

EFFICIENT APPROACHES TO REDUCING INDUSTRIAL ENERGY COSTS

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EFFICIENT APPROACHES TO REDUCING INDUSTRIAL ENERGY COSTS

FRIDAY, OCTOBER 6, 2017

U.S. SENATE,
COMMITTEE ON ENERGY AND NATURAL RESOURCES,
Searsmont, ME.

The Committee met, pursuant to notice, at 11:00 a.m. at the Robbins Lumber Mill, Searsmont, Maine, Hon. Angus S. King, Jr., presiding.

OPENING STATEMENT OF HON. ANGUS S. KING, JR., U.S. SENATOR FROM MAINE

Senator KING. This hearing of the United States Senate Committee on Energy and Natural Resources is now in order.

I will make a brief opening statement and then we will have statements from our witnesses, and I will ask a series of questions.

I want to begin by apologizing because, as I arrived today, Jimmy said, "Where are the rest of the Senators?" You've only got me. However, this is an official hearing of the Committee, authorized by the Chair, Lisa Murkowski of Alaska.

In a sense, this is a reciprocal hearing. I went to a hearing with her in Alaska about two years ago on very similar kinds of issues, and we were hoping we could get her up here, but this is the beginning of a week-long Congressional recess so everybody is scattered around the country.

I could imitate Lisa Murkowski and Bernie Sanders and Al Franken, but I certainly couldn't do Al Franken justice.

[Laughter.]

In a sense, where we are today and what we are talking about, for me, began with a cold automobile ride a year and a half ago. I was at Jackson Lab in Bar Harbor. In fact, Jackson Lab is a combined heat and light project, a major one, that uses a lot of wood products from Maine. That day, the head of the Federal Economic Development Administration was there. It became apparent as we were talking about this that he did not have a ride to Portland. Thinking quickly, I said, let's see, two hours, two and a half hours in the car with the head of the Economic Development Administration of the Federal Government? I'll take it.

We rode together down toward Portland, and I made the case to him at that time that we had lost five paper mills in four years and that what Maine had really experienced was equivalent to a hurricane. It was a slow motion, economic hurricane that devastated one of the most important industries, probably the single most important industry, in our state and that we should treat it that way.

We should treat it as something that required resources, coordination, and good thinking, and he agreed. I mean, what choice did he have? He was stuck in the car with me for three hours.

[Laughter.]

And out of that grew a project that Senator Collins, Bruce Poliquin, and I initiated with 13 federal agencies to try to come together, come to Maine, and see how we could work together to rebuild the forest products industry.

Of course, there is no single solution, and it is not all the Federal Government. It is not all state government or local government. It is mostly private sector. But what could we do to offer some support for what was going on? I think it is important to put into perspective two things about the loss of our paper mills.

Number one, it is not all over. We have paper mills in the state that are doing very well, that are growing, that are investing. We have a representative from Sappi here today, for example, that is making a major investment in their mills in Skowhegan and Hinckley. And we know that there are new paper machines at Woodland, out in Washington County. So the paper mill, the paper industry, is still a critically important part of Maine and the Maine economy.

The second thing is in terms of the scope of the loss. As we saw these mills being lost over the short period of time, I wondered, is this just Maine? So I did some research, and it turns out that during the same period, 125 paper mills closed in the United States. What we are talking about is a national phenomenon. I mean, we often think that it must be our fault or that what is happening here is not happening other places.

Of course, it is related to things like the decline in the use of paper. One of the main products made in our mills in Maine was coated paper. That was made in Bucksport and Madison. If you have gone to the magazine stand lately and seen how thin magazines are, the demand for coated paper has dropped 30 to 50 percent. When demand for your product drops 30 to 50 percent, there are going to be losses. So this is a nationwide, indeed, a worldwide phenomenon.

But the important thing for us is that we lost \$1 billion worth of economic activity in Maine. Forest products are still the most significant part. It is about \$8 billion a year in terms of our state economy, which is roughly about 17 percent. But the losses were, nonetheless, real.

One of the problems with the way the losses occurred is that the headlines are about mill jobs and losses of jobs in Madison or in Bucksport or in Old Town. Those are very real, direct, and of deep concern to everyone. But what you don't read about are the losses of jobs in the woods and in the trucks, and the people who harvest the wood and who carry the wood around. There is a whole ancillary industry, and many of you in this room are part of the total economy of wood products in Maine.

One of the results of this, and I suspect Alden might address this and I know Dana will, is the loss of the market for low-grade wood. The market has just dried up. Millions of tons of low-grade wood had a home before in pulp, but then the decline, at the same time,

of the biomass industry created a huge problem for the forest products industry.

Number one, there wasn't a market for the low-grade waste wood in the forest, and there wasn't a market for the residuals from sawmills, which had been a valuable side product for sawmills. Suddenly it became a liability if you had to landfill it or pay someone to take it away. So what we are here to talk about today is a creative, important initiative that really hits a lot of these issues.

By the way, did I mention energy? Because what we are talking about here is a project that will make electricity but will use low-grade and waste wood. It will provide steam for the kilns. It will provide steam for, we hope, an adjacent manufacturer or an adjacent user on the same property. It will provide ash that can be used in aggregate for roads or for land treatment, another valuable product. In other words, as I said on the radio this morning, we are going to use everything from the pig but the squeal.

[Laughter.]

We are getting the maximum value out of the use of this resource which, in turn, creates jobs throughout the Maine economy, particularly the economy that was hardest hit by the loss of those paper mills.

And that, really, is what we are talking about today. We are talking about efficiency because typically a power plant runs at 30 to 40 percent efficiency, but if you use the side products in other ways, then you are increasing the efficiency of the plant significantly. And we will hear testimony about that today.

So I consider this an exciting opportunity for Maine and the country. It is one of the reasons that Chairman Murkowski authorized me to hold this hearing. There is a record being kept that will go to Washington and will go to the Committee.

I want to especially recognize Ben Reinke. Ben, where are you? Oh, Ben. He's sitting in the typical staff seat.

[Laughter.]

Ben is Senator Murkowski's staff person on the Energy and Natural Resources Committee, and I am delighted that he is here and that he helped us to facilitate this hearing, along with Morgan Cashwell, Jake Springer, and Adam Lachman from my office.

With that as background, I want to welcome our witnesses. I think we are talking about the future here. We are talking about future opportunities for this tremendous resource that we have in Maine and how we can use it most efficiently, most effectively, to maintain and create value here in Maine.

Twenty-two years ago, when I first ran for office in Maine, I said that no fish should leave Maine with its head on. Most people in Maine got that, that I was talking about value added here in Maine. The Wall Street Journal, on the other hand, said it was the most bizarre political promise in the history of American politics.

[Laughter.]

But you know what I meant. What we are talking about today is making use of the resources that we have in the state, extracting value and jobs from it, and supporting the economy and the people of our state.

With that, I will turn to our witnesses now.

I want to have, let's see, introductions. Well, I will do them mostly off the top of my head.

Dr. Mark Johnson, I am really happy to have you here. Mark is with the Oak Ridge National Laboratory in Tennessee. A lot of people don't realize that we have these gems of national laboratories. Oak Ridge in Tennessee; Los Alamos in Sandia, New Mexico; Lawrence Livermore in California; and Idaho National Lab in Idaho. They are the think tanks of the Federal Government in terms of science.

Oak Ridge happens to specialize in additive manufacturing, 3D printing, and one of the outcomes of this project that I mentioned involving the federal agencies was to bring Mark up and have him develop an agreement, an understanding, a relationship between Oak Ridge and the Composites Center at the University of Maine. I am going to let him describe that and describe the work that they are doing. This is another opportunity for high level utilization of the forest resources that we have here in Maine.

So, Mark, welcome to Maine.

STATEMENT OF DR. MARK JOHNSON, DIRECTOR, ADVANCED MANUFACTURING OFFICE, OFFICE OF ENERGY EFFICIENCY AND RENEWABLE ENERGY, U.S. DEPARTMENT OF ENERGY

Dr. JOHNSON. Thank you.

Thank you very much, Senator King. And they said to hold the microphone to my side like this.

Oh, I get a different microphone, okay, good. Thank you, I appreciate it.

Thank you, Senator King, and thank you for the opportunity to join you here today to speak about the important role of new energy-related advanced manufacturing technologies and combined heat and power, in particular play in the economy.

I do do a lot of work with Oak Ridge National Laboratories and through my office, I actually direct the Advanced Manufacturing Office. I think it's interesting you thought that I do work at Oak Ridge because I'm out at the national labs more than I'm in D.C. it seems like as well, which is a good thing.

I direct the Advanced Manufacturing Office in the Department of Energy's Office of Energy Efficiency and Renewable Energy. I oversee a program with the specific mission to work with the U.S. economy, to make it more competitive through the support of research and development of new technologies related to energy and manufacturing. To accomplish this work, we partner with universities, national laboratories, companies, both for-profit and non-profits, state and local governments, and other stakeholders all across the nation.

Before I get going here, I actually want to make a quick mention. People, this is a national day today. It's National Manufacturing Day. It's an opportunity we recognize the important role manufacturing plays in both the history and future of our country. Highlighting the importance of manufacturing in our nation we can go back to a quote from Treasury Secretary Alexander Hamilton who delivered a report to Congress on manufacturing 226 years ago when he said, "It's not only the wealth, but the independence and security of a country that appear to be materially connected with

the prosperity of manufacturing.” So today on Manufacturing Day over 2,000 firms, small and large, across the country open their doors to the public in a celebration of modern manufacturing meant to inspire next generation, including events right down the road here in Maine, for instance, in Belfast, where Front Street Shipyard is hosting tours of its manufacturing facilities right now.

There’s two issues I hope to cover today. First is the importance of technology innovation in the areas related to energy and manufacturing. Second is how specific new technologies, working with combined heat and power and microgrids can impact manufacturing, particularly in energy and resource intensive manufacturing processes, like wood products, which represents an opportunity for economic growth in communities across the nation overall and here in Maine, specifically. Maine has a proud history of manufacturing. Maine’s manufacturing sector is reported to have generated \$5.3 billion of output in 2015 and supports 51,000 jobs.

The Department of Energy is partnering with manufacturers to ensure, through continued technological innovation, manufacturers in Maine and across the country stay competitive in a dynamic, modern economy.

So, as you mentioned, this past January, I joined Senator King in Orono, to announce the launch of an innovation partnership between our Oak Ridge National Laboratories in Tennessee and the University of Maine. That meeting was the first step in a long-term effort to explore new uses for forest products using all the way from the, everything but the whistle, hopefully.

For instance, using 3D printing, using composite materials for tooling and structures used in things like aviation, boat manufacturing and construction with a focus on forest-based, biological feedstocks. By combining the expertise in Oak Ridge with additive manufacturing or 3D printing with the University of Maine’s expertise in bio-based materials technology, new applications for Maine’s forest products are being investigated, researched and developed.

To give you an idea of the progress on that program we announced, the university lab led team is already making headway. A research project that they started has identified a range of thermal plastic materials, resin materials, that use a different amount of wood content, both micro and nano-cellulose content, in developing these materials. These composite materials are undergoing mechanical testing at the University of Maine and thermal and print testing at Oak Ridge right now. And in fact, a team from Oak Ridge is going to be up the week after next and do their quarterly review together. So I’m really excited that that’s moving forward.

The new technology enabled transformation in manufacturing by the private sector is also on display right here at Robbins Lumber in Searsmont. For example, there’s a state-of-the-art, eight and a half megawatt combined heat and power system, or CHP for short, that’s being built just across the way that we just had a tour of. Combined heat and power systems represent an important opportunity for manufacturers. They can provide reliable, flexible, cost-effective, energy efficient power to a variety of industrial, commercial and institutional energy consumers in our communities.

AMO’s role in CHP is to support early stage research and development of advanced CHP systems and components that can be bet-

ter integrated and interact with the electric power grid and microgrids and provide resilient and energy efficient resources to our communities. CHP can help manufacturing while delivering a number of key advantages.

First is energy security. We have onsite and microgrid-based CHP provides localized, autonomous systems that eliminate transmission line power losses and enables the integration of generation and storage from a variety of sources providing greater security against power interruptions for industrial and commercial users and a stronger, more resilient grid for the nation as a whole.

They lower costs. CHP technologies offer flexibility in terms of fuel sources and energy outputs, lowering costs while providing protection against risks from power outages, loss of critical heating and cooling services or volatile fuel prices.

In efficiency, CHP offers flexible power generation technologies to meet America's energy needs reliably and safely.

In terms of cleaner air, efficient power generation systems, such as CHP, lower the emissions by reducing overall fuel use utilization usage, utilizing domestic fuel resources and incorporation the latest in low emission technologies.

And resiliency for both natural and manmade disasters, such as both hurricanes and system-wide power blackouts, highlighting the need for securing critical infrastructure for national and regional security, economic continuity, public health and safety.

And then microgrids. Microgrids are localized, electrical grids that can disconnect from the traditional grid and operate autonomously in times of stress. A great recent example of this nationally for CHP is related to the recent flooding that happened around Hurricane Harvey in Texas at the University of Texas Medical Branch, or UTMB. Back in 2008 Hurricane Ike came through the Houston area and devastated the UTMB campus in Galveston with eight feet of flood water. As a result, the site elevated its utility infrastructure and in 2016 began the operation of a newly installed seven and a half megawatt CHP system. That system remained fully operational without interruption during Hurricane Harvey in August 2017, a month and a half ago. And while much of Houston and the surrounding areas were faced with uncertainty as Hurricane Harvey made landfall, the Texas Medical Center, which is the largest medical center in the world, was able to sustain its systems throughout the storm, thanks to CHP.

Here in Maine, CHP is helping meet Maine's energy needs, but has significant room to grow. At the beginning of 2017 Maine had 934 megawatts of capacity across 38 installations. Of that, 906 megawatts were installed in 16 industrial facilities with both pulp and paper in the wood sector, while 26 megawatts were installed across 19 commercial and institutional facilities, including such diverse applications as St. Mary's d'Youville Pavilion Nursing Home, the Augustus City Center, the Lewiston-Auburn Waste Water Treatment Plant, the Cumberland County Jail and Togus Veterans Affairs Medical Center.

Recent DOE-supported studies estimate the technical potential for additional CHP in Maine at about 3,400 megawatts, much of it in emerging commercial and institutional applications.

The United States is also in a position to lead the world in manufacturing of CHP systems. America's abundant energy supplies is a strategic advantage that positions the U.S. companies as global leaders in the manufacturing of energy-related technologies of tomorrow. One example is a company called Capstone, an American microturbine CHP manufacturer, that has almost 60 percent of Capstone sales are made in the United States and actually sold outside of the United States in North America and beyond.

So DOE continues to explore fundamental knowledge gaps that hindered new applications and designs for CHP. Going forward we hope to be able to continue to work with Maine and other states to take advantage of the sufficient, resilient and affordable technology.

I thank you, the Committee, Robbins Lumber and everybody in our audience here, for the opportunity to meet with you all today.

I look forward to answering questions you may have.

[The prepared statement of Dr. Johnson follows:]

Written Statement of Director Mark Johnson, PhD
Office of Energy Efficiency and Renewable Energy
Advanced Manufacturing Office
U.S. Department of Energy
Before the
Committee on Energy and Natural Resources
United States Senate

October 6, 2017

Introduction

Senator King, thank you for the opportunity to join you here today for a field hearing in Maine to share the important role that new energy-related advanced manufacturing technologies, and combined heat and power in particular, play in the economy.

Within the Office of Energy Efficiency and Renewable Energy, as Director of the Advanced Manufacturing Office (AMO), I oversee a program that has a specific mission to make the U.S. more competitive through the support of research and development of new technologies related to energy and manufacturing as well as building partnerships with the private sector to ensure technologies get out of the lab and into manufacturing. Topics AMO works on include new energy efficient processes, new materials, and information technologies related to manufacturing. To accomplish this work, we partner with universities, laboratories, companies (both for profit and not-for profit), state and local governments, and other stakeholders across the nation.

Working through these partnerships with the private sector, new technologies for manufacturing represent transformational opportunities to leverage affordable and reliable domestic energy resources into a competitive advantage that enhances U.S. economic growth and energy security. This is a transformation currently underway across the United States. There are two issues I hope to cover today: first is the importance of technology innovation in areas related to energy and manufacturing, second is how the specific new technologies of combined heat and power and microgrids can impact manufacturing, particularly in energy and resource intensive manufacturing processes like wood products, which represents an opportunity for economic growth in communities across the nation overall and here in Maine specifically.

The new technology-enabled transformation in manufacturing by the private sector is on display right here in Searsmont, Maine, for example, with state-of-the-art combined heat and power system, or CHP for short. This 8.5 MW biomass CHP system is enabling Robbins Lumber to reinvent itself by turning its wood residuals – chips, sawdust and bark that was previously sold to paper mills – into steam for heating its buildings and drying lumber, as well as electricity for itself and that it can sell back to Central Maine Power. In doing so, Robbins lowers costs, reduces waste and emissions, and can be a foundation for the local economy.

National Manufacturing Day

As we get started, let me mention that today is National Manufacturing Day—an annual opportunity to recognize the important role manufacturing plays in both the history and future of our country. Highlighting the importance of manufacturing to our nation, we can quote Treasury Secretary Alexander Hamilton from his Report to Congress on Manufactures 226 years ago that

“Not only the wealth; but the independence and security of a Country, appear to be materially connected with the prosperity of manufactures.” Today for Manufacturing Day, over two thousand firms—small and large, across the country—open their doors to the public in a celebration of modern manufacturing meant to inspire the next generation, including an event down the road in Belfast, Maine where Front Street Shipyard is hosting tours of its manufacturing facilities.

Innovation in manufacturing and energy is a foundation of our economic growth and jobs for the future. This growth has and will continue to require a strong commitment to the advancement of both new technologies and a skilled workforce. According to analysis by the industry trade association, the National Association of Manufacturers of data from the US Department of Commerce Bureau of Economic Analysis and the US Department of Labor Bureau of Labor Statistics, manufacturers contribute almost \$2.2 trillion per year to the U.S. GDP and represent 9% of the nation’s workforce.¹ The sector also accounts for 30% of U.S. energy consumption.² New domestic energy sources and other natural resources, combined with new energy efficient technologies and processes, represent a significant competitive advantage for the U.S. manufacturing sector.

On Manufacturing Day, it is also worth noting that manufacturing is vital to rural communities. According to data from the U.S. Department of Agriculture, manufacturing provides a higher share of jobs and earnings in rural areas than in urban areas, and was responsible for 21% of rural private nonfarm earnings and 14% of jobs in 2015.³ Data collected from 2010-2012 by the Bureau of Economic Analysis showed that 501 counties that were “manufacturing-dependent”, meaning at least 23% of earnings or 16% of jobs were in the manufacturing sector. Of those, 348 were rural or micropolitan.⁴

Maine, Manufacturing, and DOE Collaboration

Maine has a proud history of manufacturing. According to analysis by the National Association of Manufacturers, Maine’s manufacturing sector generated almost \$5.3 billion in output in 2015, supporting over 51,000 jobs.⁵ While forest products led that total with \$829 million, Maine manufacturers also produce food, transportation equipment, metal products, computers and electronics, chemicals, and a wide range of other goods.

The Department of Energy is partnering with manufacturers to ensure that— through continued technological innovation—Maine manufacturers stay competitive in a dynamic modern economy. For example, in January of this year, I joined with Senator King in Orono to announce the launch of an innovation partnership between Oak Ridge National Lab and the University of Maine. That meeting was the first step in a long-term effort to explore new uses for forest

¹ Top 20 Facts about U.S. Manufacturing: <http://www.nam.org/Newsroom/Top-20-Facts-About-Manufacturing/>
<https://www.bea.gov/iTable/iTable.cfm?ReqID=51&step=1#reqid=51&step=51&isuri=1&5114=a&5102=1>
<https://data.bls.gov/timeseries/CES3000000001>

² EIA energy consumption by sector: <http://www.eia.gov/totalenergy/data/annual/>

³ <https://www.ers.usda.gov/webdocs/publications/84758/eib177%20-%20print.pdf?v=42962>

⁴ <https://www.ers.usda.gov/webdocs/charts/62740/manufacturingdependent.png?v=42345>

⁵ <http://www.nam.org/Data-and-Reports/State-Manufacturing-Data/State-Manufacturing-Data/April-2017/Manufacturing-Facts---Maine/>

products, for instance 3D printing using composite materials for tooling and structures used in things like aviation, boat manufacturing and construction, with a focus on forest product biological feedstocks.

The new bio-based composite materials will be low-cost, energy-efficient, and recyclable – and will be developed using expertise with the University of Maine’s Advanced Structures and Composites Center in Orono. This effort will open new avenues for the Maine economy through technological innovation in the global composites tooling market, which was valued at \$316M in 2015—of which 30% is represented by North America⁶. By combining expertise at Oak Ridge in additive manufacturing with the University of Maine’s expertise in bio-based materials technology, new applications for Maine’s forest products are being investigated and developed.

To give an idea of the progress the university-lab team is already making, a research project kicked off two months ago and has worked to identify a range of thermoplastic resin materials with different amounts of wood flour, and micro and nano-cellulose content. These composite materials are undergoing mechanical testing at the University of Maine and thermal and print testing at Oak Ridge. Representatives from the team have also met with industry partners like Hodgson, Houghton Marine, Sabre Yacht, and Hinckley to explore collaboration potential on downstream composite applications for the marine industry. Next steps include testing paint coating material adhesion and exploring types of tooling components for industry relevant prototype and test.

This partnership with a national lab on bio-based composites highlights just one cross-cutting technology with the potential to positively impact manufacturing. Others include advanced sensor based industrial process controls, high-performance computing simulation, roll-to-roll manufacturing of membranes, additive materials processed, advanced materials manufacturing, chemical process intensification and sustainable materials manufacturing, all of which are new technologies with the potential to positively impact the use of forest products in manufactured goods. Technical information on these areas for research and development was published this year by the Department of Energy’s Advanced Manufacturing Office in a draft multi-year program plan, and has been available for comment and feedback by researchers, the private sector and the manufacturing community.

Combined Heat and Power (CHP)

As noted earlier, a specific advanced technology for manufacturing and energy is Combined Heat and Power, like the system at our host site for the day, Robbins Lumber.

Combined Heat and Power (CHP) systems represent an important opportunity for manufacturers as they can provide reliable, flexible, cost-effective, energy efficient power to a variety of industrial, commercial, and institutional energy consumers in our communities. Moreover, the U.S. is well-positioned to be a manufacturer and an exporter of advanced CHP equipment to the rest of the world.

AMO’s role in CHP is to support early stage research and development of advanced CHP systems and components that can better integrate and interact with the electric power grid and

⁶ Market and Markets, 2015. Composite Tooling Market Report. <http://www.marketsandmarkets.com/Market-Reports/composite-tooling-market-63004871.html>

microgrids, and provide resilient and efficient energy resources to our communities. In coordination with the Department of Energy's Office of Technology Transitions, AMO enables partnerships between National Labs, universities and industry to improve the transition of innovative technologies from the lab bench to commercial application.

CHP is helping meet Maine's energy needs, but has significant room to grow. As of the beginning of 2017, Maine had 934 MW of capacity across 38 separate installations. Of that, 906 MW were installed at 16 industrial facilities – pulp and paper, and the wood sector; while 26 MW were installed across 19 commercial and institutional facilities⁷ including such diverse applications as St Mary's d'Youville Pavilion nursing home, Augusta City Center, Lewiston Auburn waste water treatment plant, the Cumberland County Jail, and Togus Veteran's Affairs (VA) Medical Center. These systems, including the commercial installations, are fueled by a variety of sources including natural gas, biomass and biogas. Recent DOE-supported studies estimate the technical potential for additional CHP in Maine at about 3,400 MW, with much of it in emerging commercial/institutional applications for CHP.

CHP can continue to help transform manufacturing in large part due to, low cost domestic fuels including natural gas, biogas and biomass while delivering a number of key advantages, many of which facilities around the country area already experiencing:

- *Energy Security.* On-site and microgrid-based CHP generation also provides localized, autonomous systems that eliminate transmission line power losses and enable the integration of generation and storage from a variety of sources, providing greater security against power interruptions for industrial and commercial users, and a stronger, more resilient grid for the nation as a whole. In 2009 a major ice storm hit Fort Knox in Kentucky with severe effects. The post lost its connection to the local utility and several buildings went without power for as long as 10 days. Energy security and reliability being a concern, an 8.2 MW CHP was installed in 2014 to provide power, cooling and heating not only on a day-to-day basis, but also to serve as reliable backup power in case of future outages.
- *Lower costs.* CHP lowers operating costs for industry and businesses by reducing energy costs and increase power reliability and resiliency. CHP technologies offer flexibility in terms of fuel sources and energy output, providing protection against risks from power outages, loss of critical heating or cooling services, or volatility in fuel prices. O'Hair Shutters, the largest domestic shutter manufacturer in the U.S., uses CHP to reduce energy costs at its headquarters and manufacturing facility in Lubbock, Texas. The CEO has cited the \$480,000 saved annually on energy costs as a key determinant in their ability to compete with Chinese imports.
- *Efficiency.* CHP offers efficient flexible power generation technologies to meet America's energy needs reliably and safely. These systems simultaneously produce power, heating, and cooling services from a single fuel source at the point of use, providing critical energy services with up to 80% efficiency—compared to about 50% for conventional power plants and on-site boilers. As an example, the Eight Flags CHP system owned by Florida Public Utilities and Chesapeake Energy at the Rayonier

⁷ <http://www.northeastchptap.org/>

Advanced Materials softwood cellulosic specialty mill in Amelia Island, Florida allowed the facility to reduce costs, increase production, and optimize its operations, while enhancing resiliency in its steam supply and the power supply for both itself and the island. The system operates at 78% HHV efficiency, and has achieved an operating availability of 98.5% since it was commissioned in July 2016. The economic performance of the CHP system was a key part of the selection of the Florida mill for a recently announced \$115 million capacity expansion.

- *Cleaner Air.* Efficient power generation systems, such as CHP, lower emissions by reducing overall fuel usage, utilizing domestic fuel resources and incorporating the latest low-emissions technologies. This technology helps ensure clean air and clean water for generations to follow.
- *Resiliency.* Natural and man-made disasters, such as hurricanes and system-wide power blackouts, highlight the need for securing critical infrastructure (CI) for national or regional security, economic continuity, and public health and safety. CHP has proven effective in providing uninterrupted electric service and heating/cooling through multiple major disasters in hospitals, prisons, waste water treatment plants, schools, places of refuge, factories and other critical facilities. CHP systems simultaneously generate electricity and produce thermal energy, maintaining needed power, process heating, and space conditioning services on-site at high efficiency and high reliability. A great example is related to the recent flooding from Hurricane Harvey in Texas at the University of Texas Medical Branch (UTMB): In 2008, Hurricane Ike devastated the UTMB campus in Galveston with eight feet of floodwater. Subsequently they developed and implemented a plan to ensure UTMB would remain resilient during similar floods. As a result, the site elevated its utility infrastructure and in 2016 began operation of a newly installed 7.5 MW CHP system in the new East Plant, which remained fully operational without interruption when Hurricane Harvey struck on August 25, 2017, even with the rising flood level in the Brays Bayou area around UTMB. So while much of Houston, Texas and the surrounding areas were faced with uncertainty as Hurricane Harvey made landfall, the Texas Medical Center – the largest medical center in the world – was able to sustain its air conditioning, refrigeration, heating, sterilization, laundry, and hot water needs throughout the storm thanks to CHP installation.

Closer to Maine in the Northeast, the 10 MW CHP system at the Sikorsky Aircraft facility in Connecticut enabled the plant to remain open and operational during and after Hurricane Sandy. Moreover, the facility was able to service its 9,000 employees with food and amenities, even while many local communities were without power.

- *Microgrids.* Microgrids are localized grids that can disconnect from the traditional grid to operate autonomously. Because they are able to operate while the main grid is down, microgrids can strengthen grid resilience and help mitigate grid disturbances as well as function as a grid resource for faster system response and recovery. CHP can be an ideal anchor for sustainable and resilient microgrid systems because of its ability to withstand heavy storms and long outages, while also serving as an enabling technology for integrating variable renewable energy. The City of Woodbridge, Connecticut and United Illuminating are constructing a microgrid that connects seven critical facilities around Woodbridge Town Center - public works building, town hall, police station/senior center,

library, new fire station, old fire station, and high school – anchored by a 2.8 MW fuel cell CHP system at Amityville High School. Designed to keep the lights on in these critical facilities during sustained outages, the microgrid and CHP system are owned and operated by the utility, United Illuminating.

The U.S. is also in a position to lead the world in manufacturing of CHP. America's abundant energy supply is a strategic advantage that positions U.S. companies to be global leaders in the manufacturing of energy related technologies of tomorrow. One example is Capstone, an American microturbine CHP manufacturer located in California, a leading exporter of microturbines to the oil and gas industry and for CHP applications around the world. Almost 60% of Capstone's existing sales in terms of capacity have been outside of North America.

AMO continues to support research into advanced CHP technologies – in particular the components needed to better integrate CHP systems in to the national electric grid, resulting in greater resiliency and efficiency. AMO held a research workshop last year to convene industry partners and other stakeholders to identify key R&D challenges that, if addressed, would both accelerate the adoption of as well as expand the technical capabilities of CHP. While the core CHP technology is mature, its relative lack of deployment has left a number of technology gaps, particularly around grid integration, flexibility, and rampability. Based on this and other feedback, new early-stage research in technical areas like new semiconductor-based power electronic switching as well as new materials that enable high heat rates and fast ramping in CHP are being supported.

Further, DOE continues to explore fundamental knowledge gaps that hinder opportunities for new applications and designs for CHP, and that can work hand in hand with the evolution of the power system. Going forward we hope to be able to continue to work with Maine and other states to take advantage of this efficient, resilient and affordable technology in hospitals, waste water treatment plants, and universities, as well as CHP in manufacturing sites including chemicals, primary metals, paper, wood products and food processing.

In conclusion, I thank the committee for the opportunity to meet with you today and we look forward to partnerships in which these advanced technologies have positive impact on U.S. manufacturing.

Senator KING. I just want to give you an idea on the format because I am sure everybody is thinking, I want to ask some questions. We are going to go through the formal hearing part. I will be questioning the witnesses, and then we are going to break for lunch. During lunch, it is going to turn more into an informal roundtable where everyone can participate, ask questions, and discuss.

Next, I want to call on Dana Doran. Dana is the Executive Director of the Professional Logging Contractors of Maine. I went to Dana's dinner a couple years ago and just as I walked in, they were auctioning off Jimmy Buffet tickets.

[Laughter.]

That was one of the most expensive dinners that I have ever been to in Maine.

[Laughter.]

But the concert was great, so Dana, welcome.

**STATEMENT OF DANA A. DORAN, EXECUTIVE DIRECTOR,
PROFESSIONAL LOGGING CONTRACTORS OF MAINE**

Mr. DORAN. Thank you very much, Senator, and thank you for inviting me here today and thank you for your leadership on this issue.

I would like to challenge you to change one analogy and to move away from the fisherman analogy. And your new analogy should be no tree should ever leave the Maine forest without its head. If you follow me.

[Laughter.]

Okay.

Senator KING. Thank you.

Mr. DORAN. Use that one from now on.

As Senator King said, I'm Dana Doran. I'm Executive Director of the Professional Logging Contractors (PLC) of Maine. PLC is a trade association that represents loggers and truckers throughout the State of Maine. We were formed in 1995 to give independent contractors a voice in our rapidly changing industry.

As of 2014, logging and trucking contractors in Maine employed over 4,700 people directly and were indirectly responsible for the creation of an additional 3,000 jobs. The employment and the investments that contractors make attributed almost \$1 billion to that \$8.5 billion forest products industry.

Today I'm going to talk about three primary things.

One, what has happened? Senator King did a great job giving an overview. I'm going to give a little bit more detail to that. I'm going to talk about what Maine is trying to do to right the ship, especially with respect to wood energy, and then I'll go into it briefly about what our friends at the federal level, we believe, can and should do and are already doing to help right the ship.

So obviously Senator King said the forest products industry in Maine is in the midst of a crisis. In the past four years Maine has experienced a closure of five pulp and paper facilities and the periodic idling of two wood energy electric facilities. As a result, Maine has lost 50 percent of its softwood pulp market. And in the last two years it's also seen a two-million-ton reduction of biomass utilization.

Between 2014 and '16 the total economic impact of the forest products industry has dropped by about \$1.3 billion and over 5,000 jobs have been lost. This crisis has gone all the way to the tree stump, impacting more than 400 logging contractors in Maine and at least 500 jobs in logging and trucking.

To put this in perspective over just the last three years, we're talking about the loss of 121,000 undelivered truckloads of wood, or 30 percent of the total amount of fiber consumed by Maine mills prior to.

Looking prospectively, if electricity prices don't increase and there isn't a viable pathway for the full utilization of stand-alone biomass electric facilities, we could be facing a doomsday situation by the end of 2018 with a total loss of biomass in Maine, other than of the good projects like Robbins and Linkletter, that you're going to hear about later today. But really that means about 400 direct jobs at those biomass electric facilities and 900 indirect jobs and potentially the loss of \$300 million per year to the Maine economy.

Over the years loggers have become adept at finding a market for every portion of a harvested tree, including low value tree tops and limbs. The revenue brought in by selling these products is part of the business plan of every logger in Maine and generally represents about 20 to 30 percent of their business operation. Take that revenue away and many logging companies and associated businesses will shut jobs or close entirely, but that's just the beginning of the problem.

Biomass market serves another vital need in the forest products industry and that is the disposal of residuals. Without these markets, loggers are limited on the wood they can sell to sawmills and papermills and these mills are left with literally millions of tons of sawdust, chips, and bark with nowhere to go.

The costs and environmental impacts of this must be taken into account when weighing the value of programs that aid the biomass market. In 2016, Maine's legislative and executive branches came together and supported Maine's rural economy to approve contract incentives for the producers of biomass electricity to maintain stability in those markets. This decision came after careful consideration and months of review, but in the end, we believe it was the right decision. However, knowing that a life line and a bridge is not necessarily the long-term solution.

The Maine legislature also approved a bipartisan commission to study the economic environmental energy benefits of the biomass industry. Bob Linkletter sat on that Committee, along with some other folks that are in this room today.

Short-term solutions were vital, but it's the long-term road map that's so essential. And so, over the fall of 2016 this group got together and they looked at biomass from a very broad perspective, not just with respect to harvest residuals but also at the entire value chain to understand how intertwined each component is with each other from a current use perspective. The Commission quickly learned that biomass is more than just harvest residuals. It's also sawmill and manufacturing residuals. It's pellets. And it also represents, not just an asset, but an opportunity for rural Maine to fully utilize wood, or energy from wood.

In the end, the Commission came up with a long list of policy initiatives. In fact, there were roughly ten of them. They have, for instance, and I'll run through them very quickly. Benchmark other regional and global solutions where there are best practices with respect to utilization of wood for thermal biogas recovery; activated carbon in biofuel applications; expand Maine's RPS and also include a thermal carve out and potentially an economic benefit REC that would help our stand-alone electricity generators in the long run; require our state's energy office, Efficiency Maine Trust, to look at economic benefits and not just efficiency when providing grants or incentives; address high backups and standby electric charges by creating a process where a consumer stays connected to a transmission and distribution utility; enable co-location and other projects, which you're going to hear about from Bob and from Alden; require biomass to be more specifically considered in the state's comprehensive energy plan; renew and expand the state's community-based renewable energy pilot program; and then finally, encourage and use, use of wood for thermal systems wherever if possible with commercial businesses, schools and public institutions, effectively making Maine the Saudi Arabia of wood.

Clearly many of the solutions that we're reviewing here in Maine are on the state level. However, there certainly is much that can be done to provide further stability from the top, down.

Senator King, who is a member of the Committee we're before here today and his colleague, Senator Collins, have taken the lead on this. And I urge the Committee, who obviously aren't here today, to take the lead as well and join them in doing the same. Specific policies at the federal level that are now on the table include permanently codifying the principle use of biomass carbon neutrality with all federal agencies, a step that was done in the fall of 2017 and we hope will be done permanently this fall with the budget, budget negotiations that are ongoing. So the Federal Government treats biomass the same across all agencies which is a step in the right direction.

Two, pass the Biomass Thermal Utilization (BTU) Act of 2017 which Senator King is a primary sponsor and introduced in the Senate and Congressman, excuse me, Senator King and his colleague, Senator Collins, is also a co-sponsor. On the House side there's an equivalent bill and both Congressman Pingree and Congressman Poliquin have also sponsored.

Specifically, the BTU Act would underscore that heat from biomass is an underutilized energy source in the U.S. and it would add biomass fuel property to the list of existing technologies that qualify for the residential renewable energy investment tax credit. This would provide a great path forward and to encourage the use of pellet and wood chip thermal heating systems putting biomass on par with other renewables like solar and wind and geothermal.

And finally, Senator Franken, a member of this Committee, has introduced a new energy title from the Farm Bill which, I think, is very appropriate. Amongst its many provisions the energy section will support advanced biofuel production which could include wood-based fuel and will improve the market for Ag feed stocks. However, one concerning part of the bill includes a sizable portion for BCAP which was approved a few years ago and we just encour-

aged the Committee to be a little wary with respect to how that funding is utilized going forward and make sure that it does, in fact, help loggers and truckers along the way.

In closing, I'd like to thank you for hosting the hearing and for bringing these issues to the forefront. If we can all work together, in the end we could lower compliance costs for industrial rate-payers; new markets could be created for the utilization of biomass with thermal projects; the stand-alone generators could become more efficient; Maine businesses could pay less for electrical demand and bear some of the risk that they are on the hook for right now; and rural Maine could benefit from co-located businesses that in the end, energy policy would spur economic development, saving and creating jobs that every logger, trucker, and politician in this room could be thankful for.

From the landowners who cultivate it, to the foresters who oversee it, to the loggers who harvest it, to the truckers who deliver it, to the sawmills that create it, to the generation facilities that utilize it, to the pulp and paper facilities that also utilize it and the citizens who benefit. We have a holistic, viable, energy pathway that can provide a future for Maine and use our indigenous source of energy.

Thanks for the opportunity to appear before you. I'd be happy to answer any questions.

[The prepared statement of Mr. Doran follows:]



Testimony of

DANA A. DORAN
Executive Director
Professional Logging Contractors of Maine

Before the U.S. Senate Committee on Energy and Natural Resources

Field Hearing to examine efficient approaches to reducing industrial energy costs

Friday, October 6, 2017
Robbins Lumber Mill, Searsmont, ME

Senate Chairwoman Murkowski, Senator King and members of the U.S. Senate Committee on Energy and Natural Resources, my name is Dana Doran and I am a resident of Belgrade, Maine. I appear before you today as the Executive Director of the Professional Logging Contractors of Maine. The Professional Logging Contractors of Maine (PLC) is a trade association that represents logging and trucking contractors throughout the state of Maine. The PLC was formed in 1995 to give independent contractors a voice in a rapidly changing forest industry.

As of 2014, logging and trucking contractors in Maine employed over 4,700 people directly and were indirectly responsible for the creation of an additional 3,000 jobs. This employment and the investments that contractors make contributed \$882 million into the state's economy. Our membership employs over half of the individuals who work in this industry and is also responsible for about 75% of Maine's annual timber harvest.

Thank you for providing me with the opportunity today to testify on behalf of our membership how wood energy can be a beneficial and commonsense solution to reduce industrial energy costs. I would also like to thank Senator King for bringing attention to this issue.

The forest products industry in Maine is in the midst of a crisis, one that none of us have ever experienced before. In the past four years, Maine has experienced the closure of five pulp and paper mills and the periodic idling of two wood energy electric facilities. As a result, Maine has lost 50 percent of its softwood pulp market in the last two years alone and has also seen a two-million-ton reduction of biomass utilization. Between 2014 and 2016, the total economic impact of the forest products industry fell from \$9.8 billion to \$8.5 billion, and more than 5,000 jobs were lost. Rural Maine communities where mills have closed are experiencing high unemployment rates, loss of population, and significant basic infrastructure challenges.

Forest Products Industry

	2011	2014	2016
Total Economic Impact	\$8.5 billion	\$9.8 billion	\$8.5 billion
Total Jobs	38,789	38,956	33,538

This crisis has also gone all the way to the tree stump, impacting more than 400 logging contractors in the state and at least 500 jobs. To put this into perspective, over just the last three years, we are talking about the loss of 121,000 undelivered truckloads of wood, or 30% of the total amount of fiber consumed by Maine mills.

Looking prospectively, if electricity prices don't increase and there isn't a viable pathway for full utilization of the stand-alone biomass electric facilities, we could be facing a doomsday situation by the end of 2018 whereby the total loss of the biomass industry in Maine could lead to the loss of 400 direct jobs at the biomass plants and at least another 900 indirect jobs, primarily in regions of the state that cannot afford more job losses. Total economic losses to the state of Maine from these losses could be as high as \$300 million per year.

It's hard to clearly define a crisis, but in my estimation, we are in one. Without a strong biomass market, that crisis will only worsen as loggers and associated markets, take for example sawmills, lose the revenue biomass sales generate while incurring additional costs for disposal of biomass suddenly rendered worthless.

Over the years, loggers have become adept at finding a market for every portion of a harvested tree – including low value tree tops and limbs. The revenue brought in by selling these products is part of the business plan of virtually every logger in Maine, and as their operational costs have increased, they have come to depend on it. Take that revenue away and many logging companies and associated businesses will shed jobs or close entirely, but that is just the beginning of the problem.

The biomass market serves another vital need in the forest products industry, and that is disposal of residuals. Without these markets loggers are limited on the wood that they can sell to sawmills and paper mills, and these mills are left with literally millions of tons of sawdust, chips, and bark with nowhere to go. The costs and environmental impacts of this must be taken into account when weighing the value of programs that aid the biomass market.

In 2016, Maine's Legislative and the Executive Branches came together in support of Maine's rural economy to approve contract incentives for producers of biomass electricity in order to maintain a viable biomass market for our loggers and sawmills. This decision came after careful consideration and months of review, but in the end, the right decision was made.

However, knowing that a lifeline was not meant to be a longterm solution, the next step was to plan for the future. Also in 2016, Maine's Legislature created a bi-partisan commission to study the economic, environmental and energy benefits of the Maine biomass industry. This blue-ribbon, legislatively appointed Commission, was created to study the use of biomass in a thoughtful and meaningful way with the intent to create a long-term roadmap at a critical point in time. Short-term solutions were vital, but the roadmap would provide a plan for sustainability that had not been done before. The Legislature, and the industry both knew that a crisis was upon us. However, instead of managing by crisis, it took the bull by the horns and created a plan for success rather than throwing darts in the dark.

This commission looked at biomass from a very broad perspective, not just with respect to harvest residuals for electric generation, but also at the entire value chain, to understand how intertwined each component is with each other from a current use perspective. The commission quickly learned that biomass is more than just harvest residuals, it is also sawmill and manufacturing residuals, it is pellets and it also represents not just an asset, but an opportunity for rural Maine to fully utilized wood for energy.

In the end, the commission settled on a long list of policy initiatives that could elicit change. If these recommendations can be accomplished, we will have the nexus of a long-term economic development strategy for rural Maine through the utilization of one of our greatest natural resources.

The following policy initiatives could diversify and achieve this strategy:

1. BENCHMARK OTHER REGIONAL and Global SOLUTIONS: Identify current best practices around the utilization of wood for energy and byproducts that could be created, including but not limited to thermal, biogas recovery, activated carbon and biofuel applications from other states and foreign countries that have made a commitment to the use of wood for thermal energy.
2. Expand the renewable portfolio standard.
3. Create a thermal class carve-out of the RPS.
4. Create an economic benefit carve out of the RPS to provide stability for the stand-alone electric generators.
5. Require the Efficiency Maine Trust to factor in economic benefits and not just efficiency when providing grants or incentives.
6. Address high backup and standby electric charges by creating a process whereby a consumer (who stays connected to a transmission and distribution utility, even though they receive their electricity supply directly from a generator through an arrangement or produce their own electricity) and transmission and distribution utility negotiate the rate paid by the consumer for backup and standby charges.
7. Enable co-location and other projects utilizing behind-the-meter arrangements first as a pilot project, then with the ability to expand statewide. Provide clarity that an entity that constructs, maintains or operates a microgrid, allowed by law can construct and maintain electric lines, including poles or other related structure in, upon, over, across, or under a road, street or other public way without objection from the public utility.
8. Require biomass to be more specifically considered in the comprehensive state energy plan prepared by the Governor's Energy Office.
9. Renew and expand the Community-Based Renewable Energy Pilot Program as a solution to regional sawmill residual and in-woods biomass output. Develop a scenario with a series of wood energy facilities strategically located to service regional energy and forest product's needs.
10. Encourage and the USE OF WOOD THERMAL SYSTEMS. Examine the opportunity to incentivize schools, other public institutions, and small and medium sized businesses to convert to wood based thermal and/or CHP systems, including pellet, chip, and biomass systems.

Clearly, many of the solutions that we are reviewing here in Maine are on the state level, however, there is much that can be done to provide further stability from the top down.

Senator King, who is a member of this committee, along with his colleague from Maine, Senator Collins, have taken the lead and should be commended on their work to move policy initiatives forward that will provide a more certain future. I urge the Committee to join him in doing the same. Specific policies that are on the table include:

- 1) Permanently codify the principle of biomass carbon neutrality within all federal agencies. Support the key role that forests in the United States can play in addressing the energy needs of the United States, the Secretary of Energy, the Secretary of Agriculture, and the Administrator of the Environmental Protection Agency shall, consistent with their missions, jointly—
 - a) ensure that Federal policy relating to forest bioenergy— (A) is consistent across all Federal departments and agencies; and (B) recognizes the full benefits of the use of forest biomass for energy, conservation, and responsible forest management; and

- (b) establish clear and simple policies for the use of forest biomass as an energy solution, including policies that— (A) reflect the carbon-neutrality of forest bioenergy and recognize biomass as a renewable energy source, provided the use of forest biomass for energy production does not cause conversion of forests to non-forest use. (B) encourage private investment throughout the forest biomass supply chain, including in:
 - (i) working forests;
 - (ii) harvesting operations;
 - (iii) forest improvement operations;
 - (iv) forest bioenergy production;
 - (v) wood products manufacturing; or
 - (vi) paper manufacturing;
 - (c) encourage forest management to improve forest health; and (D) recognize State initiatives to produce and use forest biomass.
- 2) Pass the *Biomass Thermal Utilization Act of 2017*, legislation that incentivizes the development of biomass as an affordable, clean, and home-grown source of energy as introduced by Senator King. Specifically, the *BTU Act* would: a) underscore that heat from biomass is an underutilized energy source in the United States; and b) add biomass fuel property to the list of existing technologies that qualify for the residential renewable energy investment tax credit. This would provide a great path forward to encourage the use of pellet and wood chip thermal heating systems.
- 3) And finally, be wary of supporting policies that may have unintended consequences. On September 7th, Senator Al Franken (D-Minnesota) introduced a new energy title for the Farm Bill. Among its many provisions, the energy section will support advanced biofuel production, which could include wood based fuel, and will improve the market for ag. feedstocks. One concerning part of the bill is that it provides a sizable amount for BCAP (\$70 million / year over 5 years), which was not helpful the last time that it was approved.

In closing, I would like to thank you for hosting this hearing and bringing these issues to the forefront. If we all work together, in the end, we could lower compliance costs for industrial ratepayers, new markets could be created for the utilization of biomass with thermal projects, the stand alone generators could become more efficient, Maine businesses could pay less for electrical demand and bear some of the risk that they are on the hook for right now, rural Maine could benefit from co-located businesses and in the end, energy policy would spur economic development, saving and creating jobs that every logger, trucker and politician in this room could be thankful for.

From the landowners who cultivate it, to the foresters that oversee it, to the loggers who harvest and process it, to the truckers who deliver it, to the sawmills that create it to the generation facilities that utilize it, and the citizens who benefit from the electricity it provides; renewable biomass is often underappreciated for its holistic and systemic impact. The economic impacts are limitless and they should be enhanced, rather than adversely impacted by non-indigenous sources of energy.

Thank you for the opportunity to provide the opinion of our membership before you today and I would be happy to answer any questions you may have.

Senator KING. Thank you, Dana. We will definitely do that.

Again, I think, and your testimony suggested this, this is one part of an overall strategy to figure out new uses for forest resources. That is really what we are talking about. For 100 years, it was lumber and paper. What we are talking about now is lumber, paper, and something else. And what Mark was talking about with 3D printing, which is really, in many ways, the future of manufacturing. It never occurred to me to ask before I was in Orono, what is the stuff that you print with? 3D printing is the printing of an object. It could look like this.

Traditionally, the material that's laid down by the 3D printer is an oil-based kind of plastic. What we are experimenting with and what is exciting to me is that a forest-based, cellulosic substance could make car parts or rocket parts or gavel bases or whatever we are talking about. Although wood does pretty well for that.

But in other words, when I was a kid, we learned about George Washington Carver, who was a scientist in the South, who figured out 106 things to do with peanuts. What we need is 106 things to do with wood fiber and new products that we have not thought about. That is a big part of what this effort is all about.

Mark, you mentioned Hamilton. I have to tell you a recent Hamilton story. I serve on the Intelligence Committee, the Chairman of which is a guy named Richard Burr. I was with him recently and complimenting him on the great job that he was doing. I said, Richard, you are doing great. You are working on a bipartisan basis. You are taking this very seriously. As they say in Hamilton, history has its eyes on you. Richard stepped back and sort of smiled and said, I don't know if you want to quote Hamilton to me, Angus, since my great, great, great grandfather shot him.

[Laughter.]

I hadn't thought of it that way before.

So anyway, next I want to call on our host, Alden Robbins, the Vice President of Robbins Lumber, who set up this visit today. I want to thank him for hosting us, for the donuts, and for the tour. Alden, tell us about this project and how it fits into this strategy.

**STATEMENT OF ALDEN J. ROBBINS, VICE PRESIDENT,
ROBBINS LUMBER INCORPORATED**

Mr. ROBBINS. Thank you, Senator.

Senator, staff, members of the public, it's my pleasure to welcome you to Searsmont, Maine.

My name is Alden Robbins. I'm the Vice President of Robbins Lumber, Incorporated. We are a vertically integrated forest products manufacturing center with 27,000 acres of timber land, a high-tech, white pine board mill, that hopefully most of you got to tour, producing up to 30 million board feet of lumber and value-added products annually.

I own the business with my sister, Katherine Robbins-Halstead, and my brother, James Robbins. Together we make up the fifth generation of Robbins to operate a sawmill in this valley.

Our great, great grandfathers, Otis and Frank Robbins, purchased a water-powered mill here from George Dire in 1881. In 1947, the mill converted from water power to diesel electric power and then finally, in 1964 we started using power from the electric

grid. In 1975, my uncle, Jennis Robbins, and father, James L. Robbins, both are in this room, built a co-generation facility on this current site and continued to upgrade the infrastructure throughout the decades. As you can see, the issues of power are always on the minds of saw millers.

I'm proud to announce that the current generation have embarked on the most ambitious power project to date with the construction of a \$36 million 8.5 megawatt combined heat and power facility adjoining our current biomass facility. Our journey toward this investment started with the first announcements of the paper mill closures in the state, as some of the previous speakers have already alluded to.

As a by-product of our sawing operations, we produce approximately 100 tons of paper quality chips along with 50 tons of sawdust and over 30 tons of bark every day. Paper mills have notoriously been the major market for a number of these by-products. With the closure of these mills, sawmills are in a situation where residuals have gone from being a revenue stream into a potential liability, as the Senator spoke about earlier. This comes as an unfortunate time as I believe the forest products industry is at the dawn of a new age of prosperity. The comeback of the housing market, along with new markets such as mass timber construction and products that Mr. Johnson had spoken about earlier.

We heard a speaker at Rockland a couple weeks ago talk about Finland and their plan for the future of their forest products economy. And I thought it was interesting that not only were they going to grow their economy, half of that growth was going to come from new products that they weren't even producing at this point. So that went hand-in-hand with what you were talking about. This points to a bright future for the forest products in this country.

Senator King, I want to thank you for your support of the Timber Innovation Act which is helpful for the mass timber and other products and new markets for wood.

Maine is poised to take advantage of this renaissance. We are one of the most forested states in the nation with well managed timberlands located close to major metro markets like Boston and New York and top-notch research facilities like the previously mentioned Advanced Structures and Composite Center at the University of Maine in Orono.

In order to complete this picture, we need to find a market for the residuals coming off in the existing sawmills and the logging operations needed to supply them. My sawmill struggles every year to bring in our raw material because the loggers, that Dana's group represents, can no longer realize the revenue from the residuals and the low-grade pulp wood they once did. A vibrant biomass market through the widespread dispersement of CHP plants is one way to help address this problem.

After looking at various options for our residuals and speaking with peers such as Mr. Linkletter, we learned about the Community Based Renewables Energy Program, or CBREP, in late 2015 which had been reopened for project mills for a three-week window. And after a quick discussion, we decided to submit a proposal. In early 2016 we were informed that we were awarded a contract. We were off to the races since the CBREP program required that

projects would be completed and generating by the end of 2018—that is not a lot of time to undertake a project of this scale.

We immediately started working with our lender, Farm Credit East, who is invaluable in providing financing for our project. The construction of this plant will have many benefits to Robbins Lumber, Incorporated, the logging community, the landowners and the surrounding community, all of which can be replicated throughout the state, the benefits of which, some of them have been talked about previously, it will allow Robbins to focus on the core competence of manufacturing our top quality, Eastern White Pine products without the concern of our residuals. It helps to support the local loggers which bring in the lifeblood to our business, the Eastern White Pine saw logs. It will help us maintain the health of our forest land which you haven't spoken about as much today and helps to reduce wildfire danger. It helps diversify our income stream, attract new investment through co-location opportunities.

The job creation and retention benefits of CHP plants go far beyond the construction jobs which is where many other renewable energy sources stop in their benefit. I have included a table in my submission that shows the in-plan study that we produced for this project and it's quite impressive the economic impact of building one of these plants and what it has ongoing.

Grid security, as Mr. Johnson spoke about earlier, and of course, energy costs, which are obviously a key factor since Maine's forest products companies compete, not only locally, but globally. And the Northeast has some of the highest energy costs in the country.

CHP facilities can help control an important variable for manufacturing centers. In order to encourage the construction of facilities such as ours, they need to be financed. In order to be financed, the payback has to be shown.

Stable, federal policy that recognizes and supports the benefits of CHP plants such as our own, is imperative. The House Energy and Commerce Committee, right now, is considering modernizing the Public Utility and Regulatory Policies Act, or PURPA, a bill adopted years ago to promote renewables energy and CHP. I believe that no matter what Congress does on PURPA, it should maintain the key provisions that are necessary for maintaining equitable treatment of industrial CHP. Examples of this include, reasonable backup and standby power rates and the requirement that the utilities purchase excess power through contracts of sufficient length that they help industries obtain financing for new or expanded CHP facilities.

Senator King and Senator Collins' efforts to recognize the carbon neutrality of biomass have also been greatly appreciated and helpful toward keeping biomass competitive.

Thank you for the time to come to Robbins Lumber, Incorporated today, and I encourage you to use these ideas presented to foster the opportunity for CHP in this state. They can supply the power and the steam to drive innovation and make the products of the 21st century, as well as support the traditional businesses such as Robbins Lumber and help keep a sixth generation sawing pine in this valley.

I'd like to add my own little political statement that we'd like to see the day that no logs would have to leave the state in log form.

[The prepared statement of Mr. Robbins follows:]

Testimony of

Alden J. Robbins

Vice President

Robbins Lumber Incorporated

Field Hearing for the US Senate Committee on Energy and Natural Resources

Friday, October 6, 2017

Senators, staff, members of the public. It is my pleasure to welcome you to Searsmont, Maine. My name is Alden Robbins, and I am the Vice president of Robbins Lumber Inc. We are a vertically integrated Forest Products Manufacturing Center with 27,000 acres of timberland, a high tech White Pine Board mill producing up to 30 Million board feet of lumber annually, 750,000 board feet of drying capacity, two Planer mills, 6 million board feet of warehouse space, 90,000 square feet of coating plant and value added manufacturing, along with our own fleet of distribution trucks to help deliver it all. I own the business with my Sister, Catherine Robbins-Halsted and my Brother James Robbins. Together we make up the Fifth generation of Robbins to operate this sawmill in this valley. Our Great, Great Grandfather, Otis Robbins purchased a water powered mill here from George Dyer in 1881. In 1947, the mill converted from water power to Diesel Electric power, and then finally in 1964, we started using power from the electric grid. In 1975, my uncle, Jenness Robbins, and Father James L. Robbins, built a cogeneration facility on this current site, and continued to upgrade the infrastructure throughout the decades.

As you can see, the issues of power are always on the minds of sawmillers, and after 136 years of operation, we have only been exclusively tied to the grid for about 11 of those years!

I am proud to announce that the current generation have embarked on the most ambitious power project to date, with the construction of a 8.5 Megawatt Combined Heat and Power (CHP) facility adjoining our current biomass facility.

Our journey towards this investment started with the first announcements of the Paper Mill Closures in this state. As a byproduct of our sawing operations, we

produce approximately 100 tons of paper quality chips, 50 tons of sawdust, and over 30 tons of bark every day. Paper Mills have traditionally been the major market for a number of these by products. With the closures of half a dozen of these mills in recent years, sawmills are in a situation where residuals have gone from being a revenue stream, into a potential liability.

This comes at an unfortunate time, as the forest products industry is at the dawn of a new age of prosperity. The comeback of the housing market, along with new markets such as Mass Timber Construction, point to a bright future for Forest Products in this country.

Maine is poised to take advantage of this renaissance. We are one of the most forested states in the nation, with well managed timberlands, located close to major Metro markets like Boston and New York, and top notch research facilities like the Advanced Structures and Composites center at the University of Maine in Orono.

In order to complete this picture, we need to find a market for the residuals coming off from the existing sawmills, and the logging operations needed to supply them. My sawmill struggles every year to bring in our raw material because the loggers can no longer realize the revenue from the logging residuals and low grade pulp wood as they once did.

A vibrant biomass market, through the widespread disbursement of CHP plants is one way to help address this problem.

After looking at various options for our renewables and speaking with peers such as Mr. Linkletter, we learned about the Community Based Renewables Energy program in late 2015, which had been reopened for project submittals for a three week window. After a quick discussion, we decided to submit a proposal, and in Early 2016 we were informed that we were awarded a contract. We were off to the races, since the CBREP program required that the projects would be completed and generating by the end of 2018, and that is not a lot of time to undertake a project of this scale. We immediately started working with our lender Farm Credit East, who was invaluable in providing the financing for our project.

The construction of this plant will have many benefits to Robbins Lumber Inc., the logging community, the land owners, and the surrounding community, all of which can be replicated throughout the state. Benefits include:

- It will allow us to focus on our core competence of manufacturing Top Quality Eastern White Pine products without the concern of our residuals market.
- It helps to support our local loggers which provide the lifeblood to our business, Eastern White Pine Saw Logs.
- It will help us maintain the health of our forestland, and helps to reduce wildfire danger.
- It will diversify our income stream.
- It will attract new investment through colocation opportunities.
- The job creation and retention benefits of CHP plants go far beyond the construction jobs, which is where most other renewable energy sources stop. I have included a table from a recent Implan study done for our project which shows an impressive impact on protecting existing jobs both here at the mill and in the woods, as well as adding new jobs.
- Grid security: Geographically dispersed smaller regional generation facilities are more resilient than massive single source producers such as nuclear plants.
- Energy costs are obviously a key factor since Maine's Forest Products companies compete not only locally, but globally. The Northeast has some of the highest energy costs in the country, and CHP facilities can help control an important variable for manufacturing centers.

How do we encourage the construction of similar projects throughout the region and country?

In order to encourage the construction of facilities such as ours, they need to be financed. In order to be financed, the payback has to be shown. Stable Federal policy that recognizes and supports the benefits of CHP plants such as our own is imperative. The House Energy and Commerce committee right now is considering modernizing the Public Utility and Regulatory Policies Act (PURPA) a bill adopted years ago to promote renewables energy and CHP. I believe that no matter what Congress does on PURPA, it should maintain the key provisions that are necessary for maintaining equitable treatment of industrial CHP. Examples of this include reasonable back up and standby power rates and the requirement that utilities purchase excess power through contracts of sufficient length that they help industries obtain financing for new or expanded CHP facilities.

I thank you for taking the time to come to our little corner of the world, and I encourage you to use these ideas presented today to encourage the opportunity for CHP in this region. They can supply the power and the steam to drive innovation and make the products of the 21st century, as well as support the traditional business such as Robbins Lumber Inc. and help keep a 6th Generation sawing pine in this valley.

Table 3: Economic Impacts of 7.5 MW Biomass Plant, 2016----17

Impact Category	Sales/Spending	Jobs (FTE)	Pay & Benefits
1. Electricity Generation	\$5,501,000	45.9	\$1,944,000
<i>Plant Operation (Labor)</i>	<i>n.a.</i>	<i>6.0</i>	<i>\$222,000</i>
<i>Fuel Costs (Logging)</i>	<i>\$2,903,000</i>	<i>28.0</i>	<i>\$1,219,000</i>
<i>Operation/Maintenance</i>	<i>\$519,000</i>	<i>5.0</i>	<i>\$360,000</i>
<i>Professional Services</i>	<i>\$75,000</i>	<i>0.6</i>	<i>\$40,000</i>
<i>Property Taxes/Insurance</i>	<i>\$295,000</i>	<i>1.4</i>	<i>\$75,000</i>
<i>Banking (interest paid)</i>	<i>\$1,709,000</i>	<i>4.9</i>	<i>\$250,000</i>
2. Sawmill Operation	\$20,000,000	100	\$4,200,000
Total Direct Impact	\$25,501,000	146	\$6,144,000
Indirect Impacts	\$15,630,000	89	\$3,770,000
Induced Impacts	\$9,870,000	56	\$2,380,000
Total Economic Impact	\$51,001,000	291	\$12,294,000

Source: Robbins Lumber; Maine Department of Labor, Quarterly Census of Employment and Wages; indirect impacts derived from the IMPLAN model of the State of Maine.

Senator KING. There you go.

[Laughter.]

I was thinking today what if we could learn how to grow square trees?

[Laughter.]

I recently learned, and I should have known this a long time ago, we are the most forested state in the United States, which sort of surprised me. I thought it would be somewhere out West, but according to the forest products people that I have been talking to in Washington, we are the most heavily forested state in America, so, that is where we have to find the value and the jobs.

Bob Linkletter is the President of Maine Wood Pellet Company. He has a project completed that is similar to the one that we are seeing in construction here.

I've been to it. It is an absolutely fascinating—an incredibly high-tech facility over in Athens, Maine, and I am delighted to have him with us.

Bob, tell us about your project.

**STATEMENT OF ROBERT LINKLETTER, PRESIDENT,
MAINE WOODS PELLET COMPANY**

Mr. LINKLETTER. Hey, good morning, Senator King, Committee members, guests and the Robbins Family, thank you for hosting this meeting today. My name is Rob Linkletter. Along with my brothers, Richard and Bruce, we are owners of Athens Energy, Maine Woods Pellet Company, Linkletter and Sons and Linkletter Timberland. My family has been working in the woods for 53 years. Our company structure, by design, goes from stump to customer.

With the recent completion of Athens Energy, the puzzle is now complete. I'd like to explain that. We own 45,000 acres of land, we have our own forest crews, we have trucking and we sort and high-grade the wood. We use every bit of the wood.

The biomass goes to the biomass plant. But before it can be put in the biomass plant, it is screened and it will screen out any good chips and make pellets out of it. The pulp wood will go to the pellet plant. And the logs will go to the sawmills which we then, in turn, repurchase the sod that's in the chips from the sawmills to making the pellets or biomass. We also repurchase back from the sawmills. So we're pretty integrated with most of the companies in the State of Maine.

There is no waste, and we're looking into something else to eliminate waste. We're trying to get the highest and best use of our ash. We're currently getting rid of it all now on either farmer's fields or other situations, but we're looking into some other things we can do with our byproducts like biochar or activated charcoal. So there's all kinds of innovation trying to go on in the woods.

The idea for Athens Energy was conceived four years ago when we had very low temperatures and very high electrical costs. Maine Woods Pellet could not sustain the cost of electricity that winter.

So Athens Energy was built on the site that the developmental company has so we were able to utilize multiple, multitude equipment, between both companies.

I spent plenty of time traveling to Sweden and British Columbia to observe operations of existing power plants mated up to either sawmills or pellet mills, and they're very impressive.

CHP is prevalent in other countries where they have been utilizing biomass in the electrical portfolio for many years. We found each situation that we looked at to be different and built to best serve their host and user companies. Some companies were making steam. Some companies went the route I did with organic rank and cycle and we're making hot air and we were drying that way.

When you run a pellet mill drying is one of the most expensive costs there is. We have to reduce. It takes two tons of wood to make one ton of pellets. Fifty percent of all of your wood goes up the stack as moisture. We evaporate a 55-gallon barrel of water every minute.

Athens Energy is an eight and a half megawatt CHP that delivers, not only power, but nine million BTUs of hot water and 36 million BTUs of hot air to Maine Woods Pellet which is used in drying other pellet stock. It's pre-drying the stock.

The new CHP provides stability for the pellet company by mitigating the cost of drying frozen wood in the winter months and allowing us to run at full speed during months when pellets are in most demand. It also allows us to expand production in the future which we hope will increase jobs.

Athens Energy is an organic rank and cycle which is different than most CHP. The ORC boiler and the turbine medium is not water, it is oil. The oil is completely circulated and filtered and re-used over and over again. And we go down once a year, and we may add to it. We'll check the stability of the oil. The only thing we have to watch out is that we don't burn the oil, then it will be ruined. It has to be replaced. But the computer takes care of that for that.

Since operations began about a year ago, we've seen boiler efficiencies, by itself, in the 30 percent. And when we calculate the use of the waste heat that we are able to get out of oil, we're 62 percent efficient which is pretty amazing for CHP.

Athens Energy has been a real boost for the loggers, truckers, landowners, part suppliers and many of the local businesses within 100 miles of Athens. Currently, Athens Energy purchases waste back and chips from about 21 sawmills.

The CHP model, if spread across Maine, could truly be a shot in the arm for the economic growth and stability of Maine's forest industry. Also, if situated correctly around Maine, could truly benefit rural Maine and could help boost and stabilize the grid.

We have a great resource in Maine, our woods. It is imperative to utilize every bit of it. We must have a market for the biomass generated from the logging operation. This keeps the woods floor cleaner, not only for faster regeneration, but also reduced fire hazard.

The idea of CHP is based on a stable, long-term, power purchase agreement with utilities. This, along with stable RECs from state's recognizing the value of baseload and renewable power, is crucial.

The two programs we were able to take advantage of in building Athens Energy were the new market tax credits and investment

tax credits. These programs were essential to get the power plant built.

During this huge undertaking, we were bound to encounter some pitfalls from the power purchase agreement to the inner connection agreement, the electrical connection to the first power to the grid.

The learning curve was daunting. From the financing, the transportation, the construction during the winter months in rural Athens, at times, these steps seemed never ending. With a prize in sight, though, at the end we have persevered.

CHP is an efficient approach to reducing energy costs. I believe that they not only reduce energy costs, but they could also stabilize those costs for years to come. Additionally, they will promote many internal efficiencies between the host and user companies. They also promote efficiencies in companies such as sawmills who don't have to landfill their waste by-products.

But we need the carrot on a stick to get people to invest millions of dollars on CHPs that now show some savings to both host and user companies. We need a thermal REC class, federal or regional, that rewards the baseload at biomass plants that is either a stand-alone federal or carved out of existing regional RECs that are now available. Both New Hampshire and Massachusetts have adopted thermal RECs, and I believe that Maine and the Federal Government should take a look at these positive aspects that are happening in these two states.

Another thing that's happened is that the State of Vermont has mandated that by 2030, 60 percent of all public and school buildings shall be heated by biomass, either pellet or chip form.

Just look at the positives. Maine has the highest biomass boiler conversion potential in the Eastern U.S. We have millions of acres of renewable forests, and Maine has the most capable logging industry available.

Yes, our power costs are high, but most of our power costs are transportation and distribution charged by utilities. I have found that these costs are historically higher than the cost of the power itself. It is possible to eliminate the T&D by locating insulation such as Robbins Lumber, near an existing facility, while possibly enticing new businesses with thermal RECs getting them to relocate and have a symbiotic relationship.

Additionally, the advantages to the environment are many. The carbon neutrality, the reduction of CO₂ and the decreasing dependency on foreign oil, top the list. Imagine the emissions savings when you compare the transportation of biomass from a 50-mile radius of a facility to the transportation of oil from the southern part of the United States or worse yet, Saudi Arabia.

Even at the current rates biomass and pellets are cheaper and cleaner heat source than oil and propane.

In closing, I believe my experience with CHP has been positive. The marriage with other businesses will help control energy costs, the disposal of waste byproducts, job creation, energy efficiency and is a win/win for the State of Maine, Maine businesses today, both existing and in the future.

Thank you for allowing me to share my thoughts, and I'm open for any questions.

[The prepared statement of Mr. Linkletter follows:]

**Testimony of
Robert Linkletter
President
Maine Woods Pellet Company
Field Hearing for the US Senate Committee on Energy and Natural Resources
Friday, October 6, 2017**

Good Morning Committee members, guests and the Robbins Family. My name is Robert Linkletter. Along with my brothers Richard and Bruce, we are the owners of Athens Energy; Maine Woods Pellet Company, and Linkletter and Sons. My family has been working in the woods for over 53 years. Our company structure, by design goes from stump to customer. With the recent completion of Athens Energy the puzzle is complete.

The idea for Athens Energy was conceived four years ago when we had a very low temperatures and very high electrical costs. Athens Energy was built on the same site as the pellet company so that we are able to utilize a multitude of equipment for both companies.

Time was spent traveling to Sweden and British Columbia to observe the operation of existing power plants. CHP is prevalent in other countries where they have been utilizing biomass in their electric portfolio for many years. We found each situation to be different and built to best serve their host and user companies. With this research we were able to shape a plan to best suit our needs.

Athens Energy is an 8.5 megawatt C.H.P. that delivers not only power, but 9,000,000 Btu's/hr of hot water and 36,000,000 Btu's/hr of hot air to Maine Woods Pellet which is used in the drying of pellet stock. The new CHP provides stability for the pellet company by mitigating the cost of drying frozen wood in the winter months and allowing us to run at full speed during the months when pellets are in most demand. It will also allow us to expand production in the future, which we hope will increase job creation.

Athens Energy is an Organic Rankine Cycle, which is different than most CHP's. The ORC boiler and turbine medium is oil not water. Water is only used to cool the oil so that it can be reheated. Since operations began a year ago we have seen boiler efficiencies in the 30's and calculating the use of the waste heat it puts our efficiency at approximately 62%.

Athens Energy has been a boost for loggers, truckers, land owners, part suppliers and many other local businesses within a hundred miles of Athens. Currently Athens Energy purchases waste bark and chips from 21 sawmills. The CHP model, if spread across Maine, could truly be a shot in the arm for the economic growth and stability of Maine's forestry industry. Also, if situated correctly, could truly benefit rural Maine.

We have a great resource in Maine, our woods. It is imperative to utilize every bit of it. We must have a market for the biomass generated from the logging operation. This keeps the woods floor cleaner, not only for faster regeneration but also reduces fire hazard.

The idea of a CHP is based on a stable long term power purchase agreement with utilities. This along with stable R.E.C.'s from states recognizing the value of base loaded renewable power is crucial. The two programs we were able to take advantage of in building Athens Energy were the new market tax credits and investment tax credits. These programs were essential to getting the power plant built.

During this huge undertaking we were bound to encounter some pitfalls. From the power purchase agreement, to the interconnection agreement, the electrical connection to the first power to the grid the learning curve was daunting. From the financing, transportation and construction during the winter months in rural Athens at times these steps seemed never-ending. With the prize in site, at the end we have persevered.

So are CHP's an efficient approach to reducing energy costs? I believe that they not only reduce energy costs, but they also could stabilize those costs for years to come. Additionally, they will also promote many internal efficiencies between the host and user companies. They also promote efficiencies in companies such as sawmills who don't have to landfill their waste bi-products.

In closing, I believe my experience with CHP's has been positive. The marriage with other businesses will help control energy costs, the disposal of waste bi-products, job creation, energy efficiencies and is a win-win for the State of Maine, Maine businesses both existing and future.

Thank you for allowing me to share my thoughts with the committee this morning.

Senator KING. Thanks, Bob.

Our next guest is Mark Thibodeau, who is a Regional Manager for ReEnergy which owns, is it two plants in Maine?

Mr. THIBODEAU. Four.

Senator KING. Four plants in Maine. I know the Ashland one the best. These are stand-alone biomass plants, as opposed to what we are looking at here.

So talk to us about that part of the industry. Is it possible to convert it to make more thorough use of the resources that you have?

**STATEMENT OF MARK THIBODEAU, REGIONAL MANAGER,
REENERGY BIOMASS OPERATIONS LLC**

Mr. THIBODEAU. Alright. Thank you, Senator King and members of the Committee. I appreciate the opportunity to submit testimony regarding biomass energy.

Today I'm going to discuss the role of biomass energy in the rural forest economy, a significant role it could play in reducing energy costs for adjacent industrial users and how the Federal Government could support the biomass energy sector and efforts to increase home grown energy and reduce costs.

My name is Mark Thibodeau. I'm a lifelong Mainer. A graduate of Maine Maritime Academy, I live in Carrabassett Valley and I serve as Regional Manager for ReEnergy Biomass Operations. I have worked in the Maine biomass power industry for the past 14 years. I've been fortunate to have been a plant manager at five of the six remaining viable biomass plants in the state. I also spent two years in the California biomass industry. And I think it's important to recognize the similarities and some of the lessons learned, some of those valuable lessons that we can learn from other states' biomass industries.

I've been involved with numerous business development opportunities to co-locate industry next to a stand-alone biomass plant, but unfortunately, none of those projects have come to fruition. There have been many hurdles, including regulatory and financing challenges and a need to secure off-take contracts.

But one of the biggest hurdles has been the uncertain, long-term viability of the biomass plant itself. All the plants in Maine participate in volatile energy and REC markets. This volatility and fear of a biomass facility closure often encourages would-be investors to look at other states, countries and forms of energy.

In Maine, ReEnergy employs approximately 100 people and supports an estimated 700 indirect jobs. The company's annual economic impact in the state exceeds \$90 million. We own and operate four biomass power facilities in Maine. These facilities are located in Ashland, Fort Fairfield, Livermore Falls and Stratton.

We use sustainably harvested forest residue as fuel to generate homegrown, renewable electricity. We support jobs in the logging and trucking industries and at mills providing an end market for wood residues. ReEnergy's facilities generate 1.2 million megawatt hours of baseload, renewable electricity each year which is enough to supply power to about 154,000 homes. Our facilities have achieved certification through the sustainable forestry initiative standard which verifies that our biomass procurement programs promote land stewardship and responsible forestry practices.

Our facilities are an integral part of Maine's forest products industry, as a lot of the testimony has spoken to today which has suffered a great deal in recent years with the paper mill closures, loss of some biomass plants. And we recently analyzed a list of fuel suppliers here in Maine and determined that we conduct business with 88 logging and trucking contractors, 20 mills—comprising of sawmills, chip mills, pellet mills and pulp and paper mills—and eight industrial landowners.

Unfortunately, ReEnergy's facilities in Maine are struggling financially due to record-low prices of wholesale electricity, and our two facilities in Aroostook County, Fort Fairfield and Ashland, are struggling more than others because they must pay transmission outcharges to wield their power to ISO New England power grid.

For those of you who aren't familiar, Northern Maine, Aroostook County, is on its own transmission system, its own power grid. It's not connected to ISO New England. It is connected to New Brunswick. We believe our power plants represent a significant economic development tool. Thus far, however, that promise has remained unharnessed. We hope to change that to preserve our plants and also to offer a benefit to existing and new industry interested in co-locating with us.

All of our facilities are located in rural areas. They are located adjacent to large tracts of vacant land that would be perfect sites for new industry and new jobs.

Some of our plants are adjacent to already existing industrial consumers. Our plant in Ashland, for example, is located in an industrial park and town leaders there are working aggressively on a plan to recruit new industry to that park.

Our biomass plants are capable of delivering cost-effective thermal energy, steam and hot water, electricity and CO₂ to an industry or industries located on adjacent property. If we could sell our energy directly to a co-located industry we would become more efficient and we would gain some revenue certainty instead of simply bidding into the volatile day-ahead, wholesale electricity market.

A company has already located next to us and companies interested in moving next to us would benefit if they were able to make use of affordable electricity and/or steam. Energy costs would, by definition, be more competitive in market rate energy.

Since electricity and steam supply provided directly from a ReEnergy facility would avoid capital and maintenance costs, it would avoid electrical transmission and distribution costs and a long-term agreement would hedge market price risk for us.

I don't believe microgrids are as viable an option for the State of Maine as they are in some European countries. I feel the infrastructure to build a microgrid in rural areas is cost prohibitive in its purest form. There may be some hybrid versions of a microgrid that could hold merit in Maine, but I feel we are better suited to focus on co-location opportunities surrounding our existing stand-alone biomass plants, similar to what Mr. Linkletter has talked about today and is similar to what Robbins Lumber is executing now.

In addition, the surrounding infrastructure is already built and has been paid for the past 20, 30 years and wouldn't need to be replicated. The surrounding markets, the trained workforces, the

transmission lines, the utilities and roadways are well established around our facilities which would significantly reduce future capital costs.

Our long-term viability depends upon finding a co-located industry in using our combined heat and power capabilities, that our facilities have some significant combined heat and power capabilities due to the size of them.

We are working on a plan with Ensign Technologies to locate a renewable fuel oil manufacturing facility next to our plant in Ashland, but we are capable of servicing more load than that. In order to further our goals ReEnergy will soon issue a request for proposals to companies interested in a co-location opportunity. We're doing this request for proposals for all four of our sites in the State of Maine.

The challenges are significant. Direct connections between a power plant and an industrial user tend to be challenged by the regional T&D utility and are likely to be legally impossible if they cross the public right away. There are significant infrastructure costs to construct power and steam lines and add this to the fact that our plants are already struggling due to low electricity costs.

Senator Angus King, a member of the Committee, has been a leader in championing biomass energy with efforts such as carbon neutrality legislation and the BTU Act. I urge the Committee to join him in supporting the biomass energy sector, generally, so our projects are more sustainable and able to pursue projects like co-location projects that make use of combined heat and power. I ask the Committee, specifically, to:

- Pursue federal policy parity across renewables. Biomass provides forest management services it is not compensated for and competes in an unfair marketplace in which other renewable forms of energy receive Section 45 production tax credits that are not open to us. FERC also does not properly value baseload sources of energy, facilities that run consistently and are needed to supplement intermittent sources like wind and solar. EPA has withheld final clarity regarding the carbon benefits of biomass power. And recently, the DOE-proposed rule on baseload power supply with fuel storage is something that was just recently introduced and we feel it could be a very positive influence on biomass power in the future, especially around the recent natural disasters the country has faced.
- Protect and expand the Renewable Fuel Standard. Ensure that advanced biofuel continues to be eligible to sell Renewable Identification Numbers, or RINs. In addition, encourage EPA to rule that biomass electricity qualify for the Renewable Fuel Standard for powering electric vehicles.
- Support the use of biomass power as a source of secure, resilient power at U.S. military installations. ReEnergy owns and operates a 60-megawatt biomass plant located inside a fence line at Fort Drum Army Base in New York.
- Support continued funding for our grants and loans to support rural energy-related infrastructure.

And finally, in closing, I just thank you. Thank you, Senator King. I appreciate the opportunity to speak to you today. Thank

you to Robbins Lumber for hosting and providing a great tour. I welcome any questions.

[The prepared statement of Mr. Thibodeau follows:]



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**Testimony of Mark Thibodeau, Regional Manager
ReEnergy Biomass Operations LLC
October 6, 2017
Submitted to
The U.S. Senate Committee on Energy and Natural Resources
Field Hearing to examine efficient approaches to reducing industrial energy costs**

I appreciate the opportunity to submit testimony regarding biomass energy. I will discuss the role of biomass energy in the rural forest economy; the significant role it could play in reducing energy costs for adjacent industrial users; and how the federal government could support the biomass energy sector and efforts to increase homegrown energy and reduce costs.

My name is Mark Thibodeau. I am a lifelong Mainer and a graduate of Maine Maritime Academy. I live in Carrabassett Valley, Maine and I serve as regional manager for ReEnergy Biomass Operations ("ReEnergy") in Maine.

I have worked in the Maine biomass industry for the past 14 years and have been fortunate to have been a plant manager at five of the six remaining viable biomass plants in the state. I also spent two years in the California biomass industry, which has some similarities and can provide some valuable lessons. I have been involved with numerous business development opportunities to co-locate industry next to a standalone biomass plant and unfortunately none of those projects have come to fruition. There have been many hurdles, including regulatory and financing challenges, and the need to secure off-take contracts. But one of the biggest hurdles has been the uncertain long-term viability of the biomass plant itself. All of the plants in Maine participate in volatile energy and REC markets. This volatility and fear of a biomass facility closure often encourages would be investors to look at other states, countries, and forms of energy.

In Maine, ReEnergy employs approximately 100 people and supports an estimated 700 indirect jobs. The company's annual economic impact in the state of Maine exceeds \$90 million. We own and operate four biomass power facilities in Maine. At these facilities – in Ashland, Fort Fairfield, Livermore Falls and Stratton – we use sustainably harvested forest residue as fuel to generate homegrown, renewable electricity. We support jobs in the logging and trucking industries and at mills, providing an end-market for wood residues. ReEnergy's facilities generate 1.2 million megawatt-hours of baseload renewable electricity each year, which is enough to supply power to 154,000 homes. Our facilities have achieved certification to the Sustainable Forestry Initiative® (SFI®) Standard, which verifies that our biomass procurement programs promote land stewardship and responsible forestry practices.

Our facilities are an integral part of Maine's forest products industry, which has suffered a great deal in recent years. We recently analyzed the list of fuel suppliers here in Maine, and determined that we conduct business with 88 logging/trucking contractors; 20 mills (sawmills, chip mills, pellet mills, and pulp & paper mills); and 8 industrial landowners.

Unfortunately, ReEnergy's facilities in Maine are struggling financially due to record-low prices of wholesale electricity. Our two facilities in Aroostook County are struggling more than our other two facilities, because they must pay transmission outcharges to wheel their power into the ISO-New England power grid.

We believe our power plants represent a significant economic development tool. Thus far, however, that promise has remained unharnessed. We hope to change that -- to preserve our plants and also to offer a benefit to existing and new industry interested in co-locating with us.

All of our facilities are located in rural areas. They are located adjacent to large tracts of vacant land that would be perfect sites for new industry and new jobs. Some of our plants are adjacent to already existing industrial consumers. Our plant in Ashland is located in an industrial park, and Town leaders there are working aggressively on a plan to recruit new industry to that park. Our biomass power plants are capable of delivering cost-effective thermal energy (steam, hot water), electricity and CO₂ to an industry or industries located on adjacent property. If we could sell our energy directly to a co-located industry, or industries, we would become more efficient and we would gain some revenue certainty instead of simply bidding into the volatile day-ahead wholesale electricity market.

The companies already located next to us -- and companies interested in moving next to us -- would benefit if they were able to make use of affordable electricity and/or steam. Energy costs would, by definition, be more competitive than market-rate energy, since electricity and steam supply provided directly from a ReEnergy facility would avoid capital and maintenance costs, avoid electrical transmission and distribution costs, and a long-term agreement would hedge market price risk.

I don't believe microgrids are a viable option for the State of Maine as they are in some European countries. I feel the infrastructure to build a microgrid in rural areas is cost prohibitive in its purest form. There may be some hybrid versions of a microgrid that could hold merit in Maine but I feel we are better suited to focus on Co-location opportunities surrounding our existing standalone biomass plants.

In addition, the surrounding infrastructure is already built and has been paid for over the past 20-30 years and wouldn't need to be replicated. The surrounding markets, trained workforces, transmission lines, utilities, and roadways are well established around our facilities which would significantly reduce future capital costs.

Our long-term viability depends upon finding a co-located industry and using our combined heat and power ("CHP") capabilities. We are working on a plan with Enslyn Technologies to locate a renewable fuel oil manufacturing facility next to our plant in Ashland, but we are capable of servicing more load than that. In order to further our goals, ReEnergy will soon issue a Request for Proposals to companies interested in a co-location opportunity.

The challenges are significant. Direct connections between a power plant and an industrial user tend to be challenged by the regional T&D utility, and are likely to be legally impossible if they cross a public right of way. There are significant infrastructure costs to construct power and steam lines. And add this to the fact that our plants are already struggling due to low electricity costs.

Senator Angus King, a member of this Committee, has been a leader in championing biomass energy, with efforts such as carbon neutrality legislation and the BTU Act. I urge the Committee to join him in supporting the biomass energy sector generally so our projects are more sustainable and able to pursue projects like co-location projects that make use of combined heat and power. I ask you specifically to:

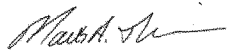
- Pursue federal policy parity across renewables: Biomass provides forest management services it is not compensated for, and competes in an unfair marketplace in which other renewable forms of energy receive Section 45 Production Tax Credits that are not open to us. FERC also does not properly value "baseload" sources of energy (facilities that run consistently and are needed to supplement intermittent

sources like wind and solar). EPA has withheld final clarity regarding the carbon benefits of biomass power.

- Protect and expand the Renewable Fuel Standard (“RFS”). Ensure that advanced biofuel continues to be eligible to sell Renewable Identification Numbers, or RINs. In addition, encourage EPA to rule that biomass electricity qualify for the RFS for powering electric vehicles.
- Support the use of biomass power as a source of secure, resilient power at U.S. military installations.
- Support continued funding for grants and loans to support rural energy-related infrastructure.

Thank you very much for the opportunity to speak to you today.

Respectfully,



Mark Thibodeau
Regional Manager

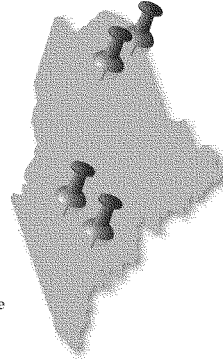
ReEnergy Biomass Power Plants in Maine: Creating Economic Development Opportunity

ReEnergy Holdings owns and operates four utility-scale renewable energy generating facilities in Maine that use locally sourced, sustainably harvested forest-derived woody biomass as fuel. ReEnergy is one of the largest biomass power companies in the United States, with 245 megawatts of installed renewable energy generation capacity. ReEnergy employs approximately 100 people in Maine and supports an estimated 700 indirect jobs. The company's economic impact in the state of Maine exceeds \$90 million.

Each facility is adjacent to undeveloped land that is available for lease or sale, and companies locating on those parcels could make use of affordable electricity and/or steam.

ReEnergy's biomass power plants are capable of delivering cost-effective thermal energy (steam, hot water), electricity and CO₂ to an industry or industries located on adjacent property. Energy costs for an entity locating at this site will be more competitive than market-rate energy, since electricity and steam supply from ReEnergy's facilities should result in avoided capital and maintenance costs, avoided electrical transmission and distribution costs, and the ability to enter into a long-term agreement to hedge market price risk. Specifications are available upon request.

A business locating a new enterprise in Maine may be in a position to take advantage of a robust suite of economic development incentives available at the local and/or state level.



THE BENEFITS OF BIOMASS POWER

Biomass power facilities provide sustainable electricity from responsibly harvested green forest residue biomass and unadulterated wood. ReEnergy has been certified as having achieved the Sustainable Forestry Initiative® (SFI®) Standard, which verifies that ReEnergy power facilities procure their forest materials from qualified logging professionals who utilize best management practices and operate with an ethic of land stewardship that integrates reforestation and protects soil, air, water resources, biological diversity and aesthetics. The material we use as fuel otherwise would have been left to decompose on forest floors, landfills or residential lots, resulting in the production of harmful methane gases and contributing to the risk of fire. In addition to the environmental benefits associated with biomass power, these facilities are very reasonably priced forms of renewable baseload energy.

Biomass power:

- ▶ provides continuous, affordable, renewable energy;
- ▶ supports local, rural jobs;
- ▶ makes use of abundant local fuel supply;
- ▶ reduces reliance on fossil fuels;
- ▶ contributes to fuel diversity;
- ▶ enhances reliability of electrical grid; and
- ▶ keeps energy dollars in the region as opposed to exportation.

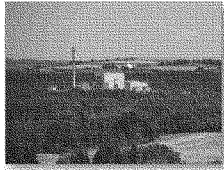
CONTACT sboggess@reenergyholdings.com
www.reenergyholdings.com





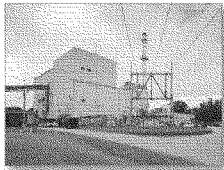
REENERGY ASHLAND

- 63 Really Road, Ashland, Maine 04732 (Aroostook County)
- 39-megawatt gross generating capacity
- Annual net MWh of 284,000, enough to supply about 37,000 homes
- In-service date of 1993
- 21 direct jobs; an estimated 150+ indirect jobs
- Annual spending of \$23 million at full capacity
- 50+ acres of vacant land immediately adjacent to the energy facility located in Ashland plus another 40+ acres available in the Plantation of Garfield:
 - Access to major state road networks to the north and east to the Canadian Border plus to the South to all markets in the lower 48 states. Located approximately one hour from I-95.
 - Adjacent to the largest privately owned, contiguous forestland base in the United States. With over 8 million total acres, this forestland is accessed by a privately built and maintained off-road network extending over 90 miles to the west, northwest and southeast to the Quebec Border.
 - Adjacent to a rail line owned by the State of Maine and operated by Maine Northern Railroad, a subsidiary of JD Irving
 - Located within two hours of two airports
 - Located in a Municipal Tax Increment Financing District
 - Located in a Pine Tree Zone



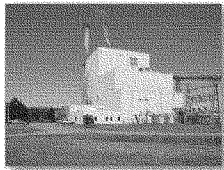
REENERGY FORT FAIRFIELD

- 78 Cheney Grove Road, Fort Fairfield, Maine 04742 (Aroostook County)
- 37-megawatt gross generating capacity
- Annual net MWh of 260,000, enough to supply about 34,000 homes
- In-service date of 1987
- 26 direct jobs; an estimated 150+ indirect jobs
- Annual spending of \$22 million at full capacity
- A 60-acre vacant parcel is located adjacent to the energy facility:
 - Easy proximity to I-95, US 1A, ME-161, and the Trans-Canada Highway (approximately 10 miles away in Perth-Andover, New Brunswick)
 - Adjacent to a rail line owned by the State of Maine and operated by Maine Northern Railroad, a subsidiary of JD Irving
 - Proximity to four international airports in 4 (+/-) hours: Bangor, Portland, Fredericton and Moncton. Daily domestic air service to Boston is available in Presque Isle (15 mins).
 - Located in a Pine Tree Zone



REENERGY LIVERMORE FALLS

- 267 Diamond Road, Livermore Falls, Maine 04254 (Androscoggin County)
- 39-megawatt gross generating capacity
- Annual net MWh of 284,000, enough to supply about 37,000 homes
- In-service date of 1992
- 25 direct jobs; an estimated 150+ indirect jobs
- Annual spending of \$22.5 million at full capacity
- 50-acre vacant parcel is located adjacent to the energy facility:
 - Close to major highways; approximately 30 miles from I-95
 - Intermodal facility within an hour
 - Located within two hours of three major airports and two ports
 - Located in a Municipal Tax Increment Financing District
 - Located in a Pine Tree Zone



REENERGY STRATTON

- 27 Fox Farm Road, Stratton, Maine 04982 (Franklin County)
- 48-megawatt gross generating capacity
- Annual net MWh of 355,000, enough to supply about 46,000 homes
- In-service date of 1989
- 28 direct jobs; an estimated 200 indirect jobs
- Annual spending of \$25.5 million at full capacity
- 100-acre vacant parcel is located adjacent to the energy facility:
 - Close to major highway Route 27
 - Within 30 minutes of the Canadian market
 - Intermodal facility within two hours
 - Located within 2.5 hours of three major airports and two seaports
 - Located in a Pine Tree Zone

The information supplied herein is provided without any representation, warranty or guarantee, expressed or implied as to its accuracy. Prospective co-locators should conduct an independent investigation and verification of all matters deemed to be material.

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Senator KING. Finally, we have Suzanne MacDonald, who is the Community Energy Director of the Island Institute. The islands, of course, have some unique challenges when it comes to energy.

One of the interesting things about Alaska that I learned when I went to Bethel, Alaska, with Senator Murkowski, was that Alaska largely has no grid. It is so large and so dispersed that all they have are little, individual pockets of energy except around the larger cities like Anchorage which creates the unique challenges that they have been dealing with. That is something that Lisa Murkowski and I have been trying to address together.

So, Suzanne, give us a perspective of a different orientation to this discussion.

Thank you.

STATEMENT OF SUZANNE MACDONALD, COMMUNITY ENERGY DIRECTOR, ISLAND INSTITUTE

Ms. MACDONALD. Great. Thank you, Senator King, for the opportunity to testify here today and to the Robbins Family for hosting us. It's great to be in Midcoast Maine with you all.

As Senator King said, my name is Suzanne MacDonald. I'm the Community Energy Director at the Island Institute. We're a community development organization who works, that works here on the coast of Maine. For the past decade I've been working with island communities to help them better understand and confront their very unique energy challenges. I'm honored to be here today to bring to you a community perspective of how microgrids and CHP are important to the State of Maine, especially on our islands.

For 34 years the Island Institute has worked to sustain Maine's island and coastal communities and exchange ideas and experiences to further the sustainability of communities here and elsewhere.

One hundred years ago, there were more than 300 islands with year-round populations in Maine, and now only 15 remain. We have, sort of, our own crisis here. Shifting economic opportunities, particularly related to fishing and commerce, coupled with an increasing cost of living are really threatening these places that we consider to be a part of the identity and heritage of our state.

Energy is a part of the problem. The people we serve pay some of the highest energy costs in the nation, up to \$0.70 per kilowatt hour and up to \$1.00 or more per gallon for heating fuels than what folks pay on the mainland.

We partner with grid-tied and islanded grid communities to improve energy systems, not out of a drive to be innovative, but out of a need to survive. On a daily basis, we are confronted with how high energy costs can make or break the viability of a business or be a factor that forces families to consider moving off island.

Four recommendations have emerged from our work on microgrids and other community energy initiatives: Make meaningful investments that blend infrastructure upgrades with investment in local leaders; take a holistic approach to tackling energy challenges to enhance economic and community development outcomes; share what works to leverage lessons from elsewhere; and create reasonable exceptions for remote or islanded communities to avoid unintended impacts of policies.

The story of nearby Monhegan Island illustrates many of these themes. The small island recently held a ribbon-cutting ceremony for a USDA-funded, community-owned project that integrates diesel-fired microturbines, the Capstone ones referenced earlier, with heat recovery and some solar. The new system is more reliable and cleaner burning, but what really stands out in this story are the Herculean efforts of community members. First just to keep the lights on and then to use this project as a platform for broad community benefit. Essentially, to be as resourceful as they can and do the most with what they have in opportunities with this project.

For years my friend and plant operator, Chris Smith, would have to come off his lobster boat in the evenings and be faced with persistent failures in equipment that came from a vendor that had since gone bankrupt and was unable to help him. Bookkeeper Marion Chioffi spent winters trying to balance the municipal power company's cash flow so that they'd have enough money in the bank when the fuel boat arrived again in the spring. Once awarded from funds from USDA, Chris had to navigate new Tier 4 emissions requirements and then mobilize a power system upgrade dealing with the logistics of being 12 miles in the middle of the ocean. Marion would spend evenings working on grant administration after a full day working as an innkeeper on the island. Together, with Jenn Pye, the curator at the nearby museum, Monhegan Museum of Art and History, they found a way to make use of the power station's waste heat, providing a more affordable source for space heating and dehumidification for its world-class collection. The students in the one-room schoolhouse tracked the project closely and even invested in their own, curriculum-based, energy efficiency projects. They had a pizza party to celebrate when they cut their electric bill. By linking energy to other community priorities, Monhegan is enhancing its sustainability, its survivability.

Fortunately, Monhegan didn't have to go it alone or reinvent the wheel. Community leaders were able to make use of the DOE-funded, Islanded Grid Resource Center network, to gain critical, on-the-ground insight from peers on the front lines on other New England islands, in Alaskan villages and even from Hawaii. They searched far and wide to find a set of committed and resourceful engineers and vendors and had an extra set of hands from an Island Institute fellow who helped them with community outreach. Now, as they think about the next steps of their energy transition, they're benefiting from technical assistance from DOE and NREL.

We believe that microgrids, CHP and other innovative energy strategies can greatly benefit the natural resource based industries in rural communities in this state and beyond and that the Maine islands can provide some important lessons. But, as you've heard today, these projects can be a really heavy lift, especially in remote areas.

Senator King, you noted a couple of years ago at one of our events that we're in the midst of an energy revolution and that the islands are Bunker Hill. We hope that as we move forward, we can continue to take lessons from what we're doing here and find ways to invest in project leaders and their host communities.

Please think of these stories as we think about the future of the sector and to put in my own little plug for policy, we do think that

the isolated microgrid components of the Senate bill 1460 are a really great way to do this.

In making such investments, we believe that energy projects will result in more robust economic gains and truly help rural communities to thrive.

Thank you again, Senator King, for the opportunity to testify. I want to recognize the very hard work of your very committed and resourceful staff and also to DOE for its continued investments here on the coast of Maine.

Thank you.

[The prepared statement of Ms. MacDonald follows:]



**Testimony of Suzanne MacDonald
Community Energy Director, Island Institute**

**Submitted to the
U.S. Senate Committee on Energy and Natural Resources**

**Field Hearing to Examine Efficient Approaches to Reducing Industrial Energy Costs
Searsmont, Maine
October 6, 2017**

I. Introduction

Senator King, members of the Committee, and the community of Searsmont, thank you for the opportunity to testify today. My name is Suzanne MacDonald and I'm the Community Energy Director at the Island Institute, a non-profit organization based in Rockland, about 30 minutes down the road from here. It's an honor to be able to host you here in Midcoast Maine and discuss the intersect between energy, economy, and community sustainability in rural parts of our state and nation.

Senator King, I also want to thank you for your leadership on the energy issues that face our state. If not for your storytelling abilities, Mainers would not be so acutely aware of the impact of our energy choices. I also appreciate your keen understanding of the issues we face on the islands: two years ago, when you delivered the keynote address at the 2015 Island Energy Conference – an event that draws 150 local energy leaders from New England islands, Alaska, and Hawaii – you noted that, **“we are in the midst of an energy revolution and the islands are Bunker Hill.”** The battle to build more resilient economies is indeed daunting, but we are eager to share what we are learning. As you know, island communities can serve as microcosms for the rest of the world, providing valuable lessons for other communities and other sectors as they consider microgrids and distributed energy systems.

I also want to recognize the U.S. Department of Energy for the technical assistance it provides to Maine's island communities and for the support it has given the Island Institute and our partners from around the U.S. so that we can exchange lessons learned. We have seen first-hand the value of the department's involvement and deeply appreciate the assistance we have received from the WINDEXchange and State Energy Programs, as well as the Energy Transition Initiative.

II. Island Institute

I've spent the last decade working with islands and other remote communities to help them better understand and confront their unique energy challenges, primarily at the Island Institute, a 34-year-old community development organization. Our staff of 55 works to sustain Maine's island and remote coastal communities and exchange ideas and experiences to further the sustainability of communities in Maine and elsewhere. We work across three strategic priorities: strengthening local economies, education and leadership for the future, and delivering and sharing solutions. We're working with local partners to tackle a suite of complex challenges including access to broadband, diversifying livelihoods, and lowering energy costs, all with the end goal of making the Maine coast a more viable place to live, work, and raise families.



III. Maine's Island Communities

The Island Institute's primary constituents are the residents of the remaining 15 year-round, unbridged islands in the Gulf of Maine (in 1900, there were more than 300 islands with year-round communities), as well as coastal communities from Portland to Eastport, next to the Canadian border. While several of our islands have communities of less than 100, collectively, the islands have a year-round population of approximately 4,500 residents that can nearly triple during the summer months; our 120 coastal and island communities have a population of approximately 450,000, 34% of the state's population.

Not unlike much of the rest of Maine and other isolated areas of the U.S., our partner communities are heavily reliant on the natural resources that surround them; in Maine, that is primarily commercial lobstering. It is worth noting that the American Lobster is the single most valuable species of fish landed in the entire country and 80% of the lobster catch comes from Maine. Three of Maine's communities - Rockland, Vinalhaven, and Stonington - landed about \$114 million dollars worth of lobster in 2015, almost equal to the value of the combined commercial fisheries in New Hampshire, Rhode Island, and Connecticut. In 2016, Maine lobster required over 270,000 commercial fishing trips, more trips than all the commercial fisheries in any other state on the East Coast. Virginia fishermen took the next most, with 220,000 trips aggregated across all of the fishermen in the state. Despite the lobster's prominence in Maine's economy and its apparent success on paper, the fishery is facing a variety of economic and environmental challenges. Whether it is diesel for lobster boats and trucks to transport the 130,000,000 pounds of live lobsters fishermen caught in 2016 or electricity to power bait coolers, co-ops, and the rest of the lobster supply chain, inexpensive energy is a cornerstone of a thriving coast.

Despite our need for affordable energy to power our economy, Maine's island communities pay some of the highest energy costs in the nation. While many of our islands are connected to the mainland grid by submarine cable, several communities have had to use local utilities, mostly electric cooperatives, to finance submarine cables and on-island grids. The resulting rates range from \$0.28 to \$0.39 per kWh. On the islands where laying a cable is cost prohibitive, communities have relied on antiquated diesel generators. In addition to age and maintenance concerns, these systems require the importation of fuels year-round. The resulting electricity rates in these communities are in the \$0.70 per kWh range. Unlike ratepayers in other isolated regions of the U.S., Maine island ratepayers do not receive any subsidy for their power bills.

Island energy challenges are even more pronounced when it comes to heating. While Maine has the distinction of having both the oldest building stock and the highest dependency on home heating oil in the country, this combination is even more pronounced on islands. These small communities have no hope for natural gas service, and heating fuels often cost a dollar or more than they do on the mainland. We often hear residents on the outer islands are kept up at night when the harsh winter winds hammer their exposed communities, worrying as much about the impact on their wallet as they are about the structural integrity of their home.

As we have been discussing today, high energy costs compound to create massive economic implications for residents, business owners, and municipalities in ways that can threaten the long-term viability of communities. Since energy is a critical input in rural economies, high costs create barriers and limit options when seeking to maximize the profitability of existing industries or to diversify livelihoods. Proactively investing in strategies to lower costs is imperative if we hope to be able to respond to the shifting economic, ecological, and social conditions of our world today.



Just like many of the forestry sector's host communities in northern and western Maine, our island communities are at the edges. Being a frontier community means that we often face complex challenges, ranging from transportation logistics to limited service providers and the ability to replace aging equipment. But more often than not, we see how these challenges drive innovation and lead to important breakthroughs out of the need to "get it done." When it comes to energy, the quest to reduce costs means reducing our reliance on imported sources through energy efficiency measures and the integration of cost-effective renewable energy. Energy efficiency appeals to our Yankee heritage of "doing more with less," and renewables appeal to our "make do with what you have" ethic. It's my hope that these themes, and the projects that have resulted, resonate with the forest products sector.

IV. Investing in Projects: Island Case Studies

Maine's islands exist as a part of a cohort of six historically diesel-powered islands in New England: Block Island in Rhode Island; Cuttyhunk and Naushon in Massachusetts; the Isles of Shoals in New Hampshire; and Matinicus and Monhegan in Maine. For the past five years, each of these islands has been working to diversify local electricity generation with innovative projects that prioritize providing safe, reliable, and affordable power, while taking a systems-level approach to address multiple energy issues and maximize community-wide benefit. These projects primarily integrate large-scale solar and storage systems with diesel as backup, and have taken steps to optimize on-island loads like wastewater treatment plants to better match generation output.

While they lack a physical connection to a larger grid, these communities do not operate in a vacuum when it comes to mainland-based activities. For example, New England islands, including Martha's Vineyard and Nantucket, are at the frontlines of the U.S.'s emerging offshore wind industry. Islanders recognize that having privately-owned, grid-scale generation projects in their backyard can create opportunities - as we've seen on Block Island where the nation's first offshore wind farm enabled the community to lower costs and stop importing a million gallons of diesel per year - but that it can also create a host of challenges when it comes to evaluating the potential for grid interconnection, disruption of current community uses like commercial fishing, negotiation of community benefits, and public acceptance. As such, these communities must keep tabs on the state and regional initiatives at the same time as trying to solve their problems at home.

- **Monhegan Island, 12 miles out to sea, population 70**

Known as a lobstering community and artist colony, tiny Monhegan Island, just to southwest of Searsport, is emblematic of energy challenges that I have seen resonate from the Hawaiian island of Molokai, to Alaskan villages, to the Maine Woods. These include: complete dependence on costly, imported fuels; aging generation equipment; an inefficient grid; barriers to financing; and median household incomes below national and state averages, all of which combine to inhibit economic growth and challenge ideals around local ownership and public acceptance. Thanks to a group of committed local leaders, extensive partnerships, technical assistance, and federal support, Monhegan is using a host of strategies ranging from Combined Heat and Power (CHP), to community-wide efficiency initiatives, and investing in energy literacy and leadership to make deep progress on its challenges.

Plagued with persistent technical problems almost as soon as its centralized 300 kW diesel plant became operational in 2000, the quasi-municipal Monhegan Plantation Power District (MPPD) and its dedicated operators - primarily fishermen who were good at working on engines - tried for more than a decade to find the parts and service providers to help them to improve the quality of service



on the island. Eventually, skyrocketing fuel and maintenance costs forced MPPD to raise rates to \$0.70 per kWh. Lacking the capital to purchase new equipment, MPPD applied for and was grateful to be awarded a **USDA Rural Development High Energy Cost Grant** in 2013. Unfortunately, delays in grant administration meant that the equipment specified in the proposal - new Tier III engines to replace the Tier 0 ones in operation and a new switchgear to control them - could no longer be installed due to new EPA Tier IV requirements included in the Clean Air Act. For more than a year, MPPD was forced to delay the project and pursue alternatives that would meet the new federal requirements and local needs (Tier IV engines available at the time were vastly over-sized, costly, and extremely complex to operate, considering the realities of Monhegan and many Alaskan villages).

MPPD's evaluation led them to utilize diesel-fired microturbines in place of traditional gensets, creating the opportunity to recover waste heat from the of the four, cleaner-burning 65-kW units. Monhegan identified a nearby customer for the heat, the non-profit Monhegan Museum of Art & History, which uses it for dehumidification and space heating for its world-class collection. This initiative is part of a host of additional energy efficiency measures that the museum, supported by the National Endowment for Humanities and others, has implemented to lower energy costs, reduce the environmental impact of the museum, and improve preservation conditions. After more than five years of problem solving and effectively leveraging federal resources, the project was finally commissioned in 2017 and included including microturbines with new controls, solar photovoltaics, a heat recovery system, and, for the first time, remote monitoring.

While they will be more reliable, cleaner, and more efficient than the generators they replaced, the microturbines still run on diesel fuel. Some have asked why MPPD didn't choose a system relying on 100% renewable generation. We recognize that, in isolated areas, microgrid project design must consider operator and community priorities, fuel accessibility, challenges of intermittency, the need for redundancy, and the state of the grid. Decreasing dependency on diesel or traditional power sources to a new system requires a delicate balance of costs, technology, safety, and reliability in a remote environment, whether it be an island or a facility in the forest products sector.

Monhegan has another lesson for the forest products sector: energy efficiency investments made in advance of generation upgrades can help to reduce demand and enhance returns. Having learned first-hand about a similar effort on Naushon Island, MPPD invested in electrical efficiency measures through bulk purchases for its ratepayers before embarking upon the power station upgrade, impacting peak load, reducing the need for new generation, and providing ratepayers with some relief. In terms of thermal measures, leveraging Efficiency Maine grants and rebates, 87% of Monhegan's year-round homes have been weatherized through a community-based Weatherization Week program. Barging a spray foam insulation truck out to the island, which has no car ferry, was a once-in-a-lifetime opportunity for residents. Needless to say, the truck returned to the mainland empty. With these measures combined, Monhegan is likely the most energy efficient in the state of Maine.

- **Matinicus Island, 22 miles out to sea, population 74**

Maine's other diesel island is Matinicus Island, a community 22 miles out to sea with a population of 74. When AlexAnna Salmon, a community leader from the small Alaskan village of Igiugig, visited Maine in 2015, she noted the similarities between her home and Matinicus: small population, similarly-sized load, dependence on diesel, and high costs. Matinicus and Igiugig also share a vision for broadening the benefits of their energy systems (on Matinicus, waste heat from the plant is



piped into the nearby fire barn to keep water from freezing during the winter months), as well as a willingness to invest in alternatives like energy efficiency and renewable energy.

Unfortunately, Matinicus, like Monhegan and many Alaskan villages, has also struggled with the Tier IV requirements. These requirements are preventing the community from upgrading to more efficient generators that would reduce emissions from the current antiquated generation capacity but are Tier III instead of Tier IV. Today, the municipal power company is seeking the right technical and financial partners to make a significant shift in generation and build a solar-storage-diesel project. Fortunately, they stand to learn from the investments made by island colleagues in the region and other remote communities in the U.S. developing microgrid solutions.

New England microgrids also have the potential to learn from grid-tied island communities, and vice-versa.

- **Isle au Haut, 7 miles out to sea, population 73**

Isle au Haut is a small island currently connected by a 32-year-old, seven-mile unburied subsea cable that is essentially the equivalent of an extension cord to the mainland, providing power to the island at \$0.39 per kWh. In their evaluation of replacing the cable, local leaders are finding that it could be more cost-effective to give up their connection to the mainland and go with a local microgrid solution. Sized to meet their peak load in summer, excess solar power in the winter would be used to charge batteries as well as air source and hot water heat pumps in community facilities. Taking a page from the playbook of several Alaskan villages using excess wind power for space heating, Isle au Haut could utilize demand response technologies to further decreasing reliance on imported fuels to the island both in terms of electricity and.

- **Vinalhaven and North Haven Islands, 12 miles out to sea, population 1,520**

The microgrid sector can also learn from grid-tied islands that have the ability to simulate islanded energy scenarios. For example, in 2011, the Fox Islands Electric Cooperative, which serves 1,800 seasonal and year-round ratepayers on the islands of Vinalhaven and North Haven, used Fox Islands Wind, the coop's 4.5 MW wind power project, to pilot an innovative demand response project where, when pricing was advantageous to do so, excess wind power generated by the project during the winter months was sold on the island for space heating with electric thermal storage units instead of being exported to the mainland. The project demonstrated an opportunity for the coop to generate more revenue from the wind project and for homeowners, businesses, and non-profit organizations to reduce their heating costs by nearly 30%.

IV. Investing in People: Examples of Successful Capacity Building

While the microgrid sector is often dominated by discussion of technical and financial design, we believe that projects cannot be successful without simultaneously investing in local leaders. In the small communities that can benefit most from these systems, residents wear many hats and may have limited time and technical expertise to contribute to solving a problem, even if the motivation for change is high. Making a project like the one on Monhegan work is a tremendous lift that ultimately depends on empowered leaders, local ownership of solutions, and grounded partners. As such, it is crucial that any effort to expand the microgrid sector purposefully recognize and address these issues.

At the Island Institute, we seek to serve as a "bridging organization" that can invest in and connect communities to the resources they need to get the job done. Our work accomplishes these goals



through a suite of programs that enhance energy literacy, leadership, networking and peer-to-peer support, and technical and on-the-ground assistance - all of which we believe have relevance beyond the coast of Maine. With more than three decades of on-the-ground experience, we believe that we are uniquely positioned to play this role, and encourage others investing in this space to consider if there is a bridging organization that can help to invest in their efforts.

Examples of our efforts include:

- **Islanded Grid Resource Center**

When Matinicus resident Eva Murray heard AlexAnna Salmon's story of Iguigig, Alaska, she responded, "(it) really struck a familiar note. 65 kilowatts. 70 cents a kilowatt-hour. OK, we're in this together." This reaction is in part what prompted the Island Institute to partner with the Renewable Energy Alaska Project (REAP) to establish the DOE-funded Islanded Grid Resource Center (IGRC) in 2014, recognizing the similarities that remote communities in our region share. The IGRC was established to build a network of wind operators, government agencies, researchers, technical experts, and others to increase information sharing and capacity building for islanded grids, eliminate redundant efforts, promote collaboration, and ensure that best practices and performance analysis related to the operation of wind, wind-diesel hybrid and other hybrid systems are effectively disseminated. We deliver capacity-building programming that includes a series of regional convenings, peer-to-peer exchange trips, and webinars, as well as maintain a website (www.islandedgrid.org) that serves as a clearinghouse for information on people, projects, and technical resources that can inform project development and implementation in remote areas.

- **Technical Assistance (TA) Partnerships**

Providing local leaders with access to high quality, trusted, and understandable technical information and analysis can also be key component of long-term energy planning and informed decision-making. Over the past two years, DOE's Energy Transition Initiative (ETI) have been supporting Maine island communities, particularly Monhegan and Isle au Haut. ETI provides a proven framework and technical resources and tools to help islands and other communities transition their energy systems. ETI programs available to the Island Institute and its partners include the Islands Playbook, an action-oriented guide that provides a readily available framework that any community can use to help successfully initiate, plan, and complete a transition to a clean energy system, as well as a host of related tools, trainings, and TA.

The ETI program facilitated a partnership between the Island Institute and the National Renewable Energy Laboratory (NREL)'s Technology Deployment program to utilize NREL's Renewable Energy Planning and Optimization (REopt) energy planning platform. REopt has analyzed cost-optimal paths to help Maine island communities reduce their fuel consumption and lower their energy costs through the microgrid systems and related measures. This in-depth analysis provides insights on how to operate existing energy assets and incorporate new energy assets to reduce costs, meet energy or carbon goals, and improve resiliency, providing communities with highly valuable information for their local decision-making processes. decision-making.

- **Island Fellows**

Small communities often have a need for an extra set of hands maximize the value of TA and implement their priority projects. The Island Institute's Island Fellows is a model program for just this kind of support. For example, an Island Fellow recently spent two years supporting the power companies on Monhegan and Matinicus, collecting and analyzing load and fuel data, managing the



logistics of community-wide transitions to LEDs, and interfacing with island schools. Importantly, the Island Fellow served as the bridge between the community and the DOE and NREL technical assistance staff, taking the time to compile the local data that were invaluable to the process and translating between each group, ensuring the most relevant and actionable outcomes from the modeling process. Fellowships are designed to help increase local capacity to carry on their work and increase the long-term sustainability of their efforts, so the benefits will outlast the placement.

V. Considerations for the Committee

- **S. 1460**

We were pleased to see that many of the themes expressed in this testimony are also reflected in the microgrid provisions for isolated communities found in S. 1460. In particular, we appreciate the considerations for input of traditional knowledge from local leaders, development of the local workforce, and increasing capacity of local and regional research partners. It is our hope that these provisions will extend beyond Alaskan villages to include the island communities that I have discussed today, as well as to include community development and bridging organizations in addition to research facilities to provide critical, on-the-ground and translation support.

Expanding our collective capacity to build microgrids at both the community and commercial scale will enable U.S. companies and technologies to establish themselves, build a successful track record, and gain competitive market advantages abroad where microgrids market is rapidly expanding. Beyond this, I encourage the Committee to consider the following lessons learned from our work:

- 1. Make Meaningful Investments - Investments that are a blend of infrastructure, technical assistance, and local capacity building are more likely to succeed and to be more durable than investments in any one strategy on its own.**

Addressing the significant challenges facing islanded grid communities from Maine to Alaska will require significant investment. As we have seen on Monhegan, support from programs like USDA Rural Development's High Energy Cost Grant have provided the financial backing that private entities have so far been unwilling to invest. We encourage the Committee to consider ways to leverage federal resources, technical and financial, to drive greater investment in these projects that can make all the difference for remote communities and provide valuable lessons for the rest of the world. Blending investments to include TA and local capacity building like the examples referenced above can achieve this goal. This type of blended assistance helps to make the TA more meaningful and accessible to the community, and allow it to endure beyond the presence of the TA provider.

- 2. Microgrids create the opportunity to address multiple energy challenges at the same time - the flexibility to be able leverage investments in electricity, heating and/or transportation can significantly enhance economic and community development outcomes.**

Thinking beyond electricity generation to consider other significant energy burdens such as heating and transport can maximize the cost-effectiveness of a microgrid project, as well as the local benefits of it. When islands and remote areas can access the technical assistance and other partnerships that they need to holistically evaluate their options, it can open the door to leverage multiple sources of financing, create longer-term and larger-scale benefits, and build economies



that are truly more resilient. We encourage the Committee to consider ways to encourage this integrated way of thinking.

3. Share What Works - make cost effective investments and leverage lessons from elsewhere and build on other work funded by the federal government.

Sharing solutions that work is powerful. When similarly-situated people and communities effectively share their experiences, projects can be developed more quickly and more cost-effectively. Learning from others' mistakes or difficulties helps to keep you from making those same mistakes and ultimately reduces the costs of the project. Initiatives like Islanded Grid Resource Center, those of the Energy Transition Initiative, and the DOE State Energy Program-funded Bridging the Rural Energy Efficiency Gap (an initiative to increase the uptake access to clean energy financing in rural areas of Maine, Alaska, New Hampshire, and Vermont, led by the Maine Governor's Energy Office and the Island Institute) enable us to accelerate the pace of change and make it more efficient, while creating opportunities to grow the microgrid market here, and establish the leadership of U.S. companies to export their products and services abroad. At the Island Institute, we look forward to continuing to play a role to connect with Alaska, Hawaii, and related federal initiatives, to learn from each other as well.

4. Create reasonable exceptions for remote or island communities that help to avoid unintended impacts of various policies.

As Congress considers ways to support the development of microgrids, I encourage you to keep Maine islands in mind, both as a place that can benefit from the right support, and also as one where the unintended consequences of well-meaning energy policies can emerge quickly. In the past few years, our communities have faced energy-related challenges that have included requirements for extremely costly retrofits to increase vessel safety standards on massive fuel tankers that have then also been applied to the very small vessels serving our islands; the restriction of transport of heating fuels on small ferries; and Clean Air Act requirements for power plants that have inadvertently created serious and costly obstacles to moving to cleaner forms of power generation and now marine vessels including larger lobster boats.

None of these policies were designed for small, rural communities, **and their application in such communities caused substantial impacts here in Maine.** Paying attention to the potential implications of energy policy on small systems - whether community-owned or owned by a small business - is critical to Maine's energy future. As you consider future laws and their impact in remote areas, please remember that communities in Maine may be challenged by them too.

VI. Conclusion

I invite the Committee and my colleagues here today to think of smart ways to forward technical and community priorities, invest in and listen to local leaders, and evaluate projects and share the lessons learned. We're confident that, with this approach, Maine islands will become more resilient and make meaningful contributions to the microgrid sector. Lowering energy costs - both through increased efficiency measures and switching to lower cost fuels - helps support our coastal economy and ultimately keeps more money in the pockets of Maine residents.

Microgrids and community resilience go hand-in-hand. Our hearts go out to the islands in the Caribbean that continue to face tremendous, immediate challenges. Here in Maine, we are starting



to recognize our own vulnerabilities to storm surge, sea level rise, a heavy reliance on diesel fuel, and the impacts that natural disasters can have to our working waterfront infrastructure and communities. From the working with Maine's island communities over the last 10 years, I strongly believe that part of being a resilient community is being able to bounce back after a disaster and one of the most important ways to build the adaptive capacity of a small community is to invest in the people.

In closing, we look forward to continuing to build diverse partnerships with from Alaska, to Hawaii, to the forestry sector in Maine to learn how microgrid and other energy solutions can help drive economic growth in some of our most rural areas of the U.S.

Thank you again to the Committee for the opportunity to testify and submit written testimony, as well as to Senator King and his staff who work so hard for the people of Maine. I would also like to acknowledge the support of the Island Institute staff members who contributed to the development of my written testimony: Brooks Winner, Janet Bosworth, Julia Maher, and Nick Battista.

Senator KING. Thank you. I want to also acknowledge the staff. I can share with you the secret of leadership in one sentence. You might want to write this down.

[Laughter.]

Hire good people and take credit for what they do.

[Laughter.]

It has worked for me for 25 years.

When you watch Senate hearings on television, one of the things you can't tell is that in front of each of us is a little digital clock, and as soon as the questioning begins, it starts to click down, usually from five minutes. So I am going to impose that on myself. I am going to ask a series of short questions here. I know a lot of you have questions and thoughts. We are going to break, and when we return it will be more informal. We will have some sandwiches and have a more informal discussion. So I am not going to take the five-minute segments of every member of the Committee, but I am just going to limit myself to a few minutes.

Dr. Johnson, what is the George Washington Carver type of work going on in terms of how we can develop new products from the forest products industry? Talk to me about the additive manufacturing, for example.

Dr. JOHNSON. Happy to, thank you very much.

Yes, in fact that's what we're looking at doing. If you look at bio-based feedstocks, that is what these scientists like to refer to it as, but basically, it's the tree, everything. I was thinking my analogy is everything but the whisper on the pine, right, that you want to be able to make it out of. And what they're looking at saying, there's a lot of materials that are being used for things like carbon fiber composites and things like that, advanced polymers. As people have noted, these wind up coming from things like petroleum-based feedstocks.

There's no reason why we can't wind up using domestic bio-based feedstocks, but that takes an entirely new set of everything from the chemistry and literally the fundamental knowledge on the chemistry up to how you can wind up doing things like using the super computers that we have through our national lab systems due to the modeling and simulation of how those reactions work. So then you can wind up making the end use part.

I'm going to give you one simple example here. People think about 3D printing as being a small part that's, you know, a gavel sized thing. We actually, about a year and a half ago, or actually, it's now three years ago, at Oak Ridge National Labs, built an entire car by 3D printing it, and I have actually driven it around. When I say car, it's not a model. It goes about 85 miles an hour.

Senator KING. It looks like a Shelby Cobra.

Dr. JOHNSON. Yes, it does, in fact, look like a Shelby Cobra, oddly, and drives about as fast as the original Shelby Cobra. It's an electric vehicle. But what that points to is you're able to actually use these advanced technologies in those areas.

One more recent project that's going on is working with the Precast Concrete Association. So if you think about when they do precast concrete, they wind up taking wood parts. They build these molds up, but you're, kind of, limited in that case to flat surfaces you wind up building. If instead, and actually this is what the Oak

Ridge project is working on right now, is if you wind up taking that woody based fiber as a precursor, you could actually make more complex shapes for those molds that then people can put into architectural structures. At the end of the day you're actually making the tooling for these things where it's a new market you'd wind up utilizing out of it.

So there's a number of places where people are doing that work. The key part is how do we wind up getting the researchers and probably the most important set of researchers, isn't the professors and people like me out there, it's the 22-year-old, the 23-year-old, that they look at this and they say, wow, I can actually build a future out of this and wind up doing the research on this and that they get dedicated to that work.

Having that integrated team where we've got students from the University of Maine, for instance, working down at Oak Ridge in the summer, coming back up here and researchers from Oak Ridge coming up and working with the students up here—that's actually a key part of making sure because I can't tell you in advance exactly what the outcome of the research is. It wouldn't be research if we knew that, but we're doing that research.

Senator KING. I can't resist asking—isn't the Composites Center at the University a cool place?

Dr. JOHNSON. Oh, it's fantastic.

Senator KING. Any of you who have not visited the Composites Center at the University of Maine in Orono, it is just amazing what they are doing there.

Bob and Alden, it seems to me that part of the key to your project is having a power purchase agreement for a period of time to give you stability. That is essential, isn't it? I mean, you couldn't finance without some stable source of revenue.

Mr. LINKLETTER. That's correct. Yeah, that's what we need and the stable RECs also.

Senator KING. Yes.

Mr. LINKLETTER. That's the key, and that's the trouble with the existing plants now.

Senator KING. I had not really thought about it until you said, Mark, it is difficult for you to get a co-locator, another company, to come and use your steam because you cannot guarantee that you will be there to supply it. Is that essentially the issue?

Mr. THIBODEAU. Yeah, that's exactly the issue with numerous business development projects that we've worked on over the last 10, 15 years, is just that. It's the long-term viability of the plant.

If you're going to build a \$100 million manufacturing facility next to one of our facilities, can I guarantee the biomass plant will be there for 20 years to supply steam and power?

Senator KING. So you are selling power into the grid, essentially, on a day-to-day market rate?

Mr. THIBODEAU. That's correct, Day-Ahead Market.

Senator KING. And that can be really high or really low, depending upon the circumstances.

Mr. THIBODEAU. Yup, exactly.

Senator KING. You are familiar with the app, ISO to Go?

Mr. THIBODEAU. Yes, very familiar.

Senator KING. ISO to Go is an app that is put out by the Independent System Operator, and it gives the wholesale price of electricity in New England, minute-to-minute, and it updates it all the time. It also tells you where all the electricity in New England is coming from at any given moment, which is absolutely fascinating.

I wouldn't say unfortunately, but the reality is between 55 and 60 percent of our electricity in New England today is from natural gas. Right now, natural gas is at an all-time low price. That is the good news. The bad news is when you are 55 percent dependent upon one source that is a fossil fuel and subject to significant price variations, as we know, that is a long-term risk.

I have always thought of plants like yours as a kind of insurance policy because you have a more stable fuel price.

Alden, talk to me about the obstacles to getting your plant online in two years. I have never heard of something happening that fast. You obviously must have gotten pretty good cooperation from the DEP, hopefully?

Mr. ROBBINS. We did, actually, yeah.

I mean, I'm happy to report that the DEP was very cooperative. They were very professional, you know, they require that we follow the letter of the law, but they really act as a partner in helping this economic development. So I'm pleased to report that the DEP really worked hand-in-hand with us to make sure that we were doing things right.

And actually, they gave us tips as far as, you know, you're talking about a system for wastewater, have you tested this? Is this fail proof? You know, you want to make sure that it's not just important for the environment but for the viability of the plant that if you don't have a plan for your water then plants need a lot of water and you have wastewater. If you don't have a plan for that that's resilient, then that could cause your plant to go down. So they were wonderful to work with.

Senator KING. That is great. That is really good to hear. We want to credit the Governor and the leadership of the Administration for that. I think that is a good sign.

You mentioned that your plant will utilize your own residuals, but that is only about 50 percent. You are going to be dealing with some of Dana's people and landowners for the rest.

Mr. ROBBINS. Exactly. Sure, just like Bob's plant, and that's a big deal. Without loggers that pile out back there starts to shrink, as it did this summer, faster than we'd like to see it. So, if we can provide a market for the head of the fish, that the head of the tree, that the limbs and the tops. I thought Dana's comment was perfect, you know, that it's not just the viability. Everything is a synergy. The health of the forest, the economic benefit to the landowner, the economic viability of the logger, residuals for the mill, log supplies for the mill. It's all interconnected, and CHP is a wonderful way to achieve that.

Senator KING. I don't think it was exactly clear, Bob, in your case. You are using the waste heat from the power plant for the pellet mill. Is that right?

Mr. LINKLETTER. That's correct.

Senator KING. That's the combined?

Mr. LINKLETTER. That's the combined, yes. It's pre-drying the pellet stock.

Senator KING. So it makes both the power plant and the pellet mill more viable?

Mr. LINKLETTER. More viable, yeah. Jobs more secure, yup, because one of the problems in a pellet mill in the winter months is the stock you receive is frozen solid. So, it takes a lot of energy to get it out, more so than the summer months. And that's when everybody wants pellets is in the winter. So your production goes down. But with this new addition the production actually has increased, even with cold, frozen wood, it doesn't matter. So we're pre-drying it with the waste heat we're using from the boiler.

Senator KING. I have always thought one of the important parts about pellets and this whole use of wood energy is, and you made this point, this is energy that comes from here.

Mr. LINKLETTER. That's right. That's right. Money stays in the state.

Senator KING. It doesn't have to be shipped across the ocean or——

Mr. LINKLETTER. That's right.

Senator KING. ——or trucked up from——

Mr. LINKLETTER. All the dollars stay here, and all the taxes stay here, and we supply all the pellets for Jackson Lab. So, we're all integrated. We're all——

Senator KING. Yes.

Mr. LINKLETTER. You know, we're all together. That pellet mill supplies a lot of energy for them and other schools that are in the State of Maine currently.

Senator KING. Well, I think it is important too because that is a benefit that is hard to quantify, but if you add the transportation costs and the energy that is used—I like the idea of stabilizing energy prices in Maine and also stabilizing the economy for people like those who Dana represents.

Well, thank you all for joining us. I have exceeded my five minutes, but that is the prerogative of Lisa, who is not here to whack me. I really enjoyed this discussion.

We are going to break now. We are going to have a little something to eat, and we will turn this into a more informal roundtable when we return.

Again, thanks to our witnesses, thanks to the staff who helped put this together, and thanks very much to Robbins Lumber for hosting us today.

This hearing is adjourned.

[Whereupon, at 12:40 p.m. the hearing was adjourned.]

APPENDIX MATERIAL SUBMITTED

**Testimony of the Industrial Energy Consumer Group
Before the
Senate Energy & Natural Resources Committee**

**Written Testimony submitted for the October 6, 2017 Field Hearing On
Approaches to Reducing Industrial Energy Costs**

October 19, 2017

Chair Murkowski and members of the committee. A thank you to Senator King for his assistance in arranging this field hearing and for his efforts regarding legislation to speed up natural gas pipeline permits. I am Bob Dorko, President of the Industrial Energy Consumer Group (IECG). The IECG is an organization made up of a diverse group of energy users including ski areas, technology services, and several manufacturing employers who generate and use electricity as part of their operations or businesses in Maine.

Energy is a vital and costly component for the businesses which belong to the IECG. We focus on reducing energy cost, usage, and improving efficiency to allow our businesses to continue to be viable. This viability translates into employment for Maine citizens, jobs and business opportunities for our suppliers and their businesses. Energy costs also affect everyone in Maine, homeowners, as well as business owners ranging from small to large manufacturing facilities. The cost of electricity rolls up into the purchased costs of all goods and service people buy and use.

The field hearing held on 6 October 2017 was focused on reducing energy costs. Much discussion concerned use of biomass fuels and combined heat and power projects. While many IECG members utilize biomass and combined heat and power systems, we believe the single most effective way to reduce energy costs in our region is to add adequate natural gas pipeline capacity in New England. Since more than half of New England's electricity is now generated by natural gas fired generation, estimates of the cost to New England consumers of the current inadequate pipeline capacity are as high as \$3 billion per year. Eliminating this burden on consumers can be done by amending the Federal Power Act to allow regional transmission organizations (such as ISO-NE) to recover the cost of such gas pipeline capacity within their wholesale regional transmission tariffs (such as ISO-NE's Open Access Transmission Tariff or OATT).

Amending the Federal Power Act would not authorize any pipeline capacity to be built, but create a mechanism for such critically needed capacity to be funded through electrical rates and to let projects be developed and approved if viable. The current system does not allow pipeline capacity to be built without subscription. A project cannot go from an idea to fruition unless generators buy sufficient capacity to allow the project to be approved by FERC and to be financed. However, in New England's deregulated market, generators must compete in a day ahead market, which creates a "Catch-22" situation, as they need more pipeline capacity to operate, but their day to day business model will not support the long-term contracts needed for pipeline capacity to be built; which reduces their ability to operate cost-effectively, if at all.

In New England, served by ISO-NE, gas is on the margin for the last available power requirements. The shortage of pipeline capacity causes a gas basis cost differential, whereby this additional cost of getting gas to New England gets added to the cost of generation, which results in driving up consumers' electrical costs.

As previously stated, New England's electrical costs were \$3 billion higher for consumers solely to the basis differential resulting from the lack of pipeline capacity. The basis differential also affects gas prices for home heating use as well as gas for business and manufacturing uses other than power generation. The \$3 billion is just the starting point of increased costs borne by all New England consumers.

With unconstrained gas pipeline capacity, power costs would decline as New England would finally be able to reap the benefits of the abundant supply and low price of Marcellus gas plus appropriate and realistic transportation costs to the generators. Heating and process gas costs would be lower also. New England would finally be able to share in the national economic benefits of our country's abundant supply of low-cost natural gas.

Many in New England are interested in solar, wind and hydro power. In their advocacy they do not appreciate the reasons why additional pipeline capacity is critically needed. In fact in their zeal for their own projects or point of view, some fight gas pipelines to the death, and force all New England consumers to pay more for heat and power by doing so. Cost-effective, baseload, and fast-ramping power generation is needed when the region's intermittent renewable resources are not producing power. In fact, without more abundant natural gas-fired generation, our region is becoming

more dependent on oil and coal-fired resources, at a time when many such resources are slated for retirement.

The reasonable compromise path forward is a combination of renewables and gas generation.

I encourage you to set in motion an amendment of the Federal Power Act to allow regional transmission organizations to recover the cost of new incremental gas pipeline capacity within their wholesale regional transmission rates (such as ISO-NE's OATT). Doing so will provide a transformational opportunity to address cost, while ensuring that appropriate federal and state reviews of individual pipeline proposals still occur as required by other laws.

This summary is a high level overview. I and my organization are available to discuss this issue and the supporting data at length at your convenience. Thank you for the opportunity to provide information to the committee.

