

Manager Requests Cost Analysis for Three Efficiency Measures: 1) Fuel Economizers for Borough Boilers Outdoor Lighting, 2) LED Street Lights, 3) High Use In-door Lighting

1) Fuel Economizer. A cost-benefit analysis for Fuel Economizers was submitted to the Borough Manager December 29. A minimum 10% savings in fuel consumption of borough boilers based on 11 months of fuel delivered in 2008 using today's per gallon cost of \$3.60/gallon equals a \$25,000.00 savings. A copy of the analysis is attached.

The economizer is a micro-processor controlled fuel-saving device for heating systems that reduces fuel consumption, wear and tear on parts, flue emissions, and electrical usage. The product manufactured the Intellidyne Corporation provides a guaranteed minimum of 10% savings in fuel oil for its burner-control microprocessor (http://www.intellidynellc.com/02_prods.htm). The marketing name for the product is *IntelliCon Economizer*.

2) LED Outdoor Lights. Haines has 324 streetlights and 20 parking lot lights (library, school). Replacement of these lights with LEDs can provide substantial savings to the municipality immediately and for years to come. LED street light technology cuts the cost to energize a light with the equivalent brightness a minimum of 50%. Higher savings have been documented.¹

The streetlights: Potential Savings. There are 210 100-watt lights, and 114 250-watt lights. A rough estimated power cost savings to the Haines Borough at the current rate of \$.1444/KWH and assuming a very conservative 50% reduction in energy use comes to \$20,527.18. If power costs rise, the savings will be greater. The LED supplier for Anchorage, Fairbanks, Valdez, Cordoba, Soldotna estimated 78% energy consumption for the City of Valdez. The City of Valdez is basing its estimate of savings on a 65% reduction in energy costs.

¹ Phil Saunders, Project Coordinator, said in a phone call 12/31/08 that preliminary data indicates an energy savings from 50-70%. Anchorage replaced lights as opposed to retrofit existing fixtures with LED lamps. Each replacement light cost \$520 before installation.

Haines Street Light Inventory

| | 100-watt | 250-watt | | Estimated KWH Cost at today's rate of \$.1444/KWH | Conservative 50% reduction in KWH |
|---------------|----------|----------|----------------|--|--|
| | (KWH) | (KWH) | Total KWH | 0.1444 | 50% savings |
| Jan-08 | 14,490 | 19,038 | 33,528 | \$4,841.44 | \$2,420.72 |
| Feb-08 | 12,180 | 15,732 | 27,912 | \$4,030.49 | \$2,015.25 |
| Mar-08 | 10,500 | 13,566 | 24,066 | \$3,475.13 | \$1,737.57 |
| Apr-08 | 8,400 | 11,514 | 19,914 | \$2,875.58 | \$1,437.79 |
| May-08 | 6,720 | 8,550 | 15,270 | \$2,204.99 | \$1,102.49 |
| Jun-08 | 4,410 | 6,270 | 10,680 | \$1,542.19 | \$771.10 |
| Jul-08 | 3,990 | 5,358 | 9,348 | \$1,349.85 | \$674.93 |
| Aug-08 | 5,670 | 7,524 | 13,194 | \$1,905.21 | \$952.61 |
| Sep-08 | 7,980 | 10,602 | 18,582 | \$2,683.24 | \$1,341.62 |
| Oct-08 | 9,240 | 12,312 | 21,552 | \$3,112.11 | \$1,556.05 |
| Nov-08 | 11,340 | 14,934 | 26,274 | \$3,793.97 | \$1,896.98 |
| Dec-08 | 13,020 | 17,442 | 30,462 | \$4,398.71 | \$2,199.36 |
| Jan-08 | 14,490 | 19,038 | 33,528 | \$4,841.44 | \$2,420.72 |
| Totals | | | 284,310 | \$41,054.36 | \$20,527.18 |

Costs associated with maintenance (bulb replacement) can also be expected to decline.² Valdez estimates a 36% cost reduction in the streetlight maintenance contract as a result of replacing 357 high-pressure sodium streetlights with LED fixtures.

In addition to savings in energy costs, several other benefits are associated with LED streetlights.³ These have been outlined in a Memo to Mayor Cottle and Valdez City

² The LED fixtures, manufactured by Beta-LED, are based on performance-leading Cree XLamp LEDs, typically last up to seven times longer than high-pressure sodium fixtures

³ Tests conducted in Anchorage enabled lighting program manager Michael Barber to make these statements in the Anchorage Daily News August 2008:

The new lights are also touted as an improvement in terms of safety and aesthetics.

Whereas the old lights would sometimes shine places people didn't want them to shine, the LEDs are shielded and can be aimed where they're needed, Barber said. They also create less glare in the sky.

The quality of light is different too. A controlled survey by the mayor's office last winter involving 50 Anchorage residents in one group and 40 lighting experts in another found that both groups preferred the whiter, full-spectrum LED lighting to the orangish hue of the old street lamps.

Council Members from Laura Robertson, Community & Economic Development Department, December 15, 2008. The full memo is attached.

Benefits of LEDs

The financial benefits of LEDs are widely documented, but there are other physical benefits to these types of lights as well:

- LED lights will reduce the cities street light energy consumption by 65% or more.
- LED lights will last more than 20 years. Sodium bulbs burn out in 2-3 years.
- LED lights can be easily shielded and reduce glare into people's yards and houses.
- LED lights significantly reduce glare into the sky, reducing light pollution and allowing better viewing of stars and northern lights.
- LED lights increase safety. Police are able to identify cars easier and see people in true color. In Anchorage, people felt safer under the white lights because they could see things more accurately.
- LED lights perform better the colder that it gets. Colder temperatures will actually make them brighter (a -4° F ambient temperature multiplies the lumens by 1.11) and they will last longer (life estimates of 22 years are based on 59° F and increase as ambient air temperature decreases).

LED Street Light Factors Yet to Be Determined.

- To retrofit or to replace. Streetlights can be retrofitted for LEDs but sometimes it is more cost effective to replace. Anchorage is replacing its lights. Valdez plans to retrofit.
- Cost of the LED fixture. Anchorage, Fairbanks, Soldotna, Valdez, and Cordoba are purchasing their LED lights from BetaLED, through a distributor (Arctic Sales, Inc.) in Eagle River. I am contacting Arctic Sales for estimates. I am also working with LEDtronics. AP&T may also be able to suggest a supplier. Laura Robertson, Valdez Planning and CIS Technician recommends these resources: <http://www.ledcity.org/> - a nationally recognized city LED program website, CREE, that has suggestions for steps to replace streetlights. <http://www.ledcity.org/fixture-contacts.html> - a lists of several different LED street light manufacturers.
- Quality of LED light desired. Anchorage and Cordova have selected the "warmer" light whereas Fairbanks has selected the "cooler" type of light. The type of light can be determined by mounting lights in Haines to measure preference.

Examining a test area in South Anchorage, women said they felt safer on the streets with the white lights, and police said the new lamps made night objects easier to see and the colors more realistic.

"The police are really excited because they'll be able to I.D. cars now," Barber said. "They can see what color jacket people are really wearing -- rather than blue looking like some sort of beige."

- Number or Selection of Lights to be Replaced. There are three types of lights in Haines. If all lights are not replaced, how should replacement be prioritized? A location map may be helpful.

Labor Cost for Replacement. An estimate for the cost of labor for replacing the streetlights will be obtained from AP&T. It is also possible that a licensed contractor with a bucket truck could do the work.

LED Street Lights in Other Alaskan Cities. The City of Valdez estimates the total one-time cost for their 347 streetlight LED replacement project at \$417,507.50 that will result in a 10-year payback period. In October 2008, the Municipality of Anchorage installed the first of 16,000 LED Street Lights after having researched the technology and the savings relative to cost. At the end of November, the City of Fairbanks launched a pilot project installing 104 LED street lights. Kodiak Electric Association (KEA) has installed a couple of LED street lights and is conducting tests to gauge customer reaction and the performance of the lights through a dark and cold Kodiak winter.

According to Anchorage Mayor Mark Begich, "We have studied new lighting technology extensively over the past several months to validate energy and maintenance cost savings. We also conducted a lighting conference and public survey in March of this year that showed our residents overwhelmingly approve of the new white LED lighting. With this feedback and quantified costs savings research in hand, we are confident moving ahead with the broad deployment of LED lighting for our roadways."⁴

3) High-Use Indoor Lighting. I am in the process of identifying lights to change to more efficient technology in each borough facility. I am asking building users to identify the number and type of lights that are "on" for the greatest length of time. This inventory includes Exit Signs. A cost – benefit analysis will be prepared for the manager.

Energy Fair

Several steps have been taken to move the Fair forward:

- An Energy Fair! Web page was added to the ESC website 1/04/09. See < <http://www.outlierproductions.com/energyfair!.html>>. An invitational flyer for retailers and a Vendor Reservation Form is available on the web, at the Chamber of Commerce, and at the Borough Administration office.
- The idea of a compact fluorescent (CFL) bulb exchange is being considered by several non-profits. Participants would be able to exchange one incandescent bulb for one CFL. The collected incandescents can later be displayed with an estimate of the KWH and dollars saved.

⁴ (<http://www.ledcity.org/applications/street-parking-lot-lighting.html>)

- The Haines Borough Library has agreed to display items in its energy conservation, energy efficiency, renewable energy collection the week prior and during the Energy Fair.
- Gary Lidholm joined the Coordinator on Energy Talk Monday, January 5, 2009, to talk about the Energy Fair.
- Invitations to participate were emailed to the major energy providers in the valley, January 4: Delta Western, AP&T, and IPEC. Danny Gonce (AP&T) and Jodi Mitchell (IPEC) have indicated an intention to participate. An invitation will be delivered to Haines Propane.
- John Anderson from Alaska Housing Finance Corporation contacted the Coordinator today for a Fair update.
- The Haines Assisted Living Board of Directors agreed to have an information table at the Fair to help the Community understand what is involved in the design and construction of a Silver LEED's Certified building.
- Bill Leighty, Leighty Foundation (www.leightyfoundation.org/), sent 8 DVDs to review for possible showing at the Energy Fair.
- The Coordinator has ordered free material to distribute from Energy Star. These materials include 100 CFL stickers, 50 each of the following: brochures on lighting, heating & cooling, home electronics, New Homes, Energy Star Qualified homes. Fifty each of the following "tip" cards" Bring Your Green to Word, Horton Tip Sheet (for kids). And 50 Horton Activity Books for kids.

Renewable Energy

Using Hydroelectric or Wind Energy to Create NH₃ Fuel for Transport. Bill Leighty, Leighty Foundation, shared the application his foundation is making with AELP, Juneau, to the Alaska Renewable Energy Fund for a

Feasibility analysis, conceptual design, and small-scale demonstration system for hydroelectric energy to anhydrous ammonia (NH₃) fuel, with the storage, and regeneration necessary for future annual-scale firming of diverse renewable energy resources for villages and small cities.

The draft application is attached. Mr. Leighty also provided a paper outlining *a conceptual study, for MW to GW scale, comparing production, transmission, and storage costs for gaseous hydrogen (GH₂) and anhydrous ammonia (NH₃) fuels made from wind-generated electricity, with and without the low-cost, annual-scale, firming storage which would add great market and strategic value.*

This paper is also attached.

Peaking Diesel

Stan Selmer, Regional Manager, AP&T, 12/31/2008, emailed this concept correction regarding "peaking diesel,"

*Listened to KHNS news Monday and was somewhat concerned to hear that Haines was being powered by diesel as the hydro was frozen. Not sure where this information came from, but it was not accurate. Since the temperatures have become what we expect them to be for this time of year, and people have been requiring more heat to keep warm and more lights too, we have found ourselves short of hydro as the demand is exhausting the supply, not because the hydro is frozen. But even the shortfall facts translate as follows: **Since December 14, 2008 the day we initially started peaking with diesel generation; 98.5% of the energy has been provided by hydro and 1.5% provided by diesel generators.** On Christmas Day and Boxing Day we did not need to use diesel for peaking.*

The current cost to peak with diesel in Skagway is 11.1 cents/kWh and thus far the 1/2 month peaking diesel generated has caused a total increase for Haines and Skagway of \$831 over the current energy charge of 7.01 cents/kWh. Double that amount to \$1662.00 for a month and the increased cost would average 68 cents per customer for the month.

Municipalization of Electric Utility: An Informative Paper

The concept of a municipal utility has occurred on the Commission's agenda several times. A paper presented to the Boulder Renewable Energy & Energy Efficiency Working Group, July 2006, may provide some background for the Commission and anyone else who is interested in this topic.

Municipal Electric Utilities – Analysis and Case Studies, can be downloaded from <http://www.fivestarconsultants.com/Grad Projects files/Municipal Electric Utilities.pdf>. The author lists eight how-to steps, and discusses pros and cons from the point of view of municipal owned utilities and investor-owned utilities. Four cases studies are presented. In summary, the author concludes:

Municipalization efforts are complicated and lengthy processes. In the cases presented, four factors were critical to the success or failure of the municipalizaiton effort:

- 1) The local government must be well perceived by the citizenry.*
- 2) Funding must be available for the campaign effort.*
- 3) The municipality must be able to overcome the incumbent utilities arguments and convince citizens that the new arrangement will result in better rates and/or better service.*
- 4) It is helpful if the incumbent utility is having financial problems.*

Using some of the links in the paper, I have developed this **summary of the electric utilities** in Alaska:

In Alaska, 34 public electric utilities service approximately 19% of the states 308,575 customers. Twenty investor-owned utilities service 9% of the customers, and 18 cooperatives service 72%. The top five electric utilities in Alaska sell 77% of the total

megawatt hours used in the state. These providers are, in order of 2006 megawatt hours sold: Golden Valley Electric Association, Chugach Electric Association, Anchorage Municipality, Matanuska Electric Association, and Homer Electric Inc. Four of the top five utilities are cooperatives.

On average, Alaskan retail customers pay 10 cents per kilowatt-hour if their provider is a public electric utility, 14.31 cents per kilowatt-hour if they purchase their electricity from an investor-owned utility, and 13.81 center per kilowatt-hour if they receive their service from an electric cooperative.

All of the above information is from the Energy Information Administration, Official Energy Statistics from the US Government, 2006 State Electricity Profiles, Tables 9 and 3. See http://www.eia.doe.gov/cneaf/electricity/st_profiles/alaska.html.

Four out of the top five utilities in the Alaska are cooperatives; cooperatives in Alaska serve the largest percentage of people. According to the National Rural Electric Cooperative Association (<http://www.nreca.org/AboutUs/Co-op101.htm>)

Electric cooperatives are private, independent electric utilities, owned by the members they serve. Democratically governed businesses, electric cooperatives are organized under the Cooperative or Rochdale Principles, anchoring them firmly in the communities they serve and ensuring that they are closely regulated by their consumers.

Attachments: City of Valdez Memorandum, December 15, 2008, LED Street Light Initiative Report

AEA Grant Application from AELP and Leighty Foundation

Transmission and Firming of GW-Scale Wind Energy via Hydrogen and Ammonia, by Bill Leighty and John Holbrook