ALASKA STATE LEGISLATURE
HOUSE COMMUNITY AND REGIONAL AFFAIRS STANDING COMMITTEE
January 27, 2015
8:01 a.m.

MEMBERS PRESENT

Representative Cathy Tilton, Chair
Representative Paul Seaton, Vice Chair
Representative Shelley Hughes
Representative Harriet Drummond
Representative Dan Ortiz

MEMBERS ABSENT

Representative Benjamin Nageak
Representative Lora Reinbold

OTHER LEGISLATORS PRESENT

Representative David Guttenberg
Representative Jim Colver
Representative Liz Vazquez
Representative David Talerico

COMMITTEE CALENDAR

PRESENTATION: ALASKA CENTER FROM ENERGY AND POWER (ACEP)

- HEARD

PRESENTATION: ALASKA AND INTERIOR ENERGY STUDY

- HEARD

PREVIOUS COMMITTEE ACTION

No previous action to record

WITNESS REGISTER

GWEN HOLDMANN, Director
Alaska Center for Energy and Power (ACEP)
University of Alaska Fairbanks (UAF)
Fairbanks, Alaska
POSITION STATEMENT: Provided an overview of ACEP.

DOUG REYNOLDS, Professor
Energy and Economics
University of Alaska Fairbanks
Fairbanks, Alaska
POSITION STATEMENT: Provided a presentation entitled "Alaska and Interior Energy Study."

ACTION NARRATIVE

8:01:08 AM

CHAIR CATHY TILTON called the House Community and Regional Affairs Standing Committee meeting to order at 8:01 a.m. Representatives Seaton, Hughes, Ortiz, and Tilton were present at the call to order. Representative Drummond arrived as the meeting was in progress. Also in attendance were Representatives Guttenberg, Colver, Vazquez, and Talerico.

Presentation: Alaska Center from Energy and Power (ACEP)

8:01:56 AM

CHAIR TILTON announced that the first order of business would be an overview of the Alaska Center for Energy and Power (ACEP).

8:02:32 AM

GWEN HOLDMANN, Director, Alaska Center for Energy and Power (ACEP), University of Alaska Fairbanks (UAF), began by highlighting that ACEP is a relatively young research group within the University of Alaska system as it was formed about seven years ago. The ACEP is housed within the College of Engineering and Mines within the Institute of Northern Engineering at UAF. She told the committee that ACEP works with researchers across the university system and also has an office in Anchorage. She explained that ACEP was formed with regard to how the university could do business and engage with the state's communities. Therefore, the decision was made not to hire a traditional academic to build and direct the program. She informed the committee that her background is in the private sector as an engineer who has developed projects in the state and worked with the university from the perspective of the private sector and a community member. The goal, she indicated, is to take advantage of the university's resources and build on those.

8:05:26 AM

REPRESENTATIVE HUGHES inquired as to the type of work Ms. Holdmann did in the private sector.

MS. HOLDMANN informed the committee that she has lived in Alaska for 21 years, her entire adult life. Although she said she has worked in a variety of fields, she highlighted her work as a design engineer in Fairbanks for a small engineering firm and noted that she owned her own company for which she designed and installed energy systems for individual homeowners, many of which live in rural areas without access to the traditional electric grid. In fact, she noted that she has never been connected to the electric grid in Alaska, and thus has lived completely off the grid for the last 21 years. Most recently, prior to her position with ACEP, Ms. Holdmann said she was the project manager and engineer for the geothermal power plant at Chena Hot Springs, which is the lowest temperature operating geothermal power plant in the world. In fact, the Chena Hot Springs geothermal power plant received the R&D 100 Award, a prestigious national award. She noted she was involved in the green house project [at Chena Hot Springs], which she opined is the only year round operating green house in Northern Alaska, as well as the ice museum that is cooled using geothermal heat. In further response to Representative Hughes, Ms. Holdmann informed the committee that she was hired seven years ago to build the program from the ground up and was its only staff at the time.

8:07:29 AM

MS. HOLDMANN, returning to her overview, stated that ACEP is technology agnostic and the mission of ACEP is to develop and disseminate practical, cost effective, [and innovative] energy solutions for communities in Alaska. Currently, ACEP has about 22 staff, primarily engineering staff, with which it works and 30 faculty. Some faculty work with ACEP on every ACEP project, but researchers from various areas of the university are utilized on an as-needed basis. She characterized the aforementioned as a strength as it affords ACEP to be dynamic and flexible. The role of ACEP and the University of Alaska (UA) is to develop information for decision makers, which includes everyone from legislators to individual citizens. The ACEP, she opined, has the opportunity to provide neutral unbiased information so that people can make the best possible decisions. Therefore, ACEP does lots of technology testing for industries and communities by bringing in and testing equipment that has potential for use in Alaska as well as planning for

deployment of technology outside of the laboratory. Although ACEP is fundamentally an engineering program, ACEP believes in the need to review the economics of a project. To that end, ACEP has an energy analysis group that performs a lot of work assessing the various options in the state. Students, she highlighted, are a large part of this program. There are about 50 students a year who work on research programs and are embedded in communities as ACEP makes partnerships with various regions. For example, ACEP had a partnership with the Northwest Arctic Borough to assess performance in the Arctic. She then pointed out that ACEP is also involved in commercializing energy innovation as evidenced by the 10 invention disclosures that it submitted last year alone. Commercializing energy innovation is an area where the university has the potential to work with the private sector to develop new ideas that can be used in Alaska and beyond.

8:11:08 AM

REPRESENTATIVE HUGHES recalled discussions with folks affiliated with the Pacific NorthWest Economic Region (PNWER) regarding the university research in Alberta, Canada, in which they were careful to ensure it was industry driven rather than academically driven. To that end, she asked whether ACEP or industry starts the conversation [on a potential project].

MS. HOLDMANN emphasized that one of ACEP's fundamental tenets is not to compete with industry but rather facilitate the success of industry inside and outside of the Alaska market. For example, there has been a lot of interest in Alaska in terms of hydrokinetic energy due to the state's tidal and river resources. Many communities in Alaska are interested in the notion of extracting energy directly from rivers. Furthermore, the industry has recognized there is the opportunity to test its devices in Alaska. The aforementioned allows ACEP to play a dual role such that ACEP facilitates the industry developing devices that work in Alaska while protecting communities. For the hydrokinetic industry ACEP worked on uncovering the industry-wide barriers to placing the equipment in Alaska's rivers and tidal areas. One of the barriers identified was debris, which led to ACEP developing a debris diversion device that's technology agnostic, and thus it can be used with any vendor. This device, she related, has been running for three years in a river in Nenana and has been tested against actual turbines and manufacturers. The industry, she further related, has been extremely pleased with what ACEP has accomplished,

particularly since the industry couldn't individually afford to do the development and testing.

8:13:43 AM

REPRESENTATIVE HUGHES asked if ACEP has conversations with those outside of the power industry.

MS. HOLDMANN said that since ACEP is an energy research program, the organization focuses on problems that are relevant to energy questions. However, at the homeowner level there is no good data with regard to how much fuel is used to heat homes in rural Alaska. The lack of real data makes it difficult for private sector investment. Therefore, one of ACEP's recent invention disclosures is a heat metering system to measure fuel use for individual structures without breaking into the fuel line. The aforementioned has the potential to be an important element for residents and policymakers in terms of how much heating fuel is being used to incentivize private investment.

REPRESENTATIVE HUGHES encouraged ACEP to increase conversations with those outside of the power industry, such as the refineries and mining industry.

MS. HOLDMANN informed the committee that ACEP performed a test of an innovative flywheel in which the laboratory was configured to emulate a remote mine in Canada. The aforementioned resulted in ACEP's test configuration being replicated in a remote mine site in Northern Quebec, Canada. Therefore, ACEP is working with industry to support its needs.

8:17:00 AM

REPRESENTATIVE SEATON recalled passage of legislation that gave free peat, of which there is a lot in Alaska, to communities across the state, but noted that he hasn't heard of anything going forward. Therefore, he asked whether there are any programs going forward utilizing the resource while providing local jobs in the harvesting and supplying of the peat resource within the communities.

MS. HOLDMANN agreed with Representative Seaton that there is a lot of peat resource in Alaska. The use of peat [as an energy source] has been considered for one community in the Interior as it has an excellent peat resource across the river from it. However, Ms. Holdmann expressed the need, in terms of energy planning for communities across the state, to broadly consider

the options with regard to the available local resources. The options under review should include peat, coal, gas, oil, or renewable energy.

REPRESENTATIVE SEATON related that one of the unique aspects of using peat is the external burner rather than the internal combustion engine, which avoids the need for refining and shipping [both of which] hold the potential for spill contamination problems. Furthermore, there would be local jobs for harvesting the supply. He expressed dismay with the U.S. exporting its technology and pilot programs elsewhere.

8:20:35 AM

MS. HOLDMANN, continuing her overview, reiterated that ACEP's emphasis is on understanding the critical challenges that face the state. The ACEP is forming teams of researchers from the university system. She noted that members should have an overview at a glance of the program, which includes a list of researchers, their location, and the project with which they are working. She highlighted that ACEP focuses on meeting the timeline of both the industry and the community. With regard to funding, ACEP receives a relatively small base allocation through the university budget. Programs such as ACEP make both the university and the state more sustainable as it brings in funds from elsewhere that are applied to challenges faced in Alaska. Ms. Holdmann said ACEP works hard in communities in order to determine how to make a difference for individual Alaskans and track via a metric. She then directed attention to a slide entitled "Conducting meaningful research for Alaska," which highlights some of the places ACEP has been working recently as well as the type of research. The research has been driven by specific questions, she noted. For example, small modular nuclear reactors were of interest to the legislature a few years ago and resulted in ACEP conducting a comprehensive study of the technology existing at that time. The findings were presented to the legislature a couple of years ago and ACEP continues to monitor that in order to understand whether there is potential for Alaska without deciding whether a particular technology is the appropriate solution for a particular community.

8:23:55 AM

MS. HOLDMANN then turned to three areas in which ACEP has invested resources. With the Power System Integration Program, which looks at how village systems operate, ACEP has observed

that individual manufacturers and developers are very focused on their products. However, how those products work together in a system in a small isolated electric grid as is the case in many locales in Alaska isn't reviewed. Therefore, there is a lot of opportunity for optimization of energy systems and that has become a major priority for ACEP. Ms. Holdmann returned to ACEP's testing of a high performance flywheel and informed the committee that it was a privately funded project, and thus a company paid ACEP to test their equipment in ACEP's laboratory that was setup to emulate the entire power spectrum of a rural village. Therefore, ACEP's laboratory can be configured to emulate any particular village in the state and determine how the equipment works to support that grid prior to sending it to a rural location. Although this test was for a remote mine site in rural Canada, the technology seemed like it would have relevance in Alaska, which is why ACEP was interested in testing it.

8:26:12 AM

REPRESENTATIVE SEATON inquired as to how the flywheel performed in the integrated system.

MS. HOLDMANN answered that it performed quite well. In fact, the test demonstrated the goal, which was to turn off a diesel generator and run the community grid with wind power, provided there was adequate wind power. She noted that the most cost savings would be achieved when the diesel generator could be turned off for periods of time in rural communities. The inverter and the fly wheel system were able to support power quality on the grid for meaningful periods of time even when no diesel generator was operating. She characterized the aforementioned as success and now the same system is being installed in a mine in Northern Quebec.

8:27:20 AM

MS. HOLDMANN, returning to the overview, directed attention a photo of a previously tested inverter system that was designed to go into the community of Kokhanok and support a wind project there. Although this inverter didn't work as well as it could, ACEP was able to work with the developer and manufacturer to make changes in the system in the laboratory that were then made in the community. The next project for ACEP is the testing of a liquid battery technology designed at Massachusetts Institute of Technology (MIT) for potential use in the community of Eagle. She then directed attention to the slide entitled "Alaska

Hydrokinetic Energy Research Center." Although hydrokinetic turbines are not a broad solution for Alaska communities, there is a lot of interest in them from manufacturers and communities. Therefore, ACEP has been testing devices in the river in Nenana. In fact, ACEP has the only river test site in the world that can test these devices. The ACEP has been working closely with industry to address environmental concerns, such as fish interactions with these devices, and to do performance testing. She highlighted that Oceana came to Alaska because of ACEP's test site and paid ACEP to test the turbine for weeks. Oceana will return next summer for additional testing and to utilize the time purchased with ACEP's power systems laboratory to work on an integration question for their particular turbine. Therefore, ACEP is bringing people to Alaska to work on technology that's relevant to Alaska.

8:29:13 AM

REPRESENTATIVE SEATON inquired as to the kilowatts of the turbine prototype.

MS. HOLDMANN explained that the turbine was a small device, a 5 kilowatt system, with a plan to scale it up to the level of the needs of a small community. She emphasized that ACEP had nothing to do with developing that technology and isn't saying that it's the appropriate technology either. However, ACEP is working with Oceana to support them and other vendors to be successful in Alaska, if possible.

8:30:04 AM

REPRESENTATIVE HUGHES asked if ACEP has an agreement such that it can benefit from the information and knowledge gathered.

MS. HOLDMANN clarified that the Oceana project is partially funded from the Emerging Technology Fund, and thus the state has invested in this project as well as some others. The ACEP has worked with the Alaska Energy Authority (AEA) to develop the program, and thus the performance data for the systems is public information. Although to the greatest degree possible ACEP does want information, at least performance assistance, to be public so that decisions can be made as to whether various [equipment/systems] are appropriate for communities, ACEP does have nondisclosure agreements with entities as well.

8:31:28 AM

MS. HOLDMANN, continuing the overview, directed attention to photos of the Nenana project, which has mostly been funded through private money, contributions from a major foundation, and some funding from the federal government. The Nenana site is the only one like it in the world and has been internationally recognized. Furthermore, ACEP is recognized by the International Standards Committee for this technology and ACEP's base report is being used to develop those standards internationally. Ms. Holdmann acknowledged that just because something works technically doesn't necessarily mean it will work for Alaska, which is the category in which hydrokinetics falls. The hydrokinetic systems work, but the question is whether they work economically. In fact, ACEP recently formed an energy analysis group that reviews how to maximize available government and private sector resources to address energy issues at the local level in Alaska. She then noted that ACEP is involved with review of the unified system operator of the Alaska Rail Belt grid and on behalf of the Regulatory Commission of Alaska (RCA) is providing technical support. The ACEP has also looked at liquefied natural gas (LNG) shipping for coastal communities for AEA. The ACEP has also reviewed diesel pricing volatility such that there is an understanding of all of the factors that go into pricing for rural Alaska in order to develop better projections for future pricing and [items] that impact energy costs more generally. She mentioned that ACEP has also done a fairly major study for Interior Alaska reviewing the various energy options and comparing projects on an equal basis.

8:33:51 AM

REPRESENTATIVE COLVER asked if ACEP has any published research on the unified system operator.

MS. HOLDMANN clarified that for that project, ACEP is serving as technological support for the RCA, and thus ACEP is not preparing a final report. Therefore, any forthcoming information has to come through the RCA.

REPRESENTATIVE COLVER further asked if ACEP has any findings that she could relate in terms of how the concept of moving the lowest cost power to Fairbanks consumers could play out.

MS. HOLDMANN highlighted that there has been a lot of work in this area, and thus there is a fairly good understanding of the pros and cons. She offered to speak with Representative Colver about putting together something for the House Special Committee on Energy.

8:35:22 AM

MS. HOLDMANN, returning to her overview, said she wanted to address an example in which Alaska has the potential to solve its problems at the community level while also building an economy with global relevance. Referring to the slide entitled "Strategic Initiative: Global Applications Program," informed the committee that this initiative isn't funded and thus ACEP is working on this with industry in the state. She then related ACEP's vision: "Alaska leading the way in innovative production, distribution, and management of energy." The vision is very much about partnership such that Alaska is leading the way, which means that ACEP does a great job getting reliable and affordable energy to all of Alaska's residents and finding innovative ways to achieve those goals that are potentially exportable. Ms. Holdmann then highlighted that Alaska is the global leader in microgrids, which are small electric grid systems. In fact, the Railbelt grid is one large microgrid because it's not connected to another grid in Canada. From a technical perspective, Alaska has developed much expertise in building and managing these energy grids. The expertise Alaska has developed in this area is very valuable and exportable to other markets. Alaska has about 12 percent of the microgrids in the world and the market is expected to grow four-fold to a $40 billion a year in revenue in the next decade or so. Therefore, Alaska should pay attention to this market so that Alaskans can be positioned to benefit from it. She informed the committee that ACEP has done a lot of research regarding where markets similar to Alaska are located and where Alaska's expertise and knowledge could be exported. The countries with markets similar to Alaska and with whom there has been Alaska involvement include the South Pacific and Guam. There has been significant interest in what Alaska is doing in this area. Ms. Holdmann related that there are about 100 Alaska companies involved in microgrids and the expertise is located throughout Alaska. She acknowledged that there is work to do as there are challenges to engage in this market and it's difficult for individual companies to enter new markets. Therefore, having a strategy with which everyone can work is important. Alaska has the operational expertise, particularly since [companies in Alaska] have been running these systems for decades. Ms. Holdmann then highlighted an example from Iceland, which has extended its geothermal expertise globally and has brought much revenue back to Iceland after working with others around the world. Although Iceland is smaller than Alaska in terms of population, they are involved in almost every major geothermal project around the

world. She related her understanding that Iceland has achieved the aforementioned by developing a training program in which people from around the world are brought to Iceland for a free education in geothermal energy, which results in those students returning to their home countries as an advocate for Iceland. Students work closely with the university and industry. The individual participants get to know the industry capabilities and skills, and therefore when they return to their home country to champion geothermal energy they invite the Icelanders to respond to request for proposals (RFPs). Ms. Holdmann expressed the desire to emulate what the Icelanders are doing. She noted that Icelanders invest in research and development (R&D); to that end, she noted that she is pleased that the governor included $1 million in the Emerging Technology Fund.

8:43:09 AM

REPRESENTATIVE HUGHES inquired as to the amount of funding Iceland invested for R&D and demonstration projects and the benefit Iceland is receiving from that.

MS. HOLDMANN answered that she didn't know, but offered to find out and provide that information to the committee.

8:43:41 AM

MS. HOLDMANN, continuing her overview, highlighted that Iceland has also developed a nonprofit business to pool and market Icelandic know-how. She expressed interest in exploring Iceland's strategies in Alaska in order to become more engaged in other parts of the world.

8:44:15 AM

REPRESENTATIVE HUGHES encouraged conversations with Joe Jacobson, Director, Division of Economic Development, Department of Commerce, Community & Economic Development (DCCED), and with the House Special Committee on Economic Development, Tourism, and Arctic Policy regarding Iceland.

8:45:13 AM

The committee took an at ease from 8:45 a.m. to 8:48 a.m.

Presentation: Alaska and Interior Energy Study

8:48:21 AM

CHAIR TILTON announced that the final order of business would be a presentation entitled "Alaska and Interior Energy Study."

8:48:45 AM

DOUG REYNOLDS, Professor, Energy and Economics, University of Fairbanks, clarified that his presentation will include information that's not his, but that he has reviewed. He directed attention to page 4 entitled "Summer 014" and explained that in July and August 2014 there was no Organization of Petroleum Exporting Countries (OPEC) action, the dollar was stable, the world supply was only a 0.2 percent increase, but the oil price fell 10 percent, which is unusual for oil markets. What's really happening is a demand decline that's causing the price decline rather than a supply inundation. Europe, Russia, Brazil, and Japan are in recession. He said it's difficult to know whether China is in recession because they don't have very good statistics. The problem is, as expressed on page 6, when the price decreases on a demand-side push supply will be effected. In fact, there is already a 28 percent decrease in investments in the oil and gas sector, which will eventually result in reductions in the supply such that oil projects will stop and there will be fewer new oil shale projects. If world growth increases and the supply decline declines, there could be a price shock up to $120 per barrel in the next one to five years. Although that's good for Alaska, it's not for others. A price shock, as related on page 8, could result in a wage-price spiral or rather inflation that hits many of the costs for the region. In summary, oil prices, wages, costs, and interest rates increase. Other businesses in the Interior, he emphasized, get hit hard through the heat, electricity, transport, and overhead, services, and food costs.

8:54:15 AM

DR. REYNOLDS moved on to page 11 entitled the "Natural Gas Alternatives." The Arctic Fox pipeline is a small 12-inch pipeline [that would cost] $750,000. He informed the committee that to get the pipeline to Anchorage would cost another $1 billion and would take two to three years. The Arctic Fox pipeline, he opined, is probably the best option if the desire is to go that route. He then moved on to the Alaska Stand-alone Pipeline (ASAP) pipeline, a 36-inch pipeline, which would cost $10 billion. Since no open season has been done, there is no knowledge as to the route. Furthermore, the ASAP pipeline is low pressure and just natural gas. Dr. Reynolds then directed

attention to page 16, the "Big Pipeline," which might take a while to achieve. Japan, he noted, is returning to nuclear. At this time, most of the LNG in the world is being bought by Japan and Korea. He opined that China will stick with coal for a while rather than go to LNG. With regard to LNG trucking, he offered that trucking is more costly than fuel oil. He noted that any time LNG is being [produced] it's a phase change in which natural gas is being changed to LNG and back, which adds costs. He then highlighted the fact that Alaska is broke.

DR. REYNOLDS moved on to page 22 regarding propane, liquid petroleum gas (LPG). He explained that LPG is not dense, which is why it's not used a lot for automobiles. Although there is a lot of propane used around the world, it's not used nearly as much as normal gasoline and diesel, which he attributed to its density. To address the density of propane, it can be bottled and kept under pressure but that makes it difficult to use. Furthermore, propane isn't as cheap as natural gas, which is why electricity power production doesn't use propane. Moreover, propane is volatile chemically. As far as Alaska is concerned, the costs of the transfers, middlemen, fees, and delays make it unaffordable. In fact, propane has some of the highest amount of transit fees and payments per British thermal unit (Btu) of any energy. He then directed attention to page 29 entitled "Propane is Ubiquitous," and said there is a lot of propane in oil shale and there is a lot of supply in the Lower 48 and Canada. Propane is portable as it's bottled and can be transported on the Rail Belt, the roadways, the river systems, and coastal regions. Furthermore, propane is flexible as it can be used in its pure form for residential applications, butane for industrial uses, and there could be a mixture of both. Moreover, propane is fast in that a big project could be accomplished in one to two years and paid off in three years. Actually, at this time a propane project could be paid off in one year. He then highlighted that propane is a reasonable cost energy source, with a price of about $1/gallon over the last couple of years. Currently, propane costs less than $.50/gallon, and thus he projected that propane wouldn't get too high in price. Propane is like natural gas and those who use it won't know the difference, except the cost is cheaper, it can be moved faster, and is really doable for Alaska in terms of economies of scale. Therefore, he suggested reviewing a larger project that could go further than Fairbanks and into other areas of Alaska. Although the ports of Vancouver, British Columbia, or Seattle are obvious sources, Prince Rupert is closer and it's getting a supply hub near there. In response to why the North Slope wouldn't be used, Dr. Reynolds explained

that North Slope propane would require a new facility for processing and the batches transported via truck would be small. Therefore, the economies of scale wouldn't be achieved. However, Alaska's rail and barge system could make [the transport of propane] work because it's not just closeness that should be considered but also the size of the system. The idea, he explained, would be to transport the propane from Prince Rupert to Fairbanks, then barge it to Whittier, and rail it from Fairbanks in order to achieve economies of scale that would reduce the cost. The Alaska Marine Highway System (AMHS) could run this as an option.

9:01:28 AM

DR. REYNOLDS, referring to page 39, suggested that a dedicated rail only barge with two levels could be used. A simple barge at a cost of $22 million could be obtained or an articulated barge that goes a bit faster [for a cost of $25 million] could be obtained. The faster articulated barge reduces the transport time and can reduce the cost and make the logistics work better while saving money. He emphasized that the key is filling the tanker rail cars while they remain on the barge, which would have all the infrastructure to fill the tanks, at Prince Rupert. The ability to fill the tanker rail cars on the barge without disembarking cuts down on time, costs, and fees. Once a barge is filled in Prince Rupert, it would sail to Whittier where the [tanker cars] would be placed on the rail to North Pole, which he characterized as a center of energy. Once a terminal is setup in North Pole, the propane could be trucked on the rail system or via a barge into the Interior. Propane distribution in Alaska could be via roadways, a coastal highway, or a river system. The goal is to move the propane to Fairbanks and then expand from there. He highlighted that there would be no piped distribution costs and the trucks hold a dense fuel, and thus the cost per Btu would be lower. Dr. Reynolds then informed the committee that the Interior market amounts to about [30] billion cubic feet per year (bcf/year), which is about 1 bcf equivalent of natural gas. Currently, fuel oil is $24/mcf, about $3.00 per gallon, but there is the potential to have propane delivered to one's door for $14/mcf, which would amount to a $10 million/mcf in savings or $300 million per year in savings for the Interior. As one moves farther away, the savings would be more. He pointed out that the to start with it would be a 5/bcf project, but there would be the potential to expand. The key is to incrementally expand such that a 5/bcf project could be expanded incrementally at about 2.5/bcf per incremental expansion. The expansion could include coastal distributions and use existing

systems to move along the coast and enter the rivers. The main point, he emphasized, is to start with a 5 bcf/year project such that $15/mcf fuel enters Fairbanks and as it travels further, the cost increases.

9:06:17 AM

DR. REYNOLDS moved on to page 48 entitled "Economics" and informed the committee that the capital expenditure (CAPEX) of the 5/bcf project starts with $50 million and the operating expenditures (OPEX) start with $15 million/year, and the revenue would amount to $30 million/year with a three year payoff. He noted that these numbers are from Energia Cura LLC engineers he knows in Fairbanks. At this time, with a selling price of $15 and purchasing [the propane] in Canada where it's $5/mcf, the project could be paid off in a year and save a lot for residences. He then directed attention to page 49, which relates the operations side that would include leasing rail cars. Currently, with a $15/mcf price in Fairbanks, which would amount to about $18/mcf to the resident, the savings would amount to roughly $20 million/year for Alaskans. The savings could be even more, say $10/mcf in Fairbanks or the barge could be paid off quicker and expansion begun. Therefore, the two strategies as outlined on page 51 are to either use the savings to lower the price or use the savings to add expansion. Furthermore, there could be a cooperative or a partnership with the Alaska Marine Highway System (AMHS) such that AMHS could own it and make money. The Alaska Railroad Corporation (ARRC) could also be a part of this. He noted that now is the time to obtain a [long-term] contract at a better price, even though it's an index price. It would also be a fixed loan, he stated. Canada, he informed the committee, needs propane buyers and thus now is the time to enter this market. Referring to the graph on page 55 regarding the price differential, he opined that the price of propane is always going to be significantly less than oil and a little bit more than natural gas. Furthermore, propane is easy to refine and thus its costs will be a little less. Currently, the price of propane in Canada is less than $.50/gallon, which means it could be transported to Fairbanks for less than $10/mcf with this project. The project could be expanded to address a lot of needs. He acknowledged that once the price of oil increases, the price of propane will increase while still remaining a lot lower price than the price of oil and a little higher than the price of natural gas. When all the costs of the infrastructure projects and paid off, propane will match anything that can be done with natural gas.

9:10:08 AM

DR. REYNOLDS, referring to page 56, projected that propane could be transported to North Pole at a cost of $15/mcf and to residences at a cost of $18/mcf. Currently, propane could be transported to North Pole at a cost of $10/mcf and residences at $12/mcf or so. Propane could help gold mines expand and re-open the [North Pole] refinery. He pointed out that each tanker could have specific products that would help the mines or other necessary industrial processes. He then directed attention to page 59, which is an example of how a river system can be used in Nenana. Nenana has a propane terminal and there are lots of storage tanks that can be filled in the summer and drawn down in the winter, which allows the system to continue year round. In contrast, the storage for pipeline systems is costly. Since everyone has a little bit of storage for propane, it costs less and will work a lot better. Propane, he opined, can be used to help with the existing Anchorage pipeline distribution system for natural gas. If extra gas is needed in that system, propane could be injected into the natural gas system.

DR. REYNOLDS concluded by highlighting that there are high heating costs, even though the price has decreased and there is a lot of pollution. Propane, he emphasized, has a weird niche advantage; "It's not exactly perfect which is why perfect," he said. Since no one uses it pervasively in the Lower 48 or Europe, there's extra supply available. He reiterated that propane is a cheap solution, but a large system with one transaction is necessary to achieve economies of scale. Furthermore, with rail transport to Fairbanks, the $15/mcf can be achieved easily even when the price of propane rises. The project could be ready in one to two years and paid off in three years. However, at this time, the pay-off could be achieved in one year or the price could be lowered. He noted that a lot of value could be leveraged to achieve potential savings for residences in proportion to expansion, which he estimated could be in the $100 millions depending upon size and expansion. With a 5 bcf project, something on the order of $20 million a year could easily be saved and paid off in one year or savings could amount to $30 or $40 million for residences and a pay-off in three to four years. He highlighted that multiple markets could be reached along the river and coast, including Cold Foot, Houston, Dawson, Tanana, Juneau, Valdez, and Anchorage. Further, there are various dimensions that could be used, including heat, industry, mining, pipelines, and cars.

9:15:36 AM

REPRESENTATIVE COLVER inquired as to the technical challenges of the low temperatures in Fairbanks and maintaining the flow of propane for residences.

DR. REYNOLDS pointed out that propane has been used in Fairbanks for 50 years, although [the system] must be engineered correctly. Typically the tank is located underground where the system works fine so long as the temperatures stay 10-30 degrees above 0. If the tank is located above ground, it can be insulated or heated.

9:16:55 AM

REPRESENTATIVE HUGHES remarked that she wasn't aware that Japan is returning to nuclear rather than seeking LNG, and inquired as to when that switch occurred and to the hard facts to support that.

DR. REYNOLDS stated that Japan has never declared that it's decertifying all its nuclear power plants, and thus he opined that they will ramp up and use more nuclear. From what he has read, he said he understands that roughly 90 percent of LNG is going to Japan and South Korea because they suddenly have this large need. China is in a recession and using coal rather than purchasing LNG that would require spending funds to set up systems to use it. Japan, on the other hand, is paying high prices for electricity as it tries to use up the LNG. For Japan's existing nuclear power plants, they just have to ensure they are safe by putting a few extra safety systems in order to reopen them. He opined that Japan is on track to reopen its nuclear plants.

REPRESENTATIVE HUGHES expressed interest in learning more about Japan reopening its nuclear plants since she had the impression otherwise.

9:19:59 AM

REPRESENTATIVE HUGHES, returning to propane, recalled Dr. Reynolds proposal for AMHS to acquire the barges he described and not use existing AMHS vessels.

DR. REYNOLDS confirmed that the barges would have to be acquired, designed and built, because they don't exist. A dedicated system is necessary such that the system can be

streamlined and expanded to do one thing very well. He projected that the barges could be built in about a year, after which they could arrive at Prince Rupert where the tanks would be filled without disembarking. The AMHS would own the barges, rent the tug boats, and manage the system to the rail after which the [ARRC] would manage the system to Fairbanks.

DR. REYNOLDS, in further response to Representative Hughes, related that he did send letters to DOT&PF and AMHS to which the response was that they are under budget. He noted that he hasn't sent a letter to ARRC yet. With regard to obtaining gas from Cook Inlet, Cook Inlet doesn't have a lot of propane available. The North Slope, on the other hand, does have a lot of propane but it's being used in the pipeline. To use propane from the North Slope outside of the pipeline would require systems changes and shipping, which would require investment. Although the road distance is less from the North Slope [than the Prince Rupert route proposal], the economies of scale [of using propane from Prince Rupert] reduces the costs per Btu. Specifically, only one truck at a time from [the North Slope] would come down whereas multiple rail cars and a barge could come up. The aforementioned really cuts the cost per Btu. In terms of whether one would want to use North Slope propane, Dr. Reynolds pointed out that the North Slope [producers] received lower taxes and have no qualms with getting propane wherever it's the cheapest. However, to help the villages, the project must start in Fairbanks. Although the cost would increase the further away from Fairbanks the propane is distributed, it would still be fairly reasonably priced energy.

9:24:55 AM

REPRESENTATIVE SEATON related his understanding that already there is a hydro train that travels from Seattle to Whittier with dedicated rail cars that are pulled off. He asked if that's the same kind of system to which Dr. Reynold's is referring or is a double deck necessary or can the hydro train be dedicated with a different stop and tanks and enter Prince Rupert as an entry point.

DR. REYNOLDS said he didn't know exactly what the hydro train has, but related his understanding that normally the upper deck of barges are filled with various other things besides energy and the lower deck with a lot of rail cars. He said he would have to look into how the hydro train works.

9:26:07 AM

REPRESENTATIVE SEATON expressed interest in seeing the analysis of using the existing hydro train, which only hauls rail cars not any other freight. He then asked whether the filling facilities in Prince Rupert already exist and whether the propane comes from St. Johns.

DR. REYNOLDS clarified that the Prince Rupert facility is planned and will be a hub. Therefore, [Alaska] could obtain a contract as the barge is being built. However, the barge he is proposing will be made such that the [tankers] would be filled on the barge without disembarking, which lowers costs significantly, saves time, and then the cars could roll off onto the train tracks in Whittier. Therefore, he suggested that the state could be in a position to get a contract [with the hub].

9:28:09 AM

REPRESENTATIVE COLVER asked if Dr. Reynolds has reviewed the availability of these rail cars and what that would add to the delivery cost of the propane. He then asked whether the federal safety rules that require there to be a dedicated port when shipping LNG from an American port would apply when delivering propane in bulk quantities.

DR. REYNOLDS answered that although he hasn't reviewed specific regulations, there should be no problem because the [tankers] roll off. He noted that empty tankers coming down from Fairbanks might have to be held on one side of the mountain into Whittier; of the exact sequence he was not sure. If it takes a year to build the barge, that should provide enough time to lease tanker cars. He noted that the lease rate is included in the costs.

9:29:57 AM

REPRESENTATIVE VAZQUEZ inquired as to the cost of converting to propane, whether for a residential or commercial application.

DR. REYNOLDS stated that one might have to buy a new tank, which he hasn't priced. He noted that the provider will include the price in [the conversion] over a long-term contract and do the work so that a little extra is paid to cover the cost of the tank. In further response to Representative Vazquez, Dr. Reynolds clarified that although it would be a case-by-case basis, most existing modern oil systems the burner tips can be

changed for propane use and the existing system can continue to be used.

CHAIR TILTON requested that Dr. Reynolds return information to the committee regarding conversion costs.

9:32:41 AM

REPRESENTATIVE HUGHES asked if the plans for these nonexistent barges have been designed or drafted. She then questioned why the state would have to put forward the capital because if this is such a good idea wouldn't industry be doing it. Furthermore, she inquired as to why the LNG trucking project moved forward instead of this.

DR. REYNOLDS, noting that he has contacted some private businesses, opined that it's difficult for small businesses that have to start slowly and build up, particularly with projects such as this because such a big system is necessary right away. Whereas, this project is perfect for the state because it could provide leverage to start the project. As far as the design, Energia Cura LLC has had discussions with shipyards regarding these [barge] designs and obtained quotes on getting these designs built. For many years, natural gas and oil has been used and dictated the thinking [of energy]. Now that there is more propane on the markets, it has been slow to materialize these markets and use them in new ways because shale oil and shale gas include a lot of propane. The price advantage of propane is achieved because propane just isn't used as much as natural gas or oil. He reiterated that although there are designs available [for these barges], they are not being used because filling the tankers on the barge prior to transport is a new and innovative idea. Dr. Reynolds mentioned that he hasn't talked with ACEP regarding this particular idea.

REPRESENTATIVE HUGHES remarked that although being the first for such a new project is a risk, a three-year payoff would seem to invite private sector interest and funding. Therefore, he encouraged Dr. Reynolds to engage with others as well as industry.

9:37:28 AM

REPRESENTATIVE SEATON, returning to the issue of converting to propane, informed the committee that the entire city of Homer has converted to natural gas. He explained the conversion

process in Homer. He further explained that in Homer, the oil burners could be converted but most of the time they were so much less efficient than new modulating gas burners and boilers, and thus it made more sense to replace the heating system. Representative Seaton mentioned that in the last 10 years propane was one of the most expensive energy sources in Homer other than electricity. Therefore, he expressed interest if this proposal is cheaper and available under a long-term contract at Prince Rupert. He then pointed out that ConocoPhillips Alaska, Inc., is trucking roughly 100 tons of propane to North Slope where it's used for enhanced oil recovery, and thus those companies won't supply propane from the North Slope fields for such a project. With regard to this proposal, Representative Seaton stressed the need to ensure the propane terminal is already being planned in Prince Rupert and is not reliant on natural gas lines from the coast such that propane would be a sub-product from the liquefaction of LNG as that would require the LNG terminal to be developed and he wasn't sure the economics were present for it.

DR. REYNOLDS reminded the committee that there is a train all the way to Prince Rupert, and thus it can be transported via rail all the way to Prince Rupert. Furthermore, Alberta, Canada, can't always sell all of its propane, which oftentimes results in them selling their propane under the Texas price. Therefore, he opined that one should be able to obtain whatever propane supply needed and if not, then it could be obtained from Seattle or Vancouver where there are existing [propane] facilities.

9:43:30 AM

ADJOURNMENT

There being no further business before the committee, the House Community and Regional Affairs Standing Committee meeting was adjourned at 9:43 a.m.