



## Southeast Alaska Community Resource Development A Snapshot of Current Operations and Future Development Plans Fall 2009

The Alaska Energy Authority (AEA) is preparing the State Energy Plan for 2009 and has asked Southeast Conference (SEC) to contact Southeast communities and regional utilities to identify current and future energy plans that may exist. This document provides information gathered from energy planners in southeast regarding local preferred resources for development and issues needing to be addressed.

### **Metlakatla**

Metlakatla, population 1,400, is located on the Annette Islands Reserve approximately 15 miles from Ketchikan, Alaska. The local utility's power generation consists of four hydro generators, one diesel generator and one battery energy storage system.

The community has identified two projects for development. The Metlakatla-Ketchikan Intertie will be a 34.5 kV transmission line that will connect the electric systems of the two municipalities. The intertie will include 16 miles of overhead line and 1 mile of submarine cable terminating at Ketchikan's Mountain Point substation. This project is partially funded by AEA and Denali Commission grant funds.

The second proposed resource development project is the Triangle Lake hydro facility. This resource is located along the proposed intertie route and would consist of a single turbine generating unit with a capacity of 4.0 MW (17,324 MWh annually). Project costs estimated at \$17.7 million (per MP&L).

### **Ketchikan**

Ketchikan Public Utilities (KPU) owns Ketchikan Lakes Hydro, Beaver Falls Hydro, and Silvis Hydro. KPU also operates Swan Lake Hydro, which is owned by the Southeast Alaska Power Agency (SEAPA). Total hydro capacity is about 34 megawatts. KPU's Bailey Plant has three peaking/standby diesel units totaling approximately 20.5 MW and there are two standby units at the North Point Higgins substation capable of generating 3.2 MW.

The preferred resource development project for the City of Ketchikan is the Whitman Lake Hydro project, located approximately four miles from town with an estimated generating capacity of 4.6 MW (16,000,000 kWh annually). This project will operate in conjunction with the Whitman Lake Hatchery. Pipelines will lead to a new powerhouse containing two hydro generating units. Unit 1 will generate power with water that would otherwise be spilled; Unit 2 will generate power from water delivered to the hatchery located next to the proposed hydro project. Projected costs (per KPU) at \$19,050,000.

### **Other Resources Near Ketchikan**

Five miles NE of Ketchikan is the proposed 9.6 MW Mahoney Lake Hydroelectric project. This joint-venture (Cape Fox, AP&T, City of Saxman) proposes the installation of a tap into Upper Mahoney Lake, a 1,700-foot-long upper tunnel, a valve house, a buried bypass pipe, a 1,370-foot-long vertical shaft, an 8-



foot-diameter, 3,350-foot-long lower tunnel, a semi-underground powerhouse, a 200-foot-long tailrace channel, 1.5 miles of buried, and 3.1 miles of overhead, transmission line, a switchyard, and 2.6 miles of new access road.

Other resources in the area include Connell Lake (KPU, 2.0 MW), Lake Shelokum (AP&T, 7 MW) and Lake 3160 (AP&T, 4.9 MW). AP&T has expressed a concern about “stranded” resources in the area without open access to transmission corridors. Biomass resources are looked to for space heating solutions.

### **Prince of Wales Island**

AP&T has developed an extensive intertie network throughout the island connecting most of the communities to its hydroelectric facilities at Black Bear Lake (4.5 MW, 1995) and South Fork Hydro (2 MW, 2006). Funds are on hand to construct a 48 mile transmission line to Naukati Bay and Coffman Cove. Construction should be completed in 2010, placing all POW communities (except Whale Pass) onto the hydroelectric grid.

Hydro resources to be developed on the island include the Reynolds Creek hydro near Hydaburg and the Neck Lake hydro in Whale Pass. The Reynolds Creek hydro is a 5 MW facility partially funded and nearly ready for construction. It will be jointly owned and operated by AP&T and the Haida Corporation. The proposed 0.3 MW Neck Lake hydro is intended to displace 100% of the diesel-generated power for Whale Pass and will be owned and operated by AP&T.

Prince of Wales Island is in a unique situation with its abundant timber resource and operating mills. Discussions with the Prince of Wales Community Advisory Council (POWCAC) showed strong support from the communities for further development of biomass energy resources. The City of Craig has successfully implemented a district heating system with the wood waste products from the local sawmill. The communities have also been in discussion with the US Forest Service about timber harvest levels that could support expanded development of energy related ventures.

### **Southeast Alaska Power Agency**

The three member utilities of the Southeast Alaska Power Agency (SEAPA) own and operate the Tye Lake hydro near Wrangell and the Swan Lake hydro near Ketchikan. Construction is nearly complete on the 57 mile Swan-Tye Intertie which has been a long-planned project and will interconnect the Swan Lake and Tye Lake projects. As a result, all of the member utilities (Ketchikan, Wrangell and Petersburg) will be interconnected for the first time and the hydroelectric projects can be more efficiently operated. Existing surplus power from the Tye Lake project will be used to displace diesel generation in Ketchikan.

There are multiple resources throughout the SEAPA network region including Thoms, Sunrise and Anita Lakes (7.5 MW, 4 MW and 8 MW respectively) near Wrangell, and the Thomas Bay hydro projects to the north of Petersburg (80 MW Cascade Creek, 40 MW Scenery Creek and 20 MW Ruth Lake). There is also geo-thermal potential at Bell Island. SEAPA is pursuing a system-wide IRP to determine which resource(s) should be developed next.



### **Hyder**

AP&T is proposing the development of a 75 MW hydro at Soule River near Hyder, AK. This 1,000-foot long, 160-foot high dam that would create an approximately 950-acre reservoir, with water flowing down a 2.08 mile pipe (penstock) spinning two generators in a tidewater-level powerhouse, producing an annual average of 270 gigawatt hours of electricity that would travel about 11 miles via underwater cable and overhead power line to connect with the British Columbia Transmission Corp.'s transmission system at Stewart, British Columbia. Projected costs are estimated at \$200 million (per AP&T).

### **Inside Passage Electrical Cooperative (IPEC)**

IPEC has actively pursued reduced and stable priced electric rates on behalf of its member owners for many years. The high and volatile price of diesel has both hurt and helped in their quest – hurt because rates necessarily climb to cover increasing costs of fuel, and helped because they now have a State grant program dedicated to assist with the mission to become diesel independent. Following is an activity update for each of IPEC's communities.

### **Angoon**

IPEC, along with members of Southeast Conference, the Alaska Energy Authority, the City of Angoon, Representative Bill Thomas, Senator Albert Kookesh, residents of Angoon and representatives of Kootznoowoo, Inc. held a community energy meeting in Angoon. The purpose of the meeting was to seek common ground in working together to build the Thayer Creek Hydro Project. Kootznoowoo has the rights to develop the project, and IPEC is the certificated and regulated electric provider for Angoon. It is conceived that IPEC will buy power from Kootznoowoo when the project is built as long as it is cheaper than diesel-generated power. Other resources such as wind, biomass and tidal may prove economical to develop in the future.

### **Hoonah**

IPEC had to abandon its decade-long effort to secure funding for the Hoonah-Juneau intertie after the price of submarine cable construction put the project at up to \$45 million. Submarine cable is expensive and risky, and the section of Chatham Strait to be crossed would be the deepest the cable manufacturer had ever attempted.

The new direction for lower cost renewable power for Hoonah is two-fold. First, is the development of two small hydro projects for Hoonah which would displace up to 70% of Hoonah's diesel-generation. Second, IPEC and Sealaska, with the help of AEA, have submitted a grant to study the geothermal generation potential of a site at the head of Tenakee Inlet, known as site SE-3. Grant awards are expected to be announced in November, and exploration activities will begin next spring if the grant proposal is successful.



### **Other Chichagof Island Resources**

Southeast Conference and AEA have been facilitating planning efforts between IPEC and the communities of Chichagof Island for possible integrated corridor development (roads, communications and electric transmission grids) to serve multiple communities. This idea is in its infant stages, but could solve many problems for the island residents, including access to healthcare facilities, an airstrip, better and more transportation options, and improved communication services. There is an abundant hydro resource in Pelican that could be dispatched via an intertie to Hoonah. The island also holds vast amounts of biomass resources that could be utilized. While Tenakee Springs is known for its geo-thermal resources, its focus is now on a potential hydro resource at Indian River to displace 44,400 gallons of diesel used annually for power generation. Elfin Cove has been identified as an ideal location for tidal energy development as has Port Frederick near Hoonah where AP&T envisions a possible 400 kW facility can be constructed.

### **Kake**

IPEC is working with the Alaska Energy Authority, Southeast Conference, the City of Kake, AKDOT, OVK and SEAPA to construct a utility corridor (intertie project) between Kake and Petersburg. The intertie would allow IPEC to buy hydro power from SEAPA, which is the only existing power vendor for Kake today. Although progress seems slow, funding is secured for the environmental review and final design.

### **Chilkat Valley/Klukwan**

IPEC is working to purchase the 10 Mile Hydro Project (northwest of Haines). Power is also being purchased from AP&T from its hydro generation facilities in Skagway and transmitted via interties. IPEC is also pursuing options to lower an enormous level of construction-related debt which directly contributes to the high cost of electrical rates (recently as high as \$0.64 kwh)

### **Sitka**

Sitka ranks as the nation's 10<sup>th</sup> largest seafood port (by value) due in large part to the availability of an abundant source of clean, hydroelectric energy. However, economic growth and stability is threatened by the lack of growth in the development of hydro resources and the exhaustion of the current 124,000 MWh supply generated annually.

Sitka is undertaking a number of efficiency and conservation measures along with generation and distribution upgrades and the implementation of interruptible load programs. Sitka continues these types of initiatives while working to expand the Blue Lake hydro (can add up to 34,000 MWh) and develop the 28 MW hydro potential at Takatz Lake (scoping process underway). Also nearby are extensive geothermal resources that may be economical to develop in conjunction with the Takatz Lake Hydro.



### **Other Sitka Resource Development**

The Coast Guard is getting into the wood energy business with multiple partners on Japonski Island, where Station Sitka is located. The SEARHC hospital, Mt. Edgecumbe High School, University of Alaska Southeast campus and the airport complex could join with the Coast Guard's Station Sitka in a central heating district fueled by biomass, collectively saving 450,000 gallons of heating oil.

### **Juneau**

With the completion of the 14.3 MW Lake Dorothy Hydroelectric project this year, Juneau has over 100 megawatts of installed renewable energy generation capacity at five power plants, including Snettisham, Annex Creek, Salmon Creek, and Gold Creek. A second phase is planned for Lake Dorothy in the future.

Snettisham is the largest hydro project with a maximum peak output of 85 megawatts and an average annual energy output of 325 million kilowatt hours. This project is located about 28 air-miles southeast of downtown Juneau and provides 80-85% of Juneau's electric energy. Built by the federal government in 1973 and expanded in 1990, the Snettisham Project was sold to the State of Alaska in 1998. AEL&P operates and maintains the project under the provisions of a long-term power sales agreement with the State.

Two other smaller hydroelectric plants supply power year-round. The Annex Creek and Salmon Creek Power plants are historically tied to the gold mining days when low-cost power was needed to operate the mills. The two plants were engineering marvels for their day, built in 1914-16, and continue to provide low-cost, reliable power today. Both provide the remaining 6 megawatts of capacity and add an additional 50 million kilowatt hours of energy production yearly.

President Obama's executive order that mandates environmentally friendlier federal buildings has spurred the NOAA Fisheries Auke Bay research facility to install a 30 foot spinning tower (wind-powered electrical generator) that will produce 1.2 kilowatts of electricity. There has been interest expressed by others in developing wind and tidal resources as well as some bio-fuels. Heat pump systems, either ground-source or using seawater are also being installed at various facilities in Juneau.

### **Gustavus**

The recently completed Falls Creek hydro produces 800 kw of electricity for Gustavus. This facility is projected to meet the community's power needs for the foreseeable future. A waste-heat project is being examined to utilize excess water coming through the facility. The utility is pursuing construction-debt relief in order to lower rates to the consumer and is working with the US Park Service to initiate the process to connect the Glacier Bay Lodge to hydro power. This project is expected to take 3-5 years. The additional power load can be easily met by current production capacity and will help lower the rate base to consumers.



### Yakutak

Yakutak is totally dependent on diesel-generated power but has an active feasibility study underway for a biomass facility. The community is renowned by surfers for its large waves (Outside Magazine rated Yakutak one of the five best surf towns in America and Newsweek wrote their article about "surfing with sea otters"). The utility is wrapping up a feasibility study for a near shore wave generator patterned after Scotland's energy farm. The wave generator is made up of connected sections which flex and bend as waves pass; it is this motion which is used to generate electricity and has a capacity to generate 650 kw. Yakutak's hydro resources are located too far from the community to be developed economically.

### Upper Lynn Canal

The Upper Lynn Canal Power Supply System was formed by AP&T to coordinate electric utility operations currently serving Skagway and Haines. This intertie has been extended up the Haines Highway to connect IPEC's system (Klukwan and Chilkat Valley) to the hydro resources generated from Skagway. If not for the intertie from Skagway, Haines would be almost totally dependent on diesel power. This has prompted the utility to examine hydro resources closer to Haines. The Connelly Lake Hydro Project is under a preliminary permit with the Federal Energy Regulatory Commission to develop and submit a license application. This storage project, which would include a small dam, would have a power plant of up to 10 megawatts. Located up the Chilkoot River approximately 12 miles southwest of Skagway and 15 miles northeast of Haines, this project is still in the preliminary design stage.

The Haines Borough is also conducting a feasibility study for a biomass district heating project. The local Chilkoot Indian Association is doing a similar study in order to utilize resources from the 286,000 Haines State Forest.

The Upper Lynn Canal's energy cornerstone is the Goat Lake Project, a 4.0 MW hydroelectric facility located seven miles north of Skagway. The 204-acre glacially fed lake has the winter storage necessary to sustain year-round hydro generation. Goat Lake Hydro became operational in December 1997, and was interconnected with Haines via a 15-mile submarine cable in September 1998. The submarine cable was laid in Taiya Inlet, a fjord with depths up to 1,500 feet. This project allowed diesel-powered generators at both the Skagway and Haines plants to be quiet for the first time in nearly 80 years.

The 943 kw Dewey Lakes Hydro Project is located adjacent to downtown Skagway. This project was built in the early 1900's and has been operated by AP&T since 1957. In 2009 the 3 MW Kasidaya Creek run-of-river hydro project was constructed 3 miles south of Skagway.

Other projects envisioned in the Municipality of Skagway are the Burro Creek Hydro (feasibility study for a run-of-river system of up to 2 MW) and the West Creek Hydro feasibility study of a 25 megawatt dam project that could supply power to cruise ships docking in Skagway.