
News and updates › Speeches ›

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From Scarcity to Abundance: How Industry Innovation Is Creating a New Era in Energy



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It is a pleasure to be here with the World Affairs Council of Dallas Fort Worth.

ExxonMobil has a long history of support and a long-standing relationship with the World Affairs Council – wherever we operate, not just here in Dallas, but other chapters in cities and states across America and the world. In our view the World Affairs Council does a great service enriching public dialogue and providing a place for in-depth discussions of public policy and the respectful exploration of solutions.

Of course, it is a special pleasure to be with you here today – not just because this area is my home, but because so many citizens here have seen firsthand what our industry's innovations have meant for our state and national economy.

In fact, many leaders and companies from the Metroplex have played a critical role in reshaping our nation's energy landscape – and with it the prospects of the global economy and international relations.

So, this afternoon, I'll discuss the transformative technologies and risk management techniques that are enabling us to unlock new supplies of energy across the continent, how that energy is bringing extraordinary economic and environmental benefits, and why, as we look to the challenges in the decades ahead, we will need public policies that allow us to build on our successes and promote innovation for decades to come.

To do this, we must challenge old ways of thinking rooted in the notion that we must ration scarcity, and we must embrace new ideas that respect the roles of industry, government, and society. All of whom must play their role in an era of abundance in energy.

Transformative Technologies and Techniques

From the outset, we must recognize that this is an extraordinary moment in the history and evolution of North American energy markets.

More than 30 years ago, my good friend U.S. Secretary of Energy Jim Schlesinger declared, and I quote: “The energy future is bleak and is likely to grow bleaker in the decade ahead. We must rapidly adjust our economics to a condition of chronic stringency in traditional energy supplies.” That mindset of scarcity influenced our nation’s outlook on energy security, our foreign policy imperatives, and our optimism about our shared future.

In the three decades since, the nations of Canada, Mexico, and the United States have been an example to the world of how trade, cooperation, and innovation can expand energy supplies and lead to mutual benefit and progress.

And in recent years, in particular, the energy industry’s long-term investments, new technologies, and risk management have combined to put North America at the vanguard of an energy transformation that is reshaping global markets.

Sources of oil and natural gas once dismissed as “uneconomic” and “inaccessible” are now reliable, affordable, and environmentally responsible contributors to our global energy portfolio – all are a result of industry innovations.

In Canada, for instance, we are deploying new technologies and techniques that are enabling the development of that nation’s vast oil sands. This resource base now has the potential to provide approximately 170 billion recoverable barrels – enough energy to fuel today’s North American personal vehicle fleet for almost 45 years.

In the Gulf of Mexico, we have taken the concept of deepwater drilling from the drawing board to execution in little less than a generation. And more recently, our industry has come together as never before and made tremendous strides in emergency response and risk management offshore. With these ongoing discoveries and advances, we anticipate more than doubling both North American and worldwide deepwater production over the next 25 years.

Finally, across the continental United States and Canada, industry innovations are enabling us to unlock so-called new unconventional sources of energy – energy located in extremely dense geologic formations, often referred to as shale gas and tight oil.

Advances in horizontal directional drilling and hydraulic fracturing are bringing vast new supplies of oil and natural gas to America's economy – safely and responsibly. These technologies and techniques are not new to our industry. We have used them for decades. It is their integration that is innovative and game changing.

To put the impact of these transformative technologies in perspective, I would ask you to consider the following:

Since 2008, U.S. natural gas production is up 19 percent. This additional increase in supply is enough to meet about 90 percent of the natural gas consumed in all of U.S. homes in 2012. And industry technologies have now put within reach enough natural gas to help power the U.S. economy at current demand for about a century.

These new technologies have boosted more than natural gas supplies. Domestic oil production is also up sharply. Since 2008, full-year domestic

oil production has risen by close to 30 percent. In fact, by the end of last year, production was up by the equivalent of nearly the entire output of Nigeria, the seventh-largest producing country in OPEC.

Thanks to these new technologies, the United States has not only reversed a more than a 25-year decline in oil output, we are now the world's fastest growing hydrocarbon region.

Economic and Environmental Benefits

These new supplies of energy are carrying strong economic benefits – increasing investment, job creation, and growth at a time when our economy needs it most.

In 2011 alone, the oil and gas industry generated more than half-a-trillion dollars of investment in the form of capital, wages, and dividends.

In Texas, the industry's multiplier effect has had a particularly strong influence on job creation. Recent economic studies find that new oil and natural gas production has created 576,000 jobs, with about one million direct and indirect jobs predicted by 2020.

The entire oil and natural gas sector currently supports 9.2 million American jobs, 7.7 percent of the U.S. economy, and delivers \$85 million every day in revenue to the government.

Our industry's innovations in oil and natural gas production have also brought renewed hope and opportunity to many areas of the country that were once written off.

For the more than 50 million people in the small cities, towns, and rural areas of America's heartland, inflation-adjusted average per capita income rose between 2007 and 2011. At the same time, incomes were falling in U.S. cities.

Industry innovations are being felt far beyond the borders of the states where energy production takes place. Energy-related economic benefits are extending to the 32 states without unconventional energy production. New York State, for instance, has more than 44,000 industry-supported jobs – with many of those the direct result of the Marcellus Shale development next-door in Pennsylvania.

This new era of abundance in energy is increasing America's international competitiveness – in sectors once believed to be in permanent decline.

Vast new supplies of natural gas are helping revitalize America's steel industry, which will contribute to rebuilding of our nation's infrastructure and automotive manufacturing. And these new gas supplies are also reinvigorating America's petrochemical industry, increasing agricultural competitiveness, and boosting

American exports of bulldozers, farm equipment, and other heavy vehicles.

Our industry's contributions go beyond economics.

The new supplies of natural gas also help our nation meet shared environmental priorities.

The U.S. Energy Information Administration has estimated that in 2012, energy-related U.S. carbon dioxide emissions had fallen to their lowest level

in more than a decade and a half.

What makes this extraordinary is that the United States has about 50 million more energy consumers than we did in 1995, with an economy that is about 50 percent larger than in 1995. And yet our CO2 emissions are close to what they were in 1995.

Building Public Policies for an Age of Abundance

In America's energy industry, we believe this is just the beginning. We believe our nation can do more to bring energy to the world.

In this historic moment, as we transition from an era of scarcity to an era of abundance, it is important for us to learn from, and build on, our successes.

We must recognize the fundamental importance of investment, innovation, and trade in helping us achieve our nation's economic and environmental needs.

To do that, we must understand that industry, government, and society all have roles to play in pressing forward the frontiers of innovation.

Role of Industry in Innovation

For our industry, the first and foremost priority is always to operate in a safe, secure, and environmentally responsible manner.

We must uphold the highest standards of operational integrity – from planning and investment to construction and project completion. This builds trust in the private sector and in industry's ability to deploy new

technologies in new ways.

In communities across the nation, we have safely and successfully implemented our hydraulic fracturing, horizontal drilling, and other innovative technologies.

This has allowed the energy industry to create jobs and spur growth. It has also encouraged our industry to engage with the public at a very local level, communicating our wide array of risk-management techniques, how we work with state and local officials to ensure industry accountability, and how we minimize our environmental footprint.

In town halls and public forums, we describe how we work with local leaders to study the land and environmental impacts where we drill, how we design and build wells with safeguards in place to protect groundwater, and how we have rigorous standards in place to monitor and maintain wells even after the drilling is complete. And as we identify new questions from the public, we support the use of sound science to inform and construct reasonable regulatory frameworks.

Role of Government in Innovation

Government also has a role to play in innovation. That begins with understanding the role of the private sector.

Energy projects are the ultimate long-term investments. The spending patterns are long, even before the first dollar of revenue is realized. And the completion cycles are also long – sometimes to depletion it is more than 75 years, all along the way requiring reinvestment.

The International Energy Agency estimates that the global energy industry will need to invest about \$37 trillion in energy-supply infrastructure through the year 2035. That comes to about \$1.6 trillion a year.

Now just think about executing a \$1.6 trillion a year capital program.

Government is uniquely positioned to enable this long-term investment by establishing sound legal and tax policies.

Too often officials focus on the near-term ups and downs of commodity prices – cycles that are reflected at the pump. Or they focus on picking winners and losers through subsidies, mandates, or tax provisions. It is far more effective to put stable and unbiased policies in place, so business can make sustained investments over these very long time horizons.

In addition, the regulatory pathway should provide certainty, transparency, and promote understanding between government officials and business leaders.

Policymakers must understand how legal and policy uncertainty can negatively affect business. They must recognize and weigh the full impact of their oversight on industry, investment, and innovation – and consider the costs of their policies to the economy and consumers against the benefits that are delivered to society.

Public policies must be governed by sound science and economic assessments of costs and benefits. The regulatory process should provide a clear and efficient pathway to meet the public's expectations for safety, efficiency, and environmental protection.

The proposed Keystone XL pipeline is an object lesson in what can go wrong when decisions veer from this path. This is a project that requires sustained investment and carries the promise of significant benefits to our economy. Yet, despite following the process as set out by our government, the project's sponsors have yet to obtain the approval to proceed.

Since 2008, going on five years now, government and industry held more than 100 open houses and public meetings, and gathered thousands of pages of supplemental information in response to questions submitted by state and federal agencies.

Throughout the process, the State Department studied 14 different routes, issued a draft environmental impact statement, a supplemental draft environmental impact statement, and a final environmental impact statement that totaled more than 10,000 pages. After all of this work and public comment, the State Department's own findings indicated that the pipeline would pose no undue risks to people or the environment. Twice, they made this finding.

And yet, as you know, the decision was made to further delay the project – preventing the creation of more than 20,000 construction jobs and more than 118,000 other new jobs for local businesses that would be located along the route of the pipeline.

In all the rhetoric, it is easy to forget that Keystone enjoys support from both sides of the aisle, Democrats and Republicans, union workers and union leaders, business and industry, as well as the Canadian government.

The decision to delay construction was simply a matter of putting politics ahead of an already rigorous regulatory permitting process.

Most of the policymakers that I have talked to over the years understand that pipelines are the best way to transport oil and natural gas. And most policymakers are also aware that there are hundreds of thousands of miles of pipeline across North America that have an extraordinary record of being safe and sound.

Government can support innovation in another way – by providing access to resources and opening avenues of trade.

With increased access, disciplined investment, and the innovative application of technology, our industry can further expand supplies, create jobs, and fuel growth in North America.

In the United States, many prospective areas for oil and natural gas lie under federal lands – lands that are owned by the American people, you and me.

Yet, these lands have been kept off limits to drilling for decades, denying the American people the economic benefits of the development of these resources.

Meanwhile, technology has advanced. Across this time, calculators no longer cost hundreds of dollars each. Computers no longer fill entire rooms. Our industry's ability to drill wells in the arctic, offshore, or even multiple wells on a single well pad – all of that advancement seems to be ignored by our federal government.

Today, federal areas – on- and off-shore – remain off limits or severely restricted. But many of these resources could be safely and responsibly developed using technologies such as 3-D seismic imaging, advanced reservoir-computer models, and extended-reach and horizontal drilling. All

of these technologies allow us and our industry to “see” underground as never before, to plan how we will maximize the efficient recovery of resources, and minimize our environmental footprint.

One study by energy researcher Wood Mackenzie estimates that “forward-looking policies” that increase access and expand opportunities for oil and natural gas production would create more than a million additional jobs and generate hundreds of billions more in revenue at all levels of government – federal, state, local.

In this new era of abundance, the United States will require new thinking in another area. We are now in a position to meet our nation’s domestic energy needs but also to become an energy exporter.

Who would have thought this possible in a nation where rationing and gasoline lines are a not-too-distant memory for many and ever-rising levels of foreign imports were considered our energy destiny?

Economic studies and academic analyses indicate that by allowing exports, we can attract new investment that will expand our own domestic supplies, create jobs, and help with our U.S. balance of payments.

Of course, a few companies have come out to limit energy exports – in particular in the form of liquefied natural gas (LNG), which is super-cooled natural gas, allowing for efficient transport by ship. Some of these opponents of free trade are appealing to political leaders who still see the world in terms of rationing scarcity. But there are reasons for optimism. This debate has prompted a strong and broad coalition made up of hundreds of voices – from governors and trade associations, to economists and manufacturing companies, who have reaffirmed the value of free trade in

energy.

After all, energy itself responds to the same basic economics that govern other exports, from American wheat and beef to computers and automobiles. And as we have shown in North America, Canada, Mexico, and the United States all are stronger because of the energy bridges and trade that have increased our energy security and investment.

Role of Society in Innovation

In the decades ahead, citizens and consumers will also need to be involved in the effort to strengthen innovation.

Our public debates and discussions in society at large need to be framed by facts and science, fundamental physics and basic economics. We must build a renewed appreciation for the timelines required to advance technology, the scale of the challenges confronting us, and the important role of engineers and scientists in driving incremental improvements as well as inventing revolutionary breakthroughs.

One of our most important priorities in this effort must be to improve our nation's educational standards and achievement – especially in science, technology, engineering, and math.

Even as America's energy industry has led the world for the past few decades, there are reasons to be concerned about America's long-term competitiveness.

Three decades ago, the United States ranked third among developed nations for college students earning science and engineering degrees.

Today, about 20 other countries rank ahead of the United States in these vital subjects.

Science, technology, engineering and math are not just important to our nation they are also gateways to opportunity for millions of students.

That's why, in 2007, ExxonMobil led the founding of the National Math and Science Initiative – and it is why we continue to press forward that commitment today.

This initiative is built on the conviction that improving STEM education means supporting teacher training and challenging students with effective curricula. Our goal is simple: to find the programs that work with measurable outcomes and scale them up in schools and universities around the nation. We don't need to invent anything new. They are out there.

The first program we identified was UTeach, which originated at the University of Texas.

UTeach facilitates undergraduate students earning a degree in math or science to also earn a teaching certificate – by providing an integrated-degree plan, financial assistance, and early teaching experience.

Since its inception, more than nine out of 10 UTeach graduates have become teachers. Eight in 10 are still in the classroom five years later – that's compared with fewer than 65 percent of teachers nationally. And importantly, 45 percent of these teachers went to work in high-needs schools.

The second program is the Advanced Placement Training and Incentive

Program, pioneered and proven here in Dallas in DISD by Peter O'Donnell.

This program encourages schools to expand college-level AP courses in high school and encourages teacher training in AP courses. The National Center for Education Accountability has confirmed that when students take and pass an Advanced Placement (AP) course, they are significantly more likely to graduate from college.

The results are nothing short of striking. Over the past four years, participating schools have increased their qualifying AP test scores in math and science by 160 percent – five times the national average.

These two successful programs give us the confidence that we can increase the ranks of the next generation of innovators.

What we need to do – as citizens and as a society – is recognize the role of education in developing future scientists and engineers. And we must have the courage to identify and uphold education standards that boost achievement, even when there may be pressure to abandon them.

Conclusion

In the decades ahead, the world's energy needs will continue to grow – and this too should shape our approach to challenges of energy and innovation. With nearly 1.3 billion people on the planet still without electricity for basic needs like clean water, cooking, sanitation, light, and safe storage for food and medicine, we must realize the need to expand energy supplies has a humanitarian dimension that is often not part of our domestic discussion.

But as our industry has proven over the past three decades, we can meet the challenges of the future. With resource access and a positive climate for

investment, we can find new technologies, spread them to new parts of the world, and unlock new sources of energy – in increasingly safe, efficient, and responsible ways.

With government, industry, and society united, we can all contribute to a national culture of education and innovation – and we can ensure the extraordinary advances of the past are nothing more than building blocks to an even brighter future.

I thank you for your kind attention.

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