

**Chugach Electric Association, Inc.
Anchorage, Alaska**

Renewable Energy Committee

Fuels

Describe the operation and capacities of the Beluga steam generator and any other steam or “combined heat & power” generation that CEA has.

The heat from Beluga 6 and 7 power the Beluga 8 steam unit. The capacity of Beluga 6 and 7 is 82 MWs each and Beluga 8 provides 53 MWs. When they are run in combined-cycle mode Beluga 6/8 and Beluga 7/8 produce a maximum of 108.5 MWs each of generation for a combined total of 217 MWs.

Describe the timing, costs and funding for the new combined-cycle gas generator, its capacity and efficiency and what it will be replacing.

Chugach plans to install a new 130MW Combined Cycle-generator by 2011. It is expected to cost approximately \$210 million, which Chugach or a JAA in which Chugach is a member will finance. The new generation will have a heat rate of approximately 7,300 Btu/kWh, which is significantly more efficient than any of Chugach’s existing generation. The new generator is not replacing any existing generator, however, it is expected that Beluga 8 will be retired in 2015 after the wholesale contracts expire.

The new Combined-Cycle gas generator has an expected output cost of 3.9¢/kWh. CEA wants renewables to cost-out under the 6.2¢/kWh threshold to help offset peak load. How can renewables compete with adding another combined-cycle generator at 3.9¢/kWh?

It is not intended for renewables to compete with Chugach’s new efficient base-load generation but to offset the more expensive generation.

Graph the kWh rates of the individual CEA gas and hydro generators (with multiple price scenarios for gas)

See attached table that shows the variable O&M plus fuel costs of Chugach’s thermal generation at different fuel prices that is used in dispatch. For the hydro generation, there are very little variable costs as most of the costs are fixed. Fixed costs are not taken into consideration in economic dispatch.

What are the impacts on CEA's rates, generation capacities and ability to obtain long-term fuel contracts now that Agrium, the Nikiski Tesoro Refinery, and Fairbanks Natural Gas are obtaining other fuel sources for their needs?

Chugach's existing natural gas contract volumes are depleted around 2011, however, Chugach has commitments from its existing Beluga producers for an additional 120 BCF of gas if contract terms and prices can be agreed upon. Chugach is currently in negotiations with the natural gas companies.

CEA produces ?? kWh of electricity annually. CEA retail uses ??% and wholesale (other utilities use ??%. What will the impacts be of MEA, HEA, GVEA not renewing future wholesale electric contracts on CEA's rates, generation capacities, fuel contracts O&M and staffing?

Chugach produced 2,753,266 MWhs of electricity in 2006. Chugach retail energy sales were 1,229,978 MWhs (45%), Chugach wholesale energy sales to MEA, HEA and Seward were 2,492,089 MWhs (46%) and Chugach's economy energy sales to GVEA were 261,177 MWhs (9%)

Chugach has analyzed the impacts of the wholesale customers not renewing their contracts with Chugach under various scenarios and has developed some least cost plans. These plans are currently considered part of Chugach's strategic planning efforts and are considered confidential.

Was CEA under the impression that the Henry Hub pricing for two of Enstar's contracts starting in 2001 would invigorate the suppliers to aggressively explore for new gas reserves?

Chugach knew the Enstar/Unocal contract was negotiated to give Unocal incentive to explore for new gas reserves, which they did.

What has CEA done since the 2004 DOE Cook Inlet Natural Gas Study to insure long term access to gas? Is CEA actively working with the gas suppliers, Enstar, industry (Agrium, LNG, refinery), the Governor/Legislature or any other Railbelt electric utility to form a coordinated response to this gas shortage?

Chugach has been actively pursuing additional natural gas volumes from our current suppliers. We have been negotiating to price future gas from our Beluga producers and talking to Marathon and others. There may or may not be a shortage of gas in Cook Inlet. It may be more about the price than the availability. Chugach is actively working with Gas suppliers, ENSTAR, industrial users and legislators on increasing availability of supplies.

Does CEA have a stated policy stance on building a North Slope natural gas pipeline and a spurline to Cook Inlet? Are they in any way lobbying for this?

Chugach sees this as just one avenue to access additional gas in the future. We are reviewing our options on the bullet line concept and a spur line concept.

Is CEA betting 100% that the Cook Inlet producers will tap another 5-10 TCF or on a gasline spur to the upper Cook Inlet?

Again, Chugach is not betting 100% on any single solution. Chugach believes that natural gas will be available either from Cook Inlet, a gasline spur or from LNG imports. The bigger question is price.

Does CEA have a policy stance toward AIDEA CTL plant idea? Or the Galena Nuclear?

No. Chugach is aware of the projects.

Coal generation of 130-260 MW is listed on the 2006 CEA generation plan starting in 2015. Is this still a goal? What would this type of plant costs and how would the 1998 Mercury cap be dealt with?

Based on Chugach existing generation plans, coal may be economic in the 2020 timeframe or sooner. Current costs estimates for coal are about \$4,000/KW. The mercury cap would have to be dealt with.

Renewables

On the 2006 CEA Generation Plan graph, all renewable (other than hydro) are listed in the future with "when economic". Bradley Lake was developed over 10 years before its projected economic viability. What was the motivation for government subsidies of the project and why is Fire Island different?

The State's decision to build Bradley Lake was a political decision. The State had already invested in energy projects in four other areas of Alaska and intended to invest in the Susitna River Dam project for the benefit of South Central, Alaska. When the Susitna River Dam project didn't materialize, the State invested in the much smaller Bradley Lake hydro project. The Bradley Lake project was funded with a 50% grant and 50% bond financing. Fire Island is probably not much different because the current economics show that it would require a grant in order to compete with existing generation.

What actions are CEA taking to obtain funding for the higher costs of renewables?

Renewables and Fire Island in particular have supporters in Juneau and Washington DC. In the state legislature, HB 73 / SB 44 have been filed to direct \$24 million from the existing Railbelt Energy Fund toward Fire Island infrastructure. Chugach has met with legislators on both of these bills. Chugach keeps the federal congressional delegation informed as project issues arise.

Graph feasibility for each (Fire Island, Mt. Spur, Chakachamna Lake, Knik Arm tidal, planned and future combined cycle gas, coal, MOA landfill gas, fish/beetle kill biomass, Susitna River Phase I). Development state and schedule. Plant capacities/costs and MWh costs/KWh rates (with & without unknowns). Permitting issues.

Much of the specific detail for Mt. Spur, Chakachamna, Knik Arm tidal and other renewable energy projects doesn't exist because the projects are still in their infancy stage to determine if they are even feasible. Please refer to the Renewable Energy Committee presentation that was presented in December 2006 for a graph of possible schedules.

As for Fire Island, it is in a fairly mature stage of investigation. Preliminary engineering, environmental evaluation studies, avian investigation, cultural resources and aeronautical issues have been researched and documented. A draft project schedule has been developed. With permits in place the wind project and infrastructure could be deployed on Fire Island in approximately 21 months. Actual construction would require about 6 months.

The utility goal is to provide infrastructure to make the Fire Island wind site available for development. Wind generated energy could then be purchased by the utilities. Wind energy would be purchased on an energy only basis under long term agreement with a developer / owner of the wind plant.

What the developer would need for its power is not known however Chugach has made estimates, (discussed below under Fire Island). Power from a new power plant would likely cost somewhat more than existing resources.

An infrastructure funding schedule has been developed. It provides a schedule of when funding milestones would be required to achieve the 21 month build out. It currently calls for starting in early '07 and completing in August of 2008. The schedule can be adjusted to match when funding becomes available.

Can we see the results of CEA public survey on green pricing, etc? Are there plans to do a survey similar to the GVEA AET/GPAC survey?

A summary of the survey results was presented at the February 20 meeting of the renewable energy committee. A hard copy of the summary was also provided.

Fire Island:

Has the Radar Technology question been solved? Is it a CEA solution?

The FAA has expressed two concerns with wind turbines on Fire Island, first with the VOR and second with the radar. They are not concerned about airspace. There is plenty of room for aircraft approach and departure.

The VOR concern has been resolved by modifying the project layout. The VOR will need to be upgraded with a Doppler kit. FAA will request the upgrade for FY '08. Chugach could then offer support for the FAA's funding request.

Software upgrades for the radar have been developed. The upgrades filter out turbines and reduce the potential for real and phantom clutter. The FAA is testing the software upgrades. The final acceptance of the radar software upgrade rests with FAA air traffic control. Tests are expected to be completed by May '07.

Where does the Denali Commission, AEA & AIDEA, legislature, administration, congress stand on supporting Fire Island? (Grants, loans, credits, guarantees)

Representatives of the Denali Commission, AEA & AIDEA, and legislature have expressed support for Fire Island. Senator Murkowski reportedly mentioned Fire Island in her recent address to the Alaska legislature. The Denali Commission has been an important supporter through \$1.2 million in grants to Chugach for studies. Another grant has been issued to ML&P for remaining studies of Fire Island infrastructure.

We're not sure where the current governor stands on the project. Congress recently passed and extension of the production tax credit which would benefit the Fire Island project if built by the end of 2008.

MOUs & other coordination (utilities, business, industry, fed/state/local government?)

The MOU partners remain interested in the Fire Island project, (Chugach, ML&P, GVEA and Homer Electric). The Anchorage chamber of commerce

passed a resolution in 2006 supporting the development of Fire Island. Numerous contractors, consultants and service providers interested in supplying the project have contacted us. The project would employ about 150 people from various trades during the construction and about 7 full time jobs during operation. The current estimates for the project are \$54 million infrastructure and \$100 - \$175 million for the wind project itself.

The project concept includes a set aside for training turbines where people could be trained to operate and maintain the turbines for other regions of Alaska.

Is the Fire Island wind project feasible without subsidies if the transmission line is no longer a cost? Is GVEA's Eva Creek equally feasible?

The Fire Island project is feasible from an engineering perspective. From a cost perspective, any new facility will cost more. Chugach's new plant will be more efficient but will add to Chugach's capital obligations. Fire Island could be built with relatively little capital from Chugach but the power will likely cost somewhat more. The acceptability of the higher cost is the point where policy is helpful to staff, management and the board.

With the cost of the infrastructure (transmission, roads etc) provided by outside sources, the cost of power would be lower but not lower than existing sources. The current cost target is approximately 6.5 cents per Kwh. We estimate the cost of power from the Fire Island project would exceed that value, probably 8 to 9 cents per Kwh. If Chugach were to purchase power from the project at that rate it would cost Chugach customers about 1 – 2 % extra per month.

The EVA Creek project studies are not as far along as Fire Island. Early wind resource data is promising. An electrical integration study is in progress. Next steps include avian studies and preliminary engineering.

Hydro:

AWWU gets 46% of the Municipal domestic water from Eklutna Lake. Population is expected to grow in the Municipality. There has been and there is potential for less rain and snow load in the Chugach Mountains. Are there any projections for the capacity of the Eklutna Hydro plant?

The capacity of the plant will remain the same but the amount of energy may decline. Chugach currently uses a historical average in its planning.

Are there any projections of climate change impacts on the reservoir heights at Bradley and Cooper Lake?

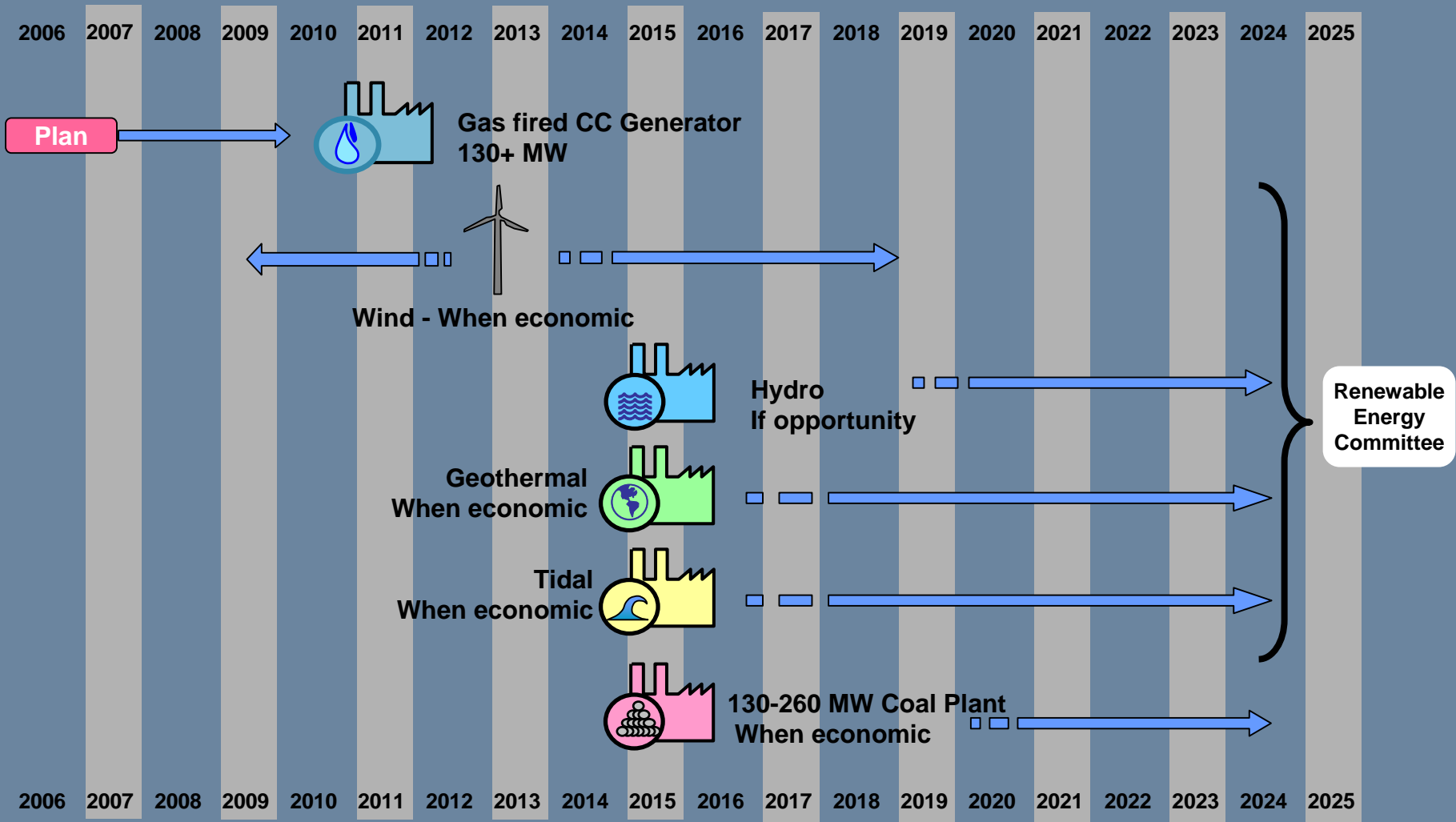
No. Chugach is currently using a historical average in its planning.

Other

Give history of standoffs/arguments in the past between all Railbelt utilities that have lead to the current lack of cooperation for a unified solution to sources for Railbelt electricity and heat.

This question is too broad to answer. Chugach believes in working with other utilities. We are actively seeking Railbelt partners in our new generation projects and we have been working cooperatively with MOU partners on the Fire Island wind project.

Renewable Energy Committee CHUGACH'S 2006 GENERATION PLAN



**Chugach Electric Association
Anchorage, Alaska**

**Variable Costs of Chugach's Thermal Generation Used in Dispatch
At Different Fuel Prices
\$/MWh**

	Variable O&M Costs Heat Rate - \$/MWh Btu/kWh		Total Variable Costs (Variable O&M + Fuel)				
			Fuel Prices \$/MMBTU =				
			\$3.00	\$4.00	\$5.00	\$6.00	\$7.00
			----- \$/MWh -----				
Beluga Unit 1	\$2.13	17,283	\$54	\$71	\$89	\$106	\$123
Beluga Unit 2	\$2.13	17,918	\$56	\$74	\$92	\$110	\$128
Beluga Unit 3	\$2.13	12,288	\$39	\$51	\$64	\$76	\$88
Beluga Unit 5	\$2.13	12,538	\$40	\$52	\$65	\$77	\$90
Beluga Unit 6	\$2.13	12,710	\$40	\$53	\$66	\$78	\$91
Beluga Unit 7	\$2.13	13,154	\$42	\$55	\$68	\$81	\$94
Beluga Unit 6/8	\$2.13	9,620	\$31	\$41	\$50	\$60	\$69
Beluga Unit 7/8	\$2.13	9,884	\$32	\$42	\$52	\$61	\$71
IGT Unit 1	\$12.40	16,121	\$61	\$77	\$93	\$109	\$125
IGT Unit 2	\$12.40	17,388	\$65	\$82	\$99	\$117	\$134
IGT Unit 3	\$12.40	15,127	\$58	\$73	\$88	\$103	\$118
Bernice Lake 2	\$10.26	14,655	\$54	\$69	\$84	\$98	\$113
Bernice Lake 3	\$10.26	13,460	\$51	\$64	\$78	\$91	\$104
Bernice Lake 4	\$10.26	13,639	\$51	\$65	\$78	\$92	\$106
New 130MW Unit	\$2.13	7,300	\$24	\$31	\$39	\$46	\$53