Bristol Bay
Regional Energy Plan

Phase II - Stakeholder Engagement

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Prepared by

Southwest Alaska Municipal Conference
3300 Arctic Blvd., Ste. 203
Anchorage, Alaska 99503

Bristol Bay Native Association
P.O. Box 310
Dillingham, Alaska 99576

Information Insights
212 Front Street, Ste. 100

ALASKA ENERGY AUTHORITY

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Bristol Bay Native Association

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AUTHORS

Lawrence Sorensen, Tribal Energy Manager, Bristol Bay Native Association

Doug Griffin, Executive Director, Southwest Alaska Municipal Conference

Laura Vaught, Energy Coordinator, Southwest Alaska Municipal Conference

Jamie Hansen, Consultant, Information Insights

Jana Peirce, Senior Consultant, Information Insights

Richard Raines, Researcher, Information Insights

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Acronyms and Abbreviations

AC	Alternating Current
ACDC	Alaska Community Development Corporation
ACEA	Alaska Commercial Energy Audit (AEA)
ACEP	Alaska Center for Energy and Power (UAF)
ADOLWD	Alaska Department of Labor and Workforce Development
ADEC	Alaska Department of Environmental Conservation
AEDG	Alaska Energy Data Gateway (ISER)
AHFC	Alaska Housing Finance Corporation
AkAES	Alaska Affordable Energy Strategy (AEA)
ALARI	Alaska Local and Regional Information (ADOLWD)
ANCSA	Alaska Native Claims Settlement Act
ARIS	Alaska Retrofit Information System (AHFC)
AEA	Alaska Energy Authority
ANTHC	Alaska Native Tribal Health Consortium
AVEC	Alaska Village Electric Cooperative
AVTEC	Alaska Vocational Technology Center (ADOLWD)
AWEDTG	Alaska Wood Energy Development Task Group
BBAHC	Bristol Bay Area Health Corporation
BBB	Bristol Bay Borough
BBBSD	Bristol Bay Borough School District
BBEDC	Bristol Bay Economic Development Corporation
BBHA	Bristol Bay Housing Authority
BBHC	Bristol Bay Housing Corporation
BBNA	Bristol Bay Native Association
BBNC	Bristol Bay Native Corporation
B/C	Benefit-Cost Ratio
BEES	Building Energy Efficiency Standard
BTU	British Thermal Unit
CCHRC	Cold Climate Housing Research Center
CDR	Conceptual Design Report
DCCED	Alaska Department of Commerce, Community, and Economic Development
DCRA	Alaska DCCED Division of Community and Regional Affairs
DMVA	Alaska Department of Military and Veterans Affairs

DOE-IE	United States Department of Energy Office of Indian Energy
EE or EE&C	Energy Efficiency, or Energy Efficiency and Conservation
EECBG	Energy Efficiency and Conservation Block Grant Program
ESCO	Energy Savings Company
EUI	Energy Use Intensity
FAA	Federal Aviation Administration
GW	Gigawatt (1,000 megawatts)
HDD	Heating Degree Days
HER	Home Energy Rebate program (AHFC)
HUD	United States Department of Housing and Urban Development
INNEC	lliamna Newhalen Nondalton Electric Cooperative
ISER	Institute of Social and Economic Research (UAA)
kBTU	Thousand BTUs
kW	Kilowatt
kWh	Kilowatt hour
LED	Light-Emitting Diode
LMI	Low and Moderate Income (HUD)
LNG	Liquefied Natural Gas
LPB	Lake and Peninsula Borough
LPSD	Lake and Peninsula School District
Met Tower	Meteorological Tower (affixed with equipment to assess wind resource)
MMBTU	One million BTUs
MW	Megawatt
MWh	Megawatt hour
N/A	Not Applicable, or Not Available
NEA	Naknek Electric Association
NEC	Nushagak Electric Cooperative
NV	Native Village
NAHASDA	Native American Housing Assistance and Self Determination Act (HUD)
NPS	National Park Service
N/O	Not Operating
NREL	National Renewable Energy Laboratory
O&M	Operations and Maintenance
PCE	Power Cost Equalization
PV	Photovoltaic
PVWatts	PVWatts Calculator (NREL)

R&R	Renewal and Replacement (accounts)
REAP	Rural Energy for America (USDA)
REF	Renewable Energy Fund (AEA)
RPSU	Rural Power System Upgrade (AEA)
RUBA	Rural Utility Business Advisor Program (DCRA)
SCADA	Supervisory Control and Data Acquisition
SWAMC	Southwest Alaska Municipal Conference
START	Strategic Technical Assistance Response Team (DOE)
UAA	University of Alaska Anchorage
UAF	University of Alaska Fairbanks
USDA	United States Department of Agriculture
VEEP	Village Energy Efficiency Program (AEA)
WEAR	Waste Erosion Assessment and Review (ADEC)

EXECUTIVE SUMMARY

The Bristol Bay Regional Energy Plan is part of a statewide effort led by the Alaska Energy Authority to identify energy projects and priorities that will reduce the long-term cost of energy and dependence on fossil fuels in Alaska. The process is designed to look at the total mix of energy needs in rural Alaska, including electricity, heating and transportation, and consider all local and regional energy resources as well as energy efficiency and conservation.

This document summarizes public input received in Phase II. The goal of this phase has been to engage community and regional leaders, residents, utilities, industry representatives, and other key stakeholders in dialog about their priorities for addressing energy needs in the region and to develop a list of projects and priorities to be assessed for economic and technical feasibility in the final phase of the planning process, Phase III.

The Phase III report will identify broadly supported strategies and a list of fundable projects that can reduce energy costs in the Bristol Bay region while developing local and regional energy resources.

Phase I Resource Inventory

Phase I provided an inventory of energy-related issues and resources in the region. While this inventory necessarily represented a snapshot in time, it was designed as a tool to focus conversations during Phase II on the most technically feasible and economically realistic projects, given the region's mix of resources and the current state of technology.

The Phase I report identified key issues in the region:

- High and volatile fuel prices
- High construction and maintenance costs for renewable energy projects due to remote location and the distances between communities
- High cost of building roads and transmission lines has resulted in few interconnections and preponderance of "islanded systems." Combined with small populations, this makes it difficult to achieve economies of scale or to create a truly "regional" plan
- High space heating costs for homes, businesses, and public facilities due to a cold climate
- Heavy dependence on diesel fuel for electricity generation (96%). However, more renewable projects are under development or have recently come online
- Declining population trends in some areas makes it difficult to plan for future demand
- Uncertainty about potential new large industrial loads and "megaconceptual" projects
- Uncertainty about future availability of natural gas
- Patchwork of land ownership with federal, state, and tribal lands. Location of many renewable resources is on protected lands or too far from communities to develop economically

Phase II Stakeholder Engagement and Public Input

In Phase II the planning team spoke with regional stakeholders, village and community leaders, and residents about energy projects and priorities with the potential to advance the broad strategies outlined in Phase I. Outreach activities included utility and community phone

interviews, subregional meetings, an industry survey, and a regional energy summit in Dillingham on May 4, 2015. During these activities, common themes that unite the region were identified, as well as instances where energy needs or priorities differ. Based on this input, the planning team developed focus areas for projects and activities designed to meet regional energy goals.

This proposed roadmap represents a synthesis of community/utility interest and resource potential, meaning that it includes those items identified as local or regional priorities which offer a clear path to reduce the long-term cost of energy and dependence on fossil fuels in the region. This determination is based on currently available technology and community support demonstrated by leadership and/or funding support for active and proposed projects. As this report is a snapshot in time, this roadmap must be re-visited on a regular basis to ensure opportunities are not missed and effort not wasted.

Table 1: Proposed Regional Energy Roadmap

Resource	Next Steps	Actions
Planning and Collaboration		
Energy Planning	Establish Energy Committee	▪ Establish regional and/or subregional energy committees to continue the work of energy planning, support implementation of priorities, and share information on energy projects and needs ▪ Seek representation of all communities by soliciting resolutions from local governing bodies appointing a local energy champion to the committee ▪ Engage regional and subregional organizations and government entities to ensure a regionwide perspective in energy planning and integrate work on energy priorities into the mission and daily operations of governing bodies and service providers across the region ▪ Secure organizational support from regional entities for holding regular meetings or teleconferences and an annual face-to-face meeting
Bulk Fuel		▪ Move forward on a cooperative purchasing structure with interested communities to increase competition and reduce costs of bulk fuel ▪ Assess feasibility of a bulk fuel storage area at Williamsport
Workforce Development	Training	▪ Develop a subregional or regional partnership model to cross-train and share locally-based utility operator/mechanics capable of handling routine technical and some electronic issues in utility operations and maintenance ▪ Develop training resources at the regional and subregional level to incorporate site-specific experience
Energy Infrastructure		
Bulk Fuel	Upgrade & Repair	▪ Secure funds and technical assistance to re-site and repair bulk fuel storage tanks that are located on eroding land in Igiugig, Port Heiden, and Togiak
	Reconnaissance and Feasibility	▪ Assess options for alternative fuel delivery due to low river levels in Koliganek, New Stuyahok, and Twin Hills
Diesel Efficiency	Upgrade & Repair	▪ Implement training and equipment upgrades and develop maintenance plans to achieve increases in generator diesel efficiency with a concentrated focus on independent utilities
Heat Recovery	Upgrade & Repair	▪ Maintain installed heat recovery systems and expand where additional waste heat is available ▪ Assess feasibility of expansion to heat additional facilities in Igiugig, Levelock, Port Alsworth, and Dillingham

Resource	Next Steps	Actions
	Design & Construction	▪ Complete projects in New Stuyahok and Togiak
	Reconnaissance & Feasibility	▪ Develop new heat recovery projects in Manokotak and Twin Hills ▪ Investigate stack heat recovery in Naknek ▪ Assess opportunities for heat absorption technology for summer ice production and flash freezing in Naknek and Levelock. Consider potential pilot project for adapting technology for small-scale use.
Transmission & Distribution	Upgrade & Repair	▪ Replace transmission line from Newhalen to Nondalton with armored submarine cable ▪ Repair or replace deteriorating transmission lines in Chignik, Chignik Lagoon, and Chignik Lake ▪ Address high line loss (over 12%) in Igiugig, Koliganek, Levelock, Perryville, and Pilot Point. Assess economic options for reducing line loss in communities with moderate line loss (6-11%) ▪ Remedy issues in Manokotak generation & distribution system to prepare for integration of renewable power if suitable wind site is located
	Training	▪ Develop a partnership model to cross-train and share locally-based lineman capable of addressing short & medium term issues across a subregion or the entire Bristol Bay region
	Reconnaissance & Feasibility	▪ Continue to monitor and assess the feasibility of subregional interties to increase economies of scale and reduce costs of small-scale, independent generation where feasible.
Energy Efficiency		
Energy Efficiency	Residential	▪ Conduct outreach and education through energy fairs, school programs or other means to promote awareness of EE&C savings opportunities, including grants and loans ▪ Assist homeowners with signing up for programs, and provide information on do-it-yourself resources ▪ Leverage federal funds from USDA and other sources to expand BBHA weatherization services to more homes and communities ▪ Oversight of weatherization contractors to ensure high quality of work and professionalism
	Non-residential	▪ Complete inventory and benchmarking of non-residential buildings in every community in order to establish baseline data and identify projects with the greatest savings potential ▪ Encourage use of loans to complete commercial and public facility retrofits with short to medium payback periods ▪ Investigate public ESCO model to fund retrofits in large high-energy use buildings or across multiple buildings ▪ Develop or adopt building codes or standards to ensure new state- and federally funded facilities built in the region meet a high standard of energy efficiency. Consider changes to local building codes ▪ Leverage federal funds from USDA and other sources to expand the number of non-residential audits and retrofits ▪ Undertake regional or subregional projects to replace remaining high energy-use streetlights with LEDs ▪ Secure funds and technical assistance to train staff and repair or replace ageing and inefficient water and sewer systems in Aleknagik, Chignik, Chignik Lake, Koliganek, Manokotak, New Stuyahok, Nondalton, and Togiak

Resource	Next Steps	Actions
Local Energy Generation		
Biomass	Upgrade & Repair	▪ Look at feasibility of expanding Kokhanok's biomass system to additional community buildings
	Design & Construction	▪ Install biomass heat loop in Clark's Point to connect Community Center, CPVC office and City Office ▪ Install high efficiency wood stoves in 3 community buildings in Nondalton ▪ Install Tarm wood boiler(s) and/or high efficiency wood stove at the Booster Club in New Stuyahok
	Reconnaissance & Feasibility	▪ Update 2012 pre-feasibility study in Aleknagik ▪ Conduct feasibility study for wood boilers at BBNA Main office and Family Resource Center building in Dillingham ▪ Assess community interest for continuing investigation of viable biomass options in Iliamna
Geothermal	Reconnaissance & Feasibility	▪ Assess interest and risk tolerance for additional reconnaissance and feasibility work for geothermal in Chignik Lagoon, Chignik Lake, Perryville, Port Heiden, and Naknek ▪ Assess economics of using air, ground, or seawater heat pumps to reduce space heating costs in interested communities (Chignik Lagoon, Chignik Lake, Perryville, Port Heiden, and Naknek) at current electrical rates
	Monitor Developments	▪ Continue to assess feasibility of heat pumps in reducing heating costs in the region as electric rates change and technology develops ▪ Monitor developments in low temperature geothermal technology
Hydro	Upgrade & Repair	▪ Install electric boilers for space heating at Chignik Lagoon and address erosion issues on hydro access road ▪ Increase river intake at INNEC plant and hook up additional electric boilers
	Design & Construction	▪ Address outstanding issues in Chignik Bay (Indian Creek Hydro) to proceed with design and permitting, including upgrade of existing powerhouse ▪ Complete design and permitting of Knutson Creek Hydro in Pedro Bay (expected 2016). Identify funds for construction
	Reconnaissance & Feasibility	▪ Conduct feasibility studies in Chignik Lake, Port Heiden, and Togiak to assess opportunities for small-scale hydro, including sites identified in 1980s screening studies
Hydrokinetic	Feasibility & Licensing	▪ Pursue licensing of Igiugig in-river hydrokinetic pilot project based on economic and technological viability and community interest
	Monitor Developments	▪ Monitor technological advances in hydrokinetic energy, including tidal and wave power. Pursue screening studies and site-specific feasibility if and when technology matures
Natural Gas	Reconnaissance & Feasibility	▪ Assess local and regional interest and risk tolerance for exploratory drilling in the North Aleutian sedimentary basin
	Monitor Developments	▪ Continue to monitor opportunities to import LNG. Assess detailed economic feasibility of regasification and conversion if opportunities emerge
Solar	Feasibility, Design & Construction	▪ Develop solar PV and solar thermal projects where economically feasible, especially in off-grid areas and in facilities with high summer energy use ▪ Expand use of solar PV and solar thermal to additional buildings in Igiugig, Perryville, and Dillingham depending on owner-interest and economics ▪ Provide information and resources to other communities interested in developing solar projects: Aleknagik, Chignik Lake, Kokhanok, Pedro Bay, Port Alsworth, and Twin Hills

Resource	Next Steps	Actions
Wind	Upgrade & Repair	▪ Complete redesign of Kokhanok wind system
	Design & Construction	▪ Work with AEA to integrate Clark's Point residential turbines with grid ▪ Based on review of submitted CDR in Pilot Point for a 100 kW wind farm with dispatchable electric boiler, proceed to final design and construction, including powerhouse controls ▪ Complete powerhouse upgrade and finalize CDR in Koliganek. Identify suitable site for turbine and assess funding options for construction ▪ Upgrade powerhouse and distribution system in Port Heiden to support a utility-scale wind system. Work with AEA wind managers to finalize a fundable conceptual design
	Reconnaissance & Feasibility	▪ Expand Igiugig vertical axis turbines if technology proves viable ▪ Complete met tower studies in Egegik, Levelock, and New Stuyahok ▪ Investigate alternative sites in Chignik Lake, Chignik Lagoon, and Manokotak after discussions with AEA on small load concerns ▪ Continue wind feasibility investigation in South Naknek depending on community and utility interest
	Planning	▪ Collect high-quality electrical load data in order to understand power/energy uses and better model wind turbine options in the future.
Transportation		
Transportation	Design & Construction	▪ Complete construction of access roads to Wood River Bridge (Aleknagik) ▪ Secure construction funds for road between Clark's Point and Ekuk ▪ Complete new dock in Iliamna and Levelock ▪ Extend airport landing strips in Pedro Bay, Port Alsworth (also build public landing strip), and Chignik Lagoon
	Reconnaissance and Feasibility	▪ Continue to monitor or assess feasibility of new roads and bridges to meet transportation needs between Iliamna and Nondalton, Ekwok and New Stuyahok, and Manokotak and Dillingham

Next Steps

In Phase III, estimates of project costs and benefits will be developed for projects for which sufficient data exist. The Phase III report will also provide an implementation plan with steps local communities, utility owners, and regional stakeholders can take to implement their priorities. It will be up to those in the region to decide which actions they would like to pursue based on community/utility interest and available funding or financing options. The cost-benefit information along with detail on available financing options provided in Phase III will help with these decisions.

State support for implementing priorities will continue through AEA's Community Assistance program, which provides hands-on assistance in developing energy projects and addressing local issues, and through the Alaska Affordable Energy Strategy (AkAES), which could provide a future funding mechanism for energy infrastructure in areas of the state that do not have direct access to a North Slope natural gas pipeline.

The Bristol Bay region is unique in that it has multiple subregional governing bodies and well-established regional groups, including the Bristol Bay Partnership. Drawing on suggestions provided in energy planning outreach efforts, the next step for BBNA, SWAMC, and AEA in fostering the creation of regional and/or subregional energy committees will involve consultation

with all interested regional and subregional organizations. AEA is recommending the creation of energy committees to assist with implementation and continue the work of energy planning into the future. The agency has committed to helping support the creation of these groups as part of the final phase of the regional planning process.

1 | Regional Energy Planning

The Bristol Bay Regional Energy Plan is part of a statewide effort led by the Alaska Energy Authority to identify energy projects that will reduce the long-term cost of energy and dependence on fossil fuels in Alaska. The process is designed to look at the total mix of energy needs in rural Alaska, including electricity, heating and transportation, and consider all local and regional energy resources as well as efficiency and conservation.

This document summarizes public input received in Phase II. The goal of this phase has been to engage community, subregional, and regional leaders; residents; utilities; boroughs; school districts; industry representatives, and other key stakeholders in dialog about their priorities for addressing energy needs in the region, and to develop a list of projects to be assessed for economic and technical feasibility in the final phase of the planning process.

The Phase III report will identify a list of fundable projects based on State criteria and broadly supported strategies with the potential to reduce energy costs in the Bristol Bay region while developing local and regional energy resources. This phase will include technical and economic analysis of priority projects using standard statewide methodology and development of a regional implementation plan.

In the Bristol Bay region, implementation will likely involve regional and/or subregional committees addressing multiple energy issues with the support and guidance of regional groups, including Bristol Bay Native Association, SWAMC, Bristol Bay Borough, Bristol Bay Economic Development Corporation, Bristol Bay Partnership, Lake and Peninsula Borough, and others.

Once complete, the plan is intended to serve as both a guiding document for communities and stakeholders and as a practical tool with information on the steps needed to move energy projects forward. Completed plans will also be used as an input to AEA's own statewide energy planning efforts, such as the Alaska Affordable Energy Strategy (AkAES) established by the Alaska Legislature in 2014 (Senate Bill 138).

Beyond the Current Planning Process

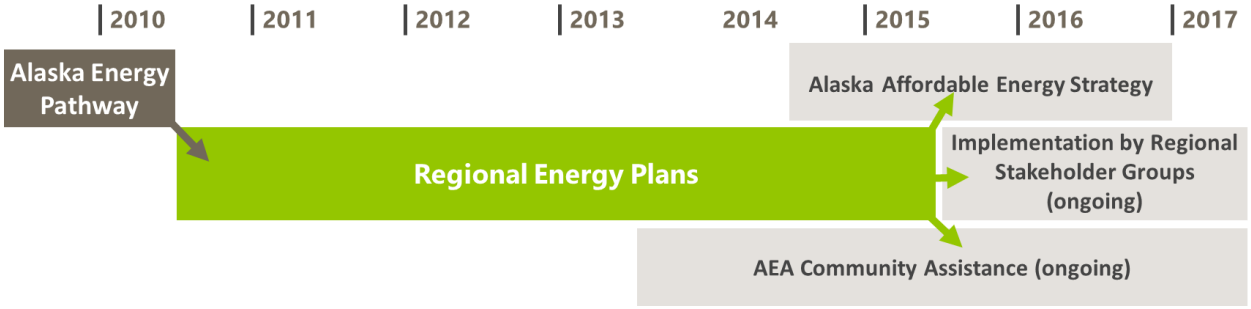
Although the state's Regional Energy Planning project will close in 2015, each regional plan is intended to continue as a living document and be updated as projects are implemented and circumstances change. To this end, a goal of the statewide project has been to develop regional capacity to continue the planning process. In the Bristol Bay region, where there are multiple government structures, regional organizations may be capable of bringing together subregions to ensure consistency and coordination and will be approached to serve as critical partners in this process.

State support for implementing priorities identified through Regional Energy Planning will continue through AEA's Community Assistance program, which provides hands-on assistance to communities in developing projects and addressing issues, and the Alaska Affordable Energy Strategy (AkAES), which could provide a future funding mechanism for energy infrastructure needed to deliver affordable energy to areas of the state that will not have direct access to a North Slope natural gas pipeline (Figure 1).

The AkAES is a long-term, state-directed effort to help provide affordable energy to all areas of the state if a natural gas pipeline is built from Alaska's North Slope using revenues from a 20 percent set-aside of pipeline revenue.

In 2017, AEA will make recommendations to the Legislature on infrastructure needed to deliver affordable energy to areas in the state that will not have direct access to a natural gas pipeline. To assist in the identification of infrastructure projects, AEA plans to draw on the data collected and publicly vetted through the Regional Energy Planning process.

Figure 1: Regional Energy Planning timeline



PLANNING AREA

The planning area for this project includes the communities within AEA's Bristol Bay energy planning region. This area largely overlaps with the Bristol Bay Native Corporation (BBNC) boundaries established under the Alaska Native Claims Settlement Act (ANCSA) (Figure 2). All communities within the BBNC boundaries as well as Port Alsworth are included in the energy region.

Six communities in the region are largely seasonal villages or have year-round populations under 25. They are Ekuk, Ivanof Bay, Kanatak, Pope-Vannoy Landing, Portage Creek, and Ugashik. None have local electric utilities. While these communities have not been actively included in Phase II, they appear in the Phase I resource inventory when a known renewable energy resource exists or when they have notable residential or community-scale energy projects.

Figure 2: Bristol Bay regional energy planning area

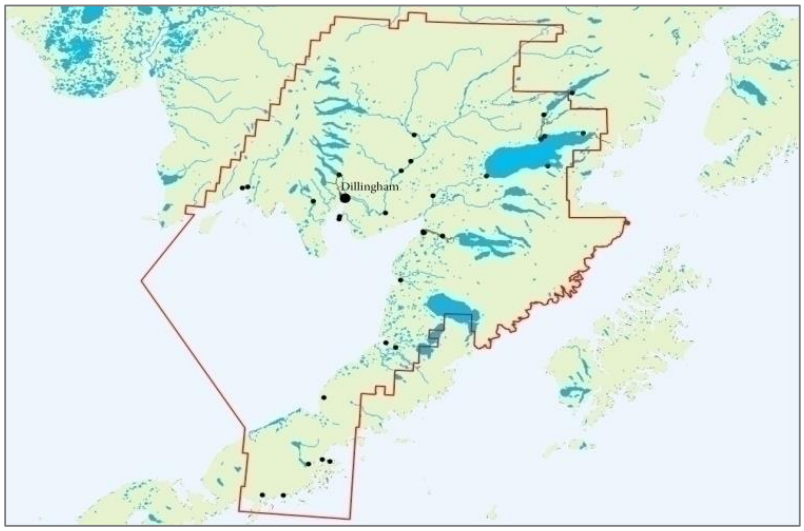


Table 2: Bristol Bay region boundaries

ANCSA Region*	Tribal Health Corporation*	Borough and Census Areas	School Districts	Western Alaska CDQ Program	Legislative Districts
For Profit: **Bristol Bay Native Corporation** Nonprofit: **Bristol Bay Native Association** **Bristol Bay Housing Authority** *Excluding Port Alsworth	**Bristol Bay Area Health Corporation**	**Bristol Bay Borough**	**Bristol Bay Borough School District**	**Bristol Bay Economic Development Corporation** (17 communities)	Senate District **S** House District **37**
		Lake & Peninsula Borough	**Lake & Peninsula School District**		
		Dillingham Census Area	**Dillingham City School District**		
			Southwest Region School District		

Subregions

The six subregions used throughout this plan are the ones used by the Bristol Bay Native Association (BBNA). The communities included in each subregion are shown in

Table 3.

Table 3: Bristol Bay subregional groupings

Bristol Bay Subregions		
Nushagak Bay Subregion Aleknagik Clark's Point Dillingham	**Nushagak River Subregion** Ekwok Koliganek New Stuyahok	**Togiak Bay Subregion** Manokotak Togiak Twin Hills
Lakes Subregion Igiugig Iliamna Kokhanok Levelock Newhalen Nondalton Pedro Bay Port Alsworth	**Peninsula Subregion** Chignik Bay Chignik Lagoon Chignik Lake Perryville	**Kvichak Bay Subregion** Egegik Pilot Point Port Heiden King Salmon Naknek South Naknek

OTHER PLANNING EFFORTS IN THE BRISTOL BAY REGION

The Alaska Energy Authority's regional energy planning process is not the only energy planning effort in the Bristol Bay region. As with many other regions in the state, there are other community, regional, and federal initiatives that deal specifically with energy or touch on similar issues. Though outside the scope of the AEA regional energy plan, efforts have been made and will continue to be made to coordinate and include findings of other planning processes in the regional energy planning effort. A brief sketch of these efforts is below.

The DOE Office of Indian Energy and the Office of Energy Efficiency and Renewable Energy provide federally recognized Alaska Native villages or regional and village corporations with technical assistance designed to advance renewable energy and energy efficiency projects. This has been accomplished through two programs open to tribal groups:

- **Alaska START Program**. Starting in 2011, the competitive Alaska START Program has provided intensive community planning efforts focused on verifying economic and technical viability of projects' power and revenue generation; developing a communication and outreach strategy to communicate the costs and benefits of a project to the broader Tribe and other community stakeholders; establishing terms and strategies for negotiating land-lease, energy off-take, and/or power purchase agreements; selecting project ownership options, partnership arrangements, and financing structures; developing requests for proposals with appropriate technical guidelines and selection criteria; and developing operations and maintenance or measurement and verification plans.

Table 4: Bristol Bay Communities in U.S. DOE START Program

Community	Subregion	Date
Native Village of Kokhanok	Lakes	2015

Data source: (1)

- **U.S. DOE Technical Assistance.** Similar to the START program, DOE provides on-demand technical assistance limited to 40 hours per community request on priority areas such as strategic energy planning, grantee support, transmission/interconnection, project development, finance, and lease agreements. Applicants are eligible to submit multiple requests per year.

Bristol Bay Partnership (BBAHC, BBEDC, BBHC, BBNA, BBNC) commissioned two energy plan documents in 2008: Bristol Bay Energy Policy and Energy Crisis Recovery Plan: Phase One and Implementation Strategies for the Bristol Bay Energy Policy and Energy Crisis Recovery Plan: Phase Two. The reports, prepared by Nils Anderson, Jr. and Greta Gotoof Co-Man Services, provide short, medium, and long-term strategies for all Bristol Bay communities to attain affordable, reliable, safe and long term energy options. BBNA released an update, Bristol Bay Energy Policy & Implementation Strategies – Status Report Update, in 2014.

The Lake & Peninsula Borough completed a regional energy plan in 2008 to evaluate energy opportunities in the region focusing on electric generation, space heating, and transportation. A screening study was conducted to identify projects with the highest potential for reducing energy costs.

Community plans for several communities in the region have been developed independently or with assistance from BBNA. Many of these plans include elements of energy planning and inventories of energy infrastructure.

STRATEGIES FOR NEAR AND MID-TERM PROJECTS

Look at Many Small Solutions rather than Focus on One Big Project

AEA designed the Regional Energy Planning process to facilitate bottom-up, short- to medium-term energy planning driven by the needs and priorities of communities and regions. That means an emphasis on community-focused planning and solutions that can be implemented at the local level and sustained over the long term. Large, capital-intensive projects take years in planning and development and may leave small communities with infrastructure that is expensive to maintain and requires outside expertise to operate.

Like other forms of community planning, the goal of energy planning should be to create sustainable, thriving communities. Rather than focus on one big energy project (or while waiting for it to pass through bureaucratic and funding hurdles), communities and regional stakeholders should consider the universe of smaller projects that can be completed more quickly and cheaply, but which cumulatively can have a big impact.

Focus on Energy Efficiency in the Short Term

Given the current Alaska state budget crisis and the relatively low price of oil, there are strong reasons to focus on energy efficiency opportunities in the near term:

- The outlook for new State investment in major infrastructure projects is poor, but the State is still funding popular programs to help pay for energy efficiency audits and upgrades.
- Even without state funding, many EE&C projects often pay for themselves within a few months or years. In the long-run, it costs more to wait to do efficiency upgrades than doing them now, even if a loan is needed to cover up-front costs.
- A good time to invest in energy efficiency is when oil prices are down. By using some of the money not being spent on fuel (due to lower prices) on energy efficiency measures, the pain of high energy costs will be less when oil prices do go back up.

Take Advantage of Federal Programs, especially for Tribally Affiliated Groups

The Department of Energy has recently increased its staffing and outreach in Alaska through the Office of Indian Energy (DOE-IE). This is a good time to take advantage of federal energy programs, especially for any entity with an Alaska Native affiliation (including federally recognized tribes, ANCSA regional and village corporations, and Native nonprofits and energy resource development organizations). Utilities may be able to partner with tribally affiliated entities to leverage these federal funds. To date, one community in the region has participated in the DOE-IE START program.

USDA Rural Development provides a source of federal funding open to all rural communities regardless of Native affiliation. Rural Energy for America (REAP) and Rural Utilities Service (RUS) are two USDA programs that can be used by Alaska utilities and small businesses to fund clean energy and energy infrastructure projects.

Create Energy Committees to Advance Shared Goals

While there is not a unified regional governing body in Bristol Bay, there are many unifying ideas and structures in place. The creation of regional or subregional energy committees is one way to advance shared energy goals in areas where there are similar resources and significant potential for savings.

As part of the planning process, AEA has committed to help support the creation of energy committees in the region. At the end of the project, committees will need to be self-sustaining or find support from regional partners or entities. Broad goals and objectives for committees include:

- Bring energy champions together from across the region.
- Track progress on accomplishment of plan goals, objectives, and activities.
- Identify similar local priorities and opportunities to create economies of scale.
- Share local knowledge and capacity to create the structure and relationships needed to carry ideas forward.
- Seek broad sustainable engagement that includes youth.
- Keep a clear focus on regional energy goals and priorities.
- Look for ways stakeholders can support the long-term sustainability of energy committees and regional energy planning.
- Periodically assess need to revise plan goals and objectives in light of new information.

Pay Attention to Factors for Success

Energy planning and project development are slow and iterative processes. A spirit of optimism is useful for keeping everyone focused on the goal, but it should not prevent clear-eyed vetting of proposed projects in which risks are analyzed as well as benefits. The following lessons learned about developing successful energy projects came from regional energy planners and project developers at the 2013 Alaska Rural Energy Conference (Table 5).

Table 5: Factors for successful energy projects

TO BE SUCCESSFUL…

Energy projects must be	Energy projects must have	Energy planners must have
▪ Economically viable ▪ Technologically feasible ▪ Supported by the local community, resource owners, utility operators, and state and local governing entities	▪ A local champion ▪ Long-term, reliable and sustainable fuel sources	▪ Hope and optimism ▪ Many conversations with stakeholders

2 | Energy Supply and Demand

Alaska's Regional Energy Planning process is intended to look at the total mix of energy needs in rural Alaska for electricity, heating and transportation and to consider all local and regional energy resources including efficiency and conservation. However, data issues prevent a consistent level of detail and analysis.

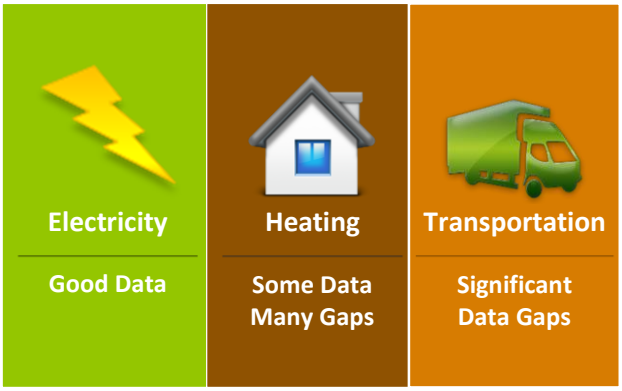


Figure 3: Data availability by energy sector

Good data is available on supply and demand for electrical power from the Power Cost Equalization (PCE) program, the Regulatory Commission of Alaska (RCA), and from utilities themselves.

Space heating costs account for over 80 percent of home energy budgets in Alaska and around 55 percent of the energy costs in public and commercial buildings. Good data on heating fuel use, including heating efficiency and types of fuels used for heating, is increasingly available from the Alaska Housing Finance Corporation through the Alaska Retrofit Information System (ARIS). Data is better for residential buildings.

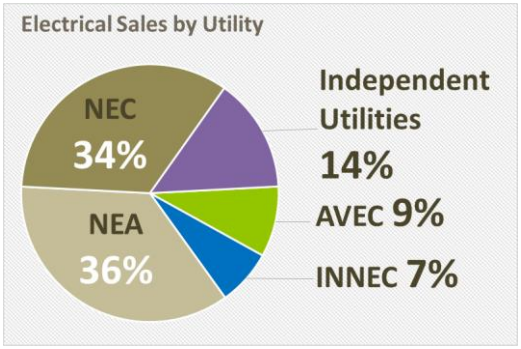
While we know that transportation costs directly affect total energy and food costs, especially in rural areas, there is little data routinely or consistently collected on transportation costs and fuel consumption. Wholesale fuel cost and sales data is largely the proprietary data of fuel vendors.

Electric Power Producers

Alaska Village Electric Cooperative

Alaska Village Electric Cooperative (AVEC) is a nonprofit, member-owned cooperative supplying electricity for 56 communities in Alaska. AVEC serves three Bristol Bay communities: Ekwok, New Stuyahok, and Togiak. AVEC manages and operates a small powerhouse in each community. At present, all electricity is generated from diesel generators. In 2014, AVEC sold 4,746 MWh of electricity, 9 percent of total regional sales.

Figure 4: Electrical Sales by Utility



Data source: (2)

Iliamna-Newhalen-Nondalton Electric Cooperative

Iliamna-Newhalen-Nondalton Electric Cooperative, Inc. (INNEC) is a member-owned, non-profit rural electric cooperative supplying electricity to three communities: Iliamna, Newhalen, and Nondalton. Since 1983 INNEC has produced electricity using diesel generators in Newhalen. With the completion of the Tazimina Hydroelectric Facility in 1998 a significant amount of electricity has been generated from hydroelectric, moving from less than 50 percent in 1998 to over 99 percent in 2013. In 2014, INNEC sold 3,755 MWh of electricity in the region, about 7 percent of total regional sales.

Naknek Electric Association

Naknek Electric Association (NEA) serves three communities: King Salmon, Naknek, and South Naknek. NEA generates electricity using diesel generators. In 2014, NEA sold 19,119 MWh of electricity in the region, about 36 percent of total regional sales.

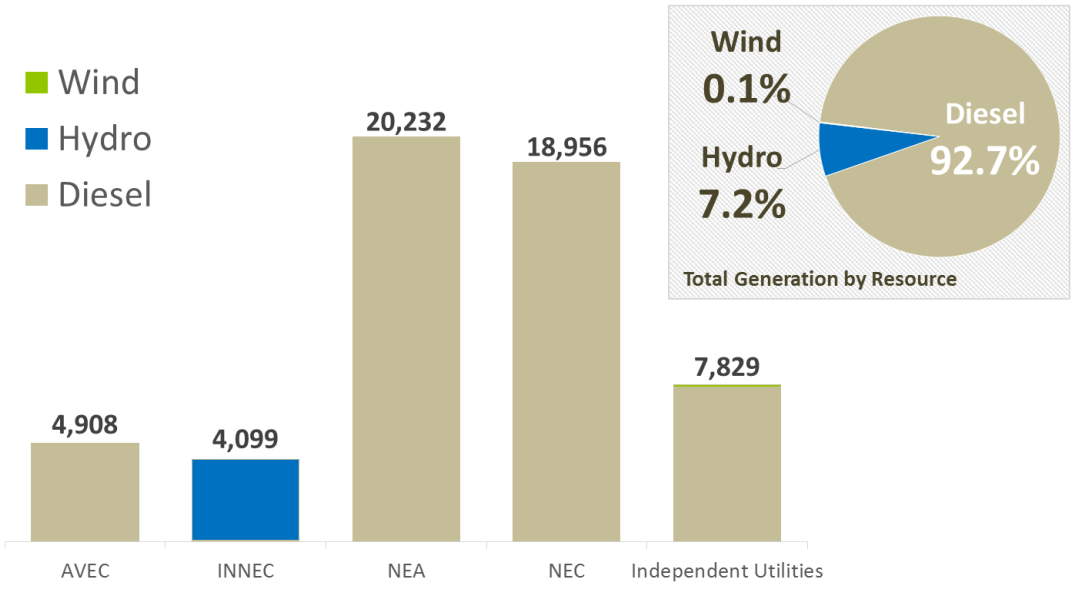
Nushagak Electric Cooperative

Nushagak Electric & Telephone Cooperative (NEC), Inc. is a member owned and operated cooperative that provides electric, telephone, cable TV, and internet services. Two communities, Dillingham and Aleknagik, are connected via intertie and are supplied with electricity from diesel generators in Dillingham. In 2014, NEC sold 18,183 MWh of electricity in the region, about 34 percent of total regional sales.

Independent Utility Generation

Sixteen Bristol Bay communities included in this report have independent utilities. Though covering the majority of communities in the region, independent utilities are in the region's smallest communities. In 2014, independent utilities sold 7,647 MWh of electricity in the region, about 14 percent of total regional sales.

Figure 5: Regional electric generation by utility and resource, 2014 (MWh)

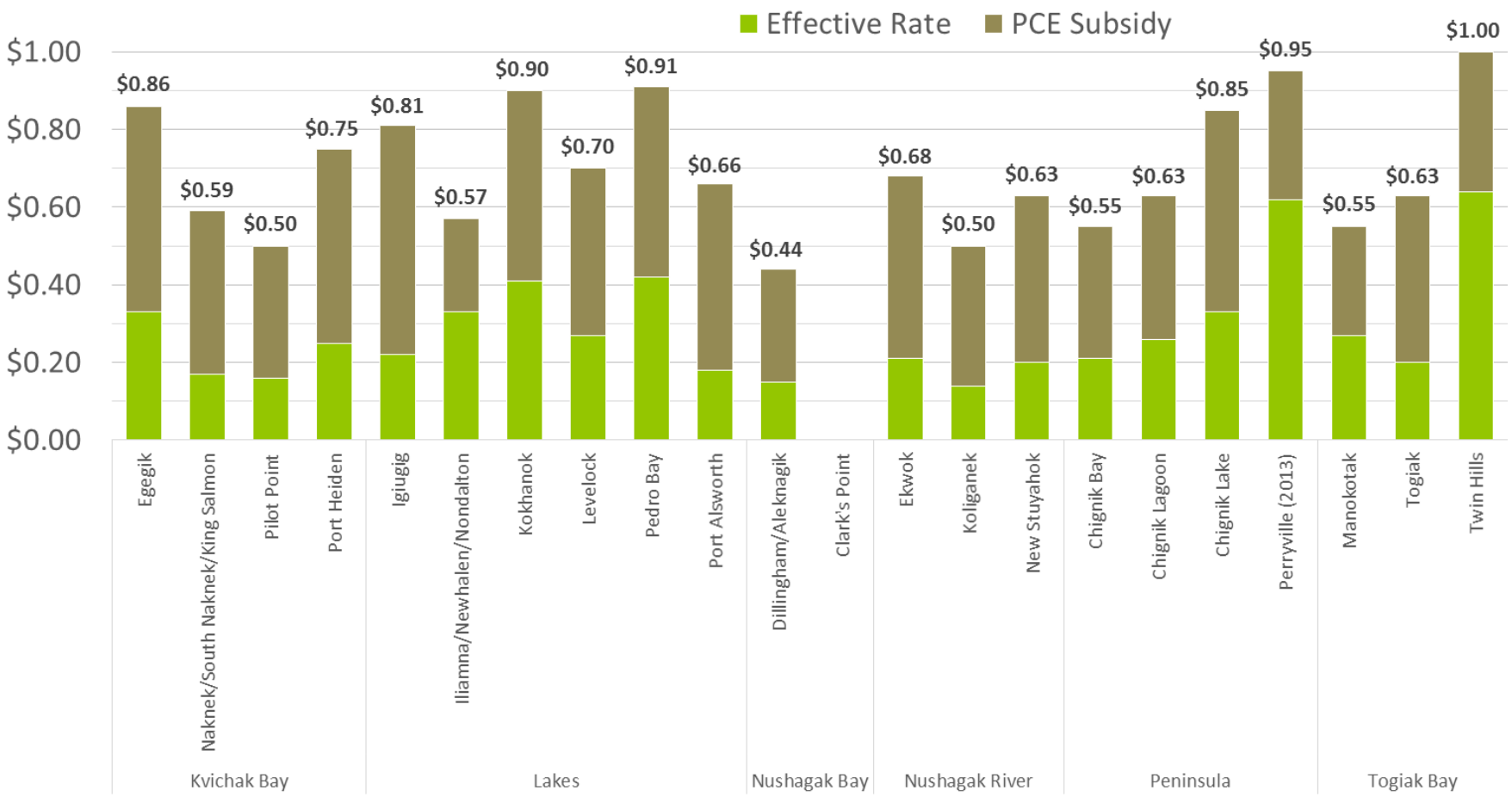


Electric Rates

For most communities in the Bristol Bay region, there are two sets of electric rates: the residential electric rate, which is set by the utility based on cost of electricity production and profit share (if applicable); and the effective rate of electricity, which is a reduced rate paid by residents in communities enrolled in the Power Cost Equalization Program (PCE). All Bristol Bay communities are eligible for PCE. Two communities, Clark's Point and Perryville, were not enrolled in PCE in 2014 but both resumed participation in the program in 2015.

Both rates vary considerably across the region. Unsubsidized residential rates range from $0.44/kWh in Dillingham and Aleknagik on Nushagak Electric Cooperative's grid to $1.00/kWh in Twin Hills, which is an independent utility. The PCE effective rates (the subsidized rates) ranges from $0.14/kWh in Koliganek to $0.64/kWh in Twin Hills for the first 500 kWh of monthly residential use Figure 6). For comparison, residential rates were $0.15/kWh in Anchorage and $0.18/kWh in Fairbanks in July 2015.

Figure 6: Electric rates by community, 2014



Notes: Perryville rates are from 2013 because this is the last year in which Perryville data is available; Clark's Point and Perryville re-enrolled in the PCE program in 2015 so 2015 data is not yet available. Data source: (2)

Power Cost Equalization and Community Facilities

The Power Cost Equalization Program (PCE) also subsidizes the rates of community buildings and facilities. The PCE statute defines a community facility as a water, sewer or charitable educational facility, public outdoor lighting, or a community building whose operation is not paid for by the State or Federal government or by a private commercial organization. A community building is a community facility that is not operated for profit and is open to the general public. The Alaska Energy Authority determines eligible community facilities based on applications and information submitted by the facility owner and utility provider.

As with the residential PCE program, there are limits on the amount of PCE-eligible electricity (kWh) that may be used by a community facility. This monthly limit is set based on the number of residents in a community and comes to no more than 70 kWh per resident per month. In a community with 100 residents the total amount of electricity (kWh) that is eligible for PCE cost reductions is equal to 7,000 kWh per month, spread across all eligible community facilities.

In this region several communities are not using the PCE program to the fullest extent, leaving significant opportunity for communities to save thousands of dollars on electricity bills for public facilities and buildings (Table 6). In other regions, planners identified several reasons that communities are not able to take advantage of this program. This relates to turnover in utility management, lack of training, lack of coordination between community facility owners and utilities as well as the lengthy processing time of PCE community facility applications and rejection notices that do not provide information on why an application was rejected.

Both Clark's Point and Perryville re-enrolled in the PCE program in 2015. Clark's Point is not shown in Table 6 because data is not yet available. The analysis for Perryville is based on 2013 data, which was the last year for which data was available at the time this report was completed.

Table 6: Savings potential for community facilities through PCE

Subregion	Community or Utility	PCE kWh per person Eligible	PCE kWh per person Used	PCE Savings Potential
Kvichak Bay	Egegik	70	70	At/Near Max
	NEA	70	70	At/Near Max
	Pilot Point	70	64	1 to 5 buildings
	Port Heiden	70	35	1 to 5 buildings
Lakes	Igiugig	70	69	At/Near Max
	INNEC	70	66	1 to 5 buildings
	Kokhanok	70	26	10+ buildings
	Levelock	70	27	5+ buildings
	Pedro Bay	70	36	1 to 5 buildings
	Port Alsworth	70	0	10+ buildings
Nushagak Bay	NEC	70	24	10+ buildings
Nushagak River	Ekwok	70	22	5+ buildings
	Koliganek	70	26	10+ buildings
	New Stuyahok	70	20	10+ buildings
Peninsula	Chignik Bay	70	68	At/Near Max
	Chignik Lagoon	70	43	1 to 5 buildings
	Chignik Lake	70	18	10+ buildings
	Perryville	70	0	5+ buildings
Togiak Bay	Manokotak	70	1	10+ buildings
	Togiak	70	27	10+ buildings
	Twin Hills	70	38	1 to 5 buildings

Legend

	High Savings Potential *(5+ buildings)*
	Medium Savings Potential *(1 to 5 buildings)*
	Limited savings potential *(At or near max)*

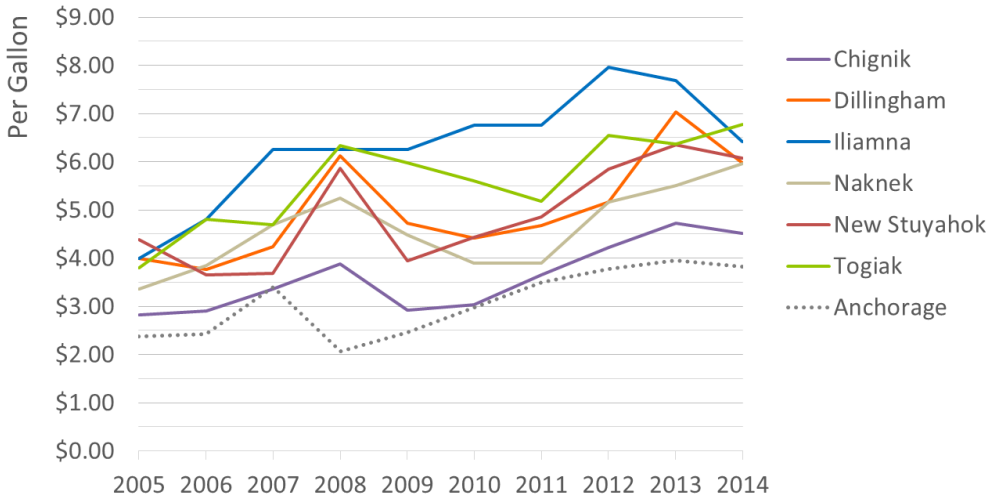
Data source: (2)

Fuel Vendors and Prices

Diesel fuel, home heating oil, unleaded gas, and other petroleum products are available from multiple vendors due to the sheer size of this region. Delta Western, Vitus Marine, Crowley, and Everts Air Fuel are some of the fuel suppliers serving Bristol Bay communities via barge and air. Several communities do not buy directly from fuel vendors, buying instead through Trident Seafoods or development corporations. As with the rest of rural Alaska, high fuel costs are a continuing concern and problem. Previous work in the region detailed significant interest in bulk fuel purchasing groups (3). This concept along with siting a bulk fuel depot at Williamsport, which would provide access to Cook Inlet, offer the potential for increasing competition and reducing prices in the fuel market.

Fuel Prices

Figure 7: Price of #1 fuel oil in hub communities



Note: Prior to 2011, fuel price data was not always collected in the same month for all communities. In Figure 7, price data for the closest month (up to 3 months) was used when data from the same month as other communities was not available. Data source: (4)

Looking at the retail price of #1 fuel oil, most hub communities experienced a steady rise in prices between 2010 and 2014 with a leveling or decrease in prices in 2013 and 2014. Two exceptions to this are Togiak and Naknek, which have experienced steady price increases since 2011. The difference between Anchorage fuel prices and all Bristol Bay hub communities is larger in 2014 than in 2005 (Figure 7).

Bulk Fuel Storage

All communities in the region have bulk fuel storage facilities; the community representatives contacted through the energy planning process indicated the storage capacity is adequate at present. Two primary issues affecting multiple communities are: erosion and, at times urgent, relocation needs of bulk fuel storage facilities and the difficulty of securing delivery of bulk fuel.

Details on storage capacity and community-specific storage concerns are in the Community and Energy Profiles (starting on page 63).

Natural Gas

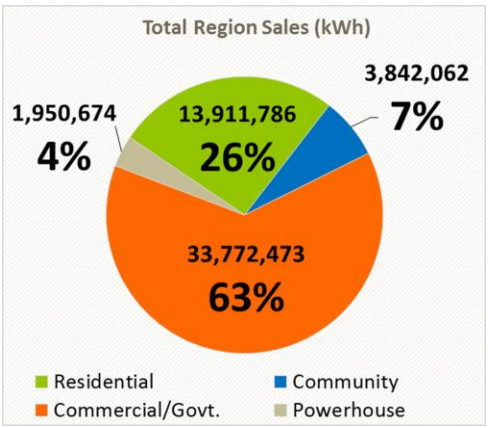
Regional interest in natural gas ranges from drilling in the Peninsula and Kvichak Bay subregions to monitoring access to LNG regionwide. A 2014 study investigating factors of market viability for LNG use in remote coastal communities found the combined demand for LNG in King Salmon, Naknek and South Naknek and the total demand in Dillingham may offer a sufficiently large electric load to support economically efficient LNG storage options (5).

Current and Projected Demand

Over 53 GWh of electricity are produced and sold in the region annually (Figure 8). The overwhelming majority of electricity sold in the Bristol Bay region is produced by diesel generators. The notable exception to this is the INNEC grid in which less than one percent of electricity is produced using diesel generators; the primary source being the Tazimina hydroelectric facility. Large and medium scale utility expansion projects are not planned for the near term. INNEC is investigating additional intake options but this is largely to maintain current capacity.

Electric Sales by Customer Type

Figure 8: Regional sales by customer type, 2014



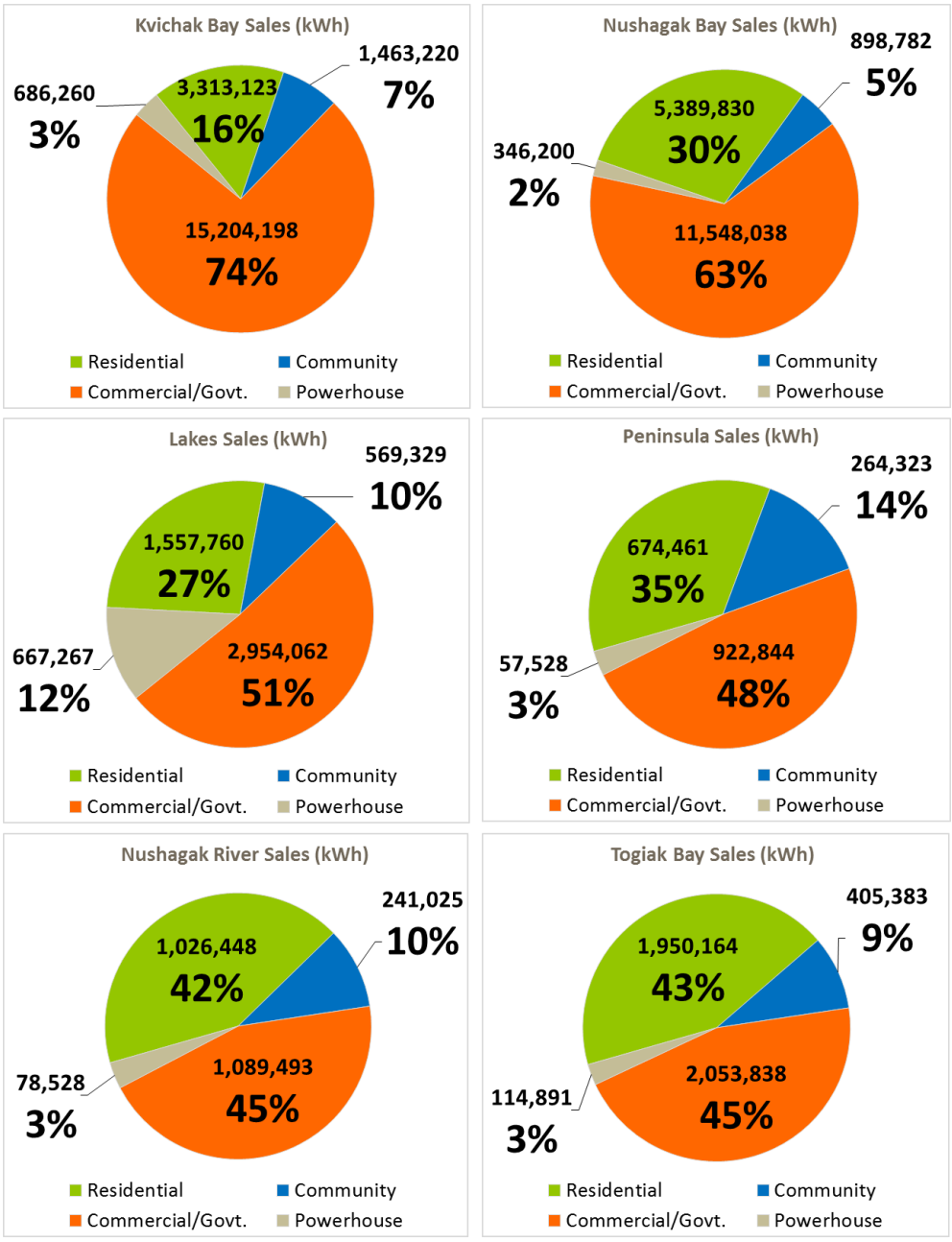
Data source: (2)

Regionwide 63 percent of electricity is used by commercial and government customers, 26 percent by residential customers, and seven percent by community buildings. Utility use accounts for the remaining four percent (Figure 8).

There is considerable variation by subregion, with commercial and government customers accounting for 74 percent of electric sales in Kvichak Bay and 63 percent in Nushagak Bay where Naknek and Dillingham, respectively, are located (Figure 9). Residential sales are a more significant component of demand, accounting for 42-43 percent of demand, in the southwest Bristol Bay subregions of Togiak Bay and Nushagak River. Community facilities use 14 percent of the electricity produced in the Peninsula, and powerhouse consumption is greatest, at 12 percent, in the Lakes subregion.

Tracking electric use by customer type is an important first step in targeting energy efficiency and conservation efforts. The following charts are helpful in showing variations between subregions, but the community-level data provided in the community profiles starting on page 63 are the best tool to determine whether residential, community or commercial customers are the top electricity users and where the greatest opportunity is for energy efficiency or conservation measures.

Figure 9: Subregional electrical sales by customer type, 2014

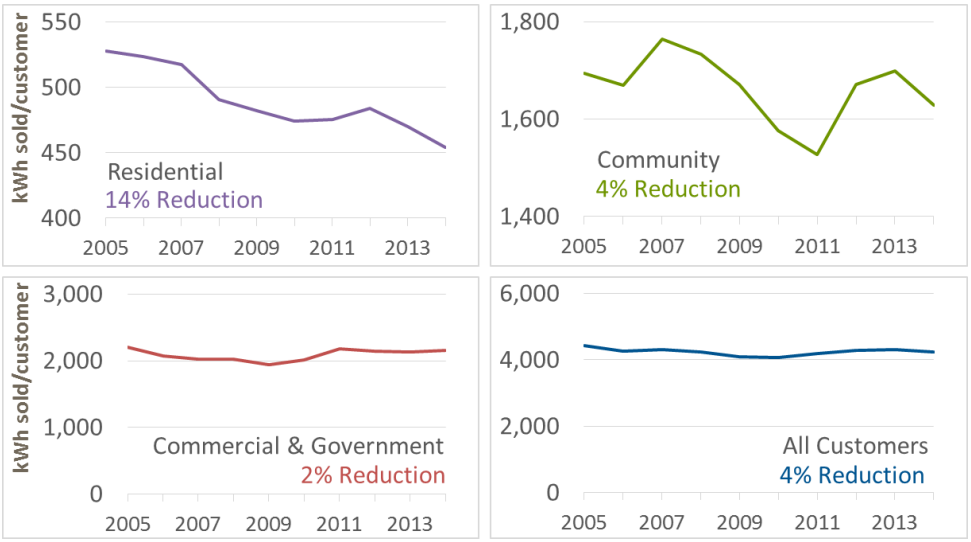


Data source: (2)

Trends in Electric Demand by Customer Type

A look at average monthly use per customer in the Bristol Bay region shows that trends in electric consumption over the past ten years have also varied by customer type. Trend data for Nushagak Electric, which serves Dillingham and Aleknagik, show an overall reduction of 4 percent in average monthly use with the steepest drop over this period among residential customers. This is likely due in part to the impact of higher energy costs, the resulting ramp up of energy efficiency and weatherization programs, and increased individual conservation efforts.

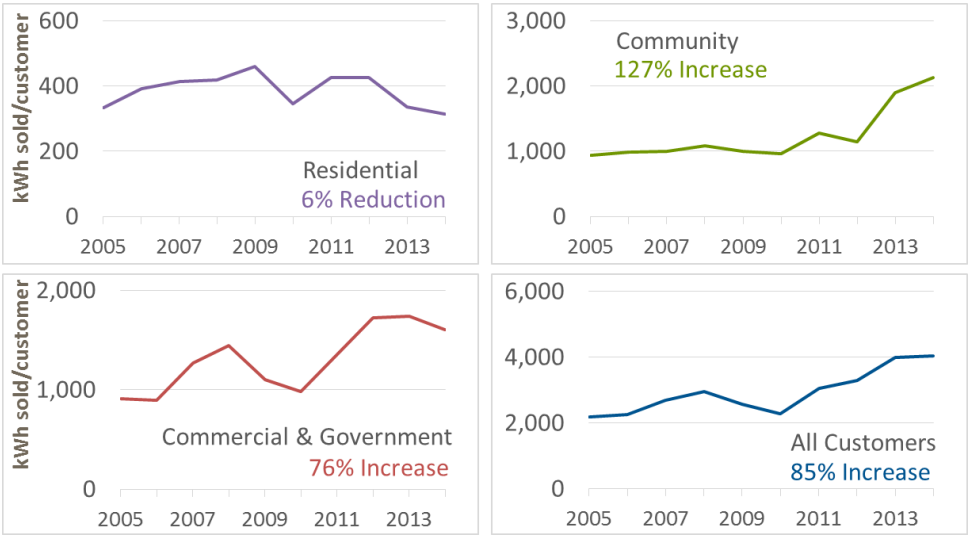
Figure 10: Trends in average monthly use by customer, Nushagak Electric Cooperative 2005-2014



Data source: (4)

In the communities on the INNEC grid—Iliamna, Newhalen, and Nondalton—the trend is striking with significant increases in commercial and community use starting in 2009 offset by much smaller declines in average residential use. This increase corresponds to the years of intensive investment and build up for the Pebble Mine project.

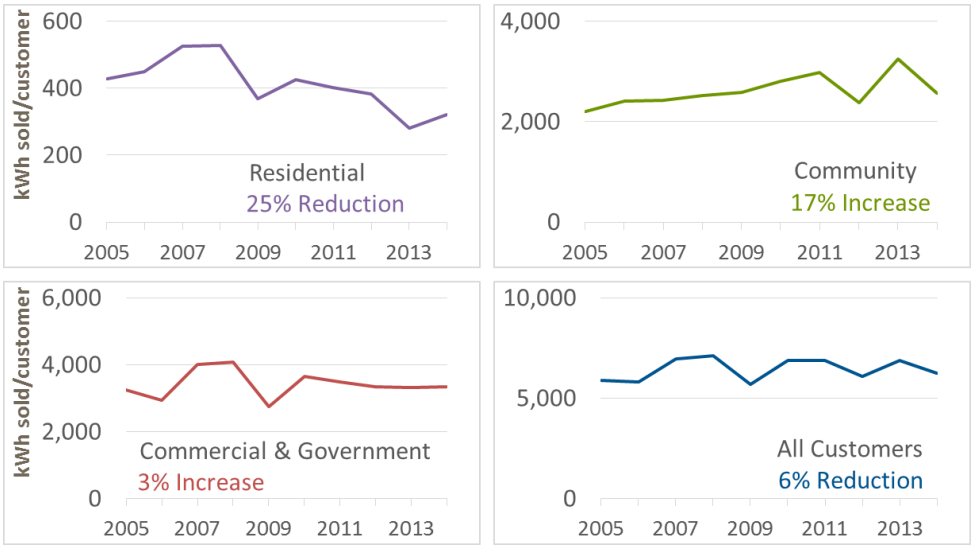
Figure 11: Trends in average monthly use by customer, INNEC 2005-2014



Data source: (4)

The NEA grid, serving King Salmon, Naknek, and South Naknek, shows a 25 percent reduction in average electrical use among residential customers and a 17 percent increase in average use by community facilities.

Figure 12: Trends in average monthly use by customer, NEA 2005-2014

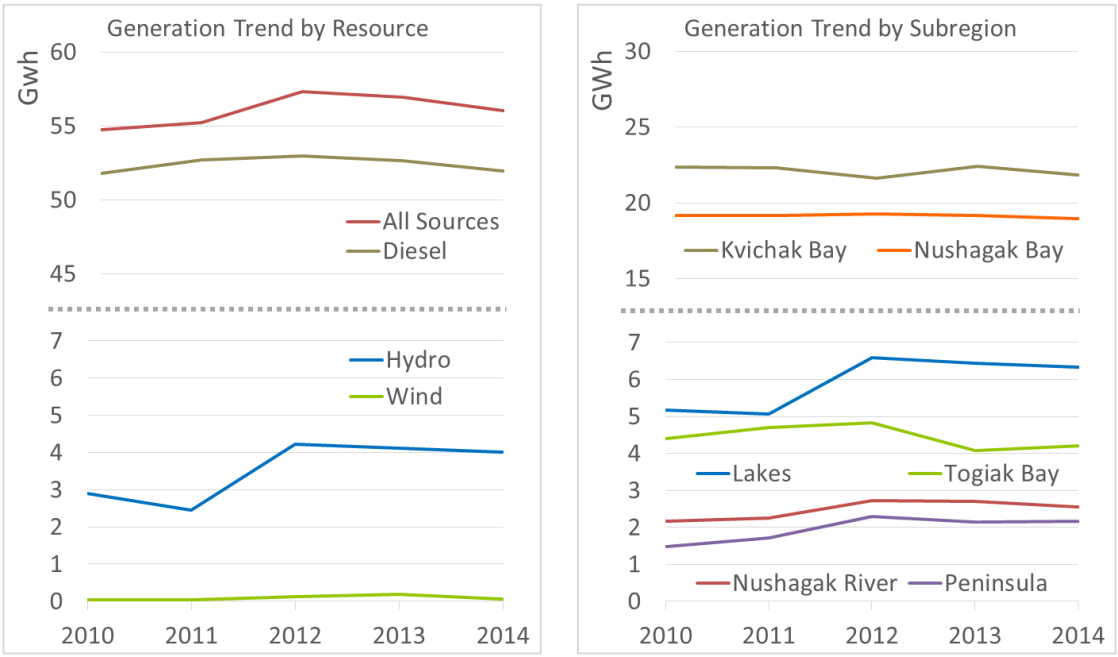


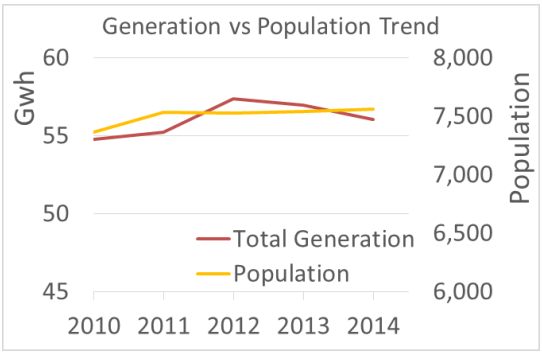
Data source: (4)

Recent Trends in Electrical Generation

Overall regional generation has increased slightly (2.3 percent) since 2010, following a similar trend in population (a gain of 2.7 percent). The relatively flat generation trend is even more apparent when generation is broken out by subregion—with only the Lakes subregion showing an increase of more than 1 GWh from 2010 to 2014 (Figure 13).

Figure 13: Generation trends, 2010-2014





Data sources: (4) (6)

Population Trends and Projections

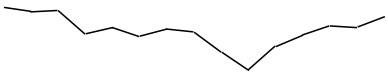
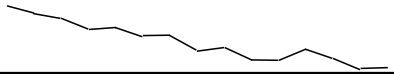
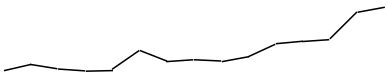
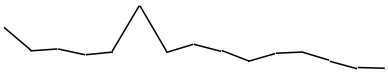
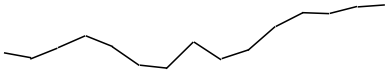
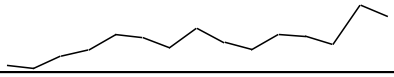
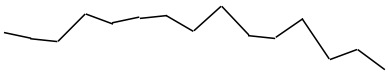
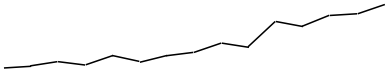
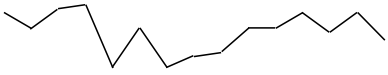
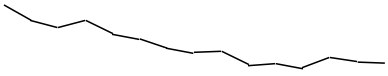
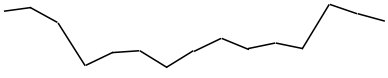
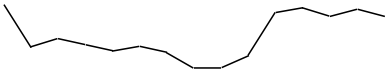
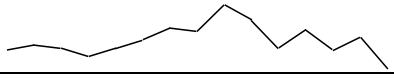
Since 2000, the population in the Bristol Bay region has fallen by three and a half percent. This change has not been even across the region. Areas with the sharpest declines are also the communities with 200 residents or less. Over the next 25 years, Alaska's state demographers predict an increase in population in the Dillingham Census Area and Lake and Peninsula Borough (6 and 4 percent, respectively) and a 19 percent decline in the Bristol Bay Borough (7).

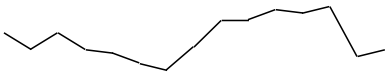
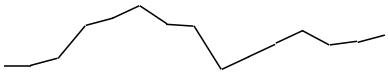
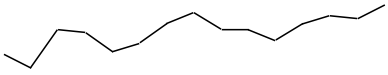
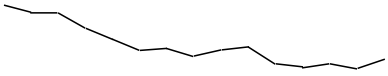
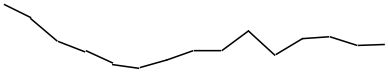
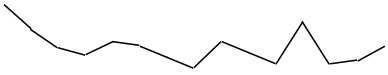
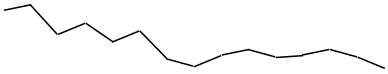
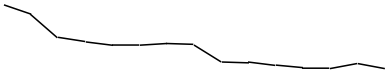
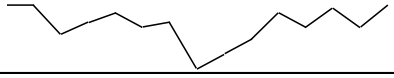
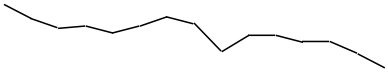
Load Forecasts

Load forecasting in a region as large as Bristol Bay is challenging. However, tracking population changes at the community level is one of the best tools for load forecasts. Population growth means new housing subdivisions, stores, and facilities all of which use electricity. While reductions in population do not reduce electricity usage on a one-to-one basis, we expect the electrical load trend to generally follow population trends.

Disruptions to this established load trend may occur due to losses or additions of major commercial customers or community wide energy efficiency steps. For example, a new fish processing plant will be setting up in Levelock. The community has been investigating the most cost effective way to meet the large energy needs of a summer-only consumer. The loss scenario is when a major customer, partially or entirely, closes or switches to independent electrical production. In the end all of these changes, whether it is population change or the addition or loss of large users, will have the same effect of increasing or decreasing efficiency and cost of diesel generation systems.

Figure 14: Historical population trends by community, 2000-2014

Population	2000 Census		2014 Est.	Change Since 2000	Avg. Annual Growth
Over 500					
Dillingham	**2,466**		**2,431**	-1.4%	**-0.1%**
Togiak	**809**		**876**	8.3%	**0.6%**
Naknek	**678**		**523**	-22.9%	**-1.5%**
201 to 500					
Manokotak	**399**		**500**	25.3%	**1.7%**
New Stuyahok	**471**		**499**	5.9%	**0.4%**
King Salmon	**442**		**335**	-24.2%	**-1.6%**
Koliganek	**182**		**231**	26.9%	**1.8%**
Newhalen	**160**		**207**	29.4%	**2.0%**
101 to 200					
Aleknagik	**223**		**197**	-11.7%	**-0.8%**
Port Alsworth	**104**		**179**	72.1%	**4.8%**
Kokhanok	**174**		**167**	-4.0%	**-0.3%**
Nondalton	**221**		**164**	-25.8%	**-1.7%**
Ekwok	**130**		**119**	-8.5%	**-0.6%**
Port Heiden	**119**		**114**	-4.2%	**-0.3%**
Egegik	**116**		**106**	-8.6%	**-0.6%**
Perryville	**112**		**101**	-9.8%	**-0.7%**

51 to 100					
Iliamna	**102**		**97**	-4.9%	**-0.3%**
Chignik Bay	**79**		**96**	21.5%	**1.4%**
Twin Hills	**69**		**87**	26.1%	**1.7%**
South Naknek	**137**		**84**	-38.7%	**-2.6%**
Levelock	**122**		**80**	-34.4%	**-2.3%**
Pilot Point	**100**		**78**	-22.0%	**-1.5%**
Chignik Lagoon	**103**		**72**	-30.1%	**-2.0%**
Chignik Lake	**145**		**70**	-51.7%	**-3.4%**
Igiugig	**53**		**53**	0.0%	**0.0%**
50 or Under					
Clark's Point	**75**		**48**	-36.0%	**-2.4%**
Pedro Bay	**50**		**47**	-6.0%	**-0.4%**

Data source: (6)

Transportation and Heating Fuel

No public data is available on the volumes of fuels used for transportation and space heating.

Diesel Powerhouse and Distribution

Fuel for Electrical Generation

Over 3.6 million gallons of diesel fuel are used per year to generate electricity in the Bristol Bay region (Figure 15).

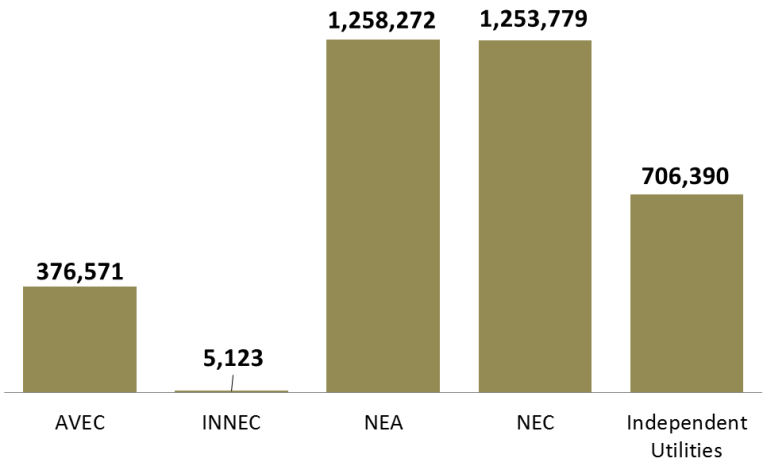
Diesel Efficiency

Diesel efficiency in the region currently ranges from 4.0 to 18.2 kWh per gallon (Figure 16). The red line showing AEA's benchmark performance targets—12.5 kWh per gallon for small (less than two million kWh generated per year) and 14.5 kWh per gallon for large systems—indicates that diesel efficiency particularly in small independent utilities is not within range of performance benchmarks.

A 10 percent increase in diesel efficiency across all utilities would realize substantial savings, amounting to an average $0.02 savings for each kWh of electricity generated on the INNEC,

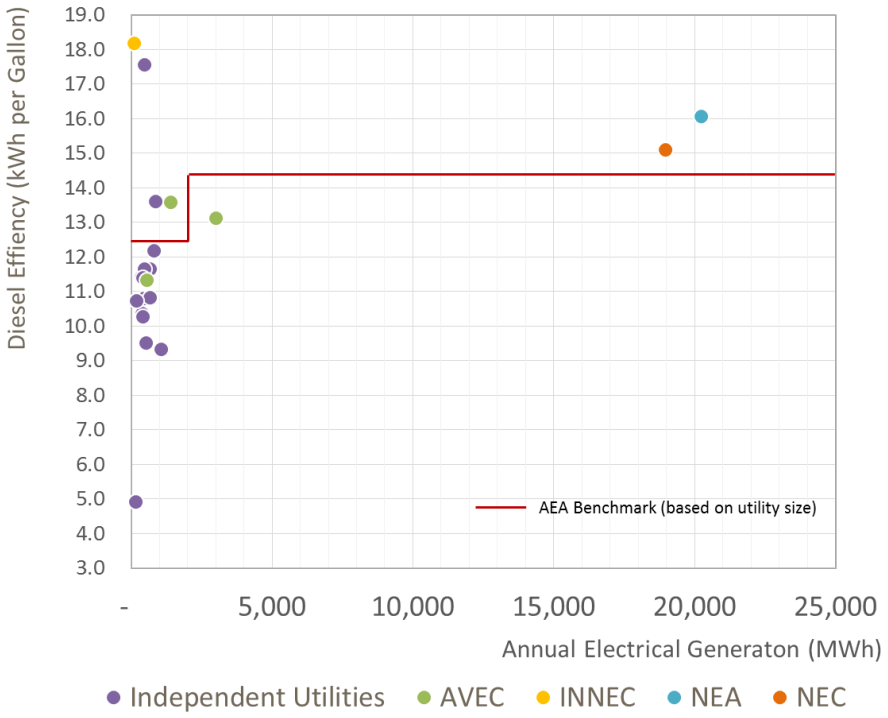
NEC, and NEA grids, an average of $0.03 in AVEC utilities, and an average of $0.04 for independent utilities (Table 7). These amounts reflect a snapshot in time and do not attempt to capture projections of fuel costs.

Figure 15: Diesel fuel used for electrical generation, 2014



Data source: (2)

Figure 16: Diesel efficiency by utility and generation, 2014



Data source: (2)

Table 7: Projected savings from 10% increase in diesel efficiency

Community by Utility Owner or Type	FY14 Fuel Used for Generation (gals.)	FY14 Diesel Efficiency (kWh/gal.)	10% increase in efficiency (kWh/gal.)	New Fuel Use (gals.)	Annual Fuel Savings (gals.)	Annual Savings ($)	Savings per KWh
Ekwok	46,990	11.3	12.5	42,718	4,272	18,454	$ 0.03
New Stuyahok	101,469	13.6	14.9	92,245	9,224	40,403	$ 0.03
Togiak	228,112	13.1	14.5	207,375	20,737	90,001	$ 0.03
AVEC	376,571	13.0	14.3	342,337	34,234	148,858	$ 0.03
Chignik Bay	62,113	13.6	15.0	56,466	5,647	21,852	$ 0.03
Chignik Lagoon	39,284	10.8	11.9	35,713	3,571	16,106	$ 0.04
Chignik Lake	37,232	10.4	11.4	33,847	3,385	17,431	$ 0.05
Egegik	55,836	11.7	12.8	50,760	5,076	23,400	$ 0.04
Igiugig	29,439	11.4	12.6	26,763	2,676	$ 17,583	$ 0.05
Kokhanok	39,466	10.3	11.3	35,878	3,588	$ 21,383	$ 0.05
Koliganek	60,032	10.8	11.9	54,575	5,457	$ 24,504	$ 0.04
Levelock	40,000	11.7	12.8	36,364	3,636	$ 15,055	$ 0.03
Manokotak	113,206	9.3	10.3	102,915	10,291	$ 43,018	$ 0.04
Pedro Bay	17,247	10.7	11.8	15,679	1,568	$ 8,388	$ 0.05
Perryville[1]	26,929	17.6	19.3	24,481	2,448	$ 11,114	$ 0.02
Pilot Point	36,248	11.4	12.6	32,953	3,295	$ 12,950	$ 0.03
Port Alsworth	65,848	12.2	13.4	59,862	5,986	$ 29,632	$ 0.04
Port Heiden	54,330	9.5	10.5	49,391	4,939	$ 20,645	$ 0.04
Twin Hills	29,180	4.9	5.4	26,527	2,653	$ 11,115	$ 0.08
Independent Utilities	706,390	11.0	12.1	642,173	64,217	$ 294,179	$ 0.04
Iliamna/Newhalen/ Nondalton	5,123	18.2	20.0	4,657	466	$ 2,175	$ 0.02
INN Electric Cooperative	5,123	18.2	20.0	4,657	466	$ 2,175	$ 0.02
Naknek/King Salmon/ S. Naknek	1,258,272	16.1	17.7	1,143,884	114,388	$ 403,791	$ 0.02
Naknek Electric Association	1,258,272	16.1	17.7	1,143,884	114,388	$ 403,791	$ 0.02
Dillingham/ Aleknagik	1,253,779	15.1	16.6	1,139,799	113,980	$ 396,650	$ 0.02
Nushagak Electric Cooperative	1,253,779	15.1	16.6	1,139,799	113,980	$ 396,650	$ 0.02

Notes: 1/ Perryville data from FY2013 PCE Annual Report. Data source: (2)

Heat Recovery

Heat recovery lowers community energy costs by reducing the cost of heating public buildings near the powerhouse. Fifteen communities in the Bristol Bay region have operational heat recovery systems and another two have active development projects to install heat recovery systems (Table 8).

Even when generators operate at maximum efficiency, 60% of all energy in the diesel fuel will be released as heat. The waste jacket heat can be run through a heat exchanger that transfers the heat to a heat loop that can warm nearby buildings. This process can recover 10 to 20% of the energy in the fuel. The heat can be measured and, if a heat sales contract is developed, sold to consumers, providing another revenue source for the utility. Potential users are often schools.

While excess or waste heat is primarily a byproduct of diesel generation, heat can be harnessed from hydro plants in situations where there is excess hydro (e.g. water going over the spillway) that can be used as a dump load to power an electric heater.

Table 8: Heat recovery systems completed or in development

Kvichak Subregion					
Status	**Community**	**Lead**	**Project Description**	**Next Step**	**Cost/Funding**
Operational	Egegik	City of Egegik	Provides excess heat to the school and adjacent community center		
	Naknek	NEA	Provides excess heat to the BBB school and a few adjacent homes		
	Pilot Point	Pilot Point Electric	Provides excess heat to the school		
	Port Heiden	Port Heiden Utilities	Provides excess to the fire department and VPSO buildings		
Lakes Subregion					
Status	**Community**	**Lead**	**Project Description**	**Next Step**	**Cost/Funding**
Operational	Igiugig	Igiugig Electric	Provides excess heat to pumphouse and recreational center buildings	Expand system to heat water tank	
	Kokhanok	City of Kokhanok	Provides excess heat to the school		
	Levelock	Levelock Electric	Provides excess heat to the school	Expand to community, tribal buildings, and youth recreational center	
	Newhalen	INNEC	Provides excess heat to the city office and fire hall		
	Pedro Bay	Pedro Bay Village Council	Provides excess heat to multiple community buildings; originally connected to school which closed		

	Port Alsworth	Tanalian Electric Cooperative	Provides excess heat to old school, duplex, and teacher's house	Need to connect new school, school housing, and community building.	Unknown (funding is a concern)

Nushagak Bay Subregion

Status	Community	Lead	Project Description	Next Step	Cost/Funding
Operational	Dillingham	NEC	Provides excess heat to school, court, DOT, and utility buildings	Determine feasibility for expansion to UAF-BB campus	
Feasibility	Dillingham	SWAMC	Capturing excess heat used to heat school when in session for ice making during summer/fishing season	Determine technical and economic feasibility	

Nushagak River Subregion

Status	Community	Lead	Project Description	Next Step	Cost/Funding
Operational	Koliganek	Village Council	Provides excess heat to school, clinic, & city offices		
Design & Construction	New Stuyahok	SRSD/AVEC	Project to capture the recovered heat from the AVEC power plant cooling system by installing heat exchangers at the plant and school boiler module and ~700 feet of underground piping	Construction in 2015	$548,000/ AEA REF & Local Match

Peninsula Subregion

Status	Community	Lead	Project Description	Next Step	Cost/Funding
Operational	Chignik Lagoon	Village Council	Provides excess heat to the school		
	Chignik Lake	Village Council	Provides excess heat to the school		
	Perryville	Village Council	Provides excess heat to the school		

Togiak Bay Subregion

Status	Community	Lead	Project Description	Next Step	Cost/Funding
Design & Construction	Togiak	City	Heat recovery between AVEC power plant and multiple buildings: Water Treatment Plant, Clinic, Police Station, City Office, and Old School Community Activity Building	Construction in 2016	$486, 180/ AEA REF & Local Match

LINE LOSS

Line loss reflects the percent of electricity (kWhs) generated by a utility that is not sold. Line loss may be due to physical losses in the distribution network (possibly caused by deteriorating lines and old or under-sized transformers) or unmetered use. The result is a direct financial loss to the utility and waste of thousands of gallons of diesel fuel per year. Line loss also affects the PCE rate available to a utility; losses above 12 percent reduce the PCE subsidy. As of 2014, five communities had line loss above 12 percent. Four communities (Clark's Point, Manokotak, Port Heiden, and Twin Hills) are not included in the analysis because of discrepancies in reported line loss.

Table 9: Line loss by community and subregion

Subregion	Community or Utility	Total kWhs generated	Line loss	kWhs lost	Diesel lost (gals.)
Kvichak Bay	Egegik	650,903	7%	48,253	4,139
	NEA	20,231,754	6%	1,112,943	69,217
	Pilot Point	461,224	19%	89,669	7,047
Lakes	Igiugig	336,581	13%	44,885	3,926
	INNEC	4,099,287	8%	344,265	430
	Kokhanok	437,928	7%	31,849	2,870
	Levelock	466,860	19%	88,705	7,600
	Pedro Bay	185,127	10%	17,969	1,674
	Port Alsworth	802,350	6%	52,042	4,271
Nushagak Bay	NEC	18,956,000	4%	773,150	51,137
Nushagak River	Ekwok	532,671	6%	32,987	2,910
	Koliganek	649,836	28%	182,994	16,905
	New Stuyahok	1,378,601	1%	19,633	1,445
Peninsula	Chignik Bay	845,836	11%	94,096	6,910
	Chignik Lagoon	424,463	1%	3,505	324
	Chignik Lake	386,321	10%	37,056	3,571
	Perryville	511,004	22%	113,811	5,998
Togiak Bay	Togiak	2,997,095	4%	109,454	8,331

Legend

- High Savings Potential (12%+ line loss)
- Medium Savings Potential (6% to 11% loss)
- Limited Savings Potential (5% or less line less)

Data source: (2)

RENEWABLE ENERGY

Renewable resources currently used to meet energy needs in the region include wind and hydro for electricity and woody biomass for space heating (8) (9). (For information on the potential for other renewable resources, see Table 24.)

Biomass

The Bristol Bay region has been the site of multiple studies and inventories of biomass potential at the regional, subregional, and community levels. From 2004 to 2007, BBNA oversaw a regionwide project on woody biomass, the Bristol Bay Region Native Allotment Forest Inventory. The inventory, performed by Tanana Chiefs Conference Forestry Program, selected 261 native allotment parcels in three regional subunits. In 2013, BBNA conducted a survey of woody biomass uses in Dillingham and Aleknagik.

Five Bristol Bay communities have taken advantage of the Alaska Wood Energy Development Task Group grants to complete pre-feasibility assessments of local wood biomass resources. Another four in the Lake and Peninsula Borough conducted feasibility studies using an AEA Renewable Energy Fund grant. Kokhanok is the only community with an operational biomass heating system for two community buildings. Other communities including Iliamna, Nondalton, Clark's Point, and New Stuyahok have completed pre-feasibility studies that show pursuing a biomass project at present may be economically viable (Table 10). Depending on the decision of city and tribal governments, additional biomass projects may start-up in the region.

Table 10: Community-scale wood biomass heating projects completed or in development

Lakes Subregion					
Status	**Community**	**Lead**	**Project Description**	**Next Step**	**Cost/Funding**
Operational	Kokhanok	Lake and Peninsula Borough	A GARN cordwood boiler heats Kokhanok Village Council Building and the Community Building.	Study feasibility of expanding to nearby buildings.	Past funding: $391,375 AEA REF/Local Match (includes feasibility studies for 4 other communities)
Pre-feasibility Completed	Iliamna	Village Council	Pre-feasibility completed in 2013. Investigated heating village office and adjacent shop building.	Found not economically viable; but prudent to continue investigation.	AWEDTG
	Nondalton	City & Village	Pre-feasibility completed in 2013 for installing high efficiency wood stoves at tribal office, community building, and St. Nicholas Church.	Found to be economically justified. Seeking funds for installation.	AWEDTG
Nushagak Bay Subregion					
Status	**Community**	**Lead**	**Project Description**	**Next Step**	**Cost/Funding**
Pre-Feasibility Completed	Aleknagik	City	Pre-feasibility study completed in 2012. Not currently viable. May revisit after	Update 2012 pre-feasibility study. New application has been submitted to AWEDTG.	AWEDTG

Nushagak Bay Subregion					
Status	**Community**	**Lead**	**Project Description**	**Next Step**	**Cost/Funding**
			washeteria or other new buildings constructed or using 10,000+ gallons of fuel.		
	Clark's Point	City	Pre-feasibility study completed in 2013. Not recommended for Water Treatment Plant and clinic, but viable for other buildings studied.	Design and install heat loop to connect Community Center, CPVC, and City Office	AWEDTG
	Dillingham	BBNA	Studies on interest and wood availability completed.	Conduct feasibility study of wood boiler heating for BBNA Main office and Family Resources center.	

Nushagak River Subregion					
Status	**Community**	**Lead**	**Project Description**	**Next Step**	**Cost/Funding**
Pre-Feasibility Completed	New Stuyahok	Stuyahok Limited	Pre-feasibility study completed in 2013 for cordwood system.	Install two Tarm Solo 40 wood boilers and one high efficiency wood stove in the Booster Club	AWEDTG

Hydroelectric

The Bristol Bay region has two operating conventional hydroelectric projects: Tazimina hydro on the INNEC grid serving Iliamna, Newhalen, and Nondalton and Packer's Creek hydro which started operation in 2015 serving Chignik Lagoon. Two projects are in the design and permitting phase: Chignik Bay and Pedro Bay.

Table 11: Hydroelectric projects in Bristol Bay region

Bristol Bay Region					
Status	**Community**	**Lead**	**Project Description**	**Next Step**	**Cost/Funding**
Operational	Chignik Lagoon	Village Council	Packer's Creek Hydro: 177 kW run-of-river with 9-ft dam.	▪ Monitor to see if able to produce estimate of 90% of power ▪ Erosion control on access road to hydro facility ▪ Install dispatchable boilers for space heating	$5,541,171/ AEA REF/Local match
	Iliamna, Newhalen, Nondalton	INNEC	Tazimina Hydro: 824 kW run-of-river project. Expandable to 1.5 MW. Dispatchable electric boilers installed in Newhalen & Nondalton.	▪ Maintain current capacity, increase river intake ▪ Hook-up additional electric boilers	$12,000,000/ AEA REF, Federal, INNEC loan

Bristol Bay Region					
Status	**Community**	**Lead**	**Project Description**	**Next Step**	**Cost/Funding**
Design & Permitting	Chignik Bay	City	Indian Creek Hydro: Restoring antiquated 60 kW hydropower System. 520 kW facility proposed. Recommended for design and permitting.	Upgrade existing powerhouse and address outstanding environmental, geotechnical, and historic preservation issues.	$207,500/ AEA REF
	Pedro Bay	Village Council	Knutson Creek Hydro: 150 kW run-of-river	Complete design and permitting in 2016	$292,500/ AEA REF/Local match
Previously Considered	Dillingham, Aleknagik	NEC	Nushagak Area Hydropower Project Proposed capacity: 1.5 MW Lake Elva; 2.7 MW Grant Lake	Feasibility complete, NEC not pursuing	$1,904,705/ AEA REF
		Nuvista	Interim feasibility conducted at Chikuminuk Lake, at the upper reaches of the Nuyakuk-Nushagak drainage in northern Wood Tikchik State Park. Possibility of serving NEC grid.	Nuvista ended efforts to pursue project.	
	Port Alsworth		Tanalian River Hydro- 75-200 kW, run-of-river	Reconnaissance study not completed due to federal land accessibility issues	

Hydrokinetic (In-River, Tidal and Wave)

Igiugig is the only community in the Bristol Bay region with a hydrokinetic in-stream pilot project. The project had two turbines assembled and deployed in the summer of 2014 in the Kvichak River. The device was retrieved after a month deployment. The project is continuing with re-design and continued testing in 2015. The energy output capacity is small (5 to 40 kW).

Table 12: Hydrokinetic energy projects operational or in progress

Bristol Bay Region					
Status	**Community**	**Lead**	**Project Description**	**Next Step**	**Cost/Funding**
In Progress	Igiugig	Village Council	Pilot project using 25 kW turbine for in-river electricity generation.	Pursue licensing for project; Determine technical and economic feasibility for village-wide electricity generation.	

Solar

Solar is not a year-round energy resource in the Bristol Bay region. However, less expensive solar panels, federal tax credits and grant support, and net metering programs have combined to shorten the payback period for solar projects. This combined with the increase in electricity demand in the summer, due to fish processing and packing operations, means solar at both small-

scale and community-scale may be an option. This is particularly the case in smaller communities with very high costs of diesel fuel and electricity or for residents not connected to utility lines.

Utilities in the Bristol Bay region do not have any installed solar arrays. However, homes, commercial buildings, and community buildings are installing small solar PV arrays on their own (Table 13). There are few residential solar thermal systems installed in the region. Using solar thermal technologies to reduce heating costs is often economic; however, these systems are significantly more complex to set up and maintain than solar PV arrays, making the lack of trained and knowledgeable operators in the region a potential barrier to expanding use.

Table 13: Community-scale solar energy projects operational or in progress

Bristol Bay Region					
Status	**Community**	**Lead**	**Project Description**	**Next Step**	**Cost/Funding**
Operational	Dillingham	Multiple Entities	Solar arrays on UAF Bristol Bay Campus, USFW building, and commercial buildings		
	Igiugig	Multiple Entities	Solar thermal installed on 3 buildings	Expand use of solar thermal	
	Perryville	Native Village	3 kW solar array on community building	Expand use to homes and community buildings	

Wind

Bristol Bay has few operational utility-scale wind projects, but several communities are in the process of developing wind projects (Table 14). In Perryville and Igiugig, both with operational wind systems, electricity generation is small scale with turbines with under 3 kW capacity. The project in Perryville uses small-scale turbines for residential electricity generation. The system in Igiugig is a pilot project using vertical-axis wind turbines. Four communities have utility scale wind projects in development or re-design, in the case of Kokhanok and one, Clark's Point, is in the process of installing residential scale turbines in a system similar to Perryville.

Communities with met towers installed prior to 2010 that have not pursued further design and development of wind systems include Chignik Lagoon, Chignik Lake, and Manokotak. These communities are mentioned because the decision not to pursue wind is not fully accepted by the communities as noted during outreach visits by the planning team and leadership at BBNA. In all cases, AEA has specific reasons for not continuing development ranging from small loads that will make integration and maintenance of wind systems technically complicated, plans for changes in maintenance and upkeep of existing diesel systems, and concern that the wind resource is not viable for utility scale electricity generation. BBNA and communities involved have disagreed with AEA's positions particularly as it relates to sites for met towers. Details are noted in Table 14.

Table 14: Wind projects in the Bristol Bay region

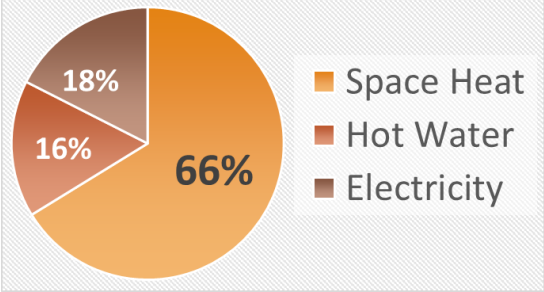
Bristol Bay Region					
Status	**Community**	**Lead**	**Project Description**	**Next Step**	**Cost/Funding**
Operational	Igiugig	Village Council	6 - 1.2 kW vertical axis wind turbines installed as pilot project	If proven, will be expanded	
	Perryville	Village Council	10 residential (2.5-2.9 kW each) turbines installed		
Design & Installation	Clark's Point	City	Installing 7 residential turbines	Work with AEA on integration with powerhouse	
	Kokhanok	Local Utility & Borough	2 - 90kW wind turbines, originally planned as high penetration system. System redesign in process. First commissioned in 2010.	Electrical & generator upgrades; test wind system at low and medium level penetration	$190,000 AEA REF/local match 000 (re-design costs only)
	Koliganek	Village Council	Wind and heat recovery system. Draft CDR complete.	Complete powerhouse upgrade & finalize CDR; identify suitable sites for wind.	$112,050/ AEA REF/Local Match (for assessment & CDR only)
	Pilot Point	City	100 kW wind farm with dispatchable electric boiler, powerhouse upgrades needed to integrate the wind farm into the Pilot Point grid.	CDR submitted. City of Pilot Point will complete a met tower study, final design, permitting, construction and startup of wind farm	$1,571,240/ AEA REF, Local Match
	Port Heiden	Lake and Peninsula Borough	LPB proposed a high penetration 330 kW design and construction project.	Limited funding for permitting and design until conceptual design is approved. The current diesel powerhouse and distribution system are not capable of supporting a utility-scale wind system.	$250,000/ AEA REF
Feasibility	Egegik	Lake and Peninsula Borough	Wind feasibility study, met tower installed 8.2014 and 1 year of data needed	Determine wind resource and if sufficient, continue with project development	$66,666/ AEA REF, Local Match
	Levelock	Lake and Peninsula Borough	LPB has added money to install a 34 meter met tower to collect bankable data. The met tower was installed in July 2014.	Determine wind resource and if sufficient, continue with project development	$11,000/ AEA REF, Local Match
	New Stuyahok	AVEC	Feasibility assessment for a proposed 300kW wind project with associated integration components	Identify site for met tower and conduct new feasibility study.	$150,000/ AEA REF, Local Match
Met Tower Installed	Chignik Lagoon	Village Council	2 met towers installed & studies completed in 2005 & 2011. 2013 feasibility study map shows level 6 wind class but 2011 study found level 1 wind class	Community interested in investigating alternative sites; AEA concerned by small load and believes alternative sites are not developable.	

Bristol Bay Region					
Status	**Community**	**Lead**	**Project Description**	**Next Step**	**Cost/Funding**
	Chignik Lake	Village Council	Met tower installed in 2011, found level 4 wind class with high turbulence	Community interested in investigating alternative sites; AEA concerned by small load.	
	Manokotak	City	Met tower installed in 2009, found level 2 wind class	Community interested in investigating alternative sites; AEA is waiting for utility plan to remedy condition of generation & distribution system to ensure sustainable project.	
Previously Considered	Chignik Bay	Village Council	1 met tower installed in 2004-6, found level 6 wind class with high turbulence.	Community focusing on hydro power	
	Togiak	City	Met tower installed 2004-6, found level 3 wind class	Community not pursuing wind resource development at present	

Energy Efficiency and Conservation

Energy Characteristics of Regional Housing Stock

Figure 17: Bristol Bay residential energy use



The 2014 Alaska Housing Assessment by the Cold Climate Housing Research Center (10) profiled the residential energy use and cost in the Bristol Bay region:

- Energy Use: The average home in the region is 1,232 square feet and uses 136,000 BTUs of energy per square foot annually. This is close to the statewide average of 137,000 BTUs per square foot per year. Two-thirds (66%) is used for space heating, 16 percent for hot water, and 18 percent for electricity.
- Energy Efficiency: The average annual energy rating in the region is 2-star plus, based on data from over 830 homes. Not surprisingly, newer homes have better energy performance. On average, homes built in the 1940s are currently rated at 1-star plus, compared to an average rating of 3-star plus for homes built after 2000.
- Housing Quality: Within current housing stock, newer homes are tighter. On average, homes built in the last decade nearly meet the 2012 BEES standard of 4 air-changes per hour at 50 Pascals (ACH50). In contrast, homes built in the 1940s are 3.4 times leakier than those built since 2000.
- Energy Cost and Affordability: The average annual home energy cost in the region is $7,054, which is approximately 2.5 times more than the cost in Anchorage, and 3.3 times more than the national average. Approximately 21% of households in the Bristol Bay region spend 30% or more of total income on housing costs, including rent, water, sewer, and energy costs.

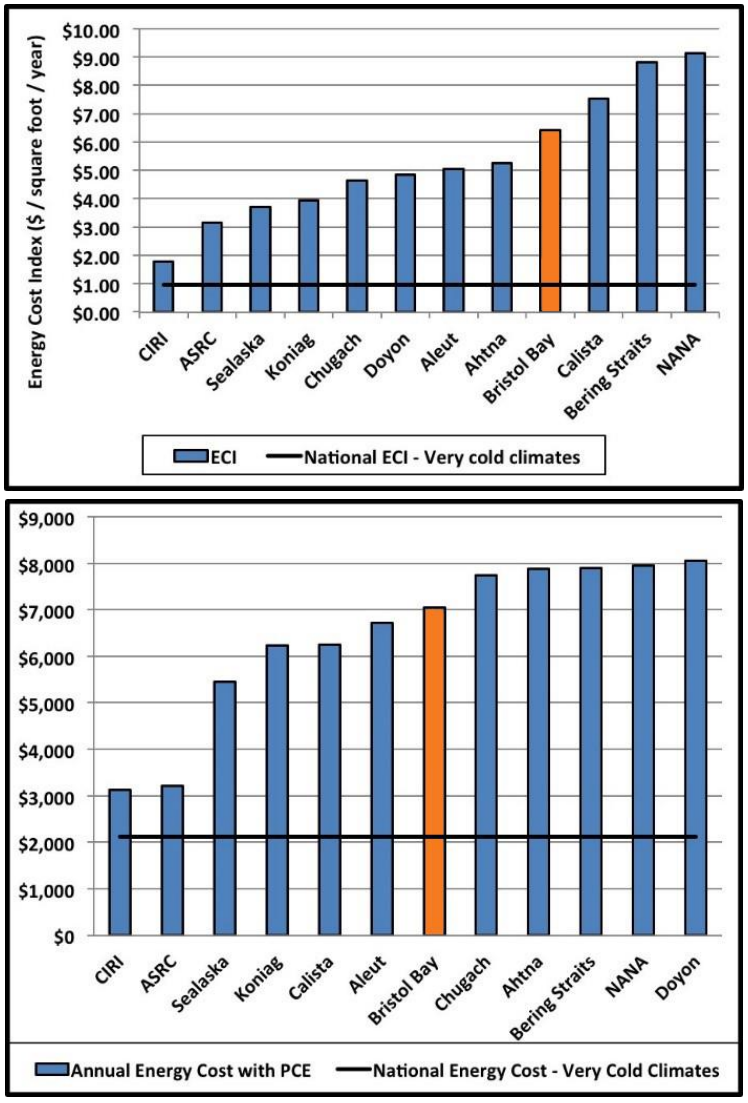
Table 15: Summary of energy characteristics of regional housing stock

Avg. Energy Rating	Avg. House Size	Avg. Annual Energy Use	Avg. Home Energy Cost[1]	Avg. Energy Use Intensity (EUI)	Avg. Energy Cost Index (ECI)[2]	Avg. Home Heating Index[3]
2-star plus	1,232 square feet	155 MMBTU	$7,054 per year	136 kBTU per square foot	$6.42 per square foot	8.2

Notes: 1/ Includes all end uses, estimated using January 2013 energy prices and including reductions from the PCE program. 2/ The amount of money spent on energy per year divided by square footage. 3/ The energy used per square foot per year divided by the area's heating degree days. Data source: (10)

Regional Comparison: Of the 12 ANCSA regions, average annual home energy costs in the Bristol Bay region are sixth highest overall and the fourth highest per square foot (10).

Figure 18: Bristol Bay residential energy costs compared with other ANCSA regions



Source: (10)

Residential Energy Efficiency & Conservation (EE&C)

More than a third of all occupied homes in the region have completed energy efficiency upgrades either through the Home Energy Rebate (HER) program, a low-income weatherization program, or with a recently built and BEES-certified home (Figure 19). Bristol Bay Housing Authority (BBHA) builds all new homes in the region above BEES standards.

Participation in AHFC's Home Energy Rebate program is open to homeowners for their primary residence; there is no upper income limit. The HER program requires homeowners to pay for recommended upgrades up front and reimburses them for direct labor and materials up to a certain amount once work is done and a "post" audit is completed. In the Bristol Bay region about 35 percent of homeowners receiving HER audits have completed upgrades and received rebates.

AHFC's weatherization services in the region are provided by Bristol Bay Housing Authority (BBHA) and the Alaska Community Development Corporation (ACDC). There is no cost to the resident or community for participation in the program.

Energy efficiency and weatherization measures completed since 2008 have reduced energy consumption in participating Bristol Bay households by 27% to 29% per year, according to AHFC program data. That translates to 300 to 450 gallons of heating oil per retrofitted home (Table 16). Most of the energy savings is in home heating, although lighting upgrades result in some electrical savings.

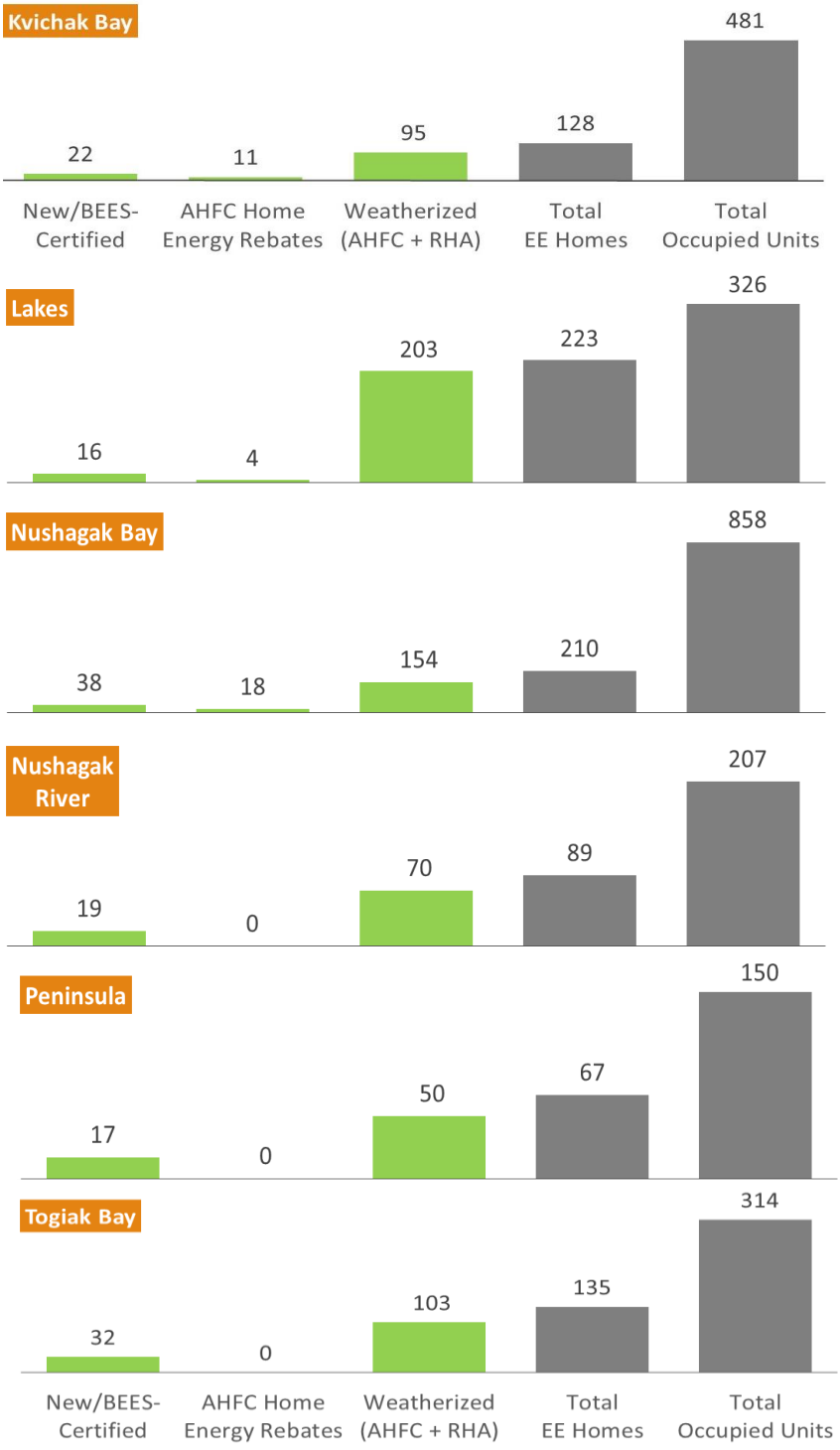
Collectively, Bristol Bay residents are saving almost $1.3 million per year from residential energy-efficiency upgrades already completed. If all remaining older homes were upgraded, an additional $2.3 million in annual fuel savings could be captured (Table 16).

Table 16: Average EE&C savings per household in the Bristol Bay region

EE&C Program	No. of Homes	Annual Energy Savings	Average Energy Savings	Estimated Fuel Savings[1]	Savings at $4.50/gal.
Home Energy Rebate	33 rebates + 5 in process out of 99 audits (35% completion rate)	60.8 MMBTU	27%	437 gallons	$1,966 per year
Weatherization[2]	675 homes	43.4 MMBTU	29%	311 gallons	$1,401 per year

Note: 1/ Assumes all heating is done with fuel oil. It does not include savings in diesel fuel from reductions in electrical generation. 2/ Includes AHFC weatherization projects plus homes weatherized by BBHA with other funding. Average annual savings is based on AHFC weatherization data only. Data source: (11)

Figure 19: Energy Efficient Housing Stock



Data sources: (11) (10) (12)

On a regional basis, residential energy efficiency (EE) measures account for over 28,000 MMBTU (1 MMBTU = 1 million British Thermal Units) annually in energy savings, over 200,000 gallons of heating fuel per year and $1.28 million in avoided fuel costs for the region

(Table 17). If the remaining energy inefficient housing stock is upgraded (or in some cases rebuilt), the savings from residential EE&C could save another 55,000 MMBTU per year. This would save another 394,000 gallons of heating oil and nearly $2.3 million more in avoided fuel costs annually. This does not include savings from lighting or appliance upgrades or other measures that reduce electrical use (or the diesel used to generate electricity).

Table 17: Estimated energy savings and potential energy savings from residential EE&C

	EE&C Savings Achieved			EE&C Savings Opportunity			
Subregion	Annual Energy Savings (MMBTU)	Annual Diesel Savings (Gallons)	Annual Fuel Cost Savings ($)	Remaining Residential EE&C Opportunity	Annual Energy Savings (MMBTU)	Annual Diesel Savings (Gallons)	Annual Fuel Cost Savings ($)
Kvichak Bay	3,967	$ 28,484	$168,750	74%	12,764	91,646	$536,949
Lakes	7,838	$ 56,278	$375,428	33%	3,533	25,369	$75,070
Nushagak Bay	6,780	$ 48,679	$286,256	76%	22,508	161,609	$950,990
Nushagak R.	3,038	$ 21,813	$147,673	59%	4,937	35,447	$227,422
Peninsula	2,127	$ 15,269	$85,260	57%	3,531	25,352	$125,617
Togiak Bay	4,470	$ 32,096	$215,368	57%	7,639	54,848	$363,636
Bristol Bay	28,220	$ 202,620	$1,278,735	64%	54,912	394,271	$2,279,685

Notes: Assumes all non-BEES-certified, income-eligible homes are weatherized and remaining owner-occupied homes participate in Home Energy Rebate program. Assumes average energy savings for region based on 2008-14 ARIS data. Assumes retail heating fuel costs for communities as of August 2014.

Public and Commercial Facilities

NON-RESIDENTIAL BUILDING AUDITS

The savings from energy efficiency and conservation changes in non-residential buildings is also large, though harder to quantify. Public and commercial building owners can typically save 20 percent on energy costs by performing both behavioral changes (like setting back thermostats) and efficiency upgrades identified in energy audits (Table 18).

Table 18: Savings potential for public and commercial facilities

Savings from Behavioral Changes Only	Behavioral Changes plus the Most Cost-Effective Retrofits	Savings from Implementing All Audit Recommendations
10-15% Savings	15-25% Savings	25-35% Savings

Data source: (13)

COMMUNITY ENERGY EFFICIENCY PROGRAMS

Since 2005, a sequence of state and federal programs have funded community-scale, energy efficiency improvements in public facilities in rural Alaska, including indoor lighting retrofits, LED street lighting, heating system upgrades, insulation and sealing, and installation of programmable thermostats and other energy saving building controls.

Table 19: Participation by Community in Energy Audit Programs since 2008

Community	Community EE&C Grants	EE Lighting Upgrades	Other Building EE Audits and Upgrades		Water and Sewer System EE	
Grouped by Subregion	VEEP / EECBG / VEUEM[1]	LED Street Lighting	School EE Audit[2]	Health Clinic EE	Sanitation EE Audit	Sanitation EE Retrofits[3]
Kvichak Bay						
Egegik	X		A			
King Salmon						
Naknek	X	P				
Pilot Point	X	X				
Port Heiden	X					
South Naknek	X			A	A	
Lakes						
Igiugig					A	
Iliamna						
Kokhanok	X					
Levelock	X	P				
Newhalen	X	X	A			
Nondalton	X	P	A		A	P
Pedro Bay	X					
Port Alsworth			A			
Nushagak Bay						
Aleknagik	X		A			
Clark's Point	X	X				
Dillingham	X					
Ekwok	X		A		A	
Koliganek	X	p	A		A	
New Stuyahok	X	p			A	
Peninsula						
Chignik Bay	X					
Chignik Lagoon		X				
Chignik Lake	X	X	A			
Perryville	X		A			
Togiak Bay						
Manokotak	X	X	A		A	
Togiak	X	P	A			
Twin Hills	X		A		A	P
Region	**22**	**12**	**12**	**1**	**8**	**2**

Notes: X=Completed, A=Audit, P=Planned or in Progress. 1/ ANTHC study funded building audits. Additional funding or local investment may be needed to finance recommended improvements. 2/ VEEP improvements in Manokotak included community-wide lighting upgrades. 3/Water and Sewer audits and work performed and reported by ANTHC. Data sources: (14) (15) (16)

Communities, tribes and boroughs in the Bristol Bay region have taken significant action on energy efficiency audits and upgrades using the community-scale programs. As of early 2015, at least 22 Bristol Bay communities had participated in the popular EECBG and VEEP programs (Table 19).

ENERGY EFFICIENT LIGHTING UPGRADES

Many communities in the region completed interior or exterior lighting retrofits on multiple community buildings as part of VEEP and EECBG-funded projects. They are saving an average of $1,650 and 3,100 kWh per building per year, based on data from seven Bristol Bay communities. Lighting upgrades generally have shorter payback periods than other building efficiency measures making them smart investments even without the incentive of grant funding (15). While a majority of Bristol Bay communities have participated in the EECBG and VEEP programs there is still savings opportunity for more lighting retrofits in the region—both for communities that have not participated in the programs as well as communities in which only schools or only city- or tribal-owned buildings received lighting retrofits.

Table 20: Savings from Energy Efficient Lighting Upgrades in 7 Bristol Bay communities

	One-time Investment	Annual Savings	Annual Electricity Saved (kWh)	Average Simple Payback Period
Average per community	$19,652	$9,187	17,289	
Average per Building	$3,527	$1,649	3,103	2.1 years
Total	$137,561	$64,309	121,026	

Data source: Based on lighting upgrades completed with VEEP and EECGB grants through 2013 in Aleknagik, Chignik, Clark's Point, Egegik, Manokotak, Newhalen, and Togiak (15).

Table 21: Savings from energy efficient lighting upgrades in 33 small communities

	One-time Investment	Annual Savings	Annual Electricity Saved (kWh)	Average Simple Payback Period
Average per Community	$26,414	$7,359	17,249	
Average per Building	$4,737	$1,320	3,094	3.6 years
Total	$871,664	$242,840	569,219	

Data source: Based on VEEP and EECBG-funded lighting upgrades completed through 2013 (15).

LED STREET LIGHTING

Rural Alaska communities that have replaced street lights with LEDs are saving an average of $10,000 per year, with an average payback period of 3.7 years. In the Bristol Bay region, six communities reported during outreach visits or interviews having completed full LED retrofits, and another four reported partial retrofits that will continue as old lights burn out. The data presented in Table 22 is based on two communities for which data was available.

Table 22: Savings from LED street lighting retrofits in 2 Bristol Bay communities

	One-time Investment	Annual Savings	Annual Electricity Saved (kWh)	Average Simple Payback Period
Average per Community	$14,440	$4,579	8,326	3.2 years
Total	$28,880	$9,159	16,652	

Data source: Based on VEEP and EECBG-funded lighting upgrades completed through 2013 in Clark's Point and Manokotak (15).

SCHOOL AND OTHER BUILDING AUDITS

Many of the region's schools, clinics, and some other community buildings been audited through AHFC's commercial energy audit program or with other funding. Because these programs typically pay for audits but, unlike VEEP or residential EE programs, do not pay for retrofits, many of the potential savings identified in audits have not been achieved and there is not good information on which EE upgrades have been done.

The Lake and Peninsula Borough approved a school package in 2013, designating that 10% of a $20 million bond be used for energy efficiency upgrades in Lake and Peninsula School District (LPSD) schools. Working with Siemens, Inc., LPSD applied for and received the VEEP grant for lighting and window upgrades in two of the LPSD's eleven schools in Perryville and Egegik. Siemens conducted investment grade energy audits on all eleven schools and in spring 2014 began work on LED lighting and control replacements in eleven schools and building automation upgrades in nine schools. The project wrapped up in May 2015. Siemens estimates the costs savings across all schools will total $165,000 in year 1 with a 12.5 year simple payback and an overall energy savings of 15.6%. With assistance from Siemens, the Lake and Peninsula Borough was able to fund this project through school bonds, state energy grants, and a 70% reimbursement for the cost of the work from the Alaska Dept. of Education and Early Development.

AEA's Commercial Building Energy Audit (CBEA) program funds whole-building energy audits for privately-owned buildings up to a limit based upon the size and type of building. Results from participants indicate average energy savings of roughly one-third as a result of energy efficiency investments. Most commercial building audits are done in urban areas of Alaska, data on participation by Bristol Bay communities was not found.

WATER AND SEWER

Alaska Native Tribal Health Consortium (ANTHC) has performed energy audits of sanitation systems in eight rural communities in the Bristol Bay region. Sanitation systems are one of the single largest energy users in rural communities, accounting for 10 to 35 percent of a community's energy use. ANTHC estimates that for every one dollar spent on energy retrofits of rural sanitation facilities (including the cost of audits) there will be a 50 cent return each year to communities plus a 50 cent annual return to the State's operating budget through lower PCE payments (17). Table 23 shows estimated cost savings from EE upgrades based on analysis of over 50 rural communities in the Interior, Southwest, and Western Alaska. To date, no sanitation system retrofits have been completed in the region and two are in progress or planned (Table 19).

Table 23: Potential savings from sanitation system EE&C based on statewide audits

Number of Water Systems Audited	One Time Investment	Electricity Savings (kWh)	Diesel Savings (Gallons)	Cost Savings ($)	Average Simple Payback (years)
51	$107,214	22,010	2,663	$25,404	4.2

Data source: (18)

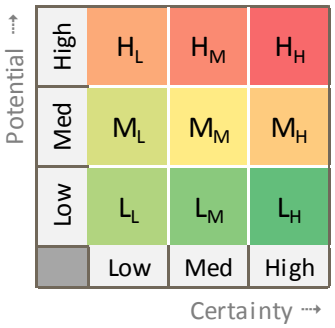
3 | Resource Potential

Table 24: Energy resource potential and certainty for new, community-scale projects

	Egegik	King Salmon	Naknek	Pilot Point	Port Heiden	South Naknek	Igiugig	Iliamna	Kokhanok	Levelock	Newhalen	Nondalton	Pedro Bay	Port Alsworth	Chignik	Chignik Lagoon	Chignik Lake	Perryville
Biomass	L	L	L	L	L	L	H	H	H	L	H	H	H	L	L	L	L	L
Geothermal	L	L	L	L	L	L	L	L	L	L	L	L	L	L	L	L	L	L
Hydro	L	L	L	L	M	L	L	H	M	L	H	H	M	M	H	H	M	M
Solar																		
Wind	L	M	M	M	L	M	L	M	H	L	M	M	L	L	L	L	L	M
Coal	M	L	L	M	M	L	L	L	L	L	L	L	L	L	M	M	M	M
Oil & Gas	L	L	L	L	L	L	L	L	L	L	L	L	L	L	L	L	L	L
Heat Recovery	L	L	H	H	H	L	L	H	H	M	H	H	L	H	L	L	H	H
Energy Efficiency	H	H	H	H	H	H	M	H	M	H	H	M	M	H	H	H	H	M
	Kvichak Bay						Lakes								Peninsula			

	Aleknagik	Clark's Point	Dillingham	Ekwok	Koliganek	New Stuyahok	Manokotak	Togiak	Twin Hills
Biomass	L	H	M	H	H	H	L	L	L
Geothermal	L	L	L	L	L	L	L	L	L
Hydro	L	L	L	L	L	L	L	L	L
Solar									
Wind	M	L	M	L	M	M	M	M	L
Coal	L	L	L	L	L	L	L	L	L
Oil & Gas	L	L	L	L	L	L	L	L	L
Heat Recovery	L	L	H	L	H	L	L	L	L
Energy Efficiency	H	H	H	H	H	M	M	H	H
	Nush. Bay			Nush. River			Togiak Bay		

Color Key



The first letter in each square represents resource potential. The subscript indicates the level of certainty in the resource potential rating.

Phase I of the Regional Energy Planning process included an inventory of all potential energy resources in the Bristol Bay region. In Phase II, a preliminary assessment of resource potential was performed. The goal was to develop a consistent set of criteria for rating resource potential that could be applied across communities and regions. This assessment looks at the resource potential for producing energy savings from *new*, *community-scale* project development given the best available information (i.e. projects that are already in operation or under development are

not counted towards the resource's potential to generate additional savings in a community). These *Potential* ratings of Low (L), Medium (M), or High (H) are accompanied by a *Certainty* rating (also L, M, H) which indicates the amount of feasibility work that has been done or the availability of other information. Low certainty generally signifies that no reconnaissance or other resource assessment has been performed. See Appendix E for a detailed description of the criteria used in the analysis.

4 | PUBLIC OUTREACH

OUTREACH ACTIVITIES

Public outreach and stakeholder engagement are major components of the second phase of AEA's regional energy planning process. In the Bristol Bay region, these goals were met through a variety of activities:

- Bristol Bay Regional Energy Summit (2015)
- Subregional Energy Meetings (2015)
- Community and Utility Interviews (2015)
- Bristol Bay Industry Survey (2015)
- Breakout Sessions at SWAMC Annual Meetings (2014, 2015)
- Energy Session at Bristol Bay Village Leadership Workshop (2013)
- Project Website: www.bristolbayenergy.org (2012-2015)

The input received through these outreach activities have been incorporated throughout this report and included in the Community and Energy Profiles, which start on Page 63.

Bristol Bay Regional Energy Summit | May 2015

An Energy Summit on May 4, 2015 in Dillingham was the capstone event for Phase II of the regional energy planning process. Over 40 representatives from across the region attended, along with regional and statewide organizations. Most communities were represented. See Appendix B for a list of participants. Summit topics were tailored to the needs and issues raised during subregional energy meetings held in March. Presentations were provided by AEA's technical staff, ANTHC, Bristol Bay Development Fund, Bristol Bay Housing Authority, Lake and Peninsula School District, Marsh Creek, Siemens, Inc, and by community and regional representatives.

A roundtable discussion with regional organizations explored current projects, services, and ideas for regional energy solutions. Topics covered electric utilities, governance, health care, and water and sewer. The summit ended with two interactive sessions. The first focused on identifying a regionwide energy vision. The group did not reach consensus on a final vision statement, but provided several areas which they would like to see addressed in future energy meetings. The second session used audience polling technology to rank regional energy strategies and assess overall interest in the structure and make-up of future energy planning committee(s) in the Bristol Bay region. Polling results appear in Appendix D.

Subregional Energy Meetings | March 2015

In March 2015, members of the planning team held meetings in Chignik Lagoon, Dillingham, Iliamna, and King Salmon to discuss energy projects and priorities. The meetings were scheduled in consultation with communities, and three representatives from every community in the region

were invited to attend the closest meeting to their community. Travel arrangements were provided for those who needed it. The agenda included presentations on the Phase I Resource Inventory and on community and technical resources from AEA. Roundtable discussions explored community/utility energy issues and goals. Representatives were also asked to review and update the draft Community and Energy Profiles. See Appendix B for a list of participants.

Table 25: Subregional energy meetings

Dates	Subregional Meetings	Community
March 23	Iliamna	Iliamna, Kokhanok, Newhalen, Nondalton, Port Alsworth, Pedro Bay
March 24	Chignik Lagoon	Chignik, Chignik Lagoon, Chignik Lake, Perryville, Pilot Point, Port Heiden
March 25	King Salmon	Egegik, Igiugig, King Salmon, Levelock, Naknek, South Naknek, Ugashik
March 26	Dillingham	Aleknagik, Clark's Point, Dillingham, Ekuk, Ekwok, Koliganek, Manokotak, New Stuyahok, Togiak, Twin Hills

Community and Utility Interviews | Jan – Feb 2015

The community-level outreach for the Phase II planning effort included telephone interviews with community and utility representatives from each Bristol Bay community in January and February 2015. The purpose of the interviews was to review the draft Community and Energy Profiles.

Bristol Bay Industry Survey | Feb – May 2015

Project team members designed an online survey requesting information on energy usage, generation sources, expected load changes, and energy efficiency measures related to commercial facilities. Businesses in fish processing, air service, fuel delivery, tourism, and large public service were contacted to complete the survey. The survey tool is presented in Appendix C. Significant outreach in the form of phone calls and emails was conducted. Three businesses completed the survey. Due to the small pool of responses, additional data on energy usage was not collected or analyzed for this report.

Bristol Bay Village Leadership Workshop | Dec 2013

The project team partnered with the Bristol Bay Native Corporation to host a half-day workshop in Anchorage in conjunction with the regional corporation's Village Leadership Workshop on December 5, 2013. The agenda included presentations on energy resources and opportunities in the Bristol Bay region and energy project financing options. Audience polling was used to engage participants and gather input on energy priorities and policy options. Participants in the annual workshop typically include about 200 village corporation officers and directors and village/city council officers and members. See polling results in Appendix D.

5 | Energy Priorities and Needs

In addition to providing a comprehensive list of energy projects and initiatives in the region, the subregional meetings and stakeholder interviews in Phase II enabled planners to identify additional priorities and needs that are not currently part of an active project. The timeframes shown in Table 26 indicate a best guess for project timing given available resources, technology readiness, community/utility interest, and competing priorities.

- Short range: expected to start within 1-5 years
- Medium range: expected to occur between 5-10 years
- Long range: expected to occur beyond 10 years

Table 26: Community energy priorities & needs identified by Bristol Bay regional stakeholders

Community/Utility	Subregion	Timeframe	Priority
Planning			
Egegik	Kvichak Bay	Ongoing	Anticipate and plan for impacts of efficiency in very small communities; A lot of villages are getting smaller – if people get too efficient, it gets harder to get fuel deliveries.
Naknek	Kvichak Bay	Ongoing	Net metering, integrating renewable energy production with the grid
Igiugig	Lakes	Ongoing	Planning for efficiency - the more efficient individuals get, the less efficient the power plant gets.
Levelock	Lakes	Ongoing	Plan for erosion affecting river front and infrastructure
Aleknagik	Nushagak Bay	Ongoing	Need a planner to facilitate & administer plans in play and for the future; Update 2013 strategic plan - do not have an energy component currently
Dillingham	Nushagak Bay	Ongoing	Explore the feasibility of developing renewable sources of energy including wind, hydro, geothermal, biomass, tidal, and solar; and of developing non-diesel sources of energy including peat and natural gas; Work with Nushagak Cooperative, Choggiung and other entities to develop feasibility assessments and a capital plan for developing new energy sources to supplement or replace existing infrastructure
Utility Management/Training			
Port Heiden, Pilot Point	Kvichak Bay	Short	Strong potential to add more community facilities to the PCE program
Pilot Point	Kvichak Bay	Short	Install meter boxes on homes; no back-up power at present
Igiugig	Lakes	Short	Generator training – funding for AVTEC or regional training
Kokhanok, Levelock, Pedro Bay, Port Alsworth	Lakes	Short	Strong potential to add more community facilities to the PCE program
Kokhanok, Levelock, Pedro Bay, Port Alsworth	Lakes	Short	Subregional on-call utility operator, fully trained and able to have full-time work by responding to regular needs and emergencies
Clark's Point, Dillingham, Aleknagik	Nushagak Bay	Short	Strong potential to add more community facilities to the PCE program
Ekwok, Koliganek, New Stuyahok	Nushagak River	Short	Strong potential to add more community facilities to the PCE program

Community/Utility	Subregion	Timeframe	Priority
Chignik Lagoon, Chignik Lake, Perryville	Peninsula	Short	Strong potential to add more community facilities to the PCE program
Chignik Bay, Chignik Lagoon, Chignik Lake, Perryville	Peninsula	Short	Subregional lineman – on call to deal with routine maintenance and emergencies
Manokotak, Togiak, Twin Hills	Togiak Bay	Short	Strong potential to add more community facilities to the PCE program
Energy Infrastructure (Powerhouses, Distribution Lines, Bulk Fuel)			
Bulk Fuel			
Port Heiden	Kvichak Bay	Short	Bulk fuel tanks on edge of eroding area, solution needed ASAP
Igiugig	Lakes	Short	New site for bulk fuel tank farm, current site is eroding into river; new diesel delivery truck
Kokhanok	Lakes	Medium	Need new fuel truck
New Stuyahok	Nushagak River	Short	Additional work on fuel storage and transport planned, but no current funding
Togiak	Togiak Bay	Short	Tank farm upgrade, tanks are old and threatened by erosion since it's near the coast and the seawall. Upgrade wasn't funded in the past due to environmental concerns.
Powerhouse			
Dillingham	Nushagak Bay	Medium	Interest in pilot studies for distributed energy systems; Determine a practical strategy and possible incentives to develop shared energy systems within small subdivisions and commercial campuses.
Chignik Lagoon	Peninsula	Short/Medium	Re-size generators to ensure efficient electricity production; new fuel truck needed
Chignik Lake	Peninsula	Medium	2 new generators needed
Twin Hills	Togiak Bay	Medium	New, low-maintenance generators needed
Heat Recovery			
NEA	Kvichak Bay	Medium	Investigate stack heat recovery, increasing capacity by using same BTU from diesel; Investigate heat absorption for ice production in summer
Levelock	Lakes	Medium	Investigate heat absorption for flash freezing; technology currently used at larger scale but need pilot project for small scale use
Manokotak	Togiak Bay	Medium	Interest in installing heat recovery system
Twin Hills	Togiak Bay	Medium	Interest in installing heat recovery system
Transmission & Distribution			
Egegik, Pilot Point, NEA	Kvichak Bay	Short	Line loss above 6% in all communities, potential for significant savings
Pilot Point	Kvichak Bay	Short	Investigate meters, upgrade distribution lines and transformers
Igiugig, INNEC, Kokhanok, Levelock, Pedro Bay, Port Alsworth	Lakes	Short	Line loss above 6% in all communities, potential for significant savings
INNEC	Lakes	Short	Upgrade distribution infrastructure Newhalen to Nondalton - replace with armored submarine cable
Kokhanok	Lakes	Medium	Powerline cables need to be replaced
Levelock	Lakes	Medium	Expand distribution system; additional powerlines need for more residents

Community/Utility	Subregion	Timeframe	Priority
Aleknagik	Nushagak Bay	Medium	Funding for substation construction; Consider energy when designing new public facilities. They will require energy which requires transmission lines and potentially more electrical capacity (3 phase).
Ekwok, Koliganek	Nushagak River	Short	Line loss above 6% in both communities, potential for significant savings
New Stuyahok & Ekwok	Nushagak River	Short	Intertie between Ekwok & New Stuyahok to capitalize on economies of scale; connect Ekwok to renewable generation once New Stuyahok's wind project is operational
Chignik, Chignik Lake, Perryville	Peninsula	Short	Line loss at high levels up to 22% in Perryville, significant savings are available to all three communities
Chignik	Peninsula	Short	Transmission lines need attention; requested lineman through AEA, never heard a response
Chignik Lagoon	Peninsula	Short/Medium	Transmission lines are in poor condition, need look at distribution lines as well; upgrade needed for metering
Chignik, Chignik Lake, Chignik Lagoon	Peninsula	Medium	Previously studied, interest remains in connecting three communities via intertie to take advantage of renewable power
Manokotak, Twin Hills	Togiak Bay	Medium	Neither community reported line loss in 2014; significant savings may be available but requires complete reporting
Manokotak	Togiak Bay	Long	Interest in intertie to Dillingham
Togiak, Twin Hills	Togiak Bay	Long	Interest in intertie connecting Twin Hills and Togiak
Energy Efficiency & Conservation			
Naknek	Kvichak Bay	Short	Increase EE of school buildings is top priority, working on a proposal for funding, Additional weatherization
Pilot Point	Kvichak Bay	Short	More weatherization needed; unsure if best to tear down or weatherize dilapidated homes
South Naknek	Kvichak Bay	Short	Weatherization and energy efficiency
Igiugig	Lakes	Short	ANTHC Rural Energy Initiative has been funded to conduct an energy audit for the sanitation system; complete and implement recommendations; more weatherization in homes in village
Iliamna	Lakes	Short	New community building that is energy efficient
Newhalen	Lakes	Short	Increase energy efficiency by remodeling school and school gym
Aleknagik	Nushagak Bay	Medium	Increase use of weatherization and EE programs; incorporate EE into facility design
Dillingham	Nushagak Bay	Short/Medium	Increase education & awareness on EE and building energy use; improve EE of homes, businesses and public buildings, promote energy conservation in heating, electricity, & transportation
Chignik	Peninsula	Short	New round of weatherization
Chignik Lagoon	Peninsula	Short	Commercial/community building weatherization, secure funding
Chignik Lake	Peninsula	Short	Additional energy efficiency measures in homes & buildings
Perryville	Peninsula	Short	Weatherization needed in older homes
Water and Sewer			
Nondalton	Lakes	Short	Water system – half replaced in project with ANTHC but remaining old system has serious leaks (losing up to 70,000 gallons of water per day); need funds to finish water system upgrade
Aleknagik	Nushagak Bay	Medium	Piped septic system needs upgrade, 27 years old and does not connect to all homes in community
Koliganek	Nushagak River	Short	Need an upgraded water & sewer system. There are many leaks and there are homes that don't have any water or sewer; water quality is being monitored for 2nd year

Community/Utility	Subregion	Timeframe	Priority
New Stuyahok	Nushagak River	Medium	Water/sewer lines need upgrading
Chignik	Peninsula	Short	Water reservoir is falling apart, expected fix in April 2015; Water/sewer Leaks - pipes need to be updated
Chignik Lake	Peninsula	Short/Medium	Water and sanitation system upgrade
Manokotak	Togiak Bay	Medium	Water/Sewer pipes near the end of their useful life
Togiak	Togiak Bay	Medium	Water and sewer lines within township were put in 1974
Local Energy Generation			
Biomass			
Geothermal			
NEA	Kvichak Bay	Medium	Conduct site tests to determine resource potential
Port Heiden	Kvichak Bay	Medium	Continue geothermal project pre-feasibility study, need more temperature monitor wells
Chignik Lagoon, Chignik Lake	Peninsula	Medium	Investigate geothermal potential and/or ground source heat pumps
Perryville	Peninsula	Medium	Expand buildings to which ground source heating is available
Hydro			
Port Heiden	Kvichak Bay	Medium	Conduct new study on hydro potential
Chignik Lake	Peninsula	Medium	Explore hydro possibilities
Togiak	Togiak Bay	Medium	Explore options for small hydro
Hydrokinetic			
Igiugig	Lakes	Medium	Monitor hydrokinetic turbine; if successful expand use
Natural Gas			
Chignik, Chignik Lake, Chignik Lagoon	Peninsula	Long	Interest in natural gas drilling in North Aleutian sedimentary basin
Solar			
Igiugig	Lakes	Short	More solar for residences and community buildings
Kokahnok	Lakes	Short	More solar for residences and community buildings
Pedro Bay	Lakes	Short	Expand use of solar thermal
Port Alsworth	Lakes	Short	Add solar arrays to residences and public buildings
Aleknagik	Nushagak Bay	Short	Add solar PV arrays to provide electricity for landfill or laundry facility
Dillingham	Nushagak Bay	Short	Add solar arrays on residential and public buildings
Chignik Lake	Peninsula	Short	Install solar PV arrays on residences and community buildings
Twin Hills	Togiak Bay	Short	Add solar arrays to homes and community buildings
Wind			
South Naknek	Kvichak Bay	Medium	Investigate wind power
Aleknagik	Nushagak Bay	Medium	Interest in installing anemometer to collect wind data, there needs to be a plan in place given the terrain
Chignik Lagoon	Peninsula	Short	Investigate wind power to supplement hydro and reduce diesel use; new sites available due to land clearing for transmission and access road to hydro facility
Chignik Lake	Peninsula	Short	Met tower removed in 2011, interested in exploring wind potential at other sites
Manokotak	Togiak Bay	Short	Community interested in new wind study

Community/Utility	Subregion	Timeframe	Priority
Transportation			
Iliamna, Nondalton	Lakes	Medium	Bridge between Iliamna and Nondalton; Dock/Barge landing & staging area in Iliamna
Levelock	Lakes	Medium	Need new dock, current is being affected by erosion
Pedro Bay	Lakes	Medium	Airport extension to enable larger shipments of fuel
Port Alsworth	Lakes	Medium	Public airstrip would reduce freight/fuel costs
Ekwok, New Stuyahok	Nushagak River	Medium	Road needed between Ekwok and New Stuyahok
Koliganek	Nushagak River	Medium	Low water levels make barging in fuel increasingly difficult, now considering flying in fuel
New Stuyahok	Nushagak River	Medium	River used for fuel transport to New Stuyahok has low water, it is easier to bring fuel via barge to Ekwok.
Chignik Lagoon	Peninsula	Medium	Airport lighting/runway expansion
Manokotak	Togiak Bay	Medium	Access road to Dillingham
Twin Hillls	Togiak Bay	Medium	Low water on river making it increasingly difficult to barge in fuel; Road pads are on tundra and moss at risk of serious deterioration

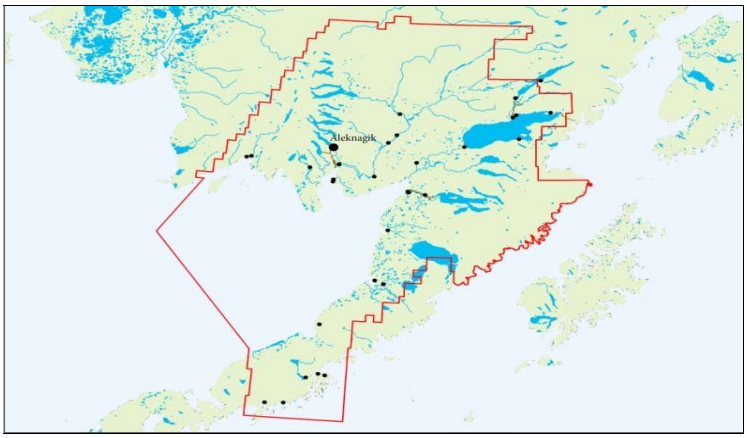
6 | COMMUNITY AND ENERGY PROFILES

This section contains profiles for communities in the Bristol Bay region. The first part contains general information about the location, economy, historical and cultural resources, planning, demographics, contacts and infrastructure in each community. It provides a broad overview of community size, location and resources to give context to the energy profile.

The second part of each profile is the energy profile, which provides an overview of energy production and distribution. It is intended to provide a snapshot of local energy conditions. The energy profile also includes a partial inventory of non-residential buildings in the community and its participation in state and federal energy efficiency programs.

The data sources used to compile the profiles are shown in Appendix F. Though based on the latest available data from state and federal sources, we know that not all information is accurate due to sampling and reporting errors. To try to correct these inaccuracies, we emailed draft versions of the Community and Energy Profile to contacts in each community in April through July 2015 in preparation for subregional energy meetings and follow-up community interviews. The profiles in this report include the revisions we received.

Community Profile: Aleknagik



Alaska Native Name (definition)

Aleknagik

Historical Setting / Cultural Resources

Aleknagik is a traditional Yup'ik Eskimo area, with historical influences from the Seventh-Day Adventists, Russian Orthodox, and Moravians. Fishing and subsistence activities are practiced.

Incorporation	2nd Class City (inc. 1973)

Location

Aleknagik is located at the head of Wood River on the southeast end of Lake Aleknagik, 16 miles northwest of Dillingham.

Longitude	-158.6178	**Latitude**	59.2731
ANCSA Region	Bristol Bay Native Corporation		
Borough/CA	Dillingham Census Area		
School District	Southwest Region School District		
AEA Region	Bristol Bay		

Taxes	**Type (rate)**	**Per-Capita Revenue**
	Sales (5%), Bed (9%)	N/A

Economy

Subsistence & commercial fishing village. Summer fishing camps. 20 commercial fishing permits. 16 business licenses.

Climate	**Avg. Temp.**	**Climate Zone**	**Heating Deg. Days**
	40.3	7	11,751

Natural Hazard Plan	**Year**
No	
Notes	Future Plan Development

Energy Priorities and Projects

Energy efficiency for all buildings from design stage; more weatherization for homes; install anemometer/interest in community wind power; biomass pre-feasibility study; Add solar PV arrays to provide electricity for community buildings; include energy in community planning

Community Plans	**Year**
Community Plan	2005

Local Contacts	**Email**	**Phone**	**Fax**
City of Aleknagik	citylekclerk@gmail.com	907-842-5953	907-842-2107
Native Village of Aleknagik	aleknagiktraditional@yahoo.com	907-842-2080	907-842-2081
Aleknagik Natives Limited		907-842-2385	907-842-1662

Demographics	**2000**	**2010**		**2013**
Population	221	**219 (228)**	**Percent of Residents Employed**	58.1%
Median Age	29	22	**Denali Commission Distressed Community**	No
Avg. Household Size	4	4	**Percent Alaska Native/American Indian (2010)**	75.8%
Median Household Income	N/A	$51,705	**Low and Moderate Income (LMI) Percent (2014)**	86.6%

Electric Utility	**Generation Sources**	**Interties**	**PCE?**
Nushagak Electric Co-op	Diesel	Dillingham	Yes

Landfill	**Class**	3	**Permitted?**	Yes	**Location**	1.85 miles north of N. shore

Water/Wastewater System		**Homes Served**	**System Volume**
Water	Well	14	
Sewer	Piped, Septic	**Energy Audit?** Yes	
Notes	Septic system ~27 y/o, upgrades/plant needed		

Access

Road	No				
Air Access	Public; Gravel/Dirt/Turf	**Runway**	1,200'x25'	2,030'x60'	1,250'x50'
Dock/Port	Yes	**Barge Access?**	Yes	**Ferry Service?**	No
Notes					

Energy Profile: Aleknagik

Diesel Power System

Utility	Nushagak Electric Cooperative		
Engine	**Make/Model**	**Condition/Hrs**	**Gen Capacity**
Unit 1	N/A		
Unit 2			
Unit 3			
Unit 4			
Line Loss		4.1%	
Heat Recovery?		No	
Upgrades	**Priority**	**Projects**	**Status**
Powerhouse			
Distribution		Substation	Complete 2015

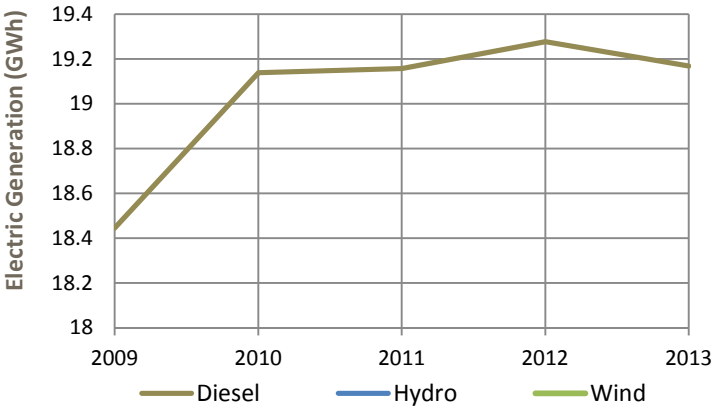
Outage History/Known Issues

Receives power from Dillingham. PCE includes both.

Operators	**No. of Operators**	**Training/Certifications**

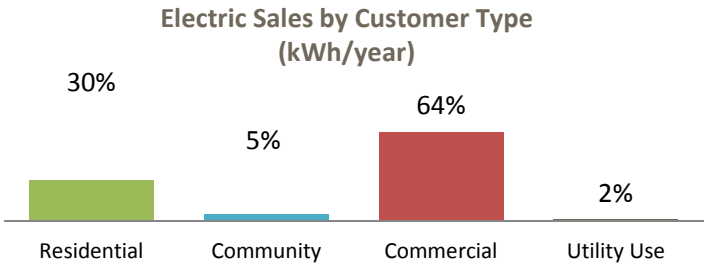
Power Production

Diesel (kWh/yr)	18,956,000	**Avg. Load (kW)**	174
Wind (kWh/yr)	0	**Peak Load (kW)**	387
Hydro (kWh/yr)	0	**Efficiency (kWh/gal)**	15
Total (kWh/yr)	18,956,000	**Diesel Used (gals/yr)**	1,253,779



Maintenance Planning (RPSU)

Electric Sales	**No. of Customers**	**kWh/year**	**kWh/Customer**
Residential	989	5,389,830	5,450
Community	46	898,782	19,539
Commercial	446	11,548,038	25,892
Utility Use		346,200	



Electric Rates ($/kWh)		**Cost per kWh Sold ($/kWh)**	
Rate with PCE	$0.17	**Fuel Cost**	$0.24
Residential Rate	$0.44	**Non-fuel Cost**	$0.19
Commercial Rate		**Total Cost**	$0.44

Fuel Prices ($)	**Utility/Wholesale**	**Retail**	**Month/Year**
Diesel (1 gal)	$3.85	$6.26	6-13; 8-14
Other Fuel? (1 gal)			
Gasoline (1 gal)			
Propane (100#)			
Wood (1 cord)			
Pellets			
Discounts?		None	

Alternative Energy	**Potential**	**Projects**	**Status**
Hydroelectric	Low	Dillingham Area Wind/Hydro Assessment	Hydro Not Feasible
Wind Diesel	Medium	Aleknagik feasibility/met tower	Investigating Wind Options
Biomass	Low		
Solar	Pending		
Geothermal	Low		
Oil and Gas	Low		
Coal	Low		
Emerging Tech	Not Rated		
Heat Recovery	Low		
Energy Efficiency	High	EECBG	Complete

Bulk Fuel

Tank Owner	**Fuel Type(s)**	**Capacity**	**Age/Condition**
Moody's Mar.		44,700	
City		11,000	
Miss. Lodge		18,000	
SW Reg. School		10,000	
Bulk Fuel Upgrade	**Priority**	**Project**	**Status**

Purchasing	**Deliveries/Year**	**Gallons/Delivery**	**Vendor(s)**
By Barge			
By Air			

Cooperative Purchasing Agreements

Notes

Competitive bidding from Dillingham vendors. Barge delivery.

Energy Profile: Aleknagik

Housing Units	Occupied	Vacant	% Owner-Occup.
	65	60	58%

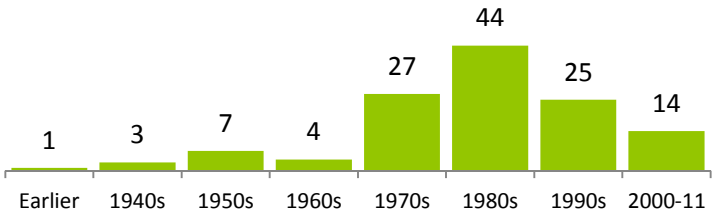
Regional Housing Authority	Weatherization Service Provider
Bristol Bay HA	Bristol Bay HA

Housing Need	Overcrowded	1-star
	15.4%	6.8%

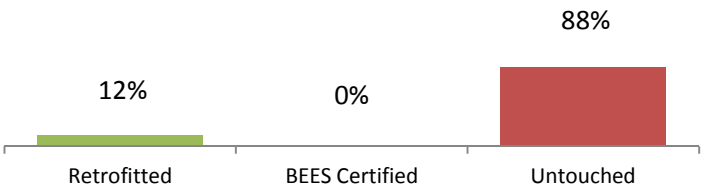
Energy Use	Average Home Energy Rating	Average Square Feet	Avg. EUI (kBTU/sf)
	3-star	914	120

Data Quality	
	High

Age of Housing Stock



Energy Efficient Housing Stock



Lighting	Owner	Number/Type	Retrofitted?	Year	Notes
	Utility	11-12			

Non-residential Building Inventory

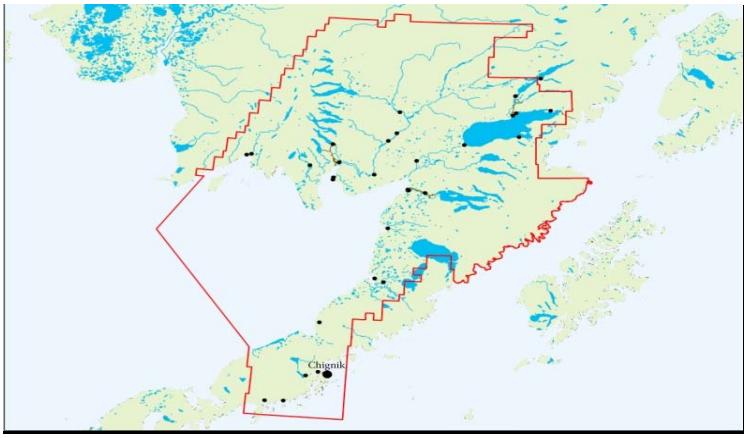
Building Name or Location	Year Built	Square Feet	Audited?	Retrofits Done?	In ARIS?
ADF&G Bunk House 1					No
ADF&G Bunk House 2					No
ADF&G Shed					No
Airport Storage	1981	336			No
Aleknagik K-8 School	1982	12,426	Yes		Yes
Chuck Hoyt Seasonal Cabin					No
City Dock					No
City Office		3,315			No
City Office	1982	3,300			No
Clinic	2007	2,562			No
Coho Cove LLC 1					No
Coho Cove LLC 2					No
Community Center	1972	1,730			No
Mark Smith Rental					No
Mission Creek Lodge - Steambath					No
Mission Creek Lodge (Employee Housing)					No
Mission Creek Lodge Bldg. 1					No
Mission Creek Lodge Bldg. 2					No
Moody's Marina					No
Moravian Church					No
Municipal North Shore City Hall					No
Municipal North Shore Community Center/Office					No
Municipal North Shore Maint. Bldg.	1982	2,300			No
Municipal South Shore Maint. Bldg	1982	2,250			No
Municipal Warm Storage Facility	2007	950			No
Orthodox Church					No

Energy Profile: Aleknagik

Non-residential Building Inventory (continued)

Building Name or Location	Year Built	Square Feet	Audited?	Retrofits Done?	In ARIS?
School Garage					No
School House Inn					No
School House Inn B&B					No
School Pumphouse					No
School Storage 1	1958	192			No
School Storage 2	1995	293			No
Silver Finn					No
South Shore City Shop 2		2,251			No
South Shore Office Bldg. 1	1999				No
South Shore Office Bldg. 2	1988				No
Traditional Council Bldg.					No
Wood River Escape (Seasonal)					No
W-T State Park Garage					No
W-T State Park House					No
Yutanna Barge					No

Community Profile: Chignik Bay



Alaska Native Name (definition)
Cirniq ("big wind")

Historical Setting / Cultural Resources

A village called "Kalwak" was originally located here; it was destroyed during the Russian fur boom in the late 1700s. Chignik was established in the late 1800s as a fishing village and cannery. Coal mining occurred from 1899 to 1915. Today, two of the historical canneries are still in operation. The community is presently a mixture of non-Natives and Alutiiq. Subsistence on fish and caribou is important to residents' livelihoods.

Energy Priorities and Projects

Secure funds for design and construction of Indian Creek Hydro; upgrade/repair on distribution system; new round of weatherization; Water reservoir & distribution system need significant repairs; Additional housing needed; street light & airport lighting upgrade to LEDs; new dock construction

Incorporation	2nd Class City

Location

Located on Anchorage Bay on the south shore of the Alaska Peninsula. It lies 450 miles southwest of Anchorage and 260 miles southwest of Kodiak.

Longitude	-158.4022	**Latitude**	56.2953
ANCSA Region	Bristol Bay Native Corporation		
Borough/CA	Lake and Peninsula Borough		
School District	Lake and Peninsula Borough School District		
AEA Region	Bristol Bay		

Taxes	**Type (rate)**	**Per-Capita Revenue**
	None	

Economy

Fishing is the primary industry. Local government, education/health services, and manufacturing are large employers.

Climate	**Avg. Temp.**	**Climate Zone**	**Heating Deg. Days**
	38.4°	7	N/A

Natural Hazard Plan	**Year**
No	

Notes	Expired

Community Plans	**Year**
Chignik Bay Community Plan	2006

Notes	**Email**	**Phone**	**Fax**
City of Chignik		907-749-2280	907-749-2300
Chignik Bay Tribal Council	cbaytc@aol.com	907-749-2445	907-749-2423
Bristol Bay Native Assoc. Inc.		907-842-5257	907-842-5932

Demographics	**2000**	**2010**		**2013**
Population	79	91	**Percent of Residents Employed**	69.1%
Median Age	37	45.3	**Denali Commission Distressed Community**	No
Avg. Household Size	3	2.22	**Percent Alaska Native/American Indian (2010)**	59.0%
Median Household Income	N/A	$97,500	**Low and Moderate Income (LMI) Percent (2014)**	52.8%

Electric Utility	**Generation Sources**	**Interties**	**PCE?**
City of Chignik	Diesel		Yes

Landfill	**Class**	3	**Permitted?**	No	**Location**	Chignik

Water/Wastewater System	City of Chignik	**Homes Served**	**System Volume**
Water	Piped	38	
Sewer	Piped	**Energy Audit?**	
Notes	Dam for reservoir leaks; needs upgrade	Yes	

Access

Road	No				
Air Access	State owned; gravel	**Runway**	2600'x60'		
Dock/Port	Yes	**Barge Access?**	Yes	**Ferry Service?**	Yes

Notes

Energy Profile: Chignik Bay

Diesel Power System

Utility	City of Chignik		
Engine	**Make/Model**	**Condition/Hrs**	**Gen Capacity**
Unit 1	John Deere	Fair/12,527	230
Unit 2	John Deere	Good/10,934	230
Unit 3	John Deere	Good/6,844	117
Unit 4			
Line Loss		11.1%	
Heat Recovery?		Yes; Not in use	

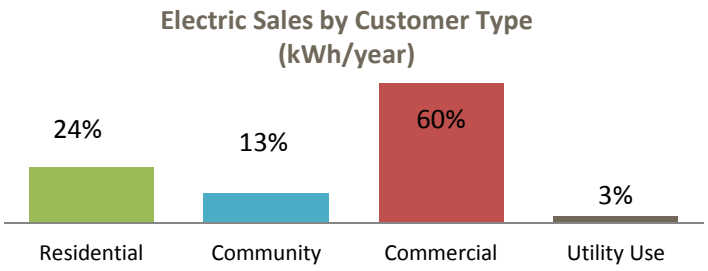
Upgrades	**Priority**	**Projects**	**Status**
RPSU Powerhouse	Low	2009 upgrade	Complete
RPSU Distribution	Med.		

Outage History/Known Issues

High cool. temp., pump fail., batt. explosion. Dist. Cond. damage.

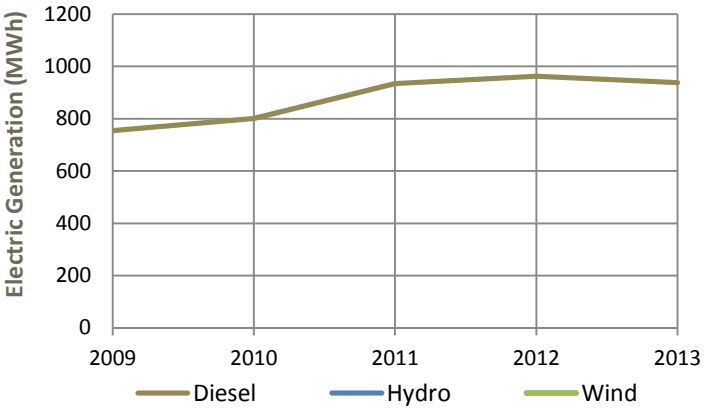
Operators	**No. of Operators**	**Training/Certifications**
	1	APPO, BFO, PPO, Clerk

Maintenance Planning (RPSU)	Good		
Electric Sales	**No. of Customers**	**kWh/year**	**kWh/Customer**
Residential	65	180,318	2,774
Community	10	97,040	9,704
Commercial	57	453,736	7,960
Utility Use		20,646	



Power Production

Diesel (kWh/yr)	845,836	**Avg. Load (kW)**	62
Wind (kWh/yr)	0	**Peak Load (kW)**	138
Hydro (kWh/yr)	0	**Efficiency (kWh/ga**	14
Total (kWh/yr)	845,836	**Diesel Used (gals/**	62,113



Electric Rates ($/kWh)		**Cost per kWh Sold ($/kWh)**	
Rate with PCE	$0.21	**Fuel Cost**	$0.33
Residential Rate	$0.55	**Non-fuel Cost**	$0.17
Commercial Rate	$0.55	**Total Cost**	$0.50

Fuel Prices ($)	**Utility/Wholesale**	**Retail**	**Month/Year**
Diesel (1 gal)	$3.90	$4.19	6-13; 3-15
Other Fuel? (1 gal)			
Gasoline (1 gal)			
Propane (100#)		$220.24	8-14
Wood (1 cord)			
Pellets			

Discounts? Seniors do not pay for delivery.

Alternative Energy	**Potential**	**Projects**	**Status**
Hydroelectric	High	Chignik Hydroelectric Project	Seeking funds for design
Wind Diesel	Low	Met tower found high turbulence	Not pursuing, focus on hydro
Biomass	Low		
Solar	Pending		
Geothermal	Low		
Oil and Gas	Low		
Coal	Low		
Emerging Tech	Not Rated		
Heat Recovery	Low		
Energy Efficiency	High	EECBG;VEEP	Both Complete

Bulk Fuel

Tank Owner	**Fuel Type(s)**	**Capacity**	**Age/Condition**
City	Heating Oil	96,000	
City	Diesel	32,000	
City (Trident uses)	Diesel	32,000	

Bulk Fuel Upgrade	**Priority**	**Project**	**Status**

Purchasing	**Deliveries/Year**	**Gallons/Delivery**	**Vendor(s)**
By Barge	2		Delta West.
By Air			via Trident

Cooperative Purchasing Agreements

No, purchase through Trident which gets better price.

Notes

Barge delivery in May & Oct.

Energy Profile: Chignik Bay

Housing Units	Occupied	Vacant	% Owner-Occup.
	44	38	66%

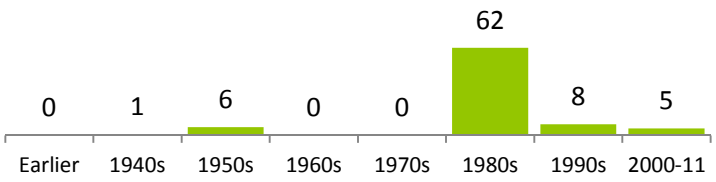
Regional Housing Authority	Weatherization Service Provider
Bristol Bay HA	Bristol Bay HA

Housing Need	Overcrowded	1-star
	11.4%	N/A

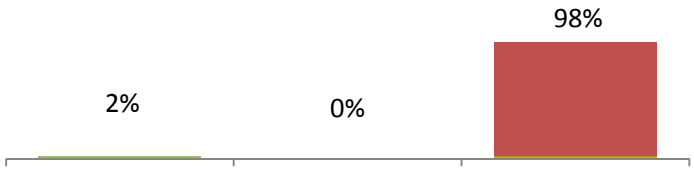
Energy Use	Average Home Energy Rating	Average Square Feet	Avg. EUI (kBTU/sf)
	N/A	N/A	N/A

Data Quality	
	Low

Age of Housing Stock



Energy Efficient Housing Stock



Street Lighting	Owner	Number/Type	Retrofitted?	Year	Notes
	City				

Non-residential Building Inventory

Building Name or Location	Year Built	Square Feet	Audited?	Retrofits Done?	In ARIS?
Adult Entertainment Bar					No
Beauty & Barber Shop					No
Boiler Building		480			No
Chignik Bay School	1995	30,000			No
City Office		4,189			No
City Shop		3,500			No
Clinic					No
Community College					No
Community Hall		2,301			No
Community. Maint. Shop					No
Cultural Center					No
Daycare					No
EMS Bldg					No
Firehall and Emergency Shelter		1,102			No
Grocery Store					No
New Fire Dept.					No
New Gym	1993	5,100			No
New Teen Center					No
Old Generator Bldg		520			No
Old Water Pumphouse		120			No
Post Office					No
Public Safety Bldg					No
Regional High school				Yes; Lights	No
School Powerhouse	1988	1,746			No
School Powerhouse					No
Senior Center					No
Small Boat Motor Service					No
Sporting Goods & Tackle Shop					No
Subregional Clinic	2009	4,456			No
Swimming Pool					No
Teacher Housing Tri-Plex		4,384			No
Tribal Council Office		1,591			No

Energy Profile: Chignik Bay

Non-residential Building Inventory (continued)

Building Name or Location	Year Built	Square Feet	Audited?	Retrofits Done?	In ARIS?
VPSO Office		1,141			No
Washeteria					No
Water Treatment Plant		600			No

Community Profile: Chignik Lagoon

Incorporation	Unincorporated

Location

Located on the south shore of the Alaska Peninsula, 450 miles southwest of Anchorage. It lies 180 air miles south of King Salmon, 8.5 miles west of Chignik, and 16 miles east of Chignik Lake.

Longitude	-158.5314	**Latitude**	56.31
ANCSA Region	Bristol Bay Native Corporation		
Borough/CA	Lake and Peninsula Borough		
School District	Lake and Peninsula Borough School District		
AEA Region	Bristol Bay		

Alaska Native Name (definition)

Nanwarnaq

Taxes	**Type (rate)**	**Per-Capita Revenue**
None		

Historical Setting / Cultural Resources

Chignik Lagoon took its name from its location and proximity to Chignik. The people of this area have always been sea-dependent, living on otter, sea lion, porpoise, and whale. During the Russian fur boom from 1767 to 1783, the sea otter population was decimated. Chignik Lagoon has developed as a fishing village, experiencing an influx of fishermen in the summer. The population swells by 200 during fishing season.

Economy

Local government, education/health services, and information are the only forms of employment. There are 22 fishing permits and 11 business licenses.

Climate	**Avg. Temp.**	**Climate Zone**	**Heating Deg. Days**
	N/A	7	

Natural Hazard Plan	**Year**

Energy Priorities and Projects

Monitor & maintain Packer's Creek Hydro; Heat Recovery- electric boilers with excess hydro; Investigate wind power (alternative sites for met tower); Re-size powerhouse, smaller more efficient generator(s); Examine distribution/ transmission lines in poor condition; geothermal/ground source heat pumps; Weatherization on community buildings; additional housing; airport lighting/runway extension

Notes

Community Plans	**Year**
Community Plan	2004
Chignik Lagoon Alt. Energy Action Plan	2010

Local Contacts	**Email**	**Phone**	**Fax**
Chignik Lagoon Native Corp.		907-840-2225	907-840-2270
Native Village of Chignik Lagoon		907-840-2206	
Bristol Bay Native Assoc. Inc.		907-842-5257	907-842-5932

Demographics	**2000**	**2010**		**2013**
Population	103	78	**Percent of Residents Employed**	37.1%
Median Age	27	36	**Denali Commission Distressed Community**	Yes
Avg. Household Size	4	2.69	**Percent Alaska Native/American Indian (2010)**	66.7%
Median Household Income	N/A	$138,542	**Low and Moderate Income (LMI) Percent (2014)**	N/A

Electric Utility	**Generation Sources**	**Interties**	**PCE?**
Chignik Lagoon Power Utility	Diesel		Yes

Landfill	**Class**	3	**Permitted?**	Yes	**Location**	Chignik Lagoon

Water/Wastewater System	Native Village of Chignik Lagoon	**Homes Served**	**System Volume**
Water	Piped	28	50,001-100,000 gallons/day
Sewer	Piped	**Energy Audit?**	
Notes	Two operators, one more in training	No	

Access

Road	No				
Air Access	State owned; gravel-dirt	**Runway**	1810'x60'		
Dock/Port	Yes	**Barge Access?**	Yes	**Ferry Service?**	No
Notes	Dock is makeshift, mostly used for personal boats.				

Energy Profile: Chignik Lagoon

Diesel Power System

Utility	Chignik Lagoon Power Utility		
Engine	**Make/Model**	**Condition/Hrs**	**Gen Capacity**
Unit 1	John Deere	Fair/33,435	148
Unit 2	John Deere	Fair/69,442	160
Unit 3	John Deere	Fair/18,279	145
Unit 4			
Line Loss		0.8%	
Heat Recovery?		Yes; School	

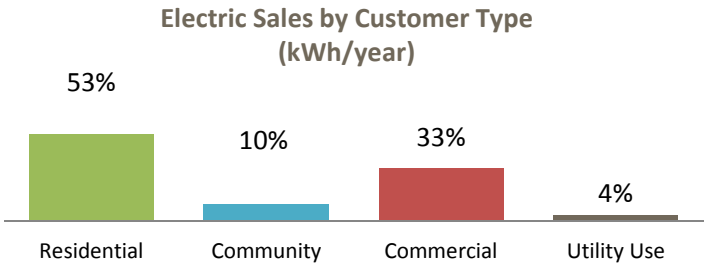
Upgrades	Priority	Projects	Status
RPSU Powerhouse	High		
RPSU Distribution	Med.		

Outage History/Known Issues

Outages due to iced fuel lines, 1 engine replaced in 2014.

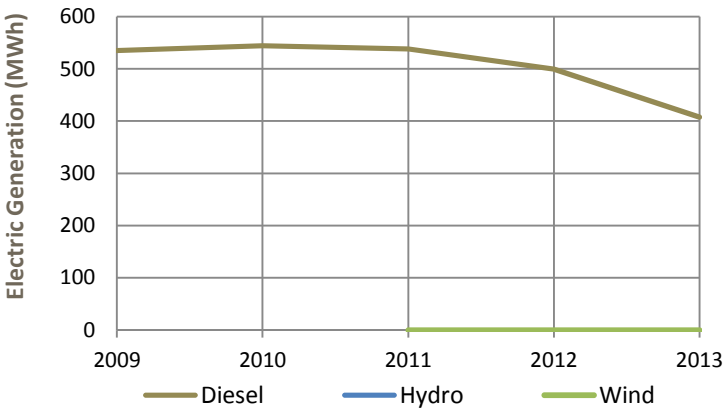
Operators	No. of Operators	Training/Certifications
	3	BFO, PPO, Clerk

Maintenance Planning (RPSU)	Unacceptable		
Electric Sales	**No. of Customers**	**kWh/year**	**kWh/Customer**
Residential	49	224,901	4,590
Community	6	42,974	7,162
Commercial	6	138,196	23,033
Utility Use		14,887	



Power Production

Diesel (kWh/yr)	424,463	**Avg. Load (kW)**	57
Wind (kWh/yr)	0	**Peak Load (kW)**	128
Hydro (kWh/yr)	0	**Efficiency (kWh/gal)**	11
Total (kWh/yr)	424,463	**Diesel Used (gals/yr)**	39,284



Electric Rates ($/kWh)		Cost per kWh Sold ($/kWh)	
Rate with PCE	$0.26	**Fuel Cost**	$0.44
Residential Rate	$0.63	**Non-fuel Cost**	NR
Commercial Rate	Varies	**Total Cost**	$0.44

Fuel Prices ($)	Utility/Wholesale	Retail	Month/Year
Diesel (1 gal)	$4.50	$4.85	6-13, 3-15
Other Fuel? (1 gal)			
Gasoline (1 gal)		$5.00	3-15
Propane (100#)			
Wood (1 cord)			
Pellets			

Discounts? No delivery charge for Seniors.

Alternative Energy	Potential	Projects	Status
Hydroelectric	High	Packers Creek Hydro Project - 167 kW	Operational in March 2015
Wind Diesel	Low	Feasibility	Not feasible; exploring alt. sites
Biomass	Low		
Solar	Pending		
Geothermal	Low		
Oil and Gas	Low		
Coal	Medium		
Emerging Tech	Not Rated		
Heat Recovery	High	HR on diesel gensets to school; Electric boilers	Operational; In progress(hydro)
Energy Efficiency	High		

Bulk Fuel

Tank Owner	Fuel Type(s)	Capacity	Age/Condition
Village	Heating Oil	35,824	Good
Village	Gasoline	17,587	Good
Village	Diesel	22,327	Good

Bulk Fuel Upgrade	Priority	Project	Status

Purchasing	Deliveries/Year	Gallons/Delivery	Vendor(s)
By Barge	2		Crowley
By Air			

Cooperative Purchasing Agreements

No

Notes

School has own tank farm, serves generators.

Energy Profile: Chignik Lagoon

Housing Units	Occupied	Vacant	% Owner-Occup.
	31	36	68%

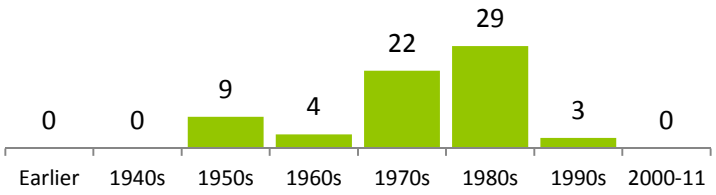
Regional Housing Authority	Weatherization Service Provider
Bristol Bay HA	Bristol Bay HA

Housing Need	Overcrowded	1-star
	N/A	N/A

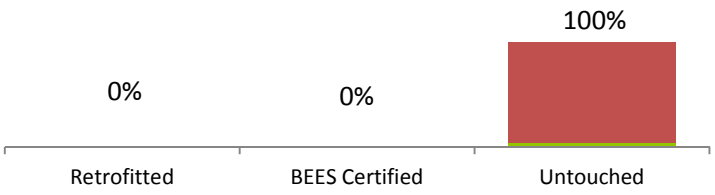
Energy Use	Average Home Energy Rating	Average Square Feet	Avg. EUI (kBTU/sf)
	N/A	N/A	N/A

Data Quality	
	Low

Age of Housing Stock



Energy Efficient Housing Stock

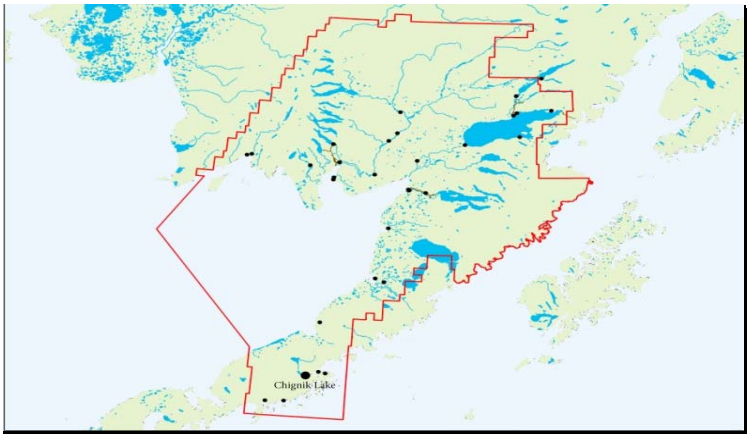


Street Lighting	Owner	Number/Type	Retrofitted?	Year	Notes
	CL Utility	19/HPS	yes		Replaced with 14 LEDs

Non-residential Building Inventory

Building Name or Location	Year Built	Square Feet	Audited?	Retrofits Done?	In ARIS?
ACS Phone Co.					No
Chignik Bible Church					No
Chignik Lagoon School	1988	12,878			No
Church					No
Clinic	1985	1,302			No
Fire & Heavy Equip. Storage					No
Fire Equip. Bldg					No
GCI Phone Co.					No
Incinerator					No
IRA Office					No
New Post Office					No
New Water Pumphouse					No
Old Tank Farm					No
Old Village Post Office					No
Pumphouse					No
School Generator Building	1987	384			No
School Powerhouse	1987	240			No
Store					No
Subsistence Bldg					No
Teacher Housing					No
Village Council Office					No
Village Generator					No
Village Water Source					No
Youth Center					No

Community Profile: Chignik Lake



Alaska Native Name (definition)

Igyaraq

Historical Setting / Cultural Resources

The present population traces its roots from the Alutiiq near Illnik and the old village of Kanatag near Becharof Lake. The community was the winter residence of a single family in 1903. Other families moved from surrounding communities in the early 1950s when a school was built. Chignik Lake is a predominantly Alutiiq fishing village.

Energy Priorities and Projects

Energy efficiency measures, determine alternative sites for wind study; Explore intertie opportunities with Chignik or Chignik Lagoon; 2 new generators; Water and sanitation system upgrade; Install solar PV arrays on residences and community buildings

Incorporation	Unincorporated

Location

Located on the south side of the Alaska Peninsula next to the body of water of the same name. It lies 13 miles from Chignik, 265 miles southwest of Kodiak, and 474 miles southwest of Anchorage.

Longitude	-158.2554	**Latitude**	56.2554
ANCSA Region	Bristol Bay Native Corporation		
Borough/CA	Lake and Peninsula Borough		
School District	Lake and Peninsula Borough School District		
AEA Region	Bristol Bay		

Taxes	**Type (rate)**	**Per-Capita Revenue**
	None	

Economy

Local government, education/health services, and construction are main employers. There are 4 fishing permits and 2 business licenses.

Climate	**Avg. Temp.**	**Climate Zone**	**Heating Deg. Days**
	N/A	7	9,612

Natural Hazard Plan	**Year**

Notes

Community Plans	**Year**

Historical Setting / Cultural Resource	**Email**	**Phone**	**Fax**
Chignik Lake Village	chigniklakecouncil@gmail.com	907-845-2212	907-845-2217
Chignik River Limited		907-845-2212	907-845-2217
Bristol Bay Native Assoc. Inc.		907-842-5257	907-842-5932

Demographics	**2000**	**2010**		**2013**
Population	145	73	**Percent of Residents Employed**	60.0%
Median Age	21	32.5	**Denali Commission Distressed Community**	No
Avg. Household Size	4	2.7	**Percent Alaska Native/American Indian (2010)**	93.3%
Median Household Income	N/A	$66,667	**Low and Moderate Income (LMI) Percent (2014)**	N/A

Electric Utility	**Generation Sources**	**Interties**	**PCE?**
Chignik Lake Electric Utility, Inc.	Diesel		Yes

Landfill	**Class**	3	**Permitted?**	No	**Location**	Chignik Lake

Water/Wastewater System	Lake and Peninsula Borough	**Homes Served**	**System Volume**
Water	Piped	26	
Sewer	Piped	**Energy Audit?**	
Notes		Yes	

Access

Road	No				
Air Access	State owned; gravel	**Runway**	2800'x60'		
Dock/Port	No	**Barge Access?**	No	**Ferry Service?**	No
Notes					

Energy Profile: Chignik Lake

Diesel Power System

Utility	Chignik Lake Electric Utility		
Engine	**Make/Model**	**Condition/Hrs**	**Gen Capacity**
Unit 1	John Deere	Poor/10,635	147
Unit 2	John Deere	Poor/3,085	125
Unit 3	John Deere	Poor/22,682	90
Unit 4	John Deere	Fair/22,959	80
Line Loss		9.6%	
Heat Recovery?		Yes; School	

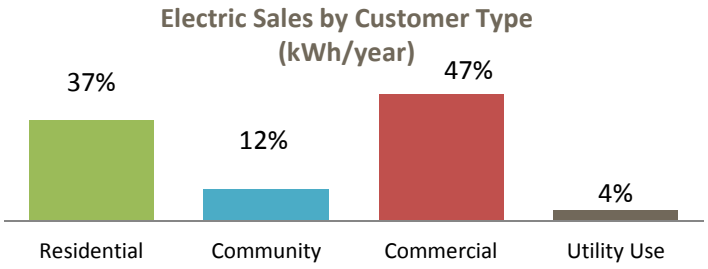
Upgrades	**Priority**	**Projects**	**Status**
RPSU Powerhouse	High		
RPSU Distribution	High		

Outage History/Known Issues

Numerous gen. shutdowns. No PCE data prior to 7-11.

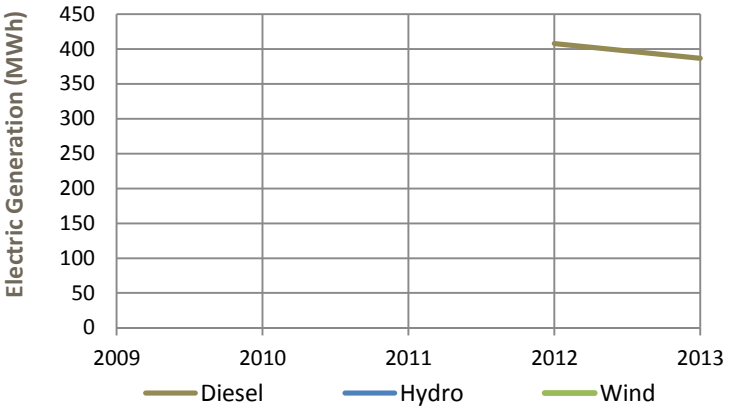
Operators	**No. of Operators**	**Training/Certifications**
	2	APPO, BFO, PPO, Clerk

Maintenance Planning (RPSU)	Unacceptable		
Electric Sales	**No. of Customers**	**kWh/year**	**kWh/Customer**
Residential	41	130,201	3,176
Community	9	41,035	4,559
Commercial	5	164,075	32,815
Utility Use		13,954	



Power Production

Diesel (kWh/yr)	386,321	**Avg. Load (kW)**	29
Wind (kWh/yr)	0	**Peak Load (kW)**	65
Hydro (kWh/yr)	0	**Efficiency (kWh/gal)**	10
Total (kWh/yr)	386,321	**Diesel Used (gals/yr)**	37,232



Electric Rates ($/kWh)		**Cost per kWh Sold ($/kWh)**	
Rate with PCE	$0.33	**Fuel Cost**	$0.57
Residential Rate	$0.85	**Non-fuel Cost**	$0.18
Commercial Rate		**Total Cost**	$0.75

Fuel Prices ($)	**Utility/Wholesale**	**Retail**	**Month/Year**
Diesel (1 gal)	$4.95	$6.01	6-13; 8-14
Other Fuel? (1 gal)			
Gasoline (1 gal)			
Propane (100#)		$220.24	8-14
Wood (1 cord)			
Pellets			

Discounts? Free delivery for Elders.

Alternative Energy	**Potential**	**Projects**	**Status**
Hydroelectric	Medium		
Wind Diesel	Low	Met tower/Feasibility in 2011	Not feasible; exploring alt. sites
Biomass	Low		
Solar	Pending		
Geothermal	Low		
Oil and Gas	Low		
Coal	Medium		
Emerging Tech	Not Rated		
Heat Recovery	High	HR to School	In progress
Energy Efficiency	High	Street light upgrade	Complete

Bulk Fuel

Tank Owner	**Fuel Type(s)**	**Capacity**	**Age/Condition**
Tribe	Heating Oil	56,000	Fair
Tribe	Gasoline	15,000	Fair

Bulk Fuel Upgrade	**Priority**	**Project**	**Status**

Purchasing	**Deliveries/Year**	**Gallons/Delivery**	**Vendor(s)**
By Barge	2		Trident
By Air			

Cooperative Purchasing Agreements

Coordinate rates through Trident.

Notes

Haul from Chignik Lagoon via boat.

Energy Profile: Chignik Lake

Housing Units	Occupied	Vacant	% Owner-Occup.
	36	22	58%

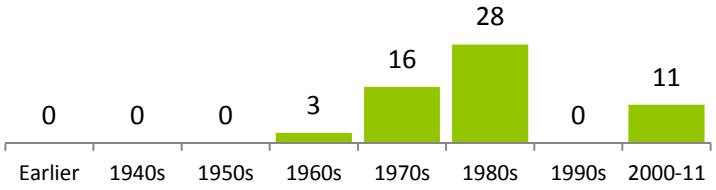
Regional Housing Authority	Weatherization Service Provider
Bristol Bay HA	Bristol Bay HA

Housing Need	Overcrowded	1-star
	11.1%	N/A

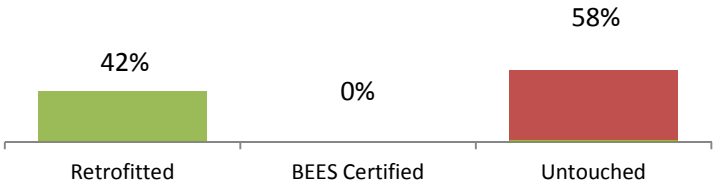
Energy Use	Average Home Energy Rating	Average Square Feet	Avg. EUI (kBTU/sf)
	N/A	N/A	N/A

Data Quality	
	Medium

Age of Housing Stock



Energy Efficient Housing Stock

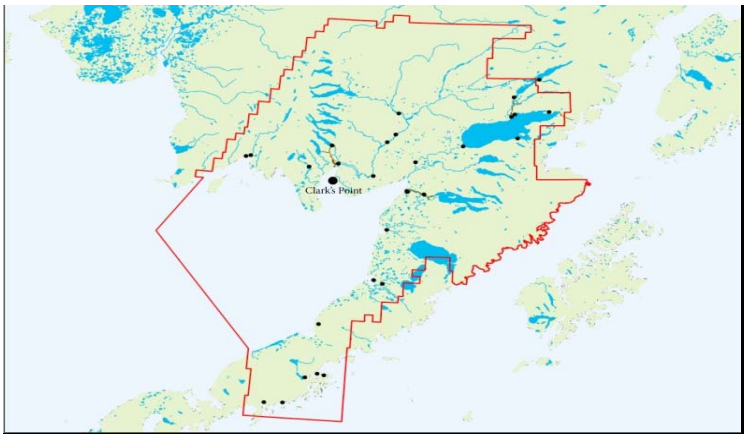


Street Lighting	Owner	Number/Type	Retrofitted?	Year	Notes
	Tribe	16	Yes	2014	Switched to LEDs

Non-residential Building Inventory

Building Name or Location	Year Built	Square Feet	Audited?	Retrofits Done?	In ARIS?
Bed & Breakfast					No
Boat Storage Area					No
Chignik Lake Clinic	2007	2,583			No
Chignik Lake K-12	1984	19,030	Yes		Yes
Church	1985	1,920			No
Code Red Bldg.					No
Community Bldg.					No
DOT Grader Storage					No
Equipment Storage	1964	800			No
Hotel					No
IGAP Building	1980	1,200			No
Metal Shop	1988	2,500			No
Office					No
Post Office, Store, & Dwelling					No
Power Plant/Water Laundry					No
Pump House	1980	12,000			No
Russian Orthodox Church					No
School Generator Building	1985	800			No
School Shop	1984	1,440			No
State of AK Storage Building	1993	1,104			No
Store					No
Sub Building	1998	2,500			No
Subsistence Bldg./Teen Center					No
Teacher Housing					No
Washeteria					No

Community Profile: Clark's Point



Alaska Native Name (definition)
N/A

Historical Setting / Cultural Resources

The community was named for John Clark, who was the manager of the Alaska Commercial Company store at Nushagak. In 1929, a major flood occurred. The village has been plagued by severe erosion. A housing project in 1982 was constructed on high and safe ground on the bluff. The community was founded on fishing operations of non-Native settlers, although presently it is predominantly Yup'ik Eskimo. The population increases by about 300 in summer months due to the commercial fishery.

Energy Priorities and Projects

Work with AEA on integration of small wind turbines to utility grid; Investigate hydro and/or solar for more renewable power generation

Incorporation	2nd Class (inc. 1971)

Location

Clark's Point is located on a spit on the northeastern shore of Nushagak Bay, 15 miles from Dillingham and 337 miles southwest of Anchorage.

Longitude	-158.5508	**Latitude**	58.8442
ANCSA Region	Bristol Bay Native Corporation		
Borough/CA	Dillingham Census Area		
School District	N/A		
AEA Region	Bristol Bay		

Taxes	**Type (rate)**	**Per-Capita Revenue**
	Sales (5%)	N/A

Economy

Subsistence fishing village. Seasonal fishing camps. 10 commercial fishing permits. 0 business licenses.

Climate	**Avg. Temp.**	**Climate Zone**	**Heating Deg. Days**
	N/A	7	N/A

Natural Hazard Plan	**Year**
No	

Notes	No record

Community Plans	**Year**

Local Contacts	**Email**	**Phone**	**Fax**
City of Clark's Point	cityofclarkspoint@gci.net	907-236-1221	907-236-1412
Bristol Bay Native Corporation		907-278-3602	907-276-3924
Village of Clark's Point			

Demographics	**2000**	**2010**		**2013**
Population	75	62	**Percent of Residents Employed**	50%
Median Age	31	45	**Denali Commission Distressed Community**	Yes
Avg. Household Size	4	3	**Percent Alaska Native/American Indian (2010)**	88.7
Median Household Income	N/A	$31,250	**Low and Moderate Income (LMI) Percent (201x)**	66.7%

Electric Utility	**Generation Sources**	**Interties**	**PCE?**
Clark's Point Electric	Diesel	No	Yes (Inactive)

Landfill	**Class**	3	**Permitted?**	No	**Location**	Bluff above town.

Water/Wastewater System	Clark's Point Water System	**Homes Served**	**System Volume**
Water	Piped		
Sewer		**Energy Audit?**	
Notes		No	

Access

Road	No				
Air Access	Public; Gravel	**Runway**	3,200'x60'		
Dock/Port	Yes	**Barge Access?**	Yes	**Ferry Service?**	No

Notes

Energy Profile: Clark's Point

Diesel Power System

Utility	City of Clark's Point		
Engine	**Make/Model**	**Condition/Hrs**	**Gen Capacity**
Unit 1	Caterpillar	Fair/62,524	113
Unit 2	Caterpillar	Fair/25,431	250
Unit 3	Caterpillar	Fair/45,551	113
Unit 4			
Line Loss			
Heat Recovery?		Yes; Users Unknown	

Upgrades	**Priority**	**Projects**	**Status**
RPSU Powerhouse	In Progress		
RPSU Distribution	In Progress		

Outage History/Known Issues

One outage due to blown transformer.

Operators	**No. of Operators**	**Training/Certifications**
	2	BFO, Clerk, PPO

Maintenance Planning (RPSU)	Acceptable

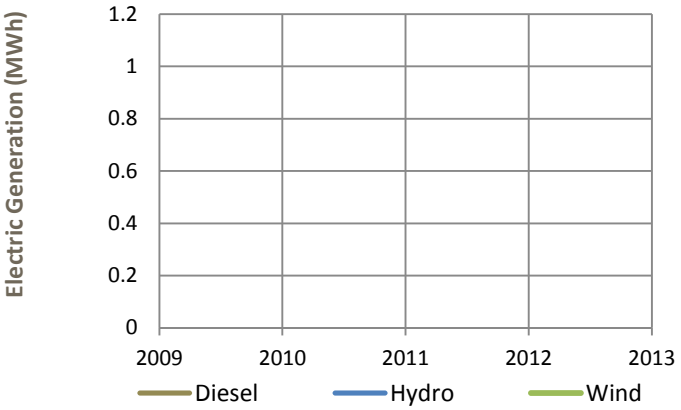
Electric Sales	**No. of Customers**	**kWh/year**	**kWh/Customer**
Residential			
Community			
Commercial			
Utility Use			

Electric Sales by Customer Type (kWh/year)

Residential Community Commercial Utility Use

Power Production

Diesel (kWh/yr)	**Avg. Load (kW)**	53
Wind (kWh/yr)	**Peak Load (kW)**	117
Hydro (kWh/yr)	**Efficiency (kWh/gal)**	
Total (kWh/yr)	**Diesel Used (gals/yr)**	



Electric Rates ($/kWh)	**Cost per kWh Sold ($/kWh)**
Rate with PCE	**Fuel Cost**
Residential Rate	**Non-fuel Cost**
Commercial Rate	**Total Cost**

Fuel Prices ($)	**Utility/Wholesale**	**Retail**	**Month/Year**
Diesel (1 gal)		$6.00	6-13; 8-14
Other Fuel? (1 gal)			
Gasoline (1 gal)			
Propane (100#)			
Wood (1 cord)			
Pellets			
Discounts?			

Alternative Energy	**Potential**	**Projects**	**Status**
Hydroelectric	Low		
Wind Diesel	Low	7 residential turbines	Installing
Biomass	High		
Solar	Pending		
Geothermal	Low		
Oil and Gas	Low		
Coal	Low		
Emerging Tech	Not Rated		
Heat Recovery	Low		
Energy Efficiency	High	1) EECBG 2) Streetlight Replacement	Both Complete

Bulk Fuel

Tank Owner	**Fuel Type(s)**	**Capacity**	**Age/Condition**
City	Heating Oil	20,000	Good
City	Gasoline	16,000	Good

Bulk Fuel Upgrade	**Priority**	**Project**	**Status**

Purchasing	**Deliveries/Year**	**Gallons/Delivery**	**Vendor(s)**
By Barge			
By Air			

Cooperative Purchasing Agreements

Notes

Delivery by barge.

Energy Profile: Clark's Point

Housing Units	Occupied	Vacant	% Owner-Occup.
	20	24	45%

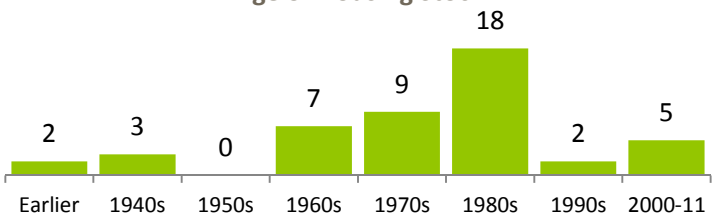
Regional Housing Authority	Weatherization Service Provider
Bristol Bay HA	Bristol Bay HA

Housing Need	Overcrowded	1-star
	25.0%	N/A

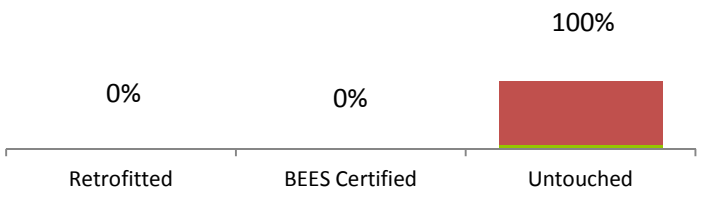
Energy Use	Average Home Energy Rating	Average Square Feet	Avg. EUI (kBTU/sf)
	N/A	N/A	N/A

Data Quality	
	Low

Age of Housing Stock



Energy Efficient Housing Stock



Lighting	Owner	Number/Type	Retrofitted?	Year	Notes
	City of CP	8/HPS	Yes	2012	Replaced with LEDs

Non-residential Building Inventory

Building Name or Location	Year Built	Square Feet	Audited?	Retrofits Done?	In ARIS?
Carpenter Shop					No
Catholic Church					No
City Office		419			No
Clinic	2006	1,604			No
Cold Storage					No
Commercial Steakhouse					No
Fisherman Bunkhouse					No
Fishery Connexes					No
Generator Shed					No
Laundromat					No
Maint. Shop		880			No
Mechanic Bunkhouse					No
Mechanist Generator/Storage					No
Office					No
Old Bunkhouse					No
Old Mess Hall					No
Old Movie Hall					No
Old Post Office					No
Powerhouse		616			No
Rental House					No
Saguyak Inc. Bldg.					No
School					No
School	1985	9,676			No
School Fuel Pumphouse	1985	64			No
School Generator Bldg	1988	365			No
School Storage Bldg	1997	265			No
State Storage Bldg 1					No
State Storage Bldg 2					No
Storage/Bunk					No
Store					No
Trident Water Pumphouse					No
USPO					No

Energy Profile: Clark's Point

Non-residential Building Inventory (continued)

Building Name or Location	Year Built	Square Feet	Audited?	Retrofits Done?	In ARIS?
Village Council Camp					No
Village Council Clinic & Center					No
Village Council Generator House					No
Village Council Office 1					No
Village Council Office 2					No
Watchman House					No
Water & Sewer Plant		600			No
Water Station					No
Way Station					No
SRE Bldg 2 West (Heated)		1,250			Yes

Community Profile: Dillingham

Alaska Native Name (definition)

Incorporation	1st class (inc. 1963)

Location

Northern end of Nushagak Bay in northern Bristol Bay, at the confluence of the Wood and Nushagak Rivers.

Longitude	-158.4575	**Latitude**	59.0397
ANCSA Region	Bristol Bay Native Corporation		
Borough/CA	Dillingham Census Area		
School District	Dillingham City School District		
AEA Region	Bristol Bay		

Taxes	**Type (rate)**	**Per-Capita Revenue**
	Sales (6%), Bed (10%), Alchl (10%), Gaming (6%), prop. tax	$2,540

Historical Setting / Cultural Resources

The area around Dillingham was inhabited by both Eskimos and Athabascans and became a trade center when Russians erected the Alexandrovski Redoubt Post in 1818. The town was named after U.S. Senator Paul Dillingham in 1904, who had toured Alaska extensively with his Senate subcommittee during 1903. The city was incorporated in 1963 as a 2nd class city. Dillingham is now a 1st class city with highly mixed population of non-Natives and Natives.

Economy

Subsistence. Major fishing, transportation, and public service hub for the Bristol Bay area. 229 commercial fishing permit holders. 248 AK business licenses.

Climate	**Avg. Temp.**	**Climate Zone**	**Heating Deg. Days**
		7	11,306

Natural Hazard Plan	**Year**

Notes	Expired

Energy Priorities and Projects

Energy efficiency (EE) in buildings, homes, and transportation; EE awarness & education; Explore the feasibility of developing renewable sources of energy; Explore the feasibility of distributed energy systems; Expand heat recovery system

Community Plans	**Year**
Comprehensive Plan	2010

Local Contacts	**Email**	**Phone**	**Fax**
City of Dillingham	cityclerk@dillinghamak.us	907-842-5212	907-842-2060
Curyung Tribal Council	dorothy@curyungtribe.com	907-842-2384	907-842-4510
Choggiung Ltd.	inunn@choggiung.com	907-842-3511	907-842-3512

Demographics	**2000**	**2010**		**2013**
Population	2466	2329	**Percent of Residents Employed**	68.3%
Median Age	33	34	**Denali Commission Distressed Community**	No
Avg. Household Size	3	3	**Percent Alaska Native/American Indian (2010)**	59.2%
Median Household Income	N/A	$69,792	**Low and Moderate Income (LMI) Percent (2014)**	37.4%

Electric Utility	**Generation Sources**	**Interties**	**PCE?**
Nushagak Cooperative	Diesel	Aleknagnik	Yes

Landfill	**Class**	2	**Permitted?**	Yes	**Location**	3.75 miles NW of airport.

Water/Wastewater System	City of Dillingham	**Homes Served**	**System Volume**
Water	Piped	855	100,001-500,000 gallons/day
Sewer	Piped	**Energy Audit?**	
Notes	1/2 community have on-site W/S	No	

Access

Road	No				
Air Access	Public; Asphalt	**Runway**	6,400'x150'		
Dock/Port	Yes	**Barge Access?**	Yes	**Ferry Service?**	No

Notes

Energy Profile: Dillingham

Diesel Power System

Utility	Nushagak Electric Cooperative		
Engine	**Make/Model**	**Condition/Hrs**	**Gen Capacity**
Unit 1	7 generators, 5 replaced since 2005		
Unit 2			
Unit 3			
Unit 4			
Line Loss		4.1%	
Heat Recovery?		Yes	
Upgrades	**Priority**	**Projects**	**Status**
Powerhouse			
Distribution		Substation	Complete 2015

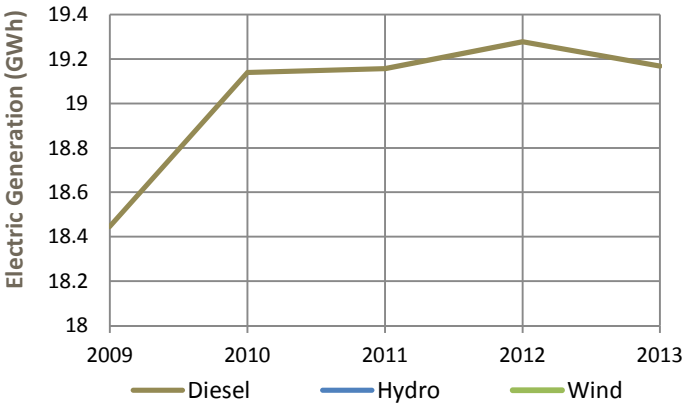
Outage History/Known Issues

Produces for Aleknagik. PCE includes both.

Operators	**No. of Operators**	**Training/Certifications**
	6	Clerk, BFO

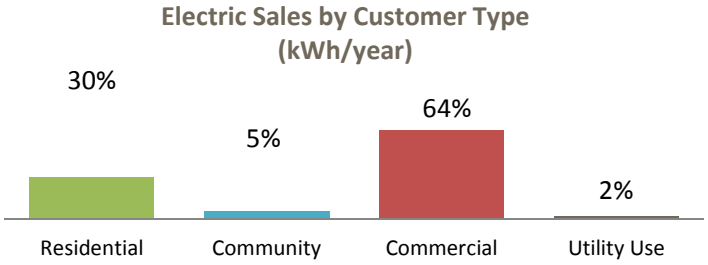
Power Production

Diesel (kWh/yr)	18,956,000	**Avg. Load (kW)**	1,937
Wind (kWh/yr)	0	**Peak Load (kW)**	4,305
Hydro (kWh/yr)	0	**Efficiency (kWh/gal)**	15
Total (kWh/yr)	18,956,000	**Diesel Used (gals/yr)**	1,253,779



Maintenance Planning (RPSU)

Electric Sales	**No. of Customers**	**kWh/year**	**kWh/Customer**
Residential	989	5,389,830	5,450
Community	46	898,782	19,539
Commercial	446	11,548,038	25,892
Utility Use		346,200	



Electric Rates ($/kWh)		**Cost per kWh Sold ($/kWh)**	
Rate with PCE	$0.17	**Fuel Cost**	$0.24
Residential Rate	$0.44	**Non-fuel Cost**	$0.19
Commercial Rate		**Total Cost**	$0.44

Fuel Prices ($)	**Utility/Wholesale**	**Retail**	**Month/Year**
Diesel (1 gal)	$3.85	$5.86	6-13; 8-14
Other Fuel? (1 gal)			
Gasoline (1 gal)		$6.80	4-13
Propane (100#)		$147.62	8-14
Wood (1 cord)			
Pellets			
Discounts?			

Alternative Energy	**Potential**	**Projects**	**Status**
Hydroelectric	Low	Dillingham Area Wind/Hydro Assessment	Hydro Not Feasible
Wind Diesel	Medium	Dillingham Area Wind/Hydro Assessment	Not pursuing
Biomass	Medium		
Solar	Pending	Private use & BB Campus & USFW	
Geothermal	Low		
Oil and Gas	Low		
Coal	Low		
Emerging Tech	Not Rated		
Heat Recovery	High	HR to schools, court, DOT, utility buildings	Operating, Expansion Possible
Energy Efficiency	High	EECBG	Complete

Bulk Fuel

Tank Owner	**Fuel Type(s)**	**Capacity**	**Age/Condition**
Delta West.		44,000	
Peter Pan Seaf.			
Nushagak Elec.		1,850,000	
Bristol Fuels			
Bulk Fuel Upgrade	**Priority**	**Project**	**Status**

Purchasing	**Deliveries/Year**	**Gallons/Delivery**	**Vendor(s)**
By Barge			
By Air			

Cooperative Purchasing Agreements

Notes

Vendors: Bristol Alliance Fuels, Delta, Vitus

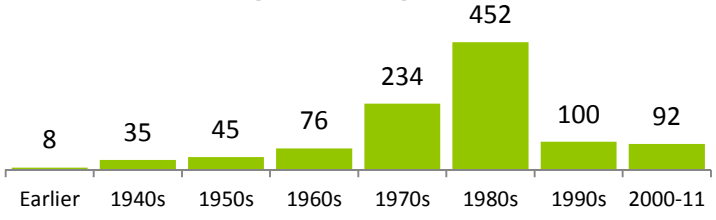
Energy Profile: Dillingham

Housing Units	Occupied	Vacant	% Owner-Occup.
	773	**264**	51%
Housing Need		**Overcrowded**	**1-star**
		7.5%	10.0%
Data Quality	High		

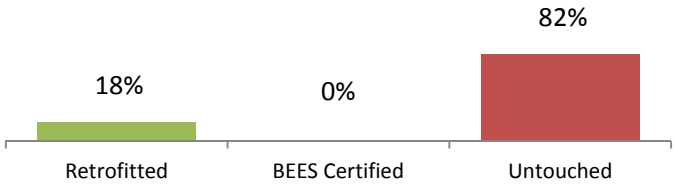
Regional Housing Authority	Weatherization Service Provider
Bristol Bay HA	Bristol Bay HA

Energy Use	Average Home Energy Rating	Average Square Feet	Avg. EUI (kBTU/sf)
	3-star	1,597	124

Age of Housing Stock



Energy Efficient Housing Stock



Lighting	Owner	Number/Type	Retrofitted?	Year	Notes

Non-residential Building Inventory

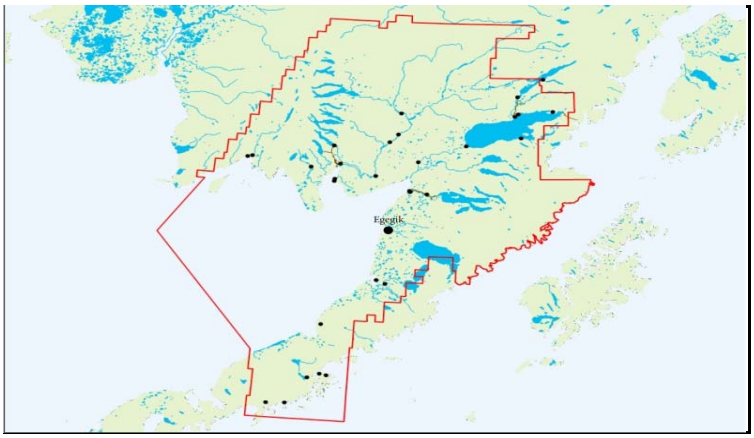
Building Name or Location	Year Built	Square Feet	Audited?	Retrofits Done?	In ARIS?
Admin. Bldg	1939	11,100			No
Admin. Offices, MS & HS		75,578			Yes
Admin/Classroom Bldg		12,525			Yes
AK DOT & Public Fac.					No
AKDF&G					No
Alascom					No
ARFF Bldg		7,042			Yes
Bahai Church					No
Ball Bros. Inc. Bldg.					No
Big Foot Retail					No
Boat Storage					No
Bristol Inn					No
City Dock Bldg.					No
City Hall		7,515			No
Commercial Company Bldg.					No
Court Bldg.					No
Dillingham Health Center		1,296			Yes
Dillingham Post Office					Yes
Dillingham RTH Unit					Yes
Electric Coop.					No
Elementary School	1990	29,659			Yes
Fire Hall					No
Garage					No
George/Joann Nelson Commercial Rental					No
Hotel					No
Icicle Seafoods					No
Jim B. Storage					No
Kallstrom Camp					No
Kanakanak Hospital		125,996			No
Kanquiqutaq Bldg.					No
L&M Supply					No
Library		4,722			No
Maintenance Shop		4,800			Yes

Energy Profile: Dillingham

Non-residential Building Inventory (continued)

Building Name or Location	Year Built	Square Feet	Audited?	Retrofits Done?	In ARIS?
Medical Office					No
Middle/High School	1990	75,578			Yes
Morovian Church					No
N&N Market					No
Office Bldg.					No
Peter Pan Seafoods Bldg.					No
PHS Quonset Bldg.					No
Police Dept.					
Public Safety Dept.		7,200			No
School ATCO Trailer	1980	960			No
School Dist. Office	1984	4,598			No
School Shop	1980	8,500			No
School Storage	1980	1,600			No
Schroeder Garage					No
Sea Inn					No
Senior Center		7,500			No
Shop		1,200			Yes
Smith's Duplex		720			Yes
South Shore House		720			Yes
SW Region School					No
Territorial School	1990	11,375			Yes
University of Alaska Bldg.					No
Village Corp. Office					No
Ward Bldg.					No
Warm Sand Storage		2,800			Yes
Warm Storage (Heated)		3,000			Yes
Water Treatment Plant					No
Wells Fargo					No
Wren Aircraft					No
Youth Center					No

Community Profile: Egegik



Alaska Native Name (definition)
Egegik ("Throat")

Historical Setting / Cultural Resources

The village was reported by Russians as a fish camp called "Igagik" (meaning "throat") in 1876. Local people would travel each year from Kanatak on the gulf coast through a portage pass to Becharof Lake and then hike or kayak on to the Egegik Bay area for summer fish camp. In 1895, an Alaska Packers Association salmon saltery was established at the mouth of Egegik River, and a town developed around the former fish camp. Egegik incorporated as a second-class city in 1995.

Energy Priorities and Projects

Determine wind resource & develop if feasible

Incorporation	2nd Class City (inc. 1995)

Location

Located on the south bank of the Egegik River, near base of Aleutian Chain. 100 miles southeast of Dillingham and 326 miles southwest of Anchorage by air.

Longitude	-157.3758	**Latitude**	58.2156
ANCSA Region	Bristol Bay Native Corporation		
Borough/CA	Lake and Peninsula Borough		
School District	Lake and Peninsula Borough School District		
AEA Region	Bristol Bay		

Taxes	**Type (rate)**	**Per-Capita Revenue**
	Raw Fish (3% + 2% Bor.), Bed (6%) Guide Tax ($3/p/d)	$12,109

Economy

Major salmon production port. Twelve commercial fishing permit holders. Four business licenses.

Climate	**Avg. Temp.**	**Climate Zone**	**Heating Deg. Days**
	N/A	7	N/A

Natural Hazard Plan	**Year**

Notes	Expired

Community Plans	**Year**
Community Action Plan	2012

Local Contacts	**Email**	**Phone**	**Fax**
City of Egegik	cityofegegik@starband.net	907-233-2400	907-233-2231
Egegik Village		907-233-2211	907-233-2312
Becharof Corporation		907-561-4777	907-561-4778

Demographics	**2000**	**2010**		**2013**
Population	116	**109**	**Percent of Residents Employed**	67.7%
Median Age	36	49	**Denali Commission Distressed Community**	No
Avg. Household Size	3	3	**Percent Alaska Native/American Indian (2010)**	39.5%
Median Household Income	N/A	$77,917	**Low and Moderate Income (LMI) Percent (2014)**	42.2%

Electric Utility	**Generation Sources**	**Interties**	**PCE?**
City of Egegik	Diesel	No	Yes

Landfill	**Class**	3	**Permitted?**	No	**Location**	15,000 ft. SE of community

Water/Wastewater System	City of Egegik	**Homes Served**	**System Volume**
Water	Well		50,001-100,000 gallons/day
Sewer		**Energy Audit?**	
Notes		Yes	

Access

Road	No				
Air Access	Public & Private; Gravel	**Runway**	1,500'x75	5,600'x100	
Dock/Port	Yes	**Barge Access?**	Yes	**Ferry Service?**	No

Notes

Energy Profile: Egegik

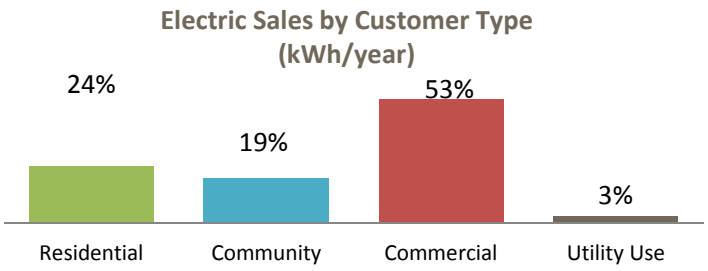
Diesel Power System

Utility	City of Egegik		
Engine	**Make/Model**	**Condition/Hrs**	**Gen Capacity**
Unit 1	Mitsubishi	Good/6,322	200
Unit 2	John Deere	Good/7,659	180
Unit 3			
Unit 4			
Line Loss		7.4%	
Heat Recovery?		Yes; School & Community Center	

Upgrades	**Priority**	**Projects**	**Status**
RPSU Powerhouse	Low	2013 Upgrade	Complete
RPSU Distribution	In Progress		
Outage History/Known Issues			

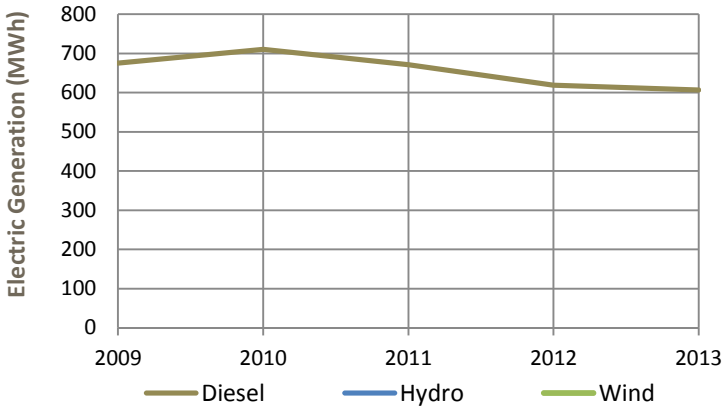
Operators	**No. of Operators**	**Training/Certifications**
	3	APPO, PPO

Maintenance Planning (RPSU)	Good		
Electric Sales	**No. of Customers**	**kWh/year**	**kWh/Customer**
Residential	74	146,389	1,978
Community	17	117,375	6,904
Commercial	16	321,001	20,063
Utility Use		17,885	



Power Production

Diesel (kWh/yr)	650,903	**Avg. Load (kW)**	69
Wind (kWh/yr)	0	**Peak Load (kW)**	153
Hydro (kWh/yr)	0	**Efficiency (kWh/gal)**	12
Total (kWh/yr)	650,903	**Diesel Used (gals/yr)**	55,836



Electric Rates ($/kWh)		**Cost per kWh Sold ($/kWh)**	
Rate with PCE	$0.33	**Fuel Cost**	$0.44
Residential Rate	$0.86	**Non-fuel Cost**	$0.19
Commercial Rate		**Total Cost**	$0.63

Fuel Prices ($)	**Utility/Wholesale**	**Retail**	**Month/Year**
Diesel (1 gal)	$4.59	$4.95	6-13; 8-14
Other Fuel? (1 gal)			
Gasoline (1 gal)			
Propane (100#)		$308.81	8-14
Wood (1 cord)			
Pellets			
Discounts?		None	

Alternative Energy	**Potential**	**Projects**	**Status**
Hydroelectric	Low		
Wind Diesel	High	Egegik Wind Feasibility Study	Met tower installed, In Progress
Biomass	Low		
Solar	Pending		
Geothermal	Low		
Oil and Gas	Low		
Coal	Low		
Emerging Tech	Not Rated		
Heat Recovery	Low	HR to school and community center	Operational
Energy Efficiency	High	VEEP - LPSD	In progress

Bulk Fuel

Tank Owner	**Fuel Type(s)**	**Capacity**	**Age/Condition**
City	Heating, #1, #2	100,000	Good

Bulk Fuel Upgrade	**Priority**	**Project**	**Status**

Purchasing	**Deliveries/Year**	**Gallons/Delivery**	**Vendor(s)**
By Barge	2		Crowley
By Air			

Cooperative Purchasing Agreements

None

Notes

Delivery by barge in Spring & Fall. No bid.

Energy Profile: Egegik

Housing Units	Occupied	Vacant	% Owner-Occup.
	15	261	73%

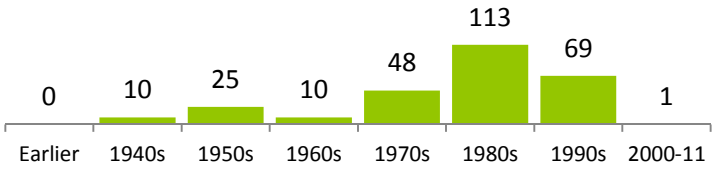
Regional Housing Authority	Weatherization Service Provider
Bristol Bay HA	Bristol Bay HA

Housing Need	Overcrowded	1-star
	N/A	N/A

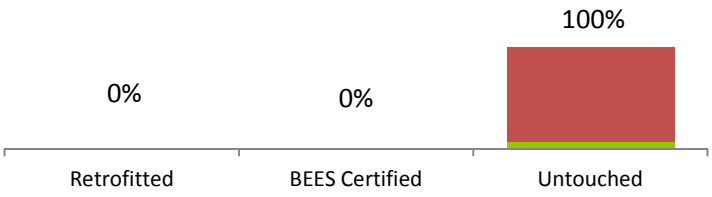
Energy Use	Average Home Energy Rating	Average Square Feet	Avg. EUI (kBTU/sf)
	N/A	N/A	N/A

Data Quality	
	Low

Age of Housing Stock



Energy Efficient Housing Stock

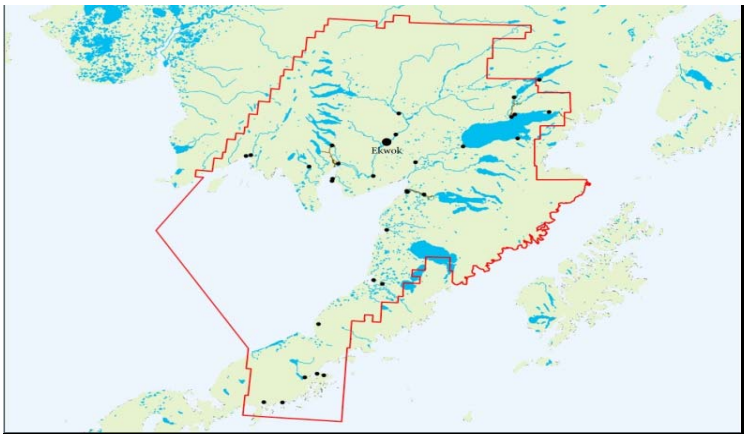


Lighting	Owner	Number/Type	Retrofitted?	Year	Notes
	City		yes		Replaced with 80W LEDs

Non-residential Building Inventory

Building Name or Location	Year Built	Square Feet	Audited?	Retrofits Done?	In ARIS?
Church (Baptist)					No
City Hall/Office		2,500			**No**
City Shop/Maint. Building		4,000			No
City Warehouse	1994	1,104			No
Clinic	2003	2,497			No
Egegik K-12 School	1962	9,651	Yes		Yes
Egegik School/Multi-Purpose/Powerhouse	1971-1997	7,182			Yes
Fisherman's Lodge		4,124			No
Incinerator Bldg.		1,200			No
Post Office					No
Power Plant					No
School Gym	1997	3,600			No
Store					No
Village Council					No
Water Plant		2,160			No

Community Profile: Ekwok



Incorporation 2nd Class City

Location

Ekwok is located along the Nushagak River, 43 miles northeast of Dillingham and 285 miles southwest of Anchorage.

Longitude	-157.4753	**Latitude**	59.3497
ANCSA Region	Bristol Bay Native Corporation		
Borough/CA	Dillingham Census Area		
School District	Southwest Region School District		
AEA Region	Bristol Bay		

Alaska Native Name (definition)

Iquaq ("end of the bluff")

Taxes **Type (rate)** **Per-Capita Revenue**

None

Historical Setting / Cultural Resources

The oldest continuously-occupied Yup'ik Eskimo village on the river. During the 1800s, the settlement was used in the spring and summer as a fish camp and in the fall as a base for berry picking. Many of the earliest homes in Ekwok were located in a low flat area near the riverbank. After a severe flood in the early 1960s, villagers relocated to the current location on higher ground.

Economy

Local government, education/health services, and financial activities are the main employers. There are 3 commercial fishing permits and 9 business licenses.

Climate	**Avg. Temp.**	**Climate Zone**	**Heating Deg. Days**
N/A		7	

Natural Hazard Plan **Year**

Notes

Energy Priorities and Projects

Intertie with New Stuyahok; Road between Ekwok & New Stuyahok; Alternative method fuel delivey due to low river level

Community Plans	**Year**
Ekwok Community Comprehensive Plan	2005

Local Contacts	**Email**	**Phone**	**Fax**
Ekwok Natives Limited		907-464-3336	907-464-3378
City of Ekwok	clark25crystalclaire@yahoo.com	907-464-3311	907-464-3328
Bristol Bay Native Corporation		907-278-3602	907-276-3924

Demographics	**2000**	**2010**		**2013**
Population	130	115	**Percent of Residents Employed**	67.9%
Median Age	32	27.3	**Denali Commission Distressed Community**	No
Avg. Household Size	4	3.11	**Percent Alaska Native/American Indian (2010)**	90.8%
Median Household Income	N/A	$31,667	**Low and Moderate Income (LMI) Percent (2014)**	64.2%

Electric Utility	**Generation Sources**	**Interties**	**PCE?**
Alaska Village Electric Cooperative - AVEC	Diesel	No	Yes

Landfill	**Class**	3	**Permitted?**	No	**Location**	Ekwok

Water/Wastewater System	N/A	**Homes Served**	**System Volume**
Water			
Sewer		**Energy Audit?**	
Notes		Yes	

Access

Road	No				
Air Access	State owned; gravel		**Runway**	3319'x75'	
Dock/Port	No		**Barge Access?**		**Ferry Service?**

Notes

Energy Profile: Ekwok

Diesel Power System

Utility	AVEC		
Engine	**Make/Model**	**Condition/Hrs**	**Gen Capacity**
Unit 1	Perkins	Fair/1,322	70
Unit 2	Perkins	Fair/2,657	124
Unit 3	John Deere	Fair/7,173	220
Unit 4			
Line Loss	6.2%		
Heat Recovery?	No		

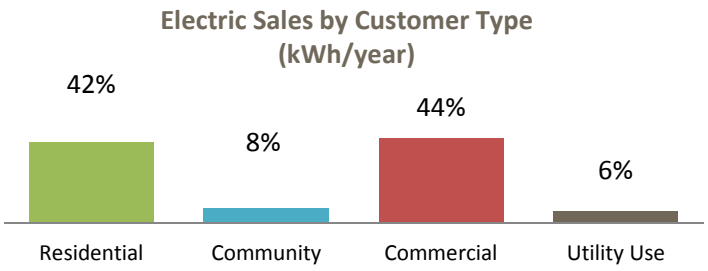
Upgrades	**Priority**	**Projects**	**Status**
RPSU Powerhouse	Low		
RPSU Distribution	Medium	Intertie	

Outage History/Known Issues

None since AVEC started operation

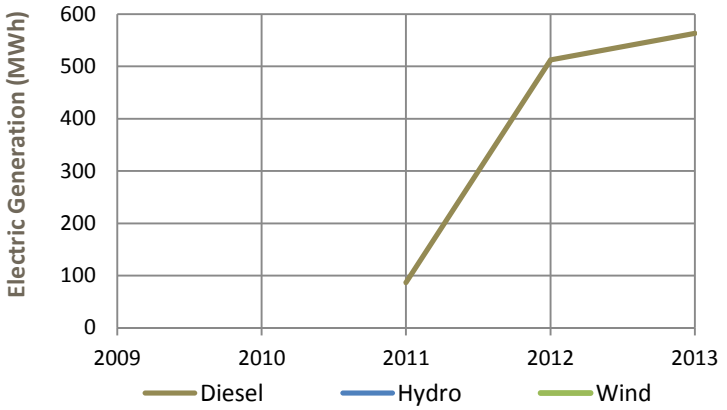
Operators	**No. of Operators**	**Training/Certifications**
	2	APPO, BFO, PPO, Clerk

Maintenance Planning (RPSU)	Good		
Electric Sales	**No. of Customers**	**kWh/year**	**kWh/Customer**
Residential	52	208,445	4,009
Community	5	39,258	7,852
Commercial	22	220,515	10,023
Utility Use		31,466	



Power Production

Diesel (kWh/yr)	532,671	**Avg. Load (kW)**	63
Wind (kWh/yr)	0	**Peak Load (kW)**	127
Hydro (kWh/yr)	0	**Efficiency (kWh/gal)**	11
Total (kWh/yr)	532,671	**Diesel Used (gals/yr)**	46,990



Electric Rates ($/kWh)		**Cost per kWh Sold ($/kWh)**	
Rate with PCE	$0.21	**Fuel Cost**	$0.43
Residential Rate	$0.68	**Non-fuel Cost**	$0.23
Commercial Rate		**Total Cost**	$0.67

Fuel Prices ($)	**Utility/Wholesale**	**Retail**	**Month/Year**
Diesel (1 gal)	$4.26	$6.75	6-13; 8-14
Other Fuel? (1 gal)			
Gasoline (1 gal)			
Propane (100#)			
Wood (1 cord)		$300 to $350	
Pellets			
Discounts?		None	

Alternative Energy	**Potential**	**Projects**	**Status**
Hydroelectric	Low		
Wind Diesel	Low		
Biomass	High		
Solar	Pending		
Geothermal	Low		
Oil and Gas	Low		
Coal	Low		
Emerging Tech	Not Rated		
Heat Recovery	Low		
Energy Efficiency	High	1) VEEP 2) Street light retrofit 3) ANTHC Sanitation EE Audit	1&2) Complete 3) Funded

Bulk Fuel

Tank Owner	**Fuel Type(s)**	**Capacity**	**Age/Condition**
City	Heating Oil	20,000	Good
City	Gasoline	20,000	Good

Bulk Fuel Upgrade	**Priority**	**Project**	**Status**

Purchasing	**Deliveries/Year**	**Gallons/Delivery**	**Vendor(s)**
By Barge	2		Delta; Vitus
By Air			

Cooperative Purchasing Agreements

No

Notes AVEC: Comp. bid (fixed) w/ Vitus Marine.

SWR School Dist.: Comp. bid (fixed) w/ W. Delta.

Energy Profile: Ekwok

Housing Units	Occupied	Vacant	% Owner-Occup.
	52	16	58%

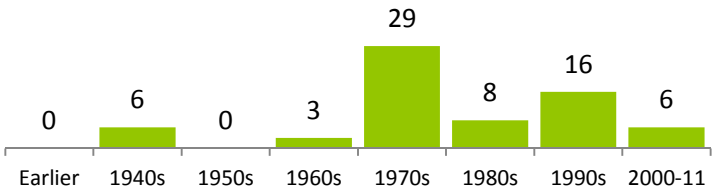
Regional Housing Authority	Weatherization Service Provider
Bristol Bay HA	Bristol Bay HA

Housing Need		Overcrowded	1-star
		17.3%	N/A

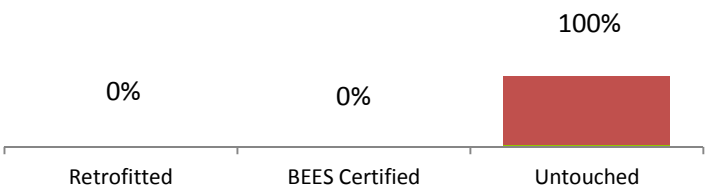
Energy Use	Average Home Energy Rating	Average Square Feet	Avg. EUI (kBTU/sf)
	N/A	N/A	N/A

Data Quality	Low

Age of Housing Stock



Energy Efficient Housing Stock

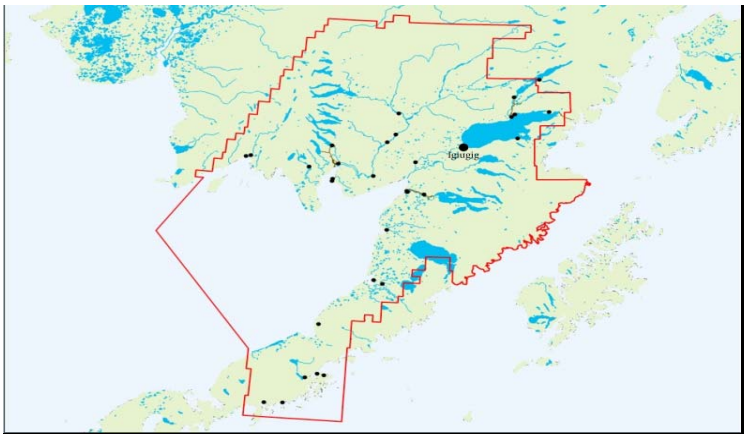


Street Lighting	Owner	Number/Type	Retrofitted?	Year	Notes

Non-residential Building Inventory

Building Name or Location	Year Built	Square Feet	Audited?	Retrofits Done?	In ARIS?
City Office Bldg					No
City Shop					No
Clinic	2011	1,636			No
Clinic (Old)					No
Country Time Store					No
Ekwok K-12 School		15,795			Yes
ENL Bldg.					No
Fuel Tank Farm					No
Green Chapel					No
Maaluq Lodge					No
R. Orthodox Church					No
School Gen. Bldg.	1932	720			No
SRE Bldg (Heated)		1,200			Yes
Storage Bldg (Heated)					No
Village Council					No
William Nelson School	1979	9,644			No

Community Profile: Igiugig



Alaska Native Name (definition)

ig ee uh' gig ("like a throat that swallows water")

Historical Setting / Cultural Resources

Kiatagmuit Eskimos originally lived on the north bank of the Kvichak River in the village of Kaskanak and used Igiugig as a summer fish camp. Today, about one-third of residents can trace their roots back to the Branch River village. A post office was established in 1934 but was discontinued in 1954. Historically an Eskimo village, the population is now primarily Alutiiq and depends upon commercial fishing and a subsistence lifestyle. Sport fishing attracts visitors during summer months.

Energy Priorities and Projects

Pilot wind project, if proven will be expanded; Solar thermal for homes; Hydrokinetic potential of Kvichak River; Energy efficiency and conservation in village; new site for tank farm (eroding into river); generator training; More solar for residences and community buildings

Incorporation	Unincorporated

Location

Igiugig is located on the Alaska Peninsula on the south shore of the Kvichak River, which flows from Iliamna Lake. It is 50 air miles northeast of King Salmon and 48 miles southwest of Iliamna.

Longitude	-155.8947	**Latitude**	59.3278
ANCSA Region	Bristol Bay Native Corporation		
Borough/CA	Lake and Peninsula Borough		
School District	Lake and Peninsula Borough School District		
AEA Region	Bristol Bay		

Taxes	**Type (rate)**	**Per-Capita Revenue**
	None	$0.00

Economy

Local government and construction are the main employers. Thirteen business licenses. Four commercial fishing permits and subsistence fishing sustain the community.

Climate	**Avg. Temp.**	**Climate Zone**	**Heating Deg. Days**
	N/A	7	11,306

Natural Hazard Plan	**Year**

Notes

Community Plans	**Year**
Bristol Bay Regional Vision	2010
Lake and Peninsula Borough Comp. Plan	2012
Energy Plan	2009

Energy Priorities and Projects	**Email**	**Phone**	**Fax**
Igiugig Village Corporation	igiugig.vc@gmail.com	907-533-3211	907-533-3217
Bristol Bay Native Corporation		907-278-3602	907-276-3924

Demographics	**2000**	**2010**		**2013**
Population	53	**50 (64)**	**Percent of Residents Employed**	83%
Median Age	37	22	**Denali Commission Distressed Community**	No
Avg. Household Size	4	3.13	**Percent Alaska Native/American Indian (2010)**	40%
Median Household Income	N/A	$14,423	**Low and Moderate Income (LMI) Percent (2014)**	N/A

Electric Utility	**Generation Sources**	**Interties**	**PCE?**
Igiugig Electric Utility	Diesel	No	Yes

Landfill	**Class**	3	**Permitted?**	Yes	**Location**	Igiugig

Water/Wastewater System	**Village**	**Homes Served**	**System Volume**
Water	Piped	16	
Sewer	Piped	**Energy Audit?**	
Notes		Yes	

Access

Road	No				
Air Access	State owned; gravel	**Runway**	3000'x75'		
Dock/Port	Yes	**Barge Access?**	Yes	**Ferry Service?**	**None**

Notes

Energy Profile: Igiugig

Diesel Power System

Utility	Igiugig Electric Utility		
Engine	**Make/Model**	**Condition/Hrs**	**Gen Capacity**
Unit 1	John Deere	Good/3,263	67
Unit 2	John Deere	Good/2,384	67
Unit 3	John Deere	Good/4,983	67
Unit 4			
Line Loss		13.3%	
Heat Recovery?		Yes; Pump House, Rec. Hall	

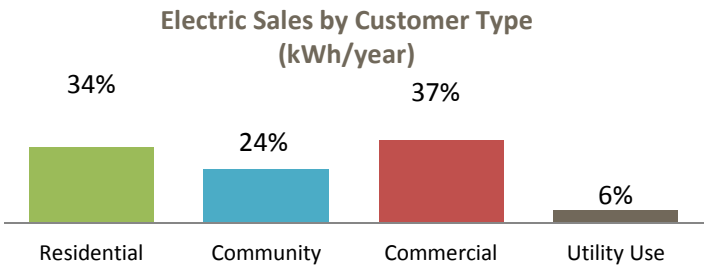
Upgrades	**Priority**	**Projects**	**Status**
RPSU Powerhouse	Low		
RPSU Distribution	Low		

Outage History/Known Issues

Adding 2 generators to meet demand

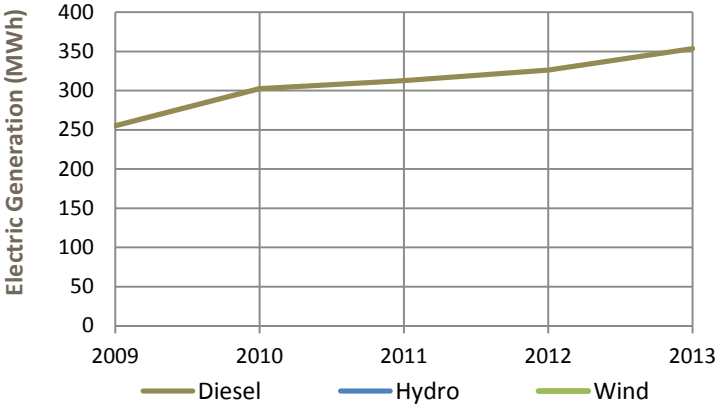
Operators	**No. of Operators**	**Training/Certifications**
	1	APPO, BF Bus Train, BFO, PPO, Utility Clerk
Maintenance Planning (RPSU)		Good

Electric Sales	**No. of Customers**	**kWh/year**	**kWh/Customer**
Residential	28	97,829	3,494
Community	12	69,551	5,796
Commercial	12	107,141	8,928
Utility Use		17,175	



Power Production

Diesel (kWh/yr)	336,581	**Avg. Load (kW)**	22
Wind (kWh/yr)	0	**Peak Load (kW)**	48
Hydro (kWh/yr)	0	**Efficiency (kWh/gal)**	11
Total (kWh/yr)	336,581	**Diesel Used (gals/yr)**	29,439



Electric Rates ($/kWh)		**Cost per kWh Sold ($/kWh)**	
Rate with PCE	$0.22	**Fuel Cost**	$0.70
Residential Rate	$0.81	**Non-fuel Cost**	$0.14
Commercial Rate	$0.91	**Total Cost**	$0.84

Fuel Prices ($)	**Utility/Wholesale**	**Retail**	**Month/Year**
Diesel (1 gal)	$6.57	$7.96	6-13; 3-15
Other Fuel? (1 gal)			
Gasoline (1 gal)			
Propane (100#)			
Wood (1 cord)	$400		
Pellets			
Discounts?			

Alternative Energy	**Potential**	**Projects**	**Status**
Hydroelectric	Low		
Wind Diesel	Low	6 - 1.2 kW vertical axis wind turbines installed	3 functional
Biomass	High	Residential Biomass Projects	
Solar	Pending	Solar thermal on 3 buildings	Operational
Geothermal	Low		
Oil and Gas	Low		
Coal	Low		
Emerging Tech	Not Rated	Kvichak River - 25 kW hydrokinetic system	Pilot project, operating 2016
Heat Recovery	Low	Diesel Generator HR, expanding to water tank	Operational
Energy Efficiency	Medium	ANTHC EE Audit	Funded

Bulk Fuel

Tank Owner	**Fuel Type(s)**	**Capacity**	**Age/Condition**
Village	Heating Oil	73,800	
Village	Gasoline	22,400	

Bulk Fuel Upgrade	**Priority**	**Project**	**Status**

Purchasing	**Deliveries/Year**	**Gallons/Delivery**	**Vendor(s)**
By Barge	0		
By Air	Year Round		

Cooperative Purchasing Agreements

L&P School Dist & Construction camp

Notes

Comp. bid. All available vendors contacted for quotes.

Energy Profile: Igiugig

Housing Units	Occupied	Vacant	% Owner-Occup.
	14	9	36%

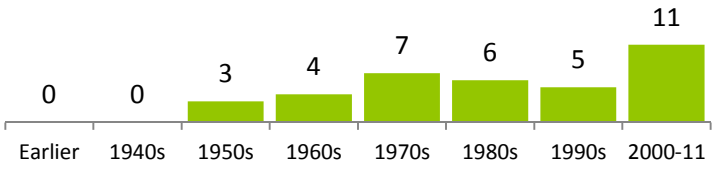
Regional Housing Authority	Weatherization Service Provider
Bristol Bay HA	Bristol Bay HA

Housing Need	Overcrowded	1-star
	28.6%	N/A

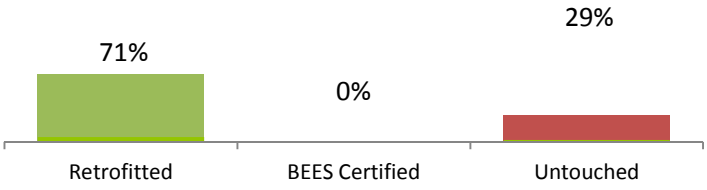
Energy Use	Average Home Energy Rating	Average Square Feet	Avg. EUI (kBTU/sf)
	4 star plus	1,209	92

Data Quality	
	Medium

Age of Housing Stock



Energy Efficient Housing Stock

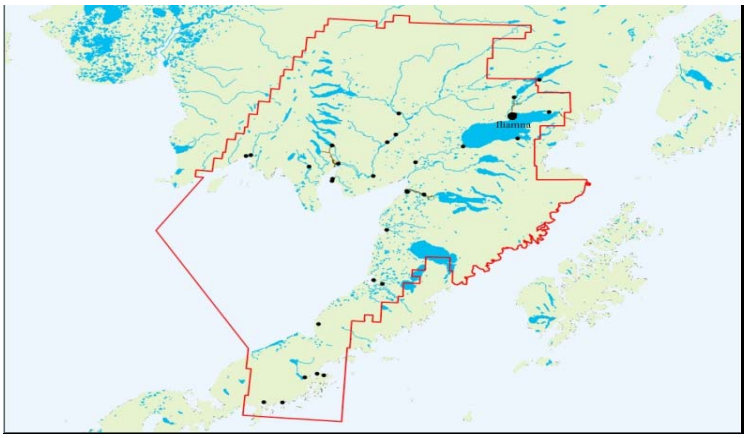


Street Lighting	Owner	Number/Type	Retrofitted?	Year	Notes
		2			No plans to upgrade

Non-residential Building Inventory

Building Name or Location	Year Built	Square Feet	Audited?	Retrofits Done?	In ARIS?
Aircraft Hanger & Council Office					No
Airport/Tourism Facility	1998			Yes; Lights	No
AKDF&G Bunkhouse					No
Community Hall/EPA Office/Post Office/Store					No
DOT&PF Storage Bldg					No
Igiugig Boarding House B&B					No
Kvichak Cabins B&B					No
Lodge 1					No
Lodge 2					No
New Village Health Clinic	2011	1500	Yes; DOE		No
Old Creek Lodge					No
Old Village Health Clinic	1980	1100			No
Orthodox Church					No
Power Plant					No
School & Library					No
School (New)	2008	9384			Yes
School Generator Bldg	1997	800			No
Sewage Lift Station					No
Smokehouse					No
Smokehouse & Fish Racks					No
SRE Bldg		1,104			No
Storage Bldg	1994	1104			No
Teacher Housing					No
Village Council Multipurpose Bldg	1970	2130			No
Washeteria/Pumphouse	1970	1400			No

Community Profile: Iliamna



Incorporation	Unincorporated

Location

Iliamna is located on the northwest side of Iliamna Lake, 225 miles southwest of Anchorage. It is near the Lake Clark Park and Preserve.

Longitude	-154.9061	**Latitude**	59.7547
ANCSA Region	Bristol Bay Native Corporation		
Borough/CA	Lake and Peninsula Borough		
School District	Lake and Peninsula School District		
AEA Region	Bristol Bay		

Alaska Native Name (definition)

ill ee am' nuh

Taxes	**Type (rate)**	**Per-Capita Revenue**
N/A		

Historical Setting / Cultural Resources

Prior to 1935, "Old Iliamna" was located near the mouth of the Iliamna River, a traditional Athabascan village. Around 1935, villagers moved to the present location, approximately 40 miles from the old site. Iliamna's current size and character can be attributed to the development of fishing and hunting lodges. Iliamna has become a recreational and tourist attraction due to the excellent fishing at Iliamna Lake. The population is mixed, with non-Natives, Tanaina Athabascans, and Alutiiq and Yup'ik Eskimos.

Economy

Local government, professional/business services, and education/health services are main employers. Thirty-two business licenses and 15 fishing permits issued.

Climate	**Avg. Temp.**	**Climate Zone**	**Heating Deg. Days**
	35.8°	7	11,130

Natural Hazard Plan	**Year**
No	

Notes	No record

Energy Priorities and Projects

INNEC: Maintain year round capacity of Tazimina, increase river intake; INNEC: Upgrade distribution infrastructure Newhalen to Nondalton; Hook-up additional electric boilers; bridge between Iliamna & Nondalton; dock/barge landing; energy efficiency measures in community buildings

Community Plans — **Year**

Local Contacts	**Email**	**Phone**	**Fax**
Village of Iliamna	ivc@iliamnavc.org	907-571-1246	907-571-1256
Bristol Bay Native Assoc. Inc.		907-842-5257	907-842-5932

Demographics	**2000**	**2010**		**2013**
Population	102	109	**Percent of Residents Employed**	68.99%
Median Age	32	29.9	**Denali Commission Distressed Community**	No
Avg. Household Size	3	2.79	**Percent Alaska Native/American Indian (2010)**	58%
Median Household Income	N/A	$83,250	**Low and Moderate Income (LMI) Percent (2014)**	N/A

Electric Utility	**Generation Sources**	**Interties**	**PCE?**
I-N-N Electric Cooperative	Hydropower, diesel	Yes, Iliamna-Newhalen-Nondalton	Yes

Landfill	**Class**	3	**Permitted?**	Yes	**Location**	Iliamna

Water/Wastewater System	City	**Homes Served**	**System Volume**
Water			
Sewer	Hauled to disposal site	**Energy Audit?**	
Notes	Septic plant not feasible due to bedrock.	No	

Access

Road	No				
Air Access	State owned; asphalt	**Runway**	5086'x100'	4800'x100'	2998'x400'
Dock/Port	Yes	**Barge Access?**	Yes	**Ferry Service?**	No
Notes	Community land locked after October. Air access only.				

Energy Profile: Iliamna

Diesel Power System

Utility	I-N-N Electric Coop, Inc		
Engine	**Make/Model**	**Condition/Hrs**	**Gen Capacity**
Unit 1	N/A		
Unit 2			
Unit 3			
Unit 4			
Line Loss		8.4%	
Heat Recovery?			

Upgrades	**Priority**	**Projects**	**Status**
RPSU Powerhouse			
RPSU Distribution			

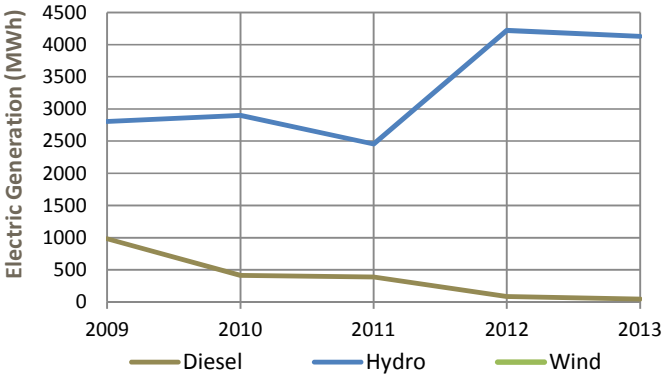
Outage History/Known Issues

PCE data includes Iliamna, Newhalen, & Nondalton.

Operators	**No. of Operators**	**Training/Certifications**

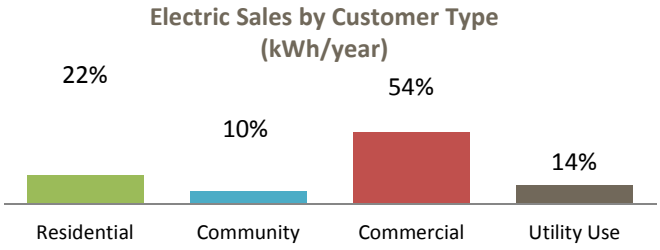
Power Production

Diesel (kWh/yr)	93,226	**Avg. Load (kW)**	51
Wind (kWh/yr)	0	**Peak Load (kW)**	113
Hydro (kWh/yr)	4,006,061	**Efficiency (kWh/gal)**	18
Total (kWh/yr)	4,099,287	**Diesel Used (gals/yr)**	5,123



Maintenance Planning (RPSU)

Electric Sales	**No. of Customers**	**kWh/year**	**kWh/Customer**
Residential	215	810,980	3,772
Community	15	382,730	25,515
Commercial	105	2,017,376	19,213
Utility Use		543,936	



Electric Rates ($/kWh)		**Cost per kWh Sold ($/kWh)**	
Rate with PCE	$0.33	**Fuel Cost**	$0.01
Residential Rate	$0.57	**Non-fuel Cost**	$0.22
Commercial Rate	None	**Total Cost**	$0.23

Fuel Prices ($)	**Utility/Wholesale**	**Retail**	**Month/Year**
Diesel (1 gal)	$4.67	$6.42	6-13; 8-14
Other Fuel? (1 gal)			
Gasoline (1 gal)			
Propane (100#)		$151.43	8-14
Wood (1 cord)			
Pellets			
Discounts?			

Alternative Energy	**Potential**	**Projects**	**Status**
Hydroelectric	High	Tazimina, 824 kW, Intertie	Operational
Wind Diesel	Medium		
Biomass	High		
Solar	Pending		
Geothermal	Low		
Oil and Gas	Low		
Coal	Low		
Emerging Tech	Not Rated		Boilers operational/2 35kW boilers for city building
Heat Recovery	High	Electric boilers, 25kW-residence, 35kW-triplex	
Energy Efficiency	High	EECBG	Complete

Bulk Fuel

Tank Owner	**Fuel Type(s)**	**Capacity**	**Age/Condition**
IDC	multiple	50,000	
Rain. K. Lodge		19,000	
Gen. Store		11,855	
Iliamna Lodge		10,900	
Paul McDowell		7,000	
Misc. Others		40,500	

Bulk Fuel Upgrade	**Priority**	**Project**	**Status**

Purchasing	**Deliveries/Year**	**Gallons/Delivery**	**Vendor(s)**
By Barge	1		IDC
By Air	Fall to Spring		

Cooperative Purchasing Agreements

None

Notes

Energy Profile: Iliamna

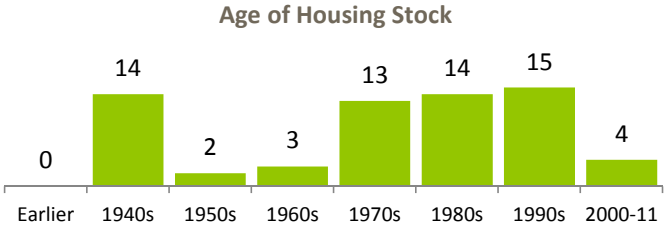
Housing Units	Occupied	Vacant	% Owner-Occup.
	25	29	40%

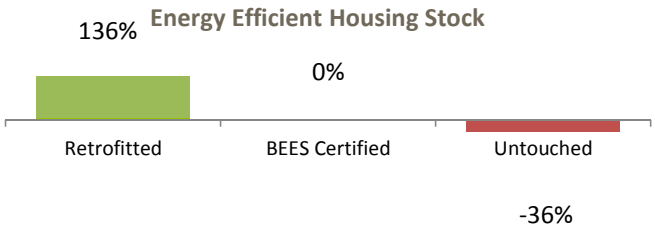
Regional Housing Authority	Weatherization Service Provider
Bristol Bay HA	Bristol Bay HA

Housing Need	Overcrowded	1-star
	N/A	3.7%

Energy Use	Average Home Energy Rating	Average Square Feet	Avg. EUI (kBTU/sf)
	3 star	1,061	150

Data Quality	Medium





Street Lighting	Owner	Number/Type	Retrofitted?	Year	Notes
		None			

Non-residential Building Inventory

Building Name or Location	Year Built	Square Feet	Audited?	Retrofits Done?	In ARIS?
10,000 G. Fuel Station					No
2,000 G. Fuel Storage					No
Air Taxi					No
Airport Hotel Weathered Inn					No
Baptist Church		4,000			No
BB Sports Fishing					No
Clinic	1980	1,044			No
Council Office Bldg 1&2		3,600			No
Council Office Bldg 3		2,100			No
DOT Maint. & Fire Station					No
Fisheries Research Instit.					No
FlyFish AK Red Quill Lodge					No
GC Sat. Dishes					No
Gram's Café & B&B					No
Iliaska Lodge					No
INL Offices/Village Shop					No
Maint. Shop		5,495			Yes
Post Office		3,500			No
Rainbow King Lodge					No
Roadhouse B&B					No
SRE/Office		5,495			Yes
Storage		1,920			Yes
Talarik Creek Lodge					No
TelAK Tower					No
Test Wells					No
Trading Co.		5,000			No
Trading Co.					No
Village Council & Comm. Bldg					No
Warm Storage		480			No

Community Profile: King Salmon

Alaska Native Name (definition)

Incorporation	Unincorporated

Location

located on the north bank of the Naknek River on the Alaska Peninsula. 15 miles upriver from Naknek and 284 miles southwest of Anchorage.

Longitude	-156.6614	**Latitude**	58.6883
ANCSA Region	Bristol Bay Native Corporation		
Borough/CA	Bristol Bay Borough		
School District	Lake and Peninsula Borough School District		
AEA Region	Bristol Bay		

Taxes	**Type (rate)**	**Per-Capita Revenue**
	Bed Tax (10% Bor.), Raw Fish (3% Bor.)	N/A

Historical Setting / Cultural Resources

Present-day tribal members are descendants of a group that was forced to relocate to King Salmon due to the eruption of Mount Katmai, on the east coast of the peninsula. The Native population is a mixture of Aleuts, Indians, and Eskimos. Although King Salmon was not included in the 1972 Alaska Native Claims Settlement Act (ANCSA), the King Salmon Tribe became a federally recognized entity as of December 29, 2000.

Economy

Transportation hub for larger Bristol Bay area. 37 commercial fishing permit holders. 105 active business licenses.

Climate	**Avg. Temp.**	**Climate Zone**	**Heating Deg. Days**
	35.2F	7	11,716

Natural Hazard Plan	**Year**
Yes	10/6/2011
Notes	Update required 10/6/2016
Community Plans	**Year**

Energy Priorities and Projects

NEA: Investigate heat absorption for ice production in summer;
NEA: Stack heat recovery

Local Contacts	**Email**	**Phone**	**Fax**
King Salmon Tribe	kstvc@starband.net	907-246-3553	907-246-3449
Bristol Bay Native Corporation		907-278-3602	907-246-6259

Demographics	**2000**	**2010**		**2013**
Population	442	374	**Percent of Residents Employed**	65.4%
Median Age	38	46	**Denali Commission Distressed Community**	No
Avg. Household Size	3	3	**Percent Alaska Native/American Indian (2010)**	27.81
Median Household Income	N/A	$90,313	**Low and Moderate Income (LMI) Percent (2014)**	N/A

Electric Utility	**Generation Sources**	**Interties**	**PCE?**
Naknek Electric Association	Diesel	Naknek, South Naknek	Yes

Landfill	**Class**	2	**Permitted?**	Yes	**Location**	Between Naknek & town.

Water/Wastewater System	USAF King Salmon Water	**Homes Served**	**System Volume**
Water	Well		100,001-500,000 gallons/day
Sewer	Piped	**Energy Audit?**	
Notes		No	

Access

Road	No				
Air Access	Public; Asphalt/Gravel	**Runway**	8,901'x150'		
Dock/Port	Yes	**Barge Access?**	Yes	**Ferry Service?**	No

Notes

Energy Profile: King Salmon

Diesel Power System

Utility	Naknek Electric Association		
Engine	**Make/Model**	**Condition/Hrs**	**Gen Capacity**
Unit 1	N/A		
Unit 2			
Unit 3			
Unit 4			
Line Loss		5.5%	
Heat Recovery?			

Upgrades	**Priority**	**Projects**	**Status**
RPSU Powerhouse			
RPSU Distribution			

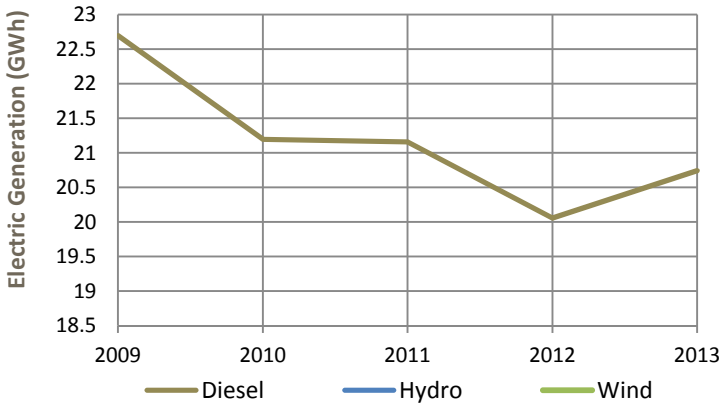
Outage History/Known Issues Feeders from NEA substation

Generation & sales for Naknek, South Naknek, & King Salmon

Operators	**No. of Operators**	**Training/Certifications**

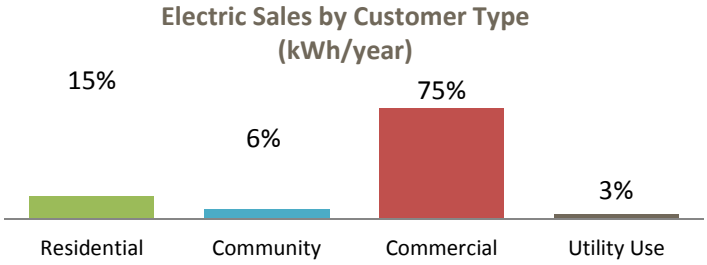
Power Production

Diesel (kWh/yr)	20,231,754	**Avg. Load (kW)**	416
Wind (kWh/yr)	0	**Peak Load (kW)**	924
Hydro (kWh/yr)	0	**Efficiency (kWh/gal)**	16
Total (kWh/yr)	20,231,754	**Diesel Used (gals/yr)**	1,258,272



Maintenance Planning (RPSU)

Electric Sales	**No. of Customers**	**kWh/year**	**kWh/Customer**
Residential	738	2,840,685	3,849
Community	40	1,234,998	30,875
Commercial	359	14,431,075	40,198
Utility Use		612,053	



Electric Rates ($/kWh)		**Cost per kWh Sold ($/kWh)**	
Rate with PCE	$0.17	**Fuel Cost**	$0.24
Residential Rate	$0.59	**Non-fuel Cost**	$0.20
Commercial Rate	$0.59	**Total Cost**	$0.44

Fuel Prices ($)	**Utility/Wholesale**	**Retail**	**Month/Year**
Diesel (1 gal)	$3.61	$5.96	6-13; 8-14
Other Fuel? (1 gal)			
Gasoline (1 gal)		$5.70	4-13
Propane (100#)		$277.38	8-14
Wood (1 cord)			
Pellets			
Discounts?			

Alternative Energy	**Potential**	**Projects**	**Status**
Hydroelectric	Low		
Wind Diesel	Medium		
Biomass	Low		
Solar	Pending		
Geothermal	Low		
Oil and Gas	Low		
Coal	Low		
Emerging Tech	Not Rated		
Heat Recovery	Low		
Energy Efficiency	High		

Bulk Fuel

Tank Owner	**Fuel Type(s)**	**Capacity**	**Age/Condition**

Bulk Fuel Upgrade	**Priority**	**Project**	**Status**

Purchasing	**Deliveries/Year**	**Gallons/Delivery**	**Vendor(s)**
By Barge			
By Air			

Cooperative Purchasing Agreements

Notes

Fuel purchased from Worldwide in Naknek.

Energy Profile: King Salmon

Housing Units	Occupied	Vacant	% Owner-Occup.
	161	164	43%

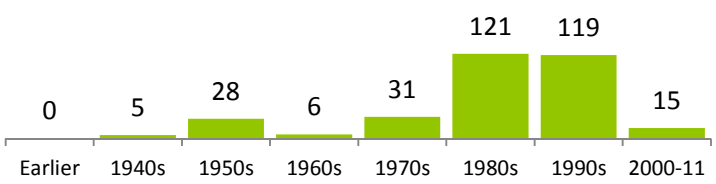
Regional Housing Authority	Weatherization Service Provider
Bristol Bay HA	Bristol Bay HA

Housing Need	Overcrowded	1-star
	6.2%	0.6%

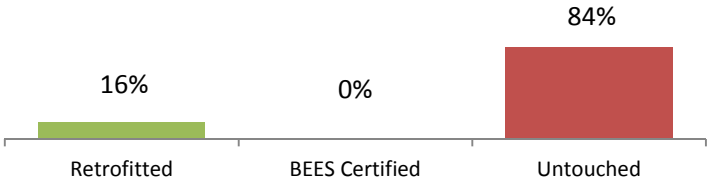
Energy Use	Average Home Energy Rating	Average Square Feet	Avg. EUI (kBTU/sf)
	2-star plus	1,688	140

Data Quality	Medium

Age of Housing Stock



Energy Efficient Housing Stock

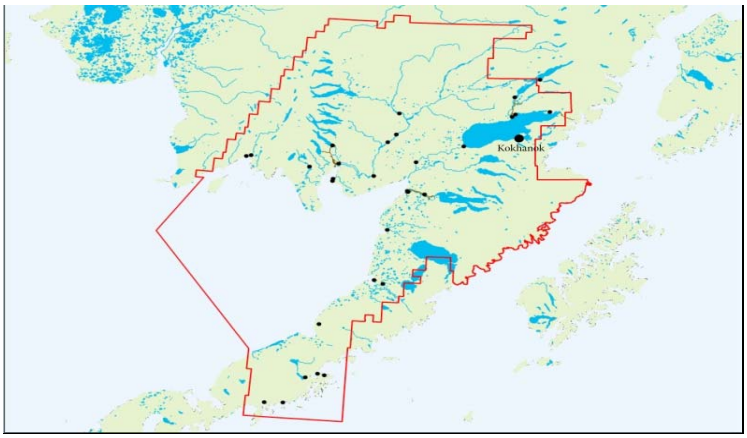


Lighting	Owner	Number/Type	Retrofitted?	Year	Notes

Non-residential Building Inventory

Building Name or Location	Year Built	Square Feet	Audited?	Retrofits Done?	In ARIS?
AC Comp. Store	1980	7,718			No
Airport Light Building					No
Airport Terminal					No
AK Fish & Game					No
AK State Troopers					No
ARFF/Maint. Bldg.	1996	8,611			Yes
Becharof Refuge Admin. Building					No
Borough Police Dept.	1988				No
Bristol Bay Telephone					No
Chain Storage Bldg.	1973				No
Church					No
Community Church & Parsonage					No
District Central Office	1983	12,000			Yes
DOT & PF Building					No
Electrical Storage Shed	1973				No
FAA Building					No
Fitness Center					No
Health Clinic	1994	1,098			No
King Salmon Public Safety (PS) Office					Yes
Lake & Penn. Borough Admin. & School Dist. Bldg.					No
Paug-Vik Inc.					No
Post Office					No
Restaurants					No
Sand Storage	1973	2,160			Yes
SAVEC Bldg					No
School Storage Bldg.	1984	1,400			No
United Pent. Church	1984	1,200			No
US Fish & Wildlife					No
US Parks Service Housing					No
US Parks Service Housing					No
Village Council & Clinic					No
Visitor Center					No
White Storage Bldg.	1973	629			No
Yellow Storage	1973				No

Community Profile: Kokhanok



Incorporation	Unincorporated

Location

Kokhanok is located on the south shore of Iliamna Lake, 22 miles south of Iliamna and 88 miles northeast of King Salmon.

Longitude	-154.7551	**Latitude**	59.4416
ANCSA Region	Bristol Bay Native Corporation		
Borough/CA	Lake and Peninsula Borough		
School District	Lake and Peninsula Borough School District		
AEA Region	Bristol Bay		

Alaska Native Name (definition)

Qarr'unaq

Taxes	**Type (rate)**	**Per-Capita Revenue**
N/A		

Historical Setting / Cultural Resources

This fishing village was first listed in the U.S. Census in 1890 by A.B. Schanz. The community was relocated to higher ground a few years ago when the rising level of Iliamna Lake threatened several community buildings. The village has a mixed Native population, primarily Alutiiq and Yup'ik. Subsistence activities are the focal point of the culture and lifestyle.

Economy

Local government, education/health services, and professional/business services are main employers. Twelve commercial fishing permits and eleven business licenses.

Climate	**Avg. Temp.**	**Climate Zone**	**Heating Deg. Days**
		7	11,610

Natural Hazard Plan	**Year**
No	

Notes	No record

Energy Priorities and Projects

Re-design & test wind system build up to medium or high penetration; Expand GARN cordwood boiler system to heat additional buildings; Add solar to buildings and residences; Power lines need upgrading; need more homes

Community Plans	**Year**
A Well Made basket: Kokhanok Com. Plan	2004

Local Contacts	**Email**	**Phone**	**Fax**
Kokhanok Village Council	kokhanok_vc@yahoo.com	907-282-2202	907-282-2264
Bristol Bay Native Corporation		907-278-3602	907-276-3924

Demographics	**2000**	**2010**		**2013**
Population	174	170	**Percent of Residents Employed**	72%
Median Age	30	27	**Denali Commission Distressed Community**	Yes
Avg. Household Size	4	3.27	**Percent Alaska Native/American Indian (2010)**	82%
Median Household Income	N/A	$18,906	**Low and Moderate Income (LMI) Percent (2014)**	N/A

Electric Utility	**Generation Sources**	**Interties**	**PCE?**
Kokhanok Village Council	Diesel, Wind-	No	Yes

Landfill	**Class**	3	**Permitted?**	Yes	**Location**	Kokhanok

Water/Wastewater System	Kokhanok Village Council	**Homes Served**	**System Volume**
Water	Piped	52	
Sewer	Piped	**Energy Audit?**	
Notes	Ageing pipes. 10-15 house off system.	Yes	

Access

Road	No				
Air Access	State owned; gravel	**Runway**	3300'x75'		
Dock/Port	No	**Barge Access?**	**No**	**Ferry Service?**	**No**

Notes

Energy Profile: Kokhanok

Diesel Power System

Utility	Kokhanok Village Council		
Engine	**Make/Model**	**Condition/Hrs**	**Gen Capacity**
Unit 1	John Deere	Good/14,993	60
Unit 2	John Deere	Good/44,717	115
Unit 3	John Deere	Good/4,529	160
Unit 4	John Deere	Good/4,137	117
Line Loss		7.3%	
Heat Recovery?		Yes; School	

Upgrades	**Priority**	**Projects**	**Status**
RPSU Powerhouse	Low	New Gen., 2009	Complete
RPSU Distribution	Med.		

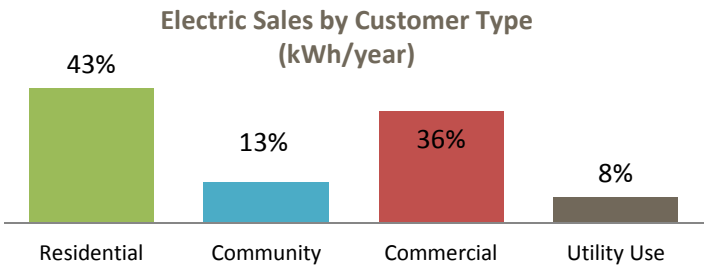
Outage History/Known Issues

Apx. 40 outs. last year, mostly due to wind integration issues.

Operators	**No. of Operators**	**Training/Certifications**
	1	OJT

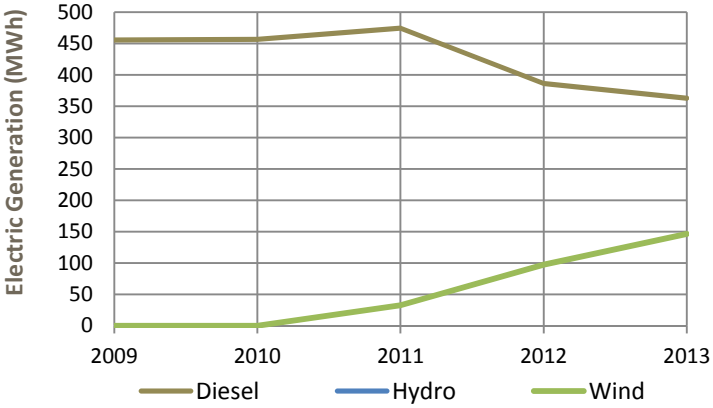
Maintenance Planning (RPSU)	Good

Electric Sales	**No. of Customers**	**kWh/year**	**kWh/Customer**
Residential	54	174,710	3,235
Community	9	52,497	5,833
Commercial	14	145,120	10,366
Utility Use		33,752	



Power Production

Diesel (kWh/yr)	406,000	**Avg. Load (kW)**	43
Wind (kWh/yr)	31,928	**Peak Load (kW)**	96
Hydro (kWh/yr)	0	**Efficiency (kWh/gal)**	10
Total (kWh/yr)	437,928	**Diesel Used (gals/yr)**	39,466



Electric Rates ($/kWh)		**Cost per kWh Sold ($/kWh)**	
Rate with PCE	$0.41	**Fuel Cost**	$0.63
Residential Rate	$0.90	**Non-fuel Cost**	$0.32
Commercial Rate	$0.90	**Total Cost**	$0.95

Fuel Prices ($)	**Utility/Wholesale**	**Retail**	**Month/Year**
Diesel (1 gal)	$6.63	$8.21	6-13; 8-14
Other Fuel? (1 gal)			
Gasoline (1 gal)			
Propane (100#)		$245.24	8-14
Wood (1 cord)	$400.00		
Pellets			
Discounts?		None	

Alternative Energy	**Potential**	**Projects**	**Status**
Hydroelectric	Medium		
Wind Diesel	High	Kokhanok High-Pen. Wind Energy, 2 Turbines	Re-design
Biomass	High	GARN boiler heating 2 community buildings	Operational
Solar	Pending		
Geothermal	Low		
Oil and Gas	Low		
Coal	Low		
Emerging Tech	Not Rated		
Heat Recovery	High	HR on diesel generator	Operational
Energy Efficiency	Medium	VEEP/BBHA Weatherization on 70% homes	Complete

Bulk Fuel

Tank Owner	**Fuel Type(s)**	**Capacity**	**Age/Condition**
Village	Diesel	120,000	Good
Village	Gasoline	75,000	Good

Bulk Fuel Upgrade	**Priority**	**Project**	**Status**

Purchasing	**Deliveries/Year**	**Gallons/Delivery**	**Vendor(s)**
By Barge			
By Air	2		

Cooperative Purchasing Agreements

L&P School Dist. & Village Council

Notes

Delivery by barge or plane in Aug. or Sept. Power purchase and

Energy Profile: Kokhanok

Housing Units	Occupied	Vacant	% Owner-Occup.
	48	17	92%

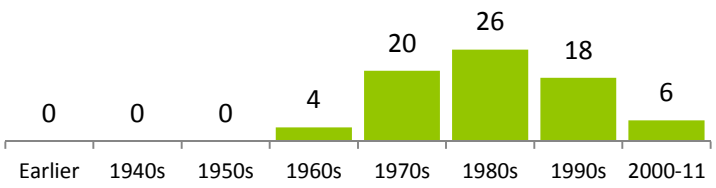
Housing Need	Overcrowded	1-star
	18.8%	3.1%

Data Quality	
	Medium

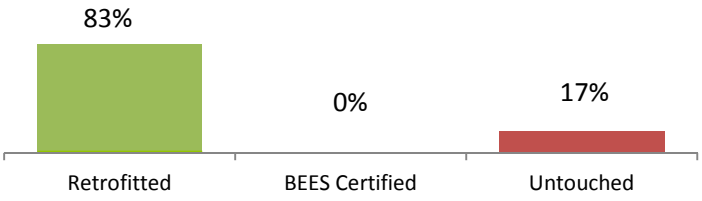
Regional Housing Authority	Weatherization Service Provider
Bristol Bay HA	Bristol Bay HA

Energy Use	Average Home Energy Rating	Average Square Feet	Avg. EUI (kBTU/sf)
	4 star	915	116

Age of Housing Stock



Energy Efficient Housing Stock

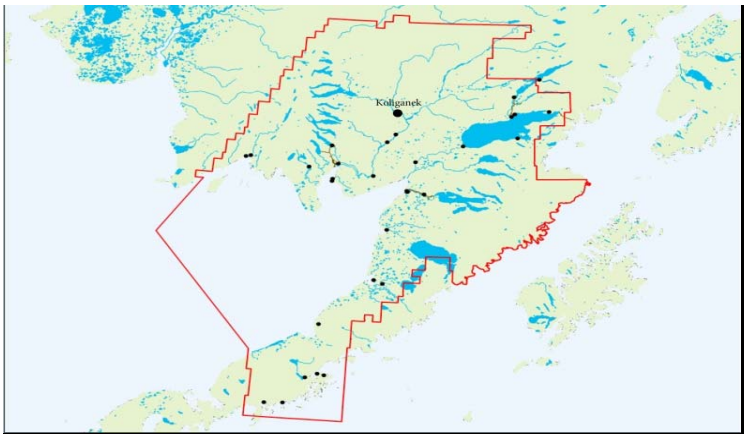


Street Lighting	Owner	Number/Type	Retrofitted?	Year	Notes

Non-residential Building Inventory

Building Name or Location	Year Built	Square Feet	Audited?	Retrofits Done?	In ARIS?
Clinic	2007	2,583			No
Community Building	1950s	1,679			No
EPA Office	1957	759			No
Kokhanok School (2008)	1985	21,880			Yes
Old Clinic (VPSO housing/office and itinerant housing)					No
Old Powerhouse (Electrical Storage)					No
Old Pre-School (Shop/Library/Itinerant Housing)	1984	1,449			No
Pump house		361			No
School Duplex 1		1,053			No
School Duplex 2		2,152			No
School Duplex 3		1,396			No
School Generator Building	1985	800			No
SRE Bldg.					Yes
Store					No
Village Council Office	1982	1,173			No

Community Profile: Koliganek



Alaska Native Name (definition)

Qalirneq

Historical Setting / Cultural Resources

It is an Eskimo village first listed in the 1880 Census as "Kalignak." The name is local, recorded by the U.S. Geological Survey in 1930. Since that time, the village has relocated two times. The first location is about 12 miles upriver from the current location. Koliganek is a Yup'ik Eskimo village with Russian Orthodox practices. Subsistence activities are an important part of the lifestyle.

Energy Priorities and Projects

Finalize wind project design; update water & sewer system; determine alternative fuel delivery method due to lower river level; more homes needed

Incorporation	Unincorporated

Location

Located on the left bank of the Nushagak River and lies 65 miles northeast of Dillingham. The village hopes to get its own zip code, although it currently shares one with Dillingham.

Longitude	-157.2844	**Latitude**	59.7286
ANCSA Region	Bristol Bay Native Corporation		
Borough/CA	Dillingham Census Area		
School District	Southwest Region School District		
AEA Region	Bristol Bay		

Taxes	**Type (rate)**	**Per-Capita Revenue**
None		

Economy

Local government, education/health services, and trade, transportation/utilities are the main employers. There are 19 commercial fishing permits and 7 business licenses.

Climate	**Avg. Temp.**	**Climate Zone**	**Heating Deg. Days**
	N/A	7	11,306

Natural Hazard Plan	**Year**
No	

Notes	Future Plan Development

Community Plans	**Year**
Koliganek Comprehensive Plan	2005

A Community Development Plan is in the works (3/2015)

Local Contacts	**Email**	**Phone**	**Fax**
Koliganek Natives Limited		907-596-3440	907-596-3462
New Koliganek Village Council	newkgkvc@hotmail.com	907-596-3434	907-596-3462
Bristol Bay Native Corporation		907-278-3602	907-276-3924

Demographics	**2000**	**2010**		**2013**
Population	182	209	**Percent of Residents Employed**	67.1%
Median Age	26	21.3	**Denali Commission Distressed Community**	Yes
Avg. Household Size	4	3.8	**Percent Alaska Native/American Indian (2010)**	95.7%
Median Household Income	N/A	$66,250	**Low and Moderate Income (LMI) Percent (2014)**	N/A

Electric Utility	**Generation Sources**	**Interties**	**PCE?**
New Koliganek Village Council	Diesel		Yes

Landfill	**Class**	3	**Permitted?**	No	**Location**	Koliganek

Water/Wastewater System	New Koliganek Village Council	**Homes Served**	**System Volume**
Water	Piped	50	
Sewer	Piped & Septic	**Energy Audit?**	
Notes		Yes	

Access

Road	No				
Air Access	State owned; gravel	**Runway**	3000'x75'		
Dock/Port	No	**Barge Access?**	Seasonal	**Ferry Service?**	No
Notes	Koliganek is upgrading to a new approx. 5,000' runway				

Energy Profile: Koliganek

Diesel Power System

Utility	New Koliganek Village Council

Engine	Make/Model	Condition/Hrs	Gen Capacity
Unit 1	John Deere	Fair/29,411	220
Unit 2	John Deere	Poor/16,892	200
Unit 3			
Unit 4			

Line Loss	11.2%
Heat Recovery?	Yes; Garage, Office, Clinic, New School

Upgrades	Priority	Projects	Status
RPSU Powerhouse	In Progress		
RPSU Distribution	In Progress		

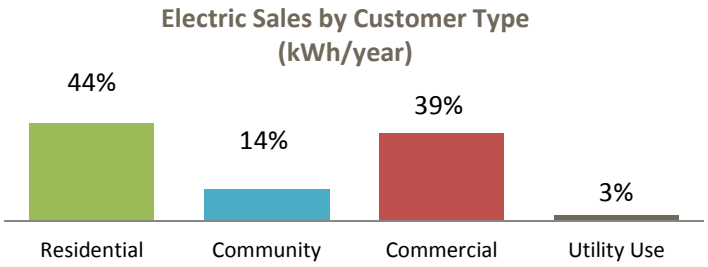
Outage History/Known Issues

5-6 per year.

Operators	No. of Operators	Training/Certifications
	1	OJT

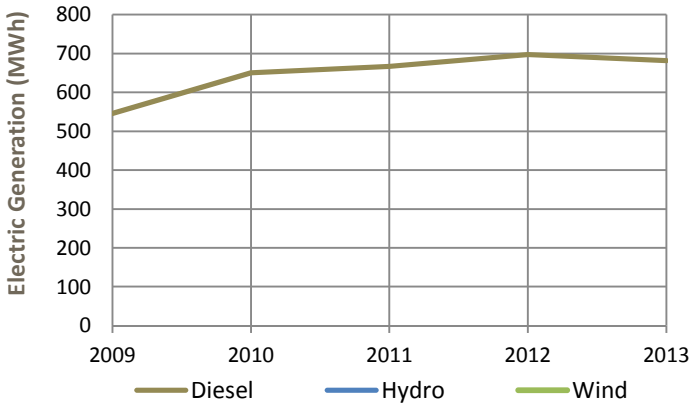
Maintenance Planning (RPSU)	Acceptable

Electric Sales	No. of Customers	kWh/year	kWh/Customer
Residential	69	253,035	3,667
Community	10	81,151	8,115
Commercial	20	227,721	11,386
Utility Use		14,935	



Power Production

Diesel (kWh/yr)	649,836	**Avg. Load (kW)**	59
Wind (kWh/yr)	0	**Peak Load (kW)**	132
Hydro (kWh/yr)	0	**Efficiency (kWh/gal)**	11
Total (kWh/yr)	649,836	**Diesel Used (gals/yr)**	60,032



Electric Rates ($/kWh)		Cost per kWh Sold ($/kWh)	
Rate with PCE	$0.14	**Fuel Cost**	$0.48
Residential Rate	$0.50	**Non-fuel Cost**	Not Reported
Commercial Rate	$0.50	**Total Cost**	$0.48

Fuel Prices ($)	Jtility/Wholesale	Retail	Month/Year
Diesel (1 gal)	$4.51	$7.00	-13; 8-14; 3-1
Other Fuel? (1 gal)			
Gasoline (1 gal)		$6.75	3-15
Propane (100#)		$275	3-15
Wood (1 cord)	N/A		
Pellets			
Discounts?			

Alternative Energy	Potential	Projects	Status
Hydroelectric	Low		
Wind Diesel	Medium	New Koliganek Wind Diesel & Heat Recovery	Draft CDR complete, commence after powerhouse upgrades
Biomass	High		
Solar	Pending		
Geothermal	Low		
Oil and Gas	Low		
Coal	Low		
Emerging Tech	Not Rated		
Heat Recovery	High	Diesel Generator HR	Operational
Energy Efficiency	High	ANTHC EE Audit	Funded

Bulk Fuel

Tank Owner	Fuel Type(s)	Capacity	Age/Condition
Village Council	Heating Oil	140,000	
Village Council	Gasoline	35,000	

Bulk Fuel Upgrade	Priority	Project	Status
			Done

Purchasing	Deliveries/Year	Gallons/Delivery	Vendor(s)
By Barge	2		Vitus Marin.
By Air			

Cooperative Purchasing Agreements

Togiak Native Ltd.

Notes

Barge delivery in May/June & Aug. Sept. Competitive bid (fixed

Energy Profile: Koliganek

Housing Units	Occupied	Vacant	% Owner-Occup.
	58	23	62%

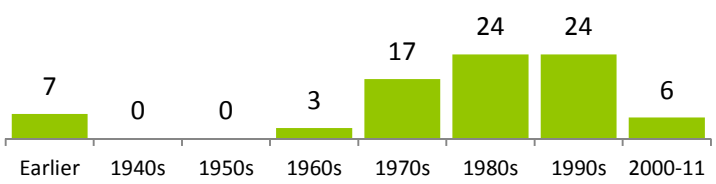
Regional Housing Authority	Weatherization Service Provider
Bristol Bay HA	Bristol Bay HA

Housing Need	Overcrowded	1-star
	29.3%	N/A

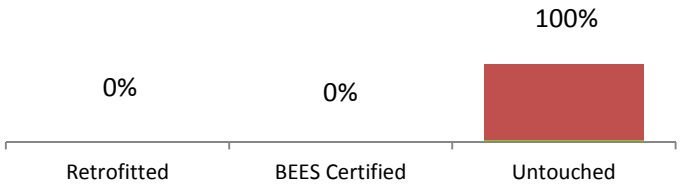
Energy Use	Average Home Energy Rating	Average Square Feet	Avg. EUI (kBTU/sf)
	N/A	N/A	N/A

Data Quality	
	Medium

Age of Housing Stock



Energy Efficient Housing Stock

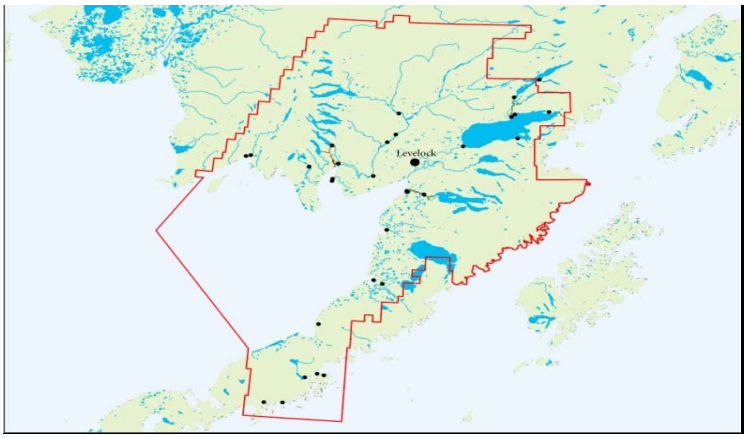


Street Lighting	Owner	Number/Type	Retrofitted?	Year	Notes
		10	Partial		Some with LEDs, USDA funding expected

Non-residential Building Inventory

Building Name or Location	Year Built	Square Feet	Audited?	Retrofits Done?	In ARIS?
Airport Maint. Bldg.	1995				No
Assembly of God Church					
AT&T Facility/Council House					No
Aviation Storage		576			No
Child Welfare Office (Old Clinic)		1,280			No
Church Parsonage					No
Church Warehouse					No
City Maintenance Shop		770			No
Clinic	2008	2,500			No
Comm. Bldg.					No
Comm. Center					No
Generator Building	1981	618			No
Koliganek Clinic	2007	2,583			No
Koliganek K-12 School		4,705			Yes
Koliganek School	1959	11,332	Yes		No
Lift Station					No
M&H Variety Store	1980	1,920			No
Old Armory					No
Police Station/VPSO		580			No
Power Plant					No
Pumphouse					No
R. Orthodox Church					No
School Power Plant					No
Storage Building #3	1996	251			No
Village Council Building		1,600			No
Warehouse					No

Community Profile: Levelock



Alaska Native Name (definition)
Liivlek

Historical Setting / Cultural Resources

Early Russian explorers reported the presence of Levelock, which they called "Kvichak." The smallpox epidemic of 1837 killed more than half of the residents of the Bristol Bay region and left entire villages abandoned. A measles epidemic hit the region in 1900. The worldwide influenza epidemic in 1918-19 again devastated area villages. Levelock is a mixed Alutiiq and Yup'ik village. Commercial fishing and subsistence activities are the focus of the community.

Energy Priorities and Projects

Continue wind study & if feasible, develop; Expand heat recovery to community and tribal buildings; Expand distribution system to reach all residents; Investigate heat absorption for flash freezing; Need new dock, current is being affected by erosion; build more homes

Incorporation	Unincorporated

Location

Located on the west bank of the Kvichak River, 10 miles inland from Kvichak Bay. It lies 40 miles north of Naknek and 278 air miles southwest of Anchorage. It is located near the Alagnak Wild and Scenic River Corridor.

Longitude	-156.8567	**Latitude**	59.115
ANCSA Region	Bristol Bay Native Corporation		
Borough/CA	Lake and Peninsula Borough		
School District	Lake and Peninsula Borough School District		
AEA Region	Bristol Bay		

Taxes	**Type (rate)**	**Per-Capita Revenue**
	N/A	

Economy

Local government, trade, transportation/utilities, and professional/business services. Six commercial fishing permits and eight business licenses.

Climate	**Avg. Temp.**	**Climate Zone**	**Heating Deg. Days**
	N/A	7	N/A

Natural Hazard Plan	**Year**

Notes

Community Plans	**Year**
Levelock Strategic Plan	2000
Levelock Watershed Comm Planning Project	2005

Local Contacts	**Email**	**Phone**	**Fax**
Levelock Village	levelock@gci.net	907-287-3030	907-287-3032
Levelock Natives Limited		907-287-3040	907-287-3032
Bristol Bay Native Corporation		907-278-3602	907-276-3924

Demographics	**2000**	**2010**		**2013**
Population	122	69	**Percent of Residents Employed**	69%
Median Age	28	32.5	**Denali Commission Distressed Community**	Yes
Avg. Household Size	3	2.56	**Percent Alaska Native/American Indian (2010)**	85%
Median Household Income	N/A	$40,000	**Low and Moderate Income (LMI) Percent (2014)**	N/A

Electric Utility	**Generation Sources**	**Interties**	**PCE?**
Levelock Electric Cooperative, Inc.	Diesel	No	Yes

Landfill	**Class**	3	**Permitted?**	Yes	**Location**	Levelock

Water/Wastewater System		**Homes Served**	**System Volume**
Water	Individual wells		
Sewer	Individual septic	**Energy Audit?**	
Notes	Village operates pump truck	No	

Access					
Road	No				
Air Access	State owned; gravel	**Runway**	3284'x60'		
Dock/Port	Yes	**Barge Access?**	Yes	**Ferry Service?**	No

Notes

Energy Profile: Levelock

Diesel Power System

Utility	Levelock Electrical		
Engine	**Make/Model**	**Condition/Hrs**	**Gen Capacity**
Unit 1	John Deere	Good/17,125	100
Unit 2	John Deere	Good/6,470	67
Unit 3	John Deere	Good/4,636	67
Unit 4			
Line Loss		19.0%	
Heat Recovery?		Yes; School	

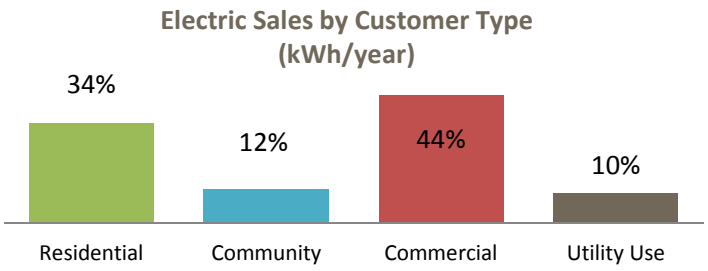
Upgrades	**Priority**	**Projects**	**Status**
RPSU Powerhouse	Low		Upgraded 2008
RPSU Distribution	Low		

Outage History/Known Issues Pre-paid meters installed

8 outages due to generator controls, has since been remedied. No

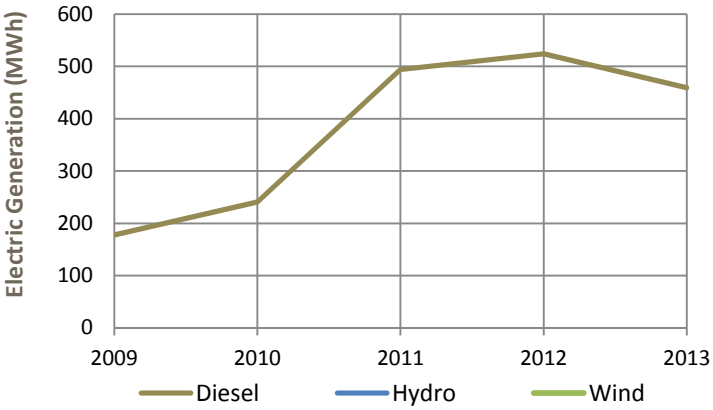
Operators	**No. of Operators**	**Training/Certifications**
	2, + 1 on-call	PPO, Lineman

Maintenance Planning (RPSU)	Acceptable		
Electric Sales	**No. of Customers**	**kWh/year**	**kWh/Customer**
Residential	33	129,555	3,926
Community	7	44,111	6,302
Commercial	24	165,798	6,908
Utility Use		38,691	



Power Production

Diesel (kWh/yr)	466,860	**Avg. Load (kW)**	37
Wind (kWh/yr)	0	**Peak Load (kW)**	83
Hydro (kWh/yr)	0	**Efficiency (kWh/gal)**	12
Total (kWh/yr)	466,860	**Diesel Used (gals/yr)**	40,000



Electric Rates ($/kWh)		**Cost per kWh Sold ($/kWh)**	
Rate with PCE	$0.27	**Fuel Cost**	$0.49
Residential Rate	$0.70	**Non-fuel Cost**	$0.37
Commercial Rate	$0.95	**Total Cost**	$0.86

Fuel Prices ($)	**Utility/Wholesale**	**Retail**	**Month/Year**
Diesel (1 gal)	$3.96	$6.20	6-13; 8-14
Other Fuel? (1 gal)			
Gasoline (1 gal)			
Propane (100#)		$191.67	8-14
Wood (1 cord)			
Pellets			
Discounts?		None	

Alternative Energy	**Potential**	**Projects**	**Status**
Hydroelectric	Medium		
Wind Diesel	Low	Levelock Wind Reconnaissance Study	Met tower installed in 2014
Biomass	Low		
Solar	Pending		
Geothermal	Low		
Oil and Gas	Low		
Coal	Low		
Emerging Tech	Not Rated		
Heat Recovery	Medium	HR to school	Operational
Energy Efficiency	High	Installing LED street lights	

Bulk Fuel

Tank Owner	**Fuel Type(s)**	**Capacity**	**Age/Condition**
Village	Heating Oil	120,000	Good
Village	Gasoline	18,000	Good

Bulk Fuel Upgrade	**Priority**	**Project**	**Status**

Purchasing	**Deliveries/Year**	**Gallons/Delivery**	**Vendor(s)**
By Barge	1		Delta W./Vitus
By Air			

Cooperative Purchasing Agreements

None

Notes

Delivery by barge each July.

Energy Profile: Levelock

Housing Units	Occupied	Vacant	% Owner-Occup.
	33	27	33%

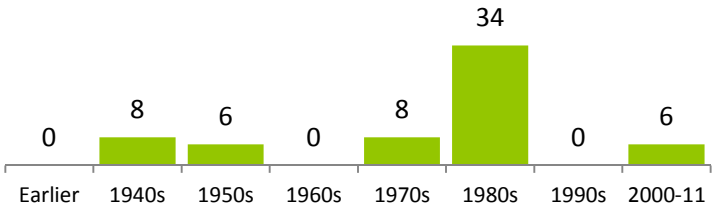
Regional Housing Authority	Weatherization Service Provider
Bristol Bay HA	Bristol Bay HA

Housing Need		Overcrowded	1-star
		24.2%	N/A

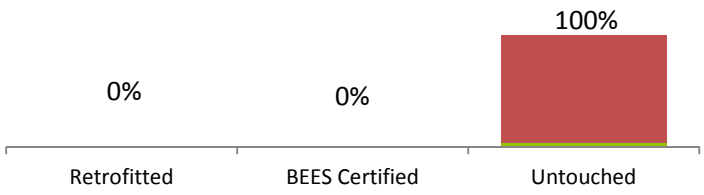
Energy Use	Average Home Energy Rating	Average Square Feet	Avg. EUI (kBTU/sf)
	N/A	N/A	N/A

Data Quality	
	Low

Age of Housing Stock



Energy Efficient Housing Stock

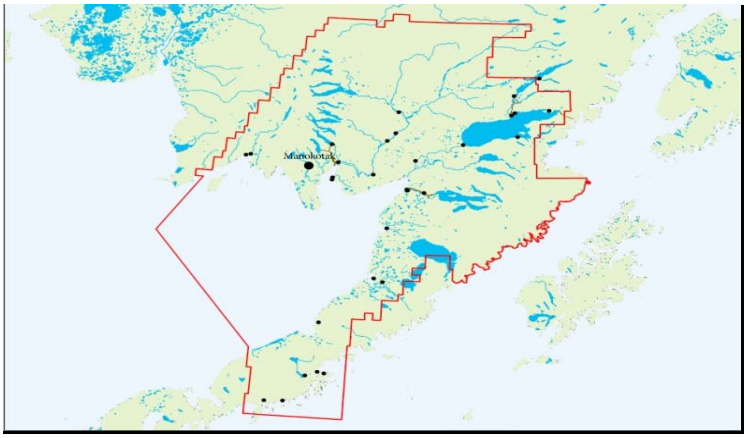


Street Lighting	Owner	Number/Type	Retrofitted?	Year	Notes
	Utility	22	Yes, partial		Some LEDs, more swapped as can be afforded.

Non-residential Building Inventory

Building Name or Location	Year Built	Square Feet	Audited?	Retrofits Done?	In ARIS?
Airport Equip. Storage	2008	336			No
Andrews Provisions Store					
AT&T Alascom					No
Baptist Church		1,200			No
Clinic	2009	1,679			No
Generator Bldg	1996	1,200			No
Levelock K-12	1985	22,942			Yes
LNL Office/Hotel					No
LNL Storage					No
LNL Storage 2					No
Old Portable Classroom (Kitchen)	1970	2,160			No
Orthodox Church					No
Post Office					No
Rainbow Hall Rec. Center	2002	3,280			No
SRE Bldg. #2 (Heated)		1,200			Yes
State of AK Storage Bldg. 2					No
Village Council Office	1982				No
Village Council Storage					No

Community Profile: Manokotak



Alaska Native Name (definition)

Manuquutaq

Historical Setting / Cultural Resources

Manokotak is one of the newer villages in the Bristol Bay region. It became a permanent settlement in 1946-47 with the consolidation of the villages of Igushik and Tuklung. People also migrated from Kulukak, Togiak, and Aleknagik. Igushik is now used as a summer fish camp by many of the residents of Manokotak. Trapping has been an attractive lure to the area, although it has declined since the 1960s. Manokotak is a Yup'ik Eskimo village with a fishing, trapping, and subsistence lifestyle.

Energy Priorities and Projects

Continue with wind power development; Install heat recovery system; interest in intertie to Dillingham; road access to Dillingham; water/sewer system in need of repairs

Incorporation	2nd Class City

Location

Located 25 miles southwest of Dillingham on the Igushik River. It lies 347 miles southwest of Anchorage.

Longitude	-159.0583	**Latitude**	58.9814
ANCSA Region	Bristol Bay Native Corporation		
Borough/CA	Dillingham Census Area		
School District	Southwest Region School District		
AEA Region	Bristol Bay		

Taxes	**Type (rate)**	**Per-Capita Revenue**
None		

Economy

Local government, trade transportation/utilities, and construction are the main employers. There are 91 fishing permits and 11 business licenses.

Climate	**Avg. Temp.**	**Climate Zone**	**Heating Deg. Days**
	33.8°	7	11,306

Natural Hazard Plan	**Year**

Notes	Future Plan Development

Community Plans	**Year**
Manokotak Comprehensive Plan	2005
Manokotak Comm Plan Jan 2001-May 2002	2002

Local Contacts	**Email**	**Phone**	**Fax**
Manokotak Village	kmo_villagecouncil@yahoo.com	907-289-2067	907-289-1235
City of Manokotak		907-289-1027	907-289-1082
Bristol Bay Native Corporation		907-278-3602	907-276-3924

Demographics	**2000**	**2010**		**2013**
Population	399	442	**Percent of Residents Employed**	68.1%
Median Age	22	26.4	**Denali Commission Distressed Community**	Yes
Avg. Household Size	5	3.65	**Percent Alaska Native/American Indian (2010)**	95.7%
Median Household Income	N/A	$32,344	**Low and Moderate Income (LMI) Percent (2014)**	70.1%

Electric Utility	**Generation Sources**	**Interties**	**PCE?**
Manokotak Power Company	Diesel		Yes

Landfill	**Class**	3	**Permitted?**	Yes	**Location**	Manokotak

Water/Wastewater System	City of Manokotak	**Homes Served**	**System Volume**
Water	Piped	121	N/A
Sewer	Piped	**Energy Audit?**	
Notes	W/S almost done. Pipes near end of useful life	Yes	

Access

Road	No				
Air Access	State owned; gravel	**Runway**	3300'x75'		
Dock/Port	No	**Barge Access?**	No	**Ferry Service?**	No

Notes

Energy Profile: Manokotak

Diesel Power System

Utility	Manokotak Power Company		
Engine	**Make/Model**	**Condition/Hrs**	**Gen Capacity**
Unit 1	John Deere	Fair/23,063	260
Unit 2	John Deere	Fair/29,048	260
Unit 3	John Deere	Fair/7,617	190
Unit 4	John Deere	Fair/5,005	120
Line Loss		Not Reported	
Heat Recovery?		**Yes; Shops**	

Upgrades	Priority	Projects	Status
RPSU Powerhouse	Medium	New CAT, 2014	Complete
RPSU Distribution	Medium		

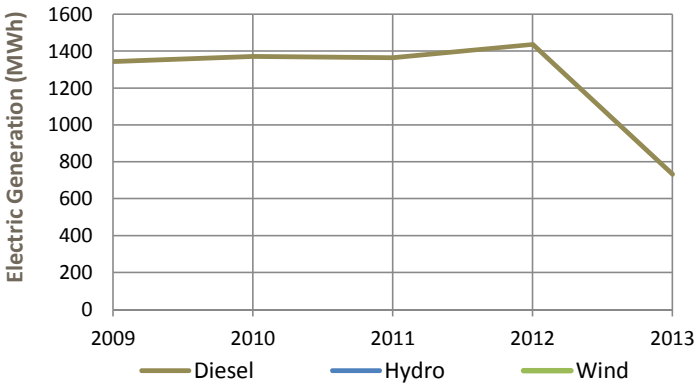
Outage History/Known Issues

Monthly out. for oil change. Outs. in summer from low oil/fuel.

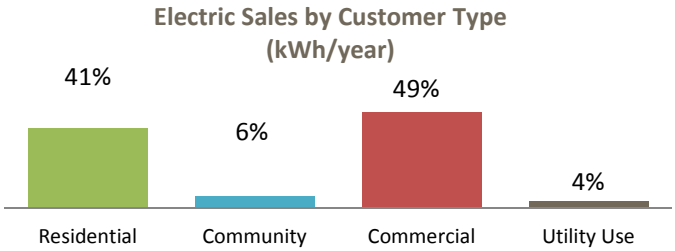
Operators	No. of Operators	Training/Certifications
	3	APPO

Power Production

Diesel (kWh/yr)	1,056,361	**Avg. Load (kW)**	128
Wind (kWh/yr)	0	**Peak Load (kW)**	285
Hydro (kWh/yr)	0	**Efficiency (kWh/gal)**	9
Total (kWh/yr)	1,056,361	**Diesel Used (gals/yr)**	113,206



Maintenance Planning (RPSU)	Good		
Electric Sales	**No. of Customers**	**kWh/year**	**kWh/Customer**
Residential	148	557,363	3,766
Community	5	85,052	17,010
Commercial	40	662,927	16,573
Utility Use		55,118	



Electric Rates ($/kWh)		Cost per kWh Sold ($/kWh)	
Rate with PCE	$0.27	**Fuel Cost**	$0.36
Residential Rate	$0.55	**Non-fuel Cost**	$0.03
Commercial Rate	$0.57	**Total Cost**	$0.40

Fuel Prices ($)	Utility/Wholesale	Retail	Month/Year
Diesel (1 gal)	$4.26	$6.78	6-13; 8-14
Other Fuel? (1 gal)			
Gasoline (1 gal)		$7.00	
Propane (100#)			
Wood (1 cord)	N/A		
Pellets			
Discounts?		None	

Alternative Energy	Potential	Projects	Status
Hydroelectric	Low		
Wind Diesel	Medium	Manokotak Wind & Heat Feasibility	Feasibility complete; Integration with diesel system uncertain
Biomass	Low		
Solar	Pending		
Geothermal	Low		
Oil and Gas	Low		
Coal	Low		
Emerging Tech	Not Rated		
Heat Recovery	Low		
Energy Efficiency	Medium	1)VEEP/Streetlight Retrofit 2) ANTHC Sanitation EE Audit	1) Complete 2) Funded

Bulk Fuel

Tank Owner	Fuel Type(s)	Capacity	Age/Condition
SWR Schools		20,000	
Manok. Nat. Ltd.		170,000	
Power Co.		21,400	
Church		2,700	
Trading Co.		1,459	
Bulk Fuel Upgrade	**Priority**	**Project**	**Status**

Purchasing	Deliveries/Year	Gallons/Delivery	Vendor(s)
By Barge	2		Crowley/Delta
By Air			

Cooperative Purchasing Agreements

Togiak Native Ltd. & SW Regional School Dist.

Notes

Barge delivery in Spring & Fall. Comp. bid (fixed price). Fuel tanks need fencing and need to be sandblasted/repainted.

Energy Profile: Manokotak

Housing Units	Occupied	Vacant	% Owner-Occup.
	95	18	76%

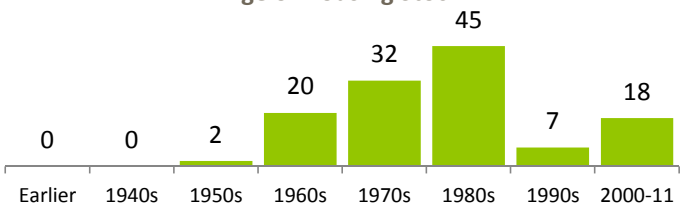
Regional Housing Authority	Weatherization Service Provider
Bristol Bay HA	Bristol Bay HA

Housing Need	Overcrowded	1-star
	17.9%	3.3%

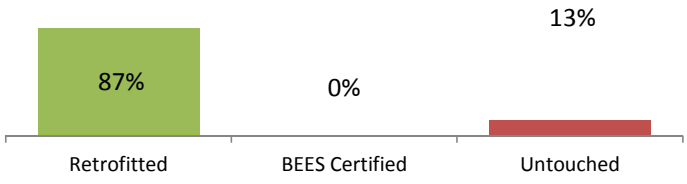
Data Quality	
	High

Energy Use	Average Home Energy Rating	Average Square Feet	Avg. EUI (kBTU/sf)
	3 star plus	916	109

Age of Housing Stock



Energy Efficient Housing Stock

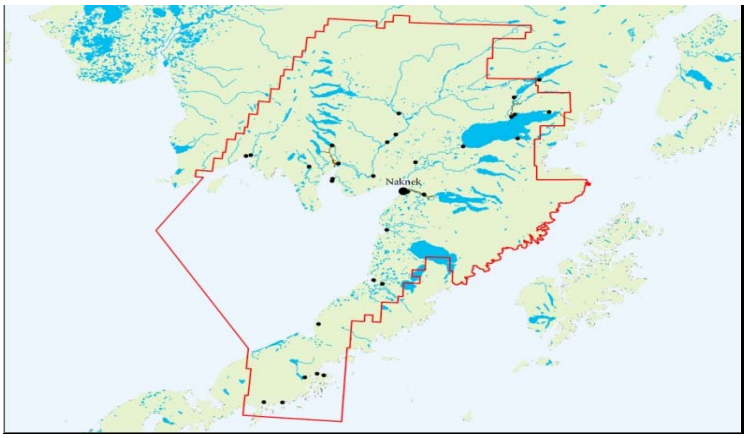


Street Lighting	Owner	Number/Type	Retrofitted?	Year	Notes
	City & MNL	23/HPS	Yes		20 LEDs in city

Non-residential Building Inventory

Building Name or Location	Year Built	Square Feet	Audited?	Retrofits Done?	In ARIS?
Airport Waiting Room	2008	960			No
BBNA Head Start					No
BBNA Youth, TCSW, & Health Families					No
Central Water/ Sewer Plant	1967/68	780			No
City-KMD Pump Station					No
GCI-Earth Station					No
Housing Water/ Sewer Plant	1987	780			No
Manokotak K-12	2001	39,200	Yes		No
Manokotak School Buildings	1985-2003	41,740			No
Manokotak Village Clinic	2007	2,583			No
Manuquutag Trading Co.	1996				No
MNL Gas Pumphouse					No
MNL Powerplant	2001				No
Moravian Church					No
Moravian Church Parsonage					No
Natives Ltd. Office					No
Natives Ltd. Shop					No
Natives Ltd. Shop 2					No
New Fire Hall					No
Nushagak Telephone Earth Station					No
Old Condemned School					No
Old Head Start					No
Old High School					No
Old SWRS Maint. Bldg					No
Other		2,600			No
Pumphouse 1 VEEP	2002	336			No
USPS					No
Village Council Office					No
VPSO/Police Station					No
Water Tank Valve House VEEP		96			No

Community Profile: Naknek



Incorporation Unincorporated

Location

Located on north bank of the Naknek River, at the northeastern end of Bristol Bay. It is 297 miles southwest of Anchorage.

Longitude	-157.0139	**Latitude**	58.7283
ANCSA Region	Bristol Bay Native Corporation		
Borough/CA	Bristol Bay Borough		
School District	Bristol Bay Borough School District		
AEA Region	Bristol Bay		

Alaska Native Name (definition)

N/A

Taxes	**Type (rate)**	**Per-Capita Revenue**
	Bed (10% Bor.), Raw Fish (3% Bor.)	N/A

Historical Setting / Cultural Resources

This region was first settled over 6,000 years ago by Yup'ik Eskimos and Athabascan Indians. In 1821, the original Eskimo village of "Naugeik" was noted by Capt. Lt. Vasiliev. By 1880, the village was called Kinuyak. It was later spelled Naknek by the Russian Navy. The first salmon cannery opened on the Naknek River in 1890. By 1900, there were approximately 12 canneries in Bristol Bay. Naknek has developed over the years as a major fishery center.

Economy

Subsistence community. Large fishing related economy. 100 commercial fishing permit holders. 116 current business licenses.

Climate	**Avg. Temp.**	**Climate Zone**	**Heating Deg. Days**
	N/A	7	11,716

Natural Hazard Plan	**Year**

Notes

Community Plans	**Year**

Energy Priorities and Projects

NEA: Investigate heat absorption for ice production in summer; NEA: Stack heat recovery; Increase energy efficiency of school buildings; more affordable housing; more weatherization in homes

Local Contacts	**Email**	**Phone**	**Fax**
Naknek Native Village	nnvcpresident@gmail.com	907-246-4210	907-246-3563
Paug-Vik Incorporated, Limited		907-246-4277	907-246-4419

Demographics	**2000**	**2010**		**2013**
Population	678	**554**	**Percent of Residents Employed**	64.3%
Median Age	35	38	**Denali Commission Distressed Community**	No
Avg. Household Size	3	3	**Percent Alaska Native/American Indian (2010)**	30.33%
Median Household Income		$88,125	**Low and Moderate Income (LMI) Percent (2014)**	N/A

Electric Utility	**Generation Sources**	**Interties**	**PCE?**
Naknek Electric Association	Diesel	King Salmon, South Naknek	Yes

Landfill	**Class**	2	**Permitted?**	Yes	**Location**	Between King Salmon & town.

Water/Wastewater System	BBBSD Naknek Water System	**Homes Served**	**System Volume**
Water	Piped	219	50,001-100,0000 gallons/day
Sewer		**Energy Audit?**	
Notes			

Access

Road	No				
Air Access	Public/Private; Gravel	**Runway**	1,950'x50'	1,836'x45'	1,700'x60'
Dock/Port	Yes	**Barge Access?**	Yes	**Ferry Service?**	No

Notes

Energy Profile: Naknek

Diesel Power System

Utility	Naknek Electric Association

Power Plant

10 stationary generators, 2 mobile generators
Working on system upgrade plan

Line Loss	5.5%
Heat Recovery?	Yes, BBB School District, Pool, 8 residences

Upgrades	**Priority**	**Projects**	**Status**
RPSU Powerhouse			
RPSU Distribution			

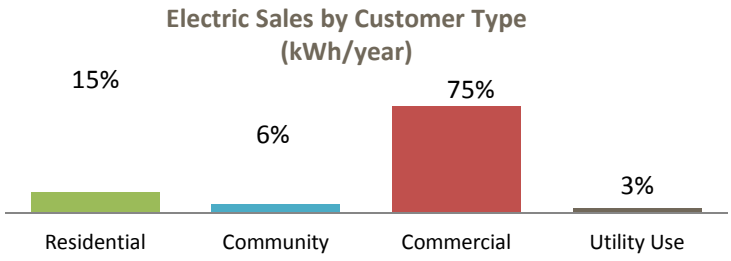
Outage History/Known Issues Very reliable, very few outages

Generation & sales for Naknek, South Naknek, & King Salmon

Operators	**No. of Operators**	**Training/Certifications**
	1 Foreman	PPO
	5 Operators	3 temp. laborers in summer

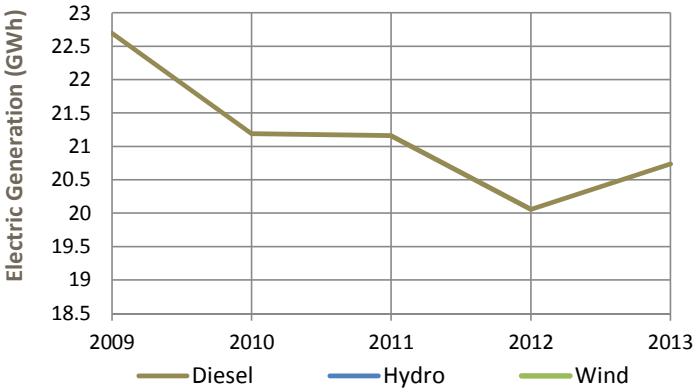
Maintenance Planning (RPSU)

Electric Sales	**No. of Customers**	**kWh/year**	**kWh/Customer**
Residential	738	2,840,685	3,849
Community	40	1,234,998	30,875
Commercial	359	14,431,075	40,198
Utility Use		612,053	



Power Production

Diesel (kWh/yr)	20,231,754	**Avg. Load (kW)**	1,317
Wind (kWh/yr)	0	**Peak Load (kW)**	2,927
Hydro (kWh/yr)	0	**Efficiency (kWh/gal)**	16
Total (kWh/yr)	20,231,754	**Diesel Used (gals/yr)**	1,258,272



Electric Rates ($/kWh)		**Cost per kWh Sold ($/kWh)**	
Rate with PCE	$0.17	**Fuel Cost**	$0.24
Residential Rate	$0.59	**Non-fuel Cost**	$0.20
Commercial Rate	$0.59	**Total Cost**	$0.44

Fuel Prices ($)	**Utility/Wholesale**	**Retail**	**Month/Year**
Diesel (1 gal)	$3.61	$5.96	6-13; 8-14
Other Fuel? (1 gal)			
Gasoline (1 gal)		$5.70	4-13
Propane (100#)		$257.38	8-14
Wood (1 cord)	N/A		
Pellets			
Discounts?		None	

Alternative Energy	**Potential**	**Projects**	**Status**
Hydroelectric	Low		
Wind Diesel	Medium		NEA not pursuing currently
Biomass	Low		
Solar	Pending		
Geothermal	Low	NEA Geothermal Project	Site tests
Oil and Gas	Low		
Coal	Low		
Emerging Tech	Not Rated		
Heat Recovery	High	NEA Stack Heat to Power Project; HR to school	Investigating; Operational
Energy Efficiency	High	VEEP - BBBSD	In progress

Bulk Fuel

Tank Owner	**Fuel Type(s)**	**Capacity**	**Age/Condition**
Naknek Elec.		1,660,000	
Borough		485,000	
Trident Seafood		31,000	
AK Gen. Seafood		24,200	
SW AK Constr.		6,000	
Others		11,700	

Bulk Fuel Upgrade	**Priority**	**Project**	**Status**

Purchasing	**Deliveries/Year**	**Gallons/Delivery**	**Vendor(s)**
By Barge			
By Air			

Cooperative Purchasing Agreements

Notes

Fish processors with tanks not included

Energy Profile: Naknek

Housing Units	Occupied	Vacant	% Owner-Occup.
	234	209	62%

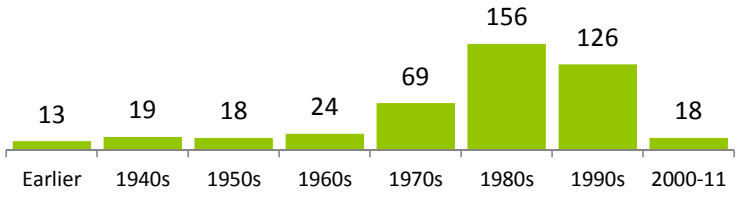
Regional Housing Authority	Weatherization Service Provider
Bristol Bay HA	Bristol Bay HA

Housing Need	Overcrowded	1-star
	3.8%	7.3%

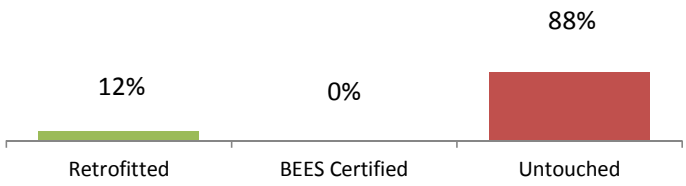
Energy Use	Average Home Energy Rating	Average Square Feet	Avg. EUI (kBTU/sf)
	3-star	1,571	141

Data Quality	
	High

Age of Housing Stock



Energy Efficient Housing Stock

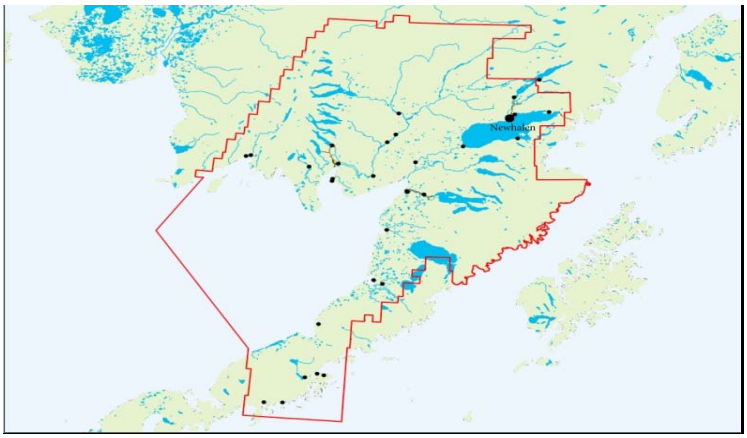


Lighting	Owner	Number/Type	Retrofitted?	Year	Notes
		216	Partial		Working on retrofits as bulbs go out

Non-residential Building Inventory

Building Name or Location	Year Built	Square Feet	Audited?	Retrofits Done?	In ARIS?
BBB Fire Station					No
Boys & Girls Club					No
Bristol Bay Borough Offices					No
Camai Comm. Health Center					No
Christian Learning Center					No
Church (LDS)					No
Church (Orthodox)					No
Clinic	1994	1,098			No
Comm. Bible Camp					No
Dept. Transportation					No
District Office Bldg.	1988	2,912			Yes
DOT Bldgs.					No
Equipment Warm Storage		2,240			Yes
Equipment Warm Storage (South)		1,104			Yes
Family Fish Plant		579			No
Hilltop Church					No
Historical Orthodox Church					No
K-12 School	1982	90,200			Yes
KAKM Radio Station					No
Living Water Fellowship Church					No
Martin Monson Library					No
Museum					No
Naknek Electric Ass.					No
Other		15,636			No
Post Office					No
Public Works Bldg.					No
Seafood Processor Bldg.					No
Sewer Bldg.					No
Soul Hanson Church					No
Swimming Pool					No
Telephone Bldg.					No
Village Council Office / Clinic					No
Well House					No

Community Profile: Newhalen



Alaska Native Name (definition)

Nuuriileng ("land of prosperity or abundance")

Historical Setting / Cultural Resources

The 1890 census listed the Eskimo village of "Noghelingamiut," meaning "people of Noghelin," at this location, with 16 residents. The present name is an Anglicized version of the original. The village was established in the late 1800s due to the bountiful fish and game in the immediate area. Newhalen includes Yup'ik Eskimos, Alutiiqs, and Athabascans. Most practice a subsistence and fishing lifestyle.

Energy Priorities and Projects

INNEC: Maintain year round capacity of Tazimina, increase river intake; INNEC: Upgrade distribution infrastructure Newhalen to Nondalton; Hook-up additional electric boilers; New lift station/replacement; Energy efficiency - Remodel school and renovate school gym

Incorporation	2nd Class City

Location

Newhalen is located on the north shore of Iliamna Lake, at the mouth of Newhalen River, 5 miles south of Iliamna and 320 miles southwest of Anchorage.

Longitude	-154.8972	**Latitude**	59.72
ANCSA Region	Bristol Bay Native Corporation		
Borough/CA	Lake and Peninsula Borough		
School District	Lake and Peninsula Borough School District		
AEA Region	Bristol Bay		

Taxes	**Type (rate)**	**Per-Capita Revenue**
	N/A	

Economy

Local government, professional/business services, and trade, transportation/utilities are main employers. There are 11 commercial fishing permits and 7 business licenses.

Climate	**Avg. Temp.**	**Climate Zone**	**Heating Deg. Days**
	N/A	7	11,130

Natural Hazard Plan	**Year**

Notes

Community Plans	**Year**

Local Contacts	**Email**	**Phone**	**Fax**
Newhalen Village	newhalentribal@yahoo.com	907-571-1410	907-571-1537
City of Newhalen	cityofnewhalen@yahoo.com	907-571-1226	907-571-1540
Bristol Bay Native Corporation		907-278-3602	907-276-3924

Demographics	**2000**	**2010**		**2013**
Population	160	190	**Percent of Residents Employed**	79.4%
Median Age	21	22.8	**Denali Commission Distressed Community**	No
Avg. Household Size	5	3.8	**Percent Alaska Native/American Indian (2010)**	82.2%
Median Household Income	N/A	$58,125	**Low and Moderate Income (LMI) Percent (2014)**	68.7%

Electric Utility	**Generation Sources**	**Interties**	**PCE?**
I-N-N Electric Cooperative	Hydropower	Yes, Iliamna-Newhalen-	Yes

Landfill	**Class**	**Permitted?**	**Location**

Water/Wastewater System	**City of Newhalen**	**Homes Served**	**System Volume**
Water	Piped	31	
Sewer	Piped, septic systems	**Energy Audit?**	
Notes	Ageing system & plant.	Yes	

Access

Road	No				
Air Access	State owned; asphalt	**Runway**	5086'x100'	4800'x100'	2998'x400'
Dock/Port	No	**Barge Access?**	Yes	**Ferry Service?**	No

Notes

Energy Profile: Newhalen

Diesel Power System

Utility	I-N-N Electric Coop, Inc

Engine	Make/Model	Condition/Hrs	Gen Capacity
Unit 1	Marathon	New	350
Unit 2	Skania	New	350
Unit 3	Kato	New	350
Unit 4			

Line Loss	8.4%
Heat Recovery?	Yes; City Office Bldg. & Fire Hall

Upgrades	Priority	Projects	Status
RPSU Powerhouse	Low		Complete
RPSU Distribution	Med.		

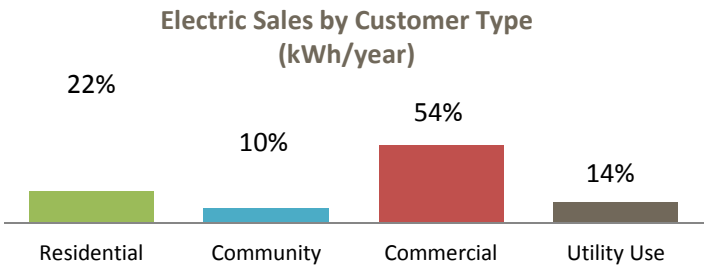
Outage History/Known Issues:

PCE data includes Iliamna, Newhalen, & Nondalton.

Operators	No. of Operators	Training/Certifications
	1	Hydro, BFO, PPO

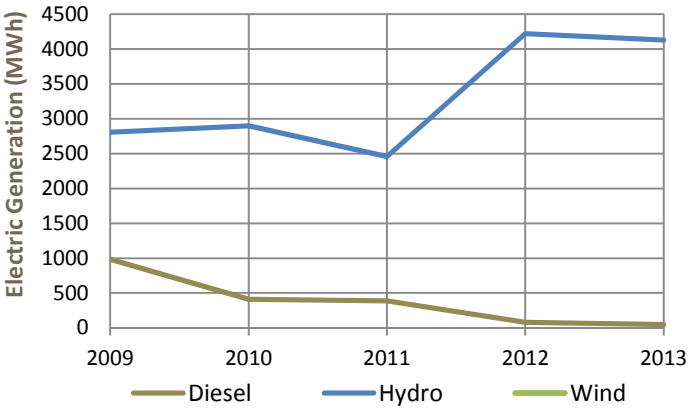
Maintenance Planning (RPSU)	Acceptable

Electric Sales	No. of Customers	kWh/year	kWh/Customer
Residential	215	810,980	3,772
Community	15	382,730	25,515
Commercial	105	2,017,376	19,213
Utility Use		543,936	



Power Production

Diesel (kWh/yr)	93,226	**Avg. Load (kW)**	161
Wind (kWh/yr)	0	**Peak Load (kW)**	358
Hydro (kWh/yr)	4,006,061	**Efficiency (kWh/ga**	18
Total (kWh/yr)	4,099,287	**Diesel Used (gals/y**	5,123



Electric Rates ($/kWh)		Cost per kWh Sold ($/kWh)	
Rate with PCE	$0.33	**Fuel Cost**	$0.01
Residential Rate	$0.57	**Non-fuel Cost**	$0.22
Commercial Rat	None	**Total Cost**	$0.23

Fuel Prices ($)	Utility/Wholesale	Retail	Month/Year
Diesel (1 gal)	$4.67	$6.68	6-13; 8-14
Other Fuel? (1 gal)			
Gasoline (1 gal)			
Propane (100#)		$157.38	8-14
Wood (1 cord)			
Pellets			
Discounts?			

Alternative Energy	Potential	Projects	Status
Hydroelectric	High	Tazimina, 824 kW, Intertie	Operational
Wind Diesel	Medium		
Biomass	High		
Solar	Pending		
Geothermal	Low		
Oil and Gas	Low		
Coal	Low		
Emerging Tech	Not Rated		
Heat Recovery	High	Hydro Electric Boilers, 150 kW to school	Operational
Energy Efficiency	High	EECBG	Complete

Bulk Fuel

Tank Owner	Fuel Type(s)	Capacity	Age/Condition
City	Heating Oil	3,000	Good
INN	Diesel	70,000	New

Bulk Fuel Upgrade	Priority	Project	Status

Purchasing	Deliveries/Year	Gallons/Delivery	Vendor(s)
By Barge			IDC
By Air			

Cooperative Purchasing Agreements

L&P School Dist.

Notes

City tanks not EPA compliant. LPSD agreement w/ INNEC to

Energy Profile: Newhalen

Housing Units	Occupied	Vacant	% Owner-Occup.
	50	11	58%

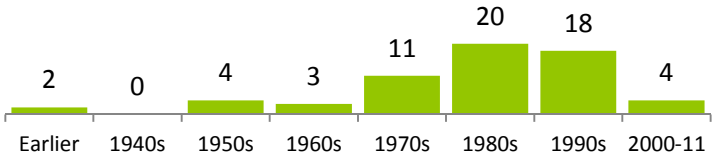
Regional Housing Authority	Weatherization Service Provider
Bristol Bay HA	Bristol Bay HA

Housing Need	Overcrowded	1-star
	22.0%	N/A

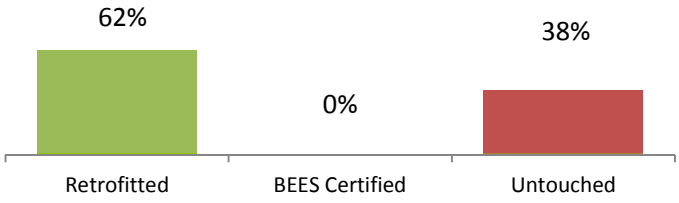
Energy Use	Average Home Energy Rating	Average Square Feet	Avg. EUI (kBTU/sf)
	N/A	N/A	N/A

Data Quality	
	Medium

Age of Housing Stock



Energy Efficient Housing Stock

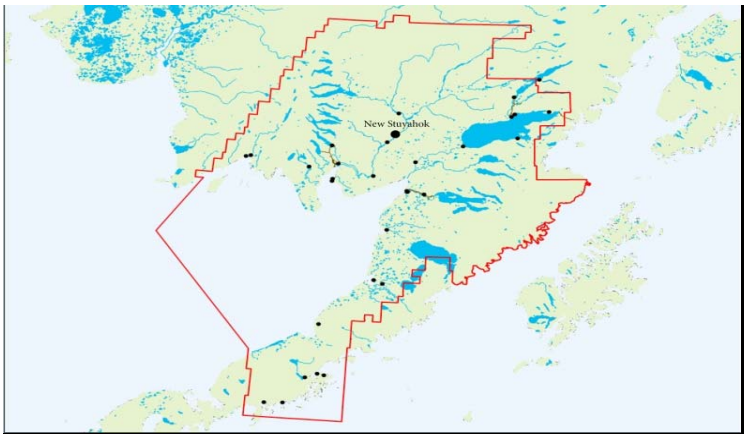


Street Lighting	Owner	Number/Type	Retrofitted?	Year	Notes
	I-N-NEC	20/HPS	Yes	2011	Newhalen Tribe secured grant for retrofit; INN owns & maintains

Non-residential Building Inventory

Building Name or Location	Year Built	Square Feet	Audited?	Retrofits Done?	In ARIS?
AK State Trooper Bldg.					No
City Council					No
Clinic	1990	754			No
General Store					No
INNEC Office Building	2013	2,700		BEES certified	No
INNEC PowerPlant	1981	3,500			No
New Clinic	1995	1,440			No
Newhalen House					No
Newhalen K-12					No
Newhalen Tribal Council		1,260			No
Orthodox Church		1,053			No
Public Safety/Fire Hall	1980-1995	28,692	Yes		Yes
Pumphouse					No
Teacher Housing 1					No
Teacher Housing 2		1,768			No
Teen Center					No
Water plant					No

Community Profile: New Stuyahok



Alaska Native Name (definition)

Cetuyaraq ("going downriver place")

Historical Setting / Cultural Resources

The present location is the third site that villagers can remember. The village moved downriver to the Mulchatna area from the "Old Village" in 1918. During the 1920s and 30s, the village was engaged in herding reindeer. By 1942, the herd had dwindled to nothing, the village had been subjected to flooding, site was too far inland to receive barge service. In 1942, the village moved downriver again to its present location. Yup'ik Eskimo village with Russian Orthodox influences. Residents live a fishing and subsistence lifestyle.

Energy Priorities and Projects

Continue with wind feasibility project; complete heat recovery project; Additional work on fuel storage and transport planned, seeking funds; Water/Sewer lines need upgrading; more homes needed

Incorporation	2nd Class City

Location

Located on the Nushagak River, about 12 miles upriver from Ekwok and 52 miles northeast of Dillingham. The village has been constructed at two elevations -- one 25 feet above river level and one about 40 feet above river level.

Longitude	-157.3119	**Latitude**	59.4528
ANCSA Region	Bristol Bay Native Corporation		
Borough/CA	Dillingham Census Area		
School District	Southwest Region School District		
AEA Region	Bristol Bay		

Taxes	**Type (rate)**	**Per-Capita Revenue**
None		

Economy

Local government, trade, transportation/utilities, and education/health services are main employers. There are 20 commercial fishing permits and 16 business licenses.

Climate	**Avg. Temp.**	**Climate Zone**	**Heating Deg. Days**
	N/A	7	11,306

Natural Hazard Plan	**Year**
Yes	7/4/1905
Notes	Update due 2017

Community Plans	**Year**
City of New Stuyahok Hazard Mitigation Plan	2012
New Stuyahok Comprehensive Plan	2005

Local Contacts	**Email**	**Phone**	**Fax**
New Stuyahok Village	newstutribe@hotmail.com	907-693-3173	907-693-3179
New Stuyahok Traditional Council		907-693-3173	
City of New Stuyahok	cityofnewstuyahok@hotmail.com	907-693-3171	907-693-3153

Demographics	**2000**	**2010**		**2013**
Population	471	510	**Percent of Residents Employed**	63.0%
Median Age	25	22.6	**Denali Commission Distressed Community**	Yes
Avg. Household Size	5	4.47	**Percent Alaska Native/American Indian (2010)**	93.7%
Median Household Income	N/A	$38,750	**Low and Moderate Income (LMI) Percent (2014)**	80.4%

Electric Utility	**Generation Sources**	**Interties**	**PCE?**
Alaska Village Electric Cooperative - AVEC	Diesel		Yes

Landfill	**Class**	3	**Permitted?**	Yes	**Location**	New Stuyahok

Water/Wastewater System	City of New Stuyahok	**Homes Served**	**System Volume**
Water	Piped	101	
Sewer	Piped	**Energy Audit?**	
Notes	**2 operators. Sewer lines in old sections need repla**	No	

Access

Road	No				
Air Access	State owned; gravel	**Runway**	3282'x95'		
Dock/Port	No	**Barge Access?**	No	**Ferry Service?**	No

Notes

Energy Profile: New Stuyahok

Diesel Power System

Utility	AVEC		
Engine	**Make/Model**	**Condition/Hrs**	**Gen Capacity**
Unit 1	Cummins	Fair/18,654	499
Unit 2	Detroit Diesel	Fair/26,264	363
Unit 3	Caterpillar	Fair/39,342	457
Unit 4			
Line Loss		1.4%	
Heat Recovery?	Yes; AVEC Tool Shack, Bunk House		

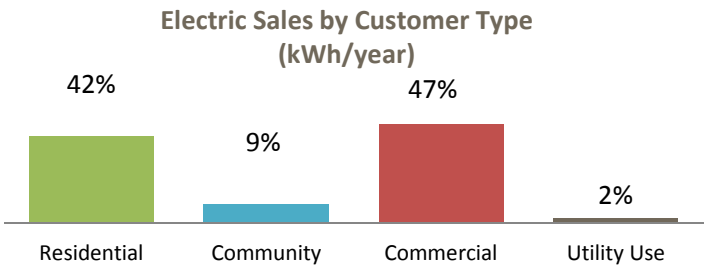
Upgrades	**Priority**	**Projects**	**Status**
RPSU Powerhouse	In Progress		
RPSU Distribution	In Progress		

Outage History/Known Issues: No

Operators	**No. of Operators**	**Training/Certifications**
	3	BFO, PPO

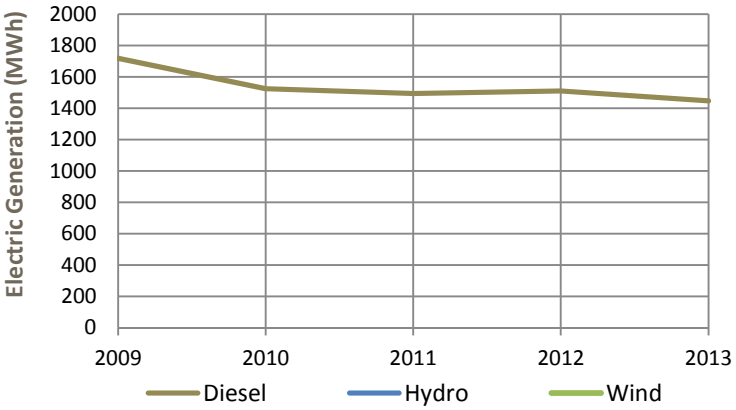
Maintenance Planning (RPSU) Acceptable

Electric Sales	**No. of Customers**	**kWh/year**	**kWh/Customer**
Residential	103	564,968	5,485
Community	11	120,616	10,965
Commercial	41	641,257	15,640
Utility Use		32,127	



Power Production

Diesel (kWh/yr)	1,378,601	**Avg. Load (kW)**	162
Wind (kWh/yr)	0	**Peak Load (kW)**	377
Hydro (kWh/yr)	0	**Efficiency (kWh/gal)**	14
Total (kWh/yr)	1,378,601	**Diesel Used (gals/yr)**	101,469



Electric Rates ($/kWh)		**Cost per kWh Sold ($/kWh)**	
Rate with PCE	$0.20	**Fuel Cost**	$0.34
Residential Rate	$0.63	**Non-fuel Cost**	$0.23
Commercial Rate		**Total Cost**	$0.57

Fuel Prices ($)	**Utility/Wholesale**	**Retail**	**Month/Year**
Diesel (1 gal)	$4.26	$6.77	6-13; 8-14
Other Fuel? (1 gal)			
Gasoline (1 gal)			
Propane (100#)		$242.14	8-14
Wood (1 cord)	Not sold, residents collect their own		
Pellets			
Discounts?		None	

Alternative Energy	**Potential**	**Projects**	**Status**
Hydroelectric	Low		
Wind Diesel	Medium	New Stuyahok Wind Feasibility Analysis	Site located, CDR on hold until wind resource proven
Biomass	High		
Solar	Pending		
Geothermal	Low		
Oil and Gas	Low		
Coal	Low		
Emerging Tech	Not Rated		
Heat Recovery	High	New Stuyahok Heat Recovery	Construction
Energy Efficiency	High	1) VEEP 2) ANTHC Sanitation EE Audit	1) Complete 2) Funded

Bulk Fuel

Tank Owner	**Fuel Type(s)**	**Capacity**	**Age/Condition**
City	Heating Oil	140,000	

Bulk Fuel Upgrade	**Priority**	**Project**	**Status**

Purchasing	**Deliveries/Year**	**Gallons/Delivery**	**Vendor(s)**
By Barge	2-3		Delta W./Vitus
By Air			

Cooperative Purchasing Agreements

None

Notes

Comp. bidding. Droughts potentially limit barge delivery.

Energy Profile: New Stuyahok

Housing Units	Occupied	Vacant	% Owner-Occup.
	97	16	60%

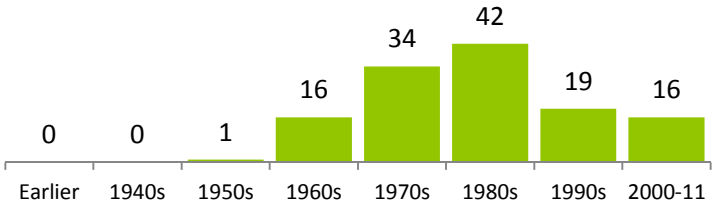
Regional Housing Authority	Weatherization Service Provider
Bristol Bay HA	Bristol Bay HA

Housing Need	Overcrowded	1-star
	57.7%	19.1%

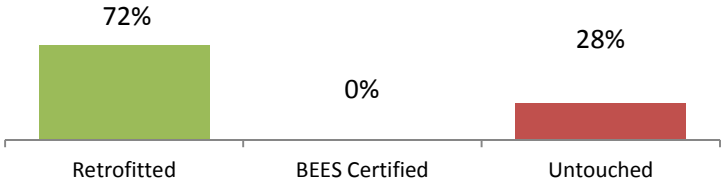
Energy Use	Average Home Energy Rating	Average Square Feet	Avg. EUI (kBTU/sf)
	2 star plus	845	164

Data Quality	
	High

Age of Housing Stock



Energy Efficient Housing Stock

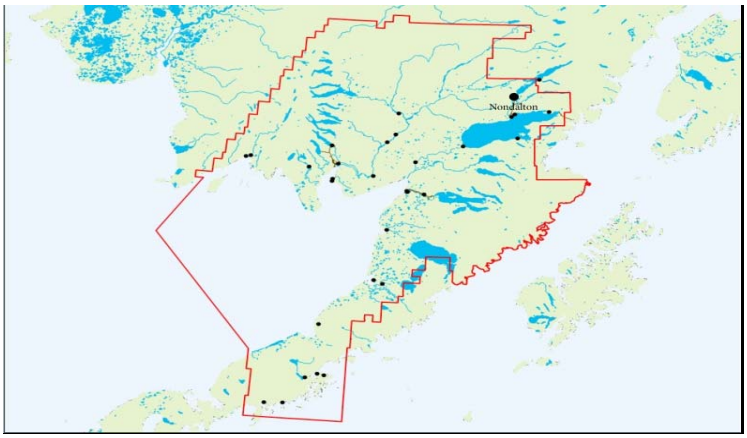


Street Lighting	Owner	Number/Type	Retrofitted?	Year	Notes
	AVEC	16	Yes		5 (approx.) replaced, remaining as needed

Non-residential Building Inventory

Building Name or Location	Year Built	Square Feet	Audited?	Retrofits Done?	In ARIS?
AVEC Power plant					No
Boys & Girls Club					No
Church	1960	4,500			No
City Dump					No
City Equip. Shed					No
City Office					No
Clinic					No
FRC/Clinic	2010	5,314			No
Headstart	1998	2,000			No
High School					No
Orthodox Church					No
Other Bldgs.		11,567			No
P-Store	1991	4,000			No
Public Safety Building					No
Public Store					No
School Gym					No
School K-12	2009	49,738			No
School Shed					No
School Shed					No
School Storage Bldg					No
SRE Building 1 (Heated)		1,200			Yes
Sunday School					No
TANF					No
Tribal Bldg					No
Tribal Council	1990	2,500			No
USPS					No
VPSO Bldg					No
Water Pump house					No

Community Profile: Nondalton



Alaska Native Name (definition)
Nundaltin

Historical Setting / Cultural Resources

Nondalton is a Tanaina name first recorded in 1909 by the U.S. Geological Survey. The village was originally located on the north shore of Six Mile Lake, but in 1940 growing mudflats and wood depletion in the surrounding area caused the village to move to its present location on the west shore. It is a Tanaina Indian (Athabascan and Iliamna) village with a fishing and subsistence lifestyle.

Energy Priorities and Projects

INNEC: Maintain year round capacity of Tazimina, increase river intake; INNEC: Upgrade distribution infrastructure Newhalen to Nondalton; Hook-up additional electric boilers; continue with biomass feasibility, seeking funds; Complete replacement of water system

Incorporation	2nd Class City

Location

Located on the west shore of Six Mile Lake, between Lake Clark and Iliamna Lake, 190 miles southwest of Anchorage.

Longitude	-154.8478	**Latitude**	59.9719
ANCSA Region	Bristol Bay Native Corporation		
Borough/CA	Lake and Peninsula Borough		
School District	Lake and Peninsula Borough School District		
AEA Region	Bristol Bay		

Taxes	**Type (rate)**	**Per-Capita Revenue**
None		

Economy

Local government, education/health, and professional/ business services are main employers. There is one commercial fishing permit and twelve business licenses.

Climate	**Avg. Temp.**	**Climate Zone**	**Heating Deg. Days**
	N/A	7	11,130

Natural Hazard Plan	**Year**

Notes	Expired

Community Plans	**Year**

Local Contacts	**Email**	**Phone**	**Fax**
City of Nondalton	nondaltoncity@hotmail.com	907-294-2235	907-294-2235
Nondalton Village	nondaltontribe@yahoo.com	907-294-2257	907-294-2271
Bristol Bay Native Corporation		907-278-3602	907-276-3924

Demographics	**2000**	**2010**		**2013**
Population	221	164	**Percent of Residents Employed**	66%
Median Age	29	28.8	**Denali Commission Distressed Community**	Yes
Avg. Household Size	4	2.88	**Percent Alaska Native/American Indian (2010)**	67%
Median Household Income	N/A	$26,042	**Low and Moderate Income (LMI) Percent (2014)**	85.3%

Electric Utility	**Generation Sources**	**Interties**	**PCE?**
I-N-N Electric Cooperative	Hydro, diesel	Yes, Iliamna-Newhalen-	Yes

Landfill	**Class**	3	**Permitted?**	Yes	**Location**	Nondalton

Water/Wastewater System	City of Nondalton	**Homes Served**	**System Volume**
Water	Piped	51	
Sewer	Piped	**Energy Audit?**	
Notes		Yes	

Access

Road	No				
Air Access	State owned; gravel	**Runway**	2800'x75'		
Dock/Port	No	**Barge Access?**	**No**	**Ferry Service?**	**No**

Notes

Energy Profile: Nondalton

Diesel Power System

Utility	I-N-N Electric Coop, Inc

Engine	Make/Model	Condition/Hrs	Gen Capacity
Unit 1	N/A		
Unit 2			
Unit 3			
Unit 4			

Line Loss	8.4%
Heat Recovery?	

Upgrades	Priority	Projects	Status
RPSU Powerhouse	N/A		
RPSU Distribution	High		

Outage History/Known Issues

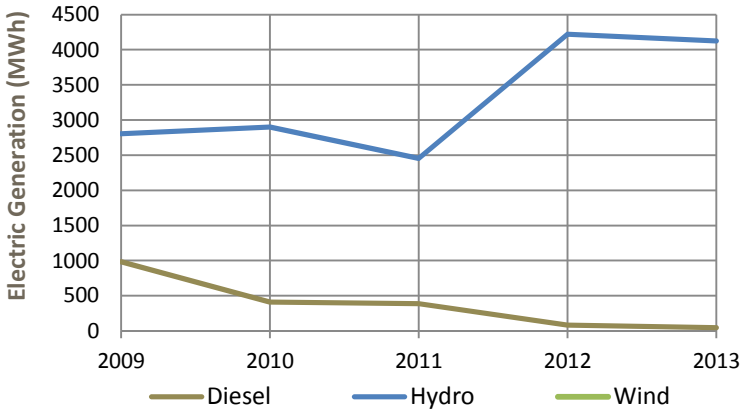
PCE data includes Iliamna, Newhalen, & Nondalton.

Operators	No. of Operators	Training/Certifications

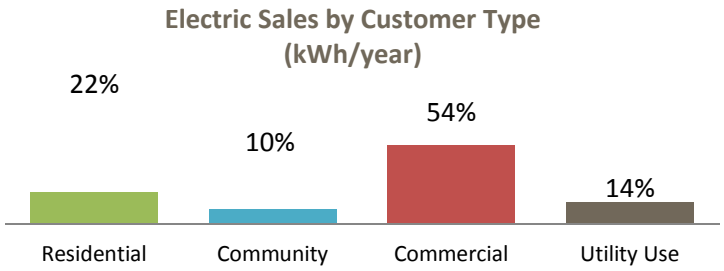
Maintenance Planning (RPSU)

Power Production

Diesel (kWh/yr)	93,226	Avg. Load (kW)	59
Wind (kWh/yr)	0	Peak Load (kW)	132
Hydro (kWh/yr)	4,006,061	Efficiency (kWh/gal)	18
Total (kWh/yr)	4,099,287	Diesel Used (gals/yr)	5,123



Electric Sales	No. of Customers	kWh/year	kWh/Customer
Residential	215	810,980	3,772
Community	15	382,730	25,515
Commercial	105	2,017,376	19,213
Utility Use		543,936	



Electric Rates ($/kWh)		Cost per kWh Sold ($/kWh)	
Rate with PCE	$0.33	Fuel Cost	$0.01
Residential Rate	$0.57	Non-fuel Cost	$0.22
Commercial Rate	None	Total Cost	$0.23

Fuel Prices ($)	Utility/Wholesale	Retail	Month/Year
Diesel (1 gal)	$4.67	$6.08	6-13; 8-14
Other Fuel? (1 gal)			
Gasoline (1 gal)			
Propane (100#)		$218.33	8-14
Wood (1 cord)			
Pellets			
Discounts?			

Alternative Energy	Potential	Projects	Status
Hydroelectric	High	Tazimina, 824 kW, Intertie	Operational
Wind Diesel	Medium		
Biomass	High		
Solar	Pending		
Geothermal	Low		
Oil and Gas	Low		
Coal	Low		
Emerging Tech	Not Rated		
Heat Recovery	High	Hydro Electric Boilers, 100kW	Operational
Energy Efficiency	High	ANTHC Sanitation EE Upgrades/Training	In Progress

Bulk Fuel

Tank Owner	Fuel Type(s)	Capacity	Age/Condition
City	Heating Oil	3,000	Fair
City	Gasoline	1,000	Fair

Bulk Fuel Upgrade	Priority	Project	Status

Purchasing	Deliveries/Year	Gallons/Delivery	Vendor(s)
By Barge			
By Air			

Cooperative Purchasing Agreements

L&P School Dist.

Notes

LPSD fuel flown in at $0.50-$1.00/gal. LPSD agreement w/ INNEC to

Energy Profile: Nondalton

Housing Units	Occupied	Vacant	% Owner-Occup.
	58	46	83%

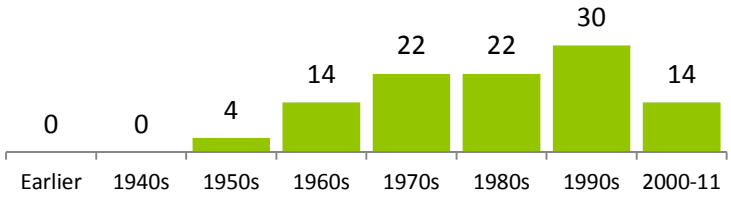
Regional Housing Authority	Weatherization Service Provider
Bristol Bay HA	Bristol Bay HA

Housing Need	Overcrowded	1-star
	27.6%	7.2%

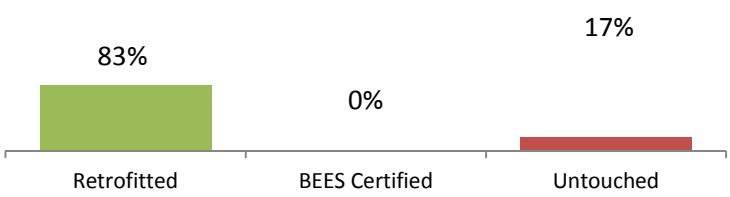
Energy Use	Average Home Energy Rating	Average Square Feet	Avg. EUI (kBTU/sf)
	2 star plus	949	129

Data Quality	
	Medium

Age of Housing Stock



Energy Efficient Housing Stock

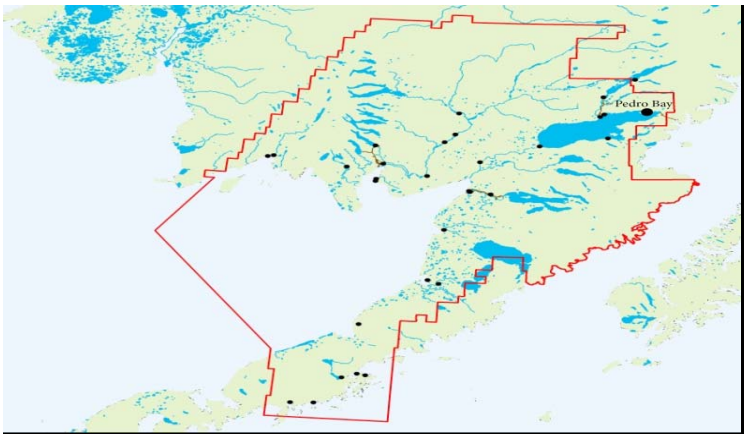


Street Lighting	Owner	Number/Type	Retrofitted?	Year	Notes
	I-N-NEC		In progress		Nondalton Tribe secured grant for retrofits; INN owns and maintains

Non-residential Building Inventory

Building Name or Location	Year Built	Square Feet	Audited?	Retrofits Done?	In ARIS?
Backup Gen. Shed for School					No
Chedda & Cheds B&B					No
City & Tribal Offices					No
City Hall		2,200			No
Clinic	2007	2,683			No
Grocery Store & Coop/Post Office					No
Nondalton Doll Factory					No
Orthodox Church					No
School K-12	1979-1985	21,744	Yes		Yes
SRE Bldg 1	1993	1,104			Yes
SRE Bldg 2 (Heated)		1,200			Yes
Teacher Housing					No
Village Comm. Center					No
Water Plant	1973	900			No

Community Profile: Pedro Bay



Incorporation Unincorporated

Location

Pedro Bay is located on the Alaska Peninsula, at the head of Pedro Bay and the east end of Iliamna Lake, 176 air miles southwest of Anchorage.

Longitude	-154.7872	**Latitude**	59.7872
ANCSA Region	Bristol Bay Native Corporation		
Borough/CA	Lake and Peninsula Borough		
School District	N/A		
AEA Region	Bristol Bay		

Alaska Native Name (definition)

N/A

Taxes **Type (rate)** **Per-Capita Revenue**

N/A

Historical Setting / Cultural Resources

The Dena'ina have occupied this area historically. The Dena'ina warred with Russian fur traders over trade practices in the early 1800s. The community was named for a man known as "Old Pedro," who lived in this area in the early 1900s. Pedro Bay is a village with a subsistence lifestyle.

Economy

Local government, natural resources/mining, and education/health services are the main employers. There are 3 commercial fishing permits and 13 business licenses.

Climate	**Avg. Temp.**	**Climate Zone**	**Heating Deg. Days**
N/A		7	

Natural Hazard Plan **Year**

Notes

Energy Priorities and Projects

Continue design & permitting for Knutson Creek hydro; Expand use of solar thermal devices; extension of airport runway to allow larger fuel deliveries; more houses needed

Community Plans **Year**

Local Contacts	**Email**	**Phone**	**Fax**
Pedro Bay Village	villagecouncil@pedrobay.com	907-850-2225	907-850-2221
Pedro Bay Corporation		907-277-1500	907-277-1501
Bristol Bay Native Corporation		907-278-3602	907-276-3924

Demographics	**2000**	**2010**		**2013**
Population	50	42	**Percent of Residents Employed**	63%
Median Age	35	40	**Denali Commission Distressed Community**	No
Avg. Household Size	3	2.21	**Percent Alaska Native/American Indian (2010)**	68.2%
Median Household Income	N/A	$43,958	**Low and Moderate Income (LMI) Percent (2014)**	N/A

Electric Utility	**Generation Sources**	**Interties**	**PCE?**
Pedro Bay Village Council	Diesel	No	Yes

Landfill	**Class**	3	**Permitted?**	No	**Note**	New landfill construct. 2015

Water/Wastewater System	Pedro Bay Village Council	**Homes Served**	**System Volume**
Water	Individual wells		
Sewer	Individual septic	**Energy Audit?**	
Notes	Council operates pump truck	No	

Access

Road	No				
Air Access	State owned; gravel	**Runway**	3002'x60'		
Dock/Port	Yes	**Barge Access?**	Yes	**Ferry Service?**	No

Notes

Energy Profile: Pedro Bay

Diesel Power System

Utility	Pedro Bay Village Council		
Engine	**Make/Model**	**Condition/Hrs**	**Gen Capacity**
Unit 1	John Deere	Fair/2,995	95
Unit 2	John Deere	Fair/47,142	58
Unit 3	John Deere	Fair/32,662	58
Unit 4			
Line Loss	9.7%		
Heat Recovery?	Yes; Main Office Bldg., EMS		

Upgrades	**Priority**	**Projects**	**Status**
RPSU Powerhouse	Med.		
RPSU Distribution	Low		

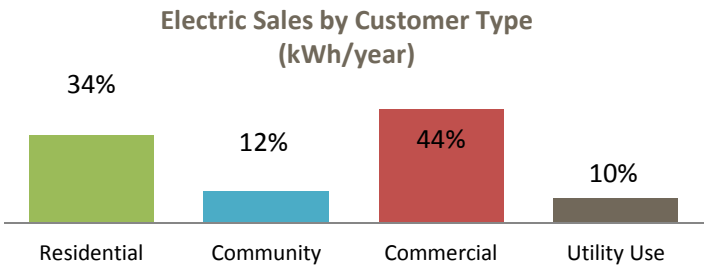
Outage History/Known Issues

One outage in the last 2.5 years.

Operators	**No. of Operators**	**Training/Certifications**
	2	OJT

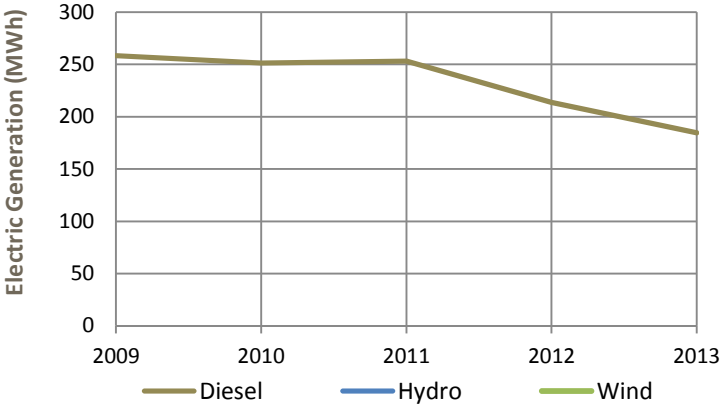
Maintenance Planning (RPSU)	Acceptable

Electric Sales	**No. of Customers**	**kWh/year**	**kWh/Customer**
Residential	19	56,731	2,986
Community	5	20,440	4,088
Commercial	12	74,105	6,175
Utility Use		15,882	



Power Production

Diesel (kWh/yr)	185,127	**Avg. Load (kW)**	26
Wind (kWh/yr)	0	**Peak Load (kW)**	57
Hydro (kWh/yr)	0	**Efficiency (kWh/gal**	11
Total (kWh/yr)	185,127	**Diesel Used (gals/yr**	17,247



Electric Rates ($/kWh)		**Cost per kWh Sold ($/kWh)**	
Rate with PCE	$0.42	**Fuel Cost**	$0.61
Residential Rate	$0.91	**Non-fuel Cost**	$0.22
Commercial Rate	$0.91	**Total Cost**	$0.83

Fuel Prices ($)	**Utility/Wholesale**	**Retail**	**Month/Year**
Diesel (1 gal)	$5.91	$5.64	6-13; 8-14
Other Fuel? (1 gal)			
Gasoline (1 gal)			
Propane (100#)		$169.05	8-14
Wood (1 cord)	No private sellers		
Pellets			
Discounts?		No	

Alternative Energy	**Potential**	**Projects**	**Status**
Hydroelectric	High	Knutson Creek Hydroelectric Project	Design and permitting
Wind Diesel	Low		
Biomass	Low		
Solar	Low		
Geothermal	Low		
Oil and Gas	Low		
Coal	Low		
Emerging Tech	Not Rated		
Heat Recovery	Low	HR System for community buildings	Operational
Energy Efficiency	Medium		

Bulk Fuel

Tank Owner	**Fuel Type(s)**	**Capacity**	**Age/Condition**
Village	Heating Oil	56,000	Good
Village	Gasoline	8,000	Good

Bulk Fuel Upgrade	**Priority**	**Project**	**Status**

Purchasing	**Deliveries/Year**	**Gallons/Delivery**	**Vendor(s)**
By Barge	2		
By Air	3-5		Everts Air Fuel

Cooperative Purchasing Agreements

None

Notes: Longer runway would allow bigger plane, price break.

Barge delivery in Spring and Fall. Year round by air.

Energy Profile: Pedro Bay

Housing Units	Occupied	Vacant	% Owner-Occup.
	10	22	80%

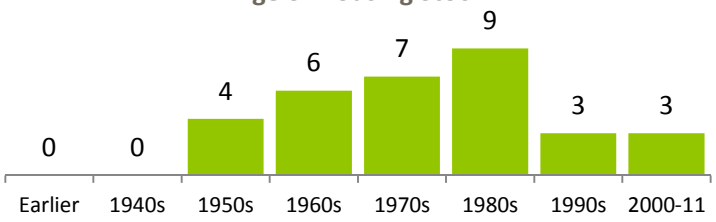
Regional Housing Authority	Weatherization Service Provider
Bristol Bay HA	Bristol Bay HA

Housing Need	Overcrowded	1-star
	40.0%	N/A

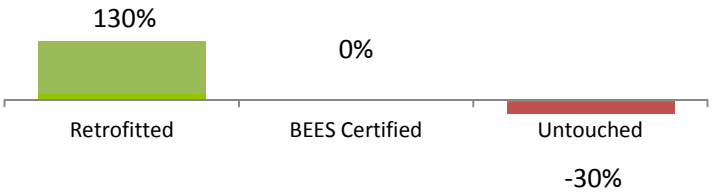
Energy Use	Average Home Energy Rating	Average Square Feet	Avg. EUI (kBTU/sf)
	N/A	N/A	N/A

Data Quality	
	Low

Age of Housing Stock



Energy Efficient Housing Stock

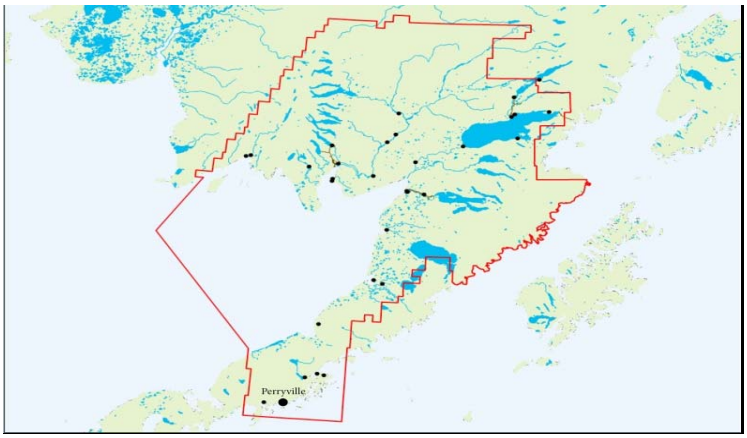


Street Lighting	Owner	Number/Type	Retrofitted?	Year	Notes
					None

Non-residential Building Inventory

Building Name or Location	Year Built	Square Feet	Audited?	Retrofits Done?	In ARIS?
Boat & Barge Landing/Storage					No
Gen. Bldg.	1989	800			No
Greenhouse					No
Library & Apts.			Yes	Yes	No
Main Office			Yes	Yes	No
Post Office					No
Power Plant					No
Russian Orthodox Church					No
Russian Orthodox Church (Old)					No
School	2002	7,520			No
School Gen. Bldg.					No
SRE Bldg (Heated)	2002	1,320			Yes
Storage Shed/EMS building	2008	600			No
Village Council/Clinic/Comm. Center	1996	797			No

Community Profile: Perryville



Alaska Native Name (definition)

Perry-q

Historical Setting / Cultural Resources

The community was founded in 1912 as a refuge for Alutiiq people driven away from their villages by the eruption of Mt. Katmai. Many villagers from Douglas and Katmai survived the eruption because they were out fishing at the time. The village was originally called "Perry," but the "ville" was added to conform to the post office name, established in 1930. The village maintains an Alutiiq culture and a subsistence lifestyle. Commercial fishing provides cash income.

Energy Priorities and Projects

Expand use of solar PV on community buildings; expand use/options for ground source heat pumps; weatherization needed in older homes, alternative energy source for swimming pool

Incorporation	Unincorporated

Location

Located on the south coast of the Alaska Peninsula, 275 miles southwest of Kodiak and 500 miles southwest of Anchorage.

Longitude	-159.1456	**Latitude**	55.9128
ANCSA Region	Bristol Bay Native Corporation		
Borough/CA	Lake and Peninsula Borough		
School District	Lake and Peninsula Borough School District		
AEA Region	Bristol Bay		

Taxes	**Type (rate)**	**Per-Capita Revenue**
	None	

Economy

Local government, education/health services, and information are the main employers. There are 8 fishing permits and 8 business licenses.

Climate	**Avg. Temp.**	**Climate Zone**	**Heating Deg. Days**

Natural Hazard Plan	**Year**
No	
Notes	No record

Community Plans	**Year**
Perryville Community Plan	2005
Update to plan (Jaylon Kosbruk)	2015

Local Contacts	**Email**	**Phone**	**Fax**
Native Village of Perryville	nvproads@hotmail.com	907-853-2203	907-853-2230
Oceanside Corporation		907-853-2300	907-853-2301
Bristol Bay Native Assoc. Inc.		907-842-5257	907-842-5932

Demographics	**2000**	**2010**		**2013**
Population	107	113	**Percent of Residents Employed**	62.5%
Median Age	27	27.8	**Denali Commission Distressed Community**	Yes
Avg. Household Size	4	2.97	**Percent Alaska Native/American Indian (2010)**	95.7%
Median Household Income	N/A	$22,344	**Low and Moderate Income (LMI) Percent (2014)**	N/A

Electric Utility	**Generation Sources**	**Interties**	**PCE?**
Native Village of Perryville	Wind turbine, Diesel		Yes

Landfill	**Class**	3	**Permitted?**	No	**Location**	Perryville

Water/Wastewater System	Native Village of Perryville	**Homes Served**	**System Volume**
Water	Piped	38	
Sewer	Piped sewer, individual septic	**Energy Audit?**	
Notes	Septic pumped and sludged for new WTP.	Yes	

Access

Road	No				
Air Access	State owned; gravel	**Runway**	3300'x75'		
Dock/Port	No	**Barge Access?**	Yes	**Ferry Service?**	No
Notes	Boat Ramp in 2014				

Energy Profile: Perryville

Diesel Power System

Utility	Native Village of Perryville		
Engine	**Make/Model**	**Condition/Hrs**	**Gen Capacity**
Unit 1	John Deere	Fair/Unknown	175
Unit 2	John Deere	Fair/Unknown	170
Unit 3	John Deere	Fair/Unknown	128
Unit 4			
Line Loss		22.3%	
Heat Recovery?		Yes; School	

Upgrades	**Priority**	**Projects**	**Status**
RPSU Powerhouse	In Progress	New Gen., 2016	
RPSU Distribution	In Progress		

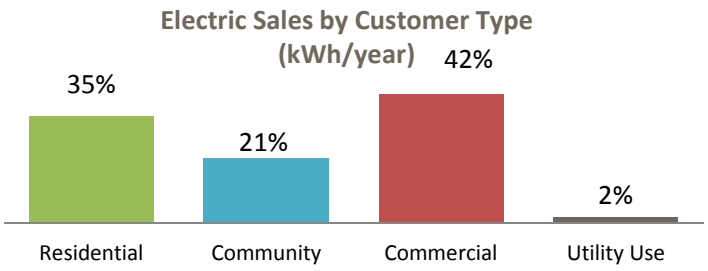
Outage History/Known Issues

Generator hours unknown. Outages once a month

Operators	**No. of Operators**	**Training/Certifications**
	1	PPO, BF

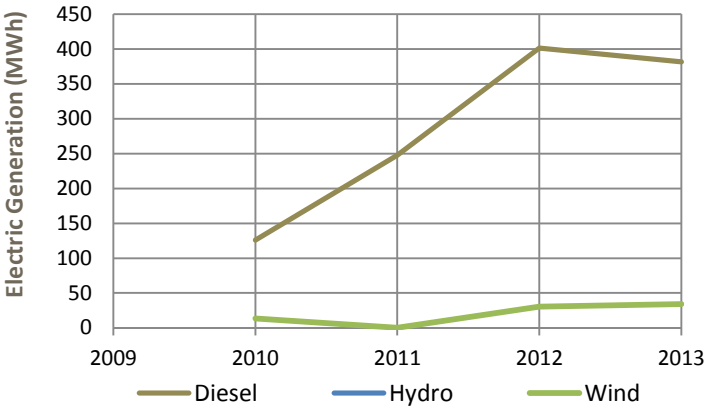
Maintenance Planning (RPSU)	Acceptable

Electric Sales	**No. of Customers**	**kWh/year**	**kWh/Customer**
Residential	52	139,041	2,674
Community	6	83,274	13,879
Commercial	14	166,837	11,917
Utility Use		8,041	



Power Production

Diesel (kWh/yr)	473,200	**Avg. Load (kW)**	95
Wind (kWh/yr)	37,804	**Peak Load (kW)**	211
Hydro (kWh/yr)	0	**Efficiency (kWh/ga**	18
Total (kWh/yr)	511,004	**Diesel Used (gals/**	26,929



Electric Rates ($/kWh)		**Cost per kWh Sold ($/kWh)**	
Rate with PCE	$0.62	**Fuel Cost**	$0.31
Residential Rate	$0.95	**Non-fuel Cost**	$0.10
Commercial Rate	$0.95	**Total Cost**	$0.41

Fuel Prices ($)	**Utility/Wholesale**	**Retail**	**Month/Year**
Diesel (1 gal)	$4.55	$5.42	6-13; 8-14
Other Fuel? (1 gal)			
Gasoline (1 gal)		$5.72	3-15
Propane (100#)		$305	3-15
Wood (1 cord)	N/A		
Pellets			
Discounts?		No	

Alternative Energy	**Potential**	**Projects**	**Status**
Hydroelectric	Medium		
Wind Diesel	Medium	10 Residential Turbines. 2.5-2.9 kW each	Operational
Biomass	Low		
Solar	Pending	Office/Clinic Bldg., 3 kW PV panels	Operational
Geothermal	Low	Geothermal/ Heat pumps, Office Bldg.	Operational
Oil and Gas	Low		
Coal	Medium		
Emerging Tech	Not Rated		
Heat Recovery	High	Diesel Genset HR	Operational
Energy Efficiency	Medium	VEEP, LPSD; Interior Lights - Community Bldgs	Complete

Bulk Fuel

Tank Owner	**Fuel Type(s)**	**Capacity**	**Age/Condition**
Village	Heating Oil	80,000	Fair
Village	Gasoline	15,000	Fair

Bulk Fuel Upgrade	**Priority**	**Project**	**Status**
			Complete

Purchasing	**Deliveries/Year**	**Gallons/Delivery**	**Vendor(s)**
By Barge	1		Crowley
By Air			

Cooperative Purchasing Agreements

None.

Notes

Barge delivery in Spring & Fall. Dock would help with access.

Energy Profile: Perryville

Housing Units	Occupied	Vacant	% Owner-Occup.
	39	16	72%

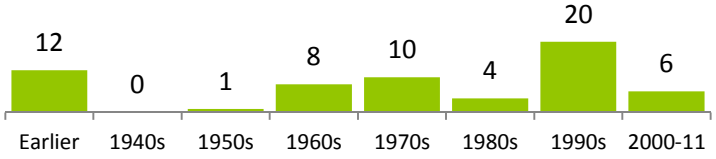
Regional Housing Authority	Weatherization Service Provider
Bristol Bay HA	Bristol Bay HA

Housing Need	Overcrowded	1-star
	17.9%	N/A

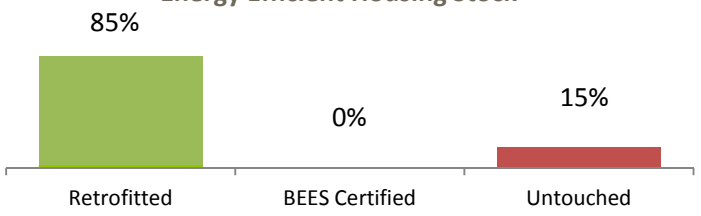
Energy Use	Average Home Energy Rating	Average Square Feet	Avg. EUI (kBTU/sf)
	N/A	N/A	N/A

Data Quality	
	Med.

Age of Housing Stock



Energy Efficient Housing Stock

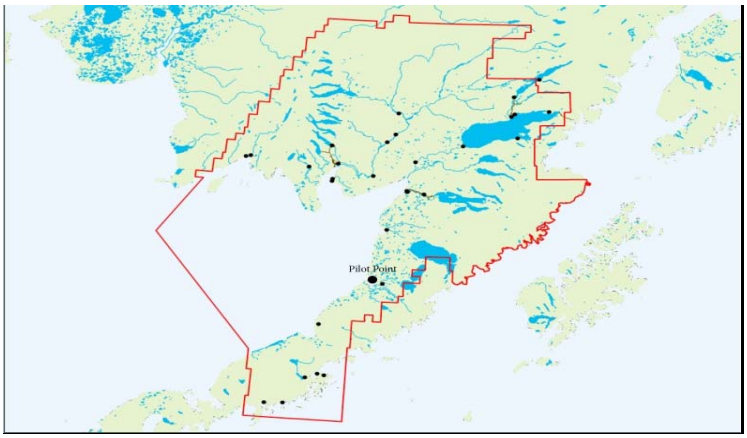


Street Lighting	Owner	Number/Type	Retrofitted?	Year	Notes
					None

Non-residential Building Inventory

Building Name or Location	Year Built	Square Feet	Audited?	Retrofits Done?	In ARIS?
AT&T Alascom Sat. Dish	~1970s				No
Cannery - City Shops (5)					
City Office Building					
Clinic	2009	4,413			No
DOT Grader Bldg	2005				No
DOT State Buildings (2)					
Fire Station					No
GCI Sat. Dish	~1990s				No
Gen. Bldg	1985	800			No
Old Power Plant					
Perryville School (k-12)	1983	16,904			Yes
Post Office	~2000s				No
Power Plant					No
PPNC Building					
Pump Station/Water Treatment	~1970s				No
R. Orthodox Church	~1920s				No
School Tank Farm/Generator	~1990s				No
State of AK Warehouse, Storage #1	2005	800			No
State of AK Warehouse, Storage #2	2005				No
Store	1960				No
Subsistence Bldg	1993				No
Teacher Housing	~1990s				No
Teacher Housing 2	~1990s				No
Tsunami Shelter	1996				No
VC Office/Oceanside Corp. Bldg	2007	10,000			No
VPSO Office Building					

Community Profile: Pilot Point



Alaska Native Name (definition)
N/A

Historical Setting / Cultural Resources

This mixed Aleut and Eskimo community developed around a fish salting plant established by C.A. Johnson in 1889. At that time, it was called "Pilot Station," after the river pilots stationed here to guide boats upriver to a large cannery at Ugashik. A post office was established in 1933, and the name was changed to Pilot Point at that time. Pilot Point incorporated as a city in 1992.

Energy Priorities and Projects

Continue with wind project development; install meter boxes on homes; set-up back-up energy source; more weatherization and energy efficiency measures or replace dilapidated homes

Incorporation	2nd Class City (inc. 1992)

Location

Pilot Point is located on the northern coast of the Alaska Peninsula, on the east shore of Ugashik Bay. The community lies 84 air miles south of King Salmon and 368 air miles southwest of Anchorage.

Longitude	-157.5792	**Latitude**	57.5642
ANCSA Region	Bristol Bay Native Corporation		
Borough/CA	Lake and Peninsula Borough		
School District	Lake and Peninsula Borough School District		
AEA Region	Bristol Bay		

Taxes	**Type (rate)**	**Per-Capita Revenue**
	Raw Fish (3% + 2% Bor.), Bed (6% Bor.) Guide ($3/p/d Bor.)	$12,150

Economy

Subsistence & commercial fishing community. 13 commercial fishing permits. 7 current business licenses.

Climate	**Avg. Temp.**	**Climate Zone**	**Heating Deg. Days**
	N/A	7	10,415

Natural Hazard Plan	**Year**

Notes	Expired

Community Plans	**Year**

Local Contacts	**Email**	**Phone**	**Fax**
City of Pilot Point		907-797-2200	907-797-2211
Native Village of Pilot Point		907-797-2330	907-797-2332
Pilot Point Native Corporation		907-797-2213	907-797-2258

Demographics	**2000**	**2010**		**2013**
Population	100	68	**Percent of Residents Employed**	91.5%
Median Age	29	17	**Denali Commission Distressed Community**	No
Avg. Household Size	4	3	**Percent Alaska Native/American Indian (2010)**	66.2%
Median Household Income	N/A	$31,563	**Low and Moderate Income (LMI) Percent (201x)**	67.5%

Electric Utility	**Generation Sources**	**Interties**	**PCE?**
Pilot Point Electrical Utility	Diesel, Wind	No	Yes

Landfill	**Class**	3	**Permitted?**	Yes	**Location**	3 miles NE of town, from beach.

Water/Wastewater System		**Homes Served**	**System Volume**
Water	Well		
Sewer	Septic	**Energy Audit?**	
Notes		No	

Access

Road	No				
Air Access	Public/Private; Gravel/Dirt	**Runway**	3,280'x75'	5,280'x125'	
Dock/Port	Yes	**Barge Access?**	Yes	**Ferry Service?**	No
Notes					

Energy Profile: Pilot Point

Diesel Power System

Utility	Pilot Point Electric Utility		
Engine	**Make/Model**	**Condition/Hrs**	**Gen Capacity**
Unit 1	John Deere	Good/15,359	101
Unit 2	John Deere	Good/12,410	67
Unit 3	John Deere	Good/255	99
Unit 4			
Line Loss	10.2%		
Heat Recovery?	Yes; School		

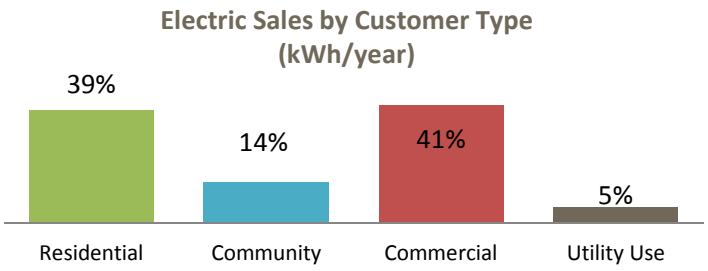
Upgrades	**Priority**	**Projects**	**Status**
RPSU Powerhouse	Low	In progress	Complete
RPSU Distribution	Med.	In progress	

Outage History/Known Issues Outages - unbalanced load

Unbalanced legs causes system failure during auto switching.

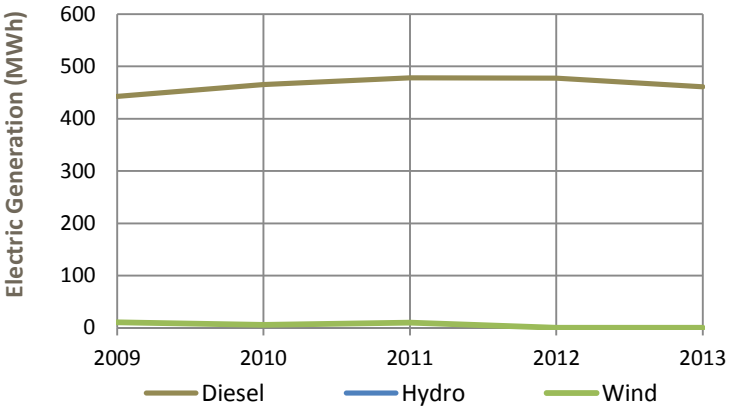
Operators	**No. of Operators**	**Training/Certifications**
	2	PPO

Maintenance Planning (RPSU)	Good		
Electric Sales	**No. of Customers**	**kWh/year**	**kWh/Customer**
Residential	47	145,904	3,104
Community	10	53,361	5,336
Commercial	19	152,272	8,014
Utility Use		20,018	



Power Production

Diesel (kWh/yr)	413,589	**Avg. Load (kW)**	42
Wind (kWh/yr)	0	**Peak Load (kW)**	93
Hydro (kWh/yr)	0	**Efficiency (kWh/gal)**	11
Total (kWh/yr)	413,589	**Diesel Used (gals/yr)**	36,248



Electric Rates ($/kWh)		**Cost per kWh Sold ($/kWh)**	
Rate with PCE	$0.16	**Fuel Cost**	$0.41
Residential Rate	$0.50	**Non-fuel Cost**	$0.13
Commercial Rate		**Total Cost**	$0.53

Fuel Prices ($)	**Utility/Wholesale**	**Retail**	**Month/Year**
Diesel (1 gal)	$4.31	$5.00	6-13; 8-14
Other Fuel? (1 gal)			
Gasoline (1 gal)			
Propane (100#)		$221.90	8-14
Wood (1 cord)			
Pellets			
Discounts?			

Alternative Energy	**Potential**	**Projects**	**Status**
Hydroelectric	Low		
Wind Diesel	Medium	Pilot Point Wind Power & Heat	Partially operational, CDR submitted
Biomass	Low		
Solar	Pending		
Geothermal	Low		
Oil and Gas	Low		
Coal	Medium		
Emerging Tech	Not Rated		
Heat Recovery	High	Wind to Heat; expansion possible	In development
Energy Efficiency	High	EECBG	Complete

Bulk Fuel

Tank Owner	**Fuel Type(s)**	**Capacity**	**Age/Condition**
City	Heating Oil	**145,000**	Good
City	Gasoline	**37,000**	Good

Bulk Fuel Upgrade	**Priority**	**Project**	**Status**

Purchasing	**Deliveries/Year**	**Gallons/Delivery**	**Vendor(s)**
By Barge	1		Crowley/De
By Air			

Cooperative Purchasing Agreements

None.

Notes

Barge delivery in mid-late Summer. Competitive bid.

Energy Profile: Pilot Point

Housing Units	Occupied	Vacant	% Owner-Occup.
	24	10	42%

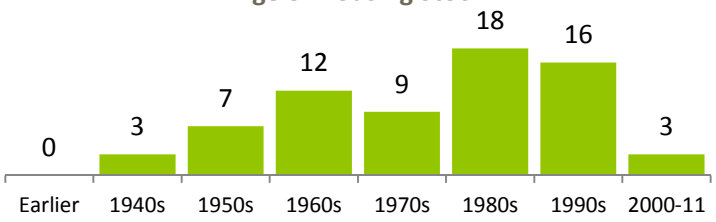
Regional Housing Authority	Weatherization Service Provider
Bristol Bay HA	Bristol Bay HA

Housing Need	Overcrowded	1-star
	23.5%	N/A

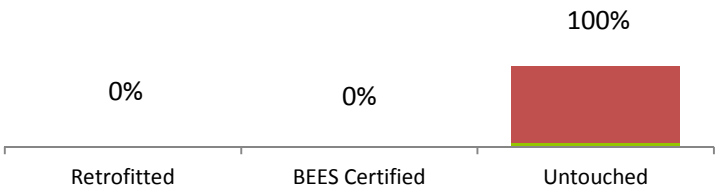
Energy Use	Average Home Energy Rating	Average Square Feet	Avg. EUI (kBTU/sf)
	1-star plus	1,477	160

Data Quality	
	Medium

Age of Housing Stock



Energy Efficient Housing Stock

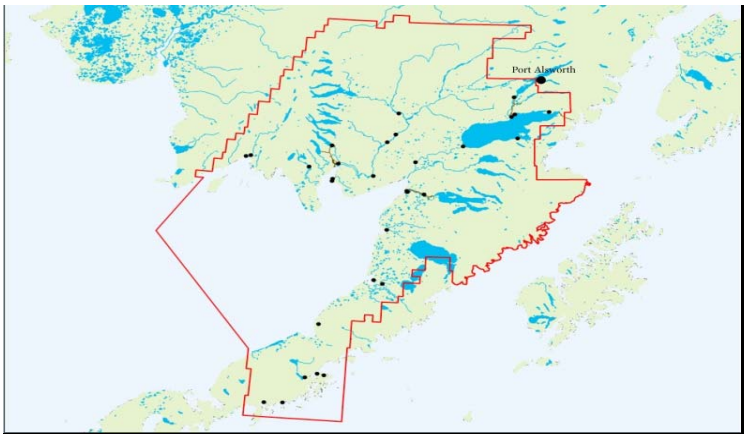


Lighting	Owner	Number/Type	Retrofitted?	Year	Notes
	City	15/HPS	Yes		Replaced with LEDs

Non-residential Building Inventory

Building Name or Location	Year Built	Square Feet	Audited?	Retrofits Done?	In ARIS?
Cannery Bldg./City Shops					No
Church (Orthodox)					No
City Bldg.					No
City Hall					No
City Office Bldg.		3,400			No
City Power Plant & Tank					No
Clinic & Council Office	2010	2,540			No
Old Post Office					No
Old Power Plant					No
Pilot Point K-12	1995	10,957			Yes
Post Office					No
Power Plant					No
PPNC Bldg.					No
SRE Bldg 2 (Heated)		1,200			Yes
State Warehouse		1,600			No
Store					No
Teacher Housing					No
VPSO Housing					No
VPSO Office					No
Workshop/Storage/Powerhouse	1995	508			No

Community Profile: Port Alsworth



Incorporation Unincorporated

Location

Port Alsworth is on the east shore of Lake Clark at Hardenburg Bay, 22 miles northeast of Nondalton. It lies in the Lake Clark National Park and Preserve.

Longitude	-154.3128	**Latitude**	60.2025
ANCSA Region	Bristol Bay		
Borough/CA	Lake and Peninsula Borough		
School District	Lake and Peninsula Borough School District		
AEA Region	Bristol Bay		

Alaska Native Name (definition)

Port Alsworth

Taxes	**Type (rate)**	**Per-Capita Revenue**
	Bed (6%), Raw Fish (2%), Guide ($3/p/d)	N/A

Historical Setting / Cultural Resources

Originally a native village, a post office was established in 1950. Port Alsworth's population is primarily non-Native.

Economy

Local government and trade, transportation/utilities are the largest employment industries. Three commercial fishing permit holders, and 35 current business licenses.

Climate	**Avg. Temp.**	**Climate Zone**	**Heating Deg. Days**
	36.1 F	7	11,206

Natural Hazard Plan	**Year**

Notes

Energy Priorities and Projects

Add solar arrays to residences and public buildings; New heat recovery system to serve newly built school and buildings; Public barge and landing strip to lower cost of fuel delivery

Community Plans	**Year**

Local Contacts	**Email**	**Phone**	**Fax**
Tanalian Inc.		907-272-3581	907-278-7030

Demographics	**2000**	**2010**		**2013**
Population	104	190	**Percent of Residents Employed**	53.9%
Median Age	26	26	**Denali Commission Distressed Community**	No
Avg. Household Size	4	4	**Percent Alaska Native/American Indian (2010)**	25%
Median Household Income	N/A	$56,250	**Low and Moderate Income (LMI) Percent (2014)**	N/A

Electric Utility	**Generation Sources**	**Interties**	**PCE?**
Tanalian Electric Cooperative	Diesel	No	Yes

Landfill	**Class**	N/A	**Permitted?**	**Location**

Water/Wastewater System	**None**	**Homes Served**	**System Volume**
Water	Individual wells		
Sewer	Individual septic	**Energy Audit?**	
Notes			

Access

Road	No				
Air Access	Private; Gravel/Dirt	**Runway**	3,000'x100'	4,200'x100'	
Dock/Port	No	**Barge Access?**	No	**Ferry Service?**	No
Notes	Private runway charges landing fees, potentially increases fuel delivery costs.				

Energy Profile: Port Alsworth

Diesel Power System

Utility	Tanalian Electric Cooperative		
Engine	**Make/Model**	**Condition/Hrs**	**Gen Capacity**
Unit 1	John Deere	Good	210
Unit 2	John Deere	Good	150
Unit 3	John Deere	Good	190
Unit 4			
Line Loss		6.5%	
Heat Recovery?		Yes; School	

Upgrades	Priority	Projects	Status
RPSU Powerhouse			In Progress
RPSU Distribution			In Progress

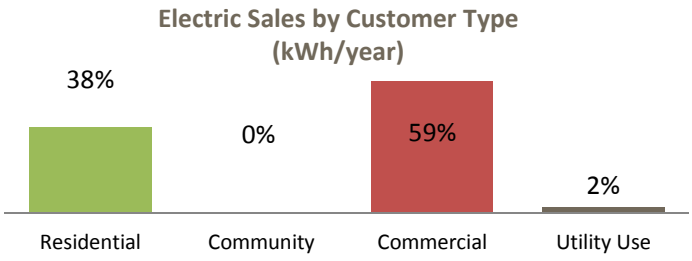
Outage History/Known Issues

Outages rare.

Operators	No. of Operators	Training/Certifications
	2	OJT

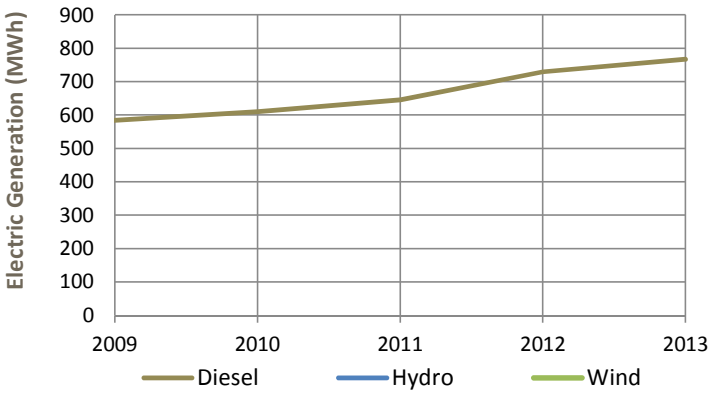
Maintenance Planning (RPSU)	Acceptable

Electric Sales	No. of Customers	kWh/year	kWh/Customer
Residential	75	287,955	3,839
Community	0	0	-
Commercial	59	444,522	7,534
Utility Use		17,831	



Power Production

Diesel (kWh/yr)	802,350	**Avg. Load (kW)**	66
Wind (kWh/yr)	0	**Peak Load (kW)**	146
Hydro (kWh/yr)	0	**Efficiency (kWh/gal)**	12
Total (kWh/yr)	802,350	**Diesel Used (gals/yr)**	65,848



Electric Rates ($/kWh)		Cost per kWh Sold ($/kWh)	
Rate with PCE	$0.18	**Fuel Cost**	$0.45
Residential Rate	$0.66	**Non-fuel Cost**	$0.16
Commercial Rate	**$0.63**	**Total Cost**	$0.61

Fuel Prices ($)	Utility/Wholesale	Retail	Month/Year
Diesel (1 gal)	$5.15		6-13
Other Fuel? (1 gal)			
Gasoline (1 gal)			
Propane (100#)			
Wood (1 cord)			
Pellets			
Discounts?		None	

Alternative Energy	Potential	Projects	Status
Hydroelectric	Low	Tanalian Falls Hydro	Location prevents development
Wind Diesel	Low	Feasibility Assessment	Complete, Not Feasible
Biomass	Low		
Solar	Pending		
Geothermal	Low		
Oil and Gas	Low		
Coal	Low		
Emerging Tech	Not Rated		
Heat Recovery	High	HRt to School, duplex, teacher's house	Operational
Energy Efficiency	High		

Bulk Fuel

Tank Owner	Fuel Type(s)	Capacity	Age/Condition
L&P Air		5,500	
L&P Schools		15,000	
Lake Clark Air		8,000	
AK Wild. Lodge		6,000	
Misc. Others		10,300	

Bulk Fuel Upgrade	Priority	Project	Status

Purchasing	Deliveries/Year	Gallons/Delivery	Vendor(s)
By Barge			
By Air	Every 2 weeks	4,000	Everts Air Fue

Cooperative Purchasing Agreements

None.

Notes

LPSD purchases on metered basis from utility.

Energy Profile: Port Alsworth

Housing Units	Occupied	Vacant	% Owner-Occup.
	65	32	38%

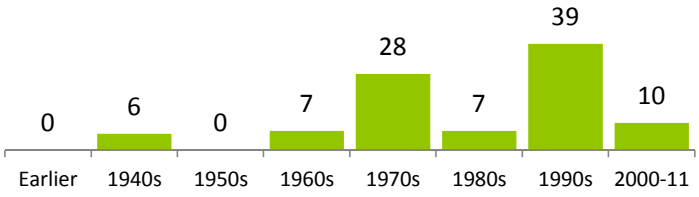
Regional Housing Authority	Weatherization Service Provider
Bristol Bay HA	Bristol Bay HA

Housing Need	Overcrowded	1-star
	N/A	N/A

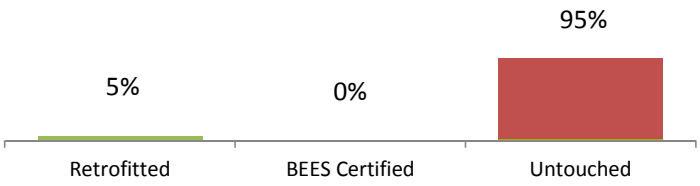
Energy Use	Average Home Energy Rating	Average Square Feet	Avg. EUI (kBTU/sf)
	N/A	N/A	N/A

Data Quality	Medium

Age of Housing Stock



Energy Efficient Housing Stock

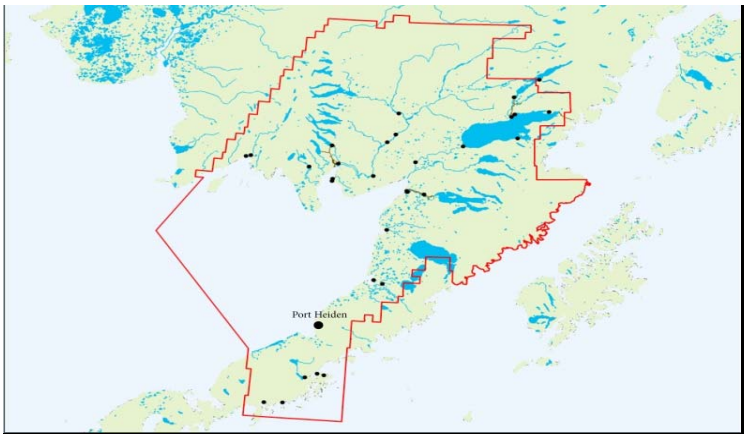


Street Lighting	Owner	Number/Type	Retrofitted?	Year	Notes
					None

Non-residential Building Inventory

Building Name or Location	Year Built	Square Feet	Audited?	Retrofits Done?	In ARIS?
AK Ventures					No
B&B					No
B&B 2					No
Bible Camp & Church					No
Community Center/Post Office					
Fuel Storage					No
Fuel Storage 2					No
NPS Bldg		5,788			No
Old Church					No
Old Harden Burs Cabin Site					No
Park Service Fuel Storage					No
Park Service Sewage Lagoon					No
Port Alsworth Improvement Bldg./Fire Dept.					No
Tanalian Electric Coop					No
Tanalian School	1983	8,172			Yes
Tanalian School (new)					
Teacher Housing					No
The Farm B&B/Lodge					No
USPS		200			No

Community Profile: Port Heiden



Alaska Native Name (definition)

N/A

Historical Setting / Cultural Resources

The old village of Meshik was located at the current site of Port Heiden. A school was established in the early 1950s, which attracted people from surrounding villages. Port Heiden incorporated as a city in 1972. The community relocated inland, because storm waves had eroded much of the old town site and threatened to destroy community buildings. Port Heiden is a traditional Alutiiq community, with a commercial fishing and subsistence lifestyle.

Energy Priorities and Projects

Continue with wind project design; Address tank farm erosion, solution needed urgently; Interest in hydro, re-do feasibility study; Interest in drilling test sites for geothermal project

Incorporation	2nd Class (inc. 1972)

Location

Port Heiden is 424 miles southwest of Anchorage, at the mouth of the Meshik River, on the north side of the Alaska Peninsula. It lies near the Aniakchak National Preserve and Monument.

Longitude	**Latitude**
ANCSA Region	Bristol Bay Native Corporation
Borough/CA	Lake and Peninsula Borough
School District	Lake and Peninsula Borough School District
AEA Region	Bristol Bay

Taxes	**Type (rate)**	**Per-Capita Revenue**
	Bed Tax (6% Bor.), Raw Fish (2% Bor.), Guide ($3/p/d Bor.)	N/A

Economy

Subsistence and commercial fishing community. 11 commercial fishing permits. 12 business licenses.

Climate	**Avg. Temp.**	**Climate Zone**	**Heating Deg. Days**
	36F	7	10,415

Natural Hazard Plan	**Year**
Notes	
Community Plans	**Year**

Local Contacts	**Email**	**Phone**	**Fax**
City of Port Heiden	cityofpth@hotmail.com	907-837-2209	907-837-2248
Native Village of Port Heiden	annie_christensen@hotmail.com	907-837-2296	907-837-2297

Demographics	**2000**	**2010**		**2013**
Population	119	102	**Percent of Residents Employed**	84.6%
Median Age	34	18	**Denali Commission Distressed Community**	No
Avg. Household Size	3	3	**Percent Alaska Native/American Indian (2010)**	83.3%
Median Household Income	N/A	$60,313	**Low and Moderate Income (LMI) Percent (2014)**	47.3%

Electric Utility	**Generation Sources**	**Interties**	**PCE?**
Port Heiden Utilities	Diesel	No	Yes

Landfill	**Class**	3	**Permitted?**	Yes	**Location**	2.5 E of town.

Water/Wastewater System	L&PSD	**Homes Served**	**System Volume**
Water	Well		
Sewer	Septic	**Energy Audit?**	
Notes		No	

Access

Road	No				
Air Access	Public; Gravel	**Runway**	5,000'x100'	4,00'x100'	
Dock/Port	Yes	**Barge Access?**	Yes	**Ferry Service?**	No

Notes

Energy Profile: Port Heiden

Diesel Power System

Utility	Port Heiden Utilities		
Engine	**Make/Model**	**Condition/Hrs**	**Gen Capacity**
Unit 1	John Deere	Poor/Unknown	179
Unit 2	John Deere	Good/6,143	190
Unit 3			
Unit 4			
Line Loss	Not Reported		
Heat Recovery?	Yes; Fire Dept., VPSO		

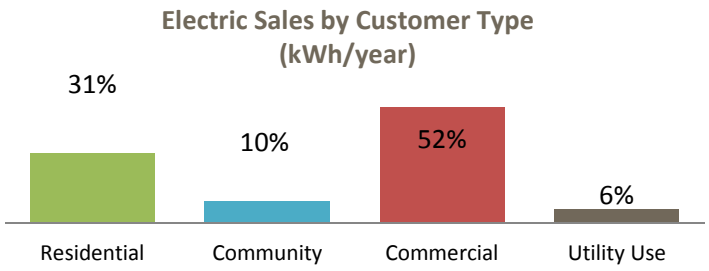
Upgrades	**Priority**	**Projects**	**Status**
RPSU Powerhouse	In Progress		
RPSU Distribution	Medium		

Outage History/Known Issues

Single engine dependent. Engine on unit 1 torn down for overhaul.

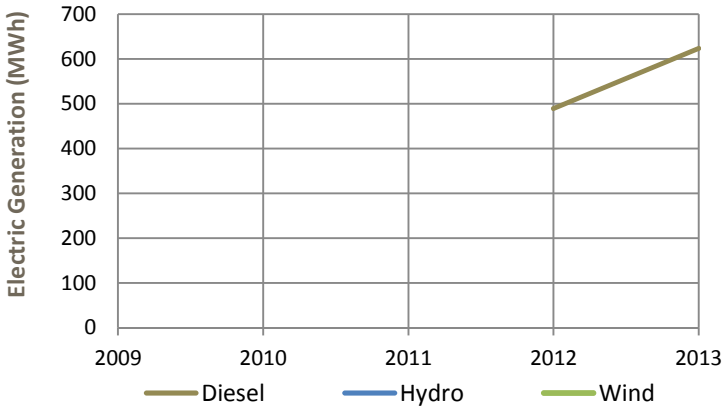
Operators	**No. of Operators**	**Training/Certifications**
		BF Book, BF Mgr., BFO, PPO, Clerk
Maintenance Planning (RPSU)		Good

Electric Sales	**No. of Customers**	**kWh/year**	**kWh/Customer**
Residential	52	180,145	3,464
Community	5	57,486	11,497
Commercial	19	299,850	15,782
Utility Use		36,304	



Power Production

Diesel (kWh/yr)	517,800	**Avg. Load (kW)**	75
Wind (kWh/yr)	0	**Peak Load (kW)**	167
Hydro (kWh/yr)	0	**Efficiency (kWh/gal)**	10
Total (kWh/yr)	517,800	**Diesel Used (gals/yr)**	54,330



Electric Rates ($/kWh)		**Cost per kWh Sold ($/kWh)**	
Rate with PCE	$0.25	**Fuel Cost**	$0.42
Residential Rate	$0.75	**Non-fuel Cost**	$0.13
Commercial Rate		**Total Cost**	$0.55

Fuel Prices ($)	**Utility/Wholesale**	**Retail**	**Month/Year**
Diesel (1 gal)	$4.23	$5.80	6-13; 8-14
Other Fuel? (1 gal)			
Gasoline (1 gal)			
Propane (100#)		$151.43	8-14
Wood (1 cord)			
Pellets			
Discounts?			

Alternative Energy	**Potential**	**Projects**	**Status**
Hydroelectric	Medium		
Wind Diesel	Low	300 kW high penetration wind system	On Hold pending RPSU upgrade conceptual design (2015)
Biomass	Low		
Solar	Pending		
Geothermal	Low		
Oil and Gas	Low		
Coal	Medium		
Emerging Tech	Not Rated		
Heat Recovery	High	HR to fire dept., VPSO office	
Energy Efficiency	High	EECBG	Complete

Bulk Fuel

Tank Owner	**Fuel Type(s)**	**Capacity**	**Age/Condition**
City	Heating Oil	64,000	Good
City	Gasoline	44,000	Good

Purchasing	**Deliveries/Year**	**Gallons/Delivery**	**Vendor(s)**
By Barge	2		
By Air			

Cooperative Purchasing Agreements

Bulk Fuel Upgrade	**Priority**	**Project**	**Status**

Notes

Barge delivery in Spring & Fall.

Energy Profile: Port Heiden

Housing Units	Occupied	Vacant	% Owner-Occup.
	25	24	60%

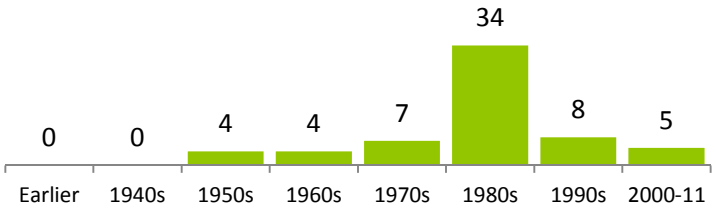
Regional Housing Authority	Weatherization Service Provider
Bristol Bay HA	Bristol Bay HA

Housing Need	Overcrowded	1-star
	N/A	4.8%

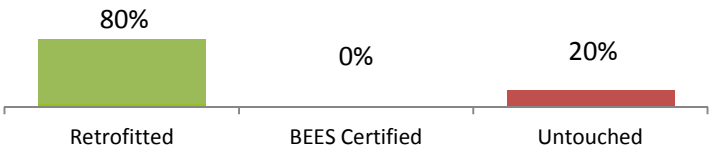
Energy Use	Average Home Energy Rating	Average Square Feet	Avg. EUI (kBTU/sf)
	4-star	1,169	98

Data Quality	
	Med.

Age of Housing Stock



Energy Efficient Housing Stock

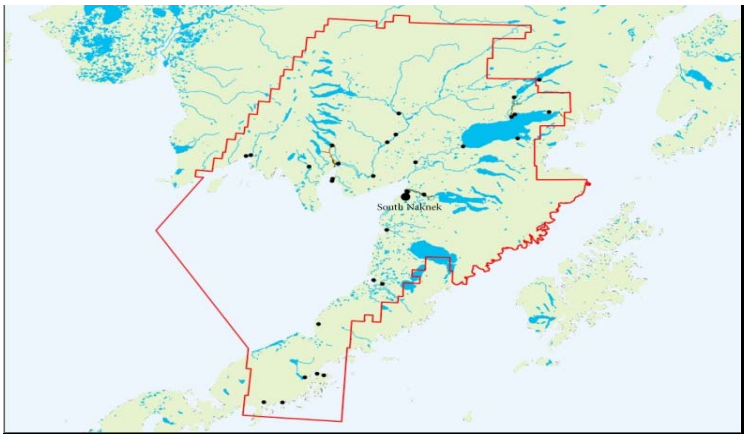


Lighting	Owner	Number/Type	Retrofitted?	Year	Notes

Non-residential Building Inventory

Building Name or Location	Year Built	Square Feet	Audited?	Retrofits Done?	In ARIS?
Airport ARFF Bldg.	1993	3,200			Yes
City & Village Council Bldg.					No
City Shop					No
Clinic	2000	2,099			No
GCI Bldg.					No
Gift Store					No
Grocery Store & Post Office					No
Hardware Store					No
Meshik K-12	1996	16,340			Yes
New Church (Orthodox)					No
Power Plant					No
St. Agafia Church					No
Storage	1981	336			No

Community Profile: South Naknek



Incorporation	Unincorporated

Location

South Naknek is located on the south bank of the Naknek River on the Alaska Peninsula, 297 miles southwest of Anchorage. It lies just west of the Katmai National Park and Preserve.

Longitude	-156.9981	**Latitude**	58.7156
ANCSA Region	Bristol Bay Native Corporation		
Borough/CA	Bristol Bay Borough		
School District	Bristol Bay Borough School District		
AEA Region	Bristol Bay		

Alaska Native Name (definition)

N/A

Taxes	**Type (rate)**	**Per-Capita Revenue**
	Bed (10% Bor.), Raw Fish (3% Bor.)	N/A

Historical Setting / Cultural Resources

South Naknek was settled permanently after the turn of the century as a result of salmon cannery development. South Naknek is a traditional Sugpiaq/Alutiiq village whose residents are descendants of people displaced by the Katmai and Novarupta volcanic eruptions of 1912.

Economy

Subsistence fishing village. 23 commercial fishing permits. 7 business licenses.

Climate	**Avg. Temp.**	**Climate Zone**	**Heating Deg. Days**
	42.1F	7	11,772

Natural Hazard Plan	**Year**
Yes	2011

Notes	Update required 10/6/2016

Energy Priorities and Projects

NEA: Investigate heat absorption for ice production in summer; NEA: Stack heat recovery; weatherization and energy efficiency; investigate wind power

Community Plans **Year**

Local Contacts	**Email**	**Phone**	**Fax**
South Naknek Village	lorianne_n@hotmail.com	907-246-8614	907-631-0949
Alaska Peninsula Corporation		907-274-2433	907-274-8694

Demographics	**2000**	**2010**		**2013**
Population	137	**79**	**Percent of Residents Employed**	52.1%
Median Age	36	18	**Denali Commission Distressed Community**	No
Avg. Household Size	3	3	**Percent Alaska Native/American Indian (2010)**	83.3%
Median Household Income	N/A	$65,250	**Low and Moderate Income (LMI) Percent (2014)**	No

Electric Utility	**Generation Sources**	**Interties**	**PCE?**
Naknek Electric Association	Diesel	Naknek, King Salmon	Yes

Landfill	**Class**	3	**Permitted?**	Yes	**Location**	~1 mile W. of town

Water/Wastewater System		**Homes Served**	**System Volume**
Water	Well		
Sewer	Septic	**Energy Audit?**	
Notes		Yes	

Access

Road	No				
Air Access	Public; Gravel/Dirt	**Runway**	2,264'x60'	3,314'x60'	
Dock/Port	Yes	**Barge Access?**	Yes	**Ferry Service?**	No

Notes

Energy Profile: South Naknek

Diesel Power System

Utility	Naknek Electric Association		
Engine	**Make/Model**	**Condition/Hrs**	**Gen Capacity**
Unit 1	N/A		
Unit 2			
Unit 3			
Unit 4			
Line Loss		5.5%	
Heat Recovery?			

Upgrades	**Priority**	**Projects**	**Status**
RPSU Powerhouse			
RPSU Distribution			

Outage History/Known Issues Feeders from NEA substation

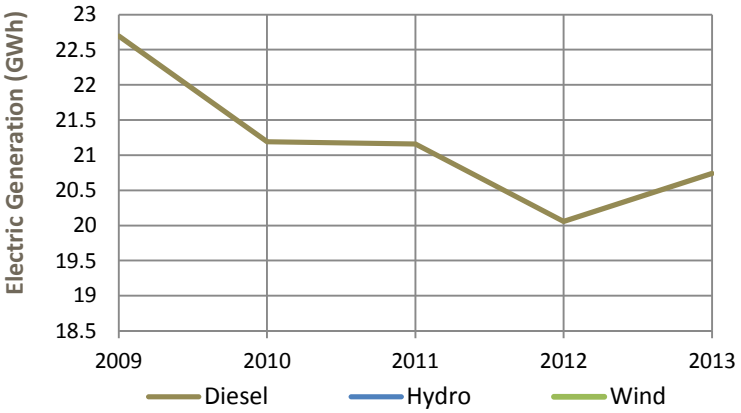
Generation & sales for Naknek, South Naknek, & King Salmon

Operators	**No. of Operators**	**Training/Certifications**

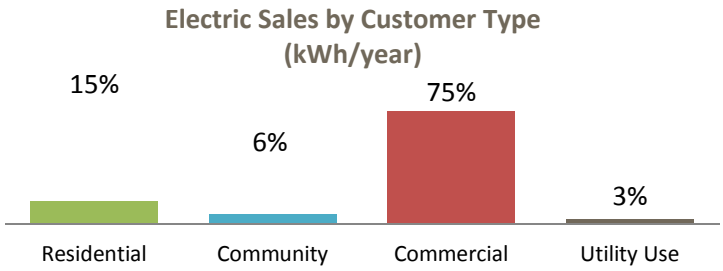
Maintenance Planning (RPSU)

Power Production

Diesel (kWh/yr)	20,231,754	**Avg. Load (kW)**	485
Wind (kWh/yr)	0	**Peak Load (kW)**	1,078
Hydro (kWh/yr)	0	**Efficiency (kWh/gal)**	16
Total (kWh/yr)	20,231,754	**Diesel Used (gals/yr)**	1,258,272



Electric Sales	**No. of Customers**	**kWh/year**	**kWh/Customer**
Residential	738	2,840,685	3,849
Community	40	1,234,998	30,875
Commercial	359	14,431,075	40,198
Utility Use		612,053	



Electric Rates ($/kWh)		**Cost per kWh Sold ($/kWh)**	
Rate with PCE	$0.17	**Fuel Cost**	$0.24
Residential Rate	$0.59	**Non-fuel Cost**	$0.20
Commercial Rate	$0.59	**Total Cost**	$0.44

Fuel Prices ($)	**Utility/Wholesale**	**Retail**	**Month/Year**
Diesel (1 gal)	$3.61	$5.96	6-13; 8-14
Other Fuel? (1 gal)			
Gasoline (1 gal)			
Propane (100#)			
Wood (1 cord)			
Pellets			
Discounts?			

Alternative Energy	**Potential**	**Projects**	**Status**
Hydroelectric	Low		
Wind Diesel	Medium		NEA not pursuing currently
Biomass	Low		
Solar	Low		
Geothermal	Low	NEA Geothermal Project	Site tests
Oil and Gas	Low		
Coal	Low		
Emerging Tech	Not Rated		
Heat Recovery	Low	NEA Stack Heat to Power Project; HR to school	Investigating; Operational
Energy Efficiency	High	ANTHC Audits-clinic, sanitation, com & trbl bldgs	Complete in 2011

Bulk Fuel

Tank Owner	**Fuel Type(s)**	**Capacity**	**Age/Condition**
Kodiak Ventures		150,100	
BB Schools		24,000	
Trident Seafood		78,000	
Peter Pan Seafood		15,000	

Bulk Fuel Upgrade	**Priority**	**Project**	**Status**

Purchasing	**Deliveries/Year**	**Gallons/Delivery**	**Vendor(s)**
By Barge			
By Air			

Cooperative Purchasing Agreements

Notes

Energy Profile: South Naknek

Housing Units	Occupied	Vacant	% Owner-Occup.
	29	106	66%

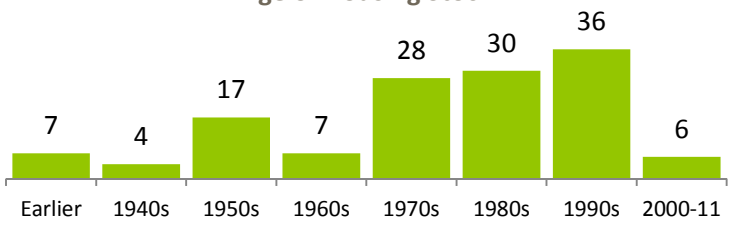
Regional Housing Authority	Weatherization Service Provider
Bristol Bay HA	Bristol Bay HA

Housing Need	Overcrowded	1-star
	N/A	2.6%

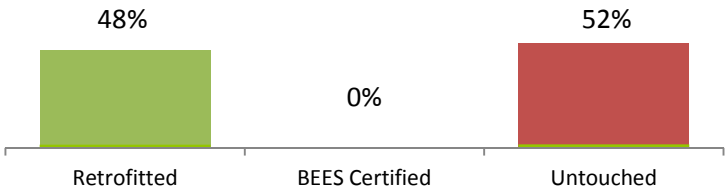
Energy Use	Average Home Energy Rating	Average Square Feet	Avg. EUI (kBTU/sf)
	3-star	1,161	134

Data Quality	
	High

Age of Housing Stock



Energy Efficient Housing Stock

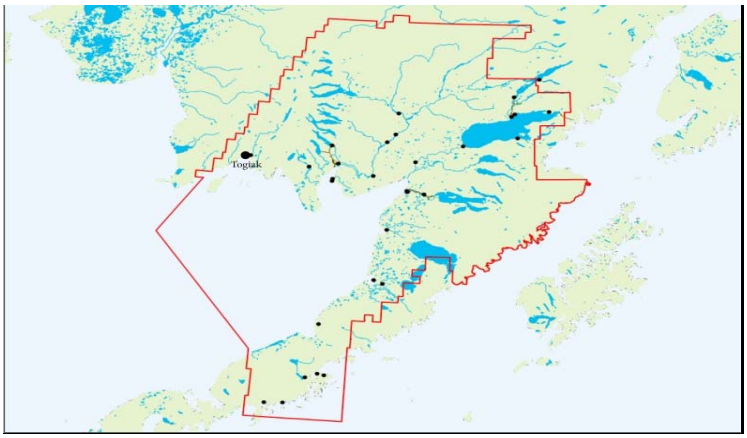


Lighting	Owner	Number/Type	Retrofitted?	Year	Notes

Non-residential Building Inventory

Building Name or Location	Year Built	Square Feet	Audited?	Retrofits Done?	In ARIS?
Apt. Complex					No
Bar					No
Borough Apts.					No
Borough Shop					No
Church (Lutheran)					No
Church (Orthodox)					No
Clinic / Tribal Bldg. / Comm. Center	1995	3,020	Yes		No
Elementary School	1980	6,960			No
Fire Station					No
Fish Proc. Plant					No
Kodiak Adventures Processing Plant					No
Landfill					No
Naknek Electric Assoc. / Telephone Coop. Shop					No
Northland LLC Barge Services					No
Old Hanger					No
Old Trident Seafoods Processing Plant					No
State DOT & PF Garage					No
Telephone Coop.					No
Tribal Office Bldg.					No
Tribal Storage Garage					No
Trident Seafoods Proc. Plant					No
US Post Office					No
Water & Sewer Shop					No
Youth Center					No

Community Profile: Togiak



Alaska Native Name (definition)

Tuyuryaq

Historical Setting / Cultural Resources

In 1880 "Old Togiak" or "Togiagamute" was located across the bay and had a population of 276. Many residents of the Yukon-Kuskokwim region migrated south to the Togiak area after the devastating influenza epidemic in 1918-19. Togiak was flooded in 1964, and many fish racks and stores of gas, fuel oil, and stove oil were destroyed. Three or four households left Togiak after the flood and developed the village of Twin Hills upriver. Togiak is a traditional Yup'ik Eskimo village with a fishing and subsistence lifestyle.

Energy Priorities and Projects

Heat recovery project under construction; small hydro project; Interest in intertie to Twin Hills; Tank farm upgrade urgently needed due to erosion on site; Upgrade to water and sewer lines

Incorporation	2nd Class City

Location

Located at the head of Togiak Bay, 67 miles west of Dillingham. It lies in Togiak National Wildlife Refuge and is the gateway to Walrus Island Game Sanctuary.

Longitude	-160.3764	**Latitude**	59.0619
ANCSA Region	Bristol Bay Native Corporation		
Borough/CA	Dillingham Census Area		
School District	Southwest Region School District		
AEA Region	Bristol Bay		

Taxes	**Type (rate)**	**Per-Capita Revenue**
	Sales (2%)	$ 138,016

Economy

Local government, trade transportation/utilities, and education/health services are main employers. There are 126 fish permits issued and 23 business licenses.

Climate	**Avg. Temp.**	**Climate Zone**	**Heating Deg. Days**
	N/A	7	11,306

Natural Hazard Plan	**Year**
Yes	2010

Notes	Updated required 2/16/2015

Community Plans	**Year**
Togiak Comprehensive Plan	2006
City of Togiak, AK Multi-Hazard Mitigation	2009

Local Contacts	**Email**	**Phone**	**Fax**
Togiak Natives Limited		907-493-5520	907-493-5554
Traditional Village of Togiak	tuyuryaq14@gmail.com	907-493-5003	907-493-5005
City of Togiak	city.of.togiak-alaska@hotmail.com	907-493-5820	907-493-5067

Demographics	**2000**	**2010**		**2013**
Population	809	880	**Percent of Residents Employed**	49.7%
Median Age	24	24.5	**Denali Commission Distressed Community**	Yes
Avg. Household Size	4	3.54	**Percent Alaska Native/American Indian (2010)**	80.9%
Median Household Income	N/A	$ 47,232.00	**Low and Moderate Income (LMI) Percent (2014)**	69.5%

Electric Utility	**Generation Sources**	**Interties**	**PCE?**
Alaska Village Electric Cooperative - AVEC	Diesel		Yes

Landfill	**Class**	3	**Permitted?**	No	**Location**	Togiak

Water/Wastewater System	City of Togiak	**Homes Served**	**System Volume**
Water	Piped	213	N/A
Sewer	Piped	**Energy Audit?**	
Notes	5 miles of lines need replacement. City has design, but no funding.	Yes	

Access

Road	No				
Air Access	State owned; gravel	**Runway**	410'x59'		
Dock/Port	Yes	**Barge Access?**	Yes	**Ferry Service?**	No

Notes

Energy Profile: Togiak

Diesel Power System

Utility	AVEC		
Engine	**Make/Model**	**Condition/Hrs**	**Gen Capacity**
Unit 1	Cummins	Fair/28,931	499
Unit 2	Caterpillar	Fair/27,865	350
Unit 3	Cummins	Fair/36,041	824
Unit 4			
Line Loss	3.7%		
Heat Recovery?	Yes; AVEC Tool Shack, Bunk House		

Upgrades	**Priority**	**Projects**	**Status**
RPSU Powerhouse	In Progress		
RPSU Distribution	In Progress	Tieline	

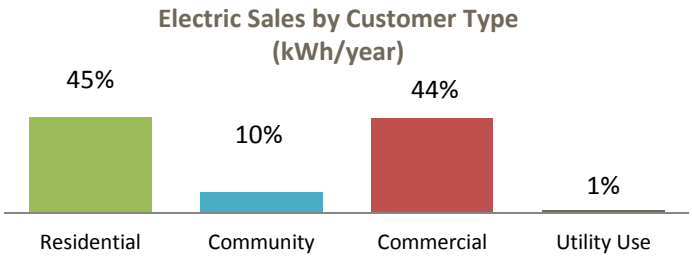
Outage History/Known Issues

Two outages due to fishing plant going online.

Operators	**No. of Operators**	**Training/Certifications**
	9	BFO, Itin BFO

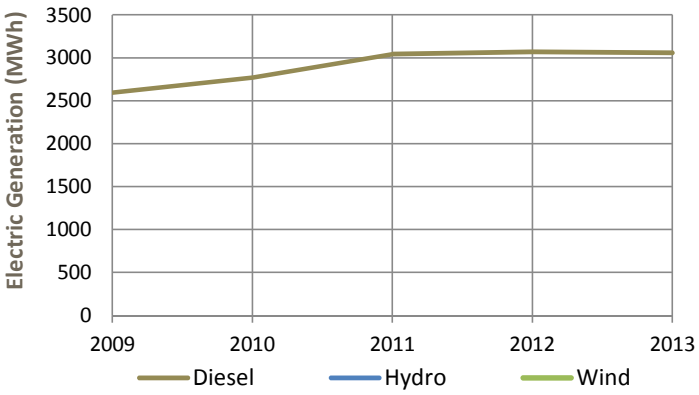
Maintenance Planning (RPSU)	Excellent

Electric Sales	**No. of Customers**	**kWh/year**	**kWh/Customer**
Residential	228	1,289,757	5,657
Community	20	282,630	14,132
Commercial	68	1,275,523	18,758
Utility Use		39,731	



Power Production

Diesel (kWh/yr)	2,997,095	**Avg. Load (kW)**	348
Wind (kWh/yr)	0	**Peak Load (kW)**	596
Hydro (kWh/yr)	0	**Efficiency (kWh/gal)**	13
Total (kWh/yr)	2,997,095	**Diesel Used (gals/yr)**	228,112



Electric Rates ($/kWh)		**Cost per kWh Sold ($/kWh)**	
Rate with PCE	$0.20	**Fuel Cost**	$0.35
Residential Rate	$0.63	**Non-fuel Cost**	$0.23
Commercial Rate		**Total Cost**	$0.58

Fuel Prices ($)	**Utility/Wholesale**	**Retail**	**Month/Year**
Diesel (1 gal)	$4.45	$6.42	6-13; 8-14
Other Fuel? (1 gal)			
Gasoline (1 gal)			
Propane (100#)			
Wood (1 cord)	N/A		
Pellets			
Discounts?		None	

Alternative Energy	**Potential**	**Projects**	**Status**
Hydroelectric	Low		
Wind Diesel	Medium		
Biomass	Low		
Solar	Pending		
Geothermal	Low		
Oil and Gas	Low		
Coal	Low		
Emerging Tech	Not Rated		
Heat Recovery	High	Togiak Waste Heat Recovery Project	Construction
Energy Efficiency	High	EECBG; VEEP	Both Complete

Bulk Fuel

Tank Owner	**Fuel Type(s)**	**Capacity**	**Age/Condition**
City	stove oil; gas	45,000	
AVEC		135,700	
SWR Schools		59,400	
Village Council		1,000	
AK Comm. Co.		2,000	
Misc. Other		6,600	

Bulk Fuel Upgrade	**Priority**	**Project**	**Status**

Purchasing	**Deliveries/Year**	**Gallons/Delivery**	**Vendor(s)**
By Barge	2+		Delta, Crowley, Vitus
By Air			

Cooperative Purchasing Agreements

None

Notes

Energy Profile: Togiak

Housing Units	Occupied	Vacant	% Owner-Occup.
	173	**68**	66%

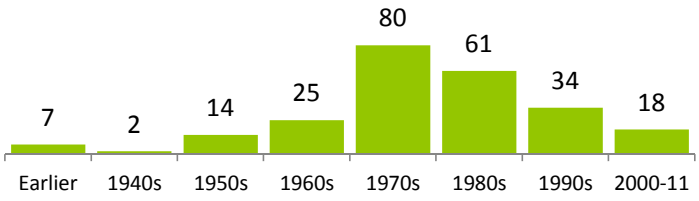
Regional Housing Authority	Weatherization Service Provider
Bristol Bay HA	Bristol Bay HA

Housing Need	Overcrowded	1-star
	39.9%	N/A

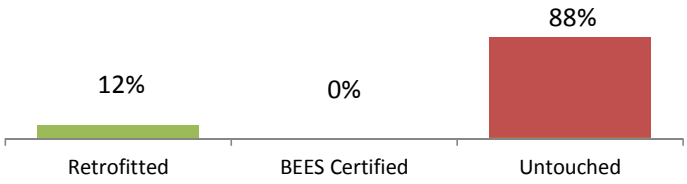
Energy Use	Average Home Energy Rating	Average Square Feet	Avg. EUI (kBTU/sf)
	N/A	N/A	N/A

Data Quality	
	Medium

Age of Housing Stock



Energy Efficient Housing Stock



Street Lighting	Owner	Number/Type	Retrofitted?	Year	Notes
	AVEC				Burnouts replaced with LEDs.

Non-residential Building Inventory

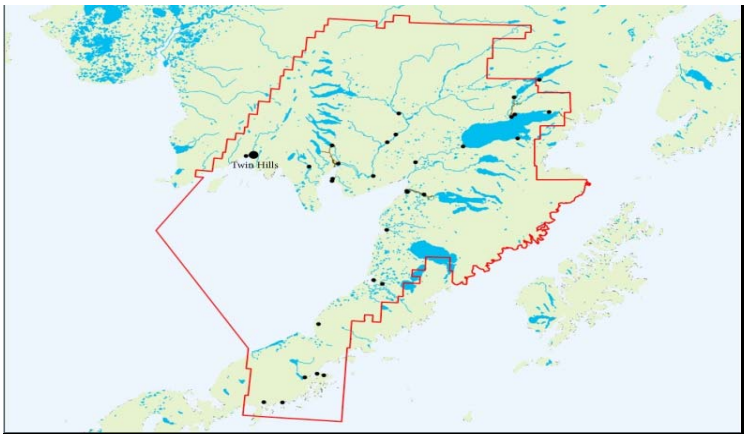
Building Name or Location	Year Built	Square Feet	Audited?	Retrofits Done?	In ARIS?
AC Store					No
Assembly Of God Church					No
AVEC Elec. Plant					No
AVEC Tank Farm					No
BBHA rentals					No
Beacon Tower					No
Boys & Girls Club		3,046			No
City Duplex		1,169			No
City Garage					No
City Maint. Bldg					No
City Office		1,682			No
City Old School		17,061			No
City Police & Fire Station					No
City Quarters					No
City Shop		1,200			No
City Water & Sewer Bldg					No
Clinic		1,000			No
Coupchiak Bldg 1					No
Coupchiak Bldg 2					No
Double Wide Trailer					No
Family Resource Center		6,548			No
GCI Station					No
Moravian Church					No
New School	2004	70,205			No
New School Gym					No
Police & Fire Bldg		2,287			No
Senior Center/Clinic					No
Senior Housing					No
Seventh Day Ad. Church					No
SWRSD housing					No
TNL Garage					No
TNL Office					No
Togiak Head Start					No

Energy Profile: Togiak

Non-residential Building Inventory (continued)

Building Name or Location	Year Built	Square Feet	Audited?	Retrofits Done?	In ARIS?
Togiak Water Tank					No
Trading Store					No
USPS					No
UUI Station					No
Yellow Bldg					No

Community Profile: Twin Hills



Incorporation	Unincorporated

Location

Twin Hills is located near the mouth of the Twin Hills River, a tributary of the Togiak River, 386 miles southwest of Anchorage.

Longitude	-160.275	**Latitude**	59.0792
ANCSA Region	Bristol Bay Native Corporation		
Borough/CA	Dillingham Census Area		
School District	Southwest Region School District		
AEA Region	Bristol Bay		

Alaska Native Name (definition)

Ingricuar

Taxes	**Type (rate)**	**Per-Capita Revenue**
None		

Historical Setting / Cultural Resources

The village was established in 1965 by families who moved from Togiak to avoid the recurrent flooding there. Some residents migrated from Quinhagak on Kuskokwim Bay. The people have strong cultural ties to the Yukon-Kuskokwim region, because many of their ancestors migrated to Togiak following the 1918-19 influenza epidemic. Twin Hills is a traditional Yup'ik Eskimo village with a fishing and subsistence lifestyle.

Economy

Local government, education/health services, and manufacturing are the main employers. There are 8 fishing permit holders and 3 business licenses.

Climate	**Avg. Temp.**	**Climate Zone**	**Heating Deg. Days**
	N/A	7	N/A

Natural Hazard Plan	**Year**

Notes

Energy Priorities and Projects

Install heat recovery system; New low-mainetence generators needed; Add solar arrays to homes and community buildings; Alternative method for fuel delivery due to lower river level; Upkeep of road pads built on tundra and moss; need more homes and community buildings

Community Plans	**Year**
Twin Hills Comprehensive Plan	2005

Local Contacts	**Email**	**Phone**	**Fax**
Twin Hills Village	william15@starband.net	907-525-4821	907-525-4822
Twin Hills Native Corporation		907-525-4327	907-525-4820
Bristol Bay Native Corporation		907-278-3602	907-276-3924

Demographics	**2000**	**2010**		**2013**
Population	69	**74 (80)**	**Percent of Residents Employed**	63.6%
Median Age	39	41.5	**Denali Commission Distressed Community**	Yes
Avg. Household Size	3	2.55	**Percent Alaska Native/American Indian (2010)**	94.7%
Median Household Income	N/A	$ 29,000.00	**Low and Moderate Income (LMI) Percent (2014)**	N/A

Electric Utility	**Generation Sources**	**Interties**	**PCE?**
Twin Hills Village	Diesel		Yes

Landfill	**Class**	3	**Permitted?**	No	**Location**	Twin Hills

Water/Wastewater System	Twin Hills Village Council	**Homes Served**	**System Volume**
Water	Piped	29	N/A
Sewer	Piped, gravity sewer	**Energy Audit?**	
Notes	Broken pipes in need of replacement.	Yes	

Access

Road	No				
Air Access	State owned; gravel	**Runway**	3000'x60'		
Dock/Port	No	**Barge Access?**	**No**	**Ferry Service?**	No

Notes

Energy Profile: Twin Hills

Diesel Power System

Utility	Twin Hills Village Council		
Engine	**Make/Model**	**Condition/Hrs**	**Gen Capacity**
Unit 1	John Deere	Fair/Unknown	128
Unit 2	John Deere	Fair/1,488	92
Unit 3			
Unit 4			
Line Loss	Not Reported		
Heat Recovery?	No		

Upgrades	**Priority**	**Projects**	**Status**
RPSU Powerhouse	In Progress		
RPSU Distribution	In Progress		

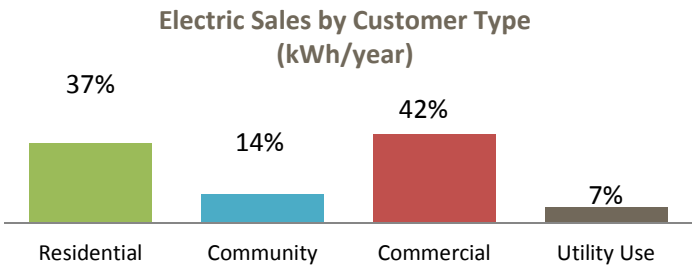
Outage History/Known Issues

1-2 outs/year from old power lines. 1 from snapped cond. line.

Operators	**No. of Operators**	**Training/Certifications**
	2	Basic PPO

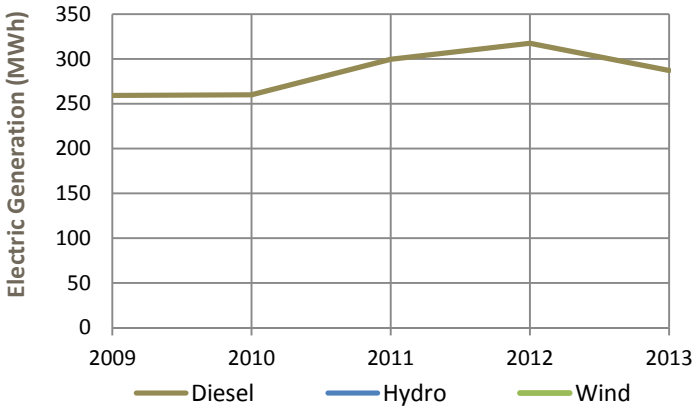
Maintenance Planning (RPSU)	Acceptable

Electric Sales	**No. of Customers**	**kWh/year**	**kWh/Customer**
Residential	29	103,044	3,553
Community	6	37,701	6,284
Commercial	9	115,388	12,821
Utility Use		20,042	



Power Production

Diesel (kWh/yr)	143,605	**Avg. Load (kW)**	18
Wind (kWh/yr)	0	**Peak Load (kW)**	41
Hydro (kWh/yr)	0	**Efficiency (kWh/g**	5
Total (kWh/yr)	143,605	**Diesel Used (gals/**	29,180



Electric Rates ($/kWh)		**Cost per kWh Sold ($/kWh)**	
Rate with PCE	$0.64	**Fuel Cost**	$0.48
Residential Rate	$1.00	**Non-fuel Cost**	$0.07
Commercial Rate	$1.00	**Total Cost**	$0.54

Fuel Prices ($)	**Utility/Wholesale**	**Retail**	**Month/Year**
Diesel (1 gal)	$4.60	$8.00	6-13; 8-14
Other Fuel? (1 gal)			
Gasoline (1 gal)			
Propane (100#)		$252.14	8-14
Wood (1 cord)			
Pellets			
Discounts?		None	

Alternative Energy	**Potential**	**Projects**	**Status**
Hydroelectric	Low		
Wind Diesel	Low		
Biomass	Low		
Solar	Pending		
Geothermal	Low		
Oil and Gas	Low		
Coal	Low		
Emerging Tech	Not Rated		
Heat Recovery	Low		
Energy Efficiency	High	1)ANTHC Water EE Audit 2)Upgrades & Training	1) Complete 2) Complete 2015

Bulk Fuel

Tank Owner	**Fuel Type(s)**	**Capacity**	**Age/Condition**
Village	Heating Oil	52,000	Good
Village	Gasoline	6,000	Good
School	Heating Oil	20,000	Unknown

Bulk Fuel Upgrade	**Priority**	**Project**	**Status**

Purchasing	**Deliveries/Year**	**Gallons/Delivery**	**Vendor(s)**
By Barge	1		Delta West.
By Air			

Cooperative Purchasing Agreements

None.

Notes

Barge delivery in late Aug. or Sept. Comp. bid (fixed price)

Energy Profile: Twin Hills

Housing Units	Occupied	Vacant	% Owner-Occup.
	20	21	55%

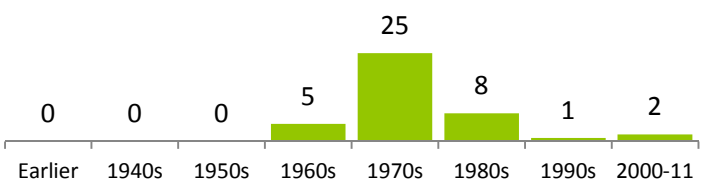
Regional Housing Authority	Weatherization Service Provider
Bristol Bay HA	Bristol Bay HA

Housing Need	Overcrowded	1-star
	5.0%	N/A

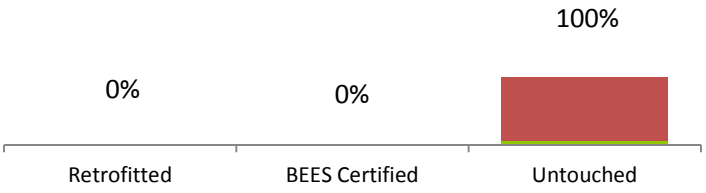
Energy Use	Average Home Energy Rating	Average Square Feet	Avg. EUI (kBTU/sf)
	N/A	N/A	N/A

Data Quality	
	Low

Age of Housing Stock



Energy Efficient Housing Stock



Street Lighting	Owner	Number/Type	Retrofitted?	Year	Notes
		9	No		Half operational. No upgrade plans.

Non-residential Building Inventory

Building Name or Location	Year Built	Square Feet	Audited?	Retrofits Done?	In ARIS?
Airport & State Storage Bldg	2000	1,104			No
Church	2005				No
Clinic	2008	1,604			No
Community Hall	1970	560			No
Native Corp.					No
Propane Farm (shed)					No
School Fuel Storage					No
School Generator					No
SRE Bldg		1,104			Yes
Tank Farm					No
Twin Hills K-12	1976	6,499	Yes		Yes
UUI					No
Village Council Offices	2002	2,400			No
Village Garage	1977	768			No
Village Generator Building	1984	384			No
Water Storage Tank					No
Water Treatment Plant					No

A | Community and Utility Interviews

Community and utility interviews were conducted over the phone from January to March 2015. Interviews were conducted by BBNA, SWAMC, and Information Insights staff.

Community	Interviewed	Utility	Interviewed
Aleknagik	Kay Andrews, City Administrator	Nushagak Electric Cooperative	Mike Megli, CEO & Michael Favors, Telecom Ops Manager, Nushagak Electric Cooperative
Chignik	Becky Boettcher, City Clerk		
Chignik Lagoon	Delissa McCormick, Tribal Administrator & Michelle Anderson, Grants Manager		
Chignik Lake	Shirley Kalmakoff, Tribal Administrator		
Clark's Point			
Dillingham	Alice Ruby, Mayor		
Egegik	Don Strand, City Administrator		
Ekwok	Crystal Clark, City Administrator		
Igiugig	AlexAnna Salmon, President and Administrator, Village Council		
Iliamna	Martha Anelon & Gerold Anelon, Tribal Administrator	INN Electric Coop, Inc	George Hornberger, General Manager, INNEC
King Salmon			
Kokhanok	Peducia Andrew, Tribal Administrator & Elijah Eknaty		
Koliganek	Herman Nelson, Sr. , President, New Koliganek Village Council		
Levelock	Alexander Tallekpalek, President, Levelock Village Council		
Manokotak	Michael Alakayuk, Manokotak Power Co		
Naknek	Lucy Goode, General Manager, Paug-Vik Inc. Ltd.	Naknek Electric Association	Donna Vukich, General Manager, NEA
New Stuyahok	William (Chuck) Peterson, City Administrator		
Newhalen	Greg Anelon, City Administrator		
Nondalton			
Pedro Bay	Keith Jenson, President, Pedro Bay Village		
Perryville	Gerald Kosbruk, President, Native Village of Perryville		

Pilot Point	Steven Kramer, Mayor
Port Alsworth	Mark Lang , Co-op Manager, Tanalian Electric Coop
Port Heiden	
South Naknek	
Togiak	Darryl Thompson, City Administrator
Twin Hills	William Ilutsik, Vice President, Twin Hills Village Council

A | Community and Utility Interviews

Community and utility interviews were conducted over the phone from January to March 2015. Interviews were conducted by BBNA, SWAMC, and Information Insights staff.

Community	Interviewed	Utility	Interviewed
Aleknagik	Kay Andrews, City Administrator	Nushagak Electric Cooperative	Mike Megli, CEO & Michael Favors, Telecom Ops Manager, Nushagak Electric Cooperative
Chignik	Becky Boettcher, City Clerk		
Chignik Lagoon	Delissa McCormick, Tribal Administrator & Michelle Anderson, Grants Manager		
Chignik Lake	Shirley Kalmakoff, Tribal Administrator		
Clark's Point			
Dillingham	Alice Ruby, Mayor		
Egegik	Don Strand, City Administrator		
Ekwok	Crystal Clark, City Administrator		
Igiugig	AlexAnna Salmon, President and Administrator, Village Council		
Iliamna	Martha Anelon & Gerold Anelon, Tribal Administrator	INN Electric Coop, Inc	George Hornberger, General Manager, INNEC
King Salmon			
Kokhanok	Peducia Andrew, Tribal Administrator & Elijah Eknaty		
Koliganek	Herman Nelson, Sr. , President, New Koliganek Village Council		
Levelock	Alexander Tallekpalek, President, Levelock Village Council		
Manokotak	Michael Alakayuk, Manokotak Power Co		
Naknek	Lucy Goode, General Manager, Paug-Vik Inc. Ltd.	Naknek Electric Association	Donna Vukich, General Manager, NEA
New Stuyahok	William (Chuck) Peterson, City Administrator		
Newhalen	Greg Anelon, City Administrator		
Nondalton			
Pedro Bay	Keith Jenson, President, Pedro Bay Village		
Perryville	Gerald Kosbruk, President, Native Village of Perryville		

Pilot Point	Steven Kramer, Mayor
Port Alsworth	Mark Lang , Co-op Manager, Tanalian Electric Coop
Port Heiden	
South Naknek	
Togiak	Darryl Thompson, City Administrator
Twin Hills	William Ilutsik, Vice President, Twin Hills Village Council

B | Energy Meeting Participants

Iliamna Subregional Meeting | March 23, 2015

Natalia Marttila	Nondalton Tribal
Will Evanoff	Nondalton Tribal
Peducia Andrew	Kokhanok Village Council
Elijah Eknaty	Kokhanok Village Council
Nathan Hill	Lake & Pen Borough
Larry J. Hill	Iliamna Village Council
George Hornberger	INN Electric Cooperative
Greg Anelon	City of Newhalen
Ben Foss	Pedro Bay
Jon Burrows	Port Alsworth
Shannon J. Nanalook	Self
Senafont Shugak Jr.	Pedro Bay Council

Chignik Lagoon Subregional Meeting | March 24, 2015

John Christensen Jr.	Port Heiden
Frank Simpson	Port Heiden Utilities
Steve Kramer	City of Pilot Point
Becky Boettcher	City of Chignik
Debbie Carlson	Chignik Bay Tribal Council
Clinton Boskofsky	Chignik Lake Village Council
Terrence Kosbruk	Native Village of Perryville
Austin Shangin	Native Village of Perryville
Willard Lind Jr.	Chignik Lake
Don Bumpus	Chignik Lagoon
Michelle L. Anderson	Chignik Lagoon Village Council
Delissa McCormick	Chignik Lagoon Village Council
Clem Grunert	Chignik Lagoon Village Council President

King Salmon Subregional Meeting | March 25, 2015

David Hostetter	Igiugig
Betsy Hostetter	Igiugig
James Kallenberg	Levelock Village Council
Henry Olsen	Egegik
Don Strand	City of Egegik
Roland Briggs	Ugashik

William Weatherby	WM Manufactory
Eddie Clark	Naknek
Dale Peters	Naknek Electric Association
Becky Savo	Bristol Bay Borough
Suzanne Lamson	Naknek Electric Association
Thomas Deck	Naknek Electric Association
Alexander Tallekpalek	Levelock Village Council
Adelheid Herrmann	SAVEC
Laura Zimin	Bristol Bay Borough/SAVEC
Paul Hansen	Naknek Native Village
Stephen Jones	Naknek Electric Association

Dillingham Subregional Meeting | March 26, 2015

Jennie Apokedak	New Koliganek Village Council - IGAP
Gwen Larson	BBNA - Community Development
Kenny Jensen	Ekwok Village Council
Diane Folsom	Ekuk Village Council
Bruse Ilutsik	Aleknagik Traditional Council
Allen Ilutsik	Aleknagik Traditional Council
Roy Hiratsuka	Ekuk Village Council
Rose Loera	City of Dillingham
Billy Maines	Curyung Tribal Council
Betty Gardiner	Clark's Point Village Council
Arthur Sharp	Twin Hills Native Corp
Joseph Wassily	Clark's Point Village Council
Mariano Floresta	Clark's Point Village Council
Dennis Andrew	New Stuyahok Limited
Peter Christopher Sr.	New Stuyahok Traditional Council
Luki Akelkok Sr.	Ekwok
Melvin P. Andrew	City of Manokotak
Kenneth Nukwak Sr.	Manokotak Natives Ltd.
Joseph Kazimirowicz	City of Ekwok
Moses Toyukak Sr.	City of Manokotak
Peter Lockuk Sr.	Togiak Traditional Council
Mark Scotford	Bristol Bay Area Health Corporation
Julianne Baltar	Bristol Bay Native Association
Jody Saiz	City of Dillingham
Eric Hanssen	ANTHC
Brice Eningowuk	City of Togiak
Tom Marsik	UAF Bristol Bay Campus
Tina Tinker	Aleknagik Traditional Council

Delores Larson	New Koliganek Village Council
Kay Andrews	City of Aleknagik
Alice Ruby	City of Dillingham
Melody Nibeck	DCRA

Energy Summit Representatives | Dillingham, May 4, 2015

Amber McDonough	Siemens
Annie Fritze	BBNA
Arthur Sharp	Twin Hills Native Corp.
Becky Savo	Bristol Bay Borough
Bill Hill	BBSD/Paug-Vik Inc. Ltd.
Brenda Kerr	BBNA/Dept. of Transportation
Cameron Poindexter	BBNC
Chris Napoli	BBEDC
Clinton Boskofsky	Chignik Lake
Connie Fredenberg	Marsh Creek
Diane Folsom	Ekuk Village Council
Elijah Eknaty	Kokhanok Village Council
Emil Larson	BBHA
Eric Hanssen	ANTHC
Francisca Demoski	BBNC
Fred (Ted) Angasan	South Naknek
Greg Anelon	City of Newhalen
Greg Calvert	BBAHC
Gusty Akelhok	BBNA
James Kallenberg	Levelock Village Council
Jaylon Kosbruk	Perryville
Jed Drolet	AEA
Jennie Apokedak	New Koliganek Village Council - IGAP
John Christensen Jr.	Port Heiden
John Wanamaker	BBDF/Alaska Venture Partners, LLC
Joseph Wassily	Clark's Pt. Village Council
Josh Craft	AEA
Lucy Goode	Paug-Vik Inc., Ltd.
Mark Scotford	BBAHC
Mischa Ellanna	BBNC
Moses Toyukak Sr.	City of Manokotak
Nick Smeaton	BBHA
Nikki Shanigan	City of Pilot Point
Pete Andrew	Nush. Electric Coop.
Peter Angasan Sr.	King Salmon Tribal

Peter Christopher Sr.	New Stuyahok Traditional Council
Peter Lockuk Sr.	Togiak Traditional Council
Rebecca Garrett	AEA
Rose Loera	City of Dillingham
Senafont Shugak Jr.	Pedro Bay Council
Steven Gilbert	AVEC
Tim McDermott	Lake and Pen School District
Tom Marsik	UAF Bristol Bay campus

C | Bristol Bay Industry Survey

Contact Information

Please verify the following information:

*First Name:

*Last Name:

*Email Address:

Work Phone:

All fields with an asterisk (*) are required.

1. Name of company:

2. Location of facilities in Bristol Bay region:

3. What is your current annual energy use?

Electricity (kWh/year):	
Fuel/Heating Oil (gallons/year):	
Other (gallons/year):	

4. If your company's energy demand is seasonal, in what month(s) is your demand for energy highest?

5. What rate does your business pay for electricity?

$/ kWh

6. Please enter the most recent date on which this rate was charged (month and year).

7. What price does your business pay for fuel? Please enter prices for any of the fuels your business purchases.

Diesel ($/gallon):	
Heating Oil ($/gallon):	
Propane ($/100 lb tank):	
Gasoline ($/gallon):	

8. Please enter the most recent dates on which this price was paid.

*9. To increase the quality of our load projections, would you be willing to share the last 2 years of electricity and/or fuel purchase data with our data analysts? (Your data will be kept strictly confidential.)(*Required)

Select one.

○	Yes	(Answer question number 9.1.)
○	No	(Go to question number 10.)
○	Maybe	(Answer question number 9.1.)

9a. Who should we contact to request your data?

Name:	
Phone or email:	
Notes:	

10. Does your company self-generate any electricity?

Select one.

○	Yes	(Answer question number 10.1.)
○	No	(Go to question number 11.)

10a. Please check all that apply.

Select all that apply.

☐	Diesel generator
☐	Solar P/V
☐	Wind turbine
☐	Waste-to-energy
☐	Other:

11. Does your company have plans to self-generate electricity in the next 5 years? Explain.

12. What does your company use for space heating? (check all that apply):

Select all that apply.

☐	Fuel Oil
☐	Electricity
☐	Natural Gas
☐	Propane
☐	Wood
☐	Coal
☐	Biodiesel (fish oil, other)
☐	Other:

13. How many buildings does your company currently heat?

Number:	
Total Square Footage:	

14. Have any of your company's buildings had a professional energy audit in the past 10 years?

Select one.

○	Yes	(Answer question number 14.1.)
○	No	(Go to question number 15.)

14a. Please enter information on the audited facility(s).

What is the name and address?:	☐
What energy efficiency and conservation measures were implemented following the audit?:	☐

15. Has your company conducted audits on overall energy use (machinery/process flow/energy conversion)?

Select one.

○	Yes
○	No

16. Have energy efficiency and conservation measures been implemented in any of your facilities - whether audited or not?

Select one.

○	Yes	(Answer question number 16.1.)
○	No	(Go to question number 18.)

16a. Check all energy efficiency retrofits that apply:

Select all that apply.

- ☐ All implemented measures reported in Question 10
- ☐ Conservation measures / changes in energy behaviors (e.g. manually setting back thermostats, turning off computers)
- ☐ Installed energy efficient indoor lighting
- ☐ Installed energy efficient outdoor lighting
- ☐ Installed energy efficient refrigeration or other appliances
- ☐ Tightened up building envelope (e.g. insulation, roof, windows)
- ☐ Installed building sensors or programmable controls (e.g. occupancy sensors or programmable thermostats)
- ☐ Machinery/Equipment upgrades
- ☐ Other:

17. Would you be interested in receiving a confidential energy audit if it were free and sponsored by a government entity?

Select one.

○	Yes
○	No

18. Looking ahead 5 years, how do you think your company's electricity use will change?

Select one.

○	Increase significantly
○	Increase modestly
○	Stay the same
○	Decrease modestly
○	Decrease significantly

19. Looking ahead 5 years, how do you think your company's energy use for heating will change?

Select one.

○	Increase significantly
○	Increase modestly
○	Stay the same
○	Decrease modestly
○	Decrease significantly

20. What do you think will drive these changes in energy use? (check all that apply):

Select all that apply.

☐	Changes in size of business operations
☐	Changes in technology
☐	Energy efficiency or conservation measures
☐	Other:

21. List any energy projects or priorities your business has for reducing or stabilizing the cost of energy for heating, electricity or transportation.

22. Which of the following energy goals would help your business the most?

Select one.

○	Reducing the cost of electricity
○	Reducing the cost of space heating
○	Reducing the cost of transportation
○	Stabilizing the overall cost of energy
○	Stabilizing the supply of energy
○	Other:

23. Have you seen the Draft Bristol Bay Regional Energy Plan?

Select one.

○	Yes	(Answer question number 23.2.)
○	No	(Answer question number 23.1.)

Please take a look at http://bristolbayenergy.org/documents/.

Thank you for reviewing the report.

D | Audience Polling Results

Table 27: May 4 Energy Summit audience polling results

Demographics					
Who are you representing today?					
Community	Tribal Organization	Regional Organization	State Organization	Business	Utility
34%	31%	11%	11%	9%	3%
Who supplies your electricity?					
Community Utility	Nushagak Electric Coop.	Naknek Electric Assoc.	AVEC	INNEC	
39%	26%	16%	16%	3%	
Did you attend a subregional meeting?					
No	Dillingham	Iliamna	Chignik Lagoon	King Salmon	
57%	23%	9%	6%	6%	
Regional Priorities					
For the following strategies, when should work start – immediately, medium-term (2 to 5 years), long-term (5+ years), or is it not a priority at all?					
Improve existing power infrastructure and systems					
Immediate	Medium-term	Long-term	Not a priority		
56%	25%	19%	0%		
Address rural utility issues through regional and subregional coordination					
Immediate	Medium-term	Long-term	Not a priority		
61%	27%	9%	3%		
Investigate and develop renewable energy generation opportunities					
Immediate	Medium-term	Long-term	Not a priority		
79%	21%	0%	0%		
Monitor emerging technologies					
Immediate	Medium-term	Long-term	Not a priority		
47%	26%	21%	6%		

Initiate additional energy efficiency projects for homes, businesses, and public facilities

Immediate	Medium-term	Long-term	Not a priority
85%	12%	3%	0%

As a region, we should prioritize energy efficiency initiatives at which level…

Homes	Businesses	Public/Community Buildings	Public Infrastructure
41%	9%	36%	14%

Implement transportation projects to improve access

Immediate	Medium-term	Long-term	Not a priority
64%	18%	12%	6%

Support for Energy Priorities

In what ways would you support an energy project that benefits your community?

Staff Time	Financial Support	Both	Neither
38%	3%	59%	0%

Interest in Energy Working Groups

Are you interested in participating in an energy working group?

Yes	No	Not Sure
55%	12%	33%

Table 28: December 2013 Village Leadership Workshop

Demographics

Who is in the room today?

Lakes Subregion	Kvichak Bay Subregion	Nushagak Bay Subregion	Nushagak River Subregion	Peninsula Subregion	Togiak Bay Subregion
6	16	18	5	22	15

What is the main hat you are wearing today?

Village Corp	BB Regional Org.	Tribal Gov't	City/Municipal Gov't	Other
51%	21%	16%	1%	10%

Energy Priorities & Concerns

What do you think has the greatest potential to lower your energy costs?

Wind	Energy Efficiency	Biomass	Geothm'l	Solar	Natr'l Gas	Diesel Eff.	Hydro	Trans. Lines
20%	14%	14%	12%	12%	11%	6%	5%	5%

Thinking about household energy costs, what is the biggest burden on your family's finances?

Electricity	Space Heating	Transportation
37%	35%	28%

Do you think your community would be interested in participating in a regional or subregional bulk fuel purchasing group to try to save costs on heating oil and other bulk fuels?

Yes	No	Don't know
85%	8%	7%

What do you think the biggest barrier is to more participation in residential EE&C programs in your community?

Hard to find auditors	Lack of info	Lack of interest	Other
41%	43%	2%	14%

Would you be in favor of coordinating the development of Wind Projects in the region to increase financing options?

Every community should develop own projects	Bundle projects within region to attract investors	Bundle projects with other regions if needed to attract more investors	Other / No opinion
41%	43%	15%	2%

If the result is cheaper power in your community, how comfortable would you be with someone else owning the power and selling it to the local utility?

Very Comfortable	Comfortable	Neutral	Uncomfortable	Very Uncomfortable
23%	16%	16%	26%	18%

Would you be interested in new subregional interties?

Yes - If it would stabilize energy rates	Yes - Only if it would reduce energy rates	No	Don't Know/ No opinion
16%	70%	8%	6%

What is the biggest barrier other than financing to advancing energy projects in your community?

Leadership/champion	Technical know how	Administrative capacity
36%	38%	25%

What is most important to your community in terms of energy planning?

Saving money	Saving energy	More reliable energy	More price stability	Community sustainability
19%	2%	21%	19%	40%

Should our Regional Energy Plan include goals for energy efficiency?

Yes	No	Don't know
97%	0%	3%

Should strategies to encourage local food production be included as part of an energy plan?

Yes	No	Don't know
68%	23%	8%

While previous road and transmission studies have not been encouraging, should we pursue updated technical and feasibility studies as part of a regional energy plan?

Yes	No	Don't know
84%	9%	6%

Who is the best group to continue the momentum for energy planning in Bristol Bay?

New group of energy stakeholders (including small and large utilities, industrial users, and local/tribal energy champion)	Bristol Bay Partnership or other existing regional group	Other/No opinion
36%	58%	6%

E | Analysis of Resource Potential

The data in the following tables has been compiled from multiple sources including the Alaska Energy Data Gateway (4), the Renewable Energy Atlas of Alaska (19), the Alaska Energy Efficiency Map (15), the Division of Geological & Geophysical Services report, Summary of Fossil Fuel and Geothermal Resource Potential in the Bristol Bay region (20), NREL's PVWatts (21), personal communication with Alaska Energy Authority program managers for Biomass Energy, Heat Recovery, Hydroelectric Power, and Wind Energy, and data shared by the region's electric utilities.

Note that each table estimates the savings potential from new, community- or utility-scale energy projects. The analysis does not reflect the value of infrastructure or programs already in place. It does not look at opportunity from residential projects; it does look at potential for building scale projects for biomass, energy efficiency, and solar.

The rating criteria for individual resources of biomass, heat recovery, hydroelectric, and wind were developed in collaboration with AEA program managers. See Table 37: Criteria used in resource potential analysis

for an explanation of the criteria used in the analysis.

Table 29: Wood biomass resource potential

	20-Year Average Diesel Fuel Price ($)	Potential	Productive Forest	Project in Operation	Rough B/C Ratio	Existing Study (R,F) or Development (D,C)	Certainty
Aleknagik	4.16	L	M	N	1.10	R	M
Chignik	4.22	L	L	N	0.00		L
Chignik Lagoon	5.12	L	L	N	0.00		L
Chignik Lake	5.12	L	L	N	0.00		L
Clark's Point	4.16	H	L	N	0.00	R	M
Dillingham	4.16	M	M	N	1.10		L
Egegik	5.26	L	L	N	0.00		L
Ekwok	5.43	H	M	N	1.64		L
Igiugig	6.88	H	L	N	0.00	R	M
Iliamna	5.51	H	M	N	1.67	R	M
King Salmon	4.22	L	L	N	0.00		L
Kokhanok	6.39	H	M	Y	2.05	C	M
Koliganek	5.97	H	M	N	1.87		L
Levelock	6.43	L	L	N	0.00		L
Manokotak	3.52	L	L	N	0.00		L
Naknek	4.22	L	L	N	0.00		L
New Stuyahok	4.97	H	M	N	1.44	R	M
Newhalen	5.51	H	M	N	1.67	R	M
Nondalton	5.51	H	M	N	1.67	R	M
Pedro Bay	6.45	H	M	N	2.07	R	M
Perryville	5.97	L	L	N	0.00		L
Pilot Point	5.76	L	L	N	0.00		L
Port Alsworth	6.38	L	M	N	2.04	R	M
Port Heiden	5.38	L	L	N	0.00		L
South Naknek	4.22	L	L	N	0.00		L
Togiak	4.69	L	L	N	0.00		L
Twin Hills	6.26	L	L	N	0.00		L

See D-1 for data sources and notes.

Table 30: Geothermal resource potential

	Potential	Identified Resource within 20 miles (Y,N)	Identified Significant Resoucece within 20 miles (Y,N)	No resource identified w/I 20 miles	Certainty
Aleknagik	L	N	N	N	L
Chignik	L	N	N	N	L
Chignik Lagoon	L	N	N	N	L
Chignik Lake	L	N	N	N	L
Clark's Point	L	N	N	N	L
Dillingham	L	N	N	N	L
Egegik	L	N	N	N	L
Ekwok	L	N	N	N	L
Igiugig	L	N	N	N	L
Iliamna	L	N	N	N	L
King Salmon	L	N	N	N	L
Kokhanok	L	N	N	N	L
Koliganek	L	N	N	N	L
Levelock	L	N	N	N	L
Manokotak	L	N	N	N	L
Naknek	L	N	N	N	L
New Stuyahok	L	N	N	N	L
Newhalen	L	N	N	N	L
Nondalton	L	N	N	N	L
Pedro Bay	L	N	N	N	L
Perryville	L	N	N	N	L
Pilot Point	L	N	N	N	L
Port Alsworth	L	N	N	N	L
Port Heiden	L	N	N	N	L
South Naknek	L	N	N	N	L
Togiak	L	N	N	N	L
Twin Hills	L	N	N	N	L

Table 31: Hydropower resource potential

	Potential	Projects in Operation	Hydro Resource	Identified in Pathway	Existing Study (R,F) or Development (D,C)	Viable Hydro based on Visual Assessment	Certainty
Aleknagik	L		Y		F	M	H
Chignik	H	Y	Y		D	H	H
Chignik Lagoon	H		Y		C	M	H
Chignik Lake	M		Y			M	M
Clark's Point	L		N			L	M
Dillingham	L		Y		F	L	H
Egegik	L		N			L	M
Ekwok	L		Y			L	M
Igiugig	L		Y			L	M
Iliamna	H	Y	Y		R	L	H
King Salmon	L		Y			L	M
Kokhanok	M		Y			M	M
Koliganek	L		Y			L	M
Levelock	L		N			L	M
Manokotak	L		Y			L	M
Naknek	L		N			L	M
New Stuyahok	L		Y			L	M
Newhalen	H	Y	Y			L	H
Nondalton	H	Y	Y			M	H
Pedro Bay	M		Y		F	M	H
Perryville	M		Y			M	M
Pilot Point	L		N			L	M
Port Alsworth	M		Y		R	M	M
Port Heiden	M		Y			M	M
South Naknek	L		N			L	M
Togiak	L		Y			L	M
Twin Hills	L		Y			L	M

Table 32: Wind energy resource potential

	Wind Potential	Wind-Resource	Wind Developability	Site Accessible	Permittability	Site Availability	Load	Certainty
Aleknagik	M	H	M	N	Y	Y	Y	M
Chignik	L	H	L	N	Y	X	Y	H
Chignik Lagoon	L	L	L	Y	Y	Y	X	H
Chignik Lake	L	L	L	Y	Y	Y	X	M
Clark's Point	L	M	L	Y	Y	Y	X	M
Dillingham	M	M	H	Y	Y	Y	Y	H
Egegik	L	M	L	Y	Y	Y	X	M
Ekwok	L	L	L	N	Y	N	X	M
Igiugig	L	L	L	Y	Y	Y	X	H
Iliamna	M	L	H	Y	Y	Y	Y	L
King Salmon	M	M	H	Y	Y	Y	Y	H
Kokhanok	H	H	H				H	H
Koliganek	M	M	H	Y	Y	Y	Y	H
Levelock	L	L	L	Y	Y	Y	X	L
Manokotak	M	M	H	Y	Y	Y	Y	H
Naknek	M	M	H	Y	Y	Y	Y	H
New Stuyahok	M	M	M	Y	Y	Y	Y	H
Newhalen	M	M	H	Y	Y	Y	Y	L
Nondalton	M	L	L	N	Y	N	Y	M
Pedro Bay	L	M	L	Y	Y	Y	X	L
Perryville	M	H	M	Y	Y	Y	X	H
Pilot Point	M	M	M	Y	Y	Y	X	H
Port Alsworth	L	L	L	Y	Y	Y	X	H
Port Heiden	L	M	L	Y	Y	Y	X	H
South Naknek	M	M	H	Y	Y	Y	Y	H
Togiak	M	M	M	Y	Y	N	Y	H
Twin Hills	L	L	L	Y	Y	Y	X	M

Table 33: Coal resource potential

	Potential	Identified Deposits	Quality/High subsurface volume	Long Distance to Load	Project Planned or in Development	Certainty
Aleknagik	L	N	N	N	N	L
Chignik	M	Y	Y	Y	N	L
Chignik Lagoon	M	Y	Y	Y	N	L
Chignik Lake	M	Y	Y	Y	N	L
Clark's Point	L	N	N	N	N	L
Dillingham	L	N	N	N	N	L
Egegik	M	Y	Y	Y	N	L
Ekwok	L	N	N	N	N	L
Igiugig	L	N	N	N	N	L
Iliamna	L	N	N	N	N	L
King Salmon	L	N	N	N	N	L
Kokhanok	L	N	N	N	N	L
Koliganek	L	N	N	N	N	L
Levelock	L	N	N	N	N	L
Manokotak	L	N	N	N	N	L
Naknek	L	N	N	N	N	L
New Stuyahok	L	N	N	N	N	L
Newhalen	L	N	N	N	N	L
Nondalton	L	N	N	N	N	L
Pedro Bay	L	N	N	N	N	L
Perryville	M	Y	Y	Y	N	L
Pilot Point	M	Y	Y	Y	N	L
Port Alsworth	L	N	N	N	N	L
Port Heiden	M	Y	Y	Y	N	L
South Naknek	L	N	N	N	N	L
Togiak	L	N	N	N	N	L
Twin Hills	L	N	N	N	N	L

Table 34: Oil and gas resource potential

	Potential	Source Rock, Traps and Reservoirs Present	Wells Drilled & Resource Identified	Certainty
Aleknagik	L	N	N	L
Chignik	L	N	N	L
Chignik Lagoon	L	N	N	L
Chignik Lake	L	N	N	L
Clark's Point	L	N	N	L
Dillingham	L	N	N	L
Egegik	L	N	N	L
Ekwok	L	N	N	L
Igiugig	L	N	N	L
Iliamna	L	N	N	L
King Salmon	L	N	N	L
Kokhanok	L	N	N	L
Koliganek	L	N	N	L
Levelock	L	N	N	L
Manokotak	L	N	N	L
Naknek	L	N	N	L
New Stuyahok	L	N	N	L
Newhalen	L	N	N	L
Nondalton	L	N	N	L
Pedro Bay	L	N	N	L
Perryville	L	N	N	L
Pilot Point	L	N	N	L
Port Alsworth	L	N	N	L
Port Heiden	L	Y	N	L
South Naknek	L	N	N	L
Togiak	L	N	N	L
Twin Hills	L	N	N	L

Table 35: Heat recovery (HR) resource potential

	Potential	HR Equipment at Powerhouse	HR In Operation	Recoverable Heat Available	Thermal Loads Nearby	Certainty
Aleknagik	L	N	N	N		H
Chignik	L	Y	Y	N	N	L
Chignik Lagoon	L	Y	Y	N		M
Chignik Lake	H	Y	Y	Y		M
Clark's Point	L	N	N	N		L
Dillingham	H	Y	Y	Y		M
Egegik	L	Y	Y	N		H
Ekwok	L	N	N	N		M
Igiugig	L	Y	Y	N		M
Iliamna	H	Y	Y	N		M
King Salmon	L	N	N	N		H
Kokhanok	H	Y	Y	N		M
Koliganek	H	Y	Y	Y		M
Levelock	M	N	N	Y		L
Manokotak	L	Y	N	N		L
Naknek	H	Y	Y	Y		H
New Stuyahok	L	Y	N	Y		H
Newhalen	H	Y	Y	N		M
Nondalton	H	Y	Y	N		M
Pedro Bay	L	Y	Y	N		H
Perryville	H	Y	Y	Y		M
Pilot Point	H	Y	Y	Y		M
Port Alsworth	H	Y	N	Y		H
Port Heiden	H	Y	N	Y		H
South Naknek	L	N	N	N		H
Togiak	L	Y	Y	Y		H
Twin Hills	L	Y	Y	N		M

Table 36: Energy Efficiency savings potential

	Potential	Residential Potential	% Homes w/o HER & WX	Commercial & Public Potential	Water/Sewer System Audit Conducted	School Audit Conducted	Street Lights	EE Program - VEEP or ECBG or Multiple AHFC Commercial	Certainty
Aleknagik	H	H	88%	H	N	Y	N	EECBG	H
Chignik	H	H	98%	H	N	Y	N	EECBG/VEEP	H
Chignik Lagoon	H	H	100%	H	N	N	Y	N	H
Chignik Lake	H	H	68%	H	N	Y	N	VEUEM	H
Clark's Point	H	H	100%	H	N	N	Y	EECBG	H
Dillingham	H	H	82%	H	N	Y	N	EECBG	H
Egegik	H	H	100%	H	Y	Y	N	VEEP/LPSD	H
Ekwok	H	H	100%	H	Y	Y	N	VEEP	H
Igiugig	M	L	29%	H	Y	N	N	N	H
Iliamna	H	L	0%	H	N	N	N	N	H
King Salmon	H	H	84%	H	N	N	N	N	H
Kokhanok	M	L	17%	H	N	N	N	VEEP	H
Koliganek	H	H	100%	H	Y	Y	P	EECBG (BBNA)	H
Levelock	H	H	100%	H	N	N	P	EECBG	H
Manokotak	M	L	12%	M	Y	Y	Y	VEEP	H
Naknek	H	H	88%	H	N	N	N	VEEP (BBB)	H
New Stuyahok	M	L	28%	H	N	N	P	VEEP	H
Newhalen	H	M	38%	H	N	Y	Y	EECBG	H
Nondalton	M	L	17%	H	Y	Y	P	EECBG (BBNA)	H
Pedro Bay	M	L	0%	H	N	N	N	VEEP	H
Perryville	M	L	15%	H	N	Y	N	VEEP	H
Pilot Point	H	H	100%	H	N	N	Y	EECBG	H
Port Alsworth	H	H	95%	H	N	Y	N	N	H
Port Heiden	H	L	20%	H	N	N	Y	EECBG	H
South Naknek	H	M	52%	H	Y	N	N	EECBG/VEEP	H
Togiak	H	H	88%	H	N	Y	N	EECBG/VEEP	H
Twin Hills	H	H	100%	H	Y	Y	N	EECBG (BBNA)	H

Table 37: Criteria used in resource potential analysis

Resource		Potential			Certainty		
Resource	What it Includes	Low	Medium	High	Low	Medium	High
Alternative Power Generation							
Coal	Resource development* and power generation	Local, quality resource absent.	Quality resource identified; further study needed	High quality, local resource identified; project in development	No information documented.	Based on documented opinion of credible source or recon level study.	Based on feasibility or higher level study.
Geothermal	Resource development and power generation	No documented resource within 20 miles.	Significant resource within 20 miles.	Significant resource within economic distance.	"	"	"
Hydro	Resource development and power generation	No hydro resource present or, if present, economic viability is nil to highly unlikely based on visual inspection.	Economic viability is unlikely to possible based on visual inspection.	Hydro project is present or under construction. Or, economic viability is possible to highly likely based on visual inspection.	No information documented.	Based on documented opinion of credible source or recon level study, including hydro database.	Based on feasibility or higher level study.
Hydrokinetic	Resource development and power generation	Not Rated (See notes on emerging technologies following table.)					
Oil & Natural Gas	Resource development and power generation	No source rock, traps or reservoirs present.	Source rock, traps or reservoirs present. Needs investigation.	Wells drilled and economic resource identified.	"	"	"
Solar	Photovoltaic	Economic criteria are more important than resource data. Projects should be evaluated on a case-by-case basis. See notes on solar technologies following table.					
Wind	Resource development and power generation	Wind resource or developability low***.	"	Project in operation, or wind resource and developability high***.	"	Based on recon level study.	Resource based on 12+ months onsite resource assessment, hourly load data, feasibility or higher level study.
Other	Nuclear, emerging energy technology	Low (See notes on emerging technologies following table.)					
Heat							

Resource		Potential			Certainty		
Resource	What it Includes	Low	Medium	High	Low	Medium	High
Biomass	Resource development and heat generation	Low productivity of nearby forest. And, if study is available, B/C ratio less than 1.0.	Medium or higher productivity of nearby forest; and, B/C ratio between 1.0 and 1.5, based on either rough analysis**** or existing study.	Medium or higher productivity of nearby forest; and B/C ratio greater than 1.5, based on either rough analysis**** or existing study.	No information documented.	Based on documented opinion of credible source or recon level study.	Based on feasibility or higher level study .
Heat Pumps	Ground, sea water, and air source heat pumps	Economic criteria are more important than resource data. Projects should be evaluated on a case-by-case basis. See notes following table on heat pumps in communities with diesel electric generation.					
Diesel Heat Recovery	CHP from diesel, other	Thermal loads remote from powerhouse, minimal recoverable heat remains.	<--->	HR equipment installed at powerhouse, thermal loads nearby, much recoverable heat remains.	No information documented.	Based on documented opinion of credible source or recon level study (e.g. power system inventory).	Based on feasibility or higher level study (e.g. RPSU CDR).
End User							
Efficiency - Based on residential & public/commercial ratings^	Residential	> 30% of homes have NOT received recent EE upgrades	30 - 59% of homes have NOT received recent EE upgrades.	< 60% of homes have NOT received recent EE upgrades	Little to no information available on buildings or recent EE upgrades.^^		Little to no information available on buildings or recent EE upgrades.
	Public & Commercial	See Note ^^	Completed all: Water/Sewer system audit, school audit, streetlight replacements, EECBG, AHFC Commercial or VEEP	Completed 3 to 0 of the infrastructure audits/upgrades/programs	Little to no information available on buildings or recent EE upgrades.^^^		Little to no information available on buildings or recent EE upgrades.
Notes							
* Resource development: Activities that include energy resource assessment, infrastructure development, transportation, fuel storage and handling.							
**Visual assessment by AEA hydro PM indication L=None to Highly Unlikely, M=Unlikely to Maybe, H=Maybe to Highly Likely							
*** Wind potential defined by two factors:	1. Wind resource: L=class 2 or lower, M=class 3-4, H=class 5 or higher.						
	2. Developability, Indicated by four factors (Y=yes, N=likely no, X=fundamental problem that indicates low wind potential)						
	a. Access in place: is there a road, power transmission, or other suitable access to a viable wind site?						

Resource		Potential			Certainty		
Resource	What it Includes	Low	Medium	High	Low	Medium	High
	b. Permitability: Can habitat, FAA, or other factors be resolved without significant difficulty?						
	c. Site availability: Is there suitable land that is available for siting wind turbines?						
	d. Load: Is there sufficient load such that wind can be integrated economically with the existing diesel system (X: less than 50 kW average load)?						
**** Rough analysis of biomass project benefit/cost estimated based on these assumptions:	1. Fuel price estimated as simple 20-year average of ISER projections of power-sector fuel price plus an adder of $0.50 per gallon for heating fuel (ftp://www.aidea.org/REFund/Round%208/Documents/EvaluationModel.xlsm)						
	2. Fuelwood with an energy content of 20 MMBtu/cord and price of $250/cord						
	3. Wood and oil combustion efficiency equal						
	4. Installed cost of system estimated at $35/gallons per year of displaced fuel						
	5. O&M cost of 1% installed cost						
Energy Efficiency Rating^	The rating is conservative in giving a high potential for communities with any high rating whether in residential or public/commercial. Medium ratings are used for communities with two mediums or a low and a high. No community is rated as low for overall energy efficiency potential.						
Energy Efficiency Low^^	Low is not used as a resource potential for public and commercial building energy efficiency because even if all programs and audits are completed there is substantial work left to be done on implementing retrofits. Where information on audits especially for public and commercial buildings is sufficient, information on whether retrofits have been implemented is often lacking. To reflect that these criteria are not the full story of energy efficiency in commercial and public infrastructure, this the low potential rating is not used.						
Energy Efficiency Certainty^^^	The assumption is audits and streetlights that have been completed are recorded by AHFC and EE programs are recorded in multiple locations - REAP, AK Energy Efficiency, and AEA. Therefore, these ratings are based on collected data and have a high level of certainty.						

Notes on Specific Technologies

SOLAR P/V AND THERMAL

In Alaska, the sun's energy is abundant in the summer when daylight hours are long. Owners and residents of off-grid lodges, fish camps, and remote cabins may find solar photovoltaic or solar thermal systems to be viable options. However, long, dark winters with six or more months of snow cover in most of the state make the economics of solar energy challenging. This is particularly true when the economics of solar energy are compared to those of energy efficiency and conservation, which can provide similar fuel-saving benefits at a fraction of the cost of solar energy.

The Alaska Energy Authority has funded the construction of one solar photovoltaic and one solar thermal project through the Renewable Energy Fund in recent years. Each of these projects was designed and constructed properly and is operating as anticipated. The Kaltag solar photovoltaic project cost $126,000 and saved $2,600 in energy costs in FY2014. The McKinley Village solar thermal project cost more than $190,000 and saved approximately $7,000 in FY2014. Once operations and maintenance costs are factored in, neither of these projects is likely to pay for itself over its expected life.

The National Renewable Energy Laboratory (NREL) has developed a valuable tool for analyzing solar photovoltaic performance and economics. It is called PVWatt's Calculator and is available at http://pvwatts.nrel.gov. Alaskans interested in learning about the potential for solar photovoltaic development can use PVWatt's as a preliminary analysis tool to analyze solar potential at their site. NREL also has a tool for analyzing solar thermal projects called System Advisor Model (SAM) and is available at https://sam.nrel.gov. Alaska residents can request assistance from the Alaska Energy Authority (David Lockard at 907-771-3062) in performing either solar P/V or solar thermal analysis.

HEAT PUMPS IN COMMUNITIES WITH DIESEL ELECTRICAL GENERATION

Given the high installation costs and efficiency limitations of current technology, heat pumps do not appear economically competitive with fuel oil heaters in rural communities that rely on diesel for electrical generation.

Heat pumps use a working fluid in a refrigeration cycle to move heat from a lower temperature source to a higher temperature load, consuming electricity in the process. Heat sources can include the ground (via glycol filled loops in vertical boreholes or horizontal trenches), air, ground water, lakes, and seawater. Heat pump performance is expressed as a ratio of thermal energy delivered to electrical energy consumed which is referred to as the Coefficient of Performance (COP).

Unit oil fuel heaters typical of rural Alaska operate at approximately 90% efficiency. Diesel genset conversion efficiencies typical of rural Alaska communities are in the range of 30-35% (in other words, 30-35% of the energy available in diesel fuel is converted to electricity). Based on these assumptions, a heat pump would need to operate with a minimum average COP greater than 2.5 in order to supply the same amount of heat from electricity generated from 1 gallon of diesel fuel as would be supplied by burning 1 gallon of diesel fuel. While this level of performance may be attainable in many areas of the state, the cost of installation—which Cold Climate Housing Research Center has estimated to range from $25,000 to $35,000 for ground

source heat pump systems—almost certainly precludes the economic viability of heat pumps in communities reliant on diesel generation. Additional factors to take into account:

- Powerhouse heat recovery adds significant additional value to each gallon of diesel consumed for electricity generation.
- Transmission losses reduce the amount of electrical energy actually available per gallon of diesel.
- Maintenance requiring specially trained technicians and equipment further increase operational costs.

EMERGING TECHNOLOGIES

River and marine hydrokinetics, including tidal and wave power, are emerging technologies with no commercial projects currently in operation in the United States. Considerable resources are being invested in advancement of the technologies at the state and federal level although at this point they are considered pre-commercial.

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G | Data Sources

Table 38: Data sources for community profiles

		Source	Date
Alaska Native Name		UAF	2014
Historical Setting		DCRA	2015
Cultural Resources		DCRA	2015
Energy Priorities		Input	2015
Contacts	City	DCRA; Input	2015
	Tribal	DCRA; Input	2015
	Village Corp	DCRA; Input	2015
Demographics			
2000	Population	DCRA	2000
	Median Age	DCRA	2000
	HH Size	DCRA	2000
	% Native	DCRA	2000
2010	Population	DCRA	2010
	Median Age	DCRA	2010
	HH Size	DCRA	2010
	% Native	DCRA	2010
Landfill	Class	DCRA	2015
	Permitted	DCRA	2015
W/W System	Water	DCRA; Input	2015
	Sewer	DCRA; Input	2015
	Condition	DCRA; Input	2015
Road Access		DCRA	2015
Air Access	Owner	DCRA	2015
	Runway (lxw)	FAA	2015
Dock/Port Facilities			
	Ferry Service	DCRA	2015
	Barge Access	DCRA	2015

		Source	Date
Location		DCRA	2015
Climate	Avg. Temp	ACRC; weatherbase.com	2015
	Climate Zone	CCHRC	2014
	HDD	CCHRC	2014
Taxes		Alaska Taxable	2013
Economy		DCRA	2015
Natural Hazards Plan		DMVA	2014
Community Plans		DCRA	2015
Demographics (cont.)			
	HH Income	DCRA	2010
	% Employed	DCRA	2015
	LMI%	HUD	2014
	Distressed	Denali Commission	2013
Landfill	Location	DCRA	2015
	Condition/Life	DCRA	2015
W/W Sys.	Audited?	ANTHC; Input	2015
	Homes Served	Input	2015
	Gallons		
Electric Utility		DCRA	2015
	Gen. Sources	AEDG	2015
	Interties	DCRA	2015
	PCE	DCRA	2015
Notes		Phase II Input	2015

Note: See page 6 for a list of acronyms.

Table 39: Data sources for energy profiles

Field		Source	Date
Utility	Name	DCRA	2015
Power House			
	Engine Make	RPSU; Utilities; Input	2012; 2014; 2015
	Line Loss	PCE	2014
	Heat Recovery	RPSU	2012
	Upgrades	RPSU; Utilities; AEA	2012; 2014
	Outages/Issues	RPSU	2012
Operators			
	Number	AEA Training Database; Input	2014; 2015
	Training/Certs	AEA Training Database	2014
	Maint. Planning	RPSU	2012
Electric Sales	Customers	PCE	2014
	kWh sold	PCE	2014
Resources	All	See Appendix E	2015
Bulk Fuel	Tanks	DCRA; ADEC-WEAR; Input	2014; 2015
	Purchasing	Input	2015
	Coop Purchase	Input	2015
	Other		
Housing Units	Occupied	CCHRC	2014
	Vacant	CCHRC	2014
Housing Need	Overcrowded	CCHRC	2014
	Owners/Occup	CCHRC	2014
Data Quality	1-star	CCHRC	2014
Housing Age	By Decade	CCHRC	2014
Non-residential Bldg Inventory		ARIS (2014), DCRA maps (2008), AK EE Maps (2015); Energy audits (variable)	

		Source	Date
Power Production			
	Diesel	PCE, Utilities	2014
	Wind	PCE, Utilities	2014
	Hydro	PCE, Utilities	2014
	Avg Load	Alaska Energy Pathway; Utilities	2010; 2014
	Peak Load	Alaska Energy Pathway; Utilities	2010; 2014
	Diesel Eff.	PCE; Utilities	2014
	Diesel Use	PCE; Utilities	2014
	5-yr Trend	AEDG	2014
Electric Rates	Residential	PCE	2014
	Commercial	PCE	2014
Cost per kWh	All	PCE	2014
Fuel Prices	Utility	AEDG; Input	2014; 2015
	Retail	AEDG; Input	2014; 2015
	Discounts	AEDG; Input	2014; 2015
	Other sources		
Regional Housing Authority		AHFC	2014
Wx Service Provider		AHFC	2014
Energy Use			
	Avg Star Rating	CCHRC	2014
	Avg Sq Feet	CCHRC	2014
	Avg. EUI	CCHRC	2014
EE Housing Stock			
	Retrofitted	CCHRC, AHFC	2014
	Retrofitted	Regional Housing Auth.	2014
	Retrofitted	Wx Service Provider	2014
	BEES Certified	CCHRC, AHFC	2014
Lighting	All	Ak EE Maps; VEEP reports; Input	2015

Note: See page 6 for a list of acronyms.