ALASKA STATE LEGISLATURE
SENATE SPECIAL COMMITTEE ON IN-STATE ENERGY
February 14, 2013
7:30 a.m.

MEMBERS PRESENT

Senator Click Bishop, Co-Chair
Senator John Coghill, Co-Chair
Senator Peter Micciche
Senator Dennis Egan
Senator Bill Wielechowski

MEMBERS ABSENT

All members present

OTHER LEGISLATORS PRESENT

Senator Charlie Huggins

COMMITTEE CALENDAR

OVERVIEW: UNIVERSITY OF ALASKA FAIRBANKS~ ALASKA CENTER FOR ENERGY AND POWER

- 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: Provided an overview of the Alaska Center for Energy and Power.

ACTION NARRATIVE

7:30:17 AM
CO-CHAIR CLICK BISHOP called the Senate Special Committee on In-State Energy meeting to order at 7:30 a.m. Present at the call

to order were Senators Micciche, Egan, Wielechowski, Co-Chair Coghill and Co-Chair Bishop.

OVERVIEW: University of Alaska Fairbanks, Alaska Center for Energy and Power

7:31:03 AM
CO-CHAIR BISHOP announced that the business before the committee would be an overview by Gwen Holdmann for the Alaska Center for Energy and Power (ACEP).

7:31:39 AM
GWEN HOLDMANN, Director, Alaska Center for Energy and Power, University of Alaska Fairbanks (UAF), stated that the In-State Energy Committee had worked on some serious issues for the state. She noted that various ACEP projects were very relevant to some of the issues that were before the committee. She disclosed that ACEP projects addressed current and long range opportunities, some extending 10 to 50 years into the future.

MS. HOLDMANN called attention to Alaska's energy use and explained the following as to what the state was on track to spend if it did nothing:

- $5 billion on diesel fuel in rural Alaska.
- $60 billion on fossil fuels for Railbelt electric power generation.

She noted that Alaska's total energy related appropriations since 2008 was $2.3 billion for the Power Cost Equalization (PCE) program, Renewable Energy (RE) Fund, Alaska Housing Finance Corporation (AHFC) programs, pipeline initiatives, and the Susitna-Watana Hydroelectric Project.

SENATOR MICCICHE asked what the timeline was for the state to spend $5 billion on diesel and $60 billion on fossil fuels.

MS. HOLDMANN answered that the energy use data was based upon a 20 year horizon.

She said Alaska's energy challenges were as follows:

- High energy costs, an issue from many parts of the state.
- Fragmented electric grid, the state was disconnected to other electric grids and that posed different challenges as opposed to the Lower 48.

- Harsh climate, the negative effects on energy infrastructure.
- End of supply lines.
- Stranded resources, the state had fantastic fossil and renewable resources, but a lot were stranded.
- Dispersed population.

7:34:59 AM
MS. HOLDMANN addressed her role with ACEP. She explained that she came from the private sector as a project developer and had been involved in building projects in the past. She stated that there was a real role for the University of Alaska (UA) in working with industry, communities, and the legislature in trying to figure out how to move forward. She said there were three main ways that UA could play a role as follows:

- Developing information for decision makers by providing: information on technology testing and optimization; industry information on technologies that were most appropriate for the Alaska environment; and energy analysis to support policy makers.
- Preparing students to work in energy related disciplines to provide education opportunities and to work closely with Alaska industry for energy related jobs.
- Commercializing energy innovation to assist businesses in industry wide challenges.

She noted an example of an industry challenge for hydrokinetics due to debris. She said debris was a problem for every hydrokinetic manufacturer with interest in Alaska. She explained that ACEP had developed a debris diversion system and tested it last summer in Nenana. She stated that the Nenana test was successful and energy related developments with the private sector could also be used outside of Alaska.

7:37:57 AM
CO-CHAIR BISHOP asked for additional information on ACEP's debris diversion system.

MS. HOLDMANN stated that ACEP was doing "real stuff" rather than just completing studies. She said ACEP subjected the Nenana debris diversion system to breakage-test conditions and the system responded well. She divulged that ACEP was seeking a patent for the debris diversion system due to its unique active-design. She remarked how excited the industry partners were after seeing the debris diversion system work in Nenana.

MS. HOLDMANN explained that ACEP was doing their work on a minimal budget and noted their [FY13 Capital Improvement Plan] (CIP) request for support to continue commercial energy innovation projects.

SENATOR MICCICHE stated that Alaska had pieces but not an actual statewide energy plan and explained that a good baseline was missing. He asked if a study were funded, would ACEP have the capacity to divide the state into logical segments that specified the available sources.

MS. HOLDMANN answered yes. She said ACEP had been doing exactly the kind of work Senator Micciche noted. She explained that ACEP worked closely with the Alaska Energy Authority (AEA) and the Alaska Division of Geological & Geophysical Surveys (ADGGS). She noted that ACEP had been working with ADGGS on geothermal and coal resource options.

7:40:41 AM
She explained that ACEP was building research teams at UAF. She noted that UAF had a wealth of existing knowledge and expertise. She said there was no need for ACEP to hire new people; the objective was to take advantage of the people that were already at the university with energy related capabilities. She commented that some individuals were not aware of their energy research capabilities and noted an example of fish biologists being involved with ACEP's hydrokinetics program. She said ACEP built teams across disciplines, schools, institutions, and campuses. She said ACEP worked closely with UAA's Institute of Social and Economic Research (ISER) and the School of Engineering. She summarized that ACEP pulled together teams, worked on an issue, and moved on to do something else.

She said ACEP worked closely with industry on research teams. She stressed that ACEP made sure not to compete with industry and noted an example of bringing in private sector companies to do a bathymetric study for hydrokinetics work and a geophysical study to support ACEP's geothermal work in Nome. She said the focus was on formulating research questions and determining how the university could address them.

CO-CHAIR BISHOP commented that he agreed with Senator Micciche relating to an energy baseline concept. He said he was a fan of T. Boone Pickens who stated, "We are going to go down as the dumbest nation on earth if we do not get an energy plan in the United States." He noted that Jack Welch said, "The single

number one thing this country could do, is get an energy plan." He said Alaska should have an energy plan.

MS. HOLDMANN answered that she would not be surprised if Co-Chair Bishop's words were echoed in the Alaska State Capital 30 years ago.

CO-CHAIR BISHOP replied that the words were echoed in the Alaska State Capital 50 years ago.

MS. HOLDMANN said energy planning has been worked on a lot in addition to being addressed by the Senate In-State Energy and Resources committees. She stated that she had worked with Senator Wielechowski in the past on energy issues and she applauded those efforts, but noted that the state needs to continue moving forward.

7:43:21 AM
She presented an example of how geothermal exploration teams were built at UAF. She noted that there was some geothermal potential in the Cook Inlet area and other regions throughout the state. She said ACEP's team concept led to bringing together researchers from UAF's Geophysical Institute (GI). She noted that GI pioneered a mapping technique for volcanoes to look for pending eruptions by identifying heat areas and mapping underground coal fires. She said ACEP applied GI's mapping technique to low temperature geothermal evaluation. She said ACEP received a grant from the U.S. Department of Energy (DOE) to test GI's mapping technique because exploration costs could be greatly reduced. She noted that the challenge with geothermal exploration was ACEP's highest expense. She stated that the testing could have been done anywhere in the U.S., but ACEP received the DOE grant to be applied in Alaska. She said ACEP chose Pilgrim Hot Springs, outside of Nome, as an ideal resource location due to its geothermal development potential on mainland Alaska. She explained that the Pilgrim Hot Springs project had been successful and its hot water source was identified, a long standing mystery. She said ACEP was moving forward with the next phases of exploration to access Pilgrim Hot Spring's potential for community and landowners. She noted that in addition to geothermal development, a significant graphite resource was discovered ten miles from Pilgrim Hot Springs. She noted that ACEP viewed plans in isolation as well as a taking a bigger holistic view. She said ACEP would continue to look at locations where energy resources were in concert with mineral resources and Alaska's communities.

MS. HOLDMANN said unmanned aerial vehicles (UAV) were going to be used to expand exploration. She explained that using a UAV's aerial perspective for geothermal exploration allowed ACEP to expand Pilgrim Hot Springs' "footprint" from very small to a four mile area. She said Pilgrim Hot Springs was a substantial resource with a magnitude that was larger than the Chena Hot Springs resource. She stated that the Pilgrim Hot Springs had potential for the Nome region.

7:46:16 AM
She said the geothermal mapping for heat evaluation was being used to target improved weatherization. She explained that an entire city could be mapped with the largest heat loss problems identified and quantified.

CO-CHAIR BISHOP addressed the use of UAV and noted that FLIR technology would be used for targeting residential energy efficiency measures. He asked what the acronym "FLIR" stood for.

MS. HOLDMANN replied that (FLIR) stood for Forward Looking Infrared Radiometry. She explained that FLIR was basically infrared imaging, a technique that ACEP did not develop. She said FLIR was used worldwide, but ACEP created algorithms that enhanced the processing technique to remove interfering background signals in order to identify a quantifiable number for heat.

She addressed how ACEP was funded and explained that $750,000 in base funding was provided annually by the state of Alaska. She said ACEP currently had $18 million and 20 active projects across a whole gamut of different technology areas. She stated that ACEP's team building concept allowed for their grant and contract acquisition. She explained that ACEP was a research enterprise that acted as a funding source for UA. She said the $18 million in funded grants and contracts supported UA's base operations and long term stability. She revealed that $4 million was funding base operations at UAF so that ACEP had lights and power. She brought attention to the fact that ACEP was bringing in $14 for every $1 that it received from the state.

SENATOR MICCICHE asked what kind of U.S. Department of Defense (DOD) projects ACEP had been working on.

MS. HOLDMANN answered that ACEP had been working with DOD quite a lot on looking at fuel supply issues and the option for potentially having a coal to liquids or gas to liquids supply in Alaska. She said ACEP had looked at some of the language in the

Defense bill that related to Section 526, a DOD provision that does not allow fossil fuels replacement with something with a higher "greenhouse gas" footprint and the impacts on what DOD could use for fuel supplies in Alaska.

7:49:13 AM
MS. HOLDMANN said ACEP's projects were funded by different mechanisms and were dispersed throughout Alaska. She noted a legislative requested project pertaining to Small Modular Nuclear Reactor (SMR). She explained that ACEP completed a comprehensive study on SMR's potential in Alaska and opined that SMR was a possible option for the future, but the technology was not currently available.

CO-CHAIR BISHOP commented on SMR and addressed the use of thorium. He asked if there was any merit in thorium based energy and inquired if China was benefiting from their investment in thorium research.

MS. HOLDMANN replied that thorium was valid. She explained that there were different kinds of nuclear material that could be used for producing heat to generate power. She noted plutonium, thorium, and several other alternatives to uranium.

CO-CHAIR COGHILL asked if the thorium discussion was ramping up in Canada.

MS. HOLDMANN answered that thorium was being discussed in Canada regarding use as a process heat source. She noted that the Canadian Oil Sands was considering SMR for heavy oil extraction. She said the issue with SMR in the U.S. was the regulatory process through the U.S. Nuclear Regulatory Commission (NRC). She divulged that Alaska has had a huge impact in moving the discussion forward at the national level due to the [nuclear] project that was proposed in Galena a decade ago. She said the proposed nuclear power plant pushed the NRC to develop a process for SMR. She explained that nuclear industry participants pay the NRC for running through the regulatory process, a cost exceeding tens of millions of dollars. She noted that there were currently no nuclear projects being reviewed by the RCA for permitting.

CO-CHAIR COGHILL commented that Alaska's legislators were in Washington, D.C. and spoke with the RCA. He said the RCA stated that finding "project specific" experts to handle information for permitting was hard to obtain. He explained that the energy industry paid for experts to go on staff at the RCA. He said

there was a real [regulatory] barrier and noted that experts were not involved until someone put the money down for a particular project.

MS. HOLDMANN answered correct. She addressed Co-Chair Coghill's interest in biomass and his instrumental role in working with Delta High School in getting their [wood chip biomass boiler] system up and running. She said ACEP was developing their team concept for a long term approach to biomass. She stated that biomass researchers were being sourced from natural resource schools, conversion technology engineers, and atmospheric science and pollution experts to look at particulate issues.

She said ACEP was going a step further in addressing energy storage and alternatives for grid-management with Golden Valley Electric Association (GVEA) to manage their generation sources. She said ACEP was looking at GVEA's Eva Creek Wind Farm and the use of ceramic heating as alternative heating that was controlled at the utility level. She noted ACEP's approach in fixing some of Alaska's energy issues by looking at the board picture, identifying all of the available opportunities, and how to fix problems.

7:53:55 AM
CO-CHAIR COGHILL addressed the use of flywheel technology to assist utilities in managing loads when using alternative energy sources.

MS. HOLDMANN replied that ACEP would be testing flywheel technology. He addressed the challenges involved with managing power load storage from alternative energy sources. She explained that ACEP had been working on energy storage for a decade by testing advanced energy technologies and worked with Alaska partners. She noted that ACEP recently field-tested advanced battery technology in Kotzebue and the test was not successful due to the battery's inability to function in an Arctic environment.

CO-CHAIR COGHILL addressed GVEA's Battery Energy Storage System (BESS) and its use for power outages. He noted that he had not heard of any critical oversight of BESS and asked if ACEP had been involved with its testing.

MS. HOLDMANN replied that BESS had been very successful in what it was designed to do and that was to support the northern end of the Intertie. She noted that BESS was only designed for 300 lifetime charge-discharge cycles. She addressed Co-Chair

Coghill's focus on integrating a non-firm energy source like wind on a grid and the requirement to use a spinning reserve, intermittent storage or other mechanism for shifting power support. She said ACEP was looking at whether [battery] storage with its inherent inefficiencies and costs was the only mechanism for power shifting support or whether ceramic dump-loads controlled at the utility level was an option. She explained that ceramic dump-loads were heating sources with inherently more efficiencies than batteries. She noted that ACEP was looking at viable battery technologies.

7:56:55 AM
SENATOR EGAN asked for an explanation on flywheel technology.

MS. HOLDMANN responded that there was an operating flywheel being used at Usibelli Coal Mine. She explained that flywheels stored energy in a rotating mass. She said the flywheel's size and rotational speed dictated the inertia available for energy storage. She said the flywheels ACEP was looking at did not store large amounts of energy, but could efficiently source small amounts of energy for short periods of time. She noted that if there was a gust or dramatic shift in load, the flywheel was used to smooth out transient loads. She said Alaska had not used flywheels beyond Usibelli Coal Mine. She explained that flywheel technology was a potential strategy and noted that ACEP lab testing would occur with a Williams Technology flywheel within the next six months.

CO-CHAIR COGHILL addressed the logistical challenges with shipping a 50 ton flywheel.

MS. HOLDMANN replied that some flywheel models were small. She said ACEP was working with Boeing on flywheels and noted their development of two small flywheels that were based upon high strength, light-weight materials. She remarked that Boeing had asked if their flywheel program could be transferred to ACEP, but funding was not available. She explained that ACEP's flywheel niche was the integration issue.

7:59:07 AM
SENATOR MICCICHE commented that flywheel technology was over 100 years old. He noted that old compressors used to have large flywheels before energy was thought to be more dispensable.

MS. HOLDMANN replied that she agreed. She explained that there was nothing wrong with looking at old technology and seeing how it applied in today's world. She noted that Chena Hot Springs'

geothermal system was a perfect example and there was nothing new with their power plant. She remarked that Chena Hot Springs' geothermal system was essentially a refrigeration system that runs in reverse. She explained that the older technology was currently applied in a way that could not be done in the past.

MS. HOLDMANN stated that ACEP was focused on looking at future economic development opportunities for residents and businesses. She noted that there were challenges, but extensive dealings with energy issues provided the state with a comparative advantage in niche areas where Alaska was, or could become or a world leader. She detailed an example of Alaska's comparative advantage relating to small-islanded electric grids with excess wind energy that could not be sent elsewhere. She said high contribution renewables was an area that Alaska excelled in and nowhere in the U.S. had work been done to the same degree.

She remarked that Alaska was the established worldwide expert in the integration of wind with diesel technologies and people from other countries had come to learn about its system development. She said having a leg-up on energy technologies provided opportunities for fledgling businesses to potentially be working in other places throughout the world. She noted that Iceland leveraged their geothermal expertise by providing free education for individuals from countries with high geothermal potential. She explained that Iceland's knowledge strategy opened a pipeline for its geothermal businesses to benefit from the worldwide connections made through its free education program. She said Iceland had a leg-up with international development in geothermal projects.

8:02:59 AM
CO-CHAIR BISHOP noted Iceland's strategy and explained that Sweden did the same thing in the bridge building business.

MS. HOLDMANN answered that was correct and noted that international training was an interesting strategy.

CO-CHAIR COGHILL asked to address what technologies had landed well in connecting wind-diesel.

MS. HOLDMANN replied that Alaska had built a lot of different systems that used very different strategies. She said there was a system in St. Paul that was duplicated at a radar facility in Tin City where 100 percent wind operation was attained with no diesel and no storage use. She explained that thermal dump-loads were used to heat water with a synchronous condenser to maintain

voltage frequency support. She stated that other strategies used energy storage and battery systems. She disclosed that the plan in Kotzebue was to integrate a battery system for a "high penetration" wind-diesel system. She explained that there were 30 developed wind projects in Alaska with some underperforming installations that could be improved. She noted that wind energy control and distribution was another strategy that ACEP was addressing in their lab. She described how the ACEP lab was able to duplicate Alaska's electric grid. She stated that data from any community could be programmed to simulate any real world event that allowed ACEP to tweak and improve systems. She noted a simulation example for Kokhanok that allowed the developer and manufacturer to fix their field problem in the ACEP lab. She referred to the Kokhanok situation as an example of ACEP working with industry.

8:06:44 AM
CO-CHAIR BISHOP addressed Ms. Holdmann's overview of how ACEP provided technical support in addition to research and development support to solve problems. He noted how Alaska's Institute of Technology (AVTEC) had integrated hands-on training for diesel, wind, and solar in a real-time program similar to ACEP's lab simulation program. He said AVTEC did "blue collar" training for rural Alaskans to maintain, service, and manage their respective energy systems. He explained that the hands-on training program was a win-win between ACEP and AVTEC.

MS. HOLDMANN replied that cross-training between ACEP and AVTEC was occurring on that day. She said ACEP's entire wind-team was at AVTEC for a two-day training session with UA researchers and community members throughout the state.

CO-CHAIR BISHOP remarked that ACEP and AVTEC had a plan and worked well together.

MS. HOLDMANN referred to a world map that showed lighting energy use at night. She said there was a large part of the world without consistent access to reliable electric power. She noted that isolated villages were impacted by the information-age by showing greater concern as to how to recharge cell phones rather than powering lights at night. She explained that electricity for isolated areas would not have power grids similar to the Lower 48 and specified that the isolated areas throughout the world would have small "patchwork" networks with similar challenges to Alaska's isolated villages. She noted that ACEP's Renewable Integrations Program had an Australian researcher involved to address Australia's 75 nonintegrated communities in

the Northern Territory. She explained that the Northern Territory did high-penetration solar-diesel systems and the concept was comparable to Alaska's program. She said ACEP was working on an international level and noted that a Danish researcher had been involved with their research team. She added that national labs had been a big partner of ACEP.

8:10:14 AM
MS. HOLDMANN reiterated ACEP's lab simulation capabilities with its "village in a box" concept. She explained that the ACEP lab was designed to look at integration issues in a rural community at full power levels with the same sized diesel and wind systems. She emphasized that the ACEP lab was scalable to integration issues with the Railbelt as well as in villages. She noted that ACEP's lab was the only facility like it in the world. She said ACEP pieced their lab system together with funding from multiple sources with the concept based on what ACEP and industry envisioned what was needed as a tool to perfect system integration. She noted that a large number of projects were lined up for testing in the ACEP lab. She revealed that a problem existed with the necessity to build out the ACEP lab to achieve the full level of capabilities and technology ranges. She noted that flywheel testing would require a containment system.

CO-CHAIR BISHOP asked what a flywheel containment system was.

MS. HOLDMANN replied that flywheels rotated at high revolutions per minute (RPM) and a containment system would contain the flywheel in case of failure. She noted that the containment system was not a huge cost, but a real cost that needed to be developed.

CO-CHAIR BISHOP asked to confirm that the containment system would address a flywheel that might come apart, not an energy storage issue for the containment of power.

MS. HOLDMANN explained that ACEP had been testing several batteries and one example was a flow-battery from Prudent Energy. She noted that ACEP had worked with Prudent Energy through several flow-battery generations for possible improvement, mechanism failure identification, and deployment in the field. She revealed that the last flow-battery version worked really well, but the economic analysis revealed that the battery's cost was too high and lower cost parts changes led to system failure. She noted that the flow-battery was intended to go out into the field, but the energy cost was not viable at

$0.26 per kilowatt hour (kWh). She explained that testing was not about technical success, but economic viability as well.

MS. HOLDMANN noted that ACEP was addressing waste heat recovery and brought attention to a success story from recent testing. She explained that the waste heat recovery device that was tested was similar to the device used at the Chena Hot Spring's power plant where additional power was generated from low quality heat. She disclosed that the tested recovery device used a diesel generator's rejected heat to generate power. She said a one thousand hour test was completed on the waste heat recovery device through a range of different scenarios and the unit was deployed at the Alaska Power & Telephone's (APT) Tok power plant for secondary testing.

8:14:11 AM
She addressed niche technologies regarding hydrokinetics and noted that debris was the industry's biggest challenge. She said ACEP had deployed debris diversion devices and the units worked effectively last summer in Nenana. She explained that a 25 kilowatt (kW) hydrokinetic unit was deployed via Alaska Power & Telephone (AP&T) in Eagle, Alaska with the deployment meeting about half of the community's needs.

CO-CHAIR BISHOP confirmed that avoiding debris on the [Tanana River] in Nenana would be a challenge.

MS. HOLDMANN agreed that debris was an issue in Nenana.

SENATOR MICCICHE asked if ACEP was doing any subsurface work that was not seasonally influenced. He inquired if permitting departments would be willing to allow subsurface hydro-projects in rivers and tidal zones.

MS. HOLDMANN replied that ACEP had a close relationship with the permitting agencies and noted that the agencies appreciated ACEP's comprehensive analysis in order to streamline the permitting process. She explained that the worry was not so much with adult fish, but rather with out-migrating smolt in the fastest moving part of a river. She noted that no one had ever done surveys in the middle of a river channel and explained that ACEP had to devise a way to capture fish. She said ACEP's fish biologists were addressing how to deal with [juvenile] salmon migration patterns and providing the information to the applicable permitting agencies. She stated that ACEP was addressing the permitting challenges for the industry and what

kind of information could be produced to make the process easier.

SENATOR MICCICHE asked about the possibilities for subservice operations to avoid seasonal generation.

MS. HOLDMANN replied that there were two problems with subservice operations. She explained that the current was not very fast under river-ice. She said the river was groundwater fed in the winter and the flow rate was 10 percent of summer levels.

SENATOR MICCICHE asked about tidal possibilities.

MS. HOLDMANN replied that tidal based energy would use the same technology as with rivers, but ACEP was first addressing issues with water surface debris prior to subsurface debris. She explained that both tidal and river deployments need to be protected and ACEP's funding request would address the next step to work with industry on the subsurface debris challenge.

8:18:07 AM
CO-CHAIR BISHOP stated that Senator Huggins was attending the committee hearing.

MS. HOLDMANN addressed low-temp geothermal as a niche area that Alaska was viewed as somewhat of a leader. She noted that the very first low temperature geothermal system in the world was installed at Manley Hot Springs in 1981. She explained that low-temp geothermal technology was pioneered in Alaska and the state never capitalized on that. She said there were opportunities in some of the niche technologies where Alaska had competitive advantages to enable local businesses to leverage. She said ACEP was involved with the Chena Geothermal plant while addressing smaller units from industrial waste heat sources. She noted that waste heat from oil wellheads was a possibility and explained that the oil industry was in a lot of ways Alaska's largest producer of geothermal energy on the planet because there was a lot of heat coming out of the ground along with the oil. He said waste heat from a diesel generator was another opportunity to make more use of the fuel that was already being used.

SENATOR MICCICHE stated that he was used to a typical efficiency on a combined-cycle to be as much as 40 percent. He asked if efficiencies were being realized from waste heat derived from smaller internal combustion waste heat units.

MS. HOLDMANN replied that the efficiency improvements were on a small scale at a few percentage points. She said the [waste heat] units did not cost very much and their cost could be recovered over a relatively short time horizon, approximately three years. She explained that projects like waste heat recovery had a short payback period and did not require grant support. She noted that ACEP worked with AP&T as an established utility to act as a partner on projects like testing waste heat recovery.

She said AEA had asked ACEP to look at fuel additives and address improving combustion cycle efficiencies. She said ACEP was taking a holistic look at all of the fuel additives marketed in Alaska to ascertain creditable information for utilities and industry.

8:22:01 AM
She addressed difficult to extract fossil fuels and noted that Alaska had a lot of fossil resources with opportunities that were further out: heavy oil, coal liquids, gas liquids, and coal gasification. She inquired how Alaska could take advantage of its coal resources and noted that it was one of the largest fossil energy reserves in the world. She said it was worth keeping an eye on technologies that might allow Alaska to export some of its resources in the future.

She spoke about arctic shipping and noted that 46 ships took the Northern Sea Route in 2012, a 10-fold increase since 2010. She addressed how Alaska could take advantage of the new mineral resources project to be discovered in the Arctic and how the state would fit into the world economy while in-state energy needs were addressed.

She addressed Alaska as a leader in energy technologies as follows:

- Coil drilling technique pioneered in Alaska.
- Thermosiphons for extracting heat to maintain pipeline and building foundations in permafrost-rich soil. She said UAF had a big role in developing thermosiphons.
- Largest battery system in the world in Fairbanks, the BESS system at GVEA.
- Low temperature geothermal (niche renewables).
- Leader in high contribution renewables.

MS. HOLDMANN commented that the key was how Alaska capitalized on its leadership role in energy technologies to create academic and job opportunities.

CO-CHAIR BISHOP asked if ACEP interfaced with Alaska's oil industry to address their energy and operating costs.

MS. HOLDMANN answered no. She said ACEP partnered with the oil and gas industry in a number of small, isolated initiatives. She cited work with British Petroleum (BP), thermosiphons use with ExxonMobil, and remote data acquisition unit with Shell.

CO-CHAIR BISHOP asked if ACEP worked with Alyeska Pipeline on projects.

MS. HOLDMANN answered yes. She noted project examples pertaining to pipeline revegetation and tapping geothermal to add heat to the pipeline as a way to increase throughput.

CO-CHAIR COGHILL noted his appreciation that Ms. Holdmann provided a drive to ACEP. He commended ACEP's assessment of technology options and technology in place. He remarked that wind technology was being installed in different locations in Alaska for the last decade and asked what ACEP had found out regarding wind technology operating in a cold, highly variable temperature climate. He inquired if ACEP was involved in discussions with wind technology manufacturers.

MS. HOLDMANN replied that there was a lot of wind turbines designed to operate in the Arctic. She noted that there were some deployed technologies in the state with rather substantial failures. She explained that one of the problems was related to cold air density and the heavier air caused problems with some of the wind turbines. She noted that one turbine brand had issues with tip breaks that led to some "runaway" modes with dramatic failures. She explained that ACEP's CIP request supported the development of an Arctic turbine test site near Fairbanks. She said funding for the proposed test site was not a lot of money and the project was in partnership with AEA. She stated that ACEP was not deploying technology down the field that was not tested in harsh environment conditions. She noted that the test site would be located at a GVEA site in the Murphy Dome area.

CO-CHAIR COGHILL asked if ACEP was watching current wind turbine installations and compiling data. He inquired if the information was proprietary.

MS. HOLDMANN answered that gathering data was an area that ACEP could improve. She commented that publically funded projects should provide data that was publically available. She explained that project data should be understood in order to assist in decisions for future projects.

CO-CHAIR COGHILL asked if the issue was related to barriers that were created or work that had to be done.

MS. HOLDMANN replied that the tendency was to move on after a project was built without going back to identify what worked and what the return on investment was. She explained that ACEP was working with AEA to address project reviews, but funding was not available. She said the Emerging Energy Technology Grant Fund (EETGF) program was a little different. She explained that ACEP pioneered the EETGF program with the Denali Commission to add a contractual step to set in place with a data management plan for every contract. She said the data management plan for EETGF had worked well, especially with pilot projects. She said it was a priority for ACEP to get better information.

8:29:26 AM
CO-CHAIR COGHILL stated that transmission was a big cost for Alaska and hardware accounted for the majority of costs. He addressed system upgrades and asked if ACEP was working on ways to make sure the electrons flowed better. He inquired if there were transmission limitations and would the state have to learn how to live with them.

MS. HOLDMANN replied that one of ACEP's challenges was operating their program without very much base funding. She said ACEP was reliant on external grants and contracts. She explained that ACEP could not put a lot of work into a problem unless there was an identified funding source. She noted that ACEP's CIP would provide the organization with some breathing room. She addressed the area of transmission and noted that ACEP had worked on the High-Voltage Direct Current (HVDC) project. She explained that the Denali Commission funded an ACEP project to look at smaller HVDC convertors with Alaska Village Electric Cooperative (AVEC) and Polar Consult Alaska, Inc. (PCA). She said ACEP had recently created a fairly comprehensive assessment of HVDC transmission technology in Alaska and worldwide. She said ACEP had been doing comparative analysis similar to the HVDC project and noted a comparative analysis was completed on energy options in the Fairbanks market. She reported that the recent Fairbanks

comparative analysis showed that the natural gas trucking option came out very positive in the analysis.

SENATOR MICCICHE commented that Alaska was an energy starved state with a tendency to jump at things that did not pencil-out. He remarked about his interest in understanding ACEP's process in evaluating projects. He stated that the key was evaluating energy projects responsibly while delivering the best options for Alaskans. He said Alaska needs a plan with a clear set of expectations and criteria that helps Alaskans understand what was feasible.

8:32:34 AM
MS. HOLDMANN agreed that there was a tendency to just want to act, build, and do something. She explained that she understood the urge to build, but looking at projects in a systematic way was an important role that ACEP provided.

CO-CHAIR BISHOP thanked Ms. Holdmann for the presentation.

8:33:46 AM
There being no further business to come before the Senate In-State Energy Committee, Co-Chair Bishop adjourned the meeting at 8:33 a.m.