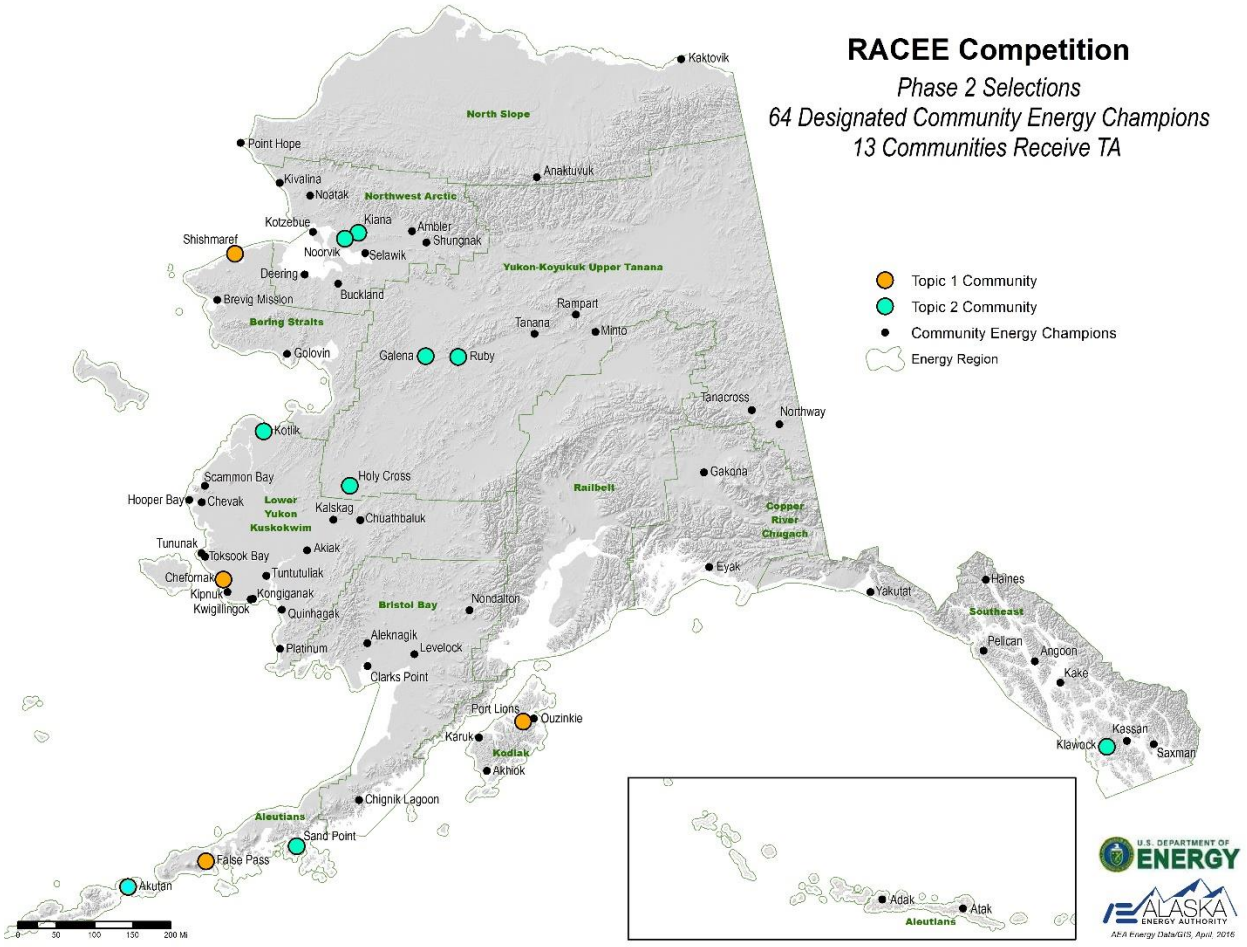
REMOTE ALASKA COMMUNITIES ENERGY EFFICIENCY COMPETITION

Phase II Summary and Strategic Energy Efficiency Plan

Chefornak



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Introduction

The Remote Alaska Communities Energy Efficiency (RACEE) Competition was intended to empower Alaskan communities and native Alaskan villages to develop effective tools to advance the use of reliable, affordable, and energy efficient solutions that are replicable throughout Alaska and other Arctic regions. The US Department of Energy (DOE) intends to issue a $4M three-phased competition to support projects designed to encourage rural community energy efficiency improvements through outreach, technical assistance (TA), and project development, provided in partnership with Alaska stakeholders. Communities that pledge to reduce energy consumption by at least 15% by 2020 will be eligible to compete for energy efficiency technical assistance (TA). TA will provide project readiness assistance such as comprehensive building inventories, building audits, energy use benchmarking, community energy fairs, business plan development, and project financing advice. The subset of communities that receive TA will be eligible to compete for implementation grants. This document is the summary of that TA for the community of Chefornak.

The community of Chefornak submitted a pledge to collect energy usage data, conduct audits of commercial, public and residential buildings, have training workshops to educate the community members about the RACEE opportunity, and analyze these energy improvement options.

RACEE provided technical assistance to bring auditors into the community for both commercial and public buildings as well as residential buildings. A building inventory was completed, and with information provided to the Alaska Energy Authority (AEA), energy use summaries were created for a baseline. The goal of the community of Chefornak is to reduce energy use by more than 15% by 2020.

RACEE Phase II Summary

The community of Chefornak asked for help creating a building inventory and gathering energy use. In addition, they requested audits of 10-20 non-residential buildings and help with looking at the financial options available to the community.

Technical assistance that was not funded was a community energy workshop, a creation of the local energy action team and community wide outreach and education.

On May 24th AEA (Rebecca Garrett), NORTECH (Steven Billa), and AVCP (Jason Smith) traveled to Chefornak to kick off the RACEE technical assistance. While on site it was quickly discovered that the community intended and needed residential units to be included in the RACEE program. This information was taken back to the program team and residential assessments were added to the scope of work.

During the May 24th visit, a building inventory was completed. Walk through level I audits were completed for Headstart, Clinic, Traditional Council, City Office, Chefarnmute, Inc., Avuigak Store, Washeteria, and Pumphouse (see Appendix A for reports submitted from Nortech). Requests were made for utility information and fuel usage. AEA was uncertain the scope change to include residential units would be possible. A small survey was created and delivered to the utility along with some LED light bulbs, power strip, and kilowatt meters so that the utility could perform some assessments and gather information for the funding opportunity on their own.

Mike Spencer of Alaska Housing Finance Corporation (AHFC) and Jason Smith traveled to Chefornak on July 28 to perform housing energy use assessments. See attachment *Chefornak Housing Assessment Summaries*.

Benchmarking the buildings in a community provides a comprehensive list of where buildings are, what they are used for and how much energy they are using. The first step in reducing energy use is knowing what is currently being used. Keeping track of monthly usage can highlight building operating problems quickly and save on maintenance and energy use.

In Alaska, benchmarked buildings can be entered into the Alaska Retrofit Information System (ARIS) to see how a similar building is operating elsewhere in the state. Often, significant savings can be found through occupant behavior and simple maintenance.

Energy Use Profile: 2010 Baseline vs. 2016 Use

See the table below that shows the energy use of the community of Chefornak in 2010 vs 2015.

		Generation/Consumption (MMBtu)			Per Capita Consumption (MMBtu/person)		
	Population	Electricity (kWh)	Heat (DGE)	Total (MMBtu)	Electricity (kWh)	Heat (DGE)	Total (MMBtu)
2010	418	1,331,348	195,616	31,538	3,185	468	75
2015	433	1,597,277	195,616	32,445	3,689	452	75

Since 2010, the community has been working to reduce their energy footprint through energy conservation and efficiency. However, due to their housing crisis, new school, and equipment aging have all resulted in an average 16% per capita **increase** in electricity use from 2010 to 2015. Heating fuel use has however declined 3% per capita, and overall per capita energy use has remained fairly constant with a slight (1%) decrease. Chefornak has signed on to be a community champion of the RACEE program, and desperately needs the assistance of this program to achieve a 15% reduction by 2020.

RACEE Projects--expected reductions (MMBtu)

	Electricity (kWh)	Heat (DGE)	Total (MMBtu)	Owner	Cost to Implement
Headstart	2400		8.19	LKSD	$ 7,200
Chefornak Clinic Tribal Government - ANTHC	2,510		9	ANTHC	$ 7,600
Traditional Council	1,100	197	31	Council	$ 700
City Office	2,500	262	45	City	$ 2,500
Chefarnrmute, Inc	22,000	550	151	Corporation	$ 15,300
Avuigak Store	1,100	65	13	Private	$ 700
Washeteria	600		2	City	$ 400
Pumphouse	1,100	100	18	VSW	$ 700
Residential Wx		16,058	2,216	Private	$ 400,000
Total	33,310	17,232	2,492		$ 435,100

If Chefornak is able to implement all these projects, they will enjoy a 19% energy savings by 2020.

		Final Total Consumption (MMBtu)			Final Per Capita Consumption (MMBtu/person)		
	Population	Electricity (kWh)	Heat (DGE)	Total (MMBtu)	Electricity (kWh)	Heat (DGE)	Total (MMBtu)
2020--expected	484	1,275,000	201,732	32,189.30	2,634.30	416.80	66.51
2020--with RACEE projects	484	1,241,690	184,500	29,698	2,565.48	381.20	61.36
2010 to 2020 Change							-19%

Implementation Plan Description

To reach the goal of a 15% reduction in energy use by 2020, the community of Chefornak should form a local energy action team with representatives from the City, Utility, Tribe and Corporation. Fuel records should be moved into an electronic format that is consistent by building and searchable.

Should the community of Chefornak move forward with the efficiency projects for the City, Tribe, Corporation and improve the housing on a community wide basis, they will need to hire a project manager within the community to coordinate the different building owners and make sure all permitting is in place, as needed. The project manager will create a schedule for construction and staging the buildings based on their use. All materials and equipment should be ordered/rented together to reduce the cost of mobilization to and from the community.

The sooner these projects are implemented in Chefornak the sooner energy use goes down. Even with careful management and planning over the winter, Chefornak would likely need two construction seasons to complete all the work proposed.

Stakeholder Engagement Plan

The community of Chefornak is in a unique situation. While small upgrades are needed in their community buildings, the real need is in the housing stock. The City, Tribe, and Corporation must bind together for the benefit of all the community members. A combined board/council meeting should take place to plan a path forward and all entities should agree on a project manager who will keep all the entities informed as the project moves forward.

Tracking energy use is valuable to see where use might be increasing, suggesting something is wrong. Each entity should assign an employee to document electrical and fuel usage. The community as a whole can participate in Energy Awareness Month each October by having an energy fair at the school and introducing Energy Smart curriculum into the classrooms. http://www.akenergysmart.org/

Estimated SEEP Impact

Chefornak pledged to be a community energy efficiency champion in January 2016 and set an example to other communities of what can be done when a community works together towards a goal. Since that time Chefornak applied for and was awarded technical assistance to audit buildings and homes and to create a plan for implementation to reduce their energy use by 15%.

These goals will be met. With funding and financing Chefornak will exceed their efficiency goals. The community of Chefornak is growing, thriving, and very hard working. This community is in need of new housing to replace homes that are in such poor condition, they have received a zero-star rating (Attachment 1). Chefornak is not the only community facing such harsh reality. Should they be able to replace some housing with efficient new homes, they would set an example in their region and around the state of what can be done.

Chefornak is also passionate about home-grown efforts to include the community members through local presentation of energy fairs, energy smart curriculum in the school and Chefornak participating in the RACEE peer exchange will only increase savings locally, and spread throughout the region.

SEEP Project Financing

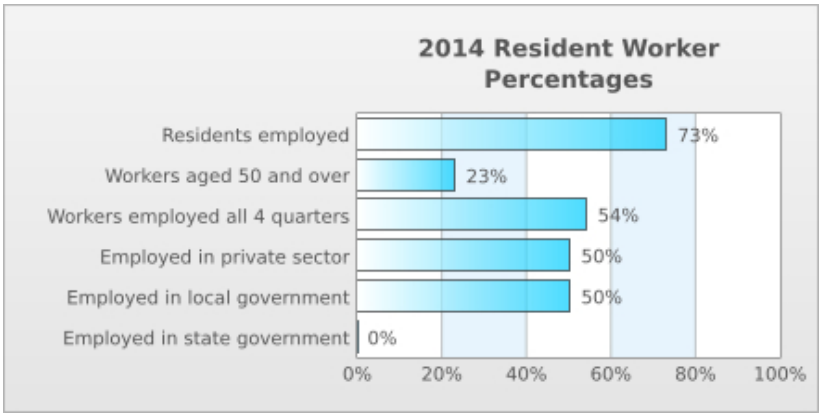
Chefornak

Community Profile/Socioeconomics

Chefornak is located on the junction of the Kinia River and the Keguk River, in the Yukon-Kuskokwim Delta. The village is 98 air miles southwest of Bethel and 490 miles southwest of Anchorage. The area has historically been occupied by Yup'ik Eskimos. In the early 1950s, Alexie Amagiqchik founded a small general store at the site. He had moved from a village on the Bering Sea to the new location one mile inland to escape potential floodwaters. Others from the original village followed and settled in Chefornak.

Population trends:
The population of Chefornak has been increasing steadily for many years.

Year	Population
2000	394
2010	418
2015	433



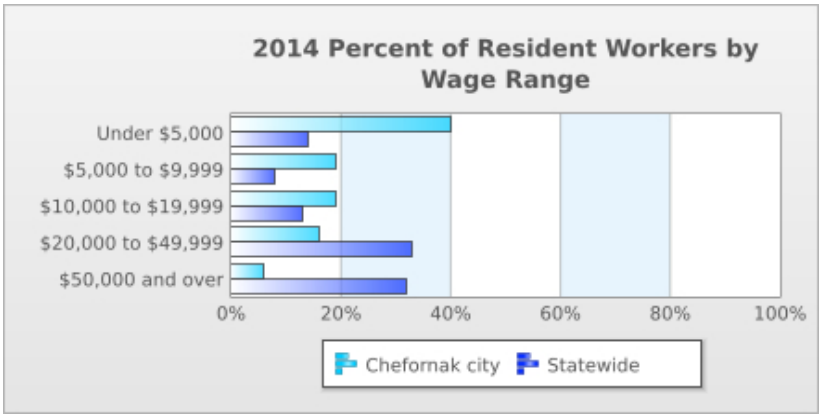
Number of students:
154

Residents employed in 2014 (AK DOLWD):
Chefornak: 73%
Statewide: 61%

Chefornak has higher overall employment rates than the statewide average. But of residents employed in Chefornak, only 54 percent were employed in all quarters. That rate is lower than

the state's rate of 72 percent. This is a reflection of the subsistence lifestyle exercised by many residents of Chefornak.

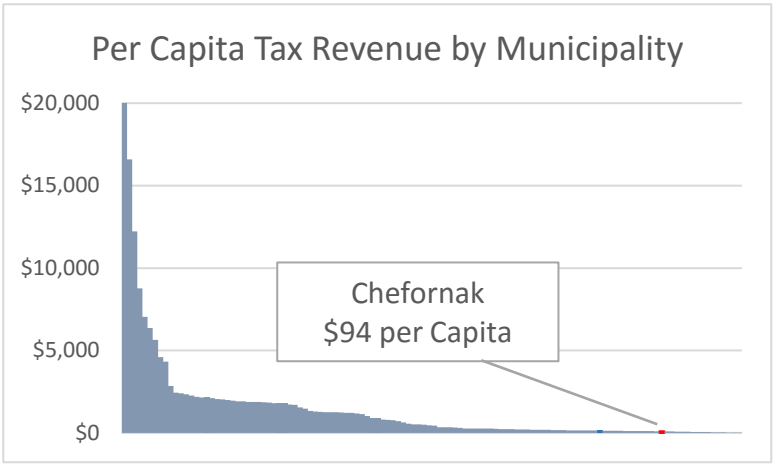
Total resident wages in 2014 (AK DOLWD):
Chefornak: $3,192,860
Statewide: $13,196,334,860



Resident wages per capita:
Chefornak: $7,584
Statewide: $17,890

Income per capita and margin of error (2010-2014 ACS):
Chefornak: $10,300 +/- $1,224
Statewide: $36,240 +/- $424
(Income = wages plus investment returns, transfer payments, and all other monetary income)

Tax powers in 2015:
Sales (2%)
Total tax revenue: $39,364
Per capita tax revenue: $94



CDQ member:
Yes, Coastal Villages Region Fund

Transportation:
Air and Small Boat

Price of energy in 2016:
$4.55/gallon of heating oil, $0.56/kWh

Power Cost Equalization

The City of Chefornak owns and operates the local electric utility - Naterkaq Light Plant. It appears that the utility regularly adjusts rates are and that they are adequately covering generation costs. Naterkaq sells just under 1.5 million kilowatt-hours a year and could plausibly finance energy efficiency projects through modest rate increases. The City of Chefornak also receives $40,000 to $60,000 annually in electricity bill reimbursements through the Power Cost Equalization program.

Financials

AEA received four years of limited financial data from the City of Chefornak (2010-2013). This data consisted of simplified profit & loss statements submitted annually to the Alaska Department of Commerce, Community, and Economic Development. Because this information does not provide any insight into the city's assets or liabilities, AEA can only comment on recent revenue and expenditure trends. This gives some sense of the direction that the City's financial

standing is headed, but not a complete picture of the entity's current financial position or their expected credit worthiness.

Revenues/expenses:

City of Chefornak	2010	2011	2012	2013
Revenues				
Taxes	$46,000	$49,621	$48,600	$46,926
State of Alaska	$120,200	$119,822	$116,634	$166,340
Federal Government	$62,000	$62,833	$62,900	$56,649
Enterprise Revenue	$776,300	$736,516	$955,238	$1,252,956
Other Revenue	$ -	$1,190	$2,461	$700
Total Revenues	$1,004,500	$969,982	$1,185,833	$1,523,571
Expenditures				
Administration	$139,274	$168,006	$143,662	$152,591
Enterprise Expenditures	$805,495	$828,030	$962,590	$1,280,931
Other Expenditure	$80,130	$19,960	$71,109	$51,667
Total Expenditures	$1,024,899	$1,015,995	$1,177,361	$1,485,190
Net Revenues	$(20,399)	$(46,013)	$8,471	$38,382

The City of Chefornak has a good range of relatively stable revenue sources. Seventy-five to eighty-five percent of the City's revenue comes from their various enterprise operations. These include the electric utility, the water utility, the washeteria, the landfill, land sales, and bingo. The City relies on outside sources for less than a fifth of their annual revenue. This shows that the City is well-positioned to cope with recent State and Federal spending decreases in rural Alaska.

While revenues were negative in 2010 and 2011, they have increased to positive in 2012 and 2013. The City's bottom line does have considerable variation from year to year. It appears that some of this variation may be due to capital projects which are simply not identified as such in the financial reports.

Without more data on the City of Chefornak's assets and liabilities, it isn't possible to gauge their ability to secure financing. Moreover the financial reports provided are a few years old and do not give any indication of current trends. All that can be said definitively is that the City appeared to be generating enough revenue to cover their expenditures by 2013 and, at the time, their financial standing appeared to be improving.

Public loans: The community does not have any bulk fuel loans. The City did receive a Power Project Fund loan in 2014 that is currently in repayment. The loan is current and expected to be paid off in late 2017.

Liens: The community does not have any current liens

Summary findings

The projects identified in Chefornak have total efficiency project costs of just over 435 thousand dollars. If the community project is not grant funded through Phase III of RACEE, each entity will need to secure alternate funding for implementation. The table below shows recommended project cost by the owner of the impacted facility.

City of Chefornak	**$**	**3,600**
Residential Owners	$	400,000
Village of Chefornak	$	8,300
Chefarnrmute Incorporated	$	15,300
Lower Kuskokwim School District	$	7,200
Avuigak Store	$	700
Total	**$**	**435,100**

The City is only responsible for a small portion of the total RACEE project. Without any knowledge of the City's reserve accounts, it is hard to say whether they have the capacity to self-finance the project or to seek outside lending. The total amount is far less than the City's net revenues in some years so the former is most likely possible without even drawing down on existing reserves.

By far, the largest portion of the project cost falls on the homeowners in Chefornak. If RACEE funding is not secured for the residential weatherization it may be difficult to complete all of this work. There are a number of funding sources that can be applied to this type of work but most of them are evaluated and funded on a home-to-home basis. Also, some are income-based programs. This could result in a fractured effort where not all homes are upgraded in the end. It may be more effective for the Association of Village Council Presidents Regional Housing Authority to coordinate this project and seek community-wide funding sources. The City, Tribe, or Corporation could assume this role as well, if need be.

The Tribe, corporation, school district, and store would be responsible for varying portions of the remainder of the project. Unfortunately, AEA did not receive financial information from any of these entities and, as such, cannot make any comment on their ability to fund the project components. It is worth noting that each entity has access to particular funding sources that other entities in the community does not and vice versa. This may help shape the community's funding strategy beyond just ownership and financial capacity. In particular, the Village of Chefornak and Chefarnrmute Incorporated are eligible for DOE Office of Indian Energy funding.

If the community chooses to apply for funding in Phase III of RACEE, this eligibility should be indicated in the application.

Attached please find a summary of potential funding and financing options available to communities in Alaska for energy infrastructure development and efficiency projects. Please note the date of last update on these documents.

Appendices

Appendix A: Level One Energy Audits

Appendix B: Energy Project Financing Options

Appendix C: Funding Sources for RACEE

Appendix D: Energy Project Financing Options for RACEE

Attachment 1: Chefornak Housing Assessment Summaries

NORTECH

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July 22, 2016

Alaska Energy Authority
813 West Northern Lights Boulevard
Anchorage, Alaska 99503

ATTN: Rebecca Garrett

RE: Level 1 Energy Assessment – City Office
Chefornak, Alaska

Rebecca:

NORTECH has completed a Level 1 Energy Assessment for the City Office building in Chefornak, Alaska. The energy assessment was funded through the Remote Alaska Community Energy Efficiency (RACEE) Competition under contract to the Alaska Energy Authority. This letter report summarizes Level 1 findings and recommendations for energy efficiency projects at this facility

Site and Building Information

The City Office is a 2,500 square foot single story wood framed building on pilings located in Chefornak, Alaska. The facility is an office space occupied by the Chefornak City government.

Preliminary Energy Use Analysis

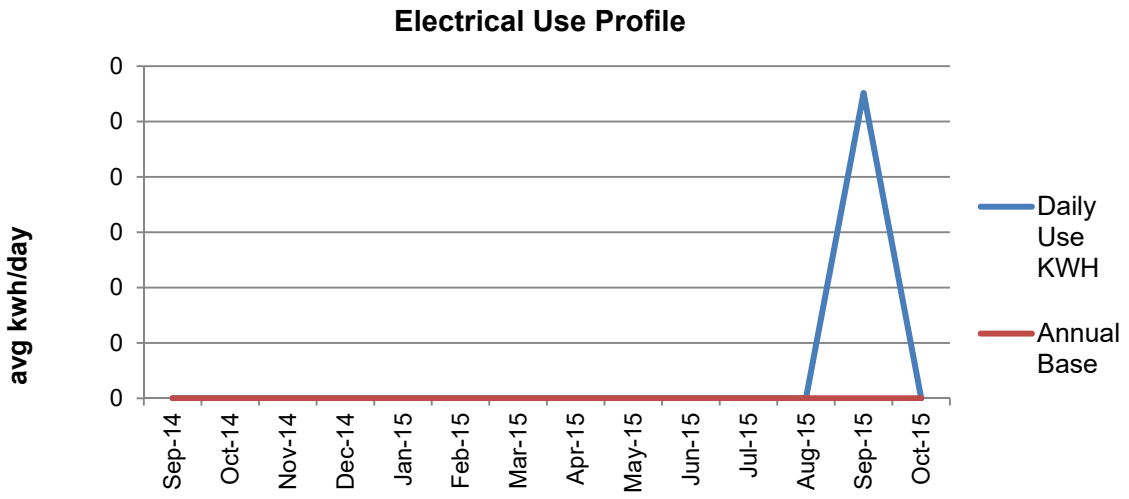
As the first step in an Energy Assessment ***NORTECH*** attempted to complete a Preliminary Energy-Use Analysis (PEA) for the City Office to analyze the available utility data for potential concerns and trends. Electronic copies of electrical utility bills for only the last 4 months of 2015 were provided for the City Office building. The electric data was in a tabular format with total use and cost per month and did not include rate structures or detailed cost breakdown. Fuel record indicate the building uses 165 gallons of fuel oil annually.

The total 2015 Electricity use for the City Office was 92 kWh at a total cost of $45. These figures indicate the building is largely unused. The Pre-PCE cost in Chefornak is $0.56/kWh and the Post-PCE cost is $0.29/kWh, the rate used for this building is not known.

Seasonal Energy Use Patterns

The Electrical Use Profile (EUP) depicts the electrical consumption broken into base use and seasonally dependent consumption. The annual base is the lowest average kwh/day per year. The building does not incur demand charges.

Only 4 months of electrical data were available, and the building appears to be charged a flat fee of $60 per month. Maximum recorded monthly electrical usage was 72 kWh and only a total of 92 kWh was recorded.



Observations from Walk-Through and Interview

A building walkthrough was conducted on May 24, 2016 to inspect the condition of the mechanical system, building envelope, and electrical systems. The building is in overall good condition.

Building Envelope
The City Office building is single story wood framed construction with T-111 siding and piling foundation. The attic was not accessible but most likely has a cold roof and is insulated from the building with studs and fiberglass bat insulation.

Lighting
Primary lighting in the facility consists of 32w T8 lamps in 4 lamp fixtures. The lights are controlled by manual switches with the intent to remain on during daily business hours.

Exterior lighting consists of high pressure sodium (HPS) wall pack fixtures with unknown control.

Plug Loads
The plug loads in this building include a coffee maker, microwave, computer and printer. This equipment appears to be average condition.

Mechanical Systems
Space heat is distributed to baseboard heating units and cabinet unit heaters around the perimeter of the building. The boiler system serving this terminal equipment was not inspected during the site visit. Space heat is intended to be controlled by a programmable thermostat. Setback capability on this thermostat is apparently not being utilized and it appears the control has been transferred to a single stand-alone thermostat with no set back or programming capabilities.

Recommended Energy Conservation Measures (ECMs)

Energy conservation measures are characterized as behavioral or operational changes that require little or no capital investment. The following low cost/no cost ECMs can typically be completed by facility operating personnel and cost less than $200 to implement. These ECMs should be implemented as soon as possible to maximize energy savings.

ECM-1: The rate structure for the building is unknown. The building appears to be billed a flat fee of $60 per month. Only 4 months of electrical billing data were available with a total of only 92 kWh recorded. At 2500 square feet this building is similar to the size of the Head Start and other buildings in this village. As such similar electrical usage would be expected unless the building is generally not occupied. **Complete billing/use data and occupancy should be verified**.

Energy Efficiency Measures (EEMs)

This section describes energy efficiency measures that require capital investment for implementation. This section identifies the Rough Order of Magnitude (ROM) installation costs and potential energy savings.

EEM-1: Replace fluorescent lighting with linear LED lighting
T8 fluorescent lighting is not as efficient as more recent technology, and every instance within the building should be replaced with newer technology lighting. Linear LED equivalent lamps are available and include a much longer life expectancy while using approximately 40% less energy. The amount of money saved will be based on the number of lamps and the operational time. At the non-PCE rate, replacing the 4 T8s in a fixture with 4 LEDs would reduce the cost of electrical use in the building by approximately $0.23 per 8-hour day per fixture. Over a 250 day operational year, this adds up to 12.5 kwh and $57.5 per fixture.

EEM-2: Replace exterior lighting with LED equivalent lighting
The exterior high pressure sodium (HPS) fixture should be replaced with an LED wall-pack. LED wall-packs tend to perform well in the cold and use more than 50% less energy than HPS. This EEM assumes that the photocell sensors are functioning correctly and could result in higher savings if the photocell sensors are currently non-functional because most LED lamps come with integrated photocell sensors. Replacement of a 200-watt HPS with a 100-watt LED would save approximately $0.45 per 8 hours of operation.

EEM-3: Utilize set-back thermostats
The Department of Energy estimates that as much as 10% heating energy can be saved per hear by turning thermostats back 7°-10° F for 8 hours per day while building is unoccupied.

ECM/EEM Summary

Priority List	
Energy Conservation Measures (ECMs)	
Name	**Improvement Description**
ECM-1	Obtain complete billing data and verify occupancy and rate structure.

Priority List				
Energy Efficiency Measures (EEMs)				
Name	**Improvement Description**	**ROM Cost**	**Estimated Savings (kWh)**	**Estimated Savings (% Building Usage)**
EEM-1	Replace fluorescent lighting with linear LED lighting	$500/ fixture	12.5/ fixture	
EEM-2	Replace exterior lighting with LED equivalent lighting	$250/ fixture	25/ fixture	
EEM-3	Confirm and program set back thermostat to reduce temperature during unoccupied hours.	$150		5-10% Heating Oil
Estimated Reduction in Building Electric Load			**N/A**	**N/A**

Based on the information presented above, the following steps are recommended:

- Implement all listed ECMs and EEMs. Specifically obtaining complete billing data and verifying occupancy and rate structure will facilitate the understanding of the potential energy savings and potential costs. .

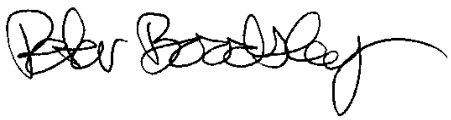
Measures Not Recommended

This section describes energy efficiency measures that did not meet energy savings criteria and were not considered for this report.

Category	Description	Discussion
Envelope – Exterior Windows	Vinyl double pane windows	Energy modelling and experience indicates that envelope upgrades generally are not cost effective simply for the energy savings. However, these upgrades also usually address other concerns related to poor vapor barrier sealing and other air leakage concerns. In addition, if envelope upgrades are undertaken for other reasons (i.e. broken windows or roof replacement) the highest level of insulation affordable should be installed.
Envelope – Exterior Doors	Insulated Metal Clad w/ thermal break	
Envelope – Insulation	Fiberglass insulation	
HVAC – Air Handling Unit	Constant volume AHU	Newer, more efficient air handling units are available with VFD operation and DDC controls providing more efficient operation. The existing air handling unit is halfway through its expected useful life and does not warrant a direct replacement at this time. Should excessive repairs become common near future, consideration should be given in selected a more efficient air handling unit.

We trust this information is adequate for your needs at the present time. If you have any questions, feel free to contact me at your earliest convenience.

Sincerely,
NORTECH



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Principal

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July 22, 2016

Alaska Energy Authority
813 West Northern Lights Boulevard
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ATTN: Rebecca Garrett

RE: Level 1 Energy Assessment – Clinic
Chefornak, Alaska

Rebecca:

NORTECH has completed a Level 1 Energy Assessment for the Health Clinic in Chefornak, Alaska. The energy assessment was funded through the Remote Alaska Community Energy Efficiency (RACEE) Competition under contract to the Alaska Energy Authority. This letter report summarizes Level 1 findings and recommendations for energy efficiency projects at this facility.

Site and Building Information

The Clinic is a one story, 2,550 square foot wood framed building on pilings located in Chefornak, Alaska. The building is composed of 4 exam rooms, a restroom, a specialty suite, two offices, a waiting area, and a temporary lodging room and storage rooms. The facility consumes electricity for plug loads and lighting, and fuel oil for space heating and water heating

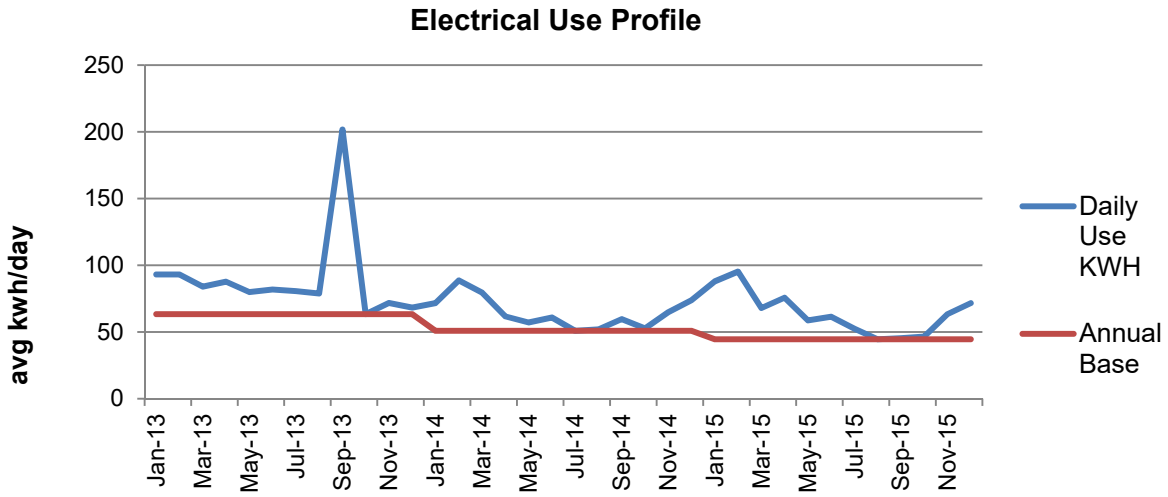
Preliminary Energy Use Analysis

As the first step in an Energy Assessment ***NORTECH*** has completed a Preliminary Energy-Use Analysis (PEA) for Clinic to analyze the available utility data for potential concerns and trends. Electronic copies of electrical utility bills for 36 consecutive months were provided for the Health Clinic. Heating oil records were not available.

The total 2015 Electricity use for the Clinic was 22,590 kWh at a total cost of $12,723. The Clinic does receive Power Cost Equalization (PCE) which reduces the cost by $6,457. The Pre-PCE cost is $0.56/kWh and the Post-PCE cost is $0.29/kWh.

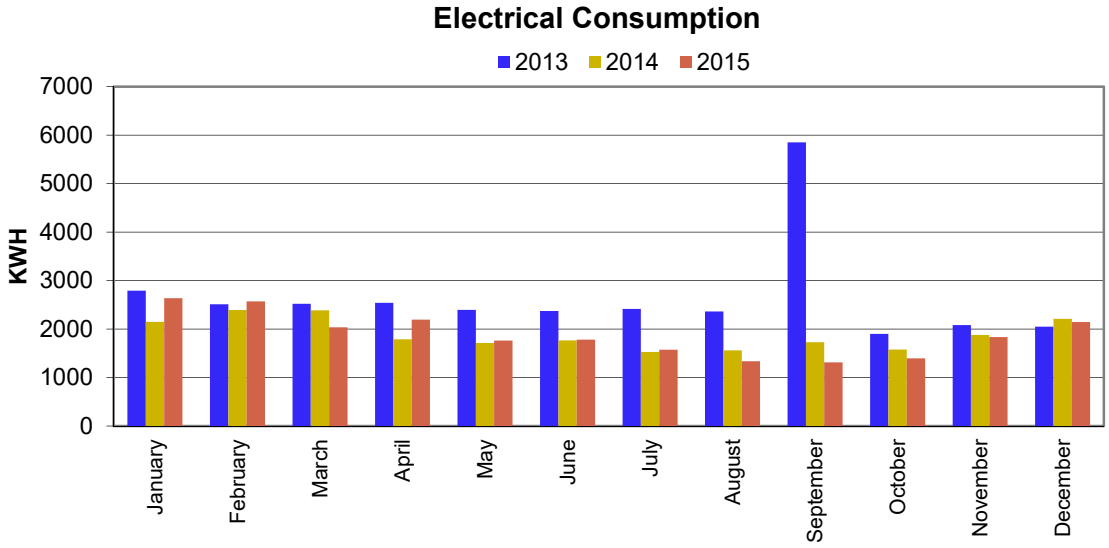
The Clinic would normally be evaluated on total energy use using the Energy Use Index (EUI) and total cost using the Energy Cost Index (ECI). However, due to the lack of fuel data, only electrical consumption analysis has been performed and the EUI and ECI cannot be calculated or compared to similar buildings.

Seasonal Energy Use Patterns
The Electrical Use Profile (EUP) depicts the electrical consumption broken into base use and seasonally dependent consumption. The annual base is the lowest average kwh/day per year.



The EUP graph shows that the electric base load in the building has decreased over the three-year period. The 2013 baseload was about 63 kWh/day as compared to about 45 kWh/day in 2015. This is a reduction in electrical consumption of about 29%. This building does not incur demand charges.

The Electrical Consumption graph below shows the facility's historical electricity use broken down by month.



Winter electrical use has remained fairly constant over three years. However, 2014/2015 summer electrical use has been substantially reduced as compared to 2013. September 2013 electrical use looks atypical and could be due to an accounting error in the spreadsheet or due to a construction project at the building.

Observations from Walk-Through and Interview

A building walkthrough was conducted on May 24, 2016 to inspect the condition of the mechanical system, building envelope, and electrical systems. The building is in overall good condition.

Building Envelope
The walls of the Clinic consist of 6" Structural Insulated Panels (SIP). The roof consists of 8" SIP. Windows all consist of vinyl double pane windows with ½" glaze spacing and rubber thermal break.

Lighting
Interior lighting consists of 32w T8 lighting. The majority of the rooms are controlled by wall mounted occupancy sensors. Most of the lighting was off during the visit as rooms were generally unoccupied with exception to a few offices and the waiting area. The hallway lighting is controlled by a manual switch near the front entrance.

Exterior lighting consists of high pressure sodium (HPS) wall pack fixtures on photocell control.

Plug Loads
There is a computer/monitor unit in each exam room, one in the reception area, and one in the rear offices. There are no other significant plug loads in the building.

Mechanical Systems
Heating in the Clinic is provided by a forced air furnace. The furnace is about 10 years old and is in good condition. The building is equipped with a Building Automation System (BAS); however, it is currently in bypass such that the system is not utilized. A bypass thermostat for the furnace has been installed. The furnace is equipped with Siemens motorized dampers to control outside air and return air.

A Bock oil fired water heater provides domestic water to the building. The temperature set point is set to "hot".

Cold water recirculation to prevent freezing of the water system was once controlled by the BAS. It now appears that the cold water recirculation pump may run continuously. A heat tape to also prevent freezing of the water system may also be present and no longer controlled.

Nominal flow rates of fixtures were examined. The flow rate for bathroom sinks were 2.0 gpm. Exam rooms were 2.2 gpm. The showerhead was 2.5 gpm. Toilets were 1.6 gallons per flush.

Four exhaust fans are located in the building. The two restroom fans are tied into the occupancy sensor switch. The exhaust fan in the janitor closet is controlled with a manual switch. The exhaust fan in the server room controlled with a reverse acting thermostat.

Recommended Energy Conservation Measures (ECMs)

Energy conservation measures are characterized as behavioral or operational changes that require little or no capital investment. The following low cost/no cost ECMs can typically be completed by facility operating personnel and cost less than $200 to implement. These ECMs should be implemented as soon as possible to maximize energy savings.

ECM-1: Most computers are left on throughout the day, having energy management software will ensure that computers enter low wattage "sleep mode" when not being utilized. It may possible to achieve savings by installing energy management software on computers used in the building. **Install energy management software on computers.**

ECM-2: Exterior doors have areas of missing weather stripping providing a path for the infiltration of cold outside air. **Inspect and replace weather stripping at exterior doors.**

Energy Efficiency Measures (EEMs)

This section describes energy efficiency measures that require capital investment for implementation. This section identifies the Rough Order of Magnitude (ROM) installation costs and potential energy savings.

EEM-1: Replace fluorescent lighting with linear LED lighting
T8 fluorescent lighting is not as efficient as more recent technology, and every instance within the building should be replaced with newer technology lighting. Linear LED equivalent lamps are available and include a much longer life expectancy while using a lower amount of energy.

The estimated savings takes into account the additional fuel oil heat necessary to overcome the reduced electrical heating output of the lower wattage LED lamps as opposed to the higher wattage fluorescent lamps.

ROM Cost:	$4,900
Estimated Life of Measure (yrs.)	17
Annual Energy Reduction (kWh)	1,925
Annual Energy Reduction (%)	53%
Reduction in Building Electrical Load (%)	8%

EEM-2: Replace exterior lighting with LED equivalent lighting
The exterior high pressure sodium (HPS) fixture should be replaced with an LED wall-pack. LED wall-packs tend to perform well in the cold and use much lower energy than HPS. This EEM assumes that the photocell sensors are functioning correctly and could result in higher savings if the photocell sensors are actually non-functional.

ROM Cost:	$2,300
Estimated Life of Measure (yrs.)	17
Annual Energy Reduction (kWh)	500
Annual Energy Reduction (%)	64%
Reduction in Building Electrical Load (%)	2%

EEM-3: Replace Midmark Mini-Fridge with a newer Energy Star rated unit
As refrigerators age, insulation is eventually saturated with moisture which reduces the insulation value. This results in the compressor coming on more frequency which increases energy use. The Midmark mini fridge in the guest room appears to be old and should be replaced with a newer Energy Star Rated unit.

ROM Cost:	$400
Estimated Life of Measure (yrs.)	15
Annual Energy Reduction (kWh)	85
Annual Energy Reduction (%)	24%
Reduction in Building Electrical Load (%)	0.4%

EEM-BAS: Turn off cold water circulation pump and heat trace when outside temperature is greater than 38°F

The Clinic uses a cold water circulation pump and heat trace to ensure that the water does not freeze. The pump used to be controlled by the BAS system. The current pump operation and heat trace is not known, and likely to be operating more than necessary. It is recommended the circulation pump and heat trace operation be confirmed. If the pump and/or heat trace is operating 24/7, controls should be added to turn off the pump and/or heat trace when outside temperature is 38°F (adjustable) or warmer.

Due to the unknowns associated with this system, calculating the ROM and reduction in electrical load is not possible. Based on average air temperatures, the controlling these units on air temperature is estimated to have at least a 40% reduction in annual use.

ECM/EEM Summary

Priority List				
Energy Conservation Measures (ECMs)				
Name	**Improvement Description**			
ECM-1	Install energy management software on computers			
ECM-2	Inspect and replace weather stripping at exterior doors			
Energy Efficiency Measures (EEMs)				
Name	**Improvement Description**	**ROM Cost**	**Estimated Savings (kWh)**	**Estimated Savings (% Building Usage)**
EEM-1	Replace fluorescent lighting with linear LED lighting	$4,900	1,925	8% Electric
EEM-2	Replace exterior lighting with LED equivalent lighting	$2,300	500	2% Electric
EEM-3	Replace Midmark Mini-Fridge with a newer Energy Star rated unit	$400	85	0.4% Electric
EEM-BAS	Control cold water circulation pump &heat tape based on outside air temp			
Estimated Reduction in Building Electric Load			**2,510 kWh**	**11%**

Based on the information presented above, the following steps are recommended:

- Implement all listed ECMs. These are relatively inexpensive measures that can be completed without a lot of effort and will provide significant savings.
- Implement all listed EEMs. Both EEMs can be implemented at an estimated rough order of magnitude cost of $7,600 and savings of $1,300 which would be a simple pay back of about 6 years. Note that if all EEMs are implemented, the total savings may differ from the sum of individual EEMs.
- Hire a contractor to evaluate the control of the cold water recirculation pump and heat trace. Ensure that neither are operating when the outside temperature is greater than 38°F.

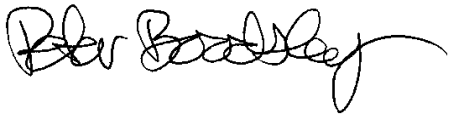
Measures Not Recommended

This section describes energy efficiency measures that did not meet energy savings criteria and were not considered for this report.

Category	Description	Discussion
Envelope – Exterior Windows	Vinyl double pane windows	Energy modelling and experience indicates that envelope upgrades generally are not cost effective simply for the energy savings. However, these upgrades also usually address other concerns related to poor vapor barrier sealing and other air leakage concerns. In addition, if envelope upgrades are undertaken for other reasons (i.e. broken windows or roof replacement) the highest level of insulation affordable should be installed.
Envelope – Exterior Doors	Insulated Metal Clad w/ thermal break	
Envelope – Insulation	6" SIP, R-30 Walls, Attic Insulation, etc	
HVAC – Furnace	Thermaflo PMP-210-DD-S2	Newer more efficient fuel oil fired furnaces are available with efficiencies up to 90%. The existing furnace is halfway through its expected useful life and does not warrant a direct replacement at this time. Should the furnace fail or be replaced in the near future, consideration should be given in selected a more efficient furnace.

We trust this information is adequate for your needs at the present time. If you have any questions, feel free to contact me at your earliest convenience.

Sincerely,
NORTECH



Peter Beardsley, PE, CEA
Principal

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July 22, 2016

Alaska Energy Authority
813 West Northern Lights Boulevard
Anchorage, Alaska 99503

ATTN: Rebecca Garrett

RE: Level 1 Energy Assessment – Head Start
Chefornak, Alaska

Rebecca:

NORTECH has completed a Level 1 Energy Assessment for the Head Start building (Head Start) in Chefornak, Alaska. The energy assessment was funded through the Remote Alaska Community Energy Efficiency (RACEE) Project managed by Alaska Energy Authority. This letter report summarizes Level 1 findings and recommendations for energy efficiency projects at this facility.

Site and Building Information

The Head Start is a 2,600 square foot one story wood framed building on pilings located in Chefornak, Alaska. The facility is a Head Start providing educational services to young children. The facility consumes electricity for plug loads and lighting, and fuel oil for space heating and water heating

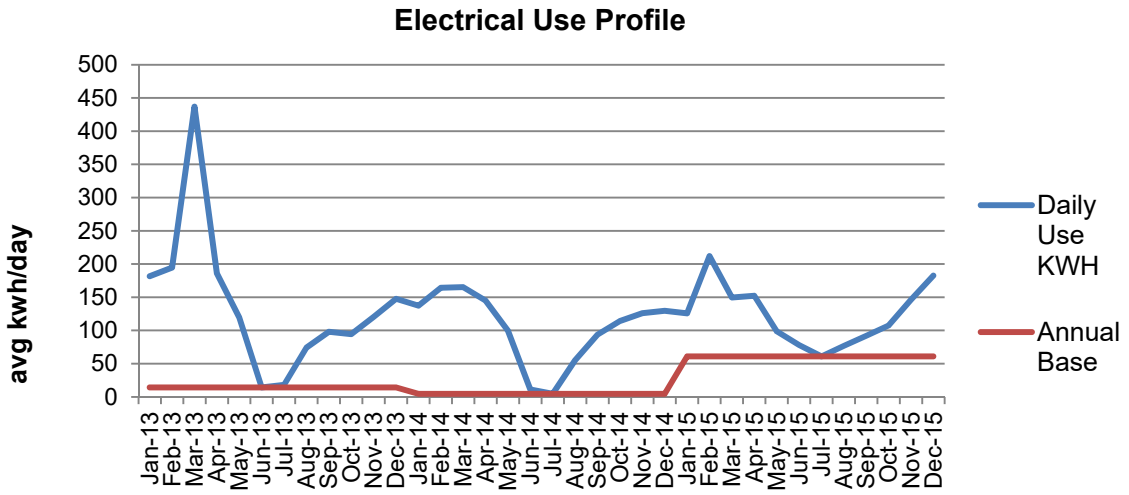
Preliminary Energy Use Analysis

As the first step in an Energy Assessment ***NORTECH*** has completed a Preliminary Energy-Use Analysis (PEA) for the Head Start. Electronic copies of electrical utility bills for 36 consecutive months were provided for the Health Clinic. Heating oil records were not available.

The total 2015 Electricity use for the Head Start building was 43,376 kWh at a total cost of $22,513. The electricity cost is $0.49/kWh.

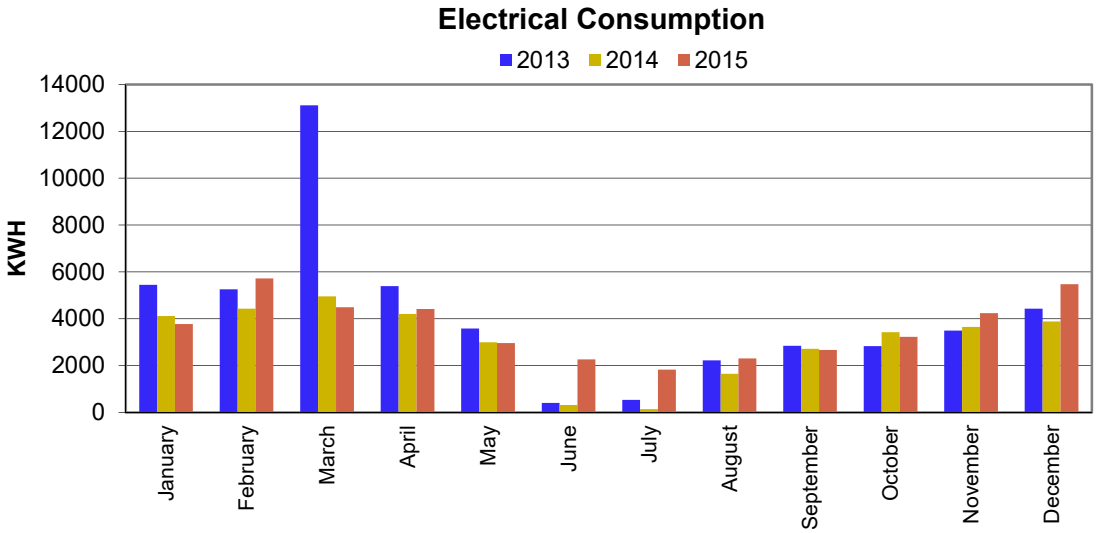
The Clinic would normally be evaluated on total energy use using the Energy Use Index (EUI) and total cost using the Energy Cost Index (ECI). However, due to the lack of fuel data, only electrical consumption analysis has been performed and the EUI and ECI cannot be calculated or compared to similar buildings.

Seasonal Energy Use Patterns
The Electrical Use Profile (EUP) depicts the electrical consumption broken into base use and seasonally dependent consumption. The annual base is the lowest average kwh/day per year.



The EUP graph shows that the electric base load in the building has increased from about 4.6 kWh/day in 2014 to about 61 kWh/day in 2015, which is an increase of about more than 10x. The nature of the electrical us profile indicates that the building was unused in June and July of 2013 and 2014. The building was in use during the summer of 2015 or some electrical load was inadvertently left on for the summer.

The Electrical Consumption graph below shows the facility's historical electricity use broken down by month.



The monthly electrical usage shows the significant increases in June and July usage in 2015.

Observations from Walk-Through and Interview

A building walkthrough was conducted on May 24, 2016 to inspect the condition of the mechanical system, building envelope, and electrical systems. The building is in overall fair condition.

Building Envelope
The Head Start building is an older one-story wood framed construction with T-111 siding and piling foundation. The attic has a cold roof and is insulated from the building with wooden trusses and fiberglass bat insulation. Windows are vinyl double pane construction. An adjacent building is connected and utilized for storage, windows in this area have been covered with plywood. This structure is in fair to poor condition and appears to be approaching its useful life.

Lighting
Primary lighting in the facility consists of 32w T8 lamps in 4 lamp fixtures. The lights are controlled by manual switches with the intent to remain on during daily business hours. The building was not occupied during the visit and lights were off.

Exterior lighting consists of high pressure sodium (HPS) wall pack fixtures with unknown control.

Plug Loads
The predominant plug load appears to be the refrigerator/freezer unit and electric stove in the kitchen area. These units are in average condition. There are no other significant plug loads in the building although when school is in session we would expect some computer loads.

Mechanical Systems
Space heat is produced by two oil boilers, and distributed by baseboard heating units and a heating loop in a separate air handling unit, that is also used to provide ventilation. Space heat is controlled by programmable thermostats. Setback capability on the thermostats is apparently not being utilized.

There is a separate 40-gallon tank type electric water heater for domestic hot water.

The building does not have a space cooling system. Then intent appears to have the air handling unit that provides ventilation off during the summer period. The building was unoccupied during our visit. The boiler system was on as well as the electric hot water heater. Recirculation pumps were also on.

Recommended Energy Conservation Measures (ECMs)

Energy conservation measures are characterized as behavioral or operational changes that require little or no capital investment. The following low cost/no cost ECMs can typically be completed by facility operating personnel and cost less than $200 to implement. These ECMs should be implemented as soon as possible to maximize energy savings.

ECM-1: The electric stove and refrigerator are left on even though the building was not occupied and school was not in session. **Unplug stove and refrigerator/freezer unit.**

ECM-2: Exterior doors have areas of missing weather stripping providing a path for the infiltration of cold outside air. **Inspect and replace weather stripping at exterior doors.**

Energy Efficiency Measures (EEMs)

This section describes energy efficiency measures that require capital investment for implementation. This section identifies the Rough Order of Magnitude (ROM) installation costs and potential energy savings.

EEM-1: Replace fluorescent lighting with linear LED lighting

T8 fluorescent lighting is not as efficient as more recent technology, and every instance within the building should be replaced with newer technology lighting. Linear LED equivalent lamps are available and include a much longer life expectancy while using a lower amount of energy.

The estimated savings takes into account the additional fuel oil heat necessary to overcome the reduced electrical heating output of the lower wattage LED lamps as opposed to the higher wattage fluorescent lamps.

ROM Cost:	$4,900
Estimated Life of Measure (yrs.)	17
Annual Energy Reduction (kWh)	1,900
Annual Energy Reduction (%)	53%
Reduction in Building Electrical Load (%)	4%

EEM-2: Replace exterior lighting with LED equivalent lighting

The exterior high pressure sodium (HPS) fixture should be replaced with an LED wall-pack. LED wall-packs tend to perform well in the cold and use much lower energy than HPS. This EEM assumes that the building has the same number of fixtures as the clinic and that the photocell sensors are functioning correctly. Actual savings will be based on the number of fixtures and higher savings per fixture could be achieved if the photocell sensors are actually non-functional.

ROM Cost:	$2,300
Estimated Life of Measure (yrs.)	17
Annual Energy Reduction (kWh)	500
Annual Energy Reduction (%)	64%
Reduction in Building Electrical Load (%)	1%

EEM-Cx: Commission Boiler, Air Handler Systems, and Hot Water

The Head Start uses multiple systems for space heat, ventilation, and hot water. These systems appear to be in use when the facility may not be in use, circulation pumps appear to run year round, and unoccupied setbacks and outdoor resets do not appear to be programmed when the building is in use. A variety of other fine tuning measures may be possible. Commissioning can typically reduce the energy consumption of a building by about 10% and this building, by atching the energy use with the occupancy, can likely reduce the overall energy load by at least 15%.

ECM/EEM Summary

Priority List				
Energy Conservation Measures (ECMs)				
Name	**Improvement Description**			
ECM-1	Unplug stove and refrigerator/freezer unit.			
ECM-2	Inspect and replace weather stripping at exterior doors			
Energy Efficiency Measures (EEMs)				
Name	**Improvement Description**	**ROM Cost**	**Estimated Savings (kWh)**	**Estimated Savings (% Building Usage)**
EEM-1	Replace fluorescent lighting with linear LED lighting	$4,900	1,900	4% Electric

Priority List				
EEM-2	Replace exterior lighting with LED equivalent lighting	$2,300	500	1% Electric
EEM-Cx	Commission existing controls for heating, ventilation, and hot water systems.			10%-15% Heating Oil
Estimated Reduction in Building Electric Load			**2,400 kWh**	**11%**

Based on the information presented above, the following steps are recommended:

- Implement all listed ECMs. These are relatively inexpensive measures that can be completed without a lot of effort and will provide significant savings.
- Implement all listed EEMs. Both EEMs can be implemented at an estimated rough order of magnitude cost of $7,200 and savings of $1,300
- Contract with a commissioning agent to evaluate the heating, ventilation, and hot water system controls and operations and develop a sequence of operations for the facility. This should include documentation of summer/winter operations, thermostat setbacks, and other operational adjustments to minimize energy use

Measures Not Recommended

This section describes energy efficiency measures that did not meet energy savings criteria and were not considered for this report.

Category	Description	Discussion
Envelope – Exterior Windows	Vinyl double pane windows	Energy modelling and experience indicates that envelope upgrades generally are not cost effective simply for the energy savings. However, these upgrades also usually address other concerns related to poor vapor barrier sealing and other air leakage concerns. In addition, if envelope upgrades are undertaken for other reasons (i.e. broken windows or roof replacement) the highest level of insulation affordable should be installed.
Envelope – Exterior Doors	Insulated Metal Clad w/ thermal break	
Envelope – Insulation	Fiberglass insulation	
HVAC – Boilers, Air Handling Unit, Hot Water Heater	Older Models	The boilers appear to be relatively new, while the other parts of the mechanical systems appear to be older. New boilers, pumps, heaters, and other units are typically more efficient than older versions. In the event that new units are considered, the highest efficiency units will minimize energy consumption.

We trust this information is adequate for your needs at the present time. If you have any questions, feel free to contact me at your earliest convenience.

Sincerely,
NORTECH

Peter Beardsley, PE, CEA
Principal

NORTECH

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July 22, 2016

Alaska Energy Authority
813 West Northern Lights Boulevard
Anchorage, Alaska 99503

ATTN: Rebecca Garrett

RE: Level 1 Energy Assessment – LKSD K-12 School
Chefornak, Alaska

Rebecca:

NORTECH has completed a Level 1 Energy Assessment for the LKSD K-12 school in in Chefornak, Alaska. The energy assessment was funded through the Remote Alaska Community Energy Efficiency (RACEE) Competition under contract to the Alaska Energy Authority. This letter report summarizes Level 1 findings and recommendations for energy efficiency projects at this facility.

Site and Building Information

The Chefornak School houses kindergarten through 12th Grade in a 44,460 square foot multi-story building on pilings located in Chefornak, Alaska. In 2012, a major renovation/addition project was undertaken. The school is the largest building in the village and is less than five years old and in good condition. The facility consumes electricity for plug loads, kitchen equipment, mechanical HVAC equipment, and lighting, as well as fuel oil for space heating and water heating.

Preliminary Energy Use Analysis

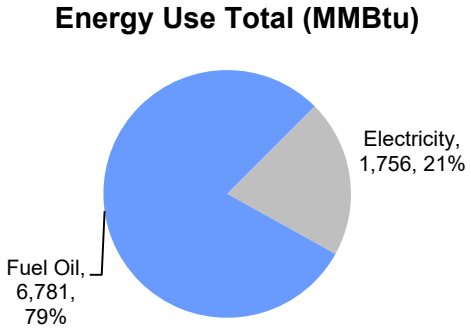
As the first step in an Energy Assessment ***NORTECH*** has completed a Preliminary Energy-Use Analysis (PEA) for the School to analyze the available utility data for potential concerns and trends. Electronic copies of electrical utility bills for 36 consecutive months were provided for the School. Heating oil records were also provided.

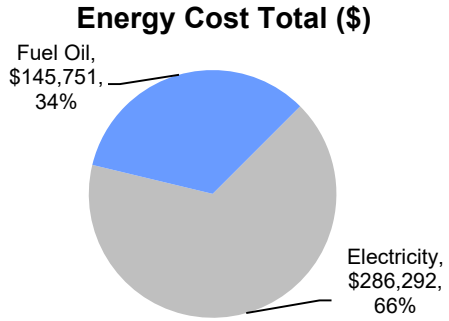
The electric data was in a tabular format with total use and cost per month and did not include rate structures or detailed cost breakdown. The total fiscal year 2015 Electricity use for the School was 514,400 kWh at a total cost of $286,292. The school does receive Power Cost Equalization (PCE) which reduces the fiscal year 2015 electricity cost by $39,920. The Pre-PCE costs is $0.56/kWh and the Post-PCE cost is $.48/kWh. The Chefornak electric utility does not have a demand charge on commercial buildings.

The total fiscal year 2015 fuel oil use for the School was 50,608 gallons at a total fuel oil cost of $145,751.

On an equivalent units of energy comparison, the above summary for fiscal year 2015 represents 1756 MMBtu of electrical consumption and 5117 MMBtu of fuel oil consumption for a total of 6872 MMBtu of energy consumption.

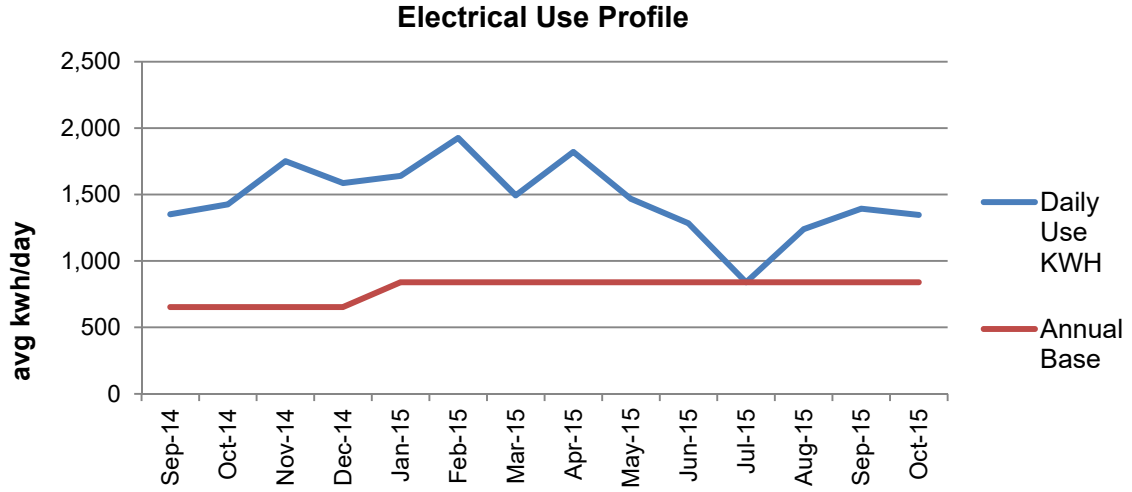
The energy use profiles below show the energy and cost breakdowns for the Chefornak School facility.





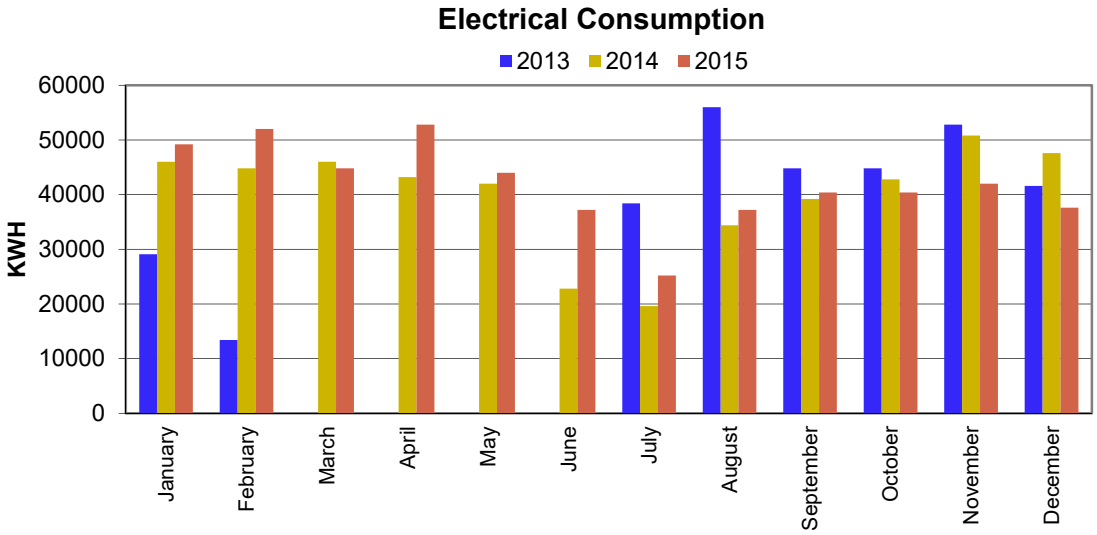
Seasonal Energy Use Patterns

The Electrical Use Profile (EUP) depicts the electrical consumption broken into base use and seasonally dependent consumption. The annual base is the lowest average kwh/day per year.



The EUP graph below shows that the electric base load in the building has increased from about 650 kWh/day in 2014 to about 840 kWh/day in 2015, which is an increase of about 30%. This increase may be attributable to an increase in building utilization. Identifying the reasons for this increase may also identify ECMs that could be undertaken to reduce the electrical use at the facility.

The Electrical Consumption graph below shows the facility's historical electricity use broken down by month.



The monthly electrical usage shows some year over year increases for some months. As would be expected the summer usage during June and July is generally lower than other months in the middle of the school year.

Observations from Plans Review and Interview

A building walkthrough was conducted on May 24, 2016 to inspect the condition of the mechanical systems, building envelope, and electrical systems. Subsequently construction plans were reviewed. The building is in overall good condition.

Building Envelope
The School is a multistory Story K-12 facility with approximately 19,500 square feet of renovated space and 27,500 square feet of new addition. The building is well-insulated with insulated metal wall panels and is supported by a piling foundation. Windows and doors appeared to be appropriate and in good condition.

Lighting
Electrical systems in the school facility include exterior and interior lighting, power, telecommunication and signal system, heat-trace system, and overhead medium voltage utility distribution system.

Primary lighting in the facility consists of primarily T5HO and T8 fluorescent lamps but also some metal halide fixtures and limited LED fixtures. The lights are controlled with a combination of manual switches and occupancy sensors with the intent to remain on throughout the occupied hours.

Exterior lighting is generally LED technology on photocell control.

Connected Plug and Power Loads
There are extensive connected loads including computers with associated printers, server room, and also smartboard technology. There is a full size commercial kitchen area has a cooking

hood exhaust system and associated appliances including refrigerator and freezers. The school has a dedicated water treatment plant that incorporates reverse osmosis filtration equipment with significant associated electrical loads. Other areas of the facility with associated electrical loads include, waste water treatment plant, fuel tank and storage building.

Mechanical Systems

The facility is provided with complex HVAC systems to provide modern school ventilation and heating requirements. Space heat is produced by three high efficiency oil boilers. Distribution piping supplies heat to terminal equipment including the following: Unit heaters, heat exchangers, cabinet unit heaters, baseboard heaters, radiant ceiling panels, variable volume boxes with reheat coils, and heating coils in air handling units. Ventilation is provided by 3 central air handling units with high efficiency motors and VFD control. Exhaust systems are comprised of over 30 exhaust fans. There is a Building Automation System (BAS) for the facility and an apparently separate SCADA system for the water treatment facility.

Recommendations

The Chefornak K-12 school building is the physically largest building in the village at approximately 45,000 square feet. Most other commercial buildings in the village are 2,500 square feet or less. As would be expected, the school is the largest consumer of electrical energy in the community on an annual basis. The 2015 annual electrical consumption for the school was approximately 502,800 kWh. The village total for the 11 commercial/government buildings was approximately 745,000 kWh. As such the school represents more than 60% of the electrical load in the community. Further the building consumes significant amounts of fuel oil, although probably slightly less as a percent of the whole community.

On an equivalent units of energy comparison, the above summary for fiscal year 2015 represents 1756 MMBtu of electrical consumption and 6781 MMBtu of fuel oil consumption for a total of 8537 MMBtu of energy consumption. The mechanical and electrical systems in the facility are complex with much of the equipment controlled by the Building Automation System. These systems may be overridden or may not incorporate seasonal building occupancy as efficiently possible.

The school is a prime candidate for existing building commissioning after several years of operations. The building should have control sequences including set back temperatures and schedules, as well as demand control ventilation. The existing building commissioning will take a deep look into the plans, original commissioning documents, and current operations to identify original operational parameters as well as changed to building since handover to owner. Further the school has now been fully operational since 2013 allowing the building owner and operator to have a more accurate concept of how the building is actually used, including hours of use and occupancy. This process will provide fine tuning of the building to current needs and incorporation of new energy saving control sequences.

The existing building commissioning process has the potential to provide significant reduction in energy consumption and bring the systems in compliance with the design intent. Beyond the intent, this also provides an opportunity to incorporate control sequences so the school can use the minimum amount of energy for maximum indoor comfort. Additional benefits include an updated manuals and operations documents, as well as additional training for school personnel in the operation of the control systems and efficient operation of the facility going forward.

The existing building commissioning process will also provide evaluation of potential ECMs and EEMs that could be undertaken as part of the process or through a separate capital improvement project effort. For example, this would evaluate the potential savings and return on investment of upgrading to LED technology as the cost of this technology continues to drop.

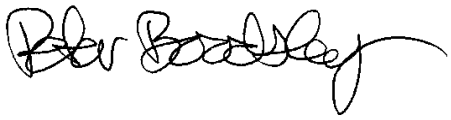
Summary

Based on the information presented above, the following steps are recommended:

- Conduct a formal Existing Building Commissioning process for the school facility. We would expect 10 to 20% energy savings from this process.

We trust this information is adequate for your needs at the present time. If you have any questions, feel free to contact me at your earliest convenience.

Sincerely,
NORTECH



Peter Beardsley, PE, CEA
Principal

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July 18, 2016

Alaska Energy Authority
813 West Northern Lights Boulevard
Anchorage, Alaska 99503

ATTN: Rebecca Garrett

RE: Level 1 Energy Assessment
Chefarnmute, Inc. Store, Chefornak, Alaska

Rebecca:

NORTECH has completed a Level 1 Energy Assessment for the Chefarnmunte, Inc. building (Store) in Chefornak, Alaska. The energy assessment was funded through the Remote Alaska Community Energy Efficiency (RACEE) Competition under contract to the Alaska Energy Authority. This letter report summarizes Level 1 findings and recommendations for energy efficiency projects at this facility.

Site and Building Information

The Store is an 8,000 square foot two-story, wood-framed building on pilings located in Chefornak, Alaska. The Store sells both dry and refrigerated/frozen goods. The first and second floors contain merchandise and are lit from 9am to 10pm daily. The attic is used for storage. The area beneath the building is used for additional storage contains five operable chest freezers. The facility consumes electricity for plug loads and lighting, and fuel oil for space heating and water heating.

Preliminary Energy Use Analysis

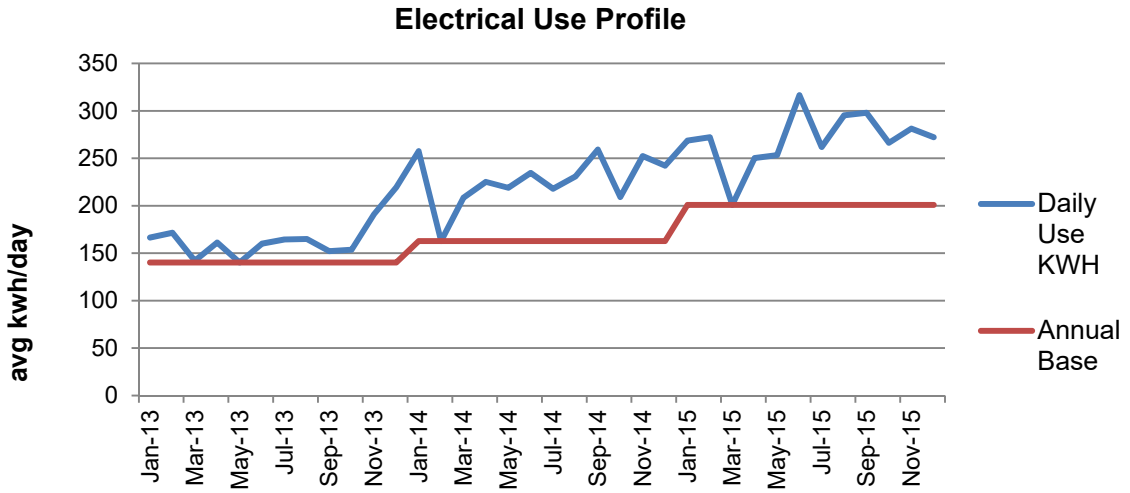
As the first step in an Energy Assessment ***NORTECH*** has completed a Preliminary Energy-Use Analysis (PEA) for the Store to analyze the available utility data for potential concerns and trends. Electronic copies of electrical utility bills for 36 consecutive months were provided for the Store. Heating oil records were not available.

The electric data was in a tabular format with total use and cost per month and did not include rate structures or detailed cost breakdown. The total 2015 Electricity use for the Store was 95,149 kWh at a total cost of $46,623. The electricity cost is $0.49/kWh. The Chefornak electric utility does not have a demand charge on commercial buildings.

The Store would normally be evaluated on total energy use using the Energy Use Index (EUI) and total cost using the Energy Cost Index (ECI). However, due to the lack of fuel data, only electrical consumption analysis has been performed and the EUI and ECI cannot be calculated or compared to similar buildings.

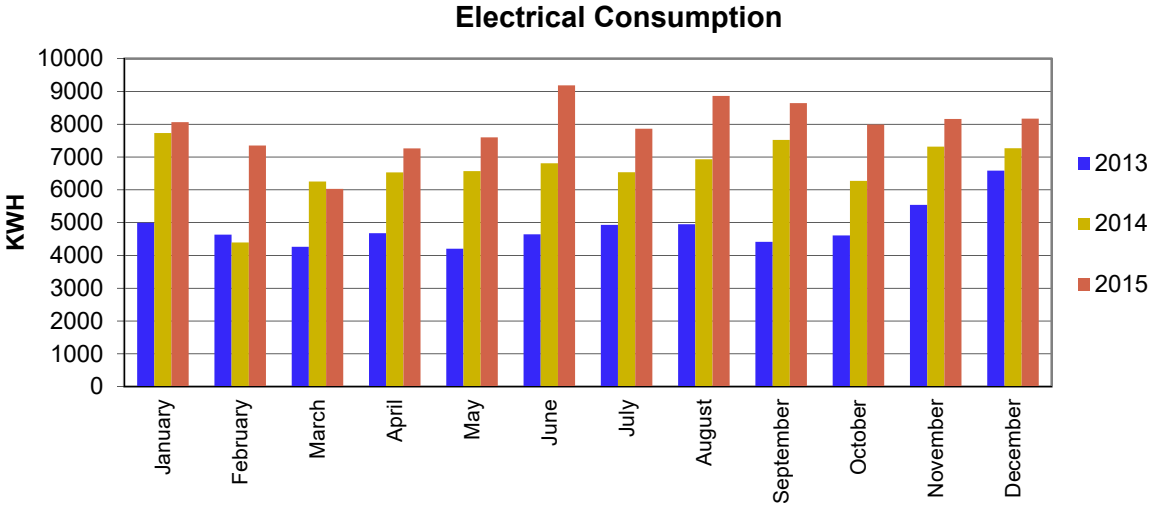
Seasonal Energy Use Patterns

The Electrical Use Profile (EUP) depicts the electrical consumption broken into base use and seasonally dependent consumption. The annual base is the lowest average kwh/day per year.



The EUP graph below shows that the electric base load in the building has increased from about 140 kWh/day in 2013 to about 200 kWh/day in 2015, which is an increase of about 40%. This increase may be attributable to either an increase in building utilization and number of refrigerators/freezers, or the decrease in performance of aging appliances. Identifying the reasons for this increase may also identify ECMs that could be undertaken to reduce the electrical use at the facility.

The Electrical Consumption graph below shows the facility's historical electricity use broken down by month.



The monthly electrical usage shows significant year over year increases for most months. Spikes in the summer of 2014 and 2015 suggest an increased refrigeration or cooling load may be present.

Observations from Walk-Through and Interview

A building walkthrough was conducted on May 24, 2016 to inspect the condition of the mechanical system, building envelope, and electrical systems. The building is in overall good condition.

Building Envelope
The Store is two-story, wood-framed construction with corrugated metal siding and piling foundation. The attic has a cold roof and is insulated from the building with 12" studs and fiberglass bat insulation. Under the building is a large crawlspace used for storage and containing five operating chest freezers.

Lighting
Primary lighting in the facility consists of 32W 4' T8 fluorescent lamps in 4 lamp fixtures. The lights are controlled with manual switches with the intent to remain on throughout the 9am to 10pm daily business hours.

Exterior lighting is High Pressure Sodium (HPS) lamps on photocell control.

Plug Loads
The predominant plug load appears to be freezers and refrigerators. The Store contains a variety of freezers and refrigerators for merchandise. Some chest freezers appear to not be defrosting properly. Vertical glass door freezers and refrigerators appear to well maintained and appear to be of make and model that were Energy Star compliant at time of manufacture.

Five older chest freezers are in operation under the building. Some appear to be mostly empty and have broken lids or hinges with leaking seals. These should be unplugged when not in use and replaced as soon as practical.

Mechanical Systems
Space heat is produced by two oil boilers, and distributed by overhead hydronic unit heaters. Space heat is thermostat controlled. Setback capability on the thermostats is not being utilized.

The building does not have a space cooling system, although the building electrical loads appear to produce significant heat. During the walkthrough in May 2015, doors were propped open and interior temperature was 78° F. The boiler is kept off during the summer to eliminate standby losses.

The source and distribution system for hot water was not observed during the site visit.

Recommended Energy Conservation Measures (ECMs)

Energy conservation measures are characterized as behavioral or operational changes that require little or no capital investment. The following low cost/no cost ECMs can typically be completed by facility operating personnel and cost less than $200 to implement. These ECMs should be implemented as soon as possible to maximize energy savings.

ECM1: Determine cause of increasing electrical load
Review appliance loads and other records from 2013 to identify potential in increased consumption to see if the increased load is fully necessary.

ECM-2: Consolidate freezers, turn off unused
Multiple freezers were observed to be in operation, but empty. Frozen and refrigerated merchandise should be consolidated into newest, most efficient appliances, and unused appliances should be unplugged and used only when necessary.

New appliances are generally up to 15% more efficient than appliances from 10 years ago, so consolidating into newer appliances will reduce energy use. Additionally, unplugging the older appliances when not necessary will eliminate that load for the period of time that it is unplugged. Although not quantifiable, this ECM might save up to 20% of the freezer electric load.

ECM-3: Defrost freezers regularly
Significant frost accumulation was observed in chest freezers beneath the building, indicating that door seals or defrost cycles were not operating properly. Units should be replaced and/or defrost cycle should be utilized.

Energy Efficiency Measures (EEMs)

This section describes energy efficiency measures that require capital investment for implementation. This section identifies the Rough Order of Magnitude (ROM) installation costs and potential energy savings.

EEM-1: Replace Interior T8 Lighting with LED tube
There are approximately 200 32W T8 lamps turned on for 14 hours per day. Replacing all T8 lamps with 18W LED replacements has potential to reduce annual electricity consumption from 32,000 kWh to 18,000 kWh, a 44% reduction.

ROM Cost:	$7,000
Estimated Life of Measure (yrs.)	17
Annual Energy Reduction (kWh)	14,000
Annual Energy Reduction (%)	44%
Reduction in Building Electrical Load (%)	15%

EEM-2: Replace Exterior High Pressure Sodium Lighting with LED Wall Packs
Exterior lighting is provided by high pressure sodium lamps with photocell control. Replacing two exterior lamps with LED wall packs will reduce annual electricity consumption from 1,800 kWh per year to 530 kWh, a 70% reduction.

ROM Cost:	$1,300
Estimated Life of Measure (yrs.);	17
Annual Energy Reduction (kWh)	1270
Annual Energy Reduction (%)	70%
Reduction in Building Electrical Load (%)	1.3%

EEM-3: Replace 5 damaged exterior chest freezers
Five chest freezers were observed in operation under the building. All were old units and displayed varying levels of damage, including broken lid hinges. Insulation and electrical performance degrade over time. A new Energy Star rated 21 cubic foot chest freezer must consume less than 840 kWh per year. Commercially available 21 cubic foot chest freezers now

operate on 356 kWh per year. The following analysis is based on assuming the under building freezers are operating at 80% of their original energy star efficiency. Replacing all five freezers would reduce the annual electrical load from 5250 kWh per year to 1750 kWh per year.

ROM Cost:	$7,000
Estimated Life of Measure (yrs.);	15
Annual Energy Reduction (kWh)	3,500
Annual Energy Reduction (%)	67%
Reduction in Building Electrical Load (%)	3.7%

EEM-4: Utilize set-back thermostats

The Department of Energy estimates that as much as 10% heating energy can be saved per hear by turning thermostats back 7°-10° F for 8 hours per day while building is unoccupied. While the heating load has only been estimated, this could be more than 500 gallons of heating oil per year.

ECM/EEM Summary

Priority List				
Energy Conservation Measures (ECMs)				
Name	**Improvement Description**			
ECM-1	Identify increased loads from 2015			
ECM-2	Consolidate freezers and unplug unused units			
ECM-3	Defrost freezers			
Energy Efficiency Measures (EEMs)				
Name	**Improvement Description**	**ROM Cost**	**Estimated Savings (kWh)**	**Estimated Savings (% Building Usage)**
EEM-1	Replace Interior T8 Lighting with LED tube	$7,000	14,000	15% Electric
EEM-2	Replace Exterior High Pressure Sodium Lighting with LED Wall Packs	$1,300	1,270	1.3% Electric
EEM-3	Replace 5 exterior freezers with new units	$7,000	3,500	3.7% Electric
Estimated Reduction in Building Electric Load			**22,000 kWh**	**20%**
EEM-4	Set back thermostats programmed to reduce temperatures during unoccupied hours			5 – 10% Heating Oil

Measures Not Recommended

This section describes energy efficiency measures that did not meet economic savings criteria, but do offer overall energy savings.

Category	Description	Discussion
Envelope – Exterior Doors	Insulated Metal Clad w/ thermal break	Replacing with more efficient doors is cost intensive and does not appear to be economical based on our past experience and the current condition of the doors.
Envelope – Insulation	R-35 Attic	The attic insulation is estimated at R-35. The building construction allows for the addition of several inches of blown in insulation in the attic spaces. An additional 10 inches of insulation would increase the attic to R-60.

We trust this information is adequate for your needs at the present time. If you have any questions, feel free to contact me at your earliest convenience.

Sincerely,
NORTECH

Peter's Signature

Peter Beardsley
Senior Civil Engineer

POTENTIAL FUNDING SOURCES FOR RACEE PROJECTS

These funding sources can be used for a wide variety of energy-related projects, including those identified in RACEE Strategic Energy Efficiency Plans. Eligibility criteria for both applicants and projects vary among the different sources, so it is important for communities to carefully check and make sure their project qualifies for a funding source before applying for it. Many public funding sources are subject to the availability of appropriations and are not necessarily funded every year, so communities should also check to make sure funding for the program is available before starting an application. AEA's Community Assistance program can help communities determine which funding sources are most appropriate for a given project. For more information on AEA's Community Assistance program, please contact:

Jed Drolet
Alaska Energy Authority
813 W. Northern Lights Blvd.
Anchorage, AK 99503
Tel: 907-771-3985
Fax: 907-771-3044
E-mail: jdrolet@aidea.org
http://www.akenergyauthority.org/Programs/CommunityAssistance

General-Purpose Funding Sources

AEA Programs

Power Project Fund

Type: Loan

Applicant eligibility: Local utilities, local governments, and independent power producers.

Project eligibility: Development or upgrade of electric power facilities, including conservation, bulk fuel storage and waste energy conservation.

For more information:

Cady Lister
Alaska Energy Authority
813 W. Northern Lights Blvd.
Anchorage, AK 99503
Tel: 907-771-3039
Fax: 907-771-3044
E-mail: clister@aidea.org
http://www.akenergyauthority.org/Programs/Loans

Other State of Alaska Programs

Sustainable Energy Transmission and Supply Program

Type: Loan

Applicant eligibility: Individual, municipal government, tribe, business, or other entity that is organized in any manner.

Project eligibility: Transmission, generation, conservation, storage, or distribution of heat or electricity; energy efficiency upgrades; and distribution and storage of natural gas and refined petroleum products.

For more information:

Nick Szymoniak
Alaska Industrial Development and Export Authority
813 W. Northern Lights Blvd.
Anchorage, AK 99503
Tel. (907) 771-3073
Fax (907) 771-3044
E-mail: nszymoniak@aidea.org

http://www.aidea.org/Programs/EnergyDevelopment.aspx

Alaska Municipal Bond Bank Authority (AMBBA)

Type: Loan

Applicant eligibility: Local government.

Project eligibility: Capital projects.

For more information:

Deven Mitchell, Executive Director
Alaska Municipal Bond Bank Authority
P.O. Box 110405
Juneau, AK 99801
Phone: (907) 465-2388
E-Mail: Deven.Mitchell@alaska.gov
http://treasury.dor.alaska.gov/ambba/

Community Development Block Grant (CDBG)

Type: Grant

Applicant eligibility: Local government (borough or incorporated city). At least 50% of the community must be low- or moderate-income.

Project eligibility: Community development, planning, and special economic development. Energy projects typically count as community development.

For more information:

Pauletta Bourne
Grants Administrator III
Division of Community & Regional Affairs
Department of Commerce, Community, and Economic Development
211 Cushman Street
Fairbanks, AK 99701-4639
Phone: (907) 451-2721
Fax: 451-2742
E-mail: Pauletta.Bourne@alaska.gov
https://www.commerce.alaska.gov/web/dcra/GrantsSection/CommunityDevelopmentBlockGrants.aspx

Designated Legislative Grant

Type: Grant

Applicant eligibility: Municipality or unincorporated community.

Project eligibility: Feasibility studies, construction projects, building improvements and upgrades, design and engineering, land acquisition, and equipment purchase, upgrades, or repairs.

For more information:

Jolene Julian
Division of Regional and Community Affairs
Department of Commerce, Community and Economic Development
211 Cushman Street
Fairbanks, AK 99701
Phone: (907) 465-4758
Fax: (907) 465-5867
E-Mail: jolene.julian@alaska.gov
https://www.commerce.alaska.gov/web/dcra/GrantsSection/DLGrants.aspx

Federal Programs

Electric Direct Loans

Type: Loan

Applicant eligibility: Electric utility

Project eligibility: Generation, transmission, distribution, efficiency, conservation, and renewable energy in rural areas.

For more information:

Rodney Peach, General Field Rep RUS AK, WA, MT, ID, CA
Phone: 509-309-6923
Rodney.Peach@wdc.usda.gov
http://www.rd.usda.gov/programs-services/electric-infrastructure-loan-loan-guarantee-program

High Energy Cost Grants

Type: Grant

Applicant eligibility: Electric utility serving community with home energy costs over 275% of national average

Project eligibility: Acquisition, construction, installation, repair, replacement, or improvement of energy generation, transmission, or distribution facilities in communities with extremely high energy costs.

For more information:

Rodney Peach, General Field Rep RUS AK, WA, MT, ID, CA
Phone: 509-309-6923

Rodney.Peach@wdc.usda.gov
http://www.rd.usda.gov/programs-services/electric-infrastructure-loan-loan-guarantee-program

Community Facilities Loans

Type: Loan

Applicant eligibility: Public bodies, community-based non-profit corporations, and federally recognized tribes

Project Eligibility: Funds can be used to purchase, construct, and / or improve essential community facilities, purchase equipment and pay related project expenses. An essential community facility is defined as a facility that provides an essential service to the local community for the orderly development of the community in a primarily rural area, and does not include private, commercial or business undertakings.

For more information:

Greg Stuckey
Director, Single Family Housing and Community Facilities Programs
USDA Rural Development
800 West Evergreen Avenue, Suite 201
Palmer, AK 99645-6539
Phone: (907) 761-7778
Fax: (907) 761-7783
greg.stuckey@ak.usda.gov

Community Facilities Grants

Type: Grant

Applicant eligibility: Public bodies, community-based non-profit corporations, and federally recognized tribes

Project Eligibility: Funds can be used to purchase, construct, and / or improve essential community facilities, purchase equipment and pay related project expenses. An essential community facility is defined as a facility that provides an essential service to the local community for the orderly development of the community in a primarily rural area, and does not include private, commercial or business undertakings.

For more information:

Greg Stuckey
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800 West Evergreen Avenue, Suite 201

Palmer, AK 99645-6539
Phone: (907) 761-7778
Fax: (907) 761-7783
greg.stuckey@ak.usda.gov

Social and Economic Development Strategies (SEDS) Program

Type: Grant

Applicant eligibility: Tribe.

Project eligibility: Projects that promote economic and social self-sufficiency for Native communities, including infrastructure projects.

For more information:

Three Star Enterprises, LLC
185 E. Nelson Ave.
Wasilla, AK 99654
Phone: (907) 376-3688
Toll Free: (800) 948-3158
Fax: (907) 376-3689
http://www.anaalaska.org/

Indian Community Development Block Grant (ICDBG)

Type: Grant

Applicant eligibility: Either tribe or Native corporation, but not both. At least 50% of the community must be low- or moderate income.

Project eligibility: Housing, community facilities, and economic development. Energy projects typically count as community facilities.

For more information:

HUD Alaska Office of Native American Programs
3000 C Street, Suite 401
Anchorage, AK 99503
Toll Free: (877) 302-9800 (Alaska Only)
Phone: (907) 677-9800
Fax: (907) 677-9807
E-mail: AK_Webmanager@hud.gov
http://portal.hud.gov/hudportal/HUD?src=/program_offices/public_indian_housing/ih/grants/icdbg

Tribal Energy Program

Type: Technical Assistance/Grant

Applicant eligibility: Federally-recognized Tribes, Tribal Energy Resource Development Organizations, or Tribal Consortia (two or more entities, at least one of which is an Indian Tribe).

Project eligibility: Renewable energy development and energy efficiency on tribal lands.

For more information:

Lizana Pierce, Project Manager
U.S. Department of Energy
Golden Field Office
1617 Cole Boulevard, MS 1501
Golden, CO 80401
Telephone: 720-356-1749
Fax: 720-356-1740
E-mail: lizana.pierce@go.doe.gov
http://energy.gov/indianenergy/funding

Strategic Technical Assistance Response Team (START)

Type: Technical Assistance/Grant

Applicant eligibility: Federally recognized tribes and village corporations.

Project eligibility: Community-based energy planning, energy awareness and training programs, and identification and implementation of renewable energy and energy efficiency opportunities.

For more information:

U.S. Department of Energy
Office of Indian Energy Policy and Programs
1000 Independence Ave. SW
Washington DC 20585
(202) 586-1272
E-mail: IndianEnergy@hq.doe.gov
http://energy.gov/indianenergy/resources/start-program/alaska-start

Private Sources

Rasmuson Foundation Grants

Type: Grant

Applicant eligibility: Nonprofit organizations based in Alaska.

Project eligibility: Capital projects and technology upgrades, typically at the individual building scale.

For more information:

Rasmuson Foundation
301 West Northern Lights Blvd.
Suite 400
Anchorage, AK 99503
(907) 297-2700
(877) 366-2700 (toll-free within Alaska)
(907) 297-2770 FAX
rasmusonfdn@rasmuson.org
http://www.rasmuson.org/

Special-Purpose Funding Sources

These funding sources are targeted at very specific types of projects. A community that is interested in pursuing one of these sources should check carefully to make sure its project qualifies for the requirements of the source. AEA's Community Assistance program can help communities evaluate their projects and determine if any of these sources would apply.

AEA Programs

Village Energy Efficiency Program

Type: Grant

Applicant eligibility: Municipalities, school districts, unincorporated villages, Native regional and village corporations, IRA councils, and traditional councils. Projects must take place in communities with fewer than 8,000 residents and applicants must commit to representing the interests of the entire community.

Project eligibility: Energy efficiency audits, energy efficiency improvements, and energy conservation measures. Limits apply to how much of a grant may be used for audits and conservation measures.

For more information:

Rebecca Garrett, Project Development Specialist
Alaska Energy Authority
813 W. Northern Lights Blvd.
Anchorage, AK 99503
Tel. (907) 771-3042
Fax (907) 771-3044
E-mail: rgarrett@aidea.org
http://www.akenergyauthority.org/Efficiency/VEEP

Renewable Energy Fund

Type: Grant

Applicant eligibility: Electric utility, independent power producer, local government, or governmental entity (includes tribes and housing authorities).

Project eligibility: Feasibility studies, reconnaissance studies, energy resource monitoring, design, and construction of renewable energy projects.

For more information:

Shawn Calfa, Grants Administrator
Alaska Energy Authority

813 W. Northern Lights Blvd.
Anchorage, AK 99503
Tel. 907.771.3031
Fax 907.771.3044
Email: scalfa@aidea.org
http://www.akenergyauthority.org/Programs/RenewableEnergyFund

Other State of Alaska Programs

Bulk Fuel Revolving Loan Program

Type: Loan

Applicant eligibility: A municipality or unincorporated village with a population under 2,000, or a private individual or company retailing fuel or electricity in such a community.

Project eligibility: Purchase of bulk fuel oil or gasoline including the shipping costs of the fuel to the community.

For more information:

Jane Sullivan
Division of Community and Regional Affairs
Department of Commerce, Community, and Economic Development
Bulk Fuel Revolving Loan Program
550 W. 7th Ave., Suite 1640
Anchorage, Alaska 99501
Telephone Number: (907) 269-4614 or 269-4564
Fax to: 907-269-4563
Email to: bulkfuel@alaska.gov
https://www.commerce.alaska.gov/web/dcra/BulkFuelLoanProgram.aspx

Supplemental Housing Development Grants

Type: Grant

Applicant eligibility: Regional housing authorities.

Project eligibility: Provision of infrastructure, including electrical distribution and energy-efficient design features, to housing projects approved under HUD Housing Development Programs.

For more information:

Esther Combs
Program Manager
Alaska Housing Finance Corporation
4300 Boniface Parkway

Anchorage, AK 99504
907-338-6100
E-mail: ecombs@ahfc.us
http://www.ahfc.us/pros/grants/development-grants/supplemental-housing-development-grant-program/

Energy Efficiency Revolving Loan Program

Type: Loan

Applicant eligibility: Regional education attendance areas; The University of Alaska; The State of Alaska; and Municipalities in the state.

Project eligibility: Permanent energy-efficient improvements to buildings owned by applicants.

For more information:

Eric A. Havelock
Multi-Family Underwriting Supervisor
Alaska Housing Finance Corporation
4300 Boniface Parkway
Anchorage, AK 99504
907-330-8245
800-478-2432
907-338-9716 (fax)
E-mail: ehaveloc@ahfc.us
http://www.ahfc.us/efficiency/energy-programs/energy-efficiency-revolving-loan-fund-aeerlp/

Federal Programs

Hazard Mitigation Grant Program

Type: Grant

Applicant eligibility: Local governments, tribes, and private non-profits that have recently suffered a Presidentially declared disaster.

Project eligibility: Projects that will reduce or eliminate losses from future disasters.

For more information:

Department of Military and Veterans Affairs
Division of Homeland Security and Emergency Management
PO Box 5750
JBER, AK 99505
(907)428-7000

(907)428-7009 Fax
mva.grants@alaska.gov
https://ready.alaska.gov/Grants/HMGP

Pre-Disaster Mitigation Grant Program

Type: Grant

Applicant eligibility: Tribes and local governments.

Project eligibility: Hazard mitigation planning and the implementation of mitigation measures prior to a disaster.

For more information:

Department of Military and Veterans Affairs
Division of Homeland Security and Emergency Management
PO Box 5750
JBER, AK 99505
(907)428-7000
(907)428-7009 Fax
mva.grants@alaska.gov
https://ready.alaska.gov/Grants/PDM

Diesel Emission Reduction Act Tribal Grants

Type: Grant

Applicant eligibility: U.S. tribal agencies or intertribal consortia with jurisdiction over transportation or air quality

Project eligibility: Projects that achieve significant reductions in diesel emissions in terms of tons of pollution produced by diesel engines and diesel emissions exposure, including engine upgrades.

For more information:

Lucita Valiere
EPA Region 10
Office of Air, Waste, and Toxics
1200 Sixth Avenue, Suite 900, AWT-107
Seattle, WA 98101-3140
https://www.epa.gov/cleandiesel/clean-diesel-tribal-grants

Region-Specific Funding Sources

These sources are limited to communities in a particular region, generally that served by the regional organization providing the funding. Those listed here have relatively formal application procedures, but other regional organizations such as regional ANCSA corporations and CDQs may also provide funding for community projects on a more informal basis. Communities may want to ask their regional organizations about this possibility, especially if they are not in the regions with formal programs on this list.

Community Development Quota (CDQ) Organizations

BBEDC Community Block Grant Program

Type: Grant

Applicant eligibility: City and tribal governments of communities served by BBEDC.

Project eligibility: Projects that promote sustainable community and regional economic development.

For more information:

Massa Pat, Alice Ruby or Bernina Venua
Bristol Bay Economic Development Corporation
P. O. Box 1464
Dillingham, Alaska 99576
Phone: (907) 842-4370
Fax: (907) 842-4336
http://www.bbedc.com/?page_id=206

BBEDC Infrastructure Grant Fund

Type: Grant

Applicant eligibility: City and tribal governments of communities served by BBEDC.

Project eligibility: Development of infrastructure that promotes and supports long-term economic growth and development of the regional economy.

For more information:

Alice Ruby
Bristol Bay Economic Development Corporation
P. O. Box 1464
Dillingham, Alaska 99576
Phone: (907) 842-4370
Fax: (907) 842-4336
http://www.bbedc.com/?page_id=338

CVRF Community Designated Fund

Type: Grant

Applicant eligibility: Local entities (city, tribe, and corporation) of communities served by CVRF.

Project eligibility: Community development projects that benefit all residents; there is also a special fund to purchase heating oil for low-income residents.

For more information:

Coastal Villages Region Fund
711 H Street, Suite 200
Anchorage, Alaska 99501
907.278.5151 | Fax: 278.5150
http://coastalvillages.org/

NSEDC Community Energy Fund

Type: Grant

Applicant eligibility: Local utility, municipal government, ANCSA Village Corporation or federally recognized tribal government located in one of NSEDC's member communities.

Project eligibility: Large-scale, "shovel-ready" projects that provide energy-related benefits for the entire community.

For more information:

Paul Ivanoff III, Community Benefits Director
Norton Sound Economic Development Corporation
P.O. Box 193
Unalakleet, AK 99684
Phone 1-907-624-3190
Fax 1-907-624-3183
pivanoff@nsedc.com
http://www.nsedc.com/programs/community-benefits/community-energy-fund/

YDFDA Village Community Development Assistance

Type: Grant

Applicant eligibility: Communities served by YDFDA.

Project eligibility: Community development projects.

For more information:

Yukon Delta Fisheries Development Association
1016 West Sixth Avenue, Suite 301
Anchorage, AK 99501
Phone 907-644-0326
Fax 907-644-0327
http://www.ydfda.org/

Other Private Sources

NANA Village Economic Development

Type: Grant

Applicant eligibility: NANA region villages

Project eligibility: Energy efficiency and economic development projects

For more information:

Dean Westlake, Director
Village Economic Development
NANA Regional Corporation
PO Box 636
Kotzebue, AK 99752
907-442-8115
E-mail: vedc@nana.com
http://nana.com/regional/shareholder-relations/shareholder-services/village-economic-development/

PROJECT FINANCING OPTIONS FOR RACEE COMMUNITIES

This list is not comprehensive but does include most well-known financing options available as of August 15, 2016.

Loans			Eligible applicants	Eligible projects	Interest rate (8.15.16)	Terms	Limits	Agency	Process	Website	Contact	Other notes
COMMERCIAL BUILDINGS & INFRASTRUCTURE	State of Alaska	**Alaska Energy Efficiency Revolving Loan Fund**	Regional education attendance areas, University of Alaska, State of Alaska and municipalities	Permanent efficiency improvements, identified by investment grade audit, to buildings owned by eligible applicants	Current rates between 1.5% and 4.5% depending on length of loan	As determined appropriate by AHFC, Varies by life of system	No cap on loan	AHFC	Submit loan application directly to AHFC	https://www.ahfc.us/efficiency/non-residential-buildings/energy-efficiency-revolving-loan-fund-aeerlp/	Eric Havelock, ehavelock@ahfc.us	All improvements must be complete within one year of loan closing
		Alternative Energy and Conservation Loan	Alaska residents	Building level alternative energy systems and energy efficiency improvements	Current rate 5%	Up to 20 years	Max loan $50,000	DED	Submit loan application directly to DED	https://www.commerce.alaska.gov/web/ded/FIN/LoanPrograms/AlternativeEnergyLoanProgram.aspx	1-800-478-LOAN, financing@alaska.gov	Must have a rejection letter from private lending institution for loans over $30,000
		Power Project Fund	Utility, regional electric authority, municipality, region and village corporations, village councils and IPPs	Small scale power production less than 10MW, bulk fuel storage, transmission and distribution, waste energy, energy conservation and efficiency of supply side system and alternative energy systems (can be over 10MW)	12 month average of municipal bond rate with ability to reduce to 0%	Varies by type of project and life of system, max 50 years	No loan cap, requires legislative approval over $5 million	AEA	Application directly to AEA	http://www.akenergyauthority.org/Programs/Loans	Cady Lister, clister@aidea.org	Requires legislative approval for over $5 million in state investment
		Sustainable Energy Transmission and Supply Development Fund	Individual, municipal government, tribe, business or other entity "that is organized in any manner"	Generation, transmission, distribution, storage and conservation associated with a qualified energy development, both heat and electric. Qualified energy development is a project that involves: transmission, generation, conservation, storage or distribution of heat or electricity or liquefaction, regas, distribution, storage or use of natural gas	Currently 4.31% variable and 5.06% fixed	Up to 30 years/life of project, up to 50 years for transmission and hydro	Max of $20 million and max of 1/3 of total project cost. Legislative approval for >$20M or >1/3 cost	AIDEA	Submit pre-application directly to AIDEA	http://www.aidea.org/Programs/EnergyDevelopment.aspx	Jeff San Juan, jsanjuan@aidea.org	Requires a first position security interest
		Alaska Municipal Bond Bank Authority	Local governments, joint action agencies, and regional health organizations	Capital projects	Varies by specific bond issue; recently has generally been between 2% and 4%	Varies	No cap on loan	AMBBA	Submit bond application to AMBBA	http://treasury.dor.alaska.gov/ambba/	Deven Mitchell, dor.trs.ambba@alaska.gov	
		Loan Participation Program	Borrowers who are approved through a qualified originator (approved private sector financial institution)	Developing, acquiring or enhancing Alaska business enterprises , loans for qualified energy development projects and energy efficiency. Project must be in Alaska	Currently 4.31% for variable and 5.06% fixed	Up to 5 year for variable rate, up to 25 years for fixed	Individual loan amounts up to $20 million	AIDEA	Apply to one of the eligible lenders (see link)	http://www.aidea.org/Programs/LoanParticipation.aspx	Individual private lenders (see link)	Requires max loan to value of 75%
	Federal	**Electric Direct Loans**	Electric utilities serving rural areas	Generation, transmission, distribution, efficiency, conservation, and renewable energy in rural areas.	Varies based on type of loan and terms; rates updated daily	Up to 35 years	No cap on loan	USDA	Apply to USDA	http://www.rd.usda.gov/programs-services/electric-infrastructure-loan-loan-guarantee-program	Rodney Peach, 509-309-6923, Rodney.Peach@wdc.usda.gov	
		Community Facilities Loans	Public bodies, community-based non-profit corporations, and federally recognized tribes	Funds can be used to purchase, construct, and / or improve essential community facilities, purchase equipment and pay related project expenses. An essential community facility is defined as a facility that provides an essential service to the local community for the orderly development of the community in a primarily rural area, and does not include private, commercial or business undertakings.	Currently 2.75%	Up to 40 years	No cap on loan	USDA	Apply to USDA	http://www.rd.usda.gov/programs-services/community-facilities-direct-loan-grant-program	Greg Stuckey, 761-7778, greg.stuckey@ak.usda.gov	Applicants must be unable to finance the project from their own resources and/or through commercial credit at reasonable rates and terms
		Rural Energy for America Program (REAP) Guaranteed Loan	Small businesses or agricultural producers outside the Municipality of Anchorage	1) Installation of renewable energy systems and 2) Energy efficiency improvements to buildings, equipment, and processes that reduce use of energy. The following purposes cannot exceed more than 5% of the loan amount: Working capital; Land acquisition; Routine lender fees; Energy Assessments, Energy Audits, technical reports, business plans, and Feasibility Studies	Lender customary interest rate, fixed or variable, negotiated by lender and business Lender customary fees, negotiated by lender and business. One-time guarantee fee equal to 1% of guaranteed amount. Annual renewal fee.	Up to 30 years	Maximum loan amounts are $25,000,000 for renewable energy projects and $10,000,000 for energy efficiency upgrades	USDA	Loan guarantees of 85% are made to traditional financial institutions and agency approved non-traditional lenders on loan amounts up to 75% of eligible project costs.	http://www.rd.usda.gov/programs-services/rural-energy-america-program-renewable-energy-systems-energy-efficiency	USDA is happy to provide your lender with a template to help them complete an application, they can contact the USDA Energy Specialist at (907) 761-7718 to request an application template or for technical assistance.	25% cash equity requirement
RESIDENTIAL BUILDINGS	State of Alaska	**2nd Mortgage for Energy Conservation**	Alaska homeowners who meet AHFC's loan requirements	Energy efficiency improvements identified on an Improvement Options Report from an energy rating. Examples are insulation, heating system, air sealing, doors and windows, ventilation, etc.	AHFC's Taxable Program interest rate (currently 3.000%) plus .375	15-year	Up to $30,000	AHFC	Submit loan application to AHFC's approved lender Alaska USA Federal Credit Union	http://www.ahfc.us/efficiency/energy-programs/second-mortgage-energy-conservation/	Alaska Housing Finance Corporation 1-800-478-AHFC	

Grants			Eligible applicants	Eligible activities	Grant size	Agency	Process	Website	Contact	Other notes
	State of Alaska	**Village Energy Efficiency Program**	Municipalities, school districts, unincorporated villages, Native regional and village corporations, 501c3 tribal consortiums, regional housing authorities, councils organized under 25 U.S.C. 476, and traditional councils on behalf of Alaska communities with populations up to 8,000	Energy audit, efficiency measures and conservation in public buildings and infrastructure	$100,000 to $400,000 depending on population	AEA	Grant application	http://www.akenergyauthority.org/Efficiency/VEEP	Rebecca Garrett, 907-771-3042, rgarrett@aidea.org	
		Community Development Block Grant (CDBG) Program	Local government (borough or incorporated city). At least 50% of the community must be low- or moderate-income.	Community development, planning, and special economic development. Energy projects typically count as community development.	Maximum of $850,000 per community	DCRA	Grant application	https://www.commerce.alaska.gov/web/dcra/GrantsSection/CommunityDevelopmentBlockGrants.aspx	Pauletta Bourne, 451-2721, pauletta.bourne@alaska.gov	
		Designated Legislative Grant	Municipality or unincorporated community	Feasibility studies, construction projects, building improvements and upgrades, design and engineering, land acquisition, and equipment purchase, upgrades, or repairs.	No limit	DCRA	Communities seek funding through their state legislators for identified capital projects.	https://www.commerce.alaska.gov/web/dcra/GrantsSection/DLGrants.aspx	Jolene Julian, 465-4758, jolene.julian@alaska.gov	Appropriations are included in the Capital Bill by the legislature at their discretion, with final approval by the governor. Under the governor's discretion, project funding may be reduced or vetoed entirely.
		Renewable Energy Fund	Electric utility, independent power producer, local government, or governmental entity (includes tribes and housing authorities).	Feasibility studies, reconnaissance studies, energy resource monitoring, design, and construction of renewable energy projects.	Maximum of $2,000,000 per project for low-energy-cost areas and $4,000,000 per project for high-energy-cost areas, with some other restrictions	AEA	Competitive grant application process.	http://www.akenergyauthority.org/Programs/RenewableEnergyFund	Shawn Calfa, 771-3031, scalfa@aidea.org	Subject to legislative appropriations. AEA conducts the review process and makes recommendations to the legislature.
		Commercial Building Energy Audit	Private commercial property owners	Commercial energy audit of privately owned (both for and non-profit) commercial buildings	$1,800 to $7,000 depending on building size and complexity	AEA	Grant application	http://www.akenergyauthority.org/Efficiency/CommercialAudit	Cady Lister, 771-3039, clister@aidea.org	

COMMERCIAL BUILDINGS & INFRASTRUCTURE	Federal	**Rural Energy for America Program (REAP) Grants**	REAP grants can be awarded to small businesses and agricultural producers outside the Municipality of Anchorage. Improvements must benefit a business and cannot accommodate residential aspects.	Energy efficiency upgrades to buildings or installation of a renewable energy system to supplement or replace traditional electric and heat cost	Grant application minimum requests are $1,500 ($6,000 total project cost) for energy efficiency projects and $2,500 ($10,000 total project cost) for renewable energy projects.These grants cannot pay for more than 25% of the overall eligible project cost and have award caps of $500,000 for renewable energy projects and $250,000 for energy efficiency upgrades.	USDA	Competitive grant application process.	http://www.rurdev.usda.gov/bcp_reap.html	USA is happy to provide you with a template to help you complete an application, please contact the USDA Energy Specialist at (907) 761-7718 to request an application template or for technical assistance.	Once a complete application has been submitted to and acknowledged by Rural Development, applicants can begin moving forward on their projects. If a project is selected for funding we can reimburse retroactively to the date upon which we received a complete application. • In most cases, grant awards are
		Community Facilities Grants	Public bodies, community-based non-profit corporations, and federally recognized tribes	Funds can be used to purchase, construct, and / or improve essential community facilities, purchase equipment and pay related project expenses. An essential community facility is defined as a facility that provides an essential service to the local community for the orderly development of the community in a primarily rural area, and does not include private, commercial or business undertakings.	Either 50 percent of the annual State allocation or $50,000, whichever is greater	USDA	Apply to USDA	http://www.rd.usda.gov/programs-services/community-facilities-direct-loan-grant-program	Greg Stuckey, 761-7778, greg.stuckey@ak.usda.gov	Percentage of project costs that can be covered by this grant varies based on community population and median household income.
		High Energy Cost Grants	Electric utility serving community with home energy costs over 275% of national average	Acquisition, construction, installation, repair, replacement, or improvement of energy generation, transmission, or distribution facilities in communities with extremely high energy costs.	Minimum $50,000 and maximum $3,000,000 in most recent solicitation	USDA	Competitive grant application process.	http://www.rd.usda.gov/programs-services/high-energy-cost-grants	Rodney Peach, 509-309-6923, Rodney.Peach@wdc.usda.gov	
		Diesel Emission Reduction Act (DERA) Tribal Grants	U.S. tribal agencies or intertribal consortia with jurisdiction over transportation or air quality	Projects that achieve significant reductions in diesel emissions in terms of tons of pollution produced by diesel engines and diesel emissions exposure, including engine upgrades.	$30,000 to $800,000 in latest solicitation	EPA	Competitive grant application process.	https://www.epa.gov/cleandiesel/clean-diesel-tribal-grants	Lucita Valiere, 206-553-1200, epa-seattle@epa.gov	Communities thinking of applying for this grant should contact AEA technical staff for assistance determining which engines comply with the requirements and would fit well with their systems.
		Social and Economic Development Strategies (SEDS) Program	Federally recognized tribes	Projects that promote economic and social self-sufficiency for Native communities, including infrastructure projects.	Minimum $50,000 and maximum $200,000 per budget period in most recent solicitation	HHS	Competitive grant application process.	http://anaalaska.org/	Three Star Enterprises, LLC, 376-3688	20% cost-share requirement
		Indian Community Development Block Grant (ICDBG) Program	Either tribe or Native corporation, but not both. At least 50% of the community must be low- or moderate income.	Housing, community facilities, and economic development. Energy projects typically count as community facilities.	Maximum of $600,000 per community	HUD	Competitive grant application process.	http://portal.hud.gov/hudportal/HUD?src=/program_offices/public_indian_housing/ih/grants/icdbg	HUD Alaska Office of Native American Programs, 677-9800, AK_Webmanager@hud.gov	
		Tribal Energy Program	Federally recognized tribes	Renewable energy development and energy efficiency on tribal lands. Solicitations generally target specific types of projects.	Variable	DOE	Competitive grant application process.	http://energy.gov/indianenergy/funding	Lizana Pierce, 720-356-1749, lizana.pierce@go.doe.gov	
		Strategic Technical Assistance Response Team (START) Program	Federally recognized tribes and tribal organizations	Technical assistance with community-based energy planning, energy awareness and training programs, and clean energy deployment and financing opportunities.	No monetary assistance, but valuable technical assistance that could potentially be used to develop a strategic plan for how to most efficiently capitalize on energy savings potential with other available financing tools	DOE	Competitive application process	http://energy.gov/indianenergy/resources/start-program	Givey Kochanowski, 907-271-1423, Givey.Kochanowski@hq.doe.gov	
RESIDENTIAL BUILDINGS		**Home Weatherization**	Alaska homeowners and renters who meet income guidelines are eligible for FREE weatherization services through their local provider	Energy Efficiency measures and health and safety measures	Free energy efficiency and health and safety measures are provided at no cost to participants	AHFC	Contact your local service provider	http://www.ahfc.us/efficiency/energy-programs/weatherization/	Alaska Housing Finance Corporation 1-800-478-AHFC	