

**ALASKA STATE LEGISLATURE
HOUSE SPECIAL COMMITTEE ON ENERGY**

March 30, 2017
10:17 a.m.

MEMBERS PRESENT

Representative Adam Wool, Chair
Representative Ivy Spohnholz, Vice Chair
Representative Matt Claman
Representative Dean Westlake
Representative DeLena Johnson
Representative Jennifer Johnston
Representative George Rauscher

MEMBERS ABSENT

All members present

COMMITTEE CALENDAR

PRESENTATION: ENERGY SOLUTIONS FOR ALASKA

- HEARD

PREVIOUS COMMITTEE ACTION

No previous action to record

WITNESS REGISTER

GWEN HOLDMANN, Director
Alaska Center for Energy and Power
University of Alaska Fairbanks
Fairbanks, Alaska

POSITION STATEMENT: Presented a PowerPoint titled "Energy Solutions for Alaska."

ACTION NARRATIVE

[10:17:14 AM](#)

CHAIR ADAM WOOL called the House Special Committee on Energy meeting to order at 10:17 a.m. Representatives Wool, Rauscher, Spohnholz, Johnston, Johnson, and Westlake were present at the

call to order. Representative Claman arrived as the meeting was in progress.

Presentation: Energy Solutions for Alaska

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CHAIR WOOL announced that the only order of business would be a presentation by the Alaska Center for Energy and Power.

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GWEN HOLDMANN, Director, Alaska Center for Energy and Power (ACEP), University of Alaska Fairbanks, shared some information on her background as a physicist and engineer and her work on energy projects in Alaska. She directed attention to slide 2, "Alaska Center for Energy and Power," and reported that the program began nine years ago and focused on the challenges facing Alaska. She said that once a particular problem was identified, then a research team was built, and resources were gathered to address that specific problem. She declared that they created information for the decision makers. She added that they had also worked lot with students in K - 12 in developing the Alaska Energy Smart curricula, a popular energy efficiency curriculum tailored to Alaska.

MS. HOLDMANN moved on to slide 3, "Current and recent research in Alaska," and stated that the focus was for energy programs in which the state was interested, including studies directed by the Alaska State Legislature.

MS. HOLDMANN shared slide 4, "Presentation Overview," and explained that she would discuss three areas: Energy technology solutions, supporting energy policy, and Alaska leadership in microgrid technologies. She declared that the energy policy had a very important role in any accomplishments in Alaska, pointing out that Alaska had 10 percent of the world's microgrids.

CHAIR WOOL asked if there was any concern for research investment.

MS. HOLDMANN replied that, as Alaska was already a leader, it was easier to maintain momentum. She shared a recent report that the Canadian government had invested \$400 million into an Arctic Energy fund, which would stimulate activity for renewable energy systems. She declared that it was important for Alaska to step up to stay at the cutting edge of technology.

REPRESENTATIVE JOHNSTON asked about energy storage.

MS. HOLDMANN replied that energy storage was a "bit of a holy grail." Low cost energy storage solutions would allow for a real global paradigm shift for the production and use of energy. She said that this had been a focus area for a number of years, and she offered an example of thermal storage, as it was a less expensive and very effective means for meeting the energy needs of a community, more so than the use of batteries.

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MS. HOLDMANN discussed slide 5, "Energy Technology Solutions: Communities," and reported that Alaska had a very high discrepancy for energy costs throughout the state. She shared that the North Slope had the lowest rates for electric power in the state, as the borough had subsidized the costs for local heat and power for many years. She pointed out that it was important to understand that subsidies and energy pricing drove the development of renewable energy systems.

CHAIR WOOL asked to clarify that these subsidies on the North Slope were not PCE (Power Cost Equalization).

MS. HOLDMANN said that these were subsidies provided through the borough and were in addition to the state subsidies. She observed that the North Slope Borough was the only region in the state which had not developed any renewable energy system. She suggested that these subsidies distorted the market as they did not recognize the true cost of energy, but, instead, it subsidized the status quo.

CHAIR WOOL mentioned that the committee had discussed PCE and whether it enhanced or inhibited the development of alternate energy.

MS. HOLDMANN said that the PCE system was the most transparent and easy to understand compared to those in other jurisdictions which came through multiple government entities. She stated that it was important to understand who was actually benefitting from a switch to an alternative energy strategy, otherwise it was difficult to meet the goals of the project.

REPRESENTATIVE JOHNSON asked about ground heat technology and if it was available all over Alaska.

MS. HOLDMANN explained that Juneau used a heat pump system, which was first installed as a seawater heat pump system in Seward. She reported that these were very efficient, and they magnified the value of the energy by pulling energy from the environment. She said that the problem was they were driven by electric power, so they must be in areas with inexpensive electric power. She said that the ACEP had done an analysis of the performance of that system and had subsequently written a guide to heat pump systems for cold climates. She added that Kotzebue was reviewing air source heat pump systems to magnify the value of the energy. She declared that these systems were not as beneficial in Interior Alaska.

MS. HOLDMANN pointed out that, as most of the diesel fuel used in Alaska was imported from outside Alaska, the pricing was driven by global markets and this was additionally challenged by the narrow window for shipping. She stated that these were more reasons for local energy sources.

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MS. HOLDMANN shared the map on slide 9, which demonstrated the magnitude of the challenge to off grid due to remoteness and incomplete infrastructure. She reported that there were almost 1.6 million people sharing power and energy resources who lived north of the grid line.

CHAIR WOOL asked about for the definition for off grid.

MS. HOLDMANN expressed her agreement that there was a struggle with terminology and explained that her definition was for individuals and communities who were disconnected from the main grid. She added that the technical term was micro grids.

MS. HOLDMANN moved on to slide 10, "ACEP Partnership with FNSB," and spoke about the partnership with the Fairbanks North Star Borough [FNSB]. She said that, as a portion of the ACEP funding was designated toward Alaska communities, they were working on strategies which could be implemented locally and be deployed in the near term.

REPRESENTATIVE JOHNSTON asked about partnerships with the military.

MS. HOLDMANN replied that they had an extensive global partnership with the Office of Naval Research.

MS. HOLDMANN directed attention to slide 11, "Volter Pilot Project at Big Dipper." She relayed that, along with solving energy problems, driving economic development was very important. She spoke about adapting technologies, as they did not believe in re-inventing the wheel, and she lauded the work with biomass in Finland. She spoke about a Finnish designed heat and power biomass system which could work well for Fairbanks and many other rural communities.

REPRESENTATIVE JOHNSON asked if biomass could include coal.

MS. HOLDMANN explained that these were wood chips, which were cheaper to produce than pellets in smaller communities. She reported that there was a pellet mill in Fairbanks. She stated that this system was not designed to run on coal, although the gasification process was similar. She reported that the new combined heat and power plant on the University of Alaska Fairbanks campus was designed to co-fire with up to 30 percent of biomass.

CHAIR WOOL asked about the air quality from this new technology.

MS. HOLDMANN said that this technology would not result in high level particulates, and it was an opportunity to educate about the differences for burning wood.

MS. HOLDMANN spoke about slide 12, "Energy Solutions for Communities & Industry," and highlighted that most microgrid and distributed generation technologies did not have anything to do with rural and remote places. She pointed out that this was a move away from a centralized generation model with one-way transmission to the end users, toward a two-way movement and flow of electricity, with pockets of small generation. She declared that this was the new paradigm for electricity in modern grids. She offered her belief that Alaska was an excellent place to pilot technologies and strategies. She listed the components to include firm generation, which included hydro power and fossil fuels; intermittent generation, which included wind power; energy storage, which included batteries, fly wheels, and thermal storage; and demand response, which was the ability to alter the power in response.

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MS. HOLDMANN pointed to slides 13-14, "ACEP Power System Integration Lab," which depicted the laboratory, a recreated

small microgrid at full power level designed to mimic operations in the not so perfect conditions of the real world.

CHAIR WOOL asked if intermittent power sources could be mitigated with an efficient storage system.

MS. HOLDMANN acknowledged that inexpensive grid scale storage was necessary, although the current costs were still fairly high. She shared some examples of battery storage, including a liquid metal battery with an unlimited number of cycles which could be done on a small scale but not yet on a utility size. She returned attention to slide 14 and stated that the goals were to reduce problems in the field, reduce the cost of energy to the end users, turn off the diesels whenever possible, and train system operators. She explained that the lab was contracted by private sectors to test systems, and then work on integration packaging. She added that it was cost neutral. She moved on to slide 15, "Raglan Mine Flywheel Integration & Testing," and explained that this was a system they had worked on in the lab, as it had never been integrated into a stationary power application. She said that their job was to figure out how to connect the developer's project to the grid, as the testing in the lab allowed failures which were not acceptable in the field.

MS. HOLDMANN returned to slide 16, "Analysis of Emerging Technologies: Storage." She said that many battery manufacturers had "come and gone." She reported that Golden Valley Electric Association operated one of the largest battery systems in the world, which supported the northern end of the Railbelt intertie.

CHAIR WOOL asked about the type of batteries.

MS. HOLDMANN replied that these were nickel cadmium, although it was only designed for potential outages, as it was a giant UPS (uninterruptable power supply) system. She spoke about a few battery systems, none of which had yet succeeded. She emphasized that they wanted to get things into community use. She clarified that they wanted the failures to occur in the lab. She shared that the lab was currently working with the Alaska Village Electric Cooperative on a small grid bridge system using ultra capacitors.

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MS. HOLDMANN shared slide 17, "Analysis of Emerging Technologies: Nuclear," and reported that the program was also interested in understanding where the market was going with new technologies. She reported on a nuclear power program study which the Alaska State Legislature had commissioned, and APEC had worked with ISER (Institute of Social and Economic Research) on the technical and economic feasibilities. She noted that, if this existed, there could be potential, and they were keeping track of the ongoing technology.

MS. HOLDMANN shared slide 18, "Emerging Technologies: Hydrokinetics," and spoke about hydrokinetics, generating power directly from moving water, either in a river, a tide, or any current. She reported that there was a lot of interest from remote communities with moving water nearby. She said that a full-scale test site was maintained in Nenana, and she pointed out that, as private investors and not the state had invested in many of these tests, many of these projects were not well known.

REPRESENTATIVE RAUSCHER asked about tidal energy.

MS. HOLDMANN replied that this was an example that investing enough money can make anything possible; however, as a way to reduce the cost of energy, tidal energy was not there just yet.

REPRESENTATIVE RAUSCHER asked if ACEP was still exploring this and were there any improvements to the process.

MS. HOLDMANN replied that currently University of Alaska had a partnership with the University of Washington and Oregon State University for the operation of the National Marine Renewable Energy Research Center on behalf of the Department of Energy. She reported that there was a major focus on wave energy, tidal energy, and in-river energy. She added that this had been under consideration for Cook Inlet for quite some time.

REPRESENTATIVE RAUSCHER asked if this was viable yet.

MS. HOLDMANN replied that it was not yet economically viable.

REPRESENTATIVE JOHNSON pointed out that, as rivers in Alaska did not flow all year because of cold temperature or ice, consistent power would require multiple types of technology.

MS. HOLDMANN acknowledged that every site in every community was different, with different challenges. She relayed that ACEP was trying to remove these barriers for industry and communities to

deploy the various systems. She reported on the development of a debris diversion system to protect the turbines and its testing and implementation.

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The committee took an at-ease from 11:03 a.m. to 11:10 a.m.

[11:10:30 AM](#)

MS. HOLDMANN offered her belief that Alaska should be thinking about what emerging technologies made sense for the state to invest and research versus what would be adopted in the future should it be developed elsewhere. She stated that the emerging energy technology grant funds were designed to address these questions, and she offered an example of hydrokinetic energy as Alaska had huge resources. She said that small modular nuclear reactors and energy storage also had potential for global application, and Alaska should be aware of what was happening with these technologies. Although Alaska did not have the funding and resources for these developments, the state should be part of figuring out how to utilize these new paradigms. She pointed out that there were 92 utilities in the state, which were good places to test new technologies.

CHAIR WOOL reiterated that the power systems of the future were less centralized, and that the utilities could be viewed as microgrids.

MS. HOLDMANN relayed that there were already more than 250 microgrids at many different levels, and that some were interconnected. She noted that the utilities in the Railbelt used to be island kingdoms. She stressed that, as there were millions of hours of operation of these micro grids in Alaska, Alaska could be part of the global transitions in the energy market.

MS. HOLDMANN addressed slide 19, "IP Disclosures by ACEP in past 2 years" and said that ACEP worked a lot with the private sector for developing their technologies, as well as in-house development. She offered an example for the development of a fuel meter which would show the amount of energy used.

MS. HOLDMANN discussed slide 20, "Supporting Energy Policy," and declared that this was where substantive changes could be made. She said that Alaska energy policy had resulted in global leadership for some emerging energy technology areas. She

offered an example of the Renewable Energy grant fund and the Power Cost Equalization program. She spoke about the ACEP work with the RCA (Regulatory Commission of Alaska) on the concept of a Unified System Operator for the Railbelt grid, as well as an LNG market analysis for the coastal communities with AEA. She stated that there was an opportunity to "tweak" the Power Project Loan Fund, an excellent fund designed for Alaskans, which was also underfunded.

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MS. HOLDMANN moved on to slide 21, "Assessment of a USO for the Railbelt Grid," and explained that ACEP provided technical assistance to the RCA and gave a series of presentations looking at specific challenges related to factors for efficient and effective transmission of electricity on the Railbelt grid, including reliability, cost, and autonomy for the different utility entities. ACEP provided information on what had been done elsewhere and what possible outcomes might occur.

REPRESENTATIVE JOHNSTON asked about the policy decisions, whether the cost was an economic study or a technical study.

MS. HOLDMANN explained that they used relevant resources and that the economics and the technical aspects went hand in hand.

MS. HOLDMANN, in response to Representative Westlake, said that ACEP was not always mentioned in reporting, as they provided technical assistance behind the scenes. They were not recommending policy, but instead, providing the information to support recommendations and policy. She offered her belief that it was very appropriate that ACEP was not mentioned in many reports.

CHAIR WOOL relayed that the House Special Committee on Energy had been more involved on the political side, and not on the technical side.

MS. HOLDMANN said that these were important issues, as it was necessary for the utility industry to function as efficiently and effectively as possible. She acknowledged that there were constraints and there was a reality for the way things happened. She declared that ACEP was a technical resource, with some understanding for the underlying issues and challenges. She stated that this was not a simple problem with a simple solution.

MS. HOLDMANN directed attention to slide 22, "AK AES Project: Barriers to Private Investment," and stated that private investment was very important moving forward on energy projects.

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MS. HOLDMANN introduced slide 23, "Cordova ESS (Specification Driven Project)," and spoke about the necessity to change the paradigm so projects would be developed around the community needs and what the grid could accept. Once that was resolved the project could be put out to bid to the private market. She addressed slide 24, "Cordova Storage Project (Proposed)," a graph which reflected the daily and seasonal changes.

MS. HOLDMANN, in response to Representative Claman, said that the blue line was the five-day demand average, and the orange line was the [power] generation, which was always more than the demand in case of an increase. She shared that ACEP had proposed a battery system that purchased power at night, when it was cheaper, and then sold the services back to the utility during the day. She pointed out that the battery could be tapped if necessary, which allowed for the use of the generator in case of demand to be kept at a lower level. She allowed that this "spinning reserve" was the most important aspect.

REPRESENTATIVE JOHNSTON asked about the economic benefit for the "spinning reserve."

MS. HOLDMANN pointed out that the asset, which was privately owned, did not work in this case because the value was mainly in owning the battery. She said that in many of these smaller projects, they would incur these challenges for identifying an interested private partner.

CHAIR WOOL asked if the battery was a bridge between the diesel and the hydro in case the demand was high. The utility was saving money by not keeping the diesel running, but the battery was not selling a lot of power.

MS. HOLDMANN expressed her agreement, and that understanding how the system was being used and where the value was were the important issues in determining the correct model.

MS. HOLDMANN observed that there was a place for private ownership models in Alaska. She declared that the motivation from a private entity for keeping an asset running was really high, as there was not any payment without the asset being on

line. She opined that the customer would not necessarily pay more money when a private investor was utilized.

REPRESENTATIVE WESTLAKE suggested that a battery pack was ancillary to the generation of renewable energy.

MS. HOLDMANN shared slide 26, "Alaska's Renewable Energy System," which depicted the 70 renewable energy systems statewide, some of which had been developed through the Renewable Energy Fund. She stated that Alaska was a leader in these developments, which could allow for new revenue opportunities and jobs for Alaskans. She projected that there would not be a lot of state dollars available in the upcoming years and that it was important to use private sector models.

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MS. HOLDMANN shared slide 28, "Iceland: Global leader in geothermal energy," mentioning that she had worked in geothermal industries and that she was an Arctic Initiative Fulbright Scholar and had worked in Iceland. She reported that Iceland needed to develop geothermal as they were importing coal from Europe. This had been a politically active decision for the transition to local energy resources. Now, 100 percent of electricity and heat was from geothermal and hydropower resources. She reported that Iceland had gained an expertise, learned how to do this right, and had created an export industry for geothermal energy knowledge. She opined that this export of knowledge was now about 7 percent of the gross domestic product. She reported that this knowledge base allowed for consultation overseas when there was a lull in projects at home, and this kept the industry employed. She stated that 3 percent of the GDP was spent on research and development, and there was a lot of public advocacy for geothermal expertise, slide 29, "Iceland's Knowledge Export Industry." She pointed to slide 30, "Overseas activities of Icelandic companies," which depicted the worldwide geothermal energy projects being worked on by Iceland. She moved on to slide 31, "Iceland UNU Geothermal Training Program," and spoke about the key differences from small investments. She reported on the careful selection process to bring 20 participants annually to the six-month training program, where they were introduced to the industry. Those students, when they returned to their home country, now had many contacts in Iceland for partnership.

MS. HOLDMANN introduced slides 32 - 33, "ARENA: Arctic Remote Energy Networks," explaining that this was a copy of the Iceland

program, and that Iceland was a mentor for developing ARENA. She said that ARENA currently focused on the circumpolar Arctic, gathering and sharing knowledge with others around the circumpolar Arctic, and building connections and bridges on the practitioner level, instead of the policy level. She noted that everyone had a specific project to move forward.

REPRESENTATIVE SPOHNHOLZ expressed her excitement about the ARENA project, and she asked if the program was secure and how to ensure it would stay in place.

MS. HOLDMANN shared her concerns, noting that it was originally an Alaska based program. She stated that it was an ACEP program, and there was no federal funding. She offered her belief that this was a global issue. She reported that they met every other year, and that it would continue if ACEP wanted. She acknowledged that funding was a substantive challenge, and that there was not a large budget for the program.

MS. HOLDMANN suggested a change in the ARENA name from Arctic to Alaska, and she reiterated that funding was an issue. She declared that small investments could go a long way, and that the private sector could also invest.

REPRESENTATIVE JOHNSTON opined that Alaska had not done a good job of exporting knowledge and capability, and that a lot of these had escaped the state.

CHAIR WOOL reiterated that Alaska was becoming a leader in micro grid technology and that it was important to maintain that edge.

MS. HOLDMANN said that this was just one example for where Alaska was innovative and been a leader. She closed with slide 34, "Alaska Center for Energy and Power," stating that the little stuff makes a big difference in these areas.

[11:49:17 AM](#)

ADJOURNMENT

There being no further business before the committee, the House Special Committee on Energy meeting was adjourned at 11:49 a.m.