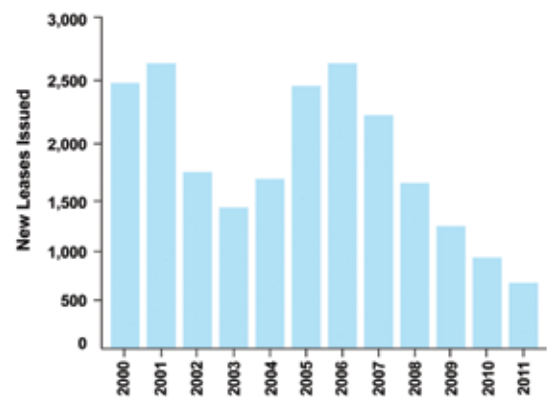
The federal Bureau of Land Management (BLM) manages about 700 million acres of “mineral estate.”⁵² As previously noted, nearly all the recent gains in U.S. hydrocarbon output have come from private lands.

And where there has been some access to BLM-managed land, there has been in recent years a precipitous drop in the number of new leases sold.⁵³

Unsurprisingly, there is a strong correlation between the number of BLM oil and gas leases and the quantity of oil produced.

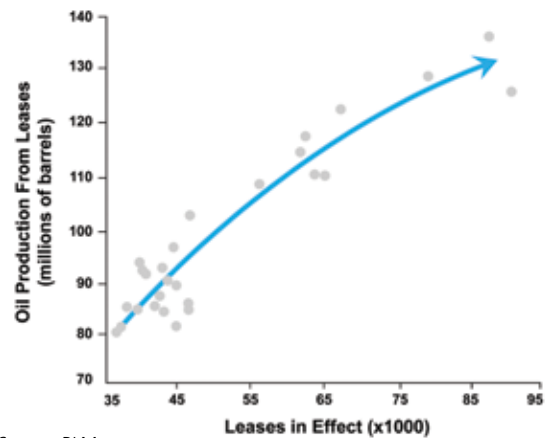
Although the U.S. is the largest producer and holds the largest quantities of total hydrocarbons, a col-

Figure 13. Oil & Gas Leases Sold on Federal Land (Western States)



Source: BLM

Figure 14. Oil Production v. Number of BLM Leases Sold



Source: BLM

laboration with Canada and Mexico could—and should—forge a broad pro-development, pro-export hydrocarbon policy capable of unleashing the mutual economic, employment, and geopolitical benefits—a NAFTA-type collaboration.

There are particularities for each hydrocarbon and each country, but there are nonetheless overarching issues and frameworks common across all three fuels, especially those relating to export capabilities and to the labyrinthine challenges of major project permits.

For the U.S., the single most effective policy change would be to emulate Canada's solution for permitting major energy projects: create a one-portal, one-permit federal policy for all permits. The current regulatory morass, unintended conflicts, and frequent capriciousness are common complaints across the hydrocarbon industries.

Rather than subject businesses to the long, costly, sometimes opaque, and often counterproductive array of permits and compliance challenges across various agencies and federal domains, energy projects could be channeled through a single federal portal. Canada's single-portal policy, outlined in that government's *Economic Action Plan 2012*, lubricates the process for industry while maintaining a focus on responsible environmental regulation.⁵⁴

Canada's system provides a clear timeline for regulatory and permitting decisions and eliminates much uncertainty. A proposal review and decision are both made within 45 days of submission. If further regulatory discussion is necessary, a review panel reaches a decision within one year. The single-portal policy also recognizes that provincial

regulatory processes are substitutes for or equivalents to federal ones. By integrating provincial and federal policy, the one-portal, one-permit policy reduces the number of governmental organizations responsible for environmental oversight from more than 40 to three. The Canadian Minister of Natural Resources is certainly correct in noting that all this is “more effective, efficient, and predictable.”⁵⁵

There will doubtless be objections to the idea of a radical shift in policies and attitudes toward hydrocarbons. But the benefits to the U.S., to the rest of North America, and to the rest of the world are so dramatic and so important that abandoning them without serious policy deliberations would be unconscionable.

Many objections merit exploration. And many policy and regulatory challenges will require creative and collaborative solutions. However, unlike geology, which is immutable, and technology, which takes (and has taken) time to mature, policies and regulations can, in principle, be changed with the stroke of a pen.

The U.S. has yet to adopt a coherent policy in response to the deep changes in energy demand and supply. The world will need enormous quantities of hydrocarbons in the future, regardless of and despite substantial gains in energy efficiency and alternative energy deployment. No single region of the world could make as significant a difference to the supply dynamic as could North America. In the energy arena, North America, to paraphrase, is punching below its weight class.

And, in these trying economic times, expanding hydrocarbon production may be the single most important opportunity for economic growth for the U.S. and North America.

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FELLOWS

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

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

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

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