Testimony of Secretary Ernest Moniz
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Thank you, Chairman Murkowski, Ranking Member Cantwell, members of the Committee and the community of Bethel, Alaska. I am pleased to be here to discuss energy technology innovation and the opportunities and challenges for Alaska's energy future. This is my fifth visit to this great state, with the first being during the Clinton Administration at the invitation of then-Chairman Frank Murkowski, and most recently in 2014. It is a pleasure to be back.

Alaska is often referred to as the "Last Frontier", but in many ways it is actually the "First Frontier". You are the first Americans to witness the destructive impacts of climate change that will ultimately be felt around the globe – and, thus, you stand to greatly benefit from technologies to both mitigate and adapt to climate change. On my last visit, I joined you, Senator Murkowski, for a tour of the Cold Regions Research and Engineering Laboratory's (CRREL) Permafrost Tunnel Research Facility, run by the U.S. Army Corps of Engineers near Fairbanks. It was fascinating and, frankly, alarming. Global warming is marching the planet toward ever higher temperatures, and the Arctic region is the canary in the coal mine; warming twice as fast as the global average. The fundamental science of climate change is unchanged, and the threat remains the same. We are already seeing the devastating effects of the rise in temperatures on communities, ecosystems and infrastructure here in Alaska.

However, this rapid warming coupled with the high costs and limited access to energy, along with the ingenuity and resourcefulness of Alaskans, puts the state on the leading edge of distributed energy and energy efficiency technology development and deployment, providing a critical service as the rest of the world transitions to a more sustainable energy future. Alaska offers the rare opportunity to demonstrate the feasibility of technologies for regions and nations of the world that do not have central grids – this includes some regions of the U.S. and many of the under-developed countries. Innovation in this arena will not only help Alaska communities, but could provide new technology export opportunities and competitive market advantages for homegrown U.S. companies that develop these technologies.

As the Secretary of Energy, I have the honor of heading up an agency that is one of the world's leading supporters of scientific discovery and energy research and development. It is our mission at the Department of Energy to ensure America's security and prosperity by addressing energy, environmental, and nuclear security challenges through transformative science and

technology solutions. As such, our investments play a critical role in enhancing innovation, economic growth, and national security in the United States, and we are particularly proud of our role in providing Alaska with the innovative tools to help meet these objectives.

ALASKA ENERGY CHALLENGES

Rich in energy resources such as oil and natural gas, Alaska is well known for its long history of providing energy security to the United States and our allies. The United States Geological Survey (USGS) estimates that the Arctic holds 412 billion barrels of oil equivalent (BOE), 210 billion barrels in North America alone, and 60 percent of that is in Alaska.[1] The industries here, in partnership with state and federal agencies, continue to develop technologies and practices to mitigate the harsh environmental conditions and the unique environmental risks of Arctic exploration and production. Beyond oil and gas, Alaska also boasts extensive hydropower, wind, geothermal, and even solar resources.

Despite these abundant energy resources, given its vast size and rugged terrain, much of Alaska deals with the constant challenge of accessing clean, reliable, and affordable energy for heat and power. The harsh Alaskan climate, relatively small scale of energy demand and the vast distances between communities - in many cases only reached by air or boat - can make conventional forms of energy infrastructure uneconomic. For the many remote communities that have no access to an interconnected electric power grid, independent micro-grids powered by expensive diesel fuel are the norm.

Consumers in Alaska pay some of the highest energy prices in America.[2] For example, in July 2015, the unsubsidized cost of heating oil averaged $5.27 per gallon across the state, and up to $9 per gallon in some regions.[3] Likewise, in these remote regions of Alaska the average electricity cost is more than $0.50 per kWh, and as high as $1.50 per kWh in some locales. For comparison, the national average for the continental United States is $0.10 per kWh.[4]

Last week, in Washington, D.C. the National Academy of Sciences hosted a workshop on electricity use in rural and islanded communities, so the DOE could hear directly from people working to address these unique challenges. Alaska co-ops have learned to be very resourceful in providing services to their members.

At the workshop, DOE heard from Alaska electricity experts, including Meera Kohler, the President and CEO of the Alaska Village Electric Cooperative, which recently added Bethel as the largest of the 56 communities it serves. Henri Dale, the former manager of Golden Valley Electric Association described how they are using battery electric storage to reduce blackouts

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[1] U.S. Geological Survey, "Circum-Arctic Resource Appraisal: Estimates of Undiscovered Oil and Gas North of the Arctic Circle," USGS Fact Sheet 2008-3049 Washington, DC (2008), Table 1, page 4

[2] Energy Information Administration, "Alaska Price Differences from U.S. Average, Most Recent Monthly," Petroleum Marketing Monthly; Natural Gas Monthly; Electric Power Monthly, October 2015

[3] Alaska Department of Commerce, "Alaska Fuel Price Report: Current Commodity Conditions," July 2015 https://www.commerce.alaska.gov/web/Portals/4/pub/FuelPriceReport_July2015.pdf

[4] Alaska Energy Authority, "2014 Power Cost Equalization Program Report," March 2015 http://www.akenergyauthority.org/Content/Programs/PCE/Documents/FY14PCEStatisticalRptByComtAmended.pdf

and improve reliability of their system. Marc Mueller-Stoffels of the University of Alaska discussed the costs and benefits of diesel-powered generation in communities isolated from the larger electricity grid.

Speakers at the workshop described the challenges of providing electricity services and meeting regulatory requirements; discussed the need for broadband access to allow rural co-ops to access improved grid management technologies; and, asked for federal agencies to work cooperatively with Alaskans in the development and implementation of policies. A summary of the workshop will be released to the public, and will be referred to by the Quadrennial Energy Review Task Force as it produces the next QER report on electricity from generation to end-use.

The high costs and limited access to energy drives Alaskans to seek out innovative solutions that others may not. Low cost and reliable distributed generation and energy storage technologies that can be scaled to meet the needs of small, rural communities could be a game-changer here in Alaska.

These challenges are not left for Alaska to tackle alone. At the Department of Energy we consider ourselves to be the "solutions" agency, and we, along with other federal agencies, want to build upon the long experience here with unique and complex energy challenges, as well as the wealth of Alaskan ingenuity and resolve, to do the research, engineering and technical assistance needed for a sustainable, productive, and competitive state economy. Our comprehensive efforts over the past two years in both National Strategy for the Arctic Region and tribal energy program, are strong first steps in a long and enduring relationship DOE seeks with Alaska. For these reasons, I reestablished a physical office here in January 2014 and we've been running full speed ahead since then, listening to you, and applying your insights and needs into our programs.

DEPARTMENT OF ENERGY RESOURCES IN ALASKA

What follows are examples of recent, ongoing and planned activities that illustrate the range of the Department's work in the State of Alaska, but, I assure you, this does not represent all of DOE activities that are relevant to Alaska. With unique energy resources and needs, and seeing the present and looming dangers of climate change, the equities for Alaska span the Department's clean energy and basic research portfolio.

The Office of Indian Energy

Since 2002, the Office of Indian Energy's Tribal Energy Program and its predecessor, the Energy Efficiency and Renewable Energy Tribal Energy Program, have funded numerous tribal energy projects in Alaska - valued at over $30 million, with DOE investing over $11 million - through financial assistance for renewable energy and energy efficiency projects. These projects aim to address many of the high energy cost issues facing Alaska. DOE's work in Native Alaska is based on strong partnerships with local communities, their utilities, their governments, Native Corporations, non-profits, the state, and federal partners.

In the last three years, the Office has responded to sixty technical assistance requests from forty-seven Alaska Native communities and organizations. Last year, Indian Energy conducted

workshops across the State, providing education and information to nearly 150 people, and training 36 State and regional organization representatives as Alaska Energy Ambassadors. The Office also issued in 2015 the "***Tribal Energy System Vulnerabilities to Climate Change and Extreme Weather***" report — providing a resource to assist tribes and Alaska villages in identifying risks to their energy systems. This year, the Department will continue to expand its services to Alaska through the addition of several new full-time staff to Indian Energy's Alaska Program Office.

Today, I am announcing up to $7 million for the establishment of an Inter-tribal technical assistance energy providers network. This funding opportunity announcement seeks Inter-Tribal Organizations and Alaska Native Regional Corporations interested in training individuals to provide expertise and technical energy assistance to Indian tribes and Alaska Native villages in their region. To expand the technical assistance being provided by the Department and to support of the Obama Administration's commitment to strengthening partnerships with tribal nations, this initiative initially aims to capitalize on the unique relationship Alaska Native Regional Corporations and Inter-tribal Organizations have with their member Indian tribes and Alaska Native communities by providing support for the development of trained energy experts. Successful applicants will receive five weeks of intensive training through DOE, the National Labs and other entities. The outcome will be a national network of regional, tribal energy experts who can provide technical energy assistance and informational resources to their member Indian tribes and Alaska Native villages, and give tribal communities and Alaska Native villages the knowledge, skills, and resources needed to implement successful strategic energy solutions.

Today I am also announcing the release of new analysis that we hope will prove foundational to Alaskan communities' pursuit of reliable and sustainable energy solutions. Indian Energy is releasing ***Solar Prospecting in Remote Alaska: An Economic Analysis of Solar Photovoltaics in the Last Frontier State*** prepared by the National Renewable Energy Laboratory (NREL). The ***Solar Prospecting*** report demonstrates the potential competitiveness of installing and operating moderately sized solar PV systems to reduce high fuel costs and make remote energy systems more resilient and effective for Alaska native villages.

Indian Energy's Alaska Strategic Technical Assistance Response Team (START) Program aims to help selected Alaska Native villages reduce the cost of energy and displace diesel oil by increasing community capacity, evaluating specific projects to prepare for funding opportunities, identifying additional funding opportunities, and providing continued assistance through the grant application and financing process. Since its inception in 2012, the Program has assisted 16 communities with long-term technical assistance and provided $1.25 million to five of those Alaska Native villages to retrofit community buildings and install small renewable systems, resulting in immediate impacts to those communities.

The Remote Alaska Communities Energy Efficiency (RACEE) Competition

In response to energy needs in Arctic communities, the President announced the Remote Alaska Communities Energy Efficiency Competition (the Competition) in September 2015. Today, more than 50 remote Alaskan communities have pledged to reduce their per capita energy use by 15

percent by 2020 as part of the Competition. These Community Efficiency Champions will have access to a peer network, and will be eligible to compete for technical assistance. The Department anticipates announcing up to 20 recipients of the targeted technical assistance at the end of April 2016. Technical assistance provided through the Competition will deliver tailored education and training to participating communities to develop viable energy efficiency project plans that may include, but are not limited to, energy use data collection, building audits, business plan development, financial feasibility assessments, engineering studies, and available funding and financing tools for implementing economic efficiency measures. These Community Efficiency Champions will then be eligible to compete for a total of up to $3.3 million awarded to up to five communities to implement the energy efficiency plans developed throughout the RACEE Competition.

EERE - Energy Transition Initiative

DOE is proposing for FY 2017 to deepen coordination across DOE and with the Department of Interior to reduce or eliminate the total dependence on imported fuels that many Alaskan communities have recognized as a threat to their sustainability. Activities would provide resources to help Alaskan communities bridge the gap between DOE-funded technology deployment, like the RivGen Power System turbine in the Kvichak River, and strategic planning efforts funded by other federal programs. Based on prior DOE investments, the EERE Strategic Programs Office has developed a replicable planning and deployment model called the "Energy Transition Initiative" that will be adapted with FY 17 funds to enable Alaskan communities to set and achieve their own sustainable energy goals. This model, and related decision support resources, can help communities evaluate the costs and benefits of different advanced energy portfolios, complementing on-going efforts to deploy small-scale, hybridized conventional fuel-renewable generation platforms in islanded grids.

EERE - State Energy Program (SEP)

Alaska received more than $881,000 in Formula Funds in 2013-2015 to support energy efficiency activities, including improvements in multi-family housing units and planning for rural communities with high energy costs. This is on top of the funding from the Recovery Act, in which Alaska received $28 million in State Energy Program funds to increase the energy efficiency of public facilities, commercial operations and low-income homes. The Alaska Energy Authority (AEA) received $300,000 in State Energy Program Competitive Funds in FY 2015. Under the award, the AEA and the Alaska Housing Finance Corporation will partner with the Alaska Native Tribal Health Consortium to establish a program to kick-start small project energy efficiency development in public facilities located in underserved rural communities.

The SEP award leverages Alaska's existing financing efforts for public buildings, some of which were developed under the American Recovery and Reinvestment Act. The state estimates that the award will result in an aggregate annual savings of 17 billion British thermal units (Btu), and $500,000 in annual energy-cost savings.

EERE - Geothermal Technologies

Given Alaska's tremendous geothermal potential, the DOE Geothermal Technologies program has invested over $16 million across 13 projects since 2005 for geothermal research and development in this state. Of this, the Department has awarded $1.7 million in funding to Chena Hot Springs Resort to make it the first geothermal power plant to come online in Alaska. In 2014, I had the opportunity to visit Chena and observe firsthand the advances made by this project. The power plant demonstrated the compelling economics of this technology, reducing the cost of electricity from about 30 cents to less than six cents per kWH, a more than an 80 percent savings. In 2007, only a year after installation, it received an R&D 100 Award as one of the most innovative new projects of the year.

Other projects include one led by the University of Alaska-Fairbanks, which received $4.3 million in funding to evaluate the geothermal potential of Pilgrim Hot Springs, 60 miles north of Nome, AK. DOE is also supporting the Akutan Geothermal Development Project with $951,000, with non-federal partners including the Alaska Energy Authority contributing $1.57 million. The goal is to allow the city of Akutan to replace the five million gallons of diesel used annually to generate electricity for the city and its seafood processing plant, the largest in North America.

EERE - Water Power

In July 2015, the Ocean Renewable Power Company deployed its RivGen turbine in the Kvichak River and provided power to Igiugig, a remote village in southwestern Alaska. The companies advanced control systems are being developed in collaboration with the University of Washington, Maine Technology Institute, and NREL with support from the DOE Water Power Program. In addition, the Igiugig Village Council is one of six organizations to receive funding under EERE's FY 2015 Durability and Survivability funding opportunity announcement. The Council will work with Ocean Renewable Power Company as a follow-on to the 2015 RivGen deployment project to develop a river turbine system that will demonstrate installation, operation, and maintenance (IO&M) design improvements to simplify maintenance and make system components more durable during operations.
Developing local renewable energy resources like power from marine and hydrokinetic (MHK) systems is critical to achieving sustainability in these villages. The project can demonstrate that commercially viable power systems that will reduce environmental impacts of electricity generation remote river communities. Since being deployed in July, the Alaska Department of Fish and Game has estimated that over 1.5 million adult sockeye salmon have migrated past the turbine area.

EERE - Weatherization Assistance Program (WAP)

Through the Weatherization Assistant Program, Alaska will receive more than $1.6 million in Formula Funds in fiscal year 2016 to support the weatherization of 150 homes. WAP's mission is to increase the energy efficiency of dwellings owned or occupied by low-income persons, reduce their total residential energy expenditures, and improve their health and safety.

Office of Fossil Energy – LNG Export

Natural gas is an important energy resource in Alaska, and the export of LNG from Alaska is a very different proposition than that of the lower 48. Alaskan natural gas is disconnected (or "stranded") from lower 48 markets, and as such DOE considers LNG export applications from Alaska differently than others. In fact, just last week, the Department renewed the FTA and non-FTA authorizations for the Kenai facility, which has exported LNG for decades. Prior to this, in May 2015, DOE issued a conditional authorization for the Alaska LNG Project to export LNG. The conditional approval is subject to environmental review and final regulatory approval, but, as we heard from the Chairman and others here in Alaska when our Deputy Secretary made the announcement in Anchorage, this conditional approval was an important step for the project.

Office of Electricity Delivery and Energy Reliability – Microgrid and Storage

In FY 2015, two *Microgrid Project* awards of $750,000 each were made to DOE national laboratories for the development of a Design Support Tool for Remote Off-grid Microgrids (ROMDST). This is being used to develop the Distributed Energy Resources Customer Adoption Model (DER-CAM) into a support tool for remote, resilient and reliable microgrids, and is being done in partnership between the Alaska Center for Energy and Power, Lawrence Berkeley National Lab, Los Alamos National Laboratory, Brookhaven National Laboratory, Argonne National Laboratory, General Electric, and Burns Engineering.

In addition, in FY 2016, the Office is conducting a technical and economic feasibility study for a load-leveling energy storage system, in partnership with the City of Cordova, Alaska, and the Alaska Center for Energy and Power.

Also in Fy2016, we have just initiated a $1 million effort with our national laboratories and the State to examine developing islanded power systems for rural Alaska. The plan is to develop a standard design for resilient microgrids using at least 50% less diesel fuel and demonstrate at three Alaskan communities. Partners include NREL, LBNL, PNNL and SNL on DOE laboratory side and the Alaska Center for Energy and Power(ACEP), Renewable Energy Alaska Project(REAP), Intelligent Energy Systems, University of Alaska Anchorage Institute for Social and Economic Research(ISER) and the Alaska Energy Authority. At DOE our Offices include Indian Energy, Alaska; Electricity Delivery and Energy Reliability; and Energy Efficiency and Renewable Energy.

The Office of Science - Basic Research and Climate

The Department's Office of Science — known as the basic research arm of DOE — has a longstanding presence in Alaska, supporting Arctic research to understand the complex set of scientific issues responsible for Arctic climate change and relevant to Alaska's arctic ecosystems.

The Office of Science is supporting multi-lab/university research to develop high resolution models and general understanding of sea ice, ice sheets, atmospheric pollutants and physics, ocean biogeochemistry, ocean turbulence and circulation, and the role that methane hydrates play in the carbon cycle. The goal is to make more accurate predictions about the impacts of climate

change, including inter-annual variabilities and extremes on Arctic ecosystems, with a special focus on Alaska.

In addition to climate modeling, the Department supports a multi-platform, multi-site system of Atmospheric Radiation Measurement observatories around the globe, with one permanent observatory in Barrow, and a second mobile facility observatory on long term deployment to Oliktok, AK. Collectively, these activities address two major areas of uncertainty in climate change model projections: the role of clouds and the effects of aerosols on precipitation, and the atmospheric radiation balance. The unique qualities of Arctic atmospheric processes require dedicated Arctic observations and research activities.

MISSION INNOVATION

The energy landscape for the U.S. has changed dramatically in recent years, and largely for the better as domestic energy production has increased and significant progress has been made in cost reduction and deployment of many clean energy technologies. Nonetheless, the pace of innovation and the scale of transformation is simply not enough. A rapid acceleration of clean energy technology breakthroughs is essential if we are to provide affordable and reliable clean energy to consumers, ensure our long-term energy security, and enhance the competitiveness of American companies in the global marketplace. This cannot be realized without involvement of the private sector at the early stages of the innovation cycle.

In November, President Obama and other world leaders came together to launch **Mission Innovation**, a landmark commitment to dramatically accelerate public and private global clean energy innovation. Through this initiative, 20 countries representing at least 80 percent of global clean energy research and development (R&D) budgets have agreed to double their governments' R&D investments in this domain over five years. These additional resources will dramatically accelerate the availability of the advanced technologies that will define a future global energy mix that is clean, affordable, reliable, and accessible. Each country in Mission Innovation is tailoring its commitment to its own clean energy needs, resources, infrastructures, security needs and innovation ecosystems.

Mission Innovation is complemented by a separate private sector-led effort called the Breakthrough Energy Coalition, spearheaded by Bill Gates. The Breakthrough Energy Coalition is a group of 28 influential investors from 10 countries that has committed to invest patient capital in early-stage technology development coming out of Mission Innovation countries that has the best chance of providing reliable, affordable energy for everyone to help build energy solutions at scale. Mission Innovation and the Breakthrough Energy Coalition constitute powerful complementary efforts to expand research and development for cutting-edge clean energy technologies.

As part of Mission Innovation the U.S. Government will seek to double federal investment in clean energy research and development from $6.4 billion in FY 2016 to $12.8 billion in FY 2021. This amounts to a roughly 15 percent annual increase for an investment portfolio that spans the full range of research and development activities — from use-inspired basic research to demonstration.

Last week, in the FY 2017 President's Budget, the Administration took a significant first step toward meeting the Mission Innovation pledge by proposing $7.7 billion for clean energy R&D. These investments span across 12 Federal agencies – including DOE, NSF, NASA, USDA, HUD and USAID[5] - with roughly 76 percent of that supporting DOE research, development, and demonstration activities across the spectrum of clean energy technologies. A broad focus that includes low- and no-carbon technologies including renewables, nuclear, CCS for coal, gas and industrial applications, energy efficiency, demand and the range of end use options, is essential for success and will create commercial opportunities in the US and around the world. DOE highlights for Mission Innovation include significant new investments in:

- Basic clean energy research on energy production, conversion, storage, and use;
- New R&D initiatives to accelerate the rate of invention of sustainable transportation, renewable power, and energy efficiency technologies, including expanded partnerships with the National Laboratories;
- Electric grid modernization, resiliency, and integration of clean energy into the grid;
- Advanced clean energy manufacturing R&D projects and facilities, including two new National Network for Manufacturing Innovation Institutes;
- Programs that expand the use and reduce the costs of clean renewable power from solar, wind, water, and geothermal energy, including support for the SunShot Initiative mission to make solar energy fully cost-competitive with traditional energy sources before the end of this decade;
- Programs and infrastructure that support the advancement of nuclear energy technologies, including R&D in advanced nuclear reactor technologies, life extension for existing power plants, and advanced nuclear fuels; and
- Research focused predominantly on development and deployment of carbon capture and storage technologies as well as other approaches to improve the emissions performance of energy generated from fossil fuels.

Another DOE program that sees a significant increase in support in Mission Innovation is the ***Advanced Research Projects Agency – Energy (ARPA-E).*** Since 2009, ARPA-E has established a remarkable track record advancing transformational technologies towards commercialization. At least 34 of its projects have received follow-on funding and 30 new companies have formed. The FY 2017 Budget Request includes $350 million in Mission Innovation discretionary funding for DOE's ARPA-E, which supports transformational applied clean energy R&D across a wide array of technologies. Beyond these discretionary funds the Budget Request also includes $150 million in mandatory funding for ARPA-E in 2017 as part of the ARPA-E Trust proposal, which seeks to grow to $1.85 billion over five years in mandatory funding for the program.

[5] *National Science Foundation (NSF); National Aeronautics and Space Administration (NASA); Department of Agriculture (USDA); Department of Housing and Urban Development (HUD); U.S. Agency for International Development (USAID).*

All of the 20 country participants in Mission Innovation, as well as Bill Gates and his colleagues in the Breakthrough Energy Coalition, share a common goal of scaling breakthrough technologies and dramatically reducing their costs enough to mitigate the impacts of climate change, support economic development, strengthen energy security, and, ultimately, increase access to clean, reliable and affordable energy.

Some of our Mission Innovation partners, such as Canada and Norway, share very similar climactic conditions with Alaska. It is my hope that through this initiative we can solidify international cooperation to leverage the expertise and technical resources of partners in researching solutions that address the critical needs of these areas

REGIONAL ENERGY INNOVATION PARTNERSHIPS

Accelerating clean energy development requires us to be innovative not only in the technology solutions we pursue, but also in how we do business. The Administration's FY 2017 budget proposes $110 million to establish a new ***Regional Energy Innovation Partnerships*** that represents a new pathway for innovators to leverage the expertise and resources of the Department for the unique clean energy R&D challenges of individual regions.

These partnerships will draw upon the strengths of each region's innovation ecosystem, linking the needs of industry and energy decision-makers with the unique R&D capabilities at nearby universities and laboratories. They can serve as forums for end-to-end coordination across the scope of clean energy innovation from fundamental research to demonstration and technology validation. A regionally-focused, technology-neutral approach to innovation can also attract clean energy stakeholders and RD&D performers not typically engaged through other government-funded research programs.

I intend to designate up to 10 innovation regions based on a range of analytically-derived factors such as energy resources and uses, markets, infrastructure, building stock, geopolitical boundaries, industry base and economic characteristics, and the regional presence of major innovation activities such as research universities and DOE national labs and other available innovation infrastructure. Public private R&D partnerships play an essential role in technology adoption.

CLIMATE AND ARCTIC

As noted, Alaska stands on the front lines of global climate change, with Arctic temperatures climbing twice as fast as the world average. Last month saw the Arctic sea ice extent at its lowest January level in the satellite record, continuing a pronounced downward trend, while much of Alaska is seeing record low snowfall and warmer-than-average temperatures this winter.

Warming oceans, coastal storms, erosion, melting glaciers and thawing permafrost can have profound effects on the health of Alaska's ecosystems and Native Alaskan communities. The Government Accountability Office reports that federal, state and village officials have identified over 30 villages that face imminent threats. Many villages will need to be relocated to higher

ground to avoid falling into the sea or flooding. DOE's modelling of the complex dynamics at play in the Arctic is critical to predicting what the future climate holds not only for Alaskans, but the entire world.

Climate change also undermines the safety and stability of energy-related infrastructure in Alaska, increasing costs and complicating investment and long-term planning in already-challenging circumstances. As the first Quadrennial Energy Review highlighted, thawing permafrost can have very serious consequences for energy infrastructure such as the Trans-Alaska Pipeline System, transmission lines and fuel storage facilities, and it could increase the cost of maintaining and operating public infrastructure —such as roads, harbor and airports —- by up to 20 percent. The drilling season on the tundra has decreased by 50 percent since the 1970s, due in large part to permafrost thaw and its effects on transportation systems and infrastructure.

At the same time, reduction in summer sea ice extent and thickness expands the time window for offshore hydrocarbon exploration and production, and, potentially opens up new shipping routes through the Arctic. Though the risks of transiting the region will remain prohibitively high for most shippers in the near-term, opening a commercial lane through the Northwest Passage would dramatically reduce the time, distance and costs of shipping between Asia and Europe. It is expected that the coming years will see heightened international competition for Arctic resources, and it is imperative to cooperate in developing rules of the road now to ensure a sustainable and peaceful path forward in the region.

ARCTIC ACTIONS BY THE ADMINISTRATION

In 2013, the President issued the National Strategy for the Arctic Region. The strategy was followed by an Implementation Plan issued in January of 2014 which is updated on a yearly basis in an effort to keep pace with the changing Arctic environment. In January of 2015, the President released an Executive Order entitled "Enhancing Coordination of National Efforts in the Arctic" which among other things established a Deputies-level governing body known as the Arctic Executive Steering Committee (AESC). This Deputies-level governance body enhances coordination of Federal Arctic policies across agencies and offices and, where applicable, with State, local, academic, private, nonprofit, and Alaska Native tribal governments and similar Alaska Native organizations.

The AESC has established a set of working groups to focus on key issues, one of which is the Energy Working Group, the mission of which is to enhance coordination of Federal efforts, coordination of Federal investment with non-federal partners, and collaboration with international partners, with the aim of improving remote energy access, increasing clean energy deployment, and reducing energy costs in Alaska.

The United States assumed the chairmanship of the Arctic Council from Canada in April 2015, affording us a unique opportunity to advance the administration's broad Arctic strategy. In September of last year, the Arctic Executive Steering Committee hosted the GLACIER conference in Anchorage, focused on global leadership in the Arctic. Seven foreign ministers as well as delegations from 12 other countries and the European Union participated. Coincident

with GLACIER, President Obama made his historic visit to Alaska, including the first-ever visit by a sitting President above the Arctic circle in Alaska. Moving into 2016, the AESC will be advancing international collaborations focused on science: to include observations and research, impact and resilience, and science-based decision-making.

CONCLUSION

With its people, its natural resources, its environment, and its location, Alaska occupies a unique position at the crossroads of energy production, energy use and climate change. The trends we see in Alaska ultimately affects us all, for better and for worse. You no longer have a front row seat to global warming – you are in it – and we at DOE are committed to providing innovative tools and unparalleled scientific capabilities to predict, combat and adapt to this changing world. The technologies and practices proven under the difficult conditions of this region will ultimately benefit not just Alaska, but also the broader U.S. economy. Our resources and challenges may be regionally-defined, but we fit into a global market and if we don't compete and support our best and brightest and advance homegrown technologies, we will watch China and others take the lead and reap the economic rewards. Because of this, Alaska is an important focus for a range of programs at the Department of Energy. Our work here is based on strong partnerships with local communities, utilities, businesses, governments, Native Corporations, educational institutions, non-profits, the State, and our federal partners, and I look forward to working with the Committee and the people of Alaska to see these activities to fruition.

Thank you.