

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

February 5, 2009  
10:33 a.m.

**MEMBERS PRESENT**

Senator Lesil McGuire, Chair  
Senator Albert Kookesh  
Senator Bill Wielechowski

**MEMBERS ABSENT**

Senator Lyman Hoffman  
Senator Bert Stedman

**COMMITTEE CALENDAR**

Overview: Biomass energy in Alaska

Presenters:

- Peter Crimp, Alternative Energy Program Coordinator  
Alaska Energy Authority
- Gwen Holdmann, Director  
Alaska Center for Energy and Power
- Donna Vukich, General Manager  
Naknek Electric Association
- Yvonne Kopy, Planner  
Bristol Bay Borough
- Greg O'Claray, Statewide Coordinator  
Alaska Chip, Ltd.

**PREVIOUS COMMITTEE ACTION**

No previous action to consider

**WITNESS REGISTER**

PETER CRIMP, Coordinator  
Alternative Energy and Energy Efficiency Program  
Alaska Energy Authority (AEA)  
Anchorage AK

**POSITION STATEMENT:** Provided an overview of Alaska's biomass energy.

GWEN HOLDMANN, Director  
Alaska Center for Energy and Power (ACEP)  
Fairbanks AK

**POSITION STATEMENT:** Discussed near-term applied biomass systems that may work in Alaska.

MS. DONNA VUKICH, General Manager  
Naknek Electric Association (NEA)  
Naknek, Alaska

**POSITION STATEMENT:** Discussed an effort to use fish waste as a biomass source in western Alaska.

YVONNE KOPY, Planner and Grant Writer  
Bristol Bay Borough  
Naknek AK

**POSITION STATEMENT:** Discussed an effort to use fish waste as a biomass source in western Alaska.

GREG O'CLARAY, Statewide Coordinator  
Alaska Chip, Ltd.  
Juneau AK

**POSITION STATEMENT:** Provided information on firewood operations in Ketchikan.

STEVE SELEY, Owner  
Alaska Chip LLC.  
Ketchikan AK

**POSITION STATEMENT:** Provided information on firewood operations in Ketchikan.

#### **ACTION NARRATIVE**

[10:33:38 AM](#)

**CHAIR LESIL MCGUIRE** called the Senate Special Committee on Energy meeting to order at 10:33. Present at the call to order were Senators Kookesh, Wielechowski, and McGuire.

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Overview: Biomass Energy in Alaska

#### **OVERVIEW: BIOMASS ENERGY IN ALASKA**

CHAIR MCGUIRE announced a presentation by Peter Crimp.

PETER CRIMP, Alternative Energy and Energy Efficiency Program Coordinator, Alaska Energy Authority (AEA), said AEA is a public corporation that has been in operation since 1976. "We own stuff," including the Anchorage/Fairbanks intertie, Bradley Lake Hydro, and a rural energy group. AEA has built many tank farms

and power systems throughout the state. It works with the Denali Commission. AEA has an alternative energy section, which he manages, and it includes programs for biomass, hydroelectric, wind, and others. AEA is now performing a technical and economic review of a renewable energy fund. His talk will focus on wood energy, but there are a number of biomass resources throughout the state, including fish oil and municipal waste. There is a wood energy development task group and an infrastructure among agencies for developing wood energy. The AEA has been working with a project in Craig, Alaska.

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MR. CRIMP said AEA has helped Anchorage with a landfill gas feasibility analysis. Wood has been the standby in Alaska. Fairbanks was originally powered by wood. He noted the use of wood for power at the old pulp mills in Ketchikan and Sitka.

MR. CRIMP showed a map of renewable energy resources in Alaska. The green area is where the forests are, and "generally it's in the Interior." The fish processing facilities are marked on the map by blue fishes. There is a fair amount of waste available from them. There are also sawmills and garbage in the major cities. Alaskans are using roughly 100,000 cords per year for heating residences. That is a very rough estimate. The state has over 18,500 square miles of productive forest that can grow 3.5 million cords of wood per year. Wood cutting can conflict with other uses, but benefits include wildfire risk reduction, economic development, and habitat enhancement.

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MR. CRIMP showed a diagram of how much wood, garbage, and fish oil is available in "diesel gallon equivalents." Sustainably-available wood equals about 500 million gallons worth of diesel. That isn't enough wood to run the state. "Of course that probably wouldn't be such a good idea anyway." But it is an important component of energy use in Alaska.

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MR. CRIMP said he will discuss technology ranging from residential wood heating to gasification and pyrolysis. But air pollution is a big consideration. It is a problem in Fairbanks because people are not burning wood efficiently. Another issue is fuel depletion and logging aesthetics. Some people don't like the look of cut-over areas, but he is not one of them. System reliability and complexity is a consideration too. But economic feasibility is the overriding factor. "Are there people to buy

the heat and power? What are the other alternatives?" He showed an image of a smoky, inefficient, outdoor wood boiler.

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MR. CRIMP said AEA has been developing a demonstration project in Dot Lake for burning wood efficiently with no smoke and more heat. It heats a washateria and seven residences. He showed a cross section of the boiler. It has a 4,400-gallon tank with a by-pass fire tube. The wood heats the water and the water is used as a heating source. The project stimulated other ones when the price of heating oil spiked last year. So one was installed in Tanana, which also heats a washateria and other buildings.

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CHAIR MCGUIRE asked about the price, the time it takes to develop, and the capacity.

MR. CRIMP replied that they are fairly simple projects, "low hanging fruit for some communities." It costs about \$250,000 and has an 8-year payback, depending on the cost of wood and oil. The unit has about 10 times the energy of a residential system. He said that the Dot Lake unit uses slabs of wood from a local sawmill and pays about \$35 per cord (and the price may be considerably higher now). In Tanana, instead of exporting money from the community to pay for oil that is barged in, "residents can fill up ... bunks with wood and get \$200 per cord."

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MR. CRIMP showed photos of a chip-fired facility near Dry Creek. It is a boiler system by Decton. It uses sawmill wastes that would have to be dealt with otherwise. There is no local market for it. It heats a dry kiln for value-added wood processing and another building. He showed a new project in Craig, which was funded by AEA, the federal government, and the Denali Commission. It is a chip-fired boiler that heats two schools and the community pool. It is high-tech and clean burning.

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MR. CRIMP said wood-fired power is another step up in complexity, and none exist in Alaska. It can be economic when there is plentiful low-cost fuel, it is displacing diesel oil, and there is a large market for both power and heat. It worked for the Southeast pulp mills, and he said it is reasonable to ask if small rural communities can use it. He presented an Alaska map showing preliminary economic feasibility assessments. It has been incorporated in models for the Alaska energy plan. A

demonstration project is needed, along with land management planning regarding the harvest levels.

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MR. CRIMP showed a photo of a small module gasifier made by Community Power Corporation who wants to demonstrate it in Alaska. He noted an organic Rankin cycle to convert wood into heat to supply a unit, such as what runs Chena Hot Springs.

MR. CRIMP said that Alaska Village Initiatives have proposed gearing up the harvest in rural communities. The big question is how much it would cost to supply a wood system. "Going out in snow-goes with a chainsaw is not a way to necessarily supply a utility." Mechanized logging would be desired with a good management plan to reduce conflict with subsistence and other uses. A track hoe with a cutter head would cost about \$600,000. Fuel supply is generally available for small villages. Wood supply would be a concern in a place like Dillingham, but Tanana would have a lot of wood and the question would be the cost.

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MR. CRIMP said he doesn't know much about converting biomass to liquids. There are technologies that will convert carbon-based substances, like coal and wood, into a liquid fuel. "Fischer-Tropsch is one of those." Southern Southeast has looked at converting to ethanol. Wood is burned in a starved-air system that breaks the carbon into smaller chains and then synthesizes it into the hydrocarbons desired and burns the rest for power and heat.

MR. CRIMP said AEA has been aggressively working with communities to develop wood-fired heating projects. Wood requires a commitment, it doesn't just dribble out of an oil tank. Chip-fired heating is a stepping stone between wood heat and power generation. "And of course bio-refineries, liquid fuels, are the future."

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GWEN HOLDMANN, Director, Alaska Center for Energy and Power (ACEP), Fairbanks, said her program is interested in near-term applied solutions that are not currently commercially viable in Alaska, "and that would be combined heat and power with biomass resources." ACEP is less interested in looking at liquid fuels from biomass because it's further off in the future. Also, it is extensively researched in the Lower 48, so Alaska doesn't need to focus on it. Alaska can wait to see what others do and take advantage of it. Using cellulose, like feedstock, for liquid

fuel would be very exciting, but ACEP is waiting to see it develop a little more. It's not a technical challenge, but an economic one. The components need to work consistently and economically.

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MS. HOLDMANN said the university has looked at burning fish oil in diesel generators quite a bit. It is doable, but oil has a shelf life. Research on algae is being done elsewhere. She noted that a large tree grows from a small seed, and asked where all the matter or mass comes from. That mass is really from the atmosphere; it is basically CO2 and water. Combusting or gasifying a biomass resource releases greenhouse gases, but they are the same gases that are taken in during the life of that tree. So as long as biomass is being planted on a sustainable basis, it is renewable.

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MS. HOLDMANN said Fairbanks was heavily deforested in the last century for power and heating. The advantages of biomass are that it can supply on-demand base-load power, similar to geothermal. It is available year round, unlike wind or solar. It is carbon neutral and can be processed into a syngas or liquid fuel. It can potentially be used for transportation applications, "but that is down the road a ways." It is also good because heating is more important than electric power in Alaska's rural communities.

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MS. HOLDMANN said the disadvantages are that biomass is expensive to handle, it has a very low energy density so it must be used near its source, it is labor intensive, storage can be a challenge, and small scale technology is still emerging.

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MS. HOLDMANN said the disadvantages mean that it can provide for local jobs. Biomass in the Lower 48 is in widespread use as a power source. It is typically used in a combustion cycle to drive a steam turbine. It is supplying about one percent of the total U.S. generating capacity, which is pretty significant for a renewable resource. Worldwide, biomass is the primary energy source for half of the world's population, so Alaska has an opportunity to develop a niche market in commercializing the technology. Europe is now the leader in clean biomass technologies. She showed a photo of a 2-megawatt gasification plant in Austria.

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MS. HOLDMANN said one research challenge is to reduce capital costs. "A lot of these technologies are technically feasible if you're willing to throw enough money at it." Component costs need to be reduced. The efficiency of the energy conversion needs to improve. The smaller the system, the less efficient it is. Emissions need to be reduced, and integration with existing generation systems needs to be better. Alaska has isolated grids, even the state is an isolated grid, and that differs with the Lower 48 states, so no one else will be addressing that challenge. But it is more common throughout the world.

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MS. HOLDMANN said gasification and direct combustion are the two avenues being considered for power generation from biomass. Direct combustion is the older version. Gasification is incomplete combustion to form a syngas that can then be used to drive a gas turbine. One of Alaska's challenges is to achieve optimal performance for varying fuel conditions. There will be different moisture levels and different trees, for example.

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MS. HOLDMANN said it would require approximately 500 acres to grow a biomass crop, like willow or alder, to fuel a 500 kW generator sustainably, assuming the use of about five tons per acre per year. She is not sure that can be sustained in Alaska. Biomass crops are fast growing and are grown specifically for energy generation. Most of the money stays in the community. It is important to be thinking about stabilizing costs and keeping jobs and not so much about reducing the cost of power or heat. Biomass is a crop and farmers can start growing it before the power plant is built.

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MS. HOLDMANN said Sweden has been growing willows since the 1970s. There are similarities between Alaska and Sweden. Sweden has done a lot of resource assessment and has refined the technology. It is expensive and usually requires a subsidy. The University of New York has been partnering in Alaska to look at growing willows and other plants as a biomass crop. There is a 500-acre test plot in New York that is co-fired in a nearby coal power plant. Co-firing biomass in coal plants is an easy way to use biomass in the near term. Eielson has a coal power plant and there was a recycling program where paper products were densified and burned in the coal plant. The program ended in 2006 after there was a fire in the facility.

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MS. HOLDMANN said willows can also be used to clean up waste water and landfills. Alyeska is one of the leaders in looking at growing short rotation biomass crops because of its need to revegetate. The University of Alaska is looking at fast-growing grasses. Growth rates can be augmented with fertilizer.

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MS. HOLDMANN said Chena Hot Springs and United Technologies are looking at substituting the heat from the geothermal resource with biomass to drive that type of organic Rankin cycle turbine. This is a major Fortune 500 company that is interested in solving Alaska's rural power generation issues. [United Technologies] sees a niche industry that can go worldwide, and it wants to invest in demonstration products in the state. Alaska should capitalize on that. The Chena geothermal power plant has low temperatures and is very inefficient. It runs at about 8 percent efficiency, but it doesn't matter when you're not paying for the fuel. Biomass fuel costs money and work, so the efficiency needs to be increased. Using both power and heat increases the efficiency up to 80 percent.

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MS. HOLDMANN said the project doesn't use a steam cycle, but an organic Rankin cycle, which uses a refrigerant that is boiled into a vapor, and it doesn't freeze or need high pressures. There is a demonstration project at K & K Recycling [near North Pole, AK] that AEA and ACEP have been involved in. It will be a 400 kW system - analogous to the Chena project. It is being done by the same owners. The fuels will be paper, cardboard, and brush. It is the same stuff that used to go into the Eielson recycling program that ended in 2006. It is designed for rural, stand-alone applications. It heats up thermal oil instead of hot water, and the thermal oil supplies the heat to run the power generation cycle. The cost of power is estimated to be about 6.4 cents in this urban area. It will be co-located with greenhouses and space heating. It represents high-value niche markets for emerging technologies. Alaskan villages could provide global leadership in rural biomass power systems, especially for 100kW to 5mW modular systems. She suggests urging manufacturers to use Alaska for testing.

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MS. HOLDMANN said Iceland became the world leader in geothermal development. When Icelanders decided to switch to geothermal, they didn't know anything about it. They didn't even have an engineering program at their university. They were way behind

where Alaska is now, but they made a commitment to become the world leader in geothermal. Icelanders went to Boise, Idaho, to learn about the oldest district heating system in the country.

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MS. HOLDMANN said ACEP is an applied research program at the University of Alaska, and it verifies performance and reliability of equipment. It does not build products, it assesses them economically and technically. It looks at integration with existing power systems for all different types of renewables. It tries to purchase products that claim to work. Some people actually market things that don't exist, so ACEP saves other people the time with testing technology that isn't really ready for prime time. ACEP works with manufacturers that do have a good product to make them better and more applicable for Alaska. Efficiency is ACEP's top priority. Secondly, they look at off-the-shelf technology, and then new technologies.

MS. HOLDMANN gave three examples of how ACEP pursues its mission. It does flow battery testing at the university to improve the system. It has tested fuel cell products, but they are not in the near term in Alaska so that has been abandoned. ACEP is doing a lot of product testing on waste heat recovery systems for existing diesel generators.

MS. DONNA VUKICH, General Manager, Naknek Electric Association (NEA), Naknek, said NEA is working with the Bristol Bay Bureau on a project developed by Yvonne Kopy.

YVONNE KOPY, Planner and Grant Writer, Bristol Bay Borough, Naknek, thanked [Mr. Crimp and Ms. Holdmann] for all their work in renewable energy. There are few trees but many fish in Southwest Alaska. She proposed a simple feasibility study of using fish oil as an energy source. The ultimate goal is a fish waste processing facility to create fish oil and other value-added products that is operated with 100 percent clean energy.

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MS. KOPY said that if the facility proves to be successful, the technology could be transferred to other industries. Bristol Bay is home to a huge fishery, including the largest sockeye fishery in the world. It is a likely location to place a model facility.

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MS. KOPY said fish processing wastes 50 percent of every fish. That number is growing because Lower 48 markets are targeted instead of Asian markets. Canning wastes only 20 to 30 percent

of the fish, but new markets are for filets. Bristol Bay harvested 29 million sockeye salmon or 170 million pounds. An average of 30 percent waste puts 57 million pounds of ground-up waste into the river system. Her proposal would use the waste for energy. It is not new technology. Unisea Inc. in Dutch Harbor, Alaska, is currently rendering its waste into fish oil and mixing it with diesel to generate energy for its plant. There is a cooperative arrangement in Kodiak to render fish waste to create oil and pellets. Juneau has a floating processing facility that is rendering fish waste into oil.

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MS. KOPY said the technology is not new, but she wants to look at untested technologies. The work she has done so far has suggested that there isn't enough fish oil to run an entire facility 100 percent, so other sources, like wood, solar, or wind, are needed, depending on the area. Cogeneration would make it possible to operate a fish waste facility 100 percent on renewable energy. Current projects are a great start, but she is asking for financing and funding to go into more depth. The project partners include the University of Alaska, the Center for Economic Development, and the Institute of Social and Economic Research (ISER), which will research economics and viability. Through study and innovation it is possible to develop this facility, and it could be duplicated throughout Southwest Alaska, a region that has suffered economically.

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CHAIR MCGUIRE asked if the project is in its initial stage.

MS. KOPY said, yes, it is just at the feasibility assessment.

CHAIR MCGUIRE said she looks forward to its completion.

DONNA VUKICH said NEA is very committed to working with the borough, industry, and residents who want to use the resource for economic development and energy.

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The committee took an at-ease.

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GREG O'CLARAY, Statewide Coordinator, Alaska Chip, Ltd., Juneau, said Alaska Chip is owned by the Seley family in Ketchikan, a longtime, timber-harvesting family. This is an exciting project, and Mr. O'Claray came out of retirement for it. He spent four years working for Governor Murkowski to solve the unemployment

and economic problems in rural Alaska by providing jobs. "We were not able to solve it because all the pieces aren't there." His current project is selling firewood out of the back of a van in Juneau. He showed "an example of the type of products that are being generated in the plant operated by the Seley family in Ketchikan." He had a piece of wood cut from standing dead yellow cedar. It is aromatic and burns hot. It sells good. It's not as heavy. Ms. Holdmann used oak as an example for the life cycle of a tree, which doesn't grow in Alaska. A cord of hemlock has the same BTUs as 157 gallons of fuel oil. He showed a picture of a log splitting machine that Mr. Seley paid over \$500,000 for. A person logging for firewood in our forests would go broke, "because the firewood really is taken from the 30 percent unmarketable commercial timber." But no one can stay in business making firewood out of high-value timber. The 30 percent would normally be considered waste material and left in the woods. Mr. Seley bought the machine at the urging of the U.S. Forest Service because of concern over waste wood in clear cuts. The machine will take a log about 60-feet long, and it will cut, split, and pile it in eight seconds. Mr. Seley cut 21 cords of wood in less than two hours by himself, and Mr. O'Claray sold 14 cords in three days.

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MR. O'CLARAY said that Mr. Seley's idea is to move wood or chips to energy-starved communities in western Alaska. There is no year-round employment in the bush communities, so social problems mount. Young people leave to find jobs, and the whole village structure was falling apart. He was involved in training people in construction work, but it is nomadic work. Many young people didn't want to leave their villages because of their family structure. With a subsistence lifestyle, when the caribou come, people need to hunt. A five-day a week job doesn't fit their lifestyle. It is easy to job-share if the industry is there. Mr. Seley's project "will entail manpower to be used at the other end." If he ships 400 cords of wood into Bristol Bay on a barge, it will require people to unload and distribute it.

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MR. O'CLARAY said the idea is to send wood in massive amounts to western Alaska and have it stored in the summer. It would then be distributed to families in the winter. "And, basically, that is what we're all about." The chip technology is a reality. People have been heating with wood products in boilers in Europe for five years. "They laugh at us when they find out we're still burning diesel in our boilers and in our homes." He showed a picture of a typical boiler. He noted that he got 10 cords of

wood in a 20-foot van by hand-loading it. He showed a picture of a pile of wood at the end of a conveyer belt. The boiler works on the same type of technology as a little conveyer belt inside an auger system.

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MR. O'CLARAY said chips or cords are superior to pellets. Pellets come from the shavings from making lumber, sawdust, and a binder. That is why they are more expensive. When pellets get wet they turn to mush, and this is wet country. If chips get wet, they can be dried. Most furnaces wet down the chips so they will burn at the same rate all the time. Hemlock is a "stable BTU releaser" because it has moisture in it. "you can hold a fire all night by throwing a couple chunks or sticks of hemlock in there with the cedar."

CHAIR MCGUIRE asked where the project stands now.

MR. O'CLARAY answered that they are "ready to go," and they are splitting wood now for shipping to Southeast Alaska communities, but the legislature needs to provide a subsidy to move the product north. Mr. Seley wants to sell the product at the same price he sells it for in Ketchikan where there is no freight costs -- \$175 per cord for hemlock.

SENATOR KOOKESH said it is all done with waste wood.

MR. O'CLARAY said yes. Cedar is valuable for totem carvings and other uses.

SENATOR KOOKESH asked why he showed the KOB system, and if Mr. Seley is a distributor.

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STEVE SELEY, Owner, Alaska Chip LLC., Ketchikan, said he has an affiliation with an engineering company that specializes in these boilers. "We've chosen to provide the data on the KOB because it was readily available, we knew it was accurate, and it was a proven system." He does not distribute the product but wanted to show what was available. He added that Western Tugboat will commit a 9,000-ton barge that could transport 2,200 cords of split wood or 3,000 dry tons of chips to western Alaska. He said he can deliver wood to Nome at a price that is equivalent to \$2.37 oil, and chips would be worth \$1.78 per gallon of oil.

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MR. SELEY said the concept is simple. His company has been in business for 35 years. He owns and operates remote camps in the Tongass National Forest, and he is very familiar with costs. The camps are like communities in rural Alaska. About 70 percent of the demand on the diesel generators is for heat. The new Tongass Land Management Plan identifies 257 million board feet of annual harvest. The 30 percent component that is waste wood could replace 31 million gallons of heating fuel. He proposes to use the expertise of the Southeast Alaska timber industry. It is located along the water, and it is a perfect fit for a coastal community in western Alaska. There are wood-burning appliances and systems, so no research is necessary. It is an immediate solution to high-cost energy; "we challenge any alternate fuel source to match what we can do with wood today."

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There being no further business to come before the Energy Committee, it was adjourned at 11:47 a.m.