

Remarks by Mary Burce Warlick
“U.S. Leadership in Addressing Global Energy Challenges”
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Thank you, Dean Rozell, for your kind introduction, and Ambassador Kauzlarich and Dr. Paul Houser, Co-Directors of George Mason’s Center for Energy Science and Policy (CESP), for inviting me to speak with you today on the occasion of your Second Annual Symposium on Energy with its timely focus on the important nexus between energy and water.

Why Energy is Important

Access to reliable, diversified and affordable energy supplies is clearly fundamental for economic growth and development, political stability, peace and prosperity, and national security in every part of the world.

And we now live in a global economy with increasingly interconnected and interdependent energy markets. As a result, energy shortages, price volatility or market supply disruptions anywhere have the potential to threaten economic growth everywhere.

This includes the United States, where our prosperity and national security is directly affected when our allies and partners do not have reliable access to energy, when the high cost of energy impacts their economic growth, or when competition for energy resources leads to conflict and instability.

Barriers to foreign energy markets, poor governance of energy resources, and the exploitation of energy resources to fund terrorist or rogue regimes are also real-world challenges that can present significant challenges to U.S. economic and national security interests.

As a result, in the context of this globally interconnected energy landscape, the need for U.S. leadership and engagement on global energy issues is more important than ever.

Role of the Department of State on International Energy Issues

Now, while many U.S. government agencies have a role to play on energy issues, the Department of State for decades has had the lead on international energy diplomacy.

In fact, it was former Secretary Henry Kissinger who played a leading role, in the wake of the 1973 oil crisis, in calling for the 1974 establishment of the International Energy Agency, an organization of 13 major oil consuming OECD, to put in place oil stockholding and other marketing monitoring mechanisms to better respond to future disruptions in oil supplies.

And when the Department of Energy was created in 1977, its own enabling legislation specified that the Secretary of State would continue to exercise primary authority for the conduct of foreign policy relating to energy and nuclear nonproliferation.

For many years, the State Department's Bureau for Economic and Business Affairs led our diplomatic efforts in this area. However, as the need for more intensive U.S. engagement on global energy challenges evolved, a number of special envoy positions were created to deal with specific regional issues, including a Special Envoy for Caspian Basin Energy Diplomacy, a Special Envoy for Eurasian Energy Diplomacy, and a Coordinator for International Energy Affairs (created by Senator Lugar in 2007 in the Energy Diplomacy and Security Act).

Subsequently, in 2011, a Bureau of Energy Resources (ENR) was formally created, in recognition of the need to further intensify and staff up the Department's engagement on the full range of global energy challenges – including to manage the geopolitics of energy through energy diplomacy, work on the full array of energy transformation issues, and address the crucial issues of energy governance and access for over 1 billion people without electricity.

Since then, the Energy Bureau at State has been on the frontline of our diplomatic engagement on global energy issues, leading the Department's and the U.S. Government's efforts with the mandate of ensuring U.S. leadership in **managing the critical intersection between energy, U.S. foreign policy and national security**.

This encompasses working with leaders at the highest level of government, business, and civil society to achieve U.S. foreign policy objectives in shaping international energy policy, strengthening U.S. and global energy security and prosperity, and responding to energy challenges from around the world that affect U.S. economic policy and national security.

So how have we been exercising this vital leadership and how well are we doing in the context of the current Administration's priorities and the rapidly evolving global energy landscape?

U.S. and Global Energy Landscape and Transformation

Let me begin by setting the scene with some background on U.S. energy trends.

Changes in U.S. Oil and Gas Markets

To begin with, the oil and gas revolution in the United States over the past decade has been a transformational period in our history, thanks to a combination of technology, innovation, investment, and entrepreneurship which has dramatically changed the U.S. energy landscape in areas like shale oil and gas production, deep-water technology, and the future for LNG exports.

During this 10-year period, the United States nearly doubled its oil production and increased natural gas production by 40 percent. These developments, in turn, have had significant global impacts.

In January 2007, U.S. crude production averaged just 5 million barrels per day.

Ten years later, in 2017, U.S. crude oil production, had climbed to an average of 9.3 million b/d with 2018 production forecast to reach 10.7 million b/d, the highest annual average level in U.S. history, [and 2019 oil production expected to reach an average level of 11.4 million b/d].

By 2023, the International Energy Agency projects that the U.S. will be producing a record high of 12.1 million bpd, overtaking Russia (which currently produces about 11 million bpd) to become the largest global oil producer.

And, thanks in large part to abundant shale gas resources and technology breakthroughs that have driven large production increases, the United States is now the world's leading natural gas producer, having surpassed Russia in 2009.

U.S. natural gas production averaged just 52.8 billion cubic feet per day in 2007, but 10 years later, in 2017, had grown to 73.6 bcf/day and is forecast by the EIA to reach 81.1 bcf/d in 2018 and 92.8 bcf/d by 2019.

While most U.S. natural gas production is consumed domestically, given large production increases the United States has quickly become a major exporter of LNG, exporting more natural gas than it imported in 2017. By 2020 the U.S. is projected to become the world's third largest LNG exporter, surpassing Malaysia and remaining behind only Australia and Qatar.

Since the first historic shipment of U.S. LNG from Cheniere Energy's Sabine Pass Terminal in February 2016, over 225 LNG export cargoes have reached more than 25 countries. And in early March, Dominion Energy's Cove Point LNG export terminal in Maryland, a former LNG import terminal, shipped its first LNG cargo.

In 2017, U.S. LNG exports quadrupled from 2016 levels, with 53% shipped to three countries: Mexico (20%), South Korea (18%), and China (15%). Significant LNG exports have also gone to other growing markets in Central and South America, Asia, Europe, and the Middle East.

And with four more LNG export terminals under construction, and significant quantities of LNG authorized by the Department of Energy for export to non-FTA countries (as of June 1, 2017, 21.33 bcf/d), more LNG exports are on the horizon.

Developments in Renewables and Clean Energy

U.S. and global growth in the clean energy and renewables sector has also been remarkable.

Investment: In 2017, nearly \$57 billion was invested into clean energy in the United States, including \$40.5 billion in renewables (6% below 2016), a modest increase over 2016 (\$56.4 B), but nearly six times higher than investments of \$10.4 B in 2004.

Total global investment in this sector also achieved new records in 2017: \$333.5 B in clean energy (up 3% over 2016 but 7% short of 2015 investment record of \$360B), including \$279.8 billion in renewables (up 2%), with China (at \$126.6 billion), which experienced a solar boom in 2017, accounting for 45% of the global total in renewables. And since 2004, total global cumulative investment in renewable energy has reached an impressive \$2.9 trillion.

Generation: And these growing investments in renewables and clean energy are playing an increasingly important role in our power generation mix. U.S. investments in renewables, for example, have contributed 55% of total new generation build in the past ten years, with wind and solar contributing more than 60% of new utility scale generating capacity in 2016 alone.

And while natural gas continues to be the most-used fuel for electricity generation, the contribution of renewables is growing, providing about 18% of total U.S. electricity generation in 2017 (including hydro; 10% without), slightly below the global contribution of 24% (including hydro; 12% without).

Jobs: All of this investment is also driving significant job growth – many times more than in any other energy sector. Globally, the renewable energy sector employed 9.8 million people in 2016, with solar PV the largest employer (3.1 million) and growth mainly China, the United States and India.

In the U.S. in 2016, almost 800,000 workers were employed in low carbon emission generation technologies with solar and wind accounting for over half (476,000) of those jobs. In addition, 2.2 million Americans are employed in energy efficiency-related jobs; 259,000 work with alternative fuels vehicles; and more than 55,000 in creating modern power grids. In other words, a grand total of over 3.4 million jobs have been created in this rapidly growing industry.

U.S. International Energy Policy Priorities

Against this positive background of growth in the U.S. energy industry, let me say a few words about the current Administration's international energy policy priorities.

As you know, the Administration announced last year a number of domestically focused energy initiatives – including the America First Energy Plan, the call for promoting American energy independence and dominance, plans to revitalize the coal industry, dismantle the Clean Energy Plan, and open new offshore and public lands to oil and gas exploration and production.

Perhaps less well known, however, are its international energy policy priorities which focus on three core areas: 1) opening markets and removing barriers to energy development and trade; 2) promoting U.S. exports of energy resources, technologies and services; and 3) ensuring energy security for the United States and our Allies and Partners.

Energy Security: First, a longstanding priority for our diplomatic engagement has been in the area of ensuring energy security for the U.S. and our allies. In this connection, the State Department has consistently backed energy projects that encourage diversification of fuel types and technologies, supply sources, and delivery routes. It has invested both diplomatic capital and technical assistance in ensuring that countries achieve their own energy security goals.

- For example, the United States has been a staunch supporter of European energy security, which is critical for ensuring Europe's role as a forceful partner with the United States in meeting global challenges.
- In the Eastern Mediterranean, the successful exploration, production, and export of natural gas resources will increase regional cooperation and energy security in the Middle East and beyond and could serve as a catalyst for increased political stability in this strategically vital region.

- North Korea is one of the starkest security challenges that the United States faces and has become a top priority for the Administration. Here, too, energy has played a key role in our sanctions policy, where restrictions on coal and oil trade have helped to bring North Korea to the negotiating table.
- In other parts of Asia – from Singapore to Tokyo – our partners view U.S. LNG exports as an important way of diversifying their energy sources and ensuring access to a reliable source of supply as they strive to create a more integrated global gas market.
- In Nigeria, the United States has been working with the Government to support its anti-corruption agenda and encourage it to pursue reforms that will increase government revenue, address instability in the Niger Delta, and ensure that U.S. and other firms are paid for their investments. We are also providing advice on revisions to the Petroleum Investment Bill and on ways to stimulate investment in gas-fired power generation that will strengthen its energy security.
- And, in Central America and the Caribbean, the United States has been working to increase energy trade and the use of low-cost, reliable sources of energy, including renewables and natural gas, to spur economic development. Such development will contribute to regional stability, increase energy diversification, reduce dependency on Venezuela's oil financing program Petrocaribe, and create opportunities for U.S. energy exports and firms.

Energy Programs and Technical Assistance: The State Department's Energy Bureau has also been working with countries around the world to build the capacity and will to pursue energy sector reforms that will improve governance, transparency, accountability, access to energy and ultimately spur investment, economic growth, energy security and political stability. These programs have built capacity on technical, regulatory, legal and financial issues for hydrocarbons, mineral, and power sectors in over 30 countries.

- In Ukraine, the Bureau has worked extensively to strengthen energy security and stability and reduce its dependence on imported gas. It is also supporting Ukraine's efforts to reduce corruption and interference in the state-owned gas provider, Naftogaz, and its upstream subsidiary – which is Ukraine's largest gas producer and taxpayer. Advisors assist on corporate governance reforms to improve transparency and company operations and are building technical capacity to assess and develop its own resources.
- In Mexico, since the start of reforms in 2013, the Energy Bureau has been working to strengthen Mexico's oversight and regulation in conventional and unconventional hydrocarbon sectors, assisting on commercial agreements, fiscal modeling, and legal frameworks. Supporting the successful and responsible development of Mexico's hydrocarbon resources stands to benefit both Mexico and its neighbors.
- In Central America, work is being done to enhance regional electricity integration, which will strengthen energy reliability, lower prices, and improve the regional economy more broadly. A multi-year technical, regulatory, policy and legal engagement program with Central America's market regulator and system operator to develop the regional power market has led to a tripling of transactions, increased the

availability of emergency supplies during shortages, reduced spot market prices, and identified necessary infrastructure improvements.

- In sub-Saharan Africa, where 600 million people still lack electricity access, the Energy Bureau has been working with USAID's Power Africa on its initiative to support the development of more than 30,000 MW of new electricity generation by 2030 to address this critical economic and energy poverty challenge.
- And, in India, through the U.S.-Clean Energy Finance Task Force, the State Department has been working, with private sector experts to help India, one of the world's largest energy consumers, attract the necessary financing (over \$100 B) and implement competitive bidding guidelines to achieve its ambitious power sector investment goals (175 GW by 2022) and meet its rapidly growing energy demands.
- Important work is also being done by my former colleague, Dr. Griff Thompson, and his team to assist China, Israel, and countries in Southeast Asia find solutions to their goals in the areas of electricity, renewable energy and energy efficiency.
- And, U.S. officials continue to play an active role in advocating on behalf of U.S. energy companies in the hydrocarbon, renewable, and energy efficiency sectors. These efforts, historically, have helped U.S. firms win bids and secure billions of dollars in contracts around the world. And a high priority for this Administration includes significant engagement in promoting U.S. LNG exports to new and growing markets worldwide.

These are just some examples of the many ways in which the State Department is actively and strategically engaged in advancing U.S. global energy and foreign policy goals.

Where are We Falling Short?

I'd now like to turn briefly to another important subject that deserves our attention, particularly in the context of today's symposium, and that is the subject of U.S. investment in innovation and research and development (R&D).

I think we'd all agree that U.S. ingenuity and innovations in science and technology have played a critical role in unlocking solutions in so many areas and that new technology breakthroughs will continue to be critical in addressing the world's many energy challenges – including the multifaceted range of issues related to the energy-water nexus.

What's not so clear is whether the U.S. is as well positioned as it needs to be to continue to lead, not only in addressing today's energy challenges with the abundant natural resources that we have, but in providing the know-how for the energy solutions that will be necessary to meet the future 21st century energy demands of our growing and interdependent global economy.

This includes continuing to develop the clean energy solutions needed to meet the commitments many countries have made to transition to a lower carbon economy with lower carbon energy solutions that will allow them to achieve their climate goals.

Mission Innovation and Breakthrough Energy Coalition

One signature initiative announced by former President Obama and French President Hollande during the Paris Climate Summit in November 2015, and spearheaded by former Energy Secretary Moniz, was Mission Innovation, a multinational initiative to dramatically accelerate public and private global clean energy innovation.

Through this initiative, 20 countries – including some of the largest oil and gas producers – agreed to double their respective clean energy R&D investment over five years to accelerate the development of clean energy solutions, technologies and innovation. This resulted in more than \$35 billion in additional investment commitments over five years.

The U.S. commitment at the time was to double clean energy R&D funding from \$6.4 billion to \$12.8 billion over this period and in 2016 the Department of Energy established a Clean Energy Investment Center to help drive public-private partnerships in this area.

In parallel to Mission Innovation, a private sector initiative – led by Bill Gates – launched a coalition of nearly 30 leading private capital investors from ten countries called the Breakthrough Energy Coalition, to help bring new clean energy technologies to market.

And, in December 2016, this Coalition announced a commitment to invest more than \$1 billion in a fund called Breakthrough Energy Ventures to help finance new clean energy investments in Mission Innovation countries with an initial focus on five areas: grid energy storage, liquid fuels, micro/mini-grids for Africa and India, alternative building materials, and geothermal.

Mission Innovation has since expanded to 22 countries plus the European Union and has launched more than 20 new international partnerships in clean energy innovation.

And, the Breakthrough Energy Coalition has expanded to include 15 additional companies and is piloting public-private collaborations with five Mission Innovation members: Canada, the European Commission, France, Mexico, and the United Kingdom to help with policy and regulations and matching promising research with investors.

As for the United States, this Administration, while expressing strong support for innovation and strategic public funding for early-stage R&D, has not yet committed to long-term clean energy R&D funding.

Administration Funding for Innovation and Clean Energy R&D

In fact, in each of the past two years, the Department of Energy has proposed significant reductions in funding for Energy Efficiency and Renewable Energy programs in a wide range of areas, including advanced vehicle technologies. The Administration's FY 2019 budget proposed a 70% cut (\$1.6 B) in these programs (\$696 M vs \$2.322 B in FY 2018).

The FY 2019 DOE budget also calls for the elimination of DOE's Advanced Research Projects Administration-Energy (ARPA-E) – which supports the development and financing of

innovative new energy technologies -- and its Loan Program Office -- which plays a critical role in ensuring the innovative technologies developed at national labs achieve commercial success.

While these programs were fully funded by Congress in the FY 2018 Omnibus Appropriations Bill in March, the Administration's future commitment to these programs remains in doubt, despite widespread recognition of the valuable research being conducted at DOE's 17 National Laboratories -- including the National Renewable Energy Laboratory - to keep the United States at the forefront of innovation and technology.

Let me conclude with this statement by Senator Murkowski, chair of the Energy and Natural Resources Committee, at DOE's budget hearing on March 20: "We should [also] recognize that innovation is critical to our nation's energy future -- it creates jobs, it boosts growth, it adds to our security, and it increases our competitiveness. We need to focus on maintaining our global leadership in science, research, and development. Central to that mission are the hardworking scientists and engineers at our national laboratories and our universities."

And that's obviously where all of you come in and why institutions such as George Mason have such a vital role to play in ensuring that we continue to focus on finding solutions to complex energy challenges such as the energy-water nexus. These are not issues for tomorrow; they require the attention you are giving them today to drive innovations in technology, policy, regulation and the development of business models that will lead to real near-term solutions.

So, thank you for all that you are doing and, once again, for inviting me to join you today.

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