Interior Alaska
Regional Energy Plan

Phase II - Stakeholder Engagement

December 2015

Prepared by

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ACKNOWLEDGMENTS

We would like to thank the many stakeholders in the Interior region who contributed their time to attend subregional energy meetings and generously shared their knowledge of the region through interviews and comments.

Shaun Adomo, Chad Albert, Bob Albert, Kayla Albert, Arron Atchley, John B. Gregory, Tim Barnum, Natalie Baumgartner, Ernie Baumgartner, Wilmer Beetus, Elisa Bergman, Matthew Berkett, Hugh BiFelt, Dan Bishop, Karin Bodony, Robert Brean, Bill Brister, Kelda Britton, Clifford C., Glenn Carlo, Kimberly Carlo, Nadine Carroll, Tracy Charles-Smith, Roy Charlie, Don Charlie, Susie Charlie, Malinda Chase, Frank Cook, Naomi Costello, Jason Custer, Josie Dayton, Rebecca Demientieff, Angela Demientieff, Theresa Demientieff, Alfred Demientieff, Jr, Angela Demintieff, Katherine Dozette, Joanne E. Wallis, Catherine Edwardsen, Don Eller, Rebecca Elswick, Ronn Englishoo, Phyllis Erhart, Shannon Erhart, Melissa Erickson, Donna Esmailka, Art Eveland, Jennifer Fate, Shirley Fields, Laree Fields, Rose Fields, Ray Fifer, Donna May Folger, Bart Garber, Jana George, Tiana Gibbens, Galen Gilbert, Steve Ginnis, Steven Graham, Carl Gregory, Heather Gross, Sharon Gurtler Strick, Wesley Hamilton, Larry Hausmann, Jack Hebert, Tamara Henry, Mickey Henton, Don Honea, Nick Hruby, Frannie Hughes, Jarrett Humphreys, Betty Huntington, Shanda Huntington, Galen Isaac, Monica Lisa Isaac, Rebecca J. Malcom, Nancy James, Judy Kangas, James Kelly, J.R. Kettendorf, Phil Koontz, Jon Korta, Jessica Kozevnikoff, Julia L. Nay, Brian Landren, Shirley Lee, Kelvin Long, Craig Losby, Angela Ludwig, Dawn Magnuson, Julie Mahler, Bill McCarty, Gina McKindy, Scott McManus, Richard Miller, Kathy Morgan, Michelle Moses, Paul Mountain, James Nathaniel, Stephanie Nial, James P. Anthony III, Gloria Patsy, Eugene Paul, Tony Peter, Jennie Peter, Dylan Peters, Maryann Peters, Ester Peters, Aaron Petruska, Cindy Pilot, Rhonda Pitka, Danny Powers, Will Putman, Katherine Quirk, Nichol Rallo, Christine Rifredi, James Ross, March Runner, Blanche Sam, Harding Sam, Edward Sarten, Anna Sattler, Marilyn Savage, Judy Schenk, Brad Scotton, Brent Sheets, Dorothy Shockley, Chris Simm, Andy Simon, Annie Silas, Brenda Sims, Sandra Sims, Garrett Sims, Elsie Sims, Michelle Sims, Carla Smith, Roberta Strick, Shandara Swatling, Sheila Symons, Thomas Teasdale, Frank Thompson, Bessie Titus, Raymond Titus, Violet Titus-Mayo, Katie Turner, Cecilla Turner, Andrea Turner, Peyton Turner, Kristi Turner, Harvey Turner, Joe Wallace, Vera Weiser, Josh Weiser, Patty Wiehl, Elizabeth Woods, Raymond Woods, Patricia Young, Joe Young, Kristie Young, Kathleen Zuray

We would like to thank the following individuals and organizations for sharing their data and expertise. Their assistance was invaluable.

Alaska Energy Authority: *Sara Fisher-Goad, Alan Baldivieso, Katie Conway, Jed Drolet, Chris Gobah, Daniel Hertrich, Jessie Huff, Cady Lister, David Lockard, Devany Plentovich, Sean Skaling, Richard Stromberg, Jim Vail, Kirk Warren;* Alaska Housing Finance Corporation: *Jimmy Ord, Scott Waterman*; Alaska Native Tribal Health Consortium: *Eric Hanssen, Gavin Dixon;* Tanana Chiefs Conference: *Stephanie Ashcraft, Charlisa Attla, Terri Cadzow, Emily Dobson, Kathryn Greenway, Brianna Gray, Nina Opferman, Tiffany Simmons, Mandy Sullivan*; U.S. Dept. of Energy, Office of Indian Energy: *Givey Kochanowski*

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Cover Photo: Bill Raften/fws.gov (Public domain via Wikimedia Commons). Inset Photos (clockwise from top left): INN Electric Cooperative, National Renewable Energy Laboratory, Clickr Bee, Wolf Solar Electric

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Acronyms and Abbreviations

AC	Alternating Current
ACDC	Alaska Community Development Corporation
ACEP	Alaska Center for Energy and Power (UAF)
ADOLWD	Alaska Deparment of Labor and Workforce Development
ADEC-WEAR	Alaska Department of Environmental Conservation – Waste Erosion Assessment and Review
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
AP&T	Alaska Power and Telephone
AVEC	Alaska Village Electric Cooperative
AVTEC	Alaska Vocational Technology Center (ADOLWD)
AWEDTG	Alaska Wood Energy Development Task Group
B/C	Benefit-Cost Ratio
BEES	Building Energy Efficiency Standard
BTU	British Thermal Unit
CCHRC	Cold Climate Housing Research Center
CBEA	Commercial Building Energy Audit (AEA)
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
GVEA	Golden Valley Electric Association
HDD	Heating Degree Days

HER	Home Energy Rebate program (AHFC)
HUD	United States Department of Housing and Urban Development
IRHA	Interior Regional Housing Authority
ISER	Institute of Social and Economic Research (UAA)
IWI	Interior Weatherization, Inc.
kBTU	Thousand BTUs
kW	Kilowatt
kWh	Kilowatt hour
LED	Light-Emitting Diode
LMI	Low and Moderate Income (HUD)
LNG	Liquefied Natural Gas
MMBTU	One million BTUs
MW	Megawatt
MWh	Megawatt hour
N/A	Not Applicable, or Not Available
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 (acounts)
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
START	Strategic Technical Assistance Response Team (DOE)
TCC	Tanana Chiefs Conference
TDX	Tanadgusix Corporation (owns TDX Power)
UAF	University of Alaska Fairbanks
USDA	United States Department of Agriculture
VEEP	Village Energy Efficiency Program (AEA)

EXECUTIVE SUMMARY

"Well managed and cooperatively-maintained low cost, self-sustaining energy for current and future generations." — Interior Energy Vision

The Interior 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. In so doing, all local and regional energy resources as well as energy efficiency and conservation are considered.

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.

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

Phase I Resource Inventory and Recommendations

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 six areas of focus for continued or new action:

- **Building Energy Efficiency**: Improving and expanding participation in state programs for residential and public building audits and upgrades.
- **Power Generation**: Expanding diesel power system upgrades while investigating and supporting implementation of alternative heating systems (recovered heat from generators and biomass) and renewable based electricity generation (through combined heat and power projects – biomass and solar).
- **Heating**: Identifying biomass resources in the region and supporting installation of efficient wood-fired boilers and development of pellet production facilities.
- **Transportation**: Collect data and diversify fuel stock and fuel suppliers.
- **Education and Outreach**: Develop energy efficiency outreach program tailored to the region and operator training programs for existing and new generation technologies.

- **Planning for the Future**: Support integrated cross-sector community planning and focus attention on modifications to the PCE program.

Phase II Stakeholder Engagement and Public Input

In Phase II, we spoke with regional stakeholders, community leaders and residents about energy projects and priorities with the potential to advance goals and strategies outlined in Phase I. Outreach activities included stakeholder interviews and subregional meetings, as well as presentations to village councils, Tanana Chiefs Conference's (TCC) subregional teleconferences, and the TCC Planning Summit held in Fairbanks in July 2015. During these activities, we listened for common themes that unite the region as well as areas where energy needs or priorities differ. Based on this input, the planning team developed the following roadmap of projects and activities designed to meet regional energy goals.

Table 1: Proposed Regional Energy Roadmap

Focus Area	Goals	Actions
Utility Management & Operations	▪ Keep subsidized cost of electricity to $0.22/ kWh or less ▪ Reduce line loss to 5% or less ▪ Add all community facilities to PCE program or reach limit of 70kWh per month per resident ▪ Meet or exceed 12.5kWh/gallon or better for diesel efficiency	▪ Train all utility clerks at both RUBA and PCE sessions and offer assistance with rate analysis ▪ Provide technical assistance on PCE reporting & applications ▪ Institute subregional operator and lineman service with on-call, highly trained, and salaried technician(s) OR ▪ Set up service contract for regular, third party repair and maintenance of powerhouse & distribution lines ▪ Establish third party holder for O&M accounts
Energy Efficiency	▪ All new building construction meets or exceeds TCC building & efficiency standards ▪ By 2020, all communities retrofit exterior lighting & street lights with LEDs ▪ Track costs & benefits of EE upgrades in public & private buildings	▪ Region-wide implementation of EE&C education and awareness campaign ▪ Address barriers to participation in residential EE&C programs ▪ Offer rural residents lists of Energy Efficient Appliances and their yearly operating costs ▪ Implement a cash-for-clunkers type program to allow residents to exchange light bulbs/appliances for more efficient versions ▪ Complete recommended retrofits from commercial and public facility (school) audits with loans or a public-ESCO model ▪ Design prototype for super energy efficient small homes suitable for the culture and climate, raise awareness of super EE building for all new-buildings in the region ▪ Complete inventory and benchmarking of non-residential buildings in every community
Electricity	▪ Communities adopt & implement renewable portfolio of 20% renewable based electricity generation by 2025	▪ Use development of Yerrick Creek with partnership between AP&T, Native Village of Tanacross, and Tanacross, Inc. as model for future resource development – specifically solar PV

Focus Area	Goals	Actions
	▪ Development of renewable resources approached through partnerships between utilities, Native Village or City, and local Native Corporations	▪ All new buildings designed to offset at least 25% of their electrical consumption with alternative energy sources ▪ Where feasible, connect grids/transmission lines to take advantage of large scale renewable energy projects and economies of scale
Heating	▪ By 2020, heat recovery systems in all viable communities are installed and operable ▪ Reduce dependence on high cost diesel fuel for heating in all communities	▪ All new buildings use lower supply & return temperatures in hydronic systems to enable integration with renewable systems (biomass & solar thermal) ▪ Expand heat recovery systems to all buildings close to power plant (where viable) ▪ Install community-scale biomass heating in all communities that have the interest and people to support ▪ Use programs for wood stove change outs and waste oil burner installation & maintenance ▪ Continue to provide and expand weatherization services to all homes and public buildings
Transportation	▪ Roads built to communities that request it, reducing the high cost of living	▪ Investigate both permanent and winter roads for routes from Fort Yukon to Circle, Bettles to Allakaket, Ruby to McGrath, Rampart to Eureka, and Tanana to Manley (in progress now)
Planning	▪ By 2016, subregional energy working groups meet to share experiences, pool resources, and implement priorities	▪ Identify funding source(s) (federal, state, or private) to hold regular meetings or teleconferences on energy projects & priorities ▪ Identify structure and staff, similar to the AEA Community Assistance program, capable of sharing staff members at the state and regional levels to facilitate effective subregional working groups

1 | Regional Energy Planning

The Interior[1] 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. In so doing, all local and regional energy resources as well as energy efficiency and conservation are considered.

This document summarizes public input received in Phase II. The goal of this phase has been to engage community leaders, subregional leaders, regional leaders, residents, utilities, school districts, industry representatives, and other key stakeholders in dialog about their priorities for addressing energy needs in the region. The result of this engagement is 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 and broadly supported strategies with the potential to reduce energy costs in the Interior 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 Interior region, implementation will likely involve subregional groups capable of addressing multiple energy issues with the support and guidance of regional groups, including TCC, IRHA, utilities, 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 end 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 Interior region, where there are few government structures, regional organizations with communication and planning structures already in place 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 do not have direct access to a North Slope natural gas pipeline (Figure 1).

[1] Though the AEA Energy region is Yukon Koyukuk/Upper Tanana, the term Interior is used in this report.

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 Yukon-Koyukuk/Upper Tanana energy planning region (green fill in the inset map). This area overlaps, for the most part, with the Doyon, Limited boundaries established under the Alaska Native Claims Settlement Act (ANCSA). The city of Nenana is also included in the Railbelt energy planning region.

Figure 2: The Yukon-Koyukuk/Upper Tanana Energy Planning Region

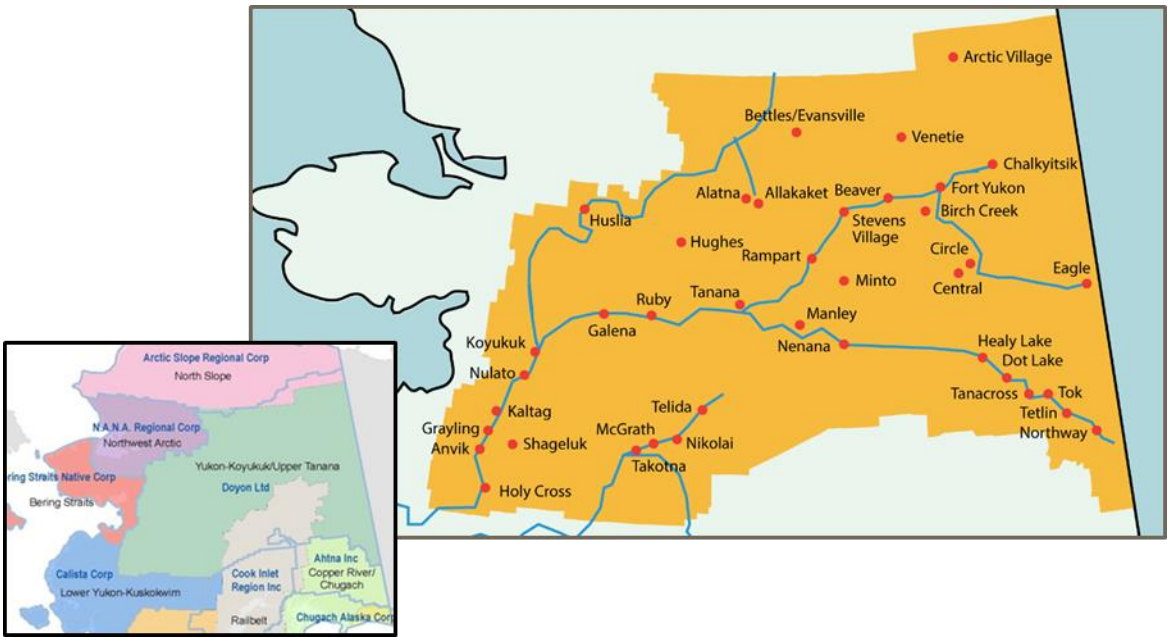


Table 2: Administrative jurisdictions within Interior Alaska

ANCSA Regional Entities	AEA Energy Planning Regions	Boroughs and Census Areas	TCC Subregions	School Districts (REAAs)	Legislative Districts
For Profit: **Doyon, Limited + Village Corporations** Nonprofits: **Tanana Chiefs Conference** **Council of Athabascan Tribal Governments** (Health, education and natural resources: Arctic Village, Beaver, Birch Creek, Chalkyitsik, Circle, Fort Yukon, Rampart, Stevens Village, Venetie) **Interior Regional Housing Authority**	Yukon-Koyukuk/ Upper Tanana	Yukon-Koyukuk Census Area	**Lower Yukon** Anvik, Grayling, Holy Cross, Shageluk	Iditarod Area	37-S
			Kuskokwim McGrath, , Nikolai, Takotna, Telida		
			Yukon Koyukuk Galena, Huslia, Kaltag, Koyukuk, Nulato, Ruby	Galena City	39-T
				Yukon-Koyukuk	6-C, 39-T, 40-T
			Yukon Tanana Alatna, Allakaket, Evansville/Bettles, Hughes, Manley, Minto, Nenana, Rampart, Stevens Village, Tanana	Nenana City	6-C
				Tanana City	
			Yukon Flats Arctic Village, Beaver, Birch Creek, Central, Chalkyitsik, Circle, Fort Yukon, Venetie	Yukon Flats (includes Rampart)	
		Southeast Fairbanks Census Area	**Upper Tanana** Dot Lake, Eagle, Healy Lake, Northway, Tanacross, Tetlin, Tok	Alaska Gateway	
				Delta-Greeley	9-E
	Railbelt	Fairbanks North Star Borough		Fairbanks North Star Borough	4-B, 5-C, 6-C
		Denali Borough		Denali Borough	6-C

Note: Gray highlighted areas are not included in the Yukon-Koyukuk/Upper Tanana energy planning area.

Other Planning Efforts in Interior Region

The Alaska Energy Authority's regional energy planning process is not the only planning effort in the Interior. As in many other regions in the state, there are other community, regional and federal initiatives that deal specifically or touch on energy issues. Though outside the scope of the regional energy plan, efforts are being made to coordinate with and include findings from other planning processes, including the following:

- **TANANA CHIEFS CONFERENCE** has a Village Planning and Development Department dedicated to providing TCC tribes with the tools needed to establish comprehensive community plans, come to consensus on the community's wants and needs, and write and submit grant proposals for a range of projects. TCC community plans were used to update and inform the community and energy profiles and priorities for 14 Interior communities.
- **U.S. 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:
    - **U.S. DOE On-Demand Technical Assistance** – DOE provides on demand technical assistance limited to 40 hours on priority areas such as strategic energy planning, grantee support, transmission/interconnection, project development, finance, and lease agreements. Unlike the START program, On-Demand Technical Assistance is not a competitive program.
    - **Alaska START Program** – Since 2011, the Alaska START Program has provided community planning efforts focused around energy projects, including verifying economic and technical viability of a project's 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 request for proposals with appropriate technical guidelines and selection criteria; and developing operations and maintenance or measurement and verification plans. Applications are accepted through a competitive process.

Table 3: Interior Energy Region communities participating in the U.S. DOE START Program

Community	Subregion	Date
Native Village of Huslia	Yukon Koyukuk	2015
Native Village of Koyukuk	Yukon Koyukuk	2013
Native Village of Minto	Yukon Tanana	2013
Arctic Village Council	Yukon Flats	2012
Venetie Village Council	Yukon Flats	2012

Source: (U.S. Department of Energy, 2015)

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 energy efficiency and conservation (EE&C) projects 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, Native nonprofits, and Native energy resource development organizations). Utilities may be able to partner with tribally affiliated entities to leverage these federal funds. To date, five communities in the region have 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 Working Groups to Advance Shared Goals

While there is no unified regional governing body in the Interior, there are many unifying ideas and structures in place. The creation of subregional energy working groups 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 groups in the region. At the end of the project, the groups will need to be self-sustaining or find support from regional partners or entities. Broad goals and objectives for energy groups 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 and benefits are analyzed. 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 4).

Table 4: Factors for successful energy projects

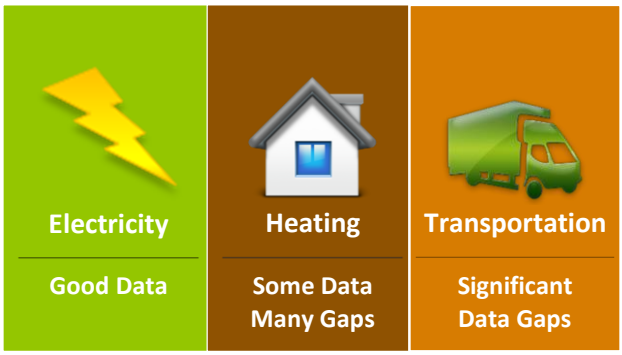
TO BE SUCCESSFUL…

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: Energy Data by 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.

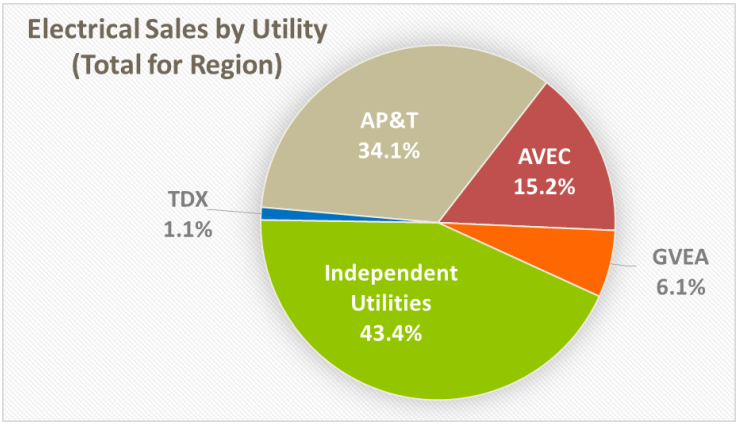
Space heating costs account for over 80 percent of home energy budgets in Alaska and around 55 percent of the energy costs in public and commercial buildings. Good data on heating fuel use, including heating efficiency and types of fuels used for heating, is increasingly available from the Alaska Housing 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 & Rates

Alaska Power & Telephone

Figure 4: Regional electric sales by utility



Data source: (Alaska Energy Authority, 2015)

Alaska Power & Telephone (AP&T) provides power to customers in the Upper Tanana and Yukon Tanana subregions. AP&T operations are divided into 5 power houses/grids serving 10 Interior communities. AP&T's most populated area in the Interior is along the Alaska Highway with powerhouses in Tok and Northway. The Tok generation facility is connected via intertie to Dot Lake, Tanacross, and Tetlin. Diesel generators produce electricity at the Tok facility but work is underway to build a hydroelectric facility and transmission lines at the Tanacross-area on Yerrick Creek. Northway, which includes Northway Village and Northway Junction, though close to the Tok grid has a separate diesel generation facility. Eagle, which includes the Native Village and City of Eagle, is served by a single powerhouse with diesel generators and a newly commissioned 24 kW solar array. This array is a small utility-scale

system owned and operated by AP&T. In the Yukon Tanana subregion, interties connect two sets of adjacent communities: Allakaket - Alatna and Bettles - Evansville. In 2014, AP&T sold 11,534 MWh from its diesel plants in Allakaket, Bettles, Eagle, Northway, and Tok accounting for 34 percent of regional electric sales.

Alaska Village Electric Cooperative

Alaska Village Electric Cooperative (AVEC) is a nonprofit, member cooperative that supplies electricity for 56 communities in Alaska. AVEC serves eight Interior communities located in the Yukon Koyukuk and Lower Yukon subregions. AVEC manages and operates small powerhouses that serve each of the eight communities ranging in generator capacity size from 385 kW to just under 1000 kW. One community, Kaltag, has an AVEC operated 10 kW solar array producing electricity for the electrical grid. In the remaining communities all electricity is produced by diesel generators. None of the AVEC communities are connected via intertie. In 2014, AVEC sold 5,140 MWh of electricity in the region, about 15 percent of total regional sales.

Golden Valley Electric Association

Golden Valley Electric Association (GVEA) is a cooperative serving close to 100,000 residents in and near Fairbanks, Delta Junction, Nenana, Healy, and Cantwell. GVEA's electricity generation comes from multiple sources: diesel from plants in Fairbanks, North Pole, and Delta Junction; coal from plants in Healy; wind from Eva Creek Wind Farm; hydro from the Bradley Lake facility; and natural gas via the Fairbanks/Anchorage intertie. Nenana, though on the Railbelt, is included in this energy plan and is the only community served by GVEA. In 2014, GVEA sold 2,070 MWh of electricity in the region, about 6 percent of total regional sales.

TDX Power, Inc.

TDX Power, Inc. is a subsidiary of Tanadgusix Corporation (TDX), an Alaska Native village corporation. TDX Power owns and operates regulated utilities in Adak, Sand Point, the North Slope, and acquired the Manley Hot Springs utility and power generation facility in 2008. In 2014, TDX Power sold 387 MWh of electricity in the region, about 1 percent of total regional sales.

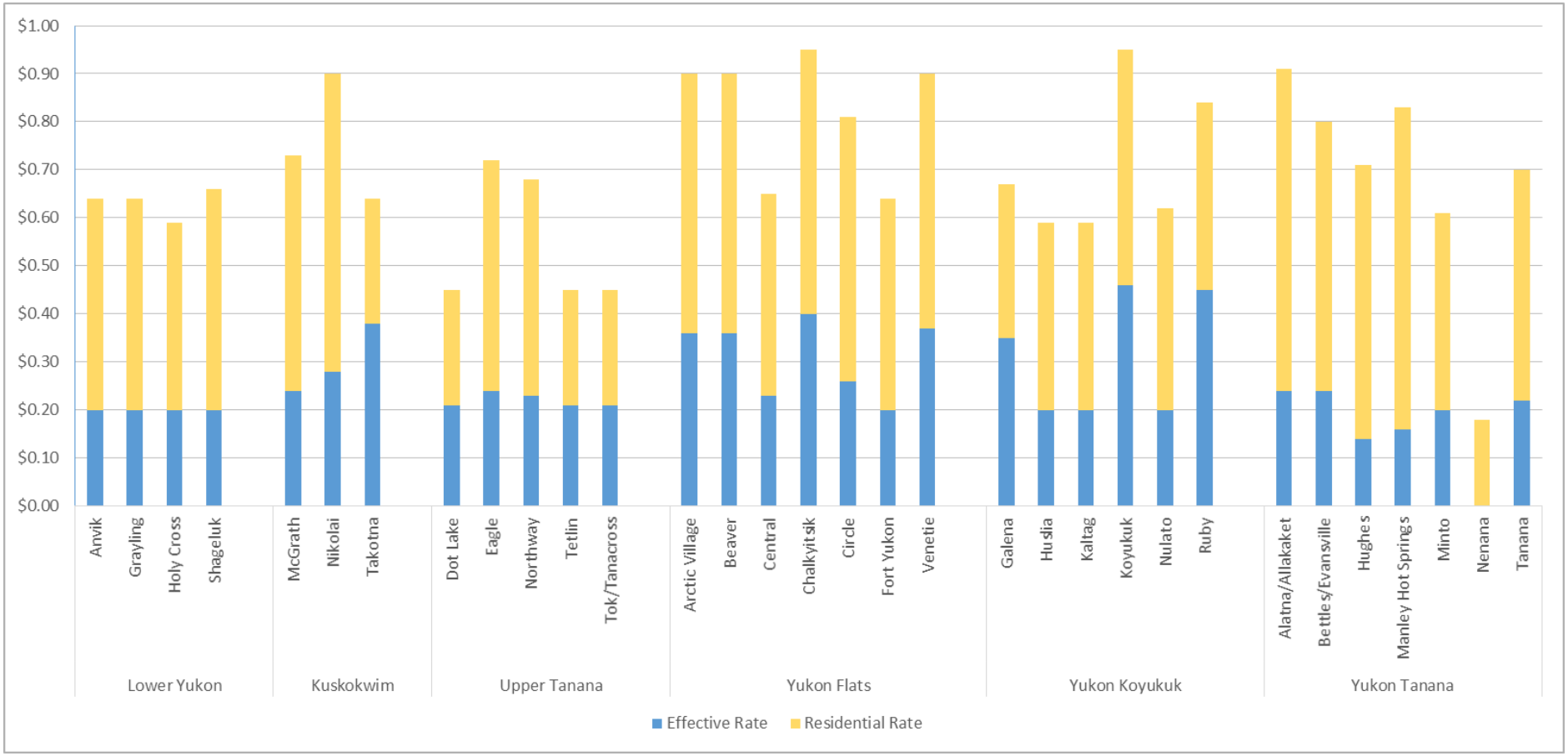
Independent Utilities

Twenty of the Interior communities included in this report have independent utilities and/or do not have commercial electric service. Though diverse, these communities are grouped together for analysis as independent utilities. Three communities, Birch Creek, Healy Lake, and Telida have very small populations and are not at present served by a commercial utility service. Healy Lake Village Council is considering taking over the recently shuttered AP&T powerhouse and returning commercial utility service to Healy Lake. In 2014, independent utilities sold 14,681 MWh of electricity in the region, about 44 percent of total regional sales.

ELECTRIC RATES

For most communities in the Interior 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.

Figure 5: Electric rates by community, 2014



Data source: (Alaska Energy Authority, 2015)

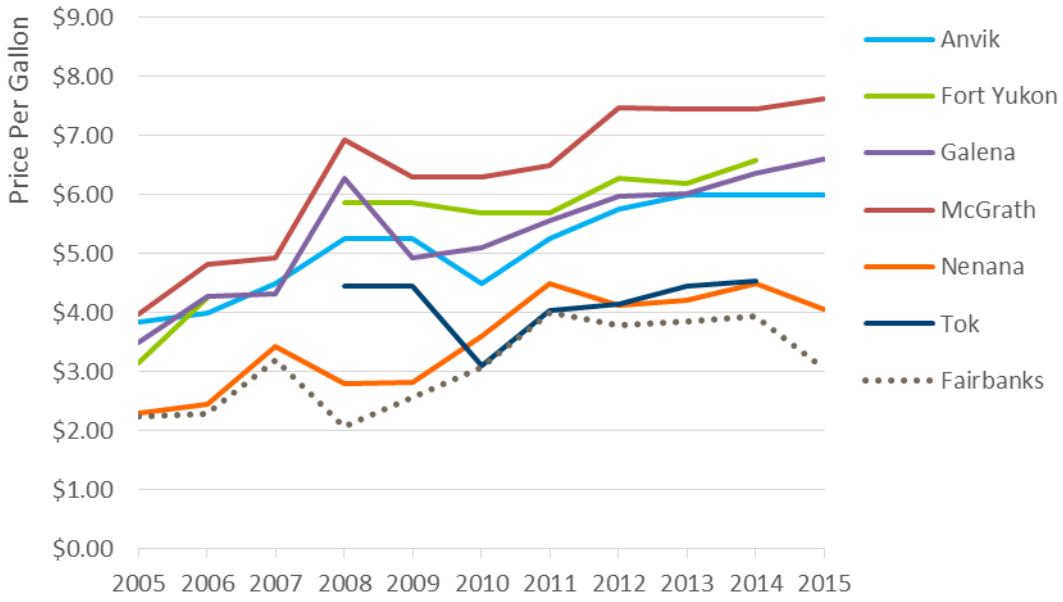
Nenana is the only community in the Interior not eligible for PCE, due to its location in the Railbelt. Birch Creek is not currently enrolled but is seeking to return to the program. Rampart re-enrolled in the PCE program in 2015. As a result, data from Rampart is not yet available through the PCE program. Healy Lake and Telida are also not enrolled due to small populations and lack of commercial services.

Both rates vary considerably across the region. Unsubsidized residential rates range from $0.18/kWh in Nenana, which is on GVEA's grid, to $0.95/kWh in Chalkyitsik and Koyukuk, which are operated as independent utilities. The PCE effective rates range from $0.14/kWh in Hughes to $0.46/kWh in Koyukuk for the first 500 kWh of monthly residential use (Figure 5). By comparison, residential rates were $0.15/kWh in Anchorage and $0.18/kWh in Fairbanks in July 2015.

FUEL VENDORS AND PRICES

Due to the size of this region, home heating oil, unleaded gas, and other petroleum products are available from multiple vendors. Crowley, Ruby Marine, Northern Energy, and Everts Air Fuel are some of the fuel suppliers serving Interior communities via barge, air, and truck.

Figure 6: Price of #1 fuel oil in hub communities



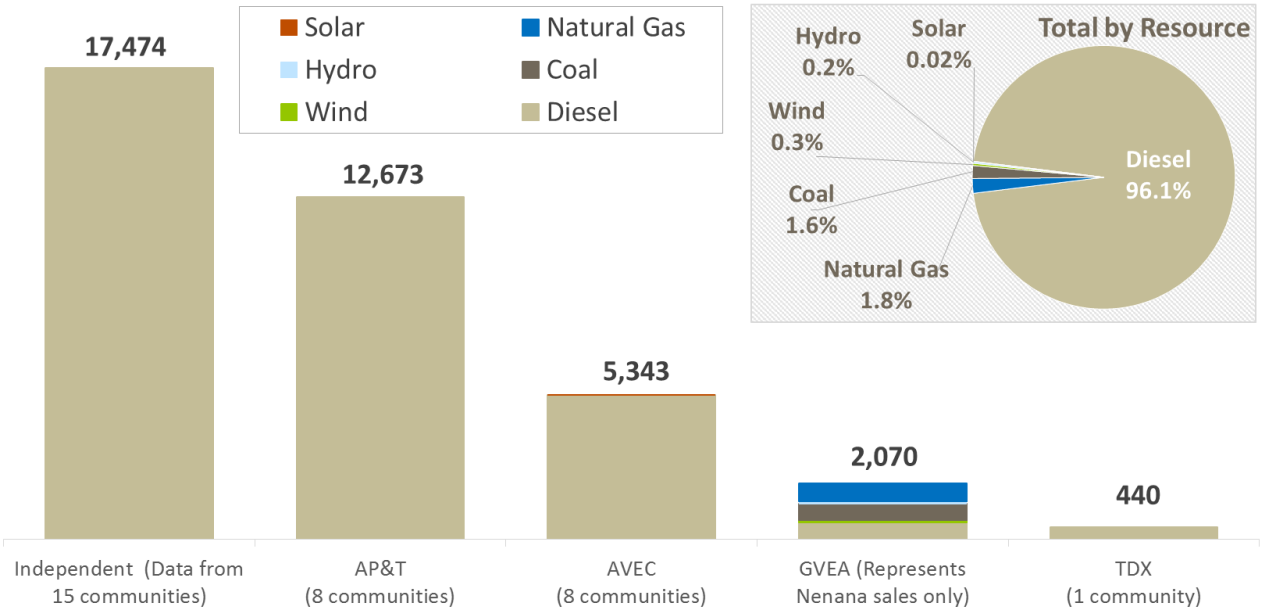
Note: Prior to 2011, the DCRA fuel price survey did not always collect data in the same month for all communities. In this figure, price data for the closest month (up to 3 months) was used when data from the same month was not available. Data source: (Institute of Social and Economic Research, 2015).

Looking at the price of #1 fuel oil, there has been a steady rise in prices, but less volatility, since 2010. The difference between prices in Fairbanks and Interior hub communities is larger than before the oil price spike in 2007 (Figure 6). Prices are highest in the communities furthest from the road system (Anvik, Fort Yukon, Galena, McGrath). In January 2015, only fuel prices in communities on the road system reflected the global drop in oil prices that began in July 2014.

ELECTRICITY GENERATION

Nearly 36,000 MWh of electricity are produced in the Interior Energy Region annually, almost entirely from diesel generation (Figure 7). In FY2014, the exception was 7 MWh of solar power produced by AVEC in Kaltag. Another 2,070 MWh sold to GVEA customers in Nenana in 2014 was generated by a diverse mix of power sources - diesel and coal-fired power plants in Fairbanks and North Pole, electricity generated from wind and coal facilities in Eva Creek and Healy, hydro electricity from Bradley Lake, and natural gas-generated electricity purchased from Anchorage.

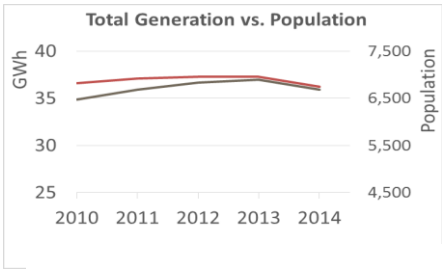
Figure 7: Regional electrical generation by utility and resource (MWh), 2014



Data source: (Alaska Energy Authority, 2015) (Bishop, 2015)

Electricity produced by the Alaska Gateway School District's combined heat and power biomass system in Tok is not included in Figure 7, but represents a significant use of a renewable resource in the Upper Tanana subregion. If developed, the Yerrick Creek Hydro project would add a significant source of non-diesel capacity to AP&T's Tok grid. This is the only large-scale renewable project being planned for the region for the near term.

Figure 8: Electrical generation trend vs. population change, 2010-2014

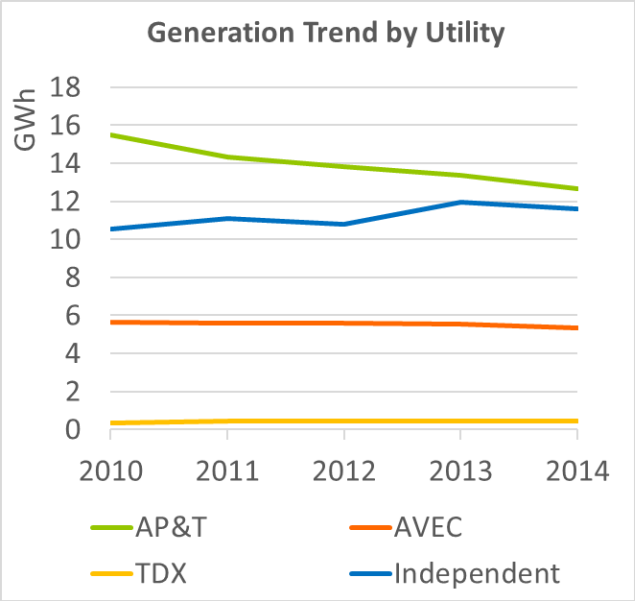


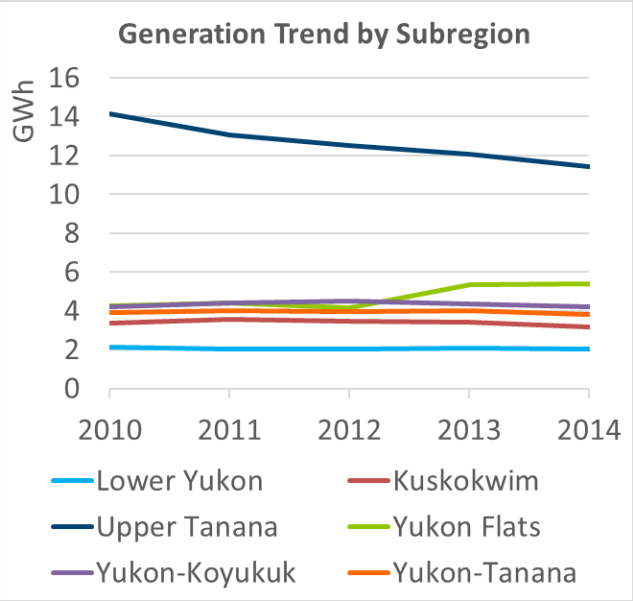
Data sources: (Alaska Energy Authority, 2015) (Alaska Department of Labor and Workforce Development, 2014)

Recent Trends in Electrical Generation

Overall, electricity generation has been relatively flat in the region since 2010, following a similar trend in population (Figure 8). More variation is seen when generation is broken out by utility and subregion, possibly reflecting local population changes and the loss or addition of large commercial/government or public facility customers (Figure 9). See Figure 14 for changes in population at the community level.

Figure 9: Generation trends by utility and subregion, 2010-2014





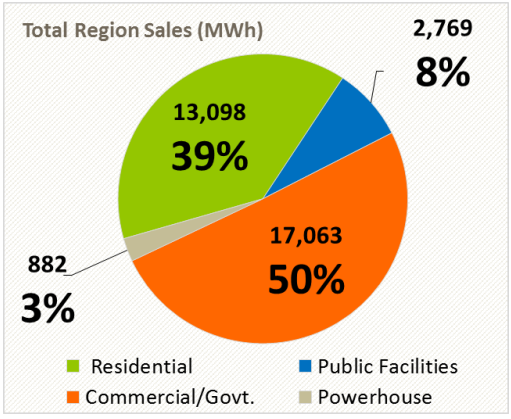
Notes: No generation data is available for Rampart and Stevens Village in the Yukon Tanana subregion for 2010-2014. For Arctic Village and Venetie, independent utilities in the Yukon Flats, only data for 2013-2014 is included. Galena removed from Yukon- Koyukuk due to data gaps.
Data sources: (Alaska Energy Authority, 2015) (Alaska Department of Labor and Workforce Development, 2014)

Growth in generation occurred among independent utilities (↑10% overall) and at TDX's plant in Manley Hot Springs (↑25%). Electrical generation declined at power plants operated by AVEC (↓5%) and AP&T (↓18%). Other independent utilities with double-digit changes included: Nikolai (↑52%), Takotna (↓39%), and Hughes (↑12%).

Current and Projected Demand

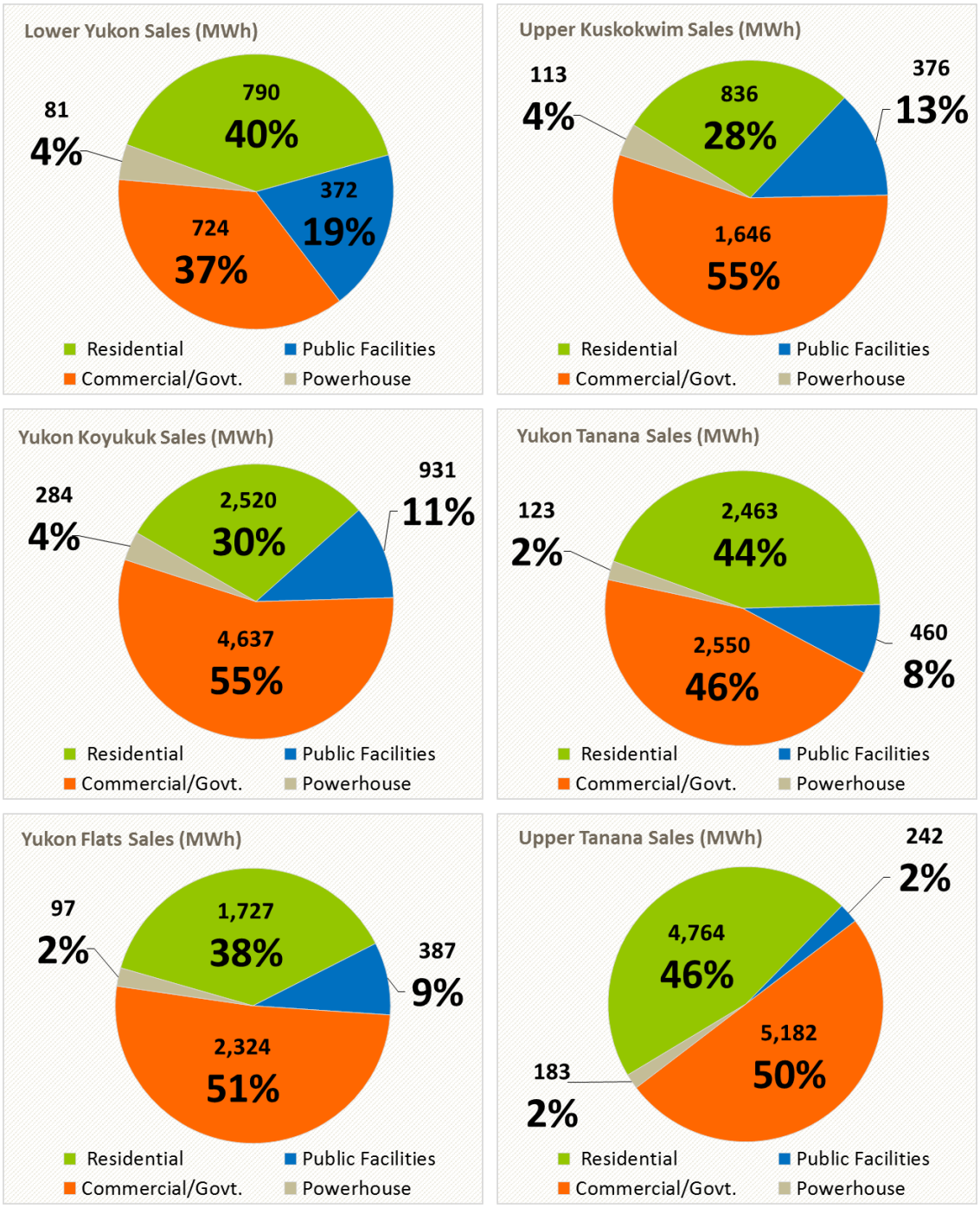
Electric sales in the Interior Energy Region totaled 33,812 MWh in FY2014. Regionwide, 50 percent of the electricity sold is used by commercial and government customers, 39 percent by residential customers, and eight percent by community buildings. Utility use accounts for the remaining three percent (Figure 10). There is some variation by subregion, mostly in the share of electricity used in community buildings, which varies from 2 percent in the Upper Tanana to 19 percent of electrical sales in Lower Yukon communities (Figure 11).

Figure 10: Regional electric sales by customer type, 2014



Tracking electrical use by customer type is an important first step in targeting energy efficiency and conservation efforts. See Community and Energy Profiles in **Chapter 6** for community-specific data on electrical use by customer type.

Figure 11: Subregional electrical sales by customer type, 2014

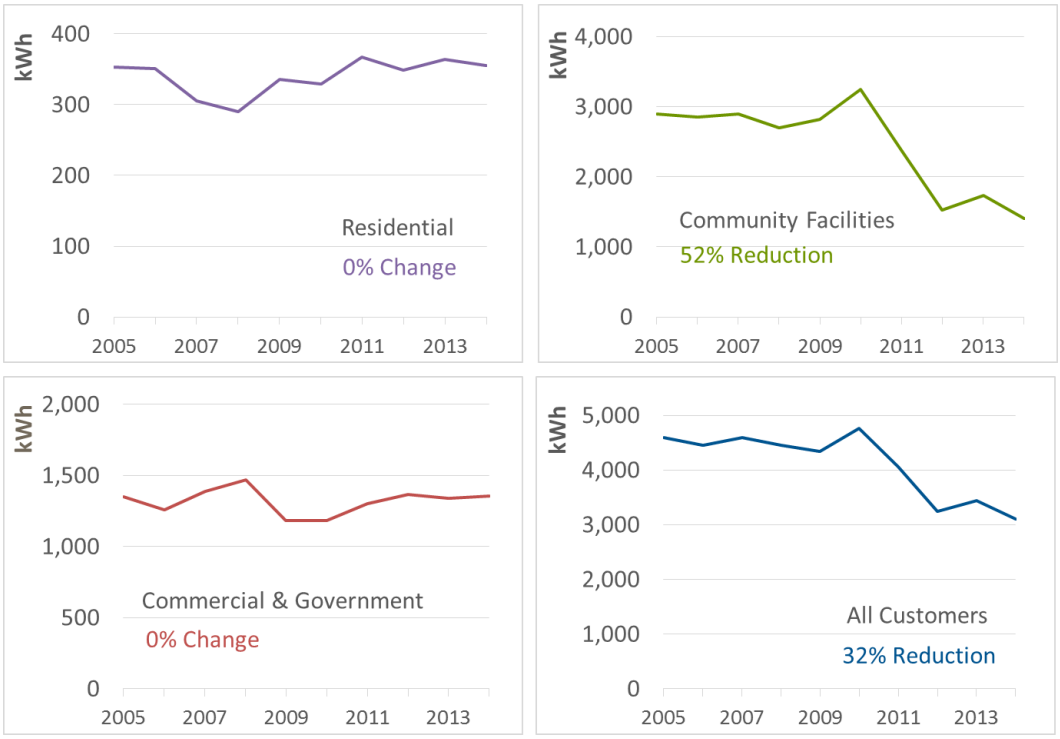


Data source: (Alaska Energy Authority, 2015) (Bishop, 2015)

Trends in Energy Use in Two Hub Communities

A look at recent trends in electricity usage reveals the likely impacts of fuel price increases and state energy efficiency programs.

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

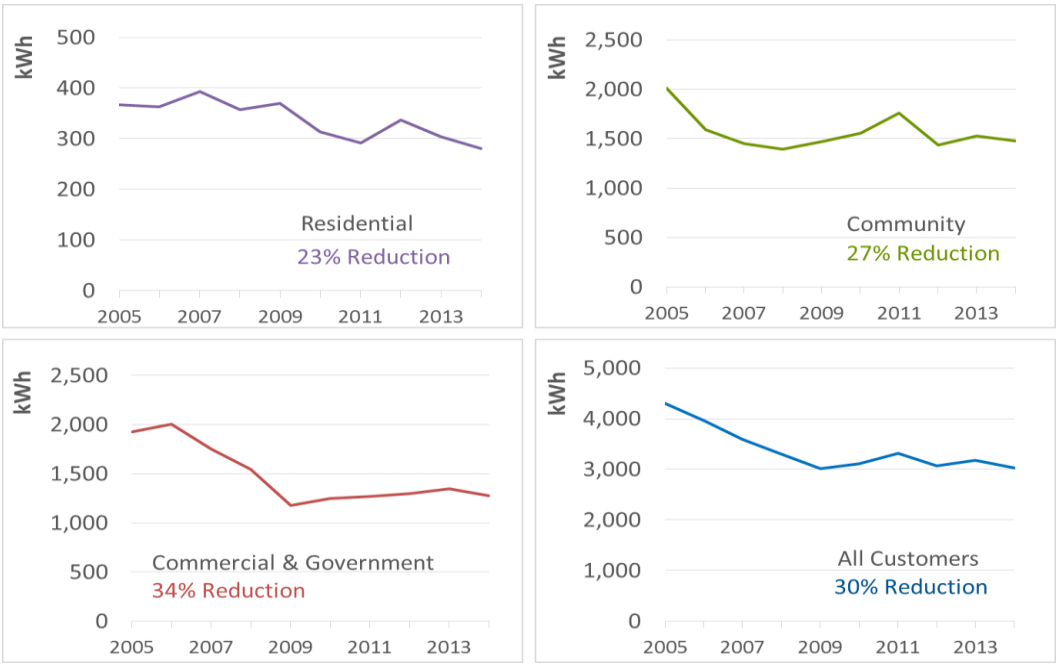


Data source: (Institute of Social and Economic Research, 2015)

The 10-year trend for electrical use on a per customer basis in Fort Yukon (Figure 12) shows a dramatic drop in electricity use by community buildings and facilities between 2010 and 2011. The Village Energy Efficiency Program (VEEP) completed lighting retrofits in 40 community buildings and two teacher housing units in Fort Yukon in 2010. While typical residential and commercial/government use experienced no change over the same period, the energy savings by public facilities resulted in a 32 percent overall reduction in average customer demand. A strategy for additional energy efficiency and conservation efforts in Fort Yukon may be most successful if targeted at homes, commercial buildings and the school (which is classified as a commercial/government user).

Data for McGrath (Figure 13) show a decline in average customer use across all customer categories over the past 10 years. This reflects the results of energy efficiency efforts at the residential level (state weatherization and energy retrofit programs) and community level (e.g., municipal street light upgrade to LEDs). The reduction in average consumption at community and commercial/government buildings could have also resulted from the decline in the city's population over the same period if public buildings get less use than in the past.

Figure 13: Trends in average monthly use by customer, McGrath 2005-2014



Data source: (Institute of Social and Economic Research, 2015)

Load Forecasting

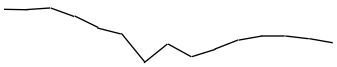
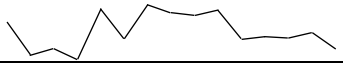
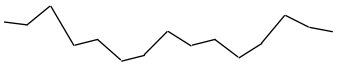
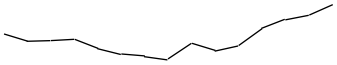
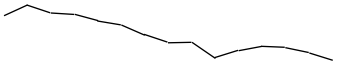
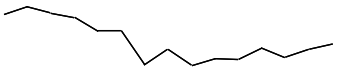
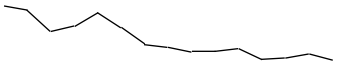
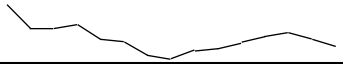
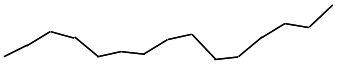
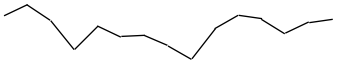
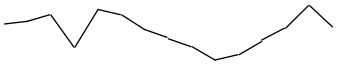
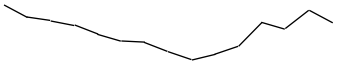
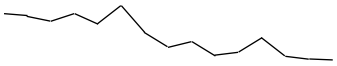
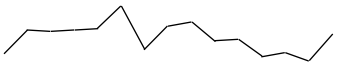
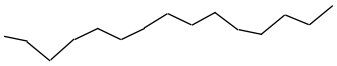
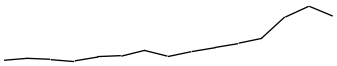
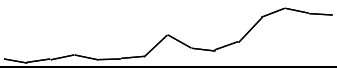
Electrical load forecasting is a complex and data-intensive activity that is beyond the scope of this project. A few of the variables affecting electric loads are discussed here. Population projections are useful for forecasting electricity demand, especially among residential customers. A second and typically larger component of demand comes from industrial and large commercial users. The possible development of a major gold mining operation in Tetlin could add a significant load demand to AP&T's grid and would improve the economics for the Yerrick Creek hydro project, other new renewable energy, and/or transmission project in the Upper Tanana subregion.

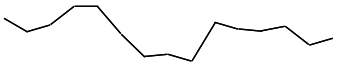
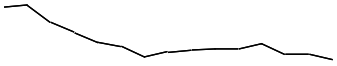
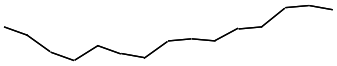
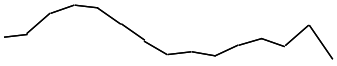
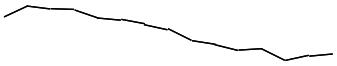
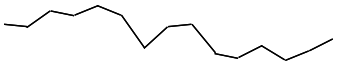
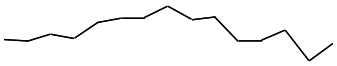
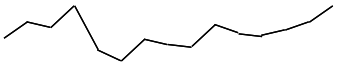
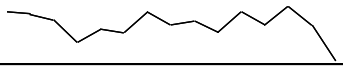
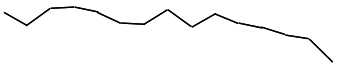
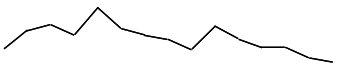
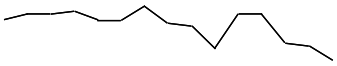
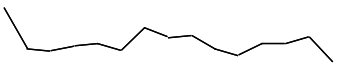
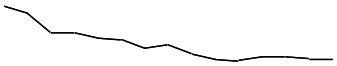
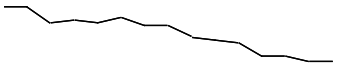
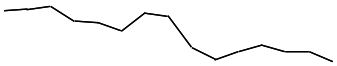
Small to moderate reductions in utility loads could result from additional community-scale energy efficiency projects, as seen in Fort Yukon in 2010-11 (Figure 12), or growth in off-grid or grid-connected distributed generation using solar or small-scale wind power. AP&T saw its load drop significantly on the Tok grid when the school district commissioned its biomass-fueled combined heat and power system. Increases or decreases in a utility's load will affect the efficiency of diesel generation systems and alter economies of scale, which may affect rates.

POPULATION TRENDS AND PROJECTIONS

Since 2000 population in the Interior Energy Region has fallen by 12 percent, but the change has not been even across the region (Alaska Department of Labor and Workforce Development, 2014). Some of the smallest communities have seen the steepest declines from 2000 to 2014, though several larger communities have also seen declines of more than 30 percent (Figure 14). Communities that have seen their population grow include Dot Lake/Dot Lake Village (151%), Manley Hot Springs (63%), Arctic Village (26%), Takotna (24%), Circle (19%), Huslia (15%), Allakaket (14%), Tetlin (12%), and Hughes (10%).

Figure 14: Population trends by community, 2000-2014

Population	2000 Census		2014 Est.	Change Since 2000	Avg. Annual Growth
Over 500					
Tok	**1,393**		**1,246**	-10.6%	**-1%**
Fort Yukon	**595**		**576**	-3.2%	**-0.2%**
201 to 500					
Galena	**675**		**449**	-33.5%	**-2.2%**
Nenana	**402**		**396**	-1.5%	**-0.1%**
Huslia	**293**		**338**	15.4%	**1.0%**
McGrath	**401**		**315**	-21.4%	**-1.4%**
Nulato	**336**		**246**	-26.8%	**-1.8%**
Northway	**274**		**240**	-12.4%	**-0.8%**
Tanana	**308**		**229**	-25.6%	**-1.7%**
Minto	**258**		**205**	-20.5%	**-1.4%**
101 to 200					
Arctic Village	**152**		**192**	26.3%	**1.8%**
Grayling	**194**		**191**	-1.5%	**-0.1%**
Ruby	**188**		**186**	-1.1%	**-0.1%**
Venetie	**202**		**186**	-7.9%	**-0.5%**
Kaltag	**230**		**182**	-20.9%	**-1.4%**
Holy Cross	**227**		**177**	-22.0%	**-1.5%**
Tetlin	**117**		**131**	12.0%	**0.8%**
Circle	**100**		**119**	19.0%	**1.3%**
Manley Hot Springs	**72**		**117**	62.5%	**4.2%**
Allakaket	**97**		**111**	14.4%	**1.0%**
Tanacross	**140**		**110**	-21.4%	**-1.4%**
Dot Lake Village	**38**		**102**	168.4%	**11%**

51 to 100					
Koyukuk	**101**		**92**	-8.9%	**-0.6%**
Central	**134**		**86**	-35.8%	**-2.4%**
Hughes	**78**		**86**	10.3%	**0.7%**
Nikolai	**100**		**83**	-17.0%	**-1.1%**
Eagle	**129**		**81**	-37.2%	**-2.5%**
Anvik	**104**		**79**	-24.0%	**-1.6%**
Shageluk	**129**		**79**	-38.8%	**-2.6%**
Chalkyitsik	**83**		**77**	-7.2%	**-0.5%**
Eagle Village	**68**		**65**	-4.4%	**-0.3%**
Takotna	**50**		**62**	24.0%	**1.6%**
Beaver	**84**		**58**	-31.0%	**-2.1%**
50 or Under					
Stevens Village	**87**		**46**	-47.1%	**-3.1%**
Dot Lake	**19**		**41**	115.8%	**7.7%**
Birch Creek	**28**		**22**	-21.4%	**-1.4%**
Alatna	**35**		**21**	-40.0%	**-2.7%**
Rampart	**45**		**21**	-53.3%	**-3.6%**
Bettles	**43**		**13**	-69.8%	**-4.7%**
Evansville	**28**		**8**	-71.4%	**-4.8%**
Healy Lake	**37**		**7**	-81.1%	**-5.4%**
Telida			**0**		

Data source: (ADOLWD, 2015)

Population Projections

Over the next 25 years, Alaska's state demographers predict a 27 percent increase in population for the Southeast Fairbanks Census Area (which includes Delta Junction and Fort Greely among others) and a 13 percent decline in the Yukon Koyukuk Census Area (ADOLWD, 2014). These projections are based on historical data and factors of change including fertility, mortality, and migration. They cannot predict for changes in local or regional economies or the impacts of natural disasters, such as floods or wildfires.

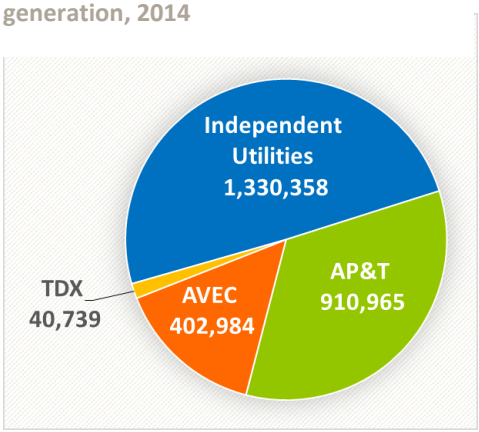
While reductions in population reduce electricity usage, they do not always do so on a proportional basis. For example, the high line loss in some communities is often due to old or abandoned facilities, homes, and buildings that are not metered yet still receive electricity.

Diesel Efficiency & Heat Recovery

Fuel for Electrical Generation

Nearly 2.7 million gallons of diesel fuel are used each year to generate electricity in the Interior Energy Region (Figure 15). This does not include fuel used by GVEA at its Fairbanks and North Pole facilities. (No public data is available on the volume of fuels used for transportation and space heating in Alaska.) In FY2014, 50 percent of this was used by 15 of the region's mostly small, independent electric utilities, 34 percent by AP&T, 15 percent by AVEC, and 1 percent by TDX (Figure 15).

Figure 15: Diesel fuel used for electrical generation, 2014

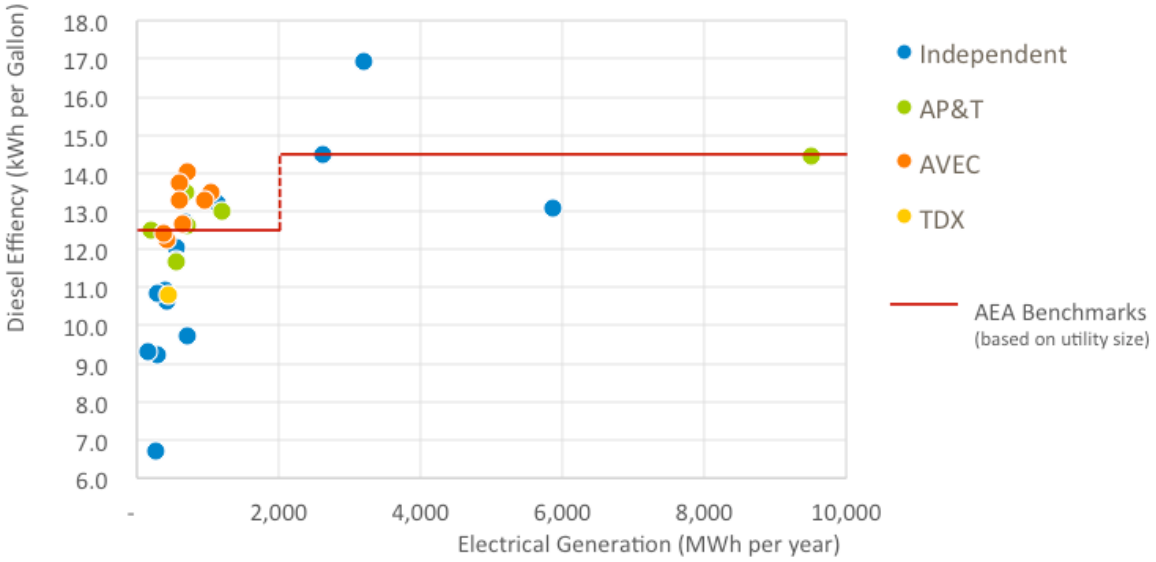


Data source: (Alaska Energy Authority, 2015)

Diesel Efficiency

Diesel efficiency (measured by the number of kWh generated from one gallon of diesel) in the Interior Energy Region currently ranges from 6.7 kWh per gallon in Beaver to 16.95 in Fort Yukon (Figure 16). The red line shows AEA's benchmark performance targets of 12.5 kWh/gallon for small utilities (those generating under 2,000 MWh per year) and 14.5 kWh/gallon for larger systems.

Figure 16: Diesel efficiency by utility and generation, 2014



Data source: (Alaska Energy Authority, 2015)

A look at Figure 16 reveals there is room for improvement in diesel efficiency, particularly among small, independent utilities. If utilities below the AEA benchmarks improved system efficiency enough to meet them, they would save anywhere from $0.01 to $0.14/kWh in avoided fuel costs (at 2014 prices). Collectively, these utilities would save 117,600 gallons of fuel oil annually—a savings of $519,000 per year at 2014 fuel prices. See Table 15 for an estimate of potential savings from increased diesel efficiency across the region.

Heat Recovery

Heat recovery lowers community energy costs by reducing the cost of heating public buildings near the powerhouse. Even when gen-sets operate at maximum efficiency, 60 percent of all energy in the diesel fuel will be released as heat. Waste jacket heat can be run through a heat exchanger that transfers the heat to a heat loop. This process can recover 10 to 20 percent of the energy in the fuel. The heat can be measured and, if a heat sales contract is developed, sold to provide another revenue source for the utility. Potential users are often schools but can be any nearby buildings.

While excess or waste heat is primarily a byproduct of diesel generation, heat can be harnessed from hydro or wind projects when their capacity exceeds local electrical needs. The excess power can be dispatched on an interruptible basis to secondary heating loads, such as an electric boiler connected to a single facility's heating system or to a district heat loop.

Twelve communities in the Interior have operational heat recovery systems and another eight have projects under active development to install or repair heat recovery systems (Table 5).

Table 5: Heat recovery systems completed or in development

Kuskokwim Subregion					
Status	**Community**	**Lead**	**Project Description**	**Next Step**	**Cost/Funding**
Operational	McGrath	McGrath Light & Power	Provides excess to Iditarod heat Area School District, clinic, and three adjacent commercial buildings.		$1,171,324 /AEA REF, Local match
Lower Yukon Subregion					
Status	**Community**	**Lead**	**Project Description**	**Next Step**	**Cost/Funding**
Design & Construction	Anvik	AVEC/ANTHC	Repairing existing heat recovery system that provides heat to community school.	Expected completion in 2015/2016.	
	Grayling	ANTHC	Design and construct system to provide excess heat to community buildings.	Secure funds	
	Holy Cross	ANTHC	Design and construct system to provide heat to City's water system via a heating connection into the circulating distribution water loop.	Secure funds	

Yukon Flats Subregion					
Status	**Community**	**Lead**	**Project Description**	**Next Step**	**Cost/Funding**
Operational	Arctic Village	AV Electric Cooperative	Provides excess heat to airport garage.		
	Beaver	VSW/ANTHC	Repairing heat recovery system to serve washeteria/ water plant only. Requires installation of valve and heat exchanger and maintenance and foundation remediation at washeteria/water plant.		
	Central	Gold Country Energy	Provides excess heat to power plant office and residence.		
Design & Construction	Birch Creek	Birch Creek Tribal Council	Small system installed in power module built by ESI to heat water plant. Not currently operable.	Needs Repair	
	Fort Yukon	Utility	Combined heat and power plant using a 1.3 to 1.8MMBTU wood chip boiler and heat recovered off diesel generator. Will provide excess heat to public and community buildings located within the Fort Yukon community core via a new below grade district heating system.	Construction will start once powerhouse upgrade and relocation is complete. Summer 2016	$2,318,255 AEA REF, Federal funds, Rural Utility Service Grant
	Venetie	ANTHC, NVV	HR to washeteria is not functional. ANTHC will install new system from power plant to provide excess heat to new health clinic. Expected savings $17,000 in fuel costs/year.	Funded; Construction to complete in Summer 2016	$204,428 AEA REF

Yukon Koyukuk Subregion					
Status	**Community**	**Lead**	**Project Description**	**Next Step**	**Cost/Funding**
Operational	Galena	City of Galena	Provides excess heat to water plant, city building, pool, school, city fire hall, and power house building.		

	Kaltag	AVEC	Provides excess heat to school and power house building.		
	Koyukuk	City of Koyukuk	Provides excess heat to school.	Install BTU meter to track and bill heat sold to school.	
	Ruby	City of Ruby	Provides excess heat to washeteria, clinic, and emergency services garage.		

Yukon Tanana Subregion					
Status	**Community**	**Lead**	**Project Description**	**Next Step**	**Cost/Funding**
Operational	Allakaket	AP&T, Allakaket Village Council	Provides excess heat to washeteria, installed in 2011.	Expand to clinic	
	Hughes	Hughes Power & Light	Provides excess heat to water treatment plant/washeteria and water lines.		
	Manley Hot Springs	TDX	Provides excess heat to trading post and hangar.		
	Minto	ANTHC, AVEC	Provides excess heat to water plant, installed in 2011.		
	Stevens Village	Stevens Village IRA Council	Provides excess heat to water treatment plant.		
Reconnaissance & Feasibility	Rampart	ANTHC, Rampart Village Council	Preliminary analysis of the potential to provide excess heat to washeteria initiated.	ANTHC will work with RVC to develop heat recovery, if determined viable.	

RENEWABLE ENERGY

Renewable resources currently used to meet energy needs in the region include solar for electricity and wood biomass for space heating. While several wind studies have been conducted in the region in recent years at present only one project, 7-Mile near Tok, is proceeding with project development. Hydroelectric power will possibly come online in the Upper Tanana region in the next few years, providing significant amounts of electricity to communities on the AP&T Tok grid. (For information on the potential for other renewable resources, see Table 13.)

Biomass

Eighteen Interior communities have taken advantage of the Alaska Wood Energy Development Task Group grants to complete pre-feasibility assessments of local wood biomass resources. Twelve communities have operational biomass heating systems for community buildings or will within the next two years. Several other community projects are on hold pending decisions by community leadership on how to proceed. The funding for these projects has come primarily through grants from the AEA Renewable Energy Fund with others supported through federal funds.

Four of the large biomass systems operating or planned in the Interior are in Tok, Tanana, Fort Yukon, and Galena. The Tanana biomass system is made up of three biomass "plants" with multiple GARN boilers heating the community's washeteria, school, and fire hall. This cordwood system is similar to many of the projects across the Interior. The Tok system has a single biomass "plant" but provides heat and power to the 75,000 square foot Tok School building and greenhouse. The planned project in Galena is will be utilized by buildings on the Galena Interior Learning Academy (GILA) campus. This will use a chip-fired boiler for heating. The Fort Yukon project stands apart in terms of the complexity of components – district heating system and heat recovery from the diesel powerhouse in addition to the over 1 MMBTU wood chip boiler that will provide heat to buildings in the core community facility area of Fort Yukon.

Table 6: Community-scale Wood biomass heating projects completed or in development

Kuskokwim Subregion						
Status	**Community**	**Lead**	**Fuel**	**Project Description**	**Next Step**	**Cost/Funding**
Design & Construction	McGrath		Chips or cord wood	ON HOLD: CDR and permitting analysis complete. Both a large scale chip system and a small scale cordwood system are feasible for the community.	Community must make a decision on level of interest; a wood delivery strategy must be developed.	$183,094.22 AEA REF/Local Match

Lower Yukon Subregion						
Status	**Community**	**Lead**	**Fuel**	**Project Description**	**Next Step**	**Cost/Funding**
Design & Construction	Anvik	ANTHC, IRHA	Cordwood	Provide heat to city hall, clinic, tribal hall, and washeteria.	Operational 2016	AEA REF

Pre-Feasibility	Grayling	NV Grayling		2014 Pre-Feasibility study found limited opportunities for biomass heat at school.	Complete small biomass project for new community hall. Will consider expansion options after first system complete.	AEA AWEDTG
	Shageluk	NV Shageluk		2014 Pre-Feasibility study found limited opportunities for biomass heat at school and shop building.	Install biomass boiler in community hall. Will consider expansion options after first system complete.	AEA AWEDTG

Upper Tanana Subregion

Status	Community	Lead	Fuel	Project Description	Next Step	Cost/Funding
Operational	Tanacross	NV Tanacross	Cordwood	2 GARN 2000 boilers heat multiuse building, safe house, and water plant /washeteria.	Commissioned in Summer 2015; start operations for the winter.	$590,000 AEA REF/Local match
	Tok	AGSD	Chips	CHP system heats 75,000 sqft school, outbuildings & greenhouse and produces portion of school's electricity.		$3,260,349 AEA REF
Pre-Feasibility	Healy Lake	Healy Lake Council	Cordwood	Pre-feasibility study completed in 2013. Recommendations: • Investigated 3 types of biomass heating for washeteria and Margaret Kirsteatter Community Hall • Wood chip hydronic heater, stick-fired wood boiler & pellet boiler system. • All three projects are economically viable.	Decision from Healy Lake Village Council on whether to proceed	AEA AWEDTG
Previously Considered	Dot Lake	NV Dot Lake	Cordwood	Garn boiler installed to heat washeteria. Washeteria burned down. Building	Not pursuing any biomass projects at this time.	

				replaced but not with a garn.		
	Northway	Northway Village Council		Pre-feasibility studies conducted in 2008 & 2014. 2014 Recommendations: • Biomass energy project configurations considered unfeasible at this time. • Structural audit of the washeteria recommended. • Audit urges consideration of a wood stove or masonry heater for Community Hall expansion.	Not pursuing a biomass project at present, focusing on energy efficiency upgrades and building designs.	

Yukon Flats Subregion						
Status	**Community**	**Lead**	**Fuel**	**Project Description**	**Next Step**	**Cost/Funding**
Design & Construction	Fort Yukon	GZ Utility	Chips	Combined heat and power plant using a 1.3 to 1.8MMBTU wood chip boiler and heat recovered off diesel generator. Heat will be distributed to public and community buildings via a new below grade district heating system.	Complete construction in Summer 2016	$2,318,255 AEA REF/ Rural Utility Service Grant
	Fort Yukon	GZ Utility	Chips	Will heat clinic	Complete construction in Summer 2016	
Pre-Feasibility	Beaver	Beaver Village Council	Chips/ Cordwood	Pre-feasibility study completed in 2014. Recommendations: • Biomass heat of washeteria/water Plant and Victor Weihl Tribal Building is pre-feasible. • Recommended to start biomass fuel sourcing with Beaver Kwit'chin Corporation right away.	Decision from Beaver Village Council on proceeding with project.	AEA AWEDTG

Yukon Flats Subregion						
Status	**Community**	**Lead**	**Fuel**	**Project Description**	**Next Step**	**Cost/Funding**
Previously Considered	Chalkyitsik	Chalkyitsik Village Council	Chips	ON HOLD: Pre-feasibility study completed in 2011. Recommendations: • All mini-plants (defined as one or more boilers in a single building serving two or more buildings) are financially feasible. • Projects strongly sensitive to price of oil • Non-profit business model recommended.	Not pursuing at present because lack manpower in the village to supply needed wood.	$42,597 AEA REF
	Venetie	Venetie Village Council	Chips	ON HOLD: Pre-feasibility study completed in 2012. Recommendations: • All mini-plants (defined as one or more boilers in a single building serving two or more buildings) are financially feasible. • Projects strongly sensitive to price of oil • Non-profit business model recommended.	Decision on whether to proceed with project	$41,866 AEA REF

Yukon Koyukuk Subregion						
Status	**Community**	**Lead**	**Fuel**	**Project Description**	**Next Step**	**Cost/Funding**
Operational	Koyukuk	City of Koyukuk	Cordwood	Garn Boiler 2000 heats washeteria, new clinic, and city/tribal offices		
Design & Construction	Galena	Louden Council	Chips	Chip-fired boiler system will heat GILA school.	Complete construction in 2016	$448,874 AEA REF/Local match
	Huslia	Huslia Village Council	Cordwood	Garn 1000 Boiler to heat WTP & clinic project.	Complete construction in 2016	$52,470 AEA REF
Previously Considered	Nulato	City & NV Nulato		Looked into the viability of a biomass system in the past; determined it is not currently a good fit.	Not pursuing	
	Ruby	City of Ruby		ON HOLD: Biomass heating system for school	Not clear at present that need at school matches system. City not pursuing at present.	

Yukon Tanana Subregion						
Status	**Community**	**Lead**	**Fuel**	**Project Description**	**Next Step**	**Cost/Funding**
Operational	Hughes	ANTHC, IRHA, City	Cordwood	Garn Boiler 2000 heats washeteria, new clinic, and city/tribal offices.	First winter run in 2015	AEA REF
	Nenana	Nenana Native Village Council	Pellets	Pellet boiler heats tribal hall, office, and clinic.	Resolve issues and investigate expansion to other buildings	
	Tanana	City, Tribe	Cordwood	3 Garn Boilers heat washeteria, 4 heat school, 1 heats fire hall, and other cordwood systems heat city housing facility.	Need forestry harvest plan to ensure wood heating of public buildings (and more) is sustainable.	$508,365 AEA REF/Local match
Design & Construction	Minto	Minto Trad. Council	Cordwood	Cordwood fired central heating system to heat Multi-Purpose Building/Lodge and clinic.	Complete construction in 2016/2017	$274,800 AEA REF
Pre-Feasibility	Alatna	Alatna Village Council	Cordwood	Pre-feasibility study completed in 2014. Recommendations: • Biomass heat at the washeteria is financially and technically un-feasible. • Potential for Village Council to own and operate a biomass project and sell heat as third party to YKSD. If fuel can be sourced at $275 per cord, project is considered pre-feasible. • Proceed with plans to re-level and improve Village Council Office foundation, and weatherize Office. May wish to upgrade Office wood stove afterwards.	Consider biomass heating for school and weatherization of council office	AEA AWEDTG
	Allakaket	Allakaket Village Council	Cordwood	Pre-feasibility study completed in 2014. Recommendations: • Biomass project for a future school is considered marginally feasible. Financially pre-feasible if fuel oil price is $6.85 per gallon or more, and wood	Interested in pursuing biomass heating. Seek funds and technical lead on project.	AEA AWEDTG

Yukon Tanana Subregion						
Status	**Community**	**Lead**	**Fuel**	**Project Description**	**Next Step**	**Cost/Funding**
				fuel can be sourced for $265 per cord or less. • Discuss possibility of biomass heat sales project with third party such as Allakaket Village Council, City, or Alatna Village Council.		
	Rampart	Rampart Village Council		Pre-feasibility study for biomass at the school and washeteria being conducted in Summer 2015.	Decision will be based on P-F study	AEA AWEDTG
Previously Considered	Manley Hot Springs	Manley Village Council		Pre-feasibility study conducted in 2012. Project types not viable.	Not pursuing	AEA REF
	Stevens Village	SV IRA Council		Pre-feasibility conducted in 2008. Projects not cost-effective.	If Council is interested, take a second look at pre-feasibility based on new structures and changes in cost of fuel.	AEA AWEDTG

Hydroelectric

Currently, there are no hydroelectric operations in the region. Nenana receives electricity through GVEA's Fairbanks/Anchorage Intertie that draws from Bradley Lake Hydro. The Upper Tanana subregion will soon have significant hydroelectric power through the Yerrick Creek run-of-river project. The project is shovel-ready after eight years of investment and grants from AEA, USDA Rural Development, and private funding from Alaska Power & Telephone. In 2014, Tanacross Inc, the Native Village of Tanacross, and AP&T signed a Memorandum of Understanding to develop the Yerrick Creek Project. Upper Tanana Energy received a $500,000 grant from USDA's Rural Energy for America Program in late 2015. All are seeking additional grant funds from the state of Alaska to start large-scale construction.

Table 7: Hydroelectric projects in Interior region

Status	Community	Lead	Project Description	Next Step	Cost/Funding
Design & Construction	Dot Lake, Tanacross, Tetlin, Tok	AP&T, NV Tanacross, Tanacross, Inc.	Yerrick Creek, 1.5 MW capacity serving AP&T Tok grid. Run of river hydro project is expected to displace 50% of total diesel generation at the Tok powerhouse.	Construction of transmission lines to/from Tanacross has started. Seeking funds for facility construction.	$20 million estimated total cost

Status	Community	Lead	Project Description	Next Step	Cost/Funding
Reconnaissance & Feasibility	Dot Lake, Tanacross, Tetlin, Tok	AP&T	Clearwater Creek, 1 MW capacity serving AP&T Tok grid. Run of river hydro with potential of supplying 3.4 GWh/year.	AP&T applying for Phase I & II funding.	
	Rampart	Rampart Village Council	Hydro assessment underway by AEA.	Feasibility study, if warranted.	

Solar

Solar is not a year-round energy resource in the Interior. 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 is especially the case for residential or building level arrays in communities with high electric rates or for residents not connected to utility lines. Data-loggers monitored by Wolf Solar Electric in Tok have shown that Eastern and Interior Alaska have the highest average solar radiation levels in the state.

Net metering improves the economics of grid-connected projects by giving utility customers credit on their electric bills for excess solar or wind power they generate. Alaska allows utilities which are unregulated or sell less than 5,000,000 kilowatt-hours (kWh) annually to set net metering policies individually. AP&T offered net metering in its service area, but filled its quota for distributed generation in the Tok area in 2012. GVEA's Renewable Energy and Net Metering Program – Sustainable Natural Alternative Power (SNAP) —offers customers the opportunity to connect small-scale renewable electricity generation projects (25 kW or less) to the grid and pay down their electricity bills through this contribution. A full inventory of utilities offering net metering is not available.

Utilities in the Interior region have installed small utility-scale solar systems in Kaltag (AVEC) and Eagle (AP&T). Other utilities are exploring alternative models. In Arctic Village the housing authority has installed solar panels on homes that connect directly to the grid, supplying the utility with electricity rather than the homeowner. Such a system, though in a pilot phase, may offer a way forward for small grids in which net metering is not offered but interest in alternative energy generation is high.

Many communities in the region have installed solar photovoltaic (PV) systems to community buildings and many other individual residents have installed solar PV arrays to homes and commercial buildings (Figure 17). Details on the community-scale solar PV projects planned or underway in the region are in Table 8. In nearly every village or subregional conversation, solar PV was brought up as a viable, low cost, low maintenance option by community members. Moving forward, our region expects solar PV to be the most wide-spread renewable energy technology utilized in the coming years.

Figure 17: Solar projects in Interior region

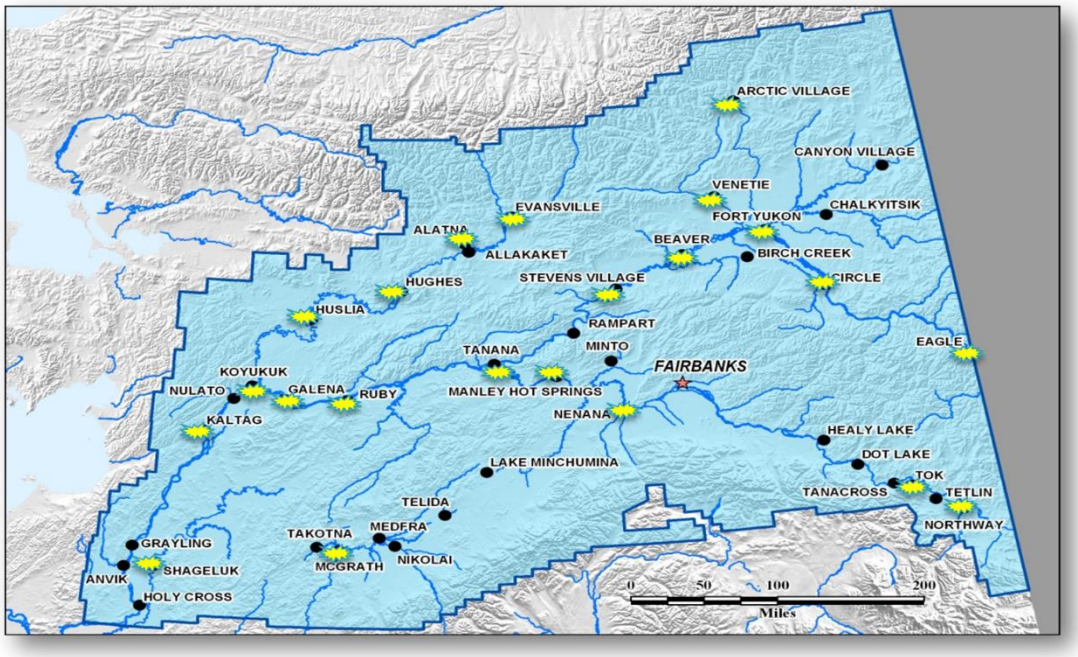


Table 8: Community-scale solar energy projects operational or in progress

Upper Tanana					
Status	**Community**	**Lead**	**Project Description**	**Next Step**	**Cost/Funding**
Operational	Eagle	AP&T	AP&T has commissioned a 24 kW solar PV array near their power plant.		
	Eagle	NV of Eagle	3kW system on the tribal office with a dual axis tracker that is working well.		
	Tok	Various	Residential and commercial scale PV arrays in place.		
Yukon Flats					
Status	**Community**	**Lead**	**Project Description**	**Next Step**	**Cost/Funding**
Operational	Arctic Village	AV Electric Coop/ AV Village Council	2- 2kW arrays owned by utility installed and operating on homes; duplex meters used so homes pay same for electricity but solar power sent back to grid, 2 PV arrays on/near washeteria but are not hooked up.	Connect one of the arrays	
	Beaver	Beaver Joint Utilities	2 kW PV array on generator building.		
	Circle	Various	PV panels installed on homes and tied into grid.		

Yukon Flats					
Status	**Community**	**Lead**	**Project Description**	**Next Step**	**Cost/Funding**
	Fort Yukon	GZG Tribal Gov't	-18 kW solar array on Tribal Hall; -3.5 kW array on FYU greenhouse; -PV panels on Addie Shewfelt Community Center		Cost to install the 18 kW array was $70, 500
	Venetie	Venetie Village Council	PV array on washeteria		

Yukon Koyukuk					
Status	**Community**	**Lead**	**Project Description**	**Next Step**	**Cost/ Funding**
Operational	Galena	Multiple	30-40 kW of PV arrays on multiple buildings.	Looking to expand solar penetration	
	Kaltag	AVEC	10 kW solar PV system installed on the generator building in 2013, producing close to expectations.		
	Koyukuk	City & Tribe	PV arrays installed on washeteria and tribal/city hall		
	Ruby	Multiple	PV arrays installed on clinic, washeteria, church, and one home (currently vacant)	Address slight phase imbalance due to too much PV-generated electricity on a single phase in community.	
Scheduled	Koyukuk	NV of Koyukuk	Recently constructed clinic built "solar ready." It has a pole ready for a solar array and a space in the electric panel for solar to be installed.	ANTHC has an RFP out for Solar PV on clinic.	

Yukon Tanana					
Status	**Community**	**Lead**	**Project Description**	**Next Step**	**Cost/ Funding**
Operational	Bettles	NPS	Solar PV on NPS/FWS buildings		
	Evansville	Evansville Village	20 panel array on tribal office		
	Nenana	Nenana Native	4.4 kW PV array on Nenana Teen Center, installed 2010.		

Yukon Tanana					
Status	**Community**	**Lead**	**Project Description**	**Next Step**	**Cost/ Funding**
		Village Council	Solar thermal collectors installed but not operational.		
	Stevens Village	SV IRA	IRHA installed PV array on tribal building.		
	Tanana	Too'gha, Inc	PV array on laundromat operating without any maintenance since 2007.		
Scheduled	Alatna	Alatna Village Council	Installed on homes not hooked up. Washeteria fire, will need to evaluate options after rebuilt.	Fix solar arrays and expand to other buildings	

There are few residential solar thermal systems installed in the region. Using solar thermal technologies to reduce heating costs may be 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.

Wind

Currently, there no wind energy projects operating in the region. AP&T has two active wind studies to determine if the wind resource at each location is adequate for utility scale wind farms. AP&T recently completed the 7-Mile Wind project study and determined feasibility is high. The Hughes Village Council was conducting a wind study and turbine test in the summer of 2015. The equipment may have been damaged or destroyed by wildfires.

Table 9: Wind projects in the Interior region

Status	Community	Lead	Project Description	Next Step	Cost/Funding
Reconnaissance	Dot Lake, Tanacross, Tetlin. Tok	AP&T	Chisana Mt. Wind project connected to AP&T Tok grid	Complete wind study	$148,800 (feasibility study only) AEA REF
	Dot Lake, Tanacross, Tetlin. Tok	AP&T	7-Mile Wind project connected to AP&T Tok grid	Securing funds; wind study complete	
	Hughes	Hughes Village Council	Wind Turbine test in July 2015 (anemometer installed June 22nd 2015, fire may have engulfed it on July 7th 2015)	Determine status of anemometer	

ENERGY EFFICIENCY & CONSERVATION

Energy Characteristics of Regional Housing Stock

The 2014 Alaska Housing Assessment by the Cold Climate Housing Research Center (Wiltse, 2014) profiled the residential energy use and cost in the Doyon region, including the Fairbanks North Star Borough (FNSB). The housing characteristics below are drawn from the Housing Assessment's profile of the two census areas in the Doyon Region: Southeast Fairbanks and Yukon-Koyukuk. Residential energy characteristics and data are drawn from the two census areas rather than the Doyon region to remove the findings for the FNSB, which has a data sample size far larger than all Interior energy communities combined. Removing FNSB from the analysis provides a regional picture that is far more representative of the Interior Energy Region communities. The Southeast Fairbanks census area does still include communities not in the Interior Energy Region such as Delta Junction and Fort Greely and it is important to note the entire census area is composed of villages that are on the road system in the Upper Tanana Subregion. This may skew the data due to the larger home sizes of road-system communities, which have better access to building material.

- **Energy Use:** The average home in the Southeast Fairbanks Census Area is 1,682 and uses 185,000 BTUs of energy per square foot annually (35 percent more than the statewide average.) The average home in the Yukon-Koyukuk Census Area is 1,042 square feet and uses 165,000 BTUs of energy per square foot annually (21 percent more than the statewide average).
- **Energy Efficiency:** The average home energy rating in both census areas is 2-star plus, based on data from over 900 homes (split evenly across the census areas). Not surprisingly, newer homes have better energy performance. On average, homes built before 1980 are currently rated at 2 stars or 2 star plus, compared to an average rating of 4 stars or 4 star plus for homes built after 2005.
- **Housing Quality:** Within current housing stock, newer homes are tighter. On average, homes built in 2005 or later performed better than the 2012 BEES standard of no more than four air-changes per hour at 50 Pascals.
- **Energy Cost and Affordability:** The average annual energy cost for homes in the Southeast Fairbanks Census Area is $7,860, which constitutes approximately 13 percent of median income in the area. Approximately 21 percent of households spend more than 30 percent of their income on housing costs, including rent, water and sewer, and energy costs. The average annual energy cost for homes in the Yukon-Koyukuk Census Area is $5,890, which constitutes approximately 17 percent of median income in the area. Approximately 25 percent of households spend more than 30 percent of their income on housing costs, including rent, water and sewer, and energy costs.
- **Regional Comparison:** Energy costs per square foot in the Interior Energy Region are higher than the average for the entire Doyon region, due to the removal of urban areas with lower costs of energy and larger homes. The comparison to other ANCSA regions shows the Interior Energy Region is on the higher end when looking at Energy Cost Index (ECI), which measures energy cost per square foot. In terms of overall energy cost with PCE, the Interior is right in the middle while the Doyon region has the highest average of all ANSCA regions. The Doyon region's position is likely the combination of larger home

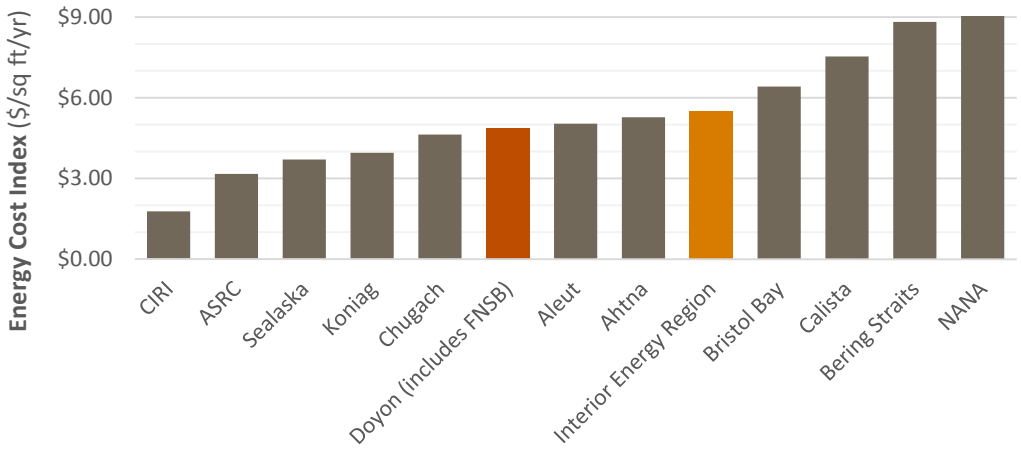
sizes (especially in urban areas), inclusion of homes not eligible for PCE savings, and the cold Interior climate (Figure 18).

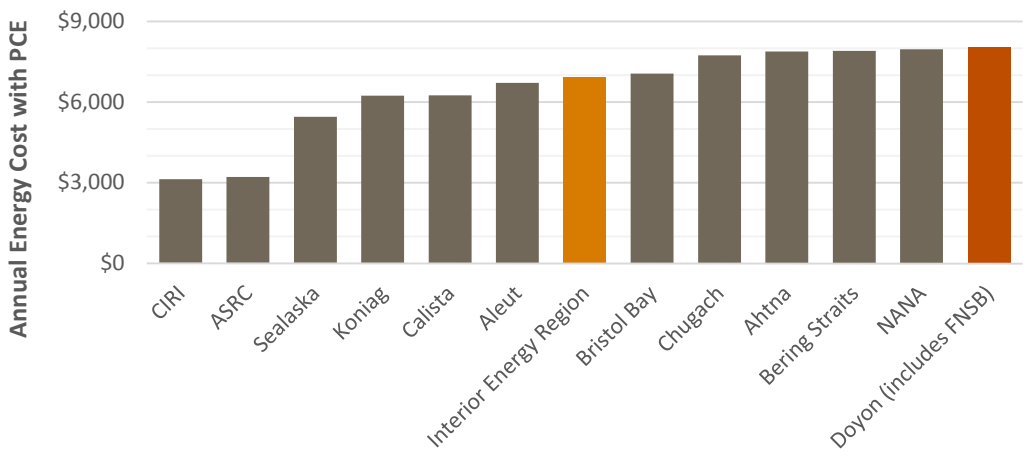
Table 10: Energy characteristics of regional housing stock

Census Area	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]
Southeast Fairbanks (includes Delta Junction)	2-star plus	1,682 square feet	263 MMBTU	$7,863 Per year	185 kBTU per square foot	$5.13 per square foot	10.8
Yukon-Koyukuk	2-star plus	1,042 square feet	167 MMBTU	$5,892 Per year	165 kBTU per square foot	$5.87 per square foot	9.0
Fairbanks North Star Borough	3-star	1,844 square feet	247 MMBTU	$8,106 Per year	143 kBTU per square foot	$4.76 per square foot	7.7

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: (Wiltse, 2014).

Figure 18: Interior energy region residential energy costs compared with ANCSA regions



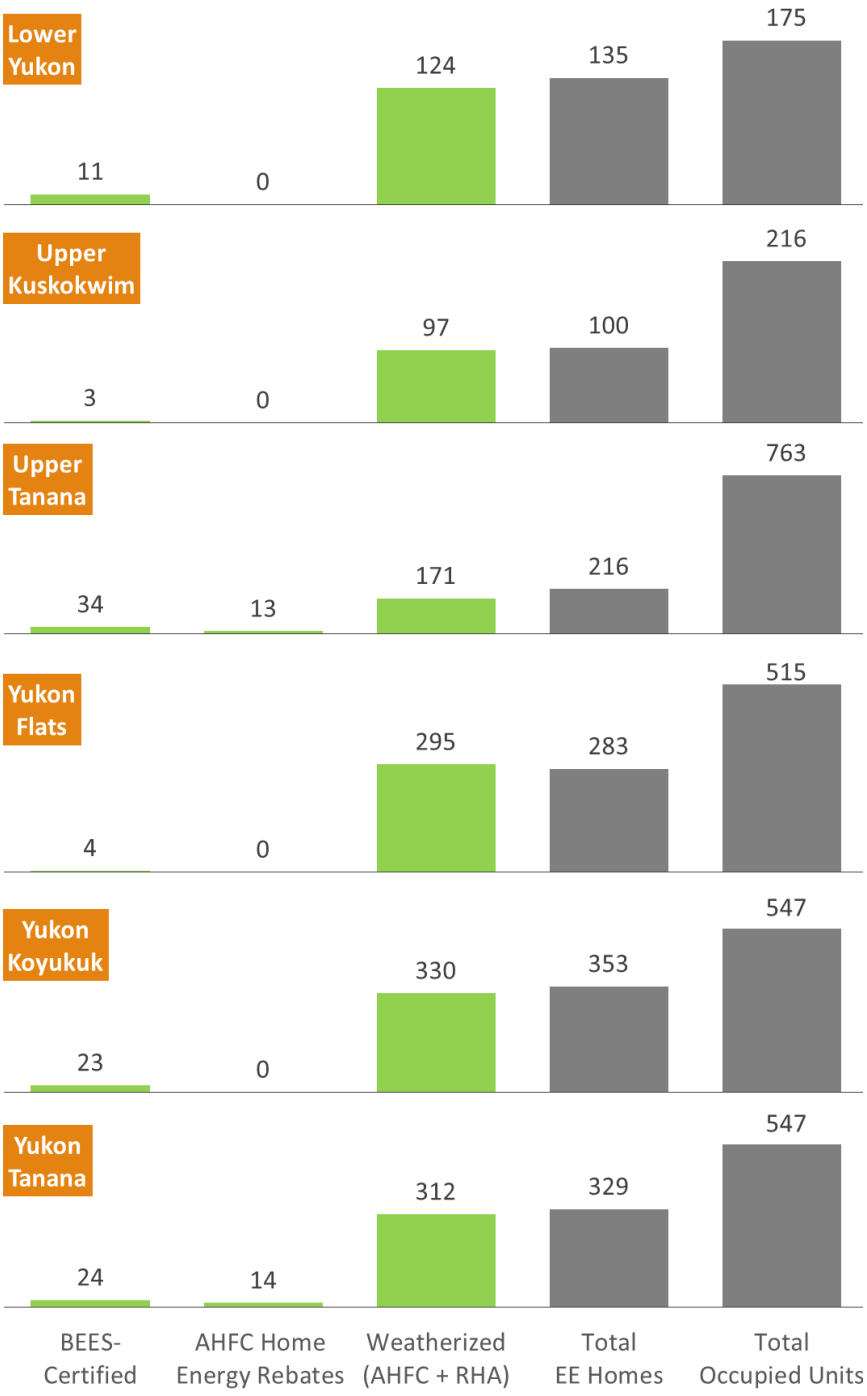


Data source: (Wiltse, 2014)

Residential EE&C Program Participation

Around half (51 percent) of occupied homes in the region have completed energy upgrades through the low-income weatherization program, the Home Energy Rebate program, or were certified as meeting the Alaska Building Energy Efficiency Standard (BEES), which is required for AHFC financing. Figure 19 shows participation by subregion in these programs.

Figure 19: Energy Efficient Housing Upgrades (2008-2014)



Data sources: (Wiltse, 2014) (Ord, 2015) (TCC, 2015)

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 Interior Energy Region

about 45 percent of homeowners receiving HER audits have completed upgrades and received rebates.

AHFC's weatherization services in the region are provided by TCC, Interior Weatherization, Inc. (IWI), the Alaska Community Development Corporation (ACDC), and the Interior Regional Housing Authority (IRHA). There is no cost to the resident or community for participation in the program.

Residential EE&C Savings

Energy efficiency and weatherization measures completed since 2008 reduced energy consumption in the Interior Energy Region by one-third, according to AHFC and TCC program data, which translates into 680 to 850 gallons of heating oil per home and over $3,000 in annual savings (Table 11). Most of the energy savings is in home heating, although lighting upgrades result in some electrical savings.

Table 11: Average EE&C savings per household in the Interior Energy 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	27 rebates + 3 in progress out of 68 audits (42% completion rate)	118.6 MMBTU	34%	852 gallons	$3,832 per year
Weatherization	1,354 homes	94.8 MMBTU	33%	681 gallons	$3,063 per year

Note: 1/ Assumes all heating is done with fuel oil. It does not include diesel fuel savings at the power plant from reductions in electrical demand and generation. Data sources: (Ord, 2015) (TCC, 2015).

On a regional basis, residential EE measures account for over 129,200 MMBTU annually in energy savings (1 MMBTU = 1 million British Thermal Units), nearly one million gallons of heating fuel per year, and over $5.8 million in avoided fuel costs for the region (Table 18). This does not include savings from lighting or appliance upgrades or other measures that reduce electrical use (or the diesel used to generate electricity). See **Chapter 3** for a breakout by subregion of the savings already achieved and the significant potential for additional savings from residential energy efficiency work.

Non-Residential EE&C Program Participation

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 12). See **Chapter 3** for a discussion of the energy savings available from energy efficient lighting retrofits and other upgrades recommended in non-residential building audits.

Table 12: Participation in Energy Efficiency Programs.

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]	Village-wide EE Lighting	LED Street Lighting	School EE Audit[2]	Health Clinic EE	Sanitation EE Audit	Sanitation EE Retrofits
Lower Yukon							
Anvik				A		A	P
Grayling				A		A	P
Holy Cross	X	X	X	A		A	X
Shageluk	X	X	X	A	A		
Kuskokwim							
McGrath	X		X	A			
Nikolai	X	X	X	A			
Takotna	X	X					
Upper Tanana							
Dot Lake			X	A			
Eagle				A		A	
Healy Lake							
Northway				A			
Tanacross				A			
Tetlin				A			
Yukon Flats							
Arctic Village	X						
Beaver	X			A		A	
Birch Creek							
Chalkyitsik							
Circle							
Fort Yukon	X	X	X	A			
Venetie	X			A			
Yukon Koyukuk							
Galena	X		X	A			
Huslia	X			A		A	X
Kaltag	X	X	X	A	A	A	P
Koyukuk	X	X	X		A	A	X
Nulato	X			A	X	A	X
Ruby	X		X	A	A	A	P
Yukon Tanana							
Alatna	X	X					
Allakaket	X	X		A		A	P
Evansville							

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]	Village-wide EE Lighting	LED Street Lighting	School EE Audit[2]	Health Clinic EE	Sanitation EE Audit	Sanitation EE Retrofits
Hughes	X	X	X		A		P
Manley Hot Springs							
Minto	X		X		A	A	P
Nenana				A	X	A	X
Rampart						A	
Stevens Village	X	X					
Tanana	X		X	A			
Doyon Region	**21**	**11**	**13**	**22**	**8**	**14**	**12**

Notes: X=Completed, A=Audit, P=Planned or in Progress. 1/ Includes participation in VEUEM (2005-2010), EECBG (2010-2012) and VEEP (2010-2014). 2/ Information on completed retrofits not available. Sources: (Alaska Energy Authority, 2013), (Dixon, ANTHC, Water System Audits, 2014)

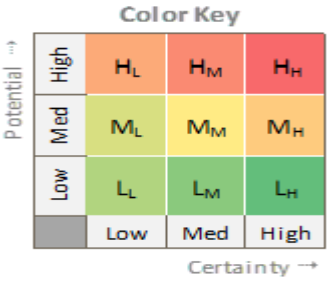
Northway Community Energy Action Plan (CEAP)

With the support of AEA, TCC is piloting a new community energy efficiency model. The Northway Community Energy Action Plan (CEAP) is a collaborative effort between Tanana Chiefs Conference, Intelligent Energy Systems (IES), and the village of Northway. IES and Northway will complete house-to-house surveys and discuss individual heating and electrical use with village residents. The Environmental Coordinator for Northway Village Council has secured a grant to purchase LED lighting for residents in the community. Northway residents will also be able to swap-out aging appliances in their homes with newer, more energy efficient models. Through a partnership with the U.S. Army, the village council will receive kitchen appliances such as refrigerators and freezers that are less than 10 years old and more efficient. The Environmental Coordinator will work with AP&T and residents to track energy use before and after the change-outs and measure the effect on individual residential electric bills and the village electric load.

3 | Resource Potential & Savings Potential

Energy Resource Potential

Phase I of the Regional Energy Planning process included an inventory of potential energy resources in the Interior 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 potential for additional energy savings from *new*, *community-scale* projects based on the best available information (i.e. projects that are already in operation or under development are not counted). 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 means that no reconnaissance or other resource assessment has been performed. See Appendix B for a detailed description of the criteria used in the analysis.



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

Table 13 shows the results of this assessment for 39 communities in the Interior Energy Region. Regionwide, the potential for new, community-scale projects is generally greatest for energy efficiency, biomass, heat recovery, and solar energy. There is medium to high potential for new hydroelectric projects in much of the Upper Tanana subregion.

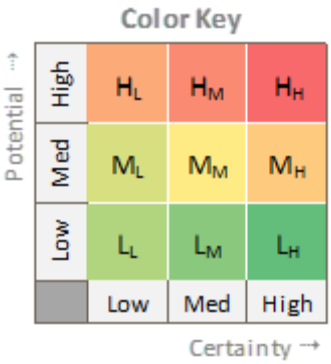
Table 13: Energy resource potential and certainty for community-scale projects

	McGrath	Nikolai	Takotna	Telida	Anvik	Grayling	Holy Cross	Shageluk	Dot Lake	Eagle	Healy Lake	Northway	Tanacross	Tetlin	Tok
Biomass	H	H	H	H	M	L	M	L	M	M	H	L	M	M	M
Geothermal	L	L	L	L	L	L	L	L	L	L	L	L	L	L	L
Hydro	L	L	L	L	L	L	L	L	H	M	M	L	H	H	H
Solar	H	H	H	H	H	H	H	H	H	H	H	H	H	H	H
Wind	L	L	L	L	L	L	L	L	M	L	L	L	M	M	M
Coal	L	L	L	L	L	L	L	L	L	L	L	L	L	L	L
Oil & Gas	L	L	L	L	L	L	L	L	L	L	L	L	L	L	L
Heat Recovery	L	M	M	M	H	H	H	L	L	L	L	M	L	L	M
Energy Efficiency	H	M	H	M	H	M	M	H	M	H	H	H	H	H	H
	Kuskokwim				Lower Yukon				Upper Tanana						

Table 14: Energy resource potential and certainty for community-scale projects (continued)

	Arctic Village	Beaver	Birch Creek	Central	Chalkyitsik	Circle	Fort Yukon	Venetie	Galena	Huslia	Kaltag	Koyukuk	Nulato	Ruby
Biomass	L	M	H	M	H	M	H	H	H	H	M	M	M	M
Geothermal	L	L	L	L	L	L	L	L	L	L	L	L	L	L
Hydro	M	L	L	M	L	L	L	L	L	L	L	L	L	M
Solar	H	H	H	H	H	H	H	H	H	H	H	H	H	H
Wind	L	L	L	L	L	L	L	L	L	L	L	L	L	L
Coal	L	L	L	L	L	L	L	L	L	M	M	M	M	M
Oil & Gas	L	L	L	L	L	L	L	L	L	L	L	L	L	L
Heat Recovery	L	L	M	H	L	M	L	L	H	L	H	H	L	L
Energy Efficiency	M	M	M	H	H	M	H	M	H	M	M	M	M	H
	Yukon Flats								Yukon Koyukuk					

	Alatna	Allakaket	Bettles/Evansville	Hughes	Manley Hot Springs	Minto	Nenana	Rampart	Stevens Village	Tanana
Biomass	L	L	M	H	L	H	M	M	L	M
Geothermal	L	L	L	L	M	L	L	L	L	L
Hydro	L	L	L	M	L	M	L	M	L	M
Solar	H	H	H	H	H	H	M	H	H	H
Wind	L	L	L	L	L	L	M	L	L	M
Coal	L	L	L	L	L	L	M	M	L	L
Oil & Gas	L	L	L	L	L	L	L	L	L	L
Heat Recovery	L	L	H	H	M	H	L	M	M	M
Energy Efficiency	M	M	H	M	H	M	H	H	M	H
	Yukon Tanana									



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

Notes: Letters refer to resource potential: High (H), Medium (M), Low (L). Color indicates both potential and certainty (see color key). See Appendix B for an explanation of the criteria used in assessing resource potential.

SAVINGS POTENTIAL FROM INCREASED DIESEL EFFICIENCY

Figure 16 in **Chapter 2** shows recent diesel efficiency performance for the region's public utilities. While it appears that diesel efficiency in the region is in the ballpark for many utilities, there is room for improvement especially among small, independently-operated utilities. If utilities below the AEA benchmarks improved system efficiency enough to meet them, they would save an average of $0.05/kWh in avoided fuel costs (Table 15). Collectively, these 14 utilities would save 117,600 gallons of fuel oil annually—or $519,000 per year at 2014 fuel prices. Additional savings are available if all utilities improve diesel efficiency from where they are at now. A 10 percent increase in efficiency across the region would reduce regional diesel consumption by nearly 248,000 gallons annually, saving over $1.0 million per year in avoided fuel costs (Table 15, bottom). Note: These savings estimates are based solely on 2014 data. They do not project future generation or fuel costs to estimate savings over time.

Table 15: Savings from increasing diesel efficiency

FY2014 Diesel Use & Efficiency			Savings from Increase to Benchmark Efficiency				
Power Plants (Grouped by Utility)	Diesel Fuel Used for Generation (gals.)	FY2014 Diesel Efficiency (kWh/gal.)	Increase to Benchmark Efficiency (kWh/gal.)	New Fuel Use (gals.)	Annual Fuel Savings (gals.)	Annual Savings ($)	Savings per KWh
Bettles/Evansville	46,928	11.7	12.5	43,779	3,149	$ 13,981	$ 0.03
AP&T	**46,928**			**43,779**	**3,149**	**$ 13,981**	$ **0.03**
Anvik	33,651	12.2	12.5	32,940	711	$ 2,814	$ 0.01
Shageluk	30,720	12.4	12.5	30,574	146	$ 538	$ 0.00
AVEC	**64,371**			**366,349**	**36,635**	**$ 137,115**	**$ 0.03**
Manley Hot Springs	40,739	10.8	12.5	35,206	5,533	$ 20,803	$ 0.05
TDX	**40,739**			**35,206**	**5,533**	**$ 20,803**	$ **0.05**
Arctic Village	46,085	12.1	12.5	44,451	1,634	$ 10,539	$ 0.02
Beaver	38,912	6.7	12.5	20,937	17,975	$ 86,280	$ 0.33
Central	46,533	11.7	12.5	43,646	2,887	$ 10,076	$ 0.02
Chalkyitsik	26,533	10.8	12.5	23,014	3,519	$ 19,392	$ 0.07
Circle	36,439	10.9	12.5	31,840	4,599	$ 16,878	$ 0.04
Galena	447,148	13.1	14.5	403,653	43,495	$ 159,628	$ 0.03
Koyukuk	31,073	9.2	12.5	22,971	8,102	$ 33,544	$ 0.12
Nikolai	39,668	10.7	12.5	33,803	5,865	$ 36,012	$ 0.09
Takotna	15,911	9.3	12.5	11,880	4,031	$ 20,839	$ 0.14
Venetie	71,943	9.7	12.5	56,008	15,935	$ 87,802	$ 0.13
Independent	**800,245**			**692,202**	**108,043**	**$ 480,990**	**$ 0.05**
Total Region	**952,283**			**834,702**	**117,581**	**$ 519,126**	**$ 0.05**

Data source: (Alaska Energy Authority, 2015)

FY2014 Diesel Use & Efficiency			Savings from 10% Increase in Diesel Efficiency				
Power Plants (Grouped by Utility)	Diesel Fuel Used for Generation (gals.)	FY 2014 Diesel Efficiency (kWh/gal.)	10% increase in efficiency (kWh/gal.)	New Fuel Use (gals.)	Annual Fuel Savings (gals.)	Annual Savings ($)	Savings per KWh
Alatna/Allakaket	55,745	12.6	13.9	50,677	5,068	$ 30,305	$ 0.04
Bettles/Evansville	46,928	11.7	12.8	42,662	4,266	$ 18,942	$ 0.03
Eagle	51,281	13.5	14.8	46,619	4,662	$ 18,461	$ 0.03
Northway	92,329	13.0	14.3	83,935	8,394	$ 32,819	$ 0.03
Dot Lake/Tanacross/ Tetlin/Tok	657,326	14.5	15.9	597,569	59,757	$ 221,698	$ 0.02
AP&T	**910,965**	**13.9**	**15.3**	**828,150**	**82,815**	**$ 322,225**	**$ 0.03**
Anvik	33,651	12.2	13.5	30,592	3,059	$ 12,114	$ 0.03
Grayling	44,826	13.3	14.6	40,751	4,075	$ 15,241	$ 0.03
Holy Cross	50,543	12.7	13.9	45,948	4,595	$ 16,909	$ 0.03
Huslia	72,329	13.3	14.6	65,754	6,575	$ 25,315	$ 0.03
Kaltag	50,025	14.0	15.4	45,477	4,548	$ 16,599	$ 0.02
Minto	43,585	13.8	15.1	39,623	3,962	$ 14,066	$ 0.02
Nulato	77,305	13.5	14.8	70,277	7,028	$ 26,565	$ 0.03
Shageluk	30,720	12.4	13.7	27,927	2,793	$ 10,305	$ 0.03
AVEC	**402,984**	**13.2**	**14.6**	**366,349**	**36,635**	**$ 137,115**	**$ 0.03**
Manley Hot Springs	40,739	10.8	11.9	37,035	3,704	$ 13,925	$ 0.03
TDX	**40,739**	**10.8**	**11.9**	**37,035**	**3,704**	**$ 13,925**	**$ 0.03**
Arctic Village	46,085	12.1	13.3	41,895	4,190	$ 27,023	$ 0.05
Beaver	38,912	6.7	7.4	35,375	3,537	$ 16,980	$ 0.06
Central	46,533	11.7	12.9	42,303	4,230	$ 14,764	$ 0.03
Chalkyitsik	26,533	10.8	11.9	24,121	2,412	$ 13,291	$ 0.05
Circle	36,439	10.9	12.0	33,126	3,313	$ 12,157	$ 0.03
Fort Yukon	188,090	16.9	18.6	170,991	17,099	$ 100,372	$ 0.03
Galena	447,148	13.1	14.4	406,498	40,650	$ 149,185	$ 0.03
Hughes	22,041	17.8	19.6	20,037	2,004	$ 11,862	$ 0.03
Koyukuk	31,073	9.2	10.2	28,248	2,825	$ 11,695	$ 0.04
McGrath	180,739	14.5	15.9	164,308	16,431	$ 74,596	$ 0.03
Nikolai	39,668	10.7	11.7	36,062	3,606	$ 22,142	$ 0.05
Ruby	53,763	12.7	14.0	48,875	4,888	$ 21,310	$ 0.03
Takotna	15,911	9.3	10.3	14,465	1,446	$ 7,478	$ 0.05
Tanana	85,480	13.2	14.5	77,709	7,771	$ 29,374	$ 0.03
Venetie	71,943	9.7	10.7	65,403	6,540	$ 36,037	$ 0.05
Independent	**1,371,097**	**13.1**	**14.4**	**1,246,452**	**124,645**	**$ 548,264**	**$ 0.03**
Total Region	**2,725,785**			**2,477,986**	**247,799**	**$ 1,021,529**	**$ 0.03**

Savings Potential from Addressing Line Loss

Line loss refers to the percent of electricity 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 from unmetered use. The result is a direct financial loss to the utility and, in the case of diesel generation, the waste of thousands of gallons of diesel fuel each year. Line loss also affects the PCE rate available to a utility; losses above 12 percent reduce the PCE subsidy. In 2014, 12 communities in the Interior Energy Region (shaded in brown in the table below) had a line loss of 12 percent or higher. Another six (shaded in tan) had line losses above 5 percent. Communities including Galena, Circle, and Koyukuk are acutely aware of the financial costs of high line loss rates. Galena has actively worked at lowering line loss through technical assistance and removing unmetered locations. Measurable savings would result from addressing the causes of line loss in all these systems.

Table 16: Line loss by community and subregion

Subregion	Community or Utility	Total kWhs generated	Line loss	kWhs lost	Diesel lost (gals.)
Kuskokwim	McGrath	2,619,660	8%	199,319	13,752
	Nikolai	422,535	14%	58,308	5,474
Lower Yukon	Anvik	411,756	5%	18,563	1,517
	Grayling	595,532	4%	23,889	1,798
	Holy Cross	639,857	4%	26,167	2,067
	Shageluk	382,178	5%	20,004	1,608
Upper Tanana	Tok/Tanacross/Tetlin	9,449,440	16%	1,558,191	107,821
	Eagle	691,440	12%	80,083	5,939
	Northway	1,200,000	8%	93,651	7,206
Yukon Flats	Arctic Village	555,638	19%	107,202	8,891
	Beaver	261,712	5%	11,895	1,769
	Central	545,574	15%	83,488	7,121
	Circle	398,000	14%	55,061	5,041
	Fort Yukon	3,187,282	19%	608,442	35,906
	Venetie	700,100	20%	142,428	14,636
Yukon Koyukuk	Galena	5,852,965	23%	1,343,455	102,636
	Huslia	960,306	2%	18,058	1,360
	Kaltag	702,302	5%	34,805	2,479
	Koyukuk	287,133	17%	49,407	5,347
	Nulato	1,043,128	5%	56,101	4,158
	Ruby	684,313	17%	119,167	9,362
Yukon Tanana	Alatna/Allakaket	704,448	6%	40,580	3,211
	Bettles/Evansville	547,238	9%	47,817	4,101
	Hughes	393,248	11%	45,126	2,529
	Manley Hot Springs	440,077	12%	53,313	4,935
	Minto	599,890	4%	23,957	1,741
	Tanana	1,129,254	7%	76,698	5,806

Data source: (Alaska Energy Authority, 2015)

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

Meter Upgrades

Another factor contributing to line loss is old and outdated metering infrastructure. All communities served by AVEC have recently converted electrical meters to the newer Elster Meter that can be read remotely. Communities served by AP&T have upgraded to a "turtle system" that allows for remote metering. An advantage of these newer meters is that they are able to populate PCE reports and billing ledgers at a specific point in time to make sure that all metering happens at the same time.

Many communities with independent utilities have installed "Ampy Meters" on residential buildings, though they are still physically reading the older meters. This can create a problem when residential and commercial meters are read over a span of several days. When the measurement is then taken at the powerhouse for total kWhs consumed, the difference between when the meters were read and when the totalizer on the power plant was read is documented as "line loss" on PCE forms. This is because line loss is simply the difference between kWh generated and kWh sold. Meter reading issues can also arise when there is high turnover in utility clerks—a common occurrence in communities with small independent utilities.

Investing in updated meters with remote access should be a priority for the region. High priority communities include Takotna, McGrath, Koyukuk, Galena, Ruby, Hughes, Rampart, Circle, Beaver and Fort Yukon. Medium priority communities that have a mix of Ampy and older meters are Arctic Village, Venetie, Stevens Village, Chalkyitsik, and Nikolai.

Savings Potential from Expanding PCE Use

The Power Cost Equalization Program subsidizes electric rates of residents as well as eligible 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 that is not operated for profit, is open to the general public, and whose operation is not paid for by the state or federal government or by a private commercial organization. AEA determines eligible community facilities based on applications submitted by the facility owner and utility provider.

As with the residential PCE program, there are monthly limits on the amount of electricity subsidized for eligible community facilities. This limit is based on the number of residents in a community and is set at 70 kWh per resident per month. In a community with 100 residents, the total community facility electrical use eligible for PCE cost reductions is equal to 7,000 kWh per month, spread across all eligible community facilities.

Very few communities in the region are close to reaching this limit, so a significant opportunity exists for communities to save on electric bills for public facilities and buildings (Table 17). Reasons communities in rural Alaska typically do not take full advantage of this subsidy include: turnover in utility management, lack of training, lack of coordination between community facility owners and utilities, lengthy processing time for applications, and rejection notices that do not provide information on why an application was rejected.

The Council of Athabascan Tribal Governments' clinic in Fort Yukon recently enrolled in the PCE program, saving over $80,000 dollars in electricity costs per year. This included retroactive credit of the same amount for electricity payments made when the clinic was not enrolled in the program.

Table 17: Savings Potential for Community Facilities through PCE

Subregion	Community	PCE kWh per person Eligible	PCE kWh per person Used	PCE Savings Potential
Kuskokwim	McGrath	70	59	1 to 5 buildings
	Nikolai	70	61	1 to 5 buildings
	Takotna	70	40	1 to 5 buildings
Lower Yukon	Anvik	70	17	1 to 5 buildings
	Grayling	70	61	1 to 5 buildings
	Holy Cross	70	55	1 to 5 buildings
	Shageluk	70	65	1 to 5 buildings
Upper Tanana	Dot Lake	70	1	5+ buildings
	Eagle	70	5	10+ buildings
	Northway	70	37	1 to 5 buildings
	Tok; Tanacross	70	5	10+ buildings
	Tetlin	70	46	1 to 5 buildings
	Arctic Village	70	11	5+ buildings
Yukon Flats	Beaver	70	0	10+ buildings
	Central	70	4	10+ buildings
	Chalkyitsik	70	0	1 to 5 buildings
	Circle	70	3	10+ buildings
	Fort Yukon	70	26	10+ buildings
	Venetie	70	29	5+ buildings
Yukon Koyukuk	Galena	70	63	1 to 5 buildings
	Huslia	70	32	10+ buildings
	Kaltag	70	17	10+ buildings
	Koyukuk	70	21	5+ buildings
	Nulato	70	55	1 to 5 buildings
	Ruby	70	32	10+ buildings
Yukon Tanana	Alatna/Allakaket	70	17	10+ buildings
	Bettles/Evansville	70	70	At/Near Max
	Hughes	70	65	At/Near Max
	Manley Hot Springs	70	6	10+ buildings
	Minto	70	48	1 to 5 buildings
	Tanana	70	55	1 to 5 buildings

Legend	
	High Savings Potential (5+ buildings)
	Medium Savings Potential (1 - 5 buildings)
	Limited savings potential (at or near max)

Data source: (Alaska Energy Authority, 2015)

A related issue is the disparity in utilities' effectiveness in taking full advantage of the PCE program. PCE records show the average cost of power in an AVEC or AP&T community is $0.21/kWh with the PCE subsidy, while the average cost of power for a residential customer of an independent utility is $0.35/kWh – 66 percent higher. Some small independent utilities such as Koyukuk charge more than $0.50/kWh after the PCE subsidy. Residents on the Koyukuk grid pay 162 percent more for their first 500 kWh each month than the average resident in a comparably sized village that is a member of AVEC. There is an opportunity to reduce this disparity with reviews of existing rate structures and additional training for independent utilities.

SAVINGS POTENTIAL FROM INCREASED ENERGY EFFICIENCY

Residential Energy Efficiency

Only half of occupied homes in the region have participated in one of the state-funded residential energy efficiency programs since 2008 or been certified as meeting the BEES energy efficient building standard (see Table 11).

Table 18: 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 ($)	Remaining Residential EE&C Opportunity	Annual Energy Savings (MMBTU)	Annual Diesel Savings (Gallons)	Annual Fuel Cost Savings ($)
Lower Yukon	11,755	84,402	$ 544,906	23%	3,140	22,547	$ 150,080
Kuskokwim	9,196	66,024	$ 503,569	54%	7,996	57,413	$ 429,707
Upper Tanana	17,753	127,464	$ 578,989	72%	50,638	363,581	$ 1,646,745
Yukon Flats	27,966	200,796	$ 1,537,300	45%	21,002	150,794	$ 942,596
Yukon Koyukuk	31,284	224,619	$ 1,394,347	35%	15,104	108,448	$ 684,595
Yukon Tanana	31,238	224,289	$ 1,309,796	40%	19,474	139,825	$ 766,928
Doyon Region outside FNSB	**129,191**	**927,595**	**$ 5,868,907**	**49%**	**117,355**	**842,607**	**$ 4,620,651**

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.

Non-residential Energy Efficiency

PUBLIC FACILITY AND COMMERCIAL ENERGY AUDITS

The savings from energy efficiency and conservation changes in non-residential buildings are 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 19).

Many of the region's schools, clinics, and other community buildings been audited through AHFC's commercial energy audit program or with other funding (Table 12). 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 limited information on which EE upgrades have been done.

Privately-owned buildings are eligible for whole-building energy audits through AEA's Commercial Building Energy Audit (CBEA) program. Like the public building audits performed by AHFC, the CBEA program covers the cost of the audit (up to a limit based upon the size and

type of building), but does not pay for retrofits. Results from participants indicate average energy savings of roughly one-third as a result of energy efficiency investments.

Though most private commercial building audits are done in urban areas of Alaska, some have been completed in rural Interior communities. As with school audits, the lack of funding to pay for retrofits themselves has meant that a minority of audits are followed up by upgrades, even though the upgrades would pay for themselves in an average of just over six years.

Table 19: 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: (Waterman, 2014)

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 $1,000 and nearly 4,500 kWh per building per year, based on data from seven communities (At least eight Interior Energy Region communities have replaced street lights with LED lighting. These communities are saving an average of $4,500 per year after a one-time investment averaging $35,000. The installed cost per capita ranges from only $119 to $536. If not grant-funded, the projects would have a 6.5-year simple payback. Collectively, the communities are saving over 100,000 kWh of electricity annually (Table 21). There is an opportunity for other communities to realize similar savings from investing in energy efficient lighting projects.

Table 20). Lighting upgrades generally have shorter payback periods than other building efficiency measures identified in energy audits, making them smart investments even without the incentive of grant funding.

At least eight Interior Energy Region communities have replaced street lights with LED lighting. These communities are saving an average of $4,500 per year after a one-time investment averaging $35,000. The installed cost per capita ranges from only $119 to $536. If not grant-funded, the projects would have a 6.5-year simple payback. Collectively, the communities are saving over 100,000 kWh of electricity annually (Table 21). There is an opportunity for other communities to realize similar savings from investing in energy efficient lighting projects.

Table 20: Savings from Energy Efficient Lighting Upgrades in seven Interior communities

	One-time Investment	Annual Savings	Annual Electricity Saved (kWh)	Average Simple Payback Period
Average per community	$28,314	$4,091	16,727	
Average per Building	$6,973	$1,007	4,452	6.9 years
Total	**$198,197**	**$28,636**	**117,088**	

Source: Based on lighting upgrades completed with VEEP and EECGB grants through 2013 in Beaver, Fort Yukon, Holy Cross, Kaltag, Koyukuk, Nikolai and Shageluk. Data source: (Alaska Energy Authority, 2013).

Table 21: Savings from LED street lighting retrofits in eight Interior communities

	One-time Investment	Annual Savings	Annual Electricity Saved (kWh)	Average Simple Payback Period
Average per Community	$35,350	$5,456	13,360	6.5 years
Total	**$284,237**	**$43,644**	**106,879**	

Source: Based on VEEP and EECBG-funded lighting upgrades completed through 2013 in Fort Yukon, Holy Cross, Hughes, Kaltag, McGrath, Nikolai, Ruby and Shageluk. Data source: (Alaska Energy Authority, 2013)

WATER AND SEWER

Alaska Native Tribal Health Consortium (ANTHC) has performed energy audits of sanitation systems in at least ten communities in the Interior Energy 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 (Dixon et al. 2013). Table 22 shows estimated cost savings from EE upgrades based on analysis of over 50 rural communities in Interior, Southwest, and Western Alaska. To date, sanitation system retrofits have been completed in four Interior communities and are in progress or being planned in at least five other communities (Table 22).

Table 22: Potential savings from sanitation system energy efficiency

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

Data source: (Dixon, 2014)

NATURAL GAS

While no criteria were defined for gas line potential as part of the regional energy planning process, the potential for new natural gas supply lines depends on identifying a reliable and affordable long-term supply of natural gas. In the Interior Energy Region, this could result from new exploration and development within the region, a North Slope natural gas pipeline with shipping by truck or railroad to Fairbanks and surrounding road-system communities, or by shipping and trucking to Fairbanks and surrounding communities directly from the North Slope. Until a long-term supply is identified, it is difficult to predict when or where work will start on securing transportation and needed infrastructure for natural gas use.

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 Interior region, these goals were met through a variety of activities:

- Kick-off meeting
- Subregional energy meetings
- Presentations via teleconference to Tribal Councils and TCC Subregional Teleconferences
- Interviews with community representatives
- TCC Regional Planning Summit

Phase II Interior Energy Plan Kick-Off Meeting

The Interior Energy Plan Kickoff Meeting was held on March 18, 2015 as part of the TCC Annual Convention in Fairbanks, Alaska. At the meeting, the goals of the energy planning process were discussed along with the specific types of information that would be gathered from Interior communities. The meeting wrapped up with a visioning session. The energy platform concept was outlined to show the impact of energy on multiple aspects of community life including housing, water and sewer, landfill, power, and transportation. Participants were then asked to write down one concept that answers the following question – What three words (or phrases) best describe how you see the energy platform in the Interior region in 20 years? The group then brainstormed a vision statement using the concepts from the exercise. The Interior Energy vision statement decided on at the meeting is:

"Well managed and cooperatively-maintained low cost, self-sustaining energy for current and future generations."

Subregional Energy Meetings

Members of the planning team visited the six subregional hub communities in the region. The meetings were set in consultation with community members from most communities in each subregion. The goal of these meetings was to discuss energy issues and priorities and get input on community-level projects and goals. Teleconference lines were set up for meetings at which community members specifically requested to attend via teleconference rather than in person.

Table 23: Subregional energy meetings

Dates/Location	Subregion	Groups and Communities Represented	Activities
April 21, 2015 Fort Yukon	Yukon Flats	City of Fort Yukon, Chalkyitsik, Central, Venetie, Yukon Flats School District, ANTHC	▪ Overview of AEA regional energy planning process ▪ TCC role in energy planning ▪ Participation in PCE program, focus on enrolling community facilities ▪ Discussion of community profiles ▪ Input on community and energy profiles - corrections, energy projects, and plans ▪ Discussion of planning outreach methodology and community profiles ▪ Plan for next steps, how these profiles and plan will be used at the community, regional, and state levels * AP&T presented on Upper Tanana renewable energy projects and plans at Tok meeting.
June 5, 2015 Tok*	Upper Tanana	Native Village of Eagle, Healy Lake, Northway, Tanacross, Tanacross Inc, Tetlin, Tok, AP&T	
June 11, 2015 Galena	Yukon Koyukuk	Native Village of Nulato, City and Village of Ruby, Dineega Corporation, City of Galena, Louden Tribal Council, Galena City School District, City and Village of Koyukuk, Gana'Yoo Limited, ANTHC	
June 15, 2015 McGrath	Kuskokwim	City and Native Village of McGrath, MTNT, McGrath Light & Power, Iditarod Area School District	
June 16, 2015 Holy Cross	Lower Yukon	Holy Cross City & Tribe	
June 18, 2015 Fairbanks	Yukon Tanana	Alatna, Hughes, Evansville Tribal Council, Native Village of Manley Hot Springs, Fairbanks Native Assoc., CCHRC, Native Village of Minto, Native Village of Tanana, Native Village of Nenana, Toghotthele, Inc., K'Oyitl'Ots'Ina Limited, Native Village of Rampart, GVEA, AP&T, AVEC, Tanana Power Co., ANTHC	

See **Appendix A** for a list of meeting participants.

School Presentation

On April 21, 2015 before the subregional energy meeting, the energy planning team presented energy avenger skits for elementary age children at the Fort Yukon School. The skits are age-appropriate education sessions on energy sources and energy use, encouraging responsibility and interest in the youngest community members. Team members also provided information to teachers on the AK Energy Smart energy efficiency curriculum for use in K-12 classrooms in Alaska.

Presentations via Teleconference

To raise awareness of the project among tribal leadership, the project team arranged short presentations via teleconfence for Tribal Council meetings and TCC's subregional teleconference

meetings. The project team was able to call into Tribal Council meetings in Arctic Village and Chalkyitsik. The team also presented on TCC's subregional teleconference for the Yukon Koyukuk and Yukon Tanana subregions. For both types of calls, the purpose was to inform community and subregional leadership about the planning process and identify dates for meetings, and community contacts for additional data collection.

Interviews with Regional and Community Stakeholders

Phone interviews were conducted with multiple communities in the Yukon Flats, Yukon Koyukuk, Yukon Tanana, and Upper Tanana subregions. When interviews were not possible, every effort was made to communicate via email or fax to identify profile corrections, active energy projects, and planned energy projects.

TCC Planning Summit

TCC's Village Planning and Development Department, identifying multiple planning efforts across the Interior region, organized a planning summit on July 7, 2015. This was a follow-on meeting to the TCC Centennial Celebration, a celebration of the first hundred years of TCC history. The meeting addressed planning efforts in housing, transportation, energy, and community and economic development strategies. Presentation were made by TCC planners on transportation, energy, and economic development. TCC and IRHA specialists did a joint presentation on housing resources and planning. The meeting was well-attended with tribal representatives from all subregions and approximately 42 tribal entities. The planning summit was designed to solicit feedback from each community on the direction of these plans and to bring them up to speed on progress to date. During the summit each plan was explained in detail to delegates and then delegates broke into subregional groups with facilitators to solicit feedback.

All input and feedback received through these community outreach activities have been incorporated into this document as well as the community and energy profiles.

5 | Energy Priorities & Needs

In addition to a snapshot of energy projects in the region, the outreach effort also enabled planners to identify specific priorities and needs that are not yet part of active projects (Table 24). These came out of energy meetings, interviews, community plans, and community visits as part of TCC's rural energy work. The timeframes shown indicate a best guess for project timing given available resources, readiness of the technology, 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 24: Energy needs & priorities identified by Interior region stakeholders

Organization	Subregion	Timing	Priority
Planning			
Fort Yukon	Yukon Flats	Ongoing	Interest in applying for 40 hours of DOE technical assistance
NV of Tanana	Yukon Tanana	Ongoing	Interest in applying for 40 hours of DOE technical assistance; wants to see subregional vision for energy
Utility Management/Training			
Eagle	Upper Tanana	Short	"Turtle meters" that allow for remote monitoring of electrical usage are likely recording kWhs sent BACK into the electric grid as charges to the customer – this may need to be corrected
Dot Lake, Eagle, Tanacross, Tetlin, Tok	Upper Tanana	Short	Strong potential to add more community facilities to the PCE program
Northway	Upper Tanana	Short	Additional community facilities eligible for coverage under PCE. An application was submitted in early 2015 and no response received.
Arctic Village,	Yukon Flats	Short	Flat rate on school's electricity usage needs to be re-negotiated to reflect usage rates
Arctic Village, Venetie	Yukon Flats	Short	Utility clerk needs training; frequent turnover in management serious need to ensure continuity
Arctic Village, Central, Venetie	Yukon Flats	Short	Strong potential to add more community facilities to the PCE program
Beaver, Chalkyitsik, Circle	Yukon Flats	Short	Additional community facilities eligible for coverage under PCE. Applications were submitted to AEA in 2014 and early 2015 and no response received.
Galena	Yukon Koyukuk	Short	Smart meters on residential buildings - to allow remote monitoring by utility of use
Huslia, Kaltag, Koyukuk, Ruby	Yukon Koyukuk	Short	Strong potential to add more community facilities to the PCE program
Alatna, Allakaket, Manley, Minto, Tanana	Yukon Tanana	Short	Strong potential to add more community facilities to the PCE program
Tanana	Yukon Tanana	Short	Additional operator training on diesel powerhouse and alternative energy systems
Biomass			
Holy Cross	Lower Yukon	Medium	Interest in pursuing community-scale biomass project

Organization	Subregion	Timing	Priority
Nikolai	Kuskokwim	Medium	NV of Nikolai is very interested in a biomass project with the city and school district.
Eagle	Upper Tanana	Short	Install biomass heating systems in new buildings - both for community and residential buildings. Apply for pre-feasibility study.
Tetlin	Upper Tanana	Short	Significant interest in continuing with biomass for washeteria, community hall, water plant. Need to coordinate future interest in garn, pellets, chips and take advantage of biomass (village corporation owns land rights in/outside Tetlin.
Tetlin	Upper Tanana	Short	Secure supply of heating fuel in winter whether diesel or biomass (note that Northern Energy not able to deliver diesel in winter due to condition of road).
Tetlin, Tok	Upper Tanana	Short	Interest in EPA wood stove change out
Fort Yukon	Yukon Tanana	Medium	Develop new logging area for stockpiling wood
Fort Yukon	Yukon Tanana	Medium	Waste burner to heat building at landfill site
Galena	Yukon Koyukuk	Medium	Biomass steam plant corridor upgrade
Ruby	Yukon Koyukuk	Short	Interest in wood stove change out program for homes
Evansville/Bettles	Yukon Tanana	Medium	Interest in Bettles wood pellet production
Nenana	Yukon Tanana	Medium	Interest in study on District heating serving school, city and tribe buildings; looking at a system similar to what Mentasta has may be an option
Geothermal			
Northway	Upper Tanana	Long	Geothermal reconnaissance
Manley Hot Springs	Yukon-Tanana	Long	Geothermal reconnaissance
Hydro			
McGrath	Kuskokwim	Medium	Interest in run of river hydroelectric
Alatna, Allakaket, Evansville, Bettles	Yukon Tanana	Long	Micro hydro; start with USGS study showing 75 to 100 kW potential
Nenana	Yukon Tanana	Medium	City and Tribe continue to support river turbine project
Tanana	Yukon Tanana	Long	Hydro project on Jackson Creek
Rampart	Yukon Tanana	Medium	Hydro Project on Minook or Hunter Creek
Tanacross	Upper Tanana	Short	Yerrick Creek is applying for funding to start construction
Solar			
Anvik, Grayling, Holy Cross, Shageluk	Lower Yukon	Short	Add solar PV to homes and community buildings
McGrath, Nikolai, Takotna	Kuskokwim	Short	Interest in adding solar PV to homes and buildings
AP&T	Upper Tanana	Medium	Utility scale solar project for AP&T grid(s) in Upper Tanana
Dot Lake	Upper Tanana	Short	Add solar PV to homes and community buildings
Healy Lake	Upper Tanana	Short	Installing a solar PV - diesel hybrid system with battery storage to serve small electricity demand
Northway	Upper Tanana	Short	Solar PV for community hall addition
Northway	Upper Tanana	Short	Identify location and funds for solar farm with utilities and landowners – look at opportunity for joint venture with AP&T
Tanacross	Upper Tanana	Short	Add solar PV panels to community buildings and homes
Birch Creek	Yukon Flats	Short	Installing a solar PV-diesel hybrid system with battery storage to serve small electric demand
Circle	Yukon Flats	Short	Utility scale solar, Investigate feasibility - cost and system stability

Organization	Subregion	Timing	Priority
Fort Yukon	Yukon Flats	Short	Install solar panels on RCC building;
Galena	Yukon Koyukuk	Short	Interest in a larger community based solar PV system
Huslia	Yukon Koyukuk	Short	Interest in solar PV on community buildings and residences
Nulato	Yukon Koyukuk	Short	Interest in solar PV on community buildings
Ruby	Yukon Koyukuk	Short	Interested in adding more solar PV at residential level to offset electrical production
Allakaket	Yukon Tanana	Short	Looking at adding solar PV array onto clinic and potential partnership with APT
Evansville/Bettles	Yukon Tanana	Short	Interest in additional solar PV for homes and potential partnership with APT
Hughes	Yukon Tanana	Medium	Interest in adding solar PV to the grid
Minto	Yukon Tanana	Medium	Seth-De-Ya-Ah Corporation and Tribe interested in solar PV; AVEC investigating land/site options
Rampart	Yukon Tanana	Short	Interest in solar PV on community buildings and residences
Stevens Village	Yukon Tanana	Short	Interest in solar PV on community buildings and residences to offset fuel consumption
Wind			
Holy Cross	Lower Yukon	Medium	Interest in installing an anemometer to determine wind resource
Native Village of Eagle	Upper Tanana	Medium	Interest in wind power/installing met tower
Minto	Yukon Tanana	Medium	Interest in taking another look at wind – the goal is to install an anemometer in a different location
Tanana	Yukon Tanana	Medium	Wind energy assessments on Mission Hill
Energy Efficiency & Conservation			
Anvik, Grayling, Holy Cross, Shageluk	Lower Yukon	Short	Energy audits, energy efficiency, upgrades, awareness and education, and upgrade schools
McGrath, Nikolai, Takotna	Kuskokwim	Short	IASD very interested in increasing energy efficiency of school buildings
Eagle	Upper Tanana	Medium	New buildings and home built after flood are not energy efficient and have different heating systems, making maintenance and up keep very difficult.
Northway	Upper Tanana	Medium	Invite representatives from CCHRC, UAF Interior Aleutians Campus, IRHA, TCC Housing Department, etc. to give community wide presentations on basic home maintenance and repair, weatherization, toyo stove repair, fire safety, emergency preparedness, etc.
Tanacross	Upper Tanana	Short	Energy efficiency audits and upgrades of homes and commercial buildings
Tetlin	Upper Tanana	Short	Energy efficiency on tribal buildings; increase in residential weatherization
Arctic Village	Yukon Flats	Short	Install smart meter at the school so conservation & efficiency can be encouraged
Chalkyitsik	Yukon Flats	Short	Retrofitting street lights with LED bulbs
Circle	Yukon Flats	Short	Energy efficiency public housing through rehab and new construction; EE upgrade/retrofits of washeteria to reduce electricity usage; Efficient and cost effective water system, considering holding tanks
Fort Yukon	Yukon Flats	Medium	Cost effective heating & lighting systems for school
Koyukuk	Yukon Koyukuk	Short	More energy efficiency upgrades for buildings, including clinic; Address retrofits for street lights

Organization	Subregion	Timing	Priority
Ruby	Yukon Koyukuk	Short	Additional weatherization on homes, doors and windows; Continue street light retrofits previous trouble with LED retrofits
Alatna	Yukon Tanana	Short	Energy efficiency upgrades in public buildings and weatherization in homes; LED retrofit for street lights
Allakaket	Yukon Tanana	Short	LED retrofit for street lights; Energy efficiency education and awareness
Evansville/Bettles	Yukon Tanana	Short	Install LED lighting for community buildings and street lights
Manley Hot Springs	Yukon Tanana	Short	Additional weatherization on homes
Nenana	Yukon Tanana	Short	Street lights – 50 HPS street lights/only 18 work, Interest in city for move to LED street lights; More energy audits and retrofits needed on all public buildings and school buildings
Rampart	Yukon Tanana	Short	Need energy audits and retrofits for all buildings; Street lights: 6 of 15 street lights retrofitted to LED in 2011; need to complete retrofits none of the remaining 9 street light bulbs work
Energy Infrastructure (Powerhouses, Transmission lines, Bulk Fuel)			
Takotna	Kuskokwim	Short	Looking for ways to reduce line loss below 11 percent
Arctic Village	Yukon Flats	Medium	Move site of bulk fuel storage from airport to tribal hall - 2-mile distance; High line loss; distribution system needs upgrade
Chalkyitsik	Yukon Flats	Urgent	Of 3 generators one is broken beyond repair and one is in need of technical updates (software updates). Initial request to AEA not completed but Chalkyitsik is one generator from shutdown of utility.
Circle	Yukon Flats	Medium	Additional bulk fuel storage needed; reduce line loss possibly by replacing and re-sizing transformers
Venetie	Yukon Flats	Medium	Need additional fuel storage at airport currently, it is old and small; High line loss (condition of transmission lines) needs to be addressed; Generator replacement or rebuild needed; need R&R fund
Galena	Yukon Koyukuk	Short	Powerhouse upgrade and distribution upgrade; Reduce line loss - Looking closely for ways to better monitor their electrical grid and improve fuel efficiency at the power plant
Koyukuk	Yukon Koyukuk	Medium	Currently working on a legislative CIP the city received to complete power plant upgrades to their generation system and their waste heat recovery system; Need to address high line loss & upgrade distribution system
Ruby	Yukon Koyukuk	Short	Address high line loss, need to replace transformers
Hughes	Yukon Tanana	Medium	Need additional storage capacity for bulk fuel; distribution system throughout town is a single phase distribution system, an analysis of upgrading to a 3-phase system may be warranted; Power plant needs to get back online with internet; Secure additional 100 kW generator for power plant
Manley Hot Springs	Yukon Tanana	Short	Install synchronous switchgear for all generators
Rampart	Yukon Tanana	Medium	Grant request for new generator; Replace or stabilize existing power poles to improve the conditions and raise the electrical lines for safety purposes; Rampart school is re-opening in 2015; watch how electrical load and heating fuel needs change
Stevens Village	Yukon Tanana	Medium	Repair of village's powerhouse switchgear and recommissioning of village powerhouse; Partnership with School to utilize un-used bulk fuel tanks for fill ups
Heat Recovery			
Circle	Yukon Flats	Medium	Interest in installing waste heat recovery system and using to heat school and teacher housing

Organization	Subregion	Timing	Priority
Chalkyitsik	Yukon Flats	Medium	Generators are very close to school; strong interest in setting up heat recovery for school and nearby buildings
Koyukuk	Yukon Koyukuk	Short	Add BTU meter to track and bill for recovered heat used by school
Allakaket	Yukon Tanana	Medium	Interest in expanding heat recovery to new clinic
Transmission			
AP&T	Upper Tanana	Long	Intertie to CVEA or GVEA from Tok grid to increase economy of scale and reduce costs for consumers; intertie from Northway to Tok grid
Allakaket, Alatna, Bettles/Evansville	Yukon Tanana	Long	Intertie to/from Bettles to Allakaket
Manley Hot Springs	Yukon Tanana	Medium	Tribal building hooked up to TDX powerhouse distribution lines in 2013. Result has been significant drop in electricity bills. Additional electrical lines needed to connect existing homes and to Corporation land for planned housing sites.
Oil & Gas			
AP&T	Upper Tanana	On-going	Monitor viability of trucking LNG
Nenana – NV, City, Toghotthele Corp.	Yukon Tanana	On-going	Support and regularly contact oil and gas producers about Nenana Basin oil and gas development
Transportation			
McGrath	Kuskokwim	Medium	NV passed resolution at TCC convention to try to help them find funding to expand the road from Ruby to McGrath
Fort Yukon	Yukon Flats	Medium	Turn winter trail into winter-road between Fort Yukon and Circle for transportation of fuel and supplies in winter months
Alatna, Allakaket, Bettles/Evansville	Yukon Tanana	Medium	Build bridge between Alatna & Allakaket; Road connection between Alatna/Allkaket to Bettles/Evansville
Rampart	Yukon Tanana	Medium	Complete road from Eureka to Rampart to improve access to resources and decrease the cost of living
Stevens Village	Yukon Tanana	Medium	Repair of village barge landing bulkhead

6 | COMMUNITY AND ENERGY PROFILES

This section contains profiles for communities in the Interior 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 E. 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: Alatna

Incorporation	Unincorporated

Location

Located on the north bank of the Koyukuk river, southwest of its junction with the Alatna River, approximately 190 air miles northwest of Fairbanks and 57 miles upriver from Hughes.

Longitude	-152.6664	**Latitude**	66.5669
ANCSA Region	Doyon, Limited		
Borough/CA	Yukon-Koyukuk Census Area		
School District	Yukon-Koyukuk School District		
AEA Region	Yukon-Koyukuk/Upper Tanana		

Alaska Native Name (definition)

Alaasuq

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

None

Historical Setting / Cultural Resources

Koyukon Athabascans and Kobuk, Selawik, and Nunamiut Eskimos from the north and northwest reside. The various bands established joint settlements after 1851. A flood inundated 85% of the community in spring 1964. In 1975, the community incorporated as a city, including both settlements of Allakaket and Alatna. September 1994, flood waters destroyed most of the community's buildings, homes, and food caches. Residents have rebuilt near the old city site, but Alatna is not within incorporated city boundaries.

Economy

Local government and leisure/hospitality are the only forms of employment.

Climate	**Avg. Temp.**	**Climate Zone**	**Heating Deg. Days**
	19	8	16,625

Natural Hazard Plan	**Year**
Yes	2010

Notes: Emergency response drafted

Energy Priorities and Projects

Fix/expand solar; Biomass heat for community bldgs; EE upgrades in public bldgs & homes; LED street lights; bridge to Allakaket; road to Bettles; intertie to Bettles; microhydro; rebuild washeteria

Community Plans **Year**

Local Contacts	**Email**	**Phone**	**Fax**
Alatna Village	alatnatribe@yahoo.com	968-2261	968-2305
K'oyitl'ots'ina, Limited		452-8119	452-8148
Doyon, Limited	info@doyon.com	459-2000	459-2060

Demographics	**2000**	**2010**		**2013**
Population	35	37	**Percent of Residents Employed**	72.7%
Median Age	26	28	**Denali Commission Distressed Community**	No
Avg. Household Size	3	4	**Percent Alaska Native/American Indian (2010)**	97.3%
Median Household Income	N/A	N/A	**Low and Moderate Income (LMI) Percent (2014)**	N/A

Electric Utility	**Generation Sources**	**Interties**	**PCE?**
Alaska Power & Telephone Company	Interties	Yes	Yes

Landfill	**Class**	None	**Permitted?**	**Location**

Water/Wastewater System	**None**	**Homes Served**	**System Volume**
Water	Hauled from washeteria (inoperable)		
Sewer	Honeybuckets and outhouses	**Energy Audit?**	
Notes		No	

Access

Road	No				
Air Access	No	**Runway**			
Dock/Port	No	**Barge Access?**	No	**Ferry Service?**	No
Notes	Winter trails connect it to Hughes, Bettles, and Tanana. River transportation is important during the summer.				

Energy Profile: Alatna

Diesel Power System

Utility	Alaska Power & Telephone Company		
Engine	**Make/Model**	**Condition/Hrs**	**Gen Capacity**
Unit 1	Not Generating Electricity		
Unit 2	Back-up generators inoperable		
Unit 3			
Unit 4			
Line Loss	5.8%		
Heat Recovery?	No		

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

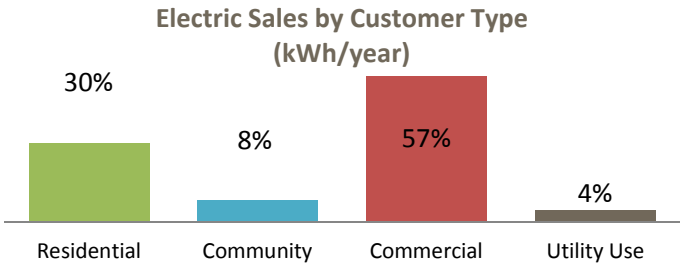
Outage History/Known Issues

Submarine intertie to Allakaket; Data covers both communities

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

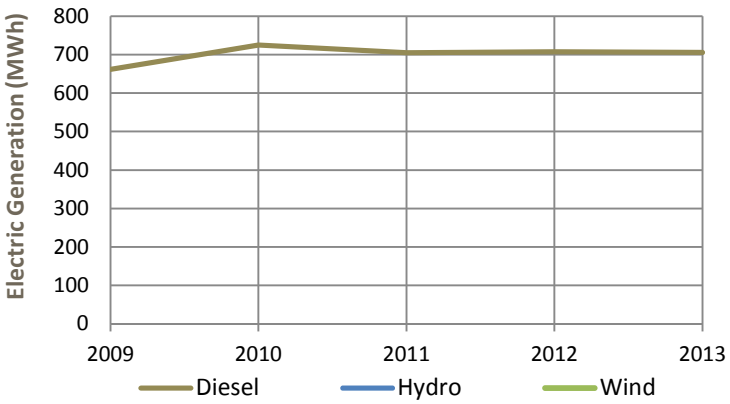
Maintenance Planning (RPSU)	Good

Electric Sales	**No. of Customers**	**kWh/year**	**kWh/Customer**
Residential	68	201,739	2,967
Community	11	55,357	5,032
Commercial	25	378,078	15,123
Utility Use		28,694	



Power Production

Diesel (kWh/yr)	704,448	**Avg. Load (kW)**	12
Wind (kWh/yr)	0	**Peak Load (kW)**	27
Hydro (kWh/yr)	0	**Efficiency (kWh/gal)**	13
Total (kWh/yr)	704,448	**Diesel Used (gals/yr)**	55,745



Electric Rates ($/kWh)		**Cost per kWh Sold ($/kWh)**	
Rate with PCE	$0.24	**Fuel Cost**	$0.53
Residential Rate	$0.91	**Non-fuel Cost**	$0.17
Commercial Rate		**Total Cost**	$0.70

Fuel Prices ($)	**Utility/Wholesale**	**Retail**	**Month/Year**
Diesel (1 gal)	$7.50	$7.00	6-15; 8-14
Other Fuel? (1 gal)			
Gasoline (1 gal)		$7.00	6-15
Propane (100#)		$292.62	8-14
Wood (1 cord)		$400.00	6-15
Pellets			

Discounts? TCC Elders Fuel program and low income.

Alternative Energy	**Potential**	**Projects**	**Status**
Hydroelectric	Low		
Wind Diesel	Low		
Biomass	Low	Pre-feasibility Study in 2014	Not feasible for Washeteria
Solar	High	1)Arrays-washeteria & homes 2)AP&T investigating	1) Not operational 2) Feasibility
Geothermal	Low		
Oil and Gas	Low	Alternative fuel under utility investigation	Feasibility
Coal	Low		
Emerging Tech	Not Rated		
Heat Recovery	Low		
Energy Efficiency	Medium	1) VEEP 2) ANTHC EE Audit/Upgrades/Training	1) Complete 2) On hold

Bulk Fuel

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

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

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

Cooperative Purchasing Agreements

Notes

Energy Profile: Alatna

Housing Units	Occupied	Vacant	% Owner-Occup.
	12	7	53%

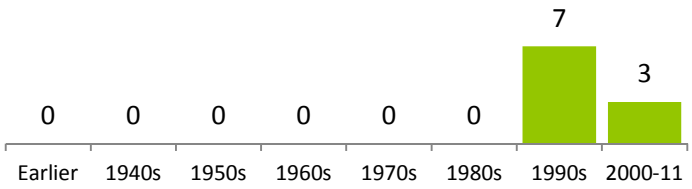
Regional Housing Authority	Weatherization Service Provider
IRHA	TCC

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

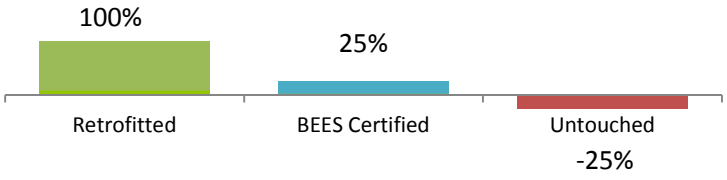
Energy Use	Average Home Energy Rating	Average Square Feet	Avg. EUI (kBTU/sf)
	N/A	N/A	N/A

Data Quality	Med.

Age of Housing Stock



Energy Efficient Housing Stock



Street Lighting	Owner	Number/Type	Retrofitted?	Year	Notes
	AP&T		no		

Non-residential Building Inventory

Building Name or Location	Year Built	Square Feet	Audited?	Retrofits Done?	In ARIS?
Bulk fuel facility (inoperable but has electric)					
Safe House				Yes; VEEP	No
Tribal Council Office				Yes; VEEP	No
Washeteria/Clinic				Yes; VEEP	No

Community Profile: Allakaket

Incorporation 2nd Class City

Location

Allakaket is on the south bank of the Koyukuk River, southwest of its junction with the Alatna River, approximately 190 air miles northwest of Fairbanks and 57 miles upriver from Hughes.

Longitude	-152.6476	**Latitude**	66.5626
ANCSA Region	Doyon, Limited		
Borough/CA	Yukon-Koyukuk Census Area		
School District	Yukon-Koyukuk School District		
AEA Region	Yukon-Koyuku/Upper Tanana		

Alaska Native Name (definition)

Aalaa Kkaakk'et

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

None

Historical Setting / Cultural Resources

Several Native groups have lived in the area. In 1938, the name of the community was changed to Allakaket, and the name Alatna was assumed by the small Eskimo community across the river. In 1994, flood waters destroyed and swept away nearly all of the community's buildings, homes, and food caches for the winter. Residents rebuilt near the old city site. Allakaket is mainly an Athabascan community; Kobuk Eskimos live across the river in Alatna. Traditional potlatches, dances and foot races attract visitors from area villages. Subsistence activities provide the majority of food sources.

Economy

Local government provides the majority of employment with trade and construction rounding out top 3 employers. There are no fishing permits issued.

Climate	**Avg. Temp.**	**Climate Zone**	**Heating Deg. Days**
	18.6	8	16,625

Natural Hazard Plan	**Year**
Yes	2010

Notes

Community Plans	**Year**
Allakaket Community Plan	2010

Energy Priorities and Projects

Biomass heating for community buildings; waste oil burner; exapnd solar to clinic; expand heat recovery to clinic; LED street light retrofits; bridge to Allakaket; road to Bettles; intertie to Bettles; microhydro; rebuild washeteria; EE education

Local Contacts	**Email**	**Phone**	**Fax**
Allakaket Village	allakaketepa@yahoo.com	968-2237	968-2233
City of Allakaket	cityofallakaket@gmail.com	968-2424	968-2241
K'oyitl'ots'ina, Limited		452-8119	452-8148

Demographics	**2000**	**2010**		**2013**
Population	97	105	**Percent of Residents Employed**	86.3%
Median Age	32	28	**Denali Commission Distressed Community**	Yes
Avg. Household Size	3	3	**Percent Alaska Native/American Indian (2010)**	95.4%
Median Household Income		$25,179	**Low and Moderate Income (LMI) Percent (2014)**	67.7%

Electric Utility	**Generation Sources**	**Interties**	**PCE?**
Alaska Power & Telephone Company	Intertie	Alatna	Yes

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

Water/Wastewater System	**None**	**Homes Served**	**System Volume**
Water	Hauled		
Sewer	Honeybuckets and outhouses	**Energy Audit?**	
Notes		Yes - 2015	

Access

Road	No				
Air Access	Yes	**Runway**	4000' x 100'		
Dock/Port	No	**Barge Access?**	No	**Ferry Service?**	No

Notes Winter trails connect it with Hughes, Bettles, and Tanana. River transportation is important in summer, no commercial barge access due to shallow water. A state-owned gravel runway is accessible year-round.

Energy Profile: Allakaket

Diesel Power System

Utility	Alaska Power & Telephone Company		
Engine	**Make/Model**	**Condition/Hrs**	**Gen Capacity**
Unit 1	John Deere	Good/11,163	175
Unit 2	John Deere	Good/24,307	175
Unit 3	John Deere	Good/22,328	175
Unit 4			
Line Loss	5.8%		
Heat Recovery?	Yes; Washeteria		

Upgrades	Priority	Projects	Status
RPSU Powerhouse	Low		Upgraded
RPSU Distribution	High		

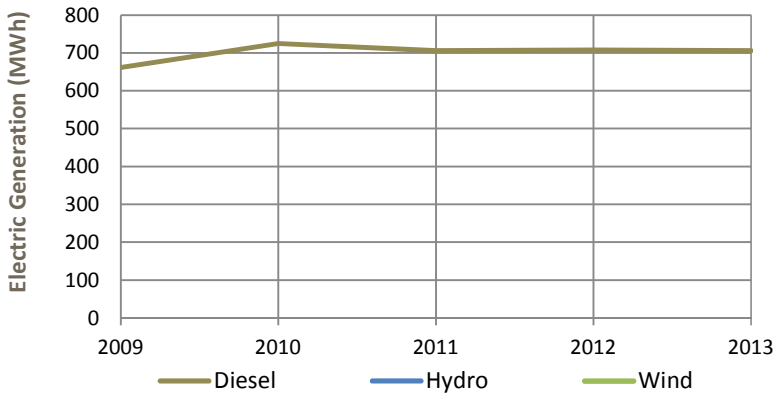
Outage History/Known Issues

Intertie to Alatna; Engine replacement needed in few years

Operators	No. of Operators	Training/Certifications
	3	BFO

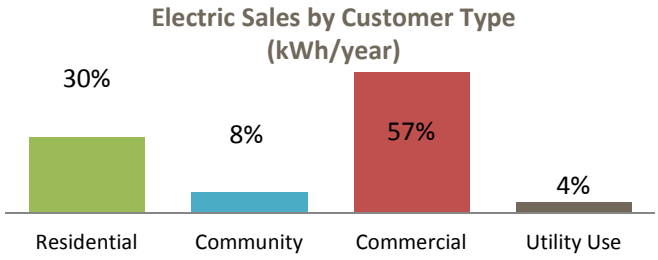
Power Production

Diesel (kWh/yr)	704,448	**Avg. Load (kW)**	39
Wind (kWh/yr)	0	**Peak Load (kW)**	87
Hydro (kWh/yr)	0	**Efficiency (kWh/gal)**	13
Total (kWh/yr)	704,448	**Diesel Used (gals/yr)**	55,745



Maintenance Planning (RPSU) Good

Electric Sales	No. of Customers	kWh/year	kWh/Customer
Residential	68	201,739	2,967
Community	11	55,357	5,032
Commercial	25	378,078	15,123
Utility Use		28,694	



Electric Rates ($/kWh)		Cost per kWh Sold ($/kWh)	
Rate with PCE	$0.24	**Fuel Cost**	$0.53
Residential Rate	$0.91	**Non-fuel Cost**	$0.17
Commercial Rate		**Total Cost**	$0.70

Fuel Prices ($)	Utility/Wholesale	Retail	Month/Year
Diesel (1 gal)	$6.10	$7.00	6-13; 8-14
Other Fuel? (1 gal)			
Gasoline (1 gal)			
Propane (100#)		$292.62	8-14
Wood (1 cord)			
Pellets			
Discounts?			

Alternative Energy	Potential	Projects	Status
Hydroelectric	Low		
Wind Diesel	Low		
Biomass	Low	Pre-Feasibility for School	Found marginally feasible
Solar	High	AP&T utility-scale investigation	Feasibility
Geothermal	Low		
Oil and Gas	Low	Alternative fuel under utility investigation	Feasibility
Coal	Low		
Emerging Tech	Not Rated		
Heat Recovery	Low	HR to Washeteria	Operational
Energy Efficiency	Medium	1)VEEP 2) ANTHC Audit & EE Upgrades	1) complete 2)Upgrades by Oct. 2015

Bulk Fuel

Tank Owner	Fuel Type(s)	Capacity	Age/Condition

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

Cooperative Purchasing Agreements

Bulk Fuel Upgrade	Priority	Project	Status

Notes

Current tanks were used prior to install; plan needed for tank upgrade

Energy Profile: Allakaket

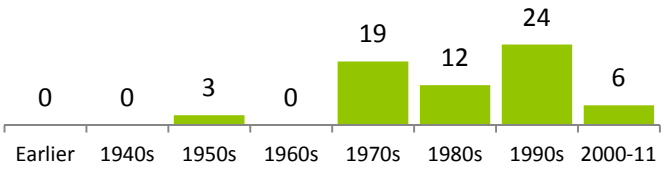
Housing Units	Occupied	Vacant	% Owner-Occup.	Regional Housing Authority	Weatherization Service Provider
	38	20	47%	IRHA	TCC

Housing Need	Overcrowded	1-star
	18.4%	N/A

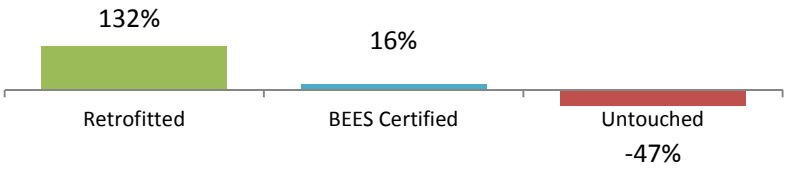
Data Quality	Med.

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

Age of Housing Stock



Energy Efficient Housing Stock



Street Lighting	Owner	Number/Type	Retrofitted?	Year	Notes
			No		

Non-residential Building Inventory

Building Name or Location	Year Built	Square Feet	Audited?	Retrofits Done?	In ARIS?
Airport Electrical		96			No
Allakaket School (Boiler Bldg.)	1979	414	Yes; Nortech	Yes; VEEP	Yes
Allakaket School (Bus Barn)				Yes; VEEP	No
Allakaket School (High School)	1979	2,090	Yes; Nortech	Yes; VEEP	Yes
Allakaket School (Main Bldg.)	1979	10,960	Yes; Nortech	Yes; VEEP	Yes
ANICA Store		1,000			No
Bus Barn		960			No
City Office				Yes; VEEP	No
Clinic					No
Community Hall				Yes; VEEP	No
J&S Store					No
Mental Health Bldg.				Yes; VEEP	No
Post Office				Yes; VEEP	No
Power House		450			No
Shed		192			No
Shop		510			No
SRE Bldg.		2,852			Yes
Tribal Office				Yes; VEEP	No
Washeteria			Yes (ANTHC)	Planned for 2015	No

Community Profile: Anvik

Incorporation	2nd Class City

Location

Anvik is located in Interior Alaska on the Anvik River, west of the Yukon River, 34 miles north of Holy Cross.

Longitude	-160.2067	**Latitude**	62.6561
ANCSA Region	Doyon, Limited		
Borough/CA	Yukon-Koyukuk Census Area		
School District	Iditarod Area School District		
AEA Region	Yukon-Koyukuk/Upper Tanana		

Alaska Native Name (definition)

Gitr'ingith Chagg

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

Historical Setting / Cultural Resources

Anvik has historically been an Ingalik Indian village. It has been known as American Station, Anvic, Anvick, Anvig, Anvig Station, and Anwig. After the flu epidemic of 1918-19 and another in 1927, many orphans became wards of the mission. Some children came from as far away as Fort Yukon. Sternwheelers carried supplies to the village in the early 1920s. Some residents had contracts to cut wood for the sternwheeler's fuel, and fish and furs were sold to traders. Subsistence is pursued by locals.

Economy

Local government and trade are the main employers.

Climate	**Avg. Temp.**	**Climate Zone**	**Heating Deg. Days**
		8	13,462

Natural Hazard Plan	**Year**
None	

Notes

Energy Priorities and Projects

Energy audits, energy efficiency, upgrades, awareness and education, and upgrade schools; add solar to homes & community bldgs.; biomass heating for city hall, clinic, tribal hall & washeteria; repair heat recovery system

Community Plans	**Year**
Anvik Comprehensive Community Plan Draft	2004

Local Contacts	**Email**	**Phone**	**Fax**
Anvik Village	skrugerdentleratc@gmail.com	663-6322	663-6357
City of Anvik	christine_elsewick@yahoo.com	663-6328	663-6321
Tanana Chiefs Conference		452-8251	459-3851

Demographics	**2000**	**2010**		**2013**
Population	104	85	**Percent of Residents Employed**	76.7%
Median Age	29	30	**Denali Commission Distressed Community**	No
Avg. Household Size	3	3	**Percent Alaska Native/American Indian (2010)**	93.2%
Median Household Income		$21,875	**Low and Moderate Income (LMI) Percent (2014)**	79.2%

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

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

Water/Wastewater System	**None**	**Homes Served**	**System Volume**
Water	Well Water		
Sewer	Piped Sewage	**Energy Audit?**	
Notes		Yes	

Access

Road	No				
Air Access	Yes	**Runway**	4000' x 75'		
Dock/Port	Yes	**Barge Access?**	**Yes**	**Ferry Service?**	**No**

Notes The Anvik River allows access during the summer by barge and float plane. The city would like to develop additional dock/harbor facilities. Local roads used by all-terrain vehicles, snow machines, and dog teams.

Energy Profile: Anvik

Diesel Power System

Utility	AVEC		
Engine	**Make/Model**	**Condition/Hrs**	**Gen Capacity**
Unit 1	Caterpillar	Fair/3,222	128
Unit 2	Detroit Diesel	Fair/8,339	207
Unit 3	Cummins	Fair/12,035	168
Unit 4			
Line Loss	4.5%		
Heat Recovery?	Yes; Power House		

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

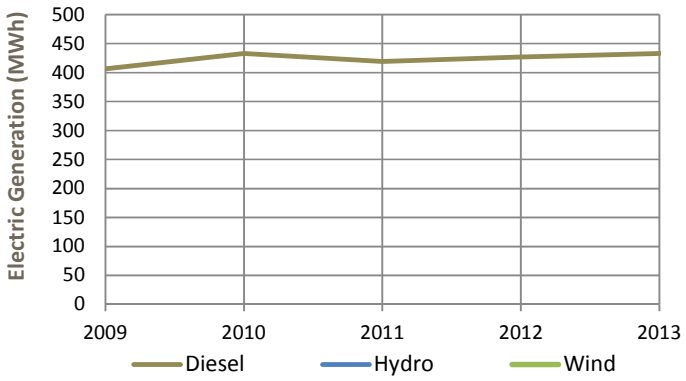
Outage History/Known Issues

No recent outages reported.

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

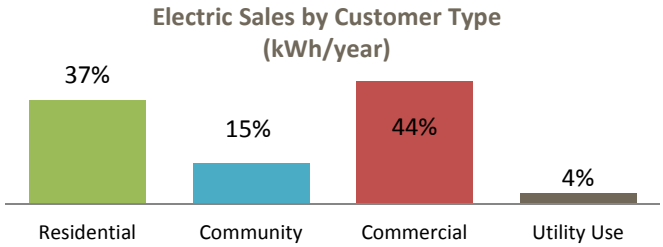
Power Production

Diesel (kWh/yr)	411,756	**Avg. Load (kW)**	50
Wind (kWh/yr)	0	**Peak Load (kW)**	124
Hydro (kWh/yr)	0	**Efficiency (kWh/gal)**	12
Total (kWh/yr)	411,756	**Diesel Used (gals/yr)**	33,651



Maintenance Planning (RPSU)	Good

Electric Sales	**No. of Customers**	**kWh/year**	**kWh/Customer**
Residential	38	146,547	3,857
Community	9	58,356	6,484
Commercial	21	172,588	8,218
Utility Use		15,702	



Electric Rates ($/kWh)		**Cost per kWh Sold ($/kWh)**	
Rate with PCE	$0.20	**Fuel Cost**	$0.35
Residential Rate	$0.64	**Non-fuel Cost**	$0.23
Commercial Rate	$0.39	**Total Cost**	$0.56

Fuel Prices ($)	**Utility/Wholesale**	**Retail**	**Month/Year**
Diesel (1 gal)	$3.79	$6.00	6-13; 8-14
Other Fuel? (1 gal)			
Gasoline (1 gal)		$5.25	1-12
Propane (100#)		$216.90/$219.76	8-14/1-12
Wood (1 cord)			
Pellets			
Discounts?			

Alternative Energy	**Potential**	**Projects**	**Status**
Hydroelectric	Low		
Wind Diesel	Low		
Biomass	Medium	Boiler heat to City Hall, Tribal Hall, Clinic & Wash.	Construction in Summer 2016
Solar	High		
Geothermal	Low		
Oil and Gas	Low		
Coal	Low		
Emerging Tech	Not Rated		
Heat Recovery	High	HR to powerhouse and school	2015 repairing HR to school
Energy Efficiency	High	1) AHFC-C & school audit 2) Upgrade Sanitation	1) Complete 2) Underway 2015

Bulk Fuel

Tank Owner	**Fuel Type(s)**	**Capacity**	**Age/Condition**
Anvik Village	Diesel; Gas	63000; 31,000	Good
AVEC Farm	Diesel	81,000	Unknown
Chase Ent. Farm	Gas/Stove Oil	10,500	Unknown
Anvik Comm. Co.	Gas/Diesel	21,835	Unknown
Deloy Ges Farm	Multiple; Gas	82,110; 9,180	Unknown

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

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

Cooperative Purchasing Agreements

Notes

Barge delivery.

Energy Profile: Anvik

Housing Units	Occupied	Vacant	% Owner-Occup.
	36	17	50%

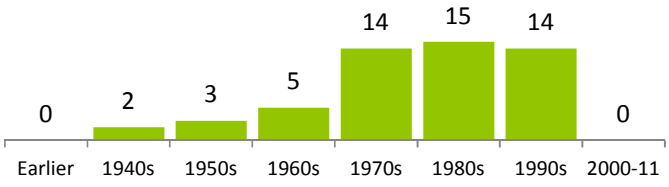
Regional Housing Authority	Weatherization Service Provider
IRHA	TCC

Housing Need	Overcrowded	1-star
	13.9%	N/A

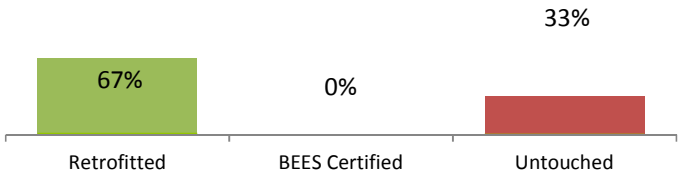
Data Quality	Medium

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

Age of Housing Stock



Energy Efficient Housing Stock

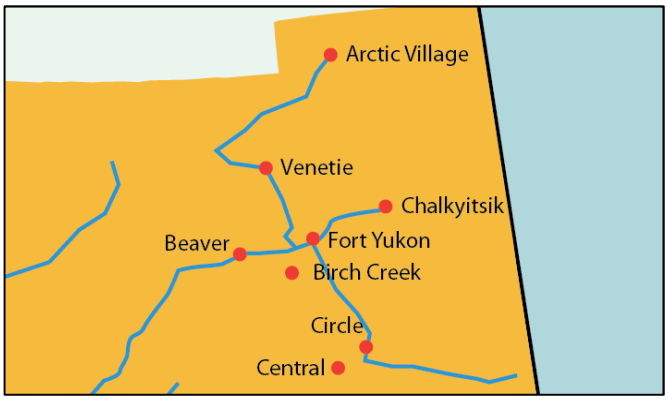


Street Lighting	Owner	Number/Type	Retrofitted?	Year	Notes

Non-residential Building Inventory

Building Name or Location	Year Built	Square Feet	Audited?	Retrofits Done?	In ARIS?
Blackwell School	1979-1999	10,298	Yes; Nortech		Yes
Christ Church		1,500			No
City Office		3,856	Yes; EAoA		No
Clinic		1,056	Yes; EAoA		No
Dely Ges Corp. Office & Store		1,500	Yes; EAoA		No
Post Office		560			No
SRE Bldg.		2,000			Yes
Tribal Community Hall		3,888	Yes; EAoA		No
Tribal Office		1,338	Yes; EAoA		No
Washeteria		1,427	Yes; EAoA		No
Wireless Network Bldg.		256	Yes; EAoA		No

Community Profile: Arctic Village



Incorporation	Unincorporated

Location

Arctic Village is on the east fork of the Chandalar River, 100 miles north of Fort Yukon and 290 miles north of Fairbanks.

Longitude	-145.5378	**Latitude**	68.1269
ANCSA Region	Doyon, Limited		
Borough/CA	Yukon-Koyukuk Census Area		
School District	Yukon Flats School District		
AEA Region	Yukon-Koyukuk/Upper Tanana		

Alaska Native Name (definition)

Neets'aii Gwich'in "residents of the north side"

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

None

Historical Setting / Cultural Resources

There is archaeological evidence that the Arctic Village area was populated as early as 4,500 BC. Reverend Albert Tritt, a Neets'aii Gwich'in born in 1880, wrote that his people led a nomadic life, traveling to the Arctic coast, Rampart, Old Crow, the Coleen River, and Fort Yukon in the 1880s and 1890s. In 1943, the Venetie Indian Reservation was established, due to the efforts of several area villagers to protect their land for subsistence use. Residents continue to use the community as they pursue seasonal subsistence activities.

Economy

Local government makes up almost 90% of employment in the village.

Climate	**Avg. Temp.**	**Climate Zone**	**Heating Deg. Days**
	15.9	8	17,356

Natural Hazard Plan **Year**

Notes

Community Plans **Year**

Energy Priorities and Projects

Solar panels on homes & community bldgs.; re-site bulk fuel storage; address high line loss; school electricity metering; generator replacement or rebuild; utility clerk training

Local Contacts	**Email**	**Phone**	**Fax**
Arctic Village Council	av_council@hotmail.com	587-5523	
Coun. Athabascan Tribal Govts		662-2460	662-6254
Tanana Chiefs Conference		452-8251	459-3851

Demographics	**2000**	**2010**		**2013**
Population	152	152	**Percent of Residents Employed**	77.1%
Median Age	24	29	**Denali Commission Distressed Community**	Yes
Avg. Household Size	3	3	**Percent Alaska Native/American Indian (2010)**	89.5%
Median Household Income		$27,500	**Low and Moderate Income (LMI) Percent (2014)**	N/A

Electric Utility	**Generation Sources**	**Interties**	**PCE?**
Arctic Village Electric Cooperative	Diesel	No	Yes

Landfill	**Class**	3	**Permitted?**	Yes	**Location**	Arctic Village

Water/Wastewater System	**None**	**Homes Served**	**System Volume**
Water	Drawn from Chandalar R., hauled from Wash.		
Sewer		**Energy Audit?**	
Notes		Yes	

Access

Road	No				
Air Access	Yes	**Runway**	4500' x 75'		
Dock/Port	No	**Barge Access?**	**No**	**Ferry Service?**	**No**

Notes Air transportation provides the only year-round access to Arctic Village. Ice fog frequently interferes with air service in winter months. A gravel airstrip is owned and managed by the tribal government. Local transportation is by ATVs and

Energy Profile: Arctic Village

Diesel Power System

Utility	Arctic Village Electric Coop.		
Engine	**Make/Model**	**Condition/Hrs**	**Gen Capacity**
Unit 1	John Deere	Fair/9,775	130
Unit 2	John Deere	Poor/13,439	100
Unit 3	John Deere	Fair/64,952	100
Unit 4	John Deere	Fair/11,469	65
Line Loss	19.3%		
Heat Recovery?	Yes; Airport Garage		

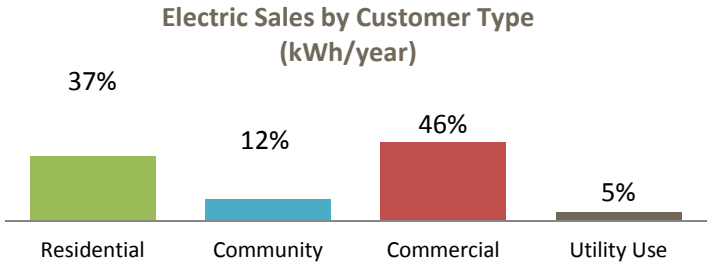
Upgrades	**Priority**	**Projects**	**Status**
RPSU Powerhouse	High		
RPSU Distribution	Med.		

Outage History/Known Issues

Most outs. due to school coming online.

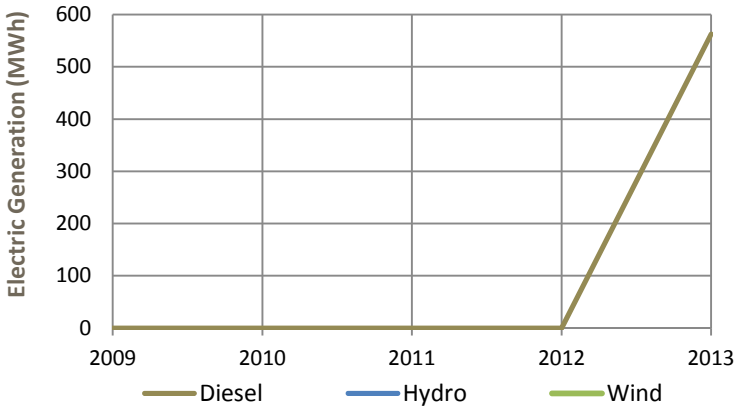
Operators	**No. of Operators**	**Training/Certifications**
	2	PPO, Utility Clerk

Maintenance Planning (RPSU)	Good		
Electric Sales	**No. of Customers**	**kWh/year**	**kWh/Customer**
Residential	76	166,896	2,196
Community	4	55,023	13,756
Commercial	13	204,147	15,704
Utility Use		22,370	



Power Production

Diesel (kWh/yr)	555,638	**Avg. Load (kW)**	27
Wind (kWh/yr)	0	**Peak Load (kW)**	59
Hydro (kWh/yr)	0	**Efficiency (kWh/gal)**	12
Total (kWh/yr)	555,638	**Diesel Used (gals/yr)**	46,085



Electric Rates ($/kWh)		**Cost per kWh Sold ($/kWh)**	
Rate with PCE	$0.36	**Fuel Cost**	$0.70
Residential Rate	$0.90	**Non-fuel Cost**	$0.16
Commercial Rate		**Total Cost**	$0.86

Fuel Prices ($)	**Utility/Wholesale**	**Retail**	**Month/Year**
Diesel (1 gal)	$6.86	$10.00	6-13; 1-14
Other Fuel? (1 gal)			
Gasoline (1 gal)			
Propane (100#)			
Wood (1 cord)			
Pellets			
Discounts?			

Alternative Energy	**Potential**	**Projects**	**Status**
Hydroelectric	Medium		
Wind Diesel	Low		
Biomass	Low		
Solar	High	1) 2 PV Arrays on washeteria 2) Utility PV on homes	1) Not Operational 2) Operational
Geothermal	Low		
Oil and Gas	Low	Yukon Flats oil & gas exploration in 2013	Low certainty
Coal	Low		
Emerging Tech	Not Rated		
Heat Recovery	Low	HR to airport garage	Operational
Energy Efficiency	Medium	1) IRHA residential light retrofits 2) VEEP	complete

Bulk Fuel

Tank Owner	**Fuel Type(s)**	**Capacity**	**Age/Condition**
Arctic Village	Diesel	17,000	Good
Arctic Village	Gasoline	5,000	Good

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

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

Cooperative Purchasing Agreements

Notes

Air deliveries every 3 weeks for diesel, & 2-3 months for gas.

Energy Profile: Arctic Village

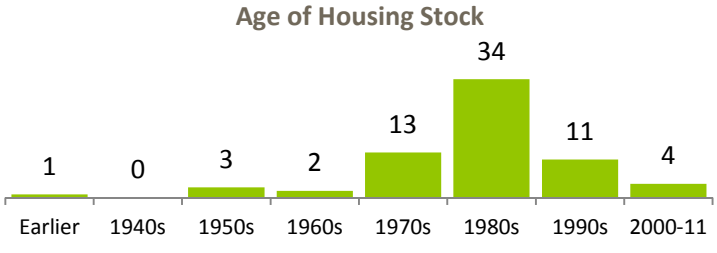
Housing Units	Occupied	Vacant	% Owner-Occup.
	65	20	75%

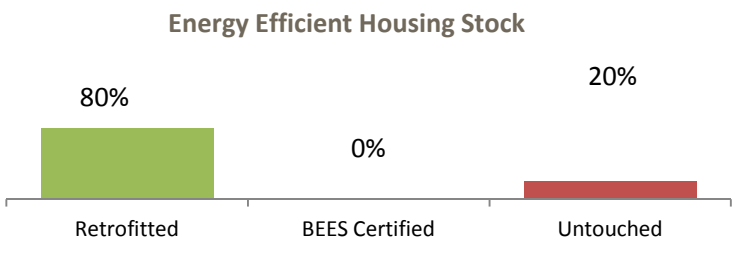
Regional Housing Authority	Weatherization Service Provider
IRHA	IRHA

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



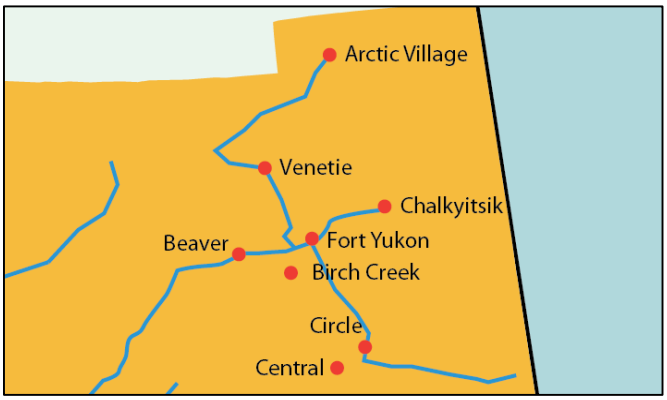


Street Lighting	Owner	Number/Type	Retrofitted?	Year	Notes

Non-residential Building Inventory

Building Name or Location	Year Built	Square Feet	Audited?	Retrofits Done?	In ARIS?
Arctic Landromat					No
Arctic Village K-12 School	2008	14,400	Yes; Nortech		No
Clinic				Yes; VEEP	No
Community Hall				Yes; VEEP	No
Council Bldg.		1,200		Yes; VEEP	No
Garage		992			No
Midnight Sun Native Store					No
Native Store/Youth Center				Yes; VEEP	No
New Church				Yes; VEEP	No
Old High School				Yes; VEEP	No
Old School Maintenance Garage				Yes; VEEP	No
Post Office		920			No
Washeteria				Yes; VEEP	No
Water Storage & Garage		1,680			No
Water Treatment Plant				Yes; VEEP	No

Community Profile: Beaver



Alaska Native Name (definition)

Ts'aahudaaneekk'onh Denh

Historical Setting / Cultural Resources

Gold discoveries in the Chandalar region in 1907 led to the founding of Beaver. It was established as the Yukon River terminus for miners heading north to the gold fields. In 1974, the village council purchased the local store and set it up as a cooperative, with villagers holding shares of stock. The population of Beaver is predominantly mixed Gwitchin/Koyukuk Athabascan and Inupiat Eskimo. Subsistence is an important source of food items.

Energy Priorities and Projects

Repair heat recovery system; biomass heating for community building; add additional community facilities to PCE

Incorporation	Unincorporated

Location

Beaver is located on the north bank of the Yukon River, approximately 60 air miles southwest of Fort Yukon and 110 miles north of Fairbanks. It lies in the Yukon Flats National Wildlife Refuge.

Longitude	-147.3964	**Latitude**	66.3594
ANCSA Region	Doyon, Limited		
Borough/CA	Yukon-Koyukuk Census Area		
School District	Yukon Flats School District		
AEA Region	Yukon-Koyukuk/Upper Tanana		

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

Economy

Local government, education and health services are the main employers in the village.

Climate	**Avg. Temp.**	**Climate Zone**	**Heating Deg. Days**
		8	15,788

Natural Hazard Plan	**Year**

Notes

Community Plans	**Year**

Local Contacts	**Email**	**Phone**	**Fax**
Beaver Kwit'chin Corporation		456-1640	
Beaver Village Council	rpitka@beavercouncil.org	628-6126	628-6815
Coun. of Athabascan Tribal Govts		662-2460	662-6254

Demographics	**2000**	**2010**		**2013**
Population	84	84	**Percent of Residents Employed**	81.1%
Median Age	30	32	**Denali Commission Distressed Community**	**Yes**
Avg. Household Size	3	3	**Percent Alaska Native/American Indian (2010)**	**97.7%**
Median Household Income		$22,500	**Low and Moderate Income (LMI) Percent (2014)**	N/A

Electric Utility	**Generation Sources**	**Interties**	**PCE?**
Beaver Joint Utilities	Diesel	No	Yes

Landfill	**Class**	3	**Permitted?**	Yes	**Location**	Beaver Village

Water/Wastewater System		**Homes Served**	**System Volume**
Water	Haul treated water	32	
Sewer	Honey buckets/Haul System	**Energy Audit?**	
Notes		Yes	

Access

Road	No				
Air Access	Yes	**Runway**	3934' x 75'		
Dock/Port	No	**Barge Access?**	Yes	**Ferry Service?**	No

Notes State-maintained public airport with a gravel runway in good condition, with daily flights from Fairbanks. Fuel and groceries are shipped by air during the winter months. Limited barge service during the summers.

Energy Profile: Beaver

Diesel Power System

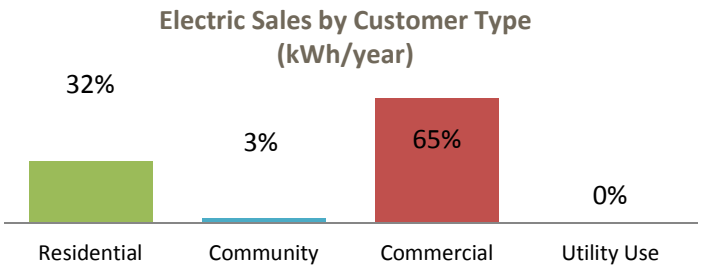
Utility	Beaver Joint Utilities		
Engine	**Make/Model**	**Condition/Hrs**	**Gen Capacity**
Unit 1	John Deere	Fair/10,171	110
Unit 2	John Deere	Poor/22,584	67
Unit 3	John Deere	Poor/7,981	67
Unit 4			
Line Loss	4.5%		
Heat Recovery?	Yes; Washeteria		

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

Outage History/Known Issues

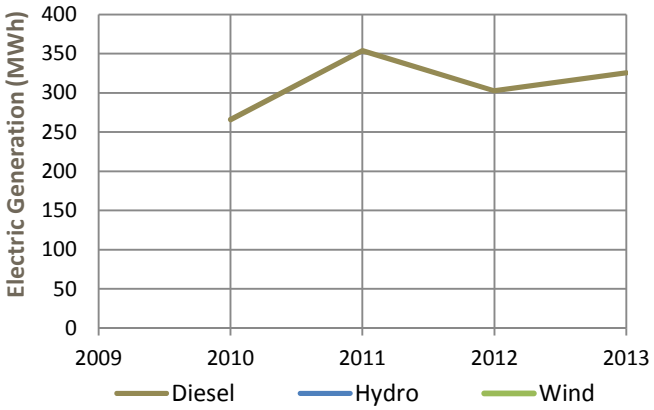
Operators	**No. of Operators**	**Training/Certifications**
	8	APPO, BFO, Elec. Util. Bus. Train
		PPO, Utility Clerk
Maintenance Planning (RPSU)		Acceptable

Electric Sales	**No. of Customers**	**kWh/year**	**kWh/Customer**
Residential	32	80,455	2,514
Community	6	6,320	1,053
Commercial	10	163,042	16,304
Utility Use		0	



Power Production

Diesel (kWh/yr)	261,712	**Avg. Load (kW)**	33
Wind (kWh/yr)	0	**Peak Load (kW)**	73
Hydro (kWh/yr)	0	**Efficiency (kWh/gal)**	7
Total (kWh/yr)	261,712	**Diesel Used (gals/yr)**	38,912



Electric Rates ($/kWh)		**Cost per kWh Sold ($/kWh)**	
Rate with PCE	$0.36	**Fuel Cost**	$0.75
Residential Rate	$0.90	**Non-fuel Cost**	$0.15
Commercial Rate	$1.00	**Total Cost**	$0.90

Fuel Prices ($)	**Itility/Wholesal**	**Retail**	**Month/Year**
Diesel (1 gal)	$5.00	$9.00	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		
Biomass	Medium	Pre-Feasibility Study Biomass Heat (10-14)	WTP/Weihl Bldg pre-feasible
Solar	High	2 kW PV array on generator bldg	Operational
Geothermal	Low		
Oil and Gas	Low	Yukon Flats oil & gas exploration in 2013	Low certainty
Coal	Low		
Emerging Tech	Not Rated	FS on Hydrokinetic	Complete
Heat Recovery	Low	HR to Washeteria & Water Plant	Foundation remediation
Energy Efficiency	Medium	1) VEEP 2) ANTHC Sanitation EE Audit	Complete

Bulk Fuel

Tank Owner	**Fuel Type(s)**	**Capacity**	**Age/Condition**
Utility	Diesel	10,000	Unknown

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

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

Cooperative Purchasing Agreements

Notes

Energy Profile: Beaver

Housing Units	Occupied	Vacant	% Owner-Occup.
	31	31	74%

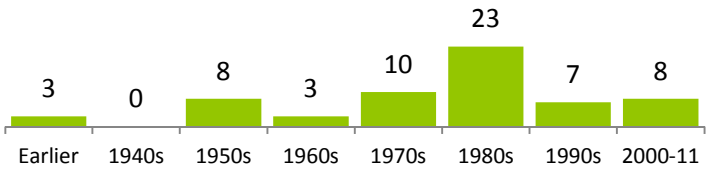
Regional Housing Authority	Weatherization Service Provider
IRHA	TCC

Housing Need	Overcrowded	1-star
	22.6%	N/A

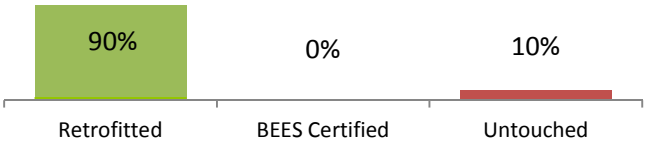
Data Quality	Low

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

Age of Housing Stock



Energy Efficient Housing Stock

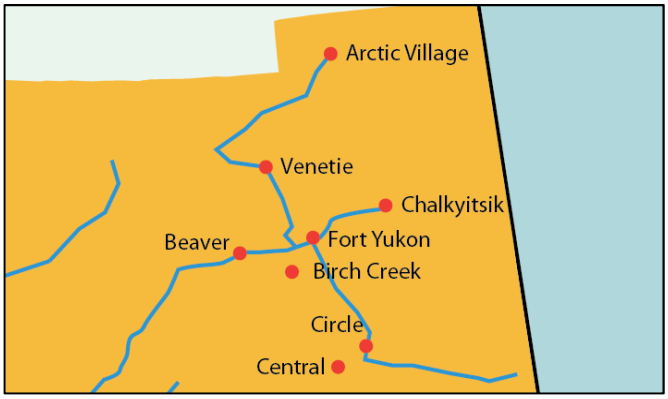


Street Lighting	Owner	Number/Type	Retrofitted?	Year	Notes

Non-residential Building Inventory

Building Name or Location	Year Built	Square Feet	Audited?	Retrofits Done?	In ARIS?
Airport Electrical		96			No
Airport Equip. Storage		1,200			No
Clinton Victor Wiehl Multipurpose Bldg./Council Office/Clinic		5,440	Yes; Ameresco		No
Community Center		500			No
Cruikshank School	1985	10,250	Yes; Nortech		Yes
Power Plant & Garage	2008	1,880	Yes; Ameresco		No
SRE Bldg.		1,200			Yes
Utility House		800			No
Warehouse		1,280			No
Washeteria		500			No
Water Treat. Plant, Washeteria, & Lift Station	~1970s	1,620	Yes; Ameresco		No

Community Profile: Birch Creek



Incorporation	Unincorporated

Location

The village is located along Birch Creek, approximately 26 miles southwest of Fort Yukon.

Longitude	-145.2562	**Latitude**	66.2562
ANCSA Region	Doyon, Limited		
Borough/CA	Yukon-Koyukuk Census Area		
School District	Yukon Flats School District		
AEA Region	Yukon-Koyukuk/Upper Tanana		

Alaska Native Name (definition)

Deenduu

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

Historical Setting / Cultural Resources

The Dendu Gwich'in traditionally occupied much of the Yukon Flats south of the Yukon River. Semi-permanent camps existed near the present village. The first written reference to a settlement in the Birch Creek area was in 1862 by a Fort Yukon clergyman who visited a camp established to provide fish for Hudson's Bay Company in Ft. Yukon. Some anthropologists believe that this band was annihilated by scarlet fever in the 1880s. Local residents are Dendu Gwich'in Athabascans and are active in subsistence practices.

Economy

Education/health services provides 50% of employment with local gov't providing 25%, and state gover't/prof. services the remainder. No fishing permits are issued.

Climate	**Avg. Temp.**	**Climate Zone**	**Heating Deg. Days**
		8	16,326

Natural Hazard Plan	**Year**
None	

Notes

Energy Priorities and Projects

Community Plans	**Year**
None	

Local Contacts	**Email**	**Phone**	**Fax**
Birch Creek Tribe	angela@arcticrg.com	221-2211	221-2312
Tihteet'aii, Incorporated		455-8484	455-8486

Demographics	**2000**	**2010**		**2013**
Population	28	33	**Percent of Residents Employed**	50.0%
Median Age	34	35	**Denali Commission Distressed Community**	Yes
Avg. Household Size	3	2	**Percent Alaska Native/American Indian (2010)**	100%
Median Household Income		$4,583	**Low and Moderate Income (LMI) Percent (2014)**	N/A

Electric Utility	**Generation Sources**	**Interties**	**PCE?**
Birch Creek Tribe	Diesel	No	No

Landfill	**Class**	3	**Permitted?**	No	**Location**	Birch Creek

Water/Wastewater System	**None**	**Homes Served**	**System Volume**
Water	Hauled from water plant		
Sewer	Sewage lagoon	**Energy Audit?**	
Notes		No	

Access

Road	No				
Air Access	Yes	**Runway**	4000' x 75'		
Dock/Port	No	**Barge Access?**	No	**Ferry Service?**	No

Notes Access to Birch Creek is primarily by a state-owned airstrip. The village used to be served by barge during high water. There is a 26-mile winter trail to Ft. Yukon.

Energy Profile: Birch Creek

Diesel Power System

Utility	Dendu Gwich'in Tribal Council		
Engine	**Make/Model**	**Condition/Hrs**	**Gen Capacity**
Unit 1	Kubota		27
Unit 2			
Unit 3			
Unit 4			
Line Loss			
Heat Recovery?	No		

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

Outage History/Known Issues

PCE Eligible but inactive, no data.

Operators	**No. of Operators**	**Training/Certifications**
	1	Utility Clerk

Maintenance Planning (RPSU)	Acceptable

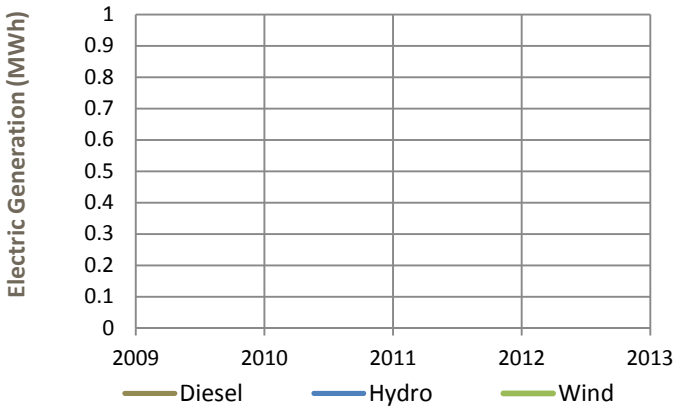
Electric Sales	**No. of Customers**	**kWh/year**	**kWh/Customer**
Residential			
Community			
Commercial			
Utility Use			

Electric Sales by Customer Type (kWh/year)

Residential | Community | Commercial | Utility Use

Power Production

Diesel (kWh/yr)	**Avg. Load (kW)**	12
Wind (kWh/yr)	**Peak Load (kW)**	27
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)		$5.01	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		
Biomass	High		
Solar	Not Rated		
Geothermal	Low		
Oil and Gas	Low	Yukon Flats oil & gas exploration in 2013	Low certainty
Coal	Low		
Emerging Tech	High		
Heat Recovery	Medium		
Energy Efficiency	Medium		

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

Energy Profile: Birch Creek

Housing Units	Occupied	Vacant	% Owner-Occup.
	10	8	70%

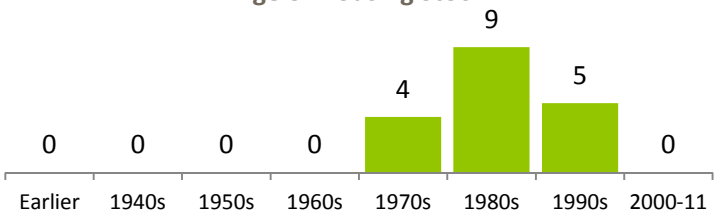
Regional Housing Authority	Weatherization Service Provider
IRHA	TCC

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

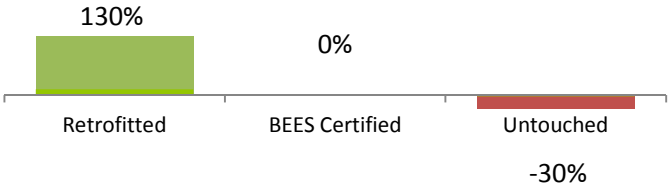
Energy Use	Average Home Energy Rating	Average Square Feet	Avg. EUI (kBTU/sf)
	N/A	N/A	N/A

Data Quality	Low

Age of Housing Stock



Energy Efficient Housing Stock

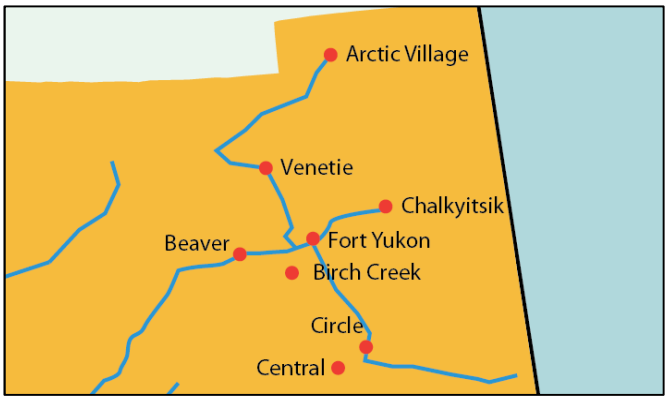


Street Lighting	Owner	Number/Type	Retrofitted?	Year	Notes

Non-residential Building Inventory

Building Name or Location	Year Built	Square Feet	Audited?	Retrofits Done?	In ARIS?
Airport Electrical		96			No
Airport Equipment Storage		1,600			No
DOT Hanger					No
GCI Dish Bldg.					No

Community Profile: Central



Alaska Native Name (definition)

Incorporation	Unincorporated

Location

Central is located on the Steese Highway about 125 miles northeast of Fairbanks and 28 miles southwest of Circle. Circle Hot Springs is located nearby.

Longitude	-144.8031	**Latitude**	65.5725
ANCSA Region	N/A		
Borough/CA	Yukon-Koyukuk Census Area		
School District	Yukon Flats School District		
AEA Region	Yukon-Koyukuk/Upper Tanana		

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

Historical Setting / Cultural Resources

After the discovery of gold in the Circle Mining District in the 1890s, a centrally-located roadhouse was needed between Circle. It became the center of a small community of miners who settled there and provided food and shelter to travelers and support services to nearby miners. In 1927, a road link to Fairbanks was completed. Mining continued until the beginning of World War II. In 1978, the Circle Mining District was the most active in Alaska, with 65 gold mining operations employing over 200 people.

Economy

Natural resources/mining, construction, and state government are the three main employers. There are 2 fishing permits issued for the village.

Climate	**Avg. Temp.**	**Climate Zone**	**Heating Deg. Days**
		8	16,315

Natural Hazard Plan	**Year**
None	

Notes

Energy Priorities and Projects

Community Plans	**Year**
None	

Local Contacts	**Email**	**Phone**	**Fax**
Gold Country Energy	goldcountryenergy@gmail.com	907-520-5681	

Demographics	**2000**	**2010**		**2013**
Population	134	96	**Percent of Residents Employed**	22.9%
Median Age	45	53	**Denali Commission Distressed Community**	Yes
Avg. Household Size	2	2	**Percent Alaska Native/American Indian (2010)**	6.1%
Median Household Income		$45,313	**Low and Moderate Income (LMI) Percent (2014)**	N/A

Electric Utility	**Generation Sources**	**Interties**	**PCE?**
Gold County Energy	Diesel	No	Yes

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

Water/Wastewater System	**None**	**Homes Served**	**System Volume**
Water			
Sewer		**Energy Audit?**	
Notes		Yes	

Access

Road	Yes				
Air Access	Yes	**Runway**	2782'x 60'		
Dock/Port	No	**Barge Access?**	No	**Ferry Service?**	No
Notes	Year-round maintenance by the Department of Transportation enabled goods to be delivered on a regular schedule by truck. A state-owned gravel airstrip is available.				

Energy Profile: Central

Diesel Power System

Utility	Gold Country Energy		
Engine	**Make/Model**	**Condition/Hrs**	**Gen Capacity**
Unit 1	John Deere	Good/5,243	100
Unit 2	John Deere	Good/3,717	100
Unit 3	John Deere	Good/538	145
Unit 4			
Line Loss	15.3%		
Heat Recovery?	Yes; Powerhouse Office, Residence		

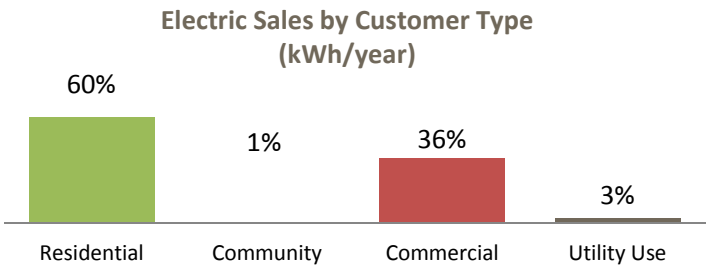
Upgrades	**Priority**	**Projects**	**Status**
RPSU Powerhouse		Upgrade	Complete 2015
RPSU Distribution	In Progress		

Outage History/Known Issues

Upgrade of powerhouse completed in 2015

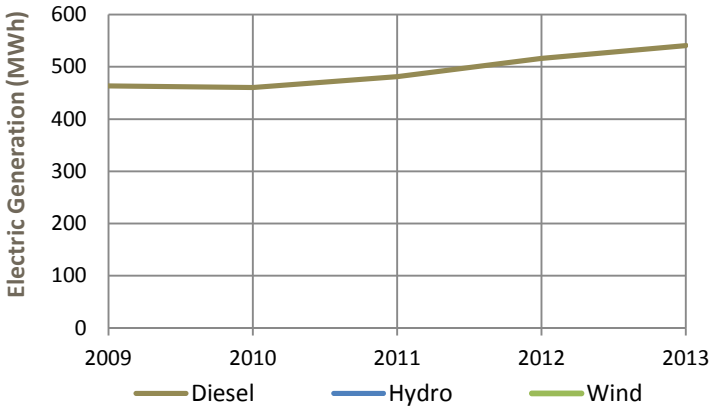
Operators	**No. of Operators**	**Training/Certifications**
	3	
	1	Utility Clerk
Maintenance Planning (RPSU)	Good	

Electric Sales	**No. of Customers**	**kWh/year**	**kWh/Customer**
Residential	140	276,163	1,973
Community	1	4,647	4,647
Commercial	13	168,211	12,939
Utility Use		13,065	



Power Production

Diesel (kWh/yr)	577,308	**Avg. Load (kW)**	49
Wind (kWh/yr)	0	**Peak Load (kW)**	110
Hydro (kWh/yr)	0	**Efficiency (kWh/gal)**	12
Total (kWh/yr)	577,308	**Diesel Used (gals/yr)**	46,533



Electric Rates ($/kWh)		**Cost per kWh Sold ($/kWh)**	
Rate with PCE	$0.23	**Fuel Cost**	$0.36
Residential Rate	$0.65	**Non-fuel Cost**	$0.11
Commercial Rate		**Total Cost**	$0.47

Fuel Prices ($)	**Utility/Wholesale**	**Retail**	**Month/Year**
Diesel (1 gal)	$3.57	$4.51	6-13; 8-14
Other Fuel? (1 gal)			
Gasoline (1 gal)			
Propane (100#)			
Wood (1 cord)			
Pellets			
Discounts?			

Alternative Energy	**Potential**	**Projects**	**Status**
Hydroelectric	Medium		
Wind Diesel	Low		
Biomass	Medium		
Solar	High		
Geothermal	Low		
Oil and Gas	Low	Yukon Flats oil & gas exploration in 2013	Low certainty
Coal	Low		
Emerging Tech	Not Rated		
Heat Recovery	High	HR in powerplant office and residence	Potenial for expansion
Energy Efficiency	High	AHFC-R	Complete

Bulk Fuel

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

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

Cooperative Purchasing Agreements

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

Notes

Energy Profile: Central

Housing Units	Occupied	Vacant	% Owner-Occup.
	67	115	64%

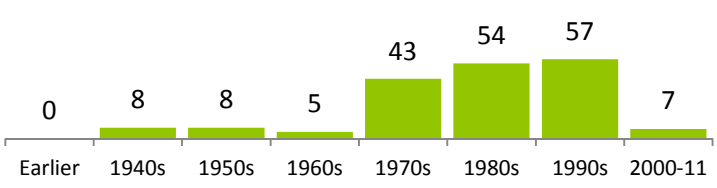
Regional Housing Authority	Weatherization Service Provider
IRHA	ACDC

Housing Need	Overcrowded	1-star
	13.4%	N/A

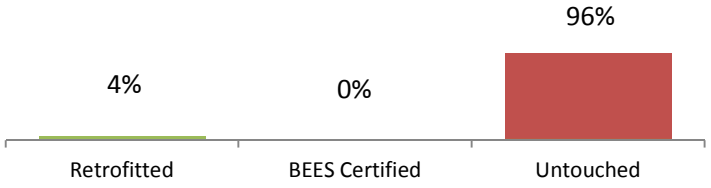
Data Quality	Med.

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

Age of Housing Stock



Energy Efficient Housing Stock

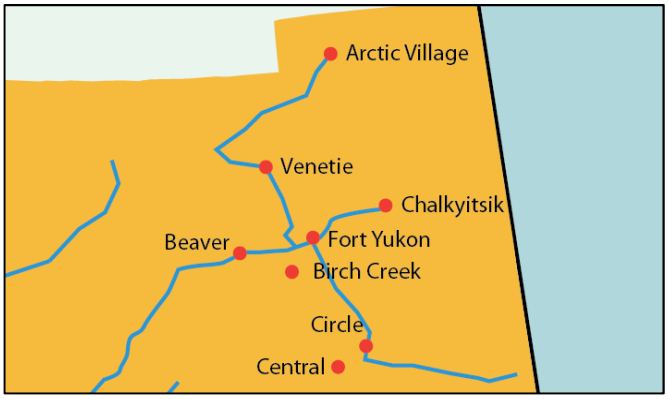


Street Lighting	Owner	Number/Type	Retrofitted?	Year	Notes

Non-residential Building Inventory

Building Name or Location	Year Built	Square Feet	Audited?	Retrofits Done?	In ARIS?
Central Corner		2,500			No
Circle Museum		2,544			No
Facilities ATCO - 2 Bedroom		360			No
Far North Market		2,640			No
Generator Bldg.		300			No
Post Office		1,350			No
Maintenance Shop/Garage HWY		3,840			Yes
Storage		200			No

Community Profile: Chalkyitsik



Incorporation	Unincorporated

Location

Chalkyitsik is located on the Black River about 50 miles east of Fort Yukon.

Longitude	-143.7222	**Latitude**	66.6544
ANCSA Region	Doyon, Limited		
Borough/CA	Yukon-Koyukuk Census Area		
School District	Yukon Flats School District		
AEA Region	Yukon-Koyukuk/Upper Tanana		

Alaska Native Name (definition)

Jałgiitsik "fish hooking place"

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

Historical Setting / Cultural Resources

Archaeological excavations in the area reveal use and occupancy of the region as early as 10,000 BC. Village elders remember a highly nomadic way of life. In the late 1930s, a boat bound for Salmon Village with construction materials for a school had to unload at Chalkyitsik because of low water. By 1969, there were 26 houses, a store, two churches, and a community hall in Chalkyitsik. Chalkyitsik is a traditional Gwich'in Athabascan village, with a subsistence lifestyle.

Economy

Local government accounts for almost 90% of employment in the village with education/health services providing the remaining.

Climate	**Avg. Temp.**	**Climate Zone**	**Heating Deg. Days**
	20.6	8	16,326

Natural Hazard Plan	**Year**
None	

Notes

Energy Priorities and Projects

Install heat recovery for school; repair/upgrade generators; solar PV on homes & community buildings; LED street lights in next few years; add community facilities to PCE

Community Plans	**Year**
Chalkyitsik Community Plan	2009

Local Contacts	**Email**	**Phone**	**Fax**
Chalkyitsik Native Corp.		848-8112	848-8114
Chalkyitsik Village Council	ta_cvc@hotmal.com	848-8117	848-8986

Demographics	**2000**	**2010**		**2013**
Population	83	69	**Percent of Residents Employed**	72.3%
Median Age	34	28	**Denali Commission Distressed Community**	Yes
Avg. Household Size	3	3	**Percent Alaska Native/American Indian (2010)**	85.5%
Median Household Income		$38,750	**Low and Moderate Income (LMI) Percent (2014)**	N/A

Electric Utility	**Generation Sources**	**Interties**	**PCE?**
Chalkyitsik Traditional Council	Diesel	No	Yes

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

Water/Wastewater System	**None**	**Homes Served**	**System Volume**
Water	Drawn from Black R., self haul from wash.		
Sewer	Outhouses and honeybuckets	**Energy Audit?**	
Notes	Very few have running water in homes	No	

Access

Road	No				
Air Access	Yes	**Runway**	4000' x 75'		
Dock/Port	No	**Barge Access?**	Intermittent	**Ferry Service?**	No

Notes Access is primarily by air; there is a gravel runway. No roads connect to Chalkyitsik, there is a winter trail to Fort Yukon. It is accessible by small riverboat and barge access is available based on water level.

Energy Profile: Chalkyitsik

Diesel Power System

Utility	Chalkyitsik Traditional Council		
Engine	**Make/Model**	**Condition/Hrs**	**Gen Capacity**
Unit 1	John Deere	Fair	100
Unit 2	John Deere	N/O	95
Unit 3	John Deere	N/O	65
Unit 4			
Line Loss	Not Reported		
Heat Recovery?	No		

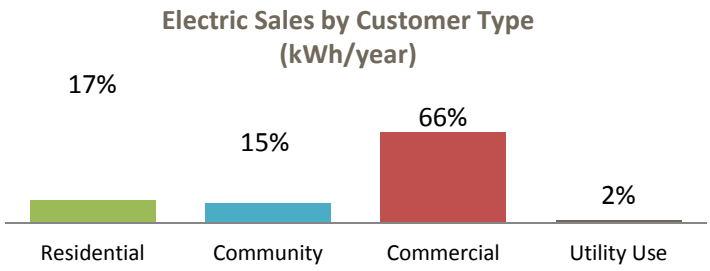
Upgrades	**Priority**	**Projects**	**Status**
RPSU Powerhouse	High		
RPSU Distribution	High		

Outage History/Known Issues

2 gensets broken, repairs needed 7/15; AMPY meters installed.

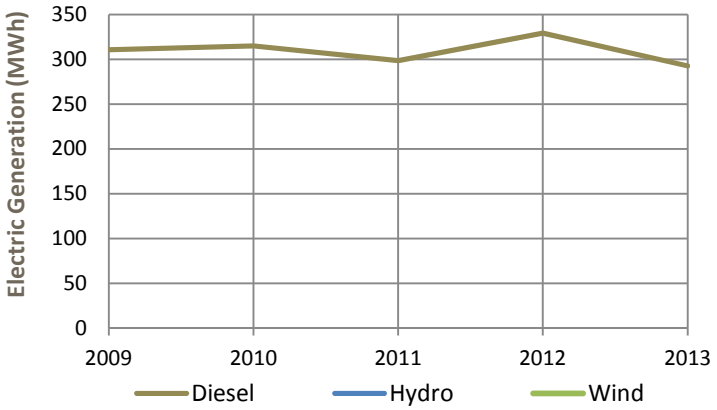
Operators	**No. of Operators**	**Training/Certifications**
	1	BFO, PPO
	1	Utility Clerk
Maintenance Planning (RPSU)	Acceptable	

Electric Sales	**No. of Customers**	**kWh/year**	**kWh/Customer**
Residential	44	59,735	1,358
Community	2	53,821	26,911
Commercial	20	236,871	11,844
Utility Use		7,693	



Power Production

Diesel (kWh/yr)	287,670	**Avg. Load (kW)**	26
Wind (kWh/yr)	0	**Peak Load (kW)**	59
Hydro (kWh/yr)	0	**Efficiency (kWh/gal)**	11
Total (kWh/yr)	287,670	**Diesel Used (gals/yr)**	26,533



Electric Rates ($/kWh)		**Cost per kWh Sold ($/kWh)**	
Rate with PCE	$0.40	**Fuel Cost**	$0.42
Residential Rate	$0.95	**Non-fuel Cost**	Not Reported
Commercial Rate		**Total Cost**	$0.42

Fuel Prices ($)	**Utility/Wholesale**	**Retail**	**Month/Year**
Diesel (1 gal)	$4.85		6-13; 8-14
Other Fuel? (1 gal)		$8.00	7-15
Gasoline (1 gal)		$8.00	7-15
Propane (100#)		$250.00	7-15
Wood (1 cord)			
Pellets			

Discounts? Other Fuel is heating fuel sold from CNC.

Alternative Energy	**Potential**	**Projects**	**Status**
Hydroelectric	Low		
Wind Diesel	Low		
Biomass	High	Biomass Heating for Community Buildings	Not pursuing at present
Solar	High		
Geothermal	Low		
Oil and Gas	Low	Explr. in 2013; waste oil burners in garage	1) Low certainty 2) operational
Coal	Low		
Emerging Tech	Not Rated		
Heat Recovery	Low		
Energy Efficiency	High		

Bulk Fuel

Tank Owner	**Fuel Type(s)**	**Capacity**	**Age/Condition**
CTC	Diesel	3 x 10,000 gals	40 yrs old
CNC	Gasoline	2 x 5,000	
YFSD	Diesel	4 x 10,000 gals	

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

Purchasing	**Deliveries/Year**	**Gallons/Delivery**	**Vendor(s)**
By Barge			
By Air	4	4,000	

Cooperative Purchasing Agreements

Notes

4 deliveries is only for CTC buildings & generators. School orders separate.

Energy Profile: Chalkyitsik

Housing Units	Occupied	Vacant	% Owner-Occup.
	32	10 (not livable)	63%

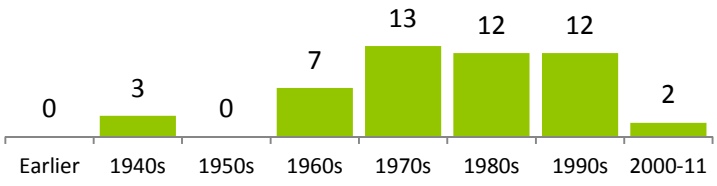
Regional Housing Authority	Weatherization Service Provider
IRHA	TCC

Housing Need	Overcrowded	1-star
	22.7%	N/A

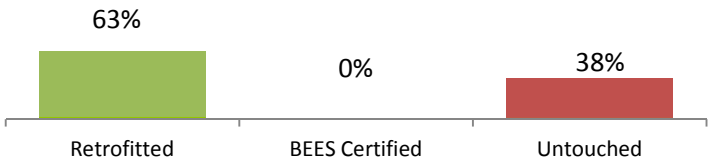
Data Quality	Low

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

Age of Housing Stock



Energy Efficient Housing Stock

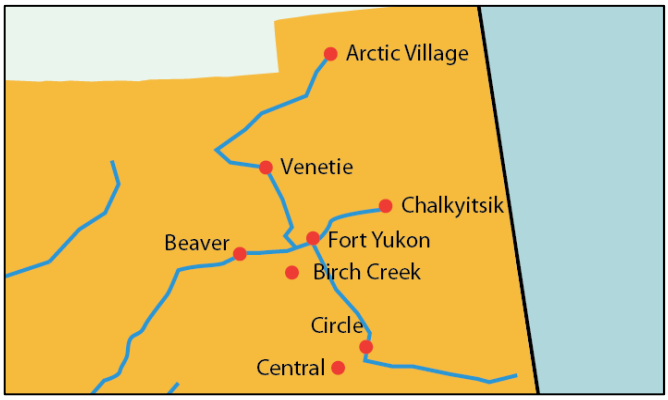


Street Lighting	Owner	Number/Type	Retrofitted?	Year	Notes
	CTC	5/HPS	no		

Non-residential Building Inventory

Building Name or Location	Year Built	Square Feet	Audited?	Retrofits Done?	In ARIS?
Airport Electrical		96			No
Airport Storage Bldg.		1,040			No
Church					
Clinic					No
CNC Store					
Community Hall		2,905			No
Garage		400			No
Lift Station Building					
Post Office					
Power House		1,296			No
Storage		1,656			No
Tribal Council Office					
Tsuk Taih School		9,854			No
United Utilities Building					
Washeteria					No
Youth Center					
		576			No

Community Profile: Circle



Incorporation	Unincorporated

Location

Circle is located on the south bank of the Yukon River at the edge of the Yukon Flats, 160 miles northeast of Fairbanks. It is at the eastern end of the Steese Highway.

Longitude	-144.0606	**Latitude**	65.8256
ANCSA Region	Doyon, Limited		
Borough/CA	Yukon-Koyukuk Census Area		
School District	Yukon Flats School District		
AEA Region	Yukon-Koyukuk/Upper Tanana		

Alaska Native Name (definition)

Danzhit Hanlą̨ jj

Taxes

Type (rate)	Per-Capita Revenue
None	

Historical Setting / Cultural Resources

Sir Alexander Mackenzie established the first European contact with this area in 1789. Gold was dicovered in the area in 1884. Circle was established in 1893 as a supply point for goods shipped up the Yukon River. Circle's history since 1898 was marked by miners moving elsewhere to look for gold and members of surrounding villages moving to Circle for jobs and an education for their children. The population of Circle is predominantly Athabascan, but there are several non-Native families.

Economy

Local government accounts for over 50% of the employment with education/health services, and leisure/hospitality the other top employers.

Climate	Avg. Temp.	Climate Zone	Heating Deg. Days
		8	16,349

Natural Hazard Plan	Year
None	

Notes

Energy Priorities and Projects

Feasibility of utility-scale solar; more bulk fuel storage; install heat recovery for school & teacher housing; EE upgrades to washeteria; EE public housing through rehab & new construction; add community facilities to PCE

Community Plans	Year
Circle Community Plan	2014

Local Contacts	Email	Phone	Fax
Circle Tribal Council	angela@arcticrg.com	773-2822	773-2823
Danzhit Hanlaii Corporation		455-8484	
Circle Civic Comm. Assoc.		773-1222	

Demographics	2000	2010		2013
Population	100	104	Percent of Residents Employed	49.3%
Median Age	34	32	Denali Commission Distressed Community	Yes
Avg. Household Size	3	3	Percent Alaska Native/American Indian (2010)	81.8%
Median Household Income		$17,361	Low and Moderate Income (LMI) Percent (2014)	N/A

Electric Utility	Generation Sources	Interties	PCE?
Circle Electric Utility	Diesel	No	Yes

Landfill	Class	3	Permitted?	Yes	Location	Circle

Water/Wastewater System	None	Homes Served	System Volume
Water	Haul from washeteria/fire station		
Sewer		Energy Audit?	
Notes		No	

Access

Road	Yes				
Air Access	Yes	Runway	2979' x 60'		
Dock/Port	No	Barge Access?	Yes	Ferry Service?	No

Notes Barges deliver goods by the Yukon River during summer. Residents use ATVs, snowmobiles, and dog sleds for recreation and subsistence activities. A state-owned gravel airstrip is available.

Energy Profile: Circle

Diesel Power System

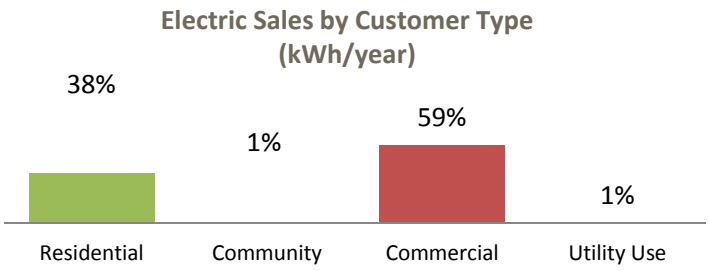
Utility	Circle Electric Utility (Private)		
Engine	**Make/Model**	**Condition/Hrs**	**Gen Capacity**
Unit 1	John Deere	Good/7,491	90
Unit 2	Caterpillar	Poor/21,906	98
Unit 3			
Unit 4			
Line Loss	13.8%		
Heat Recovery?	No		

Upgrades	**Priority**	**Projects**	**Status**
RPSU Powerhouse	Low		
RPSU Distribution	Med.		
Outage History/Known Issues			

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

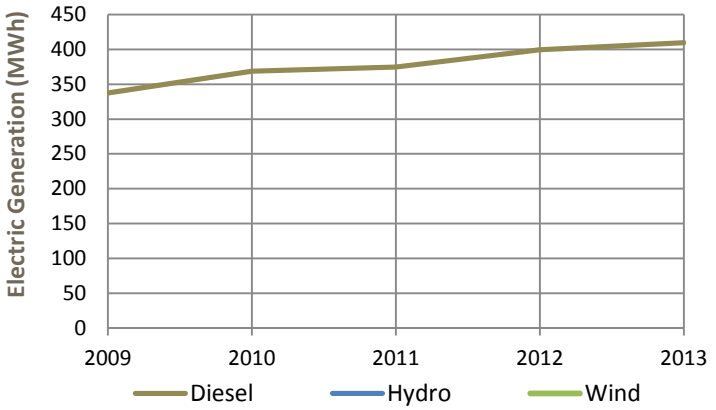
Maintenance Planning (RPSU)	Excellent

Electric Sales	**No. of Customers**	**kWh/year**	**kWh/Customer**
Residential	39	130,544	3,347
Community	2	4,414	2,207
Commercial	12	203,824	16,985
Utility Use		4,157	



Power Production

Diesel (kWh/yr)	398,000	**Avg. Load (kW)**	36
Wind (kWh/yr)	0	**Peak Load (kW)**	80
Hydro (kWh/yr)	0	**Efficiency (kWh/gal)**	11
Total (kWh/yr)	398,000	**Diesel Used (gals/yr)**	36,439



Electric Rates ($/kWh)		**Cost per kWh Sold ($/kWh)**	
Rate with PCE	$0.26	**Fuel Cost**	$0.40
Residential Rate	$0.81	**Non-fuel Cost**	$0.19
Commercial Rate		**Total Cost**	$0.59

Fuel Prices ($)	**Utility/Wholesale**	**Retail**	**Month/Year**
Diesel (1 gal)	$3.82		6-13
Other Fuel? (1 gal)			
Gasoline (1 gal)			
Propane (100#)			
Wood (1 cord)			
Pellets			
Discounts?			

Alternative Energy	**Potential**	**Projects**	**Status**
Hydroelectric	Low		
Wind Diesel	Low		
Biomass	Medium		
Solar	High	Residences with PV tied to grid	Operational
Geothermal	Low		
Oil and Gas	Low	Yukon Flats oil & gas exploration in 2013	Low certainty
Coal	Low		
Emerging Tech	Not Rated		
Heat Recovery	Medium	Powerhouse relocated; interest in HR	
Energy Efficiency	Medium		

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

Energy Profile: Circle

Housing Units	Occupied	Vacant	% Owner-Occup.
	22	22	86%

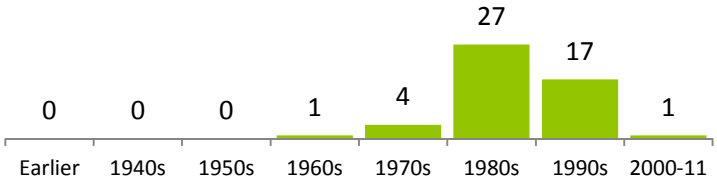
Regional Housing Authority	Weatherization Service Provider
IRHA	Interior Weatherization Inc

Housing Need	Overcrowded	1-star
	13.6%	N/A

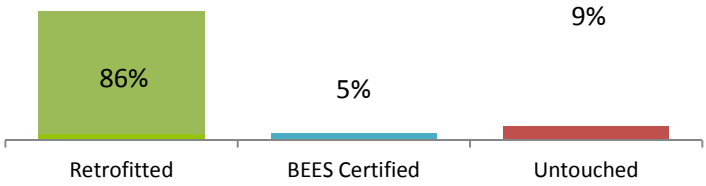
Energy Use	Average Home Energy Rating	Average Square Feet	Avg. EUI (kBTU/sf)
	N/A	N/A	N/A

Data Quality

Age of Housing Stock



Energy Efficient Housing Stock

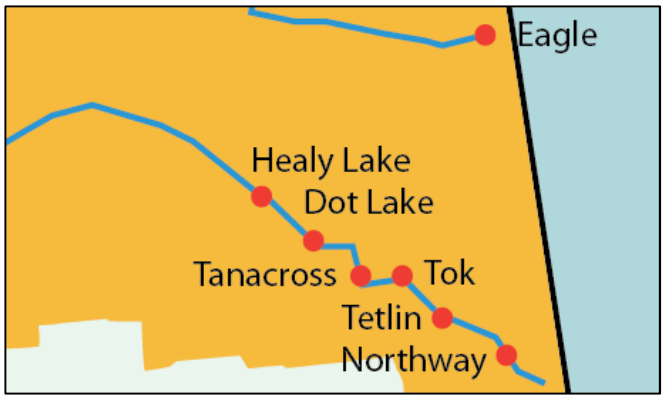


Street Lighting	Owner	Number/Type	Retrofitted?	Year	Notes
		3/HPS	No		Need additional streetlights

Non-residential Building Inventory

Building Name or Location	Year Built	Square Feet	Audited?	Retrofits Done?	In ARIS?
Circle K-12 School		9,206			No
Clinic					No
Community Hall					No
Fire Hall					No
Holy Trinity Church		320			No
Post Office		600			No
Tribal Office					
VPSO Housing					
Warehouse		1,575			No

Community Profile: Dot Lake



Alaska Native Name (definition)
Kelt'aaddh Menn'

Historical Setting / Cultural Resources
Dot Lake was originally a resting and hunting spot for the Athabascans in the Upper Tanana subregion. It was founded as a community in the mid 1940s by Doris Charles who was originally from Batzulnetas/Tanacross. Other native families soon followed. Dot Lake is a Native community.

Energy Priorities and Projects
Add solar PV to homes & community buildings;
retrofit VC owned triplex

Incorporation	Unincorporated

Location
Dot Lake and Dot lake Village are located on the Alaska Highway, 50 miles northwest of Tok and 155 road miles southeast of Fairbanks. It lies south of the Tanana River.

Longitude	-144.1699	**Latitude**	63.5852
ANCSA Region	N/A		
Borough/CA	Southeast Fairbanks Census Area		
School District	Alaska Gateway School District		
AEA Region	Yukon-Koyukuk/Upper Tanana		

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

Economy
Local government, state government, and education/health services are the main employers for the village.

Climate	**Avg. Temp.**	**Climate Zone**	**Heating Deg. Days**
	24	8	14,829

Natural Hazard Plan	**Year**
None	
Notes	

Community Plans	**Year**

Local Contacts	**Email**	**Phone**	**Fax**
Dot Lake Village Council		882-2695	
Dot Lake Native Corporation		347-1251	

Demographics	**2000**	**2010**
Population	57	75
Median Age	39	39
Avg. Household Size	3	3
Median Household Income		$22,500

	2013
Percent of Residents Employed	39.7%
Denali Commission Distressed Community	Yes
Percent Alaska Native/American Indian (2010)	72.0%
Low and Moderate Income (LMI) Percent (2014)	N/A

Electric Utility	**Generation Sources**	**Interties**	**PCE?**
Alaska Power and Telephone Company	Intertie	Tetlin, Tok Dot Lake Village, Tanacross	Yes

Landfill	**Class**	3	**Permitted?**	Yes	**Location**	Dot Lake

Water/Wastewater System		**Homes Served**	**System Volume**
Water	Piped system, and well	7	
Sewer	Community septic system	**Energy Audit?**	
Notes		No	

Access						
Road	Yes					
Air Access	No	**Runway**				
Dock/Port	No	**Barge Access?**	No	**Ferry Service?**	No	
Notes	Supplies are brought in by truck or bus. The nearest public airstrips are at Delta Junction and Tok. Cars, trucks, snow machines, and ATVs are used for local transportation.					

Energy Profile: Dot Lake

Diesel Power System

Utility	Alaska Power & Telephone Company		
Engine	**Make/Model**	**Condition/Hrs**	**Gen Capacity**
Unit 1	Intertie to AP&T Powerhouse in Tok		
Unit 2			
Unit 3			
Unit 4			
Line Loss			
Heat Recovery?			

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

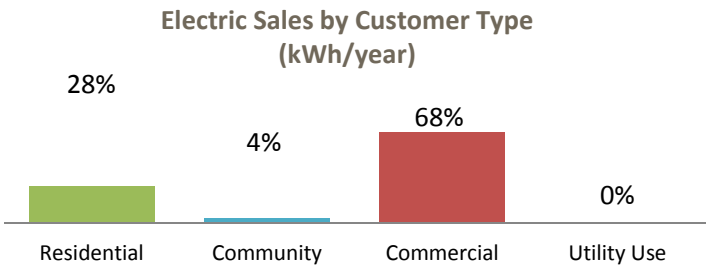
Outage History/Known Issues

Production shows Tok Powerhouse. PCE includes DL & DL Village.

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

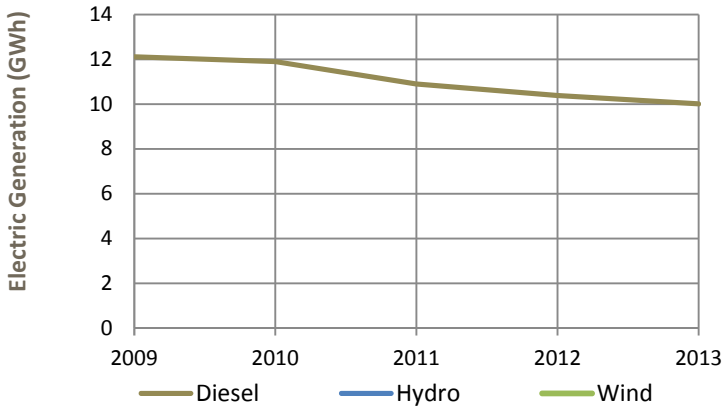
Maintenance Planning (RPSU) N/A

Electric Sales	**No. of Customers**	**kWh/year**	**kWh/Customer**
Residential	25	97,063	3,883
Community	2	14,463	7,232
Commercial	18	235,922	13,107
Utility Use		500	



Power Production

Diesel (kWh/yr)	9,499,440	**Avg. Load (kW)**	9
Wind (kWh/yr)	0	**Peak Load (kW)**	19
Hydro (kWh/yr)	0	**Efficiency (kWh/gal)**	14
Total (kWh/yr)	9,499,440	**Diesel Used (gals/yr)**	657,326



Electric Rates ($/kWh)		**Cost per kWh Sold ($/kWh)**	
Rate with PCE	$0.21	**Fuel Cost**	N/A
Residential Rate	$0.45	**Non-fuel Cost**	$0.08
Commercial Rate		**Total Cost**	$0.08

Fuel Prices ($)	**Utility/Wholesale**	**Retail**	**Month/Year**
Diesel (1 gal)	$3.75	$4.60	6-13; 8-14
Other Fuel? (1 gal)			
Gasoline (1 gal)			
Propane (100#)		$108.81	8-14
Wood (1 cord)			
Pellets			
Discounts?			

Alternative Energy	**Potential**	**Projects**	**Status**
Hydroelectric	High	1) Yerrick Creek, 1.5 MW, Tanacross 2) Clearwater Creek	1) Final design/ permitting; 2) Secure funds, develop post YC
Wind Diesel	Medium	1) Chisana Mt Feasibility 2) Tok- 7 Mile Wind	1) Feasibility/Met Tower 2) Feasible, securing funds
Biomass	Medium	Garn Wood-Fired Boiler	Installed/inoperable due to fire
Solar	High	AP&T utility-scale investigation	Feasibility
Geothermal	Low		
Oil and Gas	Low	Alternative fuel under utility investigation	Feasibility
Coal	Low		
Emerging Tech	Not Rated		
Heat Recovery	Low		
Energy Efficiency	Medium		

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

Energy Profile: Dot Lake

Housing Units	Occupied	Vacant	% Owner-Occup.
	17	11 (not livable)	71%

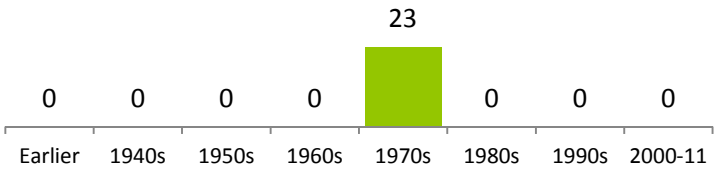
Regional Housing Authority	Weatherization Service Provider
IRHA	IRHA, ACDC

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

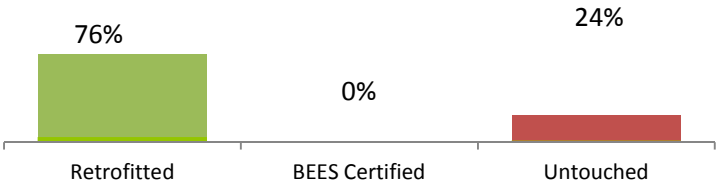
Data Quality	Low

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

Age of Housing Stock



Energy Efficient Housing Stock

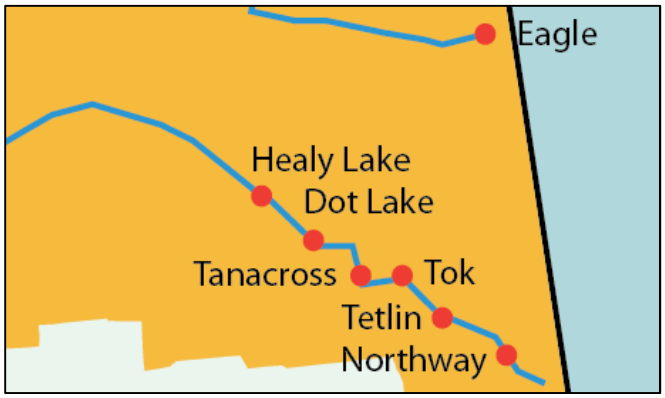


Street Lighting	Owner	Number/Type	Retrofitted?	Year	Notes
		3 or 4/LED	Yes		

Non-residential Building Inventory

Building Name or Location	Year Built	Square Feet	Audited?	Retrofits Done?	In ARIS?
Community Center & Clinic					
Dot Lake Chapel, Parsonage & Trailer		480			No
Dot Lake School		11,330			Yes
Dot Lake Village Council Office					
Garage					
Hockey Shed		640			No
Post Office		1,000			No
Safe House					
Storage Units					
Utility Building/Laundromat					

Community Profile: Eagle



Alaska Native Name (definition)
Tthee T'äwdlenn

Historical Setting / Cultural Resources

The area has been the historical home to Han Gwich'in Indians. By 1898, the population had grown to over 1,700. A U.S. Army camp was established in 1899, and Fort Egbert was completed in 1900. Eagle became the first incorporated city in the Interior in January 1901. The Valdez-Eagle Telegraph line was completed in 1903. By 1910, Fairbanks and Nome gold prospects had lured away many. The adjacent Eagle Village is home to Alaska Natives. Subsistence activities are part of the lifestyle.

Energy Priorities and Projects

Biomass heating systems for community buildings; look into wind; EE & basic retrofits to new buildings (post-flood); utility-scale solar coming online; solar PV on tribal office;
add community facilities to PCE

Incorporation	2nd Class City

Location

Eagle and Eagle Village are located on the Taylor Highway, 6 miles west of the Alaska-Canadian border. Eagle is on the left bank of the Yukon River. The Yukon-Charley Rivers National Preserve is northwest of the area.

Longitude	-141.2000	**Latitude**	64.7881
ANCSA Region	N/A		
Borough/CA	Southeast Fairbanks Census Area		
School District	Alaska Gateway School District		
AEA Region	Yukon-Koyukuk/Upper Tanana		

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

Economy

Local government, state government, and trade/utilites are the main employers in the village.

Climate	**Avg. Temp.**	**Climate Zone**	**Heating Deg. Days**
	24.6	8	14,891

Natural Hazard Plan	**Year**
None	

Notes

Community Plans	**Year**
Scheduled with TCC (includes City)	2016

Local Contacts	**Email**	**Phone**	**Fax**
City of Eagle	eaglecty@aptalaska.net	547-2282	547-2338
Tanana Chiefs Conference		452-8251	459-3851
Native Village of Eagle	eaglevillagecouncil@outlook.com	547-2781	547-2318

Demographics	**2000**	**2010**		**2013**
Population	129	86	**Percent of Residents Employed**	36.4%
Median Age	45	56	**Denali Commission Distressed Community**	Yes
Avg. Household Size	3	3	**Percent Alaska Native/American Indian (2010)**	9.2%
Median Household Income		$37,000	**Low and Moderate Income (LMI) Percent (2014)**	47.9%

Electric Utility	**Generation Sources**	**Interties**	**PCE?**
Alaska Power and Telephone Company	Intertie	Eagle Village	Yes

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

Water/Wastewater System	**None**	**Homes Served**	**System Volume**
Water	Central well, hauled		
Sewer	Some plumbing	**Energy Audit?**	
Notes	Washeteria planned	Yes	

Access

Road	Yes				
Air Access	Yes	**Runway**	3600' x 75'		
Dock/Port	No	**Barge Access?**	Yes	**Ferry Service?**	No

Notes Eagle has access to the state road system and Canada only during summer months. A state-owned gravel airstrip is available; flights originate from Fairbanks. Goods are shipped in by air during the winter months.

Energy Profile: Eagle

Diesel Power System

Utility	Alaska Power & Telephone Company		
Engine	**Make/Model**	**Condition/Hrs**	**Gen Capacity**
Unit 1	Cummins	Good/8,290	150
Unit 2	Cummins	Good/78,321	175
Unit 3	Cummins	Good/8,664	125
Unit 4			
Line Loss	11.6%		
Heat Recovery?	Yes; School, Truck Shop		

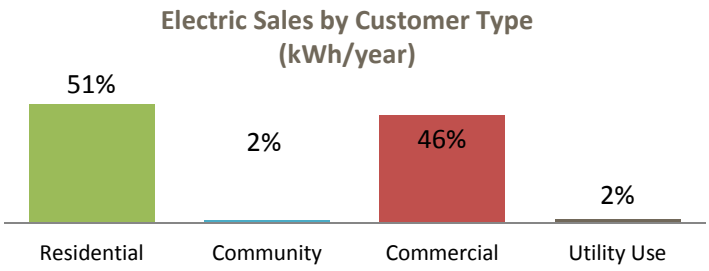
Upgrades	**Priority**	**Projects**	**Status**
RPSU Powerhouse	Low		
RPSU Distribution	Low		

Outage History/Known Issues PCE data-Eagle & Eagle Village

Engine & switchgear replacement needed.

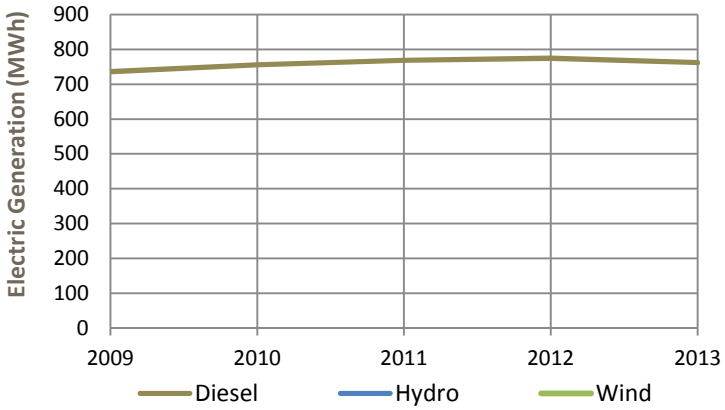
Operators	**No. of Operators**	**Training/Certifications**

Maintenance Planning (RPSU)	Excellent		
Electric Sales	**No. of Customers**	**kWh/year**	**kWh/Customer**
Residential	132	310,097	2,349
Community	7	9,706	1,387
Commercial	35	281,226	8,035
Utility Use		10,328	



Power Production

Diesel (kWh/yr)	691,440	**Avg. Load (kW)**	49
Wind (kWh/yr)	0	**Peak Load (kW)**	109
Hydro (kWh/yr)	0	**Efficiency (kWh/gal)**	13
Total (kWh/yr)	691,440	**Diesel Used (gals/yr)**	51,281



Electric Rates ($/kWh)		**Cost per kWh Sold ($/kWh)**	
Rate with PCE	$0.24	**Fuel Cost**	$0.34
Residential Rate	$0.72	**Non-fuel Cost**	$0.35
Commercial Rate		**Total Cost**	$0.68

Fuel Prices ($)	**Utility/Wholesale**	**Retail**	**Month/Year**
Diesel (1 gal)	$3.80	$6.00	6-15
Other Fuel? (1 gal)			
Gasoline (1 gal)	$4.50-$5		6-15
Propane (100#)		$115.95	8-14
Wood (1 cord)		$375.00	6-15
Pellets			
Discounts?			

Alternative Energy	**Potential**	**Projects**	**Status**
Hydroelectric	Medium	American Creek	Feasibility
Wind Diesel	Low		Further reconnaissance needed
Biomass	Medium		
Solar	High	24kW Solar PV Array & 3kW PV on Tribal Office	Operational
Geothermal	Low		
Oil and Gas	Low	Alternative fuel under utility investigation	Feasibility
Coal	Low		
Emerging Tech	Not Rated	Experimental Hydrokinetic Turbine	Discontinued
Heat Recovery	Low	HR to school and truck stop	Operational
Energy Efficiency	High	AHFC-C	Complete

Bulk Fuel

Tank Owner	**Fuel Type(s)**	**Capacity**	**Age/Condition**
AP&T		50,000	Needs Upgrade
Eagle Trading CO.	Fuel Oil/Gas		
Telegraph Hill Services			

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

Purchasing	**Deliveries/Year**	**Gallons/Delivery**	**Vendor(s)**
By Truck	1 to 2		
By Air			

Cooperative Purchasing Agreements

Notes

Energy Profile: Eagle

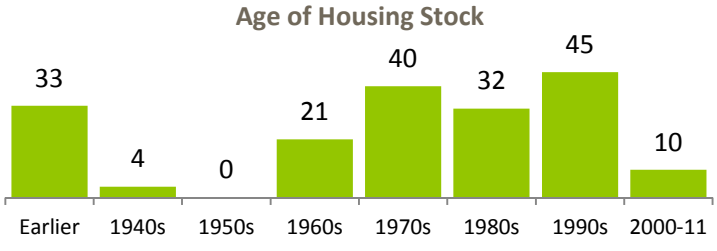
Housing Units	Occupied	Vacant	% Owner-Occup.
	70	115	79%

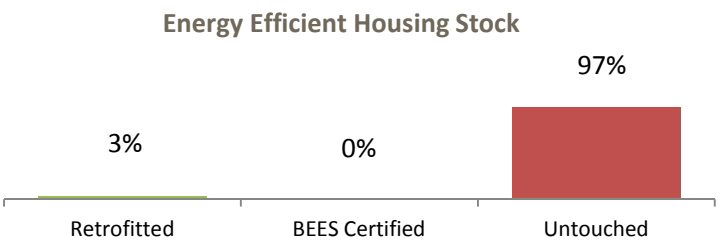
Regional Housing Authority	Weatherization Service Provider
IRHA	ACDC

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



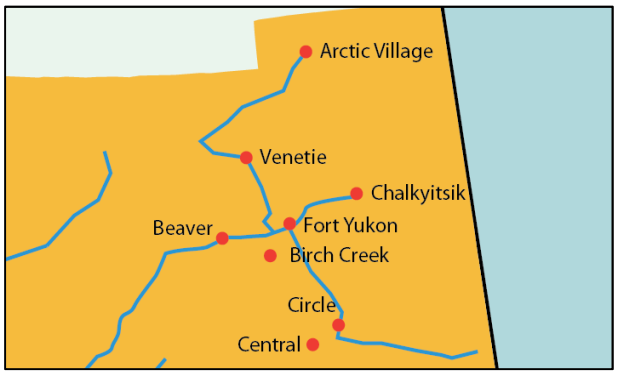


Street Lighting	Owner	Number/Type	Retrofitted?	Year	Notes
	Village	5	No	2000-2011	Village has lights; City doesn't.

Non-residential Building Inventory

Building Name or Location	Year Built	Square Feet	Audited?	Retrofits Done?	In ARIS?
Adult training center (planned)					
Airport Lighting		96			No
Bunk House		1,018			Yes
City Hall (New Addition)		384			Yes
Clinic	2012			Yes; EECBG	No
Eagle Community School	1986	17,092	Yes; Nortech		Yes
Fire Hall		1,760			Yes
Library		1,500			Yes
Maintenance Shop/Office		3,040			Yes
Multipurpose (Village)					
Office		1,018			No
Old School House		1,350			Yes
Redman Hall		1,475			No
Store/Laundromat		2,700			No
Tribal Hall	2001			Yes; EECBG	No
Village Garage					
Village well-house					
VPSO					
Washeteria (under construction)					
Well House	2012	684			Yes

Community Profile: Fort Yukon



Incorporation 2nd Class City

Location

Fort Yukon is located at the confluence of the Yukon and Porcupine Rivers, about 145 air miles northeast of Fairbanks.

Longitude	-145.2739	**Latitude**	66.5647
ANCSA Region	Doyon, Limited		
Borough/CA	Yukon-Koyukuk Census Area		
School District	Yukon Flats School District		
AEA Region	Yukon-Koyukuk/Upper Tanana		

Alaska Native Name (definition)

Gwichyaa Zhee "house on the flats"

Taxes	**Type (rate)**	**Per-Capita Revenue**
	3% Sales	$ 300

Historical Setting / Cultural Resources

Fort Yukon became an important trade center for the Gwich'in Athabascans. Major epidemics of introduced diseases struck the Fort Yukon population from the 1860s to 1920s. In 1949, a flood damaged or destroyed many homes in Fort Yukon. During the 1950s, an Air Force station were established. Most residents are descendants of the Yukon Flats, Chandalar River, Birch Creek, Black River, and Porcupine River Gwich'in Athabascan tribes. City is a regional hub with 15,000 sq ft clinic, FWS station, and base of operations for YFSD.

Economy

Local government and trade are main forms of employment for the village.

Climate	**Avg. Temp.**	**Climate Zone**	**Heating Deg. Days**
	35	8	16,326

Natural Hazard Plan	**Year**
Yes	2010

Notes

Energy Priorities and Projects

CHP Biomass project; Solar PV in place add to RCC building; develop logging area for stockpiling wood; apply for DOE TA; EE & cost effective heating & lighting in school; used oil program; add community facilities to PCE

Community Plans	**Year**
Beyond Vision: Gwichyaa Zhee Gwich'in Tribal Government Community Plan	2007
City of Fort Yukon Comprehensive Plan	1996

Local Contacts	**Email**	**Phone**	**Fax**
City of Fort Yukon	cityclerk@gci.net	662-2479	662-2717
Gwichyaa Zhee Gwich'in Tribal Government	janet.cadzow@fortyukon.org; Nancy.James@fortyukon.org	662-2581	662-2222
Gwitchyaa Zhee Corporation		662-2933	662-3056

Demographics	**2000**	**2010**		**2013**
Population	595	583	**Percent of Residents Employed**	65.2%
Median Age	32	34	**Denali Commission Distressed Community**	Yes
Avg. Household Size	3	3	**Percent Alaska Native/American Indian (2010)**	89.1%
Median Household Income	$29,375	$32,292	**Low and Moderate Income (LMI) Percent (2014)**	69.2%

Electric Utility	**Generation Sources**	**Interties**	**PCE?**
Gwitchyaa Zhee Utilities	Diesel	No	Yes

Landfill	**Class**	3	**Permitted?**	No	**Location**	Fort Yukon

Water/Wastewater System	**City of Fort Yukon**	**Homes Served**	**System Volume**
Water	Piped, delivery, and wells	204	50,001 - 100,000
Sewer	Plumbing in 50% of community	**Energy Audit?**	
Notes	ANTHC to install remote monitor to stop failures (freeze ups). Install Dec. 2015	in 2016	

Access

Road	No				
Air Access	Yes	**Runway**	5000' x 100'		
Dock/Port	No	**Barge Access?**	Yes	**Ferry Service?**	No

Notes Fort Yukon is accessible by air year-round and by barge during the summer. Heavy cargo is brought in by barge from the end of May through mid-September. Grocery items and other supplies are also shipped by air.

Energy Profile: Fort Yukon

Diesel Power System

Utility	Gwitchyaa Zhee Utilities Company

Engine	Make/Model	Condition/Hrs	Gen Capacity
Unit 1	Caterpillar	Fair/9,497	600
Unit 2	Caterpillar	Fair/24,865	560
Unit 3	Caterpillar	Fair/13,148	455
Unit 4	Caterpillar	Fair/4,971	455

Line Loss	19.1%
Heat Recovery?	No

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

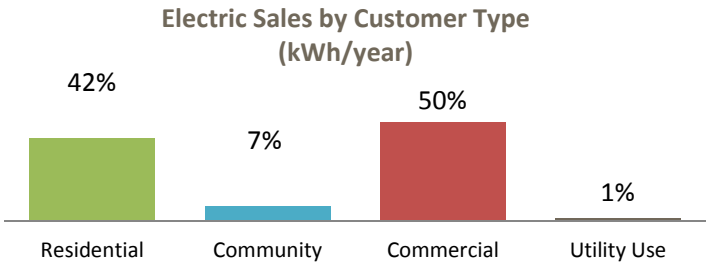
Outage History/Known Issues

Outage Dec. 2014

Operators	No. of Operators	Training/Certifications
	3 (2 full-time)	PPO, Utility Clerk

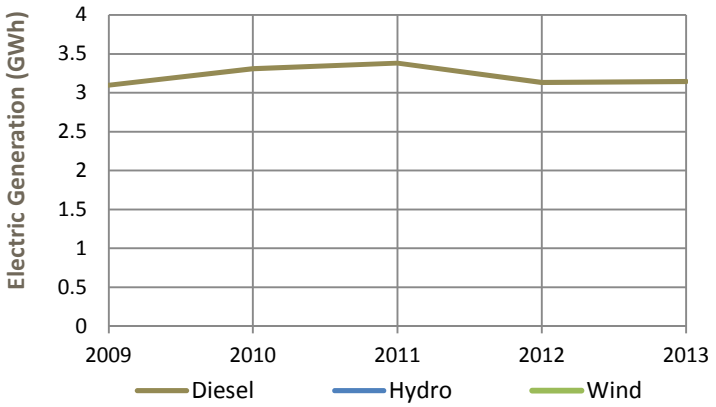
Maintenance Planning (RPSU)	Acceptable

Electric Sales	No. of Customers	kWh/year	kWh/Customer
Residential	253	1,077,875	4,260
Community	11	185,072	16,825
Commercial	79	1,283,009	16,241
Utility Use		32,884	



Power Production

Diesel (kWh/yr)	3,187,282	**Avg. Load (kW)**	279
Wind (kWh/yr)	0	**Peak Load (kW)**	620
Hydro (kWh/yr)	0	**Efficiency (kWh/gal)**	17
Total (kWh/yr)	3,187,282	**Diesel Used (gals/yr)**	188,090



Electric Rates ($/kWh)		Cost per kWh Sold ($/kWh)	
Rate with PCE	$0.20	**Fuel Cost**	$0.43
Residential Rate	$0.64	**Non-fuel Cost**	$0.15
Commercial Rate		**Total Cost**	$0.58

Fuel Prices ($)	Utility/Wholesale	Retail	Month/Year
Diesel (1 gal)	$5.81	$6.57	6-13; 8-14
Other Fuel? (1 gal)			
Gasoline (1 gal)			
Propane (100#)		$211.90	8-14
Wood (1 cord)			
Pellets			
Discounts?			

Alternative Energy	Potential	Projects	Status
Hydroelectric	Low		
Wind Diesel	Low		
Biomass	High	CHP District Heating Loop & Chip boiler at clinic	Final Design/Construction
Solar	High	1) 17 kW PV Tribal Off. 2) 3.4 kW PV Greenhouse	1) Operational 2) Planned
Geothermal	Low		
Oil and Gas	Low	Yukon Flats oil & gas exploration in 2013	Low certainty
Coal	Low		
Emerging Tech	Not Rated		
Heat Recovery	Low	Part of District Wood Heating	Final Design/Construction
Energy Efficiency	High	1) VEEP 2) ANTHC Sanitation EE Audit & Remote Monitor	1) Complete 2) Funded (2016 Install)

Bulk Fuel

Tank Owner	Fuel Type(s)	Capacity	Age/Condition

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

Cooperative Purchasing Agreements

Bulk Fuel Upgrade	Priority	Project	Status
			Complete 2012

Notes

Energy Profile: Fort Yukon

Housing Units	Occupied	Vacant	% Owner-Occup.
	231	99	74%

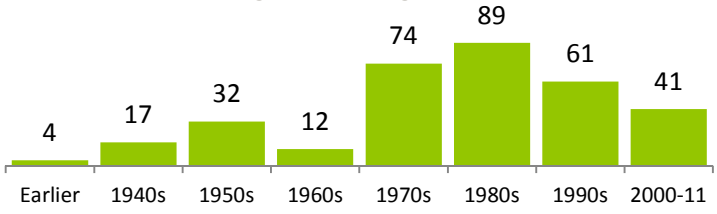
Regional Housing Authority	Weatherization Service Provider
IRHA	TCC

Housing Need	Overcrowded	1-star
	18.2%	N/A

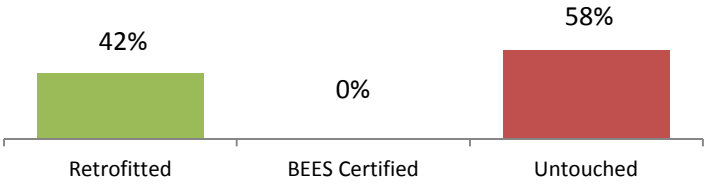
Energy Use	Average Home Energy Rating	Average Square Feet	Avg. EUI (kBTU/sf)
	N/A	N/A	N/A

Data Quality	
	Low

Age of Housing Stock



Energy Efficient Housing Stock



Street Lighting	Owner	Number/Type	Retrofitted?	Year	Notes
	City Ft. Yukon	110/HPS	Yes	2012	LED retrofits; $31,799 annual savings

Non-residential Building Inventory

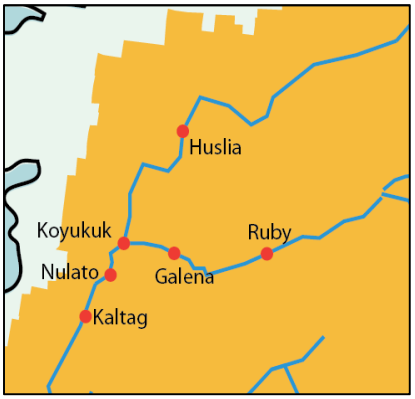
Building Name or Location	Year Built	Square Feet	Audited?	Retrofits Done?	In ARIS?
AC Commercial Company Store		9,917			No
Addie Shewfelt Bldg.	1974	2,059	Yes; Ameresco		No
Airport Electrical		176			No
ANTHC Office				Yes; VEEP	No
ANTHC Warm Storage				Yes; VEEP	No
Arctic Circle Baptist Church				Yes; VEEP	No
Assembly of God Church				Yes; VEEP	No
Bingo Hall				Yes; VEEP	No
CATG Natural Resource Dept.				Yes; VEEP	No
City Hall	1981	3,120	Yes; Ameresco		No
City Offices				Yes; VEEP	No
City Shop				Yes; VEEP	No
Combined Facility		3,472			Yes
Community Kitchen				Yes; VEEP	No
District Office		3,268			No
Education Department				Yes; VEEP	No
Elder Kitchen				Yes; VEEP	No
Elder's Bldg.				Yes; VEEP	No
Episcopal Church				Yes; VEEP	No
F&G Storage		576			No
Fort Yukon School		32,000			No
Fuel Company				Yes; VEEP	No
Gwandak Public Broadcasting & CATG Bldg.		2,188	Yes; Ameresco		No
Gym		10,000			No
Learning Center				Yes; VEEP	No
Liquor Store				Yes; VEEP	No
New Clinic				Yes; VEEP	No
Old Clinic Shop				Yes; VEEP	No
Power House	~1940s		Yes; Ameresco		No
Pump Station 2				Yes; VEEP	No
Red Recycling Bldg.				Yes; VEEP	No

Energy Profile: Fort Yukon

Non-residential Building Inventory (cont.)

Building Name or Location	Year Built	Square Feet	Audited?	Retrofits Done?	In ARIS?
Richard C. Carroll Community Center		1,800	Yes; Ameresco	Yes; VEEP	No
School Bus Barn				Yes; VEEP	No
School Shop				Yes; VEEP	No
SRE Bldg.		2,000			Yes
Tribal Hall	1982	4,740	Yes; Ameresco		No
Tribal Office			Yes; Ameresco	Yes; VEEP	No
Utility Office				Yes; VEEP	No
Vocational Education Bldg. (New)		9,147		Yes; VEEP	No
Vocational Education Bldg. (Old)		2,304		Yes; VEEP	No
Vocational Education Dorms				Yes; VEEP	No
Vocational Education Shops				Yes; VEEP	No
Water Plant				Yes; VEEP	No
Youth R Us				Yes; VEEP	No

Community Profile: Galena



Incorporation	1st Class City

Location

Galena is located on the north bank of the Yukon River, 45 miles east of Nulato and 270 air miles west of Fairbanks. It lies northeast of the Innoko National Wildlife Refuge.

Longitude	-156.9275	**Latitude**	64.733
ANCSA Region	Doyon, Limited		
Borough/CA	Yukon-Koyukuk Census Area		
School District	Galena City School District		
AEA Region	Yukon-Koyukuk/Upper Tanana		

Alaska Native Name (definition)

Notaalee Denh

Taxes	**Type (rate)**	**Per-Capita Revenue**
	3% Sales, 6% Bed, 3% Sin	$ 490

Historical Setting / Cultural Resources

Galena was established in 1918. It became a supply and trans-shipment point for nearby lead ore mines. In 1920, Athabascans living 14 miles upriver at Louden began moving to Galena to sell wood to steamboats and to work hauling for the mines. In the 1950s military facilities and road developments sparked growth. The USAF station closed in 1993, and the facilities are currently being used by the Galena School District as a boarding school. The population is mixed Athabascan and non-Native.

Economy

Local government, education and health services, construction, and trade are the top employers in the community.

Climate	**Avg. Temp.**	**Climate Zone**	**Heating Deg. Days**
	26.1	8	14,847

Natural Hazard Plan	**Year**
Yes (flooding)	Updated 2015

Notes

Energy Priorities and Projects

* Biomass heating for GILA;Biomass steam plant utilidor upgrade
* Residential smart meters - remote monitor by utility
* Powerhouse and electric distribution upgrade & improve efficiency
* More solar PV arrays

Community Plans	**Year**
Galena Strategic Community Plan 2012-17	2012
Comprehensive Plan (after flood)	

Local Contacts	**Email**	**Phone**	**Fax**
City of Galena	shuntington@ci.galena.ak.us	656-1769	656-1769
Louden Tribal Council	marchrunner@aol.com	656-1711	656-1716

Demographics	**2000**	**2010**		**2013**
Population	675	470	**Percent of Residents Employed**	66.5%
Median Age	29	37	**Denali Commission Distressed Community**	No
Avg. Household Size	3	3	**Percent Alaska Native/American Indian (2010)**	64.9%
Median Household Income	$61,125	$60,313	**Low and Moderate Income (LMI) Percent (2014)**	26.8%

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

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

Water/Wastewater System	**City of Galena**	**Homes Served**	**System Volume**
Water	Wells and piped system	190	10,000 - 50,000
Sewer	Piped sewer (60%) and flush & haul system (40%);	**Energy Audit?**	
Notes	less than 10% use honey buckets		

Access

Road	No				
Air Access	Yes	**Runway**	2786' x 80';	7249' x 150'	
Dock/Port	Yes	**Barge Access?**	Yes	**Ferry Service?**	No

Notes Galena serves as the transportation and commercial center for surrounding villages in the western Interior. Rivers are used for travel to Ruby, Koyukuk, Kaltag, and Nulato. A winter trail is available to Huslia.

Energy Profile: Galena

Diesel Power System

Utility	City of Galena		
Engine	**Make/Model**	**Condition/Hrs**	**Gen Capacity**
Unit 1	Caterpillar	Fair	850
Unit 2	Caterpillar	Fair	500
Unit 3	Caterpillar	Poor	600
Unit 4	Caterpillar	Fair	1050
Unit 5	Caterpillar	Fair	600
Line Loss	17.0%		
Heat Recovery?	Yes; Water Plant, City Works Bldg., Pool, School, City Hall, Power Plant, Clinic		

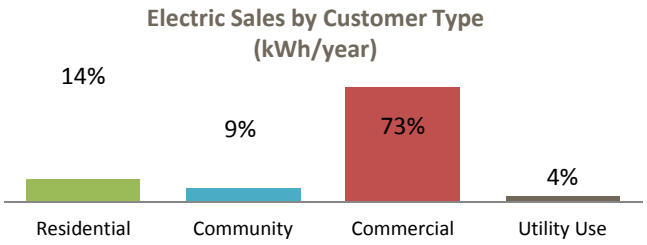
Upgrades	Priority	Projects	Status
RPSU Powerhouse	In Progress		
RPSU Distribution	In Progress		

Outage History/Known Issues

Damage sustained to powerhouse during 2013 flood.

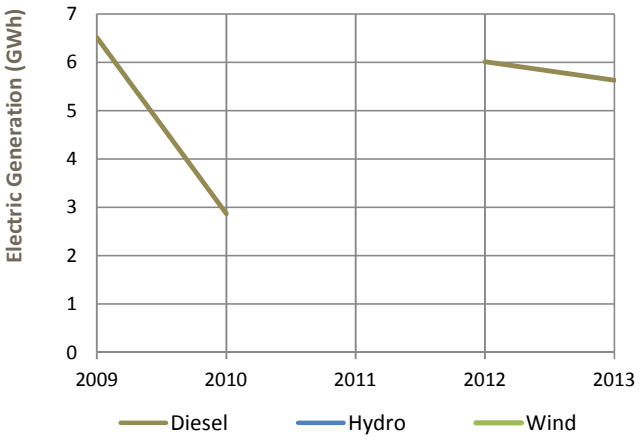
Operators	No. of Operators	Training/Certifications
	4 FT	BFO, PPO
	1 back-up	
Maintenance Planning (RPSU)	Acceptable	

Electric Sales	No. of Customers	kWh/year	kWh/Customer
Residential	186	639,927	3,440
Community	9	402,678	44,742
Commercial	158	3,288,406	20,813
Utility Use		178,499	



Power Production

Diesel (kWh/yr)	5,852,965	**Avg. Load (kW)**	789
Wind (kWh/yr)	0	**Peak Load (kW)**	1,753
Hydro (kWh/yr)	0	**Efficiency (kWh/gal)**	13
Total (kWh/yr)	5,852,965	**Diesel Used (gals/yr)**	447,148



Electric Rates ($/kWh)		Cost per kWh Sold ($/kWh)	
Rate with PCE	$0.35	**Fuel Cost**	$0.38
Residential Rate	$0.67	**Non-fuel Cost**	$0.12
Commercial Rate		**Total Cost**	$0.50

Fuel Prices ($)	Utility/Wholesale	Retail	Month/Year
Diesel (1 gal)	$2.72	$5.90	6-13; 8-14
Other Fuel? (1 gal)			
Gasoline (1 gal)	$7.03	$7.03	
Propane (100#)		$205.71	8-14
Wood (1 cord)			
Pellets			
Discounts?			

Alternative Energy	Potential	Projects	Status
Hydroelectric	Low		
Wind Diesel	Low		
Biomass	High	Chip-fired boiler system for GILA school	Construction in 2016
Solar	High	30kW of PV panels - multiple buildings	Operational
Geothermal	Low		
Oil and Gas	Low		
Coal	Low		
Emerging Tech	Not Rated		
Heat Recovery	High	HR to WTP, community buildings	Operational
Energy Efficiency	High	ANTHC Sanitation EE Audit	Funded, Expected in 2016

Bulk Fuel

Tank Owner	Fuel Type(s)	Capacity	Age/Condition
City		1,000,000	
Crowley		1,297,750	
City Power Plant	Diesel	630,000	
City School		60,500	
Tank #44		1,700,000	

Bulk Fuel Upgrade	Priority	Project	Status

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

Cooperative Purchasing Agreements

Notes

Barge delivery in June & July. Additional storage capacity of 167,000 at Air Base for airport/airlines.

Energy Profile: Galena

Housing Units	Occupied	Vacant	% Owner-Occup.
	173	106	64%

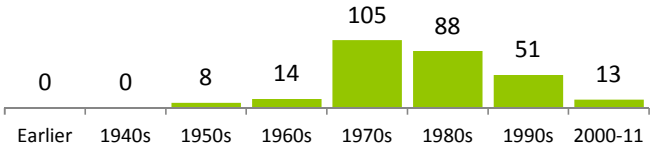
Housing Need	Overcrowded	1-star
	9.2%	N/A

Data Quality	Medium

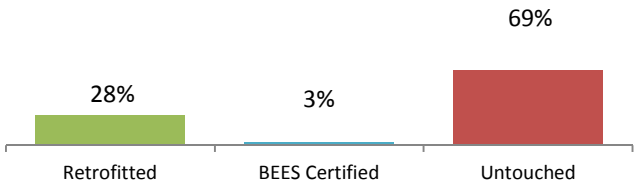
Regional Housing Authority	Weatherization Service Provider
IRHA	IRHA

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

Age of Housing Stock



Energy Efficient Housing Stock



Street Lighting	Owner	Number/Type	Retrofitted?
	City of Galena	121/LED	yes

Year	Notes
2012-2015	135/HPS were replaced with 121 LEDs

Non-residential Building Inventory

Building Name or Location	Year Built	Square Feet	Audited?	Retrofits Done?	In ARIS?
Administrative Office					
Archie's Store					
Arctic Circle Air Service					
Assisted Living Center	2009				
Aviation Tech Lab					
Birchwood Adult Dorm					
Birchwood Hall					
BLM Building					
Carpenter Main					No
Catholic Church					
City Offices	1980-2001	1,280			No
Cold Storage					
Community Mess Hall					
Cosmetology Bldg.		16,000	Yes; Ameresco		No
Crowley					
Dining Hall					
DOT Shop					
Early Learning Center					
Edgar Nollner Health Clinic	2003	10,500	Yes; Ameresco		No
Edward G Pitka Sr. Airport					
Elder Housing Center					
Evert Air Alaska					
F&W Storage Hangar					
Fire Department	1980s	1,500			No
Frontier Flying Service					
Galena Bible Church					
Galena Day Care					
Galena Liquor Store					
Galena Store					
Galena USAF Base					
Gana-A'Yoo Limited					
GILA Auto Shop	1959		Yes; Ameresco		No
GILA Composite Bldg.	1985				
GILA Gym	1966-2010	8,125	Yes; Nortech		Yes
GILA Headquarters	1984	17,590	Yes; Nortech		Yes
GILA Iditarod Hall	1987	15,124	Yes; Nortech		Yes
GILA School					
GM Auto Tech Lab					

Energy Profile: Galena

Non-residential Building Inventory (continued)

Building Name or Location	Year Built	Square Feet	Audited?	Retrofits Done?	In ARIS?
Joey's					
K&W Services (maintenance shop attached)					
KIYU Radio Station		12,536	Yes; Nortech		Yes
Large Steel Garage/Shop Facility					
Large Steel Work Shop					
Larson Community Hall	1985	35,579	Yes; Nortech		Yes
Louden House Garage					
Louden Office Storage					
Louden Tribal Council Office					
Maintenance Shop					
Maintenance Shop (New)		4,235	Yes; Ameresco		No
Mental Health Clinic					
Munitions Bldg.		5,400			No
Old Dining Hall					
Old Shop		21,228			Yes
Old Supply		10,623			No
Petroleum, Oils, & Lubricants Bldg.		3,500			No
Police Station					
Post Office					No
Power Plant					No
Ptarmigan Hall		800			No
Ravn Air					
Red Shed Storage Bldg.					
Sand Storage			Yes; Ameresco		No
Service/Maint. Shop City Garage					
Service/Maint. Shop State Garage					
SHS Storage		58,494			No
SHS Vocational		2,160			No
Sidney Huntington Elementary	1986	1,600			No
Sidney Huntington High School	1977				No
Steam Plant			Yes; Ameresco		No
Student Dormitory					
Suzuki Tech Lab					
Sweetsirs					
Swimming Pool		15,501	Yes; Amer./Nort.		Yes
Trooper Housing		33,776	Yes; Amer./Nort.		Yes
Two Seasons		7,800			No
UAF Interior Aleutians Campus		1,104			Yes
US Fish & Wildlife					
Vehicle Maintenance		10,662			No
Warm Storage Bldg.		6,531			No
Water Treatment Plant		6,720			No

Community Profile: Grayling

Alaska Native Name (definition)
Sixno' Xidakagg

Historical Setting / Cultural Resources

In 1900, the U.S. Revenue steamer Nunivak reported 75 inhabitants, a store, and a large wood yard to supply steamers. Between 1962 and 1966, 25 families moved from Holikachuk on the Innoko River to Grayling. Holikachuk was prone to annual spring flooding, and low water levels made the return trip from Yukon fish camps each year difficult. The population of Grayling is comprised of Holikachuk and Ingalik Indians. Subsistence activities are important to villagers' livelihoods.

Energy Priorities and Projects

Biomass heating for community hall; Energy audits, energy efficiency, upgrades, awareness and education, and upgrade schools; Add solar panels to homes and community bldgs; work with AVEC; Heat recovery system for community bldgs

Incorporation	2nd Class City

Location

Grayling is located in Interior Alaska on the west bank of the Yukon River, east of the Nulato Hills. It is 18 air miles north of Anvik.

Longitude	-160.0647	**Latitude**	62.9036
ANCSA Region	Doyon, Limited		
Borough/CA	Yukon-Koyukuk Census Area		
School District	Iditarod Area School District		
AEA Region	Yukon-Koyukuk/Upper Tanana		

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

Economy

Local government and professional services are main forms of employment in the village. There are 25 fishing permits issued.

Climate	**Avg. Temp.**	**Climate Zone**	**Heating Deg. Days**
		8	13,462

Natural Hazard Plan	**Year**
None	

Notes

Community Plans	**Year**

Local Contacts	**Email**	**Phone**	**Fax**
City of Grayling	cityofgrayling@yahoo.com	453-5148	453-5223
Hee-Yaa-Lingde Corporation		453-5133	453-5151
Organized Village of Grayling	rachel.freireich@tananachiefs.org	453-5116	453-5146

Demographics	**2000**	**2010**		**2013**
Population	194	194	**Percent of Residents Employed**	78.7%
Median Age	20	24	**Denali Commission Distressed Community**	Yes
Avg. Household Size	4	4	**Percent Alaska Native/American Indian (2010)**	87.4%
Median Household Income	$21,875	$23,125	**Low and Moderate Income (LMI) Percent (2014)**	93.0%

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

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

Water/Wastewater System		**Homes Served**	**System Volume**
Water	Drawn from Grayling Creek, and piped.	55	
Sewer	Piped sewer system	**Energy Audit?**	
Notes		Yes	

Access

Road	No				
Air Access	Yes	**Runway**	4000' x 75'		
Dock/Port	Yes	**Barge Access?**	Yes	**Ferry Service?**	No

Notes In summer, access is by air, riverboat, or barge. No roads connect to Grayling. Skiffs are used for transportation up and down the river during summer. Many supplies are bought in by airplane.

Energy Profile: Grayling

Diesel Power System

Utility	AVEC		
Engine	**Make/Model**	**Condition/Hrs**	**Gen Capacity**
Unit 1	Detroit Diesel	Fair/401	229
Unit 2	Cummins	Fair/34,678	168
Unit 3	Cummins	Fair/7,607	203
Unit 4			
Line Loss	4.0%		
Heat Recovery?	No		

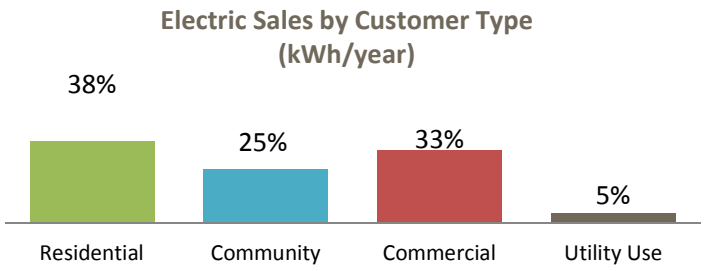
Upgrades	**Priority**	**Projects**	**Status**
RPSU Powerhouse	Medium		
RPSU Distribution	Medium		

Outage History/Known Issues

2 short unscheduled outages in 2015.

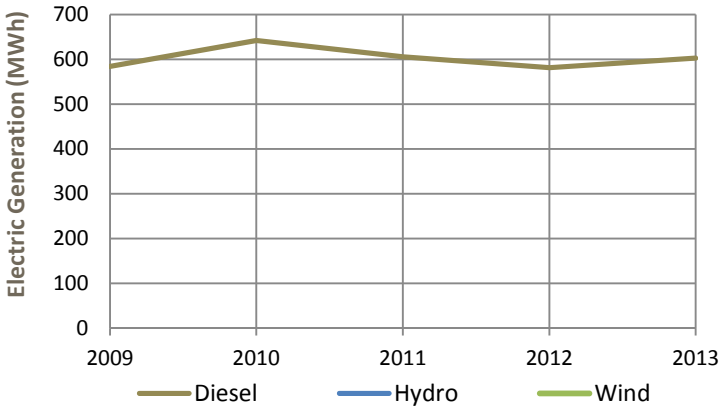
Operators	**No. of Operators**	**Training/Certifications**
	4	BFO, PPO

Maintenance Planning (RPSU)	Good		
Electric Sales	**No. of Customers**	**kWh/year**	**kWh/Customer**
Residential	62	214,856	3,465
Community	12	140,054	11,671
Commercial	11	189,365	17,215
Utility Use		27,368	



Power Production

Diesel (kWh/yr)	595,532	**Avg. Load (kW)**	70
Wind (kWh/yr)	0	**Peak Load (kW)**	209
Hydro (kWh/yr)	0	**Efficiency (kWh/gal)**	13
Total (kWh/yr)	595,532	**Diesel Used (gals/yr)**	44,826



Electric Rates ($/kWh)		**Cost per kWh Sold ($/kWh)**	
Rate with PCE	$0.20	**Fuel Cost**	$0.31
Residential Rate	$0.64	**Non-fuel Cost**	$0.23
Commercial Rate	$0.35	**Total Cost**	$0.54

Fuel Prices ($)	**Utility/Wholesale**	**Retail**	**Month/Year**
Diesel (1 gal)	$3.79	$5.75/$5.00	6-13; 8-14/1-12
Other Fuel? (1 gal)			
Gasoline (1 gal)		$6.00	1-12
Propane (100#)		$176.67	8-14
Wood (1 cord)			
Pellets			
Discounts?			

Alternative Energy	**Potential**	**Projects**	**Status**
Hydroelectric	Low		
Wind Diesel	Low		
Biomass	Low	1) Pre-FS for School 2)Project for Community Hall	1) Not feasible 2) In progress
Solar	High		
Geothermal	Low		
Oil and Gas	Low		
Coal	Low		
Emerging Tech	Not Rated		
Heat Recovery	High	Heat Recovery for community buildings	Seeking Funding
Energy Efficiency	Medium	1) Energy audits -public bldgs 2) EE Upgrades in Sanitation	1) Complete 2) In Progress (2015)

Bulk Fuel

Tank Owner	**Fuel Type(s)**	**Capacity**	**Age/Condition**
Consol. Farm	Gas/Diesel	175,300	17 yrs

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

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

Cooperative Purchasing Agreements

Notes

Energy Profile: Grayling

Housing Units	Occupied	Vacant	% Owner-Occup.
	50	12	48%

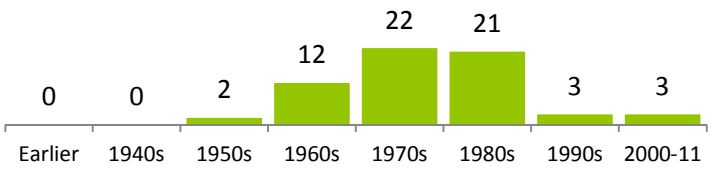
Regional Housing Authority	Weatherization Service Provider
IRHA	IRHA

Housing Need	Overcrowded	1-star
	34.0%	N/A

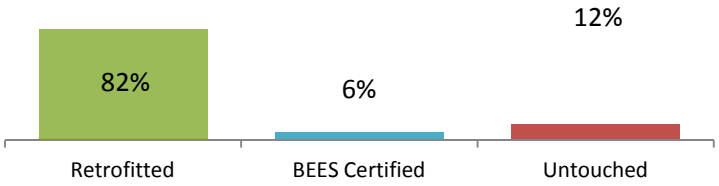
Energy Use	Average Home Energy Rating	Average Square Feet	Avg. EUI (kBTU/sf)
	N/A	N/A	N/A

Data Quality

Age of Housing Stock



Energy Efficient Housing Stock

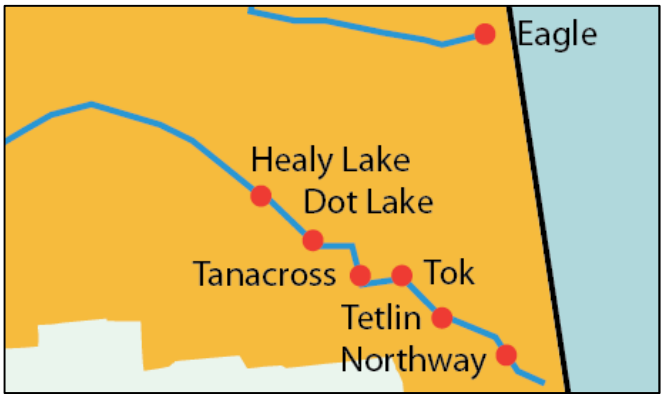


Street Lighting	Owner	Number/Type	Retrofitted?	Year	Notes

Non-residential Building Inventory

Building Name or Location	Year Built	Square Feet	Audited?	Retrofits Done?	In ARIS?
Airport Electrical		96			No
Clinic			Yes; ANTHC		No
David-Louis Memorial School	1987	21,370	Yes; Nortech		Yes
Equipment Storage Bldg.		2,000			No
Generator/Boiler Bldg.		2,064			No
Post Office/City Offices/Rental Rooms					No
SRE Bldg.		2,000			Yes
St. Paul's Church					No
Water Treatment Plant	1977	1,536	Yes; ANTHC		No

Community Profile: Healy Lake



Incorporation	Unincorporated

Location

The 5-mile long Healy Lake lies on the course of the Healy River, 29 miles east of Delta Junction.

Longitude	-144.6616	**Latitude**	64.0269
ANCSA Region	Doyon, Limited		
Borough/CA	Southeast Fairbanks Census Area		
School District	Delta-Greely School District		
AEA Region	Yukon-Koyukuk/Upper Tanana		

Alaska Native Name (definition)

Mendees Cha-ag

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

Historical Setting / Cultural Resources

The local name was reported in 1914 by the U.S. Geological Survey. Due to declining enrollment, the school closed in 1999. Healy Lake is a mixed Athabascan and non-Native community. It is a subsistence-based community with archeological carbon dating 15,000+ years and is considered one of the oldets tites known in North America.

Economy

Construction, Tribal government, and utilities are the main employers in the village.

Climate	**Avg. Temp.**	**Climate Zone**	**Heating Deg. Days**
	30.1		12,582

Natural Hazard Plan	**Year**

Energy Priorities and Projects

Re-start electrical system; biomass heating for community buildings; solar on homes or for small-scale utility

Community Plans	**Year**
Notes: Goal to revitalize the Village	

Local Contacts	**Email**	**Phone**	**Fax**
Healy Lake Village	melissaerickson21@hotmail.com	479-0638	479-0639
Mendas Cha-ag Native Corp.		452-3094	
Tanana Chiefs Conference		452-8251	459-3851

Demographics	**2000**	**2010**		**2013**
Population	37	6	**Percent of Residents Employed**	
Median Age	26	42	**Denali Commission Distressed Community**	Yes
Avg. Household Size	3	2	**Percent Alaska Native/American Indian (2010)**	100.0%
Median Household Income			**Low and Moderate Income (LMI) Percent (2014)**	N/A

Electric Utility	**Generation Sources**	**Interties**	**PCE?**
Alaska Power and Telephone Company	Intertie	No	Yes

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

Water/Wastewater System	**None**	**Homes Served**	**System Volume**
Water	It exists, non-operational (needs repairs)		
Sewer	Works in some homes still	**Energy Audit?**	
Notes	Groundwater, none treated	No	

Access

Road	No, except seasonal ice bridge				
Air Access	40 Mile Air 3 times a week	**Runway**	15,000 ft, privately owned		
Dock/Port	Yes, landing	**Barge Access?**	No	**Ferry Service?**	No
Notes	During the winter, residents fly in by ski plane or drive in on the ice road. Healy Lake receives funds from the Essential Air Services program that subsidizes the cost of commercial flights.				

Energy Profile: Healy Lake

Diesel Power System

Utility	Alaska Power & Telephone Company		
Engine	**Make/Model**	**Condition/Hrs**	**Gen Capacity**
Unit 1	System has been shut down.		
Unit 2			
Unit 3			
Unit 4			
Line Loss			
Heat Recovery?	No		

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

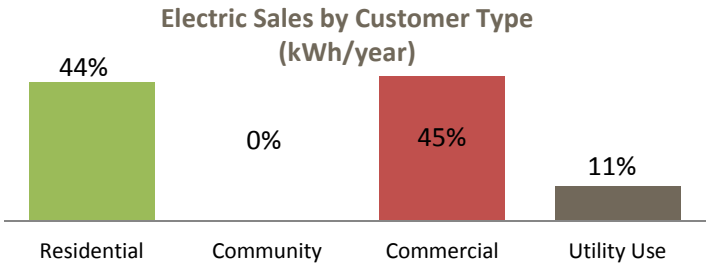
Outage History/Known Issues

Generation suspended. 33kW generator too big for load.

Operators	**No. of Operators**	**Training/Certifications**
	0	

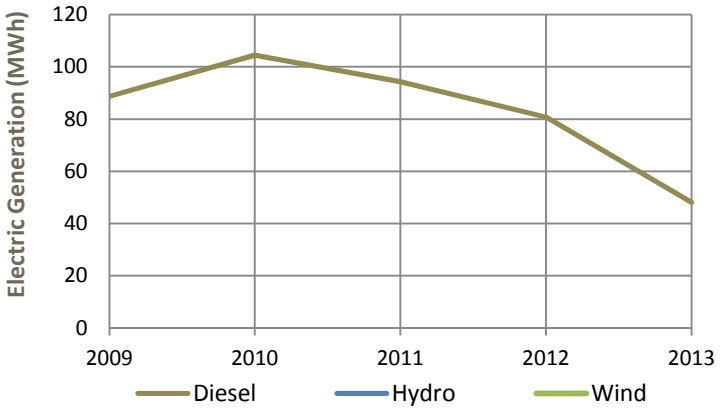
Maintenance Planning (RPSU)	Excellent

Electric Sales	**No. of Customers**	**kWh/year**	**kWh/Customer**
Residential	2	9,006	4,503
Community	0	0	-
Commercial	1	9,386	9,386
Utility Use		2,274	



Power Production

Diesel (kWh/yr)	30,314	**Avg. Load (kW)**	14
Wind (kWh/yr)	0	**Peak Load (kW)**	30
Hydro (kWh/yr)	0	**Efficiency (kWh/gal)**	4
Total (kWh/yr)	30,314	**Diesel Used (gals/yr)**	7,356



Electric Rates ($/kWh)		**Cost per kWh Sold ($/kWh)**	
Rate with PCE	$0.31	**Fuel Cost**	$1.79
Residential Rate	$1.90	**Non-fuel Cost**	$1.53
Commercial Rate		**Total Cost**	$3.32

Fuel Prices ($)	**Utility/Wholesale**	**Retail**	**Month/Year**
Diesel (1 gal)	$4.23		6-13
Other Fuel? (1 gal)			
Gasoline (1 gal)			
Propane (100#)	$8.50	$11.30 + Transport	
Wood (1 cord)	$350.00		
Pellets			
Discounts?			

Alternative Energy	**Potential**	**Projects**	**Status**
Hydroelectric	Medium		
Wind Diesel	Low		
Biomass	High	Pre-Feasibility Study in 2013	3 options pre-feasible
Solar	High		
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**
AP&T		14,000	

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

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

Cooperative Purchasing Agreements

Notes

Energy Profile: Healy Lake

Housing Units	Occupied	Vacant	% Owner-Occup.
	7	12	57%

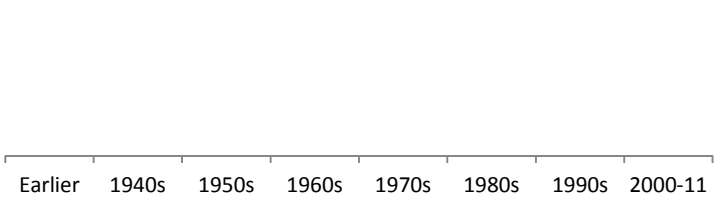
Regional Housing Authority	Weatherization Service Provider
IRHA	ACDC

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

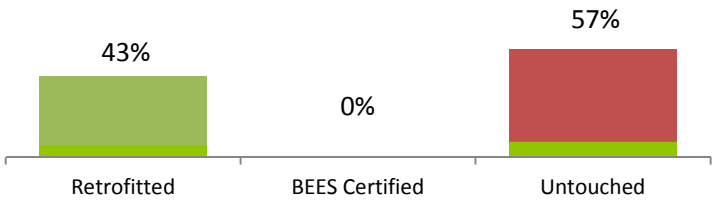
Energy Use	Average Home Energy Rating	Average Square Feet	Avg. EUI (kBTU/sf)
	N/A	N/A	N/A

Data Quality	N/A

Age of Housing Stock



Energy Efficient Housing Stock



Street Lighting	Owner	Number/Type	Retrofitted?	Year	Notes
					No street lights installed

Non-residential Building Inventory

Building Name or Location	Year Built	Square Feet	Audited?	Retrofits Done?	In ARIS?
Community Hall					
Healy Lake School (closed 2009)		7,600			No
Tribal Office (needs repair)					

Community Profile: Holy Cross

Incorporation	2nd Class City

Location

Holy Cross is located in Interior Alaska on the west bank of Ghost Creek Slough off the Yukon River. It is 40 miles northwest of Aniak and 420 miles southwest of Fairbanks.

Longitude	-159.7714	**Latitude**	62.1994
ANCSA Region	Doyon, Limited		
Borough/CA	Yukon-Koyukuk Census Area		
School District	Iditarod Area School District		
AEA Region	Yukon-Koyukuk/Upper Tanana		

Alaska Native Name (definition)

Ingirraller

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

Historical Setting / Cultural Resources

Holy Cross, originally known as Anilukhtakpak, had its first contact with Europeans in the early 1840s when Russian explorers traveled the Yukon River. Father Aloysius Robaut established a Catholic mission and school in the 1880s. Ingalik Indians then migrated to Holy Cross to be near the mission. In 1899, a post office opened under the name "Koserefsky." In 1912, the name of the town was changed to "Holy Cross" after the mission. The original mission and many buildings were torn down after the boarding school ceased operations in 1956.

Economy

Local government provides more than 70% employment in the village with health services and trade the other 2 highest employers.

Climate	**Avg. Temp.**	**Climate Zone**	**Heating Deg. Days**
	28	8	13,462

Natural Hazard Plan	**Year**
Yes	2013

Notes

Energy Priorities and Projects

Energy audits, energy efficiency, upgrades, awareness and education, and upgrade schools; Add solar panels to homes and community buildings; heat recovery for water system; community-scale biomass project; look into wind

Community Plans — **Year**

Local Contacts	**Email**	**Phone**	**Fax**
City of Holy Cross	cityofholycross@gci.net	476-7139	476-7141
Deloycheet, Incorporated		476-7177	476-7176
Holy Cross Village	rebecca.elswick@tananachiefs.org	476-7124	476-7132

Demographics	**2000**	**2010**		**2013**
Population	227	178	**Percent of Residents Employed**	67.4%
Median Age	27	31	**Denali Commission Distressed Community**	No
Avg. Household Size	4	3	**Percent Alaska Native/American Indian (2010)**	91.9%
Median Household Income		$35,833	**Low and Moderate Income (LMI) Percent (2014)**	87.8%

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

Landfill	**Class**	3	**Permitted?**	No	**Location**	Holy Cross

Water/Wastewater System		**Homes Served**	**System Volume**
Water	Drawn from central well and piped	49	
Sewer	Piped	**Energy Audit?**	
Notes		Yes	

Access

Road	No				
Air Access	Yes	**Runway**	4000' x 100'		
Dock/Port	Yes	**Barge Access?**	Yes	**Ferry Service?**	No

Notes The community is dependent upon air and boat transportation. Groceries and small items are shipped in by airplane. Serviced by barge in the summer. Barge access is now limited due to low water levels.

Energy Profile: Holy Cross

Diesel Power System

Utility	AVEC		
Engine	**Make/Model**	**Condition/Hrs**	**Gen Capacity**
Unit 1	Detroit Diesel	Fair/3,049	207
Unit 2	Allis Chalmers	Fair/3,077	175
Unit 3	Cummins	Fair/21,350	250
Unit 4			
Line Loss	Not Reported		
Heat Recovery?	No		

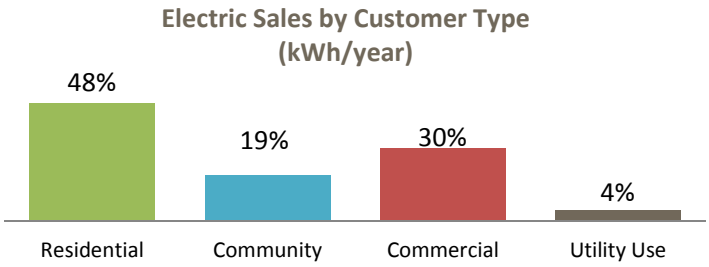
Upgrades	Priority	Projects	Status
RPSU Powerhouse	In Progress		
RPSU Distribution	In Progress		

Outage History/Known Issues

1 short unscheduled outage in 2015.

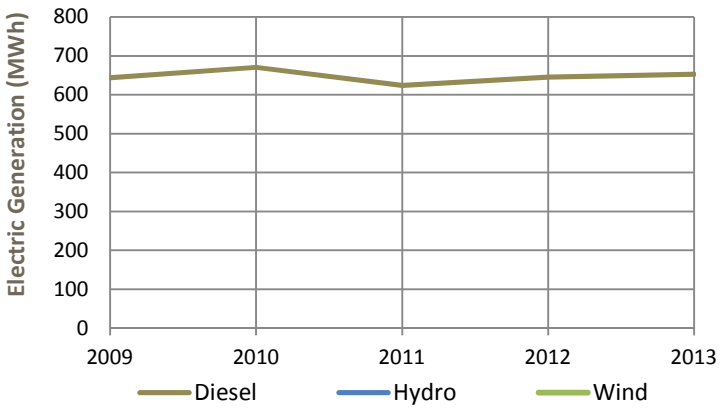
Operators	No. of Operators	Training/Certifications
	1	PPO, BFO

Maintenance Planning (RPSU)	Acceptable		
Electric Sales	**No. of Customers**	**kWh/year**	**kWh/Customer**
Residential	77	305,564	3,968
Community	11	118,548	10,777
Commercial	15	189,578	12,639
Utility Use		26,764	



Power Production

Diesel (kWh/yr)	639,857	**Avg. Load (kW)**	75
Wind (kWh/yr)	0	**Peak Load (kW)**	187
Hydro (kWh/yr)	0	**Efficiency (kWh/gal)**	13
Total (kWh/yr)	639,857	**Diesel Used (gals/yr)**	50,543



Electric Rates ($/kWh)		Cost per kWh Sold ($/kWh)	
Rate with PCE	$0.20	**Fuel Cost**	$0.30
Residential Rate	$0.59	**Non-fuel Cost**	$0.23
Commercial Rate	$0.33	**Total Cost**	$0.54

Fuel Prices ($)	Utility/Wholesale	Retail	Month/Year
Diesel (1 gal)	$3.79	$7.15	6-13; 6-15
Other Fuel? (1 gal)			
Gasoline (1 gal)		$7.35	6-15
Propane (100#)		$242.14	8-14
Wood (1 cord)			
Pellets			
Discounts?			

Alternative Energy	Potential	Projects	Status
Hydroelectric	Low		
Wind Diesel	Low		
Biomass	Medium	Feasibility Assessment Heat in Public Bldgs	Complete
Solar	High		
Geothermal	Low		
Oil and Gas	Low		
Coal	Low		
Emerging Tech	Not Rated		
Heat Recovery	High	HR for Water System	Seeking Funding
Energy Efficiency	Medium	EE Audit & Upgrades for sanitation system	Complete

Bulk Fuel

Tank Owner	Fuel Type(s)	Capacity	Age/Condition
Holy Cross Oil	Diesel; Gas	100,000; 62,500	Good
AVEC	Diesel	76,591	Unknown
City RR Tanks	Unknown	14,084	Unknown

Bulk Fuel Upgrade	Priority	Project	Status

Purchasing	Deliveries/Year	Gallons/Delivery	Vendor(s)
By Barge	1		
By Air			

Cooperative Purchasing Agreements

Notes

Barge delivery in Summer. School has contract w/ Crowley.

Energy Profile: Holy Cross

Housing Units	Occupied	Vacant	% Owner-Occup.
	58	19	84%

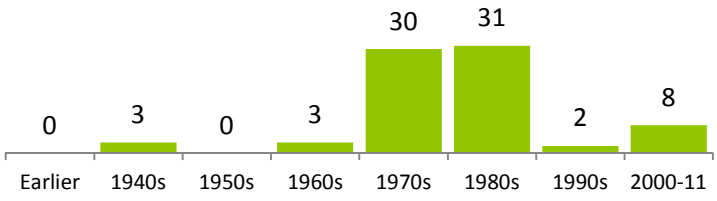
Regional Housing Authority	Weatherization Service Provider
IRHA	TCC

Housing Need	Overcrowded	1-star
	15.5%	N/A

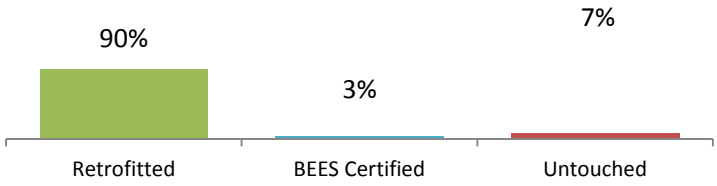
Energy Use	Average Home Energy Rating	Average Square Feet	Avg. EUI (kBTU/sf)
	N/A	N/A	N/A

Data Quality	Medium

Age of Housing Stock



Energy Efficient Housing Stock

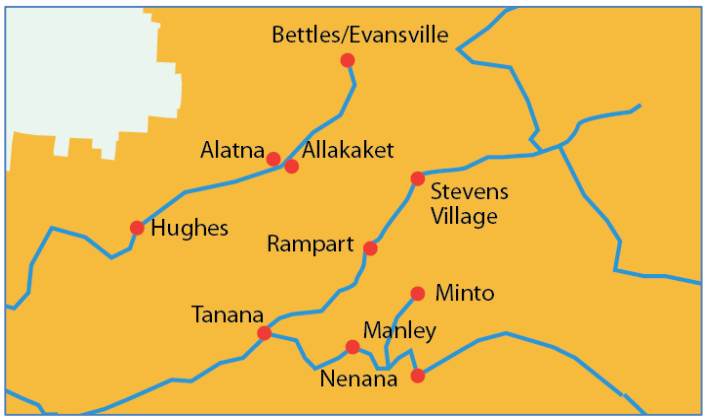


Street Lighting	Owner	Number/Type	Retrofitted?	Year	Notes
		20/HPS	Yes	2012	Replaced with LEDs

Non-residential Building Inventory

Building Name or Location	Year Built	Square Feet	Audited?	Retrofits Done?	In ARIS?
Airport Electrical		96			No
Armory					
Bush Tel					
Catholic Church					
City Office		770	Yes; Ameresco		No
Community Hall		2,640	Yes; Ameresco		No
Deloycheet					
Holy Cross K-12 School	1978	19,580	Yes; Amer./Nort.		Yes
Holy Cross Oil					
Lift Station					
Post Office					No
SRE Bldg.		2,000			Yes
Tribal Office					
Washeteria	1986	330	Yes; Ameresco		No
Water Treatment Plant	1986	860	Yes; Ameresco		No
Wood Shop/Storage		3,300			No
YKHC Clinic					
Youth Center					

Community Profile: Hughes



Alaska Native Name (definition)

Hut'odlee Kkaakk'et

Historical Setting / Cultural Resources

Several groups have lived in the area, including Koyukon Athabascans and Kobuk, Selawik, and Nunamiut Eskimos. Hughes was a mining village in the early 1900s after Alfred Isaac discovered gold; it was used as a trade center between Athabascans and Eskimos. Sidney Huntington was born here in 1915. In 1994, flood waters destroyed nearly all of the community's buildings, homes. Residents have rebuilt homes and facilities. Hughes is a Koyukon Athabascan village. Traditional ways of life persist.

Energy Priorities and Projects

Need additional bulk fuel storage; need additional 100 kW generator for utility & restore internet connection with power plant; assess distribution system (single phase not three phase); anemometer installed for wind study; EE upgrades & education

Incorporation	2nd Class City

Location

Hughes is located on a 500-foot bluff on the east bank of the Koyukuk River, about 115 air miles northeast of Galena and 210 air miles northwest of Fairbanks.

Longitude	-154.2556	**Latitude**	66.0489
ANCSA Region	Doyon, Limited		
Borough/CA	Yukon-Koyukuk Census Area		
School District	Yukon-Koyukuk School District		
AEA Region	Yukon-Koyukuk/Upper Tanana		

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

Economy

Local government and work in the village with trade and health care are the top three employers.

Climate	**Avg. Temp.**	**Climate Zone**	**Heating Deg. Days**
	23	8	14,942

Natural Hazard Plan	**Year**
Yes	2010
Flood plan	2013
Fuel Reduction	2009
Notes	

Community Plans	**Year**
Hughes Community Plan	2013

Local Contacts	**Email**	**Phone**	**Fax**
City of Hughes	thelma.nicholia@tananachiefs.org	889-2206	889-2252
Hughes Village	janet.bifelt@tananachiefs.org	889-2239	889-2252
K'oyitl'ots'ina, Limited	blanche.sam@koyitlotsina.com	452-8119	452-8148

Demographics	**2000**	**2010**		**2013**
Population	78	77	**Percent of Residents Employed**	83.3%
Median Age	26	33	**Denali Commission Distressed Community**	
Avg. Household Size	3	3	**Percent Alaska Native/American Indian (2010)**	96.1%
Median Household Income		$30,750	**Low and Moderate Income (LMI) Percent (2014)**	

Electric Utility	**Generation Sources**	**Interties**	**PCE?**
Hughes Power & Light	Diesel	No	Yes

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

Water/Wastewater System	**None**	**Homes Served**	**System Volume**
Water	Some piped downtown, some hauled from watering hole.		
Sewer		**Energy Audit?**	
Notes			

Access

Road	No				
Air Access	Yes	**Runway**	4500' x 100'		
Dock/Port	None	**Barge Access?**	None	**Ferry Service?**	No
Notes	River				

Energy Profile: Hughes

Diesel Power System

Utility	Hughes Power & Light		
Engine	**Make/Model**	**Condition/Hrs**	**Gen Capacity**
Unit 1	John Deere	Fair/31,062	78
Unit 2	John Deere	Fair/31,041	78
Unit 3	John Deere	Fair/6,530	37
Unit 4	John Deere	Fair/4,560	37
Line Loss	11.5%		
Heat Recovery?	Yes; Water Lines (done on both), Plant		

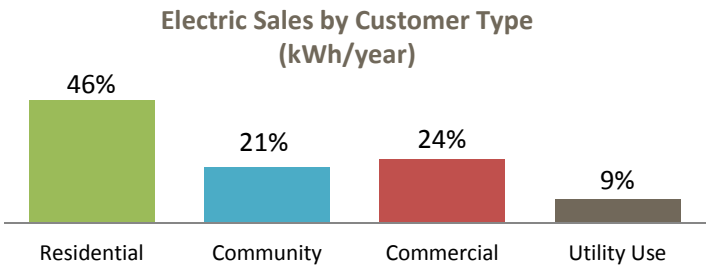
Upgrades	**Priority**	**Projects**	**Status**
RPSU Powerhouse	Medium	2008/2009	
RPSU Distribution	Medium		

Outage History/Known Issues

Unit 1 & 2 overheat and shutdown almost daily.

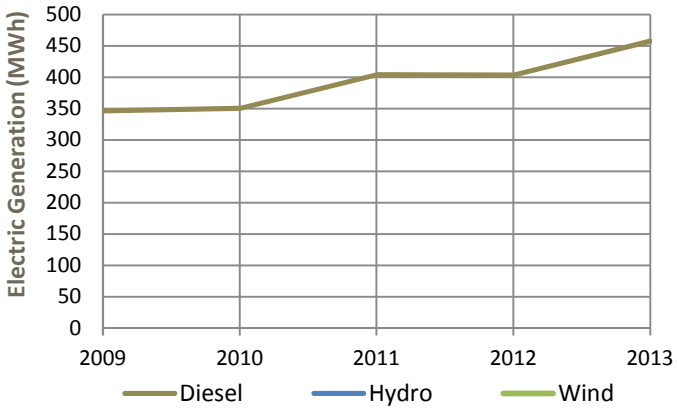
Operators	**No. of Operators**	**Training/Certifications**
	3	APPO, BFO, Itin. BFO, PPO,
	1	Utility Clerk
Maintenance Planning (RPSU)	Good	

Electric Sales	**No. of Customers**	**kWh/year**	**kWh/Customer**
Residential	36	160,106	4,447
Community	3	73,065	24,355
Commercial	10	83,227	8,323
Utility Use		31,724	



Power Production

Diesel (kWh/yr)	393,248	**Avg. Load (kW)**	27
Wind (kWh/yr)	0	**Peak Load (kW)**	60
Hydro (kWh/yr)	0	**Efficiency (kWh/ga**	17.84
Total (kWh/yr)	393,248	**Diesel Used (gals/**	22,041



Electric Rates ($/kWh)		**Cost per kWh Sold ($/kWh)**	
Rate with PCE	$0.14	**Fuel Cost**	$0.41
Residential Rate	$0.71	**Non-fuel Cost**	$0.23
Commercial Rate		**Total Cost**	$0.64

Fuel Prices ($)	**Utility/Wholesale**	**Retail**	**Month/Year**
Diesel (1 gal)	$6.02	$9.00	6-13; 8-14
Other Fuel? (1 gal)			
Gasoline (1 gal)		$9.50	6-15
Propane (100#)		$375.00	8-14
Wood (1 cord)		$400.00	6-15
Pellets			
Discounts?			

Alternative Energy	**Potential**	**Projects**	**Status**
Hydroelectric	Medium		
Wind Diesel	Low	Met Tower Installed	In Progress
Biomass	High	2 Garn 1000 Boilers for Washeteria & City Office	Operational
Solar	High	PV Array on Hughes City Bldg. (6 panels)	Operational
Geothermal	Low		
Oil and Gas	Low		
Coal	Low		
Emerging Tech	Not Rated		
Heat Recovery	High	HR to water treatment plant and water lines	Operational
Energy Efficiency	Medium	1) VEEP 2) EE Upgrades in community bldgs	1) Complete 2) Start 9/2015

Bulk Fuel

Tank Owner	**Fuel Type(s)**	**Capacity**	**Age/Condition**
Hughes P&L	Diesel	20,000	2008
School	Diesel	28,000	2012
City	Diesel & Gas	6,000	

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

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

Cooperative Purchasing Agreements

Notes

Fuel shipped by air; 6,000 gals inadequate for comm. use

Energy Profile: Hughes

Housing Units	Occupied	Vacant	% Owner-Occup.
	31	18	61%

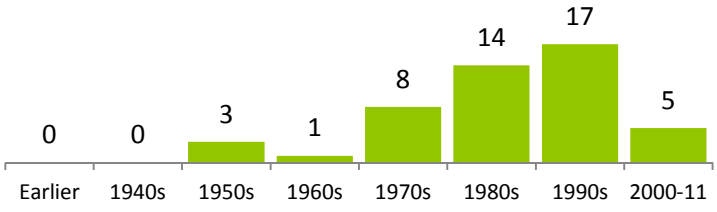
Regional Housing Authority	Weatherization Service Provider
IRHA	IRHA & TCC

Housing Need	Overcrowded	1-star
	24.0%	8.9%

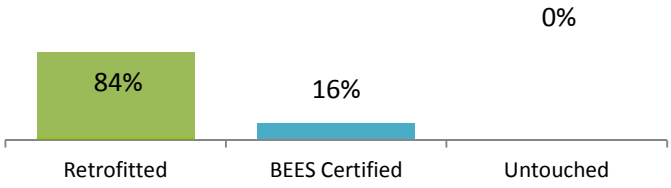
Data Quality	Med.

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

Age of Housing Stock



Energy Efficient Housing Stock

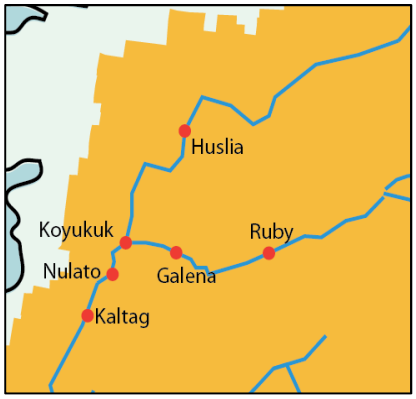


Street Lighting	Owner	Number/Type	Retrofitted?	Year	Notes
		24/HPS	Partial		10 lights replaced with LEDs

Non-residential Building Inventory

Building Name or Location	Year Built	Square Feet	Audited?	Retrofits Done?	In ARIS?
Airport Electrical		96			No
Airport Storage Bldg.		1,040			No
City Hall/Village Council/Post Office		3,456	Yes	Yes; VEEP	Yes
Community / Tribal Hall		576	Yes		No
Community Store		1,555	Yes	Yes; VEEP	No
Health Clinic/Computer Lab	2009	1,679	Yes	Yes; VEEP	Yes
Johnny Oldman School	1981	10,848	Yes	Yes; VEEP	Yes
Power House		448			No
Safe House				Yes; VEEP	No
St. Paul's Church	1994				No
Storage		320			No
Storage Bldg.		1,040			Yes
Tribal Office		1,374	Yes	Yes; VEEP	No
Water Plant & Washeteria	1988/2002	2,000	Yes	Yes; VEEP	No

Community Profile: Huslia



Alaska Native Name (definition)

Ts'aateyhdenaadekk'onh Denh

Historical Setting / Cultural Resources

The Koyukon Athabascans lived between the south fork of the Koyukuk River and the Kateel River. In 1949, the community moved to the present site, because Cutoff flooded frequently, and the ground was swampy. Huslia had been used as a burial site since 1886, but, by the time of the move, most of the old cemetery had been destroyed by erosion. In 1950, the first school was established, then a post office, airport, and road construction in 1952. At this time, families began to live year-round at Huslia. Huslia is an Athabascan village.

Energy Priorities and Projects

Add solar panels to homes & community bldgs; biomass heating for WTP & clinic; energy efficiency upgrades to sanitation system in progress

Incorporation	2nd Class City

Location

Huslia is located on the north bank of the Koyukuk River, about 170 river miles northwest of Galena and 290 air miles west of Fairbanks. It lies within the Koyukuk National Wildlife Refuge.

Longitude	-156.3997	**Latitude**	65.6986
ANCSA Region	Doyon, Limited		
Borough/CA	Yukon-Koyukuk Census Area		
School District	Yukon-Koyukuk School District		
AEA Region	Yukon-Koyukuk/Upper Tanana		

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

Economy

Local government provides over 65% of employment in the village with health care and construction rounding out the top three.

Climate	**Avg. Temp.**	**Climate Zone**	**Heating Deg. Days**
		8	14,942

Natural Hazard Plan	**Year**
Yes	2010

Notes

Community Plans	**Year**
Huslia Community Plan	2010
Huslia Comprehensive Community Dev. Plan	1999

Local Contacts	**Email**	**Phone**	**Fax**
City of Huslia	elsiev@gci.net	829-2266	829-2224
Huslia Village	husliatribe@gmail.com	829-2294	829-2214
K'oyitl'ots'ina, Limited		452-8119	452-8148

Demographics	**2000**	**2010**		**2013**
Population	293	275	**Percent of Residents Employed**	65.8%
Median Age	25	26	**Denali Commission Distressed Community**	Yes
Avg. Household Size	4	4	**Percent Alaska Native/American Indian (2010)**	92.1%
Median Household Income	$27,000	$27,188	**Low and Moderate Income (LMI) Percent (2014)**	77.8%

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

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

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

Access						
Road	No					
Air Access	Yes	**Runway**	4000' x 75'			
Dock/Port	No	**Barge Access?**	Yes	**Ferry Service?**	No	

Notes Water is the main mode of transport in summer. Cargo and fuel arrives by barge twice each year. Groceries are flown in weekly. Huslia has winter trails, the frozen river is used as an ice road to neighboring villages.

Energy Profile: Huslia

Diesel Power System

Utility	AVEC		
Engine	**Make/Model**	**Condition/Hrs**	**Gen Capacity**
Unit 1	Detroit Diesel	Fair/51,675	236
Unit 2	Cummins	Fair/8,521	250
Unit 3	Detroit Diesel	Fair/8,596	314
Unit 4			
Line Loss	1.9%		
Heat Recovery?	Yes; AVEC Facilities		

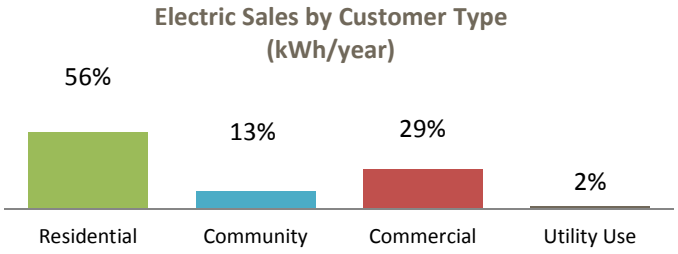
Upgrades	**Priority**	**Projects**	**Status**
RPSU Powerhouse	Med.		
RPSU Distribution	Med.		

Outage History/Known Issues

1 short unscheduled outage in 2015.

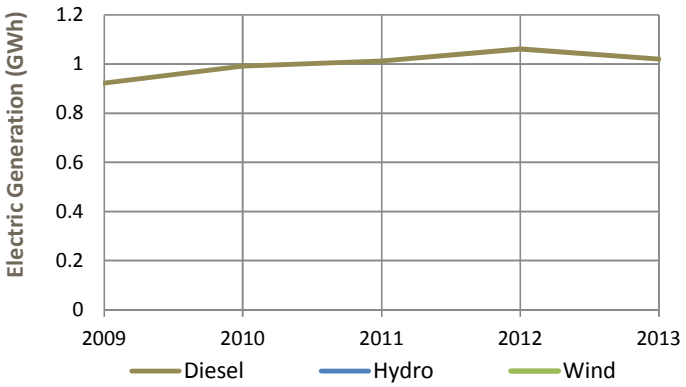
Operators	**No. of Operators**	**Training/Certifications**
	4	BF Book, BF Manager, BFO, Itin. BFO, PPO
Maintenance Planning (RPSU)		Good

Electric Sales	**No. of Customers**	**kWh/year**	**kWh/Customer**
Residential	105	530,122	5,049
Community	15	120,136	8,009
Commercial	19	272,635	14,349
Utility Use		19,355	



Power Production

Diesel (kWh/yr)	960,306	**Avg. Load (kW)**	114
Wind (kWh/yr)	0	**Peak Load (kW)**	227
Hydro (kWh/yr)	0	**Efficiency (kWh/gal)**	13
Total (kWh/yr)	960,306	**Diesel Used (gals/yr)**	72,329



Electric Rates ($/kWh)		**Cost per kWh Sold ($/kWh)**	
Rate with PCE	$0.20	**Fuel Cost**	$0.30
Residential Rate	$0.59	**Non-fuel Cost**	$0.23
Commercial Rate	$0.34	**Total Cost**	$0.54

Fuel Prices ($)	**Utility/Wholesale**	**Retail**	**Month/Year**
Diesel (1 gal)	$3.75	$7.00	6-13; 8-14
Other Fuel? (1 gal)			
Gasoline (1 gal)			
Propane (100#)		$188.57	8-14
Wood (1 cord)		$400.00	
Pellets			
Discounts?			

Alternative Energy	**Potential**	**Projects**	**Status**
Hydroelectric	Low		
Wind Diesel	Low		
Biomass	High	Garn 1000 Boiler Heat to WTP & Clinic Project	Design & Construction start 2015
Solar	High		
Geothermal	Low		
Oil and Gas	Low		
Coal	Low		
Emerging Tech	Not Rated		
Heat Recovery	Low		
Energy Efficiency	Medium	VEEP & WTP & Sanitation EE Upgrades/Training	Complete

Bulk Fuel

Tank Owner	**Fuel Type(s)**	**Capacity**	**Age/Condition**
AVEC		67,174	
Schools		39,874	
City		60,559	

Bulk Fuel Upgrade	**Priority**	**Project**	**Status**
			Upgraded 2006

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

Cooperative Purchasing Agreements

Notes

Energy Profile: Huslia

Housing Units	Occupied	Vacant	% Owner-Occup.
	88	30 (not livable)	68%

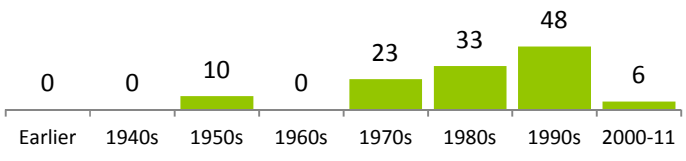
Regional Housing Authority	Weatherization Service Provider
IRHA	IRHA, TCC

Housing Need	Overcrowded	1-star
	23.9%	N/A

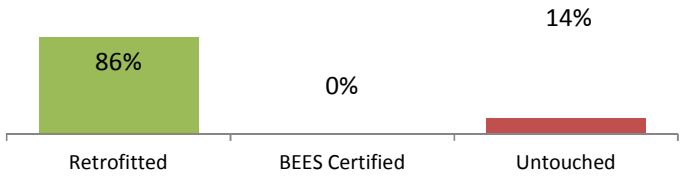
Data Quality	High

Energy Use	Average Home Energy Rating	Average Square Feet	Avg. EUI (kBTU/sf)
	3 star plus	966	132

Age of Housing Stock



Energy Efficient Housing Stock

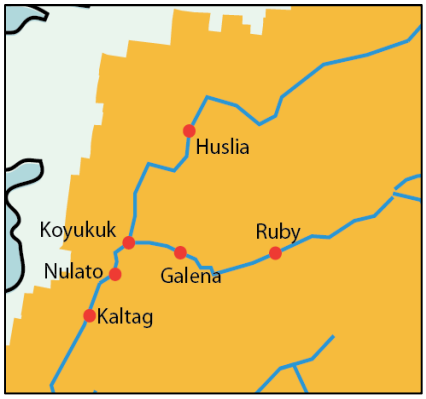


Street Lighting	Owner	Number/Type	Retrofitted?	Year	Notes

Non-residential Building Inventory

Building Name or Location	Year Built	Square Feet	Audited?	Retrofits Done?	In ARIS?
Airport Electrical					No
Airport Equipment Bldg.					No
Armory				Yes; VEEP	No
Bifelt Enterprises Store					No
City Office	1985	1,664	Yes; EAoA	Yes; VEEP	Yes
Clinic	2006	2,657	Yes; EAoA		No
Community Center		1,374	Yes; EAoA		No
Community Church				Yes; VEEP	No
Community Hall	1980	309		Yes; VEEP	Yes
Dakli Bldg.		810	Yes; EAoA		Yes
Elder's Center					No
Episcopal Church				Yes; VEEP	No
Gas & Oil Office				Yes; VEEP	No
Good Shepard Mission					No
Head Start Bldg.		1,536	Yes; EAoA	Yes; VEEP	Yes
Jimmy Huntington Elementary School	1960	5,446	Yes; Nortech	Yes; VEEP	Yes
Jimmy Huntington High School	1979	11,640	Yes; Nortech	Yes; VEEP	Yes
Jimmy Huntington School Gym				Yes; VEEP	No
Jimmy Huntington School Maintenance Shop				Yes; VEEP	No
Jimmy Huntington School Wood Shop				Yes; VEEP	No
Old Clinic/Tribal Office				Yes; VEEP	No
Old Environmental Office		775	Yes; EAoA		No
Post Office					No
Power House		480			No
R&M Mercantile Store					No
RJ's Store					No
SRE Bldg.		1,040			Yes
St. Francis Church					No
Storage		320			No
Storage Shop		768			No
Tribal Family & Youth Services Bldg.				Yes; VEEP	No
Tribal Office		1,624	Yes; EAoA	Yes; VEEP	No
Water Treatment Plant & Washeteria	2008	2,048	Yes; ANTHC/EAoA		Yes

Community Profile: Kaltag



Alaska Native Name (definition)

Ggaał Doh

Historical Setting / Cultural Resources

Kaltag is located in Koyukon Athabascan territory and was used as a cemetery for surrounding villages.During 1900, food shortages and a measles epidemic struck down one-third of the Native population. Kaltag was established thereafter, when survivors from three nearby seasonal villages moved to the area. Gold seekers left the mid-Yukon after 1906, but other mining activity, such as the Galena lead mines, began operating in 1919. Kaltag's residents are Koyukon Athabascans.

Energy Priorities and Projects

Energy efficiency upgrades to sanitation system

Incorporation	2nd Class City

Location

Kaltag is located on the west bank of the Yukon River, 75 miles west of Galena and 335 miles west of Fairbanks. It is situated on a 35-foot bluff at the base of the Nulato Hills, west of the Innoko National Wildlife Refuge.

Longitude	-158.7219	**Latitude**	64.3272
ANCSA Region	Doyon, Limited		
Borough/CA	Yukon-Koyukuk Census Area		
School District	Yukon-Koyukuk School District		
AEA Region	Yukon-Koyukuk/Upper Tanana		

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

Economy

Local government is the main employer at near 50% with manufacturing and trade rounding out the top three for the village.

Climate	**Avg. Temp.**	**Climate Zone**	**Heating Deg. Days**
	25.2	8	14,847

Natural Hazard Plan	**Year**
Yes	2010

Notes

Community Plans	**Year**

Local Contacts	**Email**	**Phone**	**Fax**
City of Kaltag	jdsnicholas@hotmail.com	534-2301	534-2236
Gana-A'Yoo, Limited	bhuntington@ganaayoo.com	569-9599	569-9699
Village of Kaltag	esmailka32@hotmail.com	534-2224	534-2299

Demographics	**2000**	**2010**		**2013**
Population	230	190	**Percent of Residents Employed**	78.7%
Median Age	26	32	**Denali Commission Distressed Community**	Yes
Avg. Household Size	4	3	**Percent Alaska Native/American Indian (2010)**	91.8%
Median Household Income		$25,833	**Low and Moderate Income (LMI) Percent (2014)**	79.4%

Electric Utility	**Generation Sources**	**Interties**	**PCE?**
Alaska Village Electric Cooperative	Diesel, Solar	No	Yes

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

Water/Wastewater System		**Homes Served**	**System Volume**
Water	Piped	70	
Sewer	Piped	**Energy Audit?**	
Notes		Yes	

Access

Road	No				
Air Access	Yes	**Runway**	3986' x 100'		
Dock/Port	No	**Barge Access?**	Yes	**Ferry Service?**	No

Notes Barges typically deliver heavy cargo three times a year. The frozen river, local trails, and the 90-mile Old Mail Trail to Unalakleet are used during the winter for woodcutting and trap lines.

Energy Profile: Kaltag

Diesel Power System

Utility	AVEC		
Engine	**Make/Model**	**Condition/Hrs**	**Gen Capacity**
Unit 1	Detroit Diesel	Fair/67,204	236
Unit 2	Detroit Diesel	Fair/4,144	236
Unit 3	Detroit Diesel	Fair/762	363
Unit 4			
Line Loss	6.0%		
Heat Recovery?	Yes; Power House & Related Modules, School		

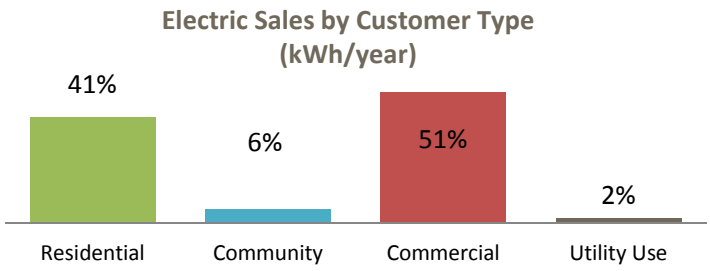
Upgrades	**Priority**	**Projects**	**Status**
RPSU Powerhouse	Low		Upgraded 2004
RPSU Distribution	Low		

Outage History/Known Issues

One short unscheduled outage in 2015.

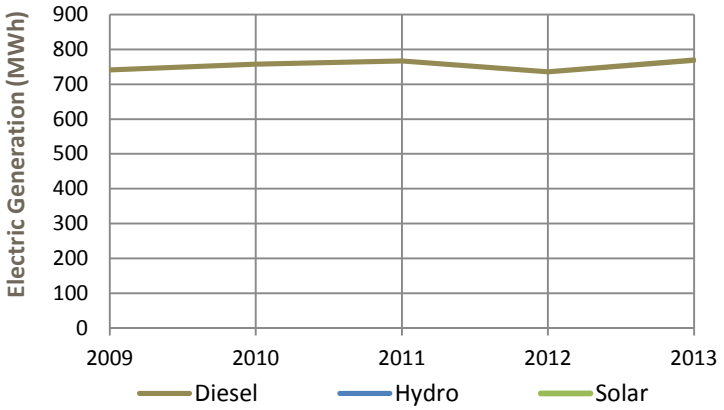
Operators	**No. of Operators**	**Training/Certifications**
	2	APPO, BFO, PPO

Maintenance Planning (RPSU)	Good		
Electric Sales	**No. of Customers**	**kWh/year**	**kWh/Customer**
Residential	71	276,042	3,888
Community	10	37,642	3,764
Commercial	24	339,675	14,153
Utility Use		14,138	



Power Production

Diesel (kWh/yr)	702,302	**Avg. Load (kW)**	83
Solar (kWh/yr)	7,037	**Peak Load (kW)**	267
Hydro (kWh/yr)	0	**Efficiency (kWh/gal)**	14
Total (kWh/yr)	709,339	**Diesel Used (gals/yr)**	50,025



Electric Rates ($/kWh)		**Cost per kWh Sold ($/kWh)**	
Rate with PCE	$0.20	**Fuel Cost**	$0.28
Residential Rate	$0.59	**Non-fuel Cost**	$0.23
Commercial Rate	$0.35	**Total Cost**	$0.51

Fuel Prices ($)	**Utility/Wholesale**	**Retail**	**Month/Year**
Diesel (1 gal)	$3.76	$5.75	6-13; 8-14
Other Fuel? (1 gal)			
Gasoline (1 gal)		$5.50	7-15
Propane (100#)		$50.00	7-15
Wood (1 cord)		$300.00	7-15
Pellets			
Discounts?			

Alternative Energy	**Potential**	**Projects**	**Status**
Hydroelectric	Low		
Wind Diesel	Low		
Biomass	Medium	Biomass Hydronic Heating for YKSD	Complete/Not pursuing
Solar	High	AVEC PV Array 10 kW (30 Panels)	Operational
Geothermal	Low		
Oil and Gas	Low		
Coal	Low		
Emerging Tech	Not Rated		
Heat Recovery	High	HR for School and Powerhouse	Operational, expansion possible
Energy Efficiency	Medium	1) VEEP 2) Sanitation EE Upgrades	1) Complete 2) In Progress (2015)

Bulk Fuel

Tank Owner	**Fuel Type(s)**	**Capacity**	**Age/Condition**
School			
City			
AVEC			
Co-Op			

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

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

Cooperative Purchasing Agreements

Notes

Energy Profile: Kaltag

Housing Units	Occupied	Vacant	% Owner-Occup.
	60	26	78%

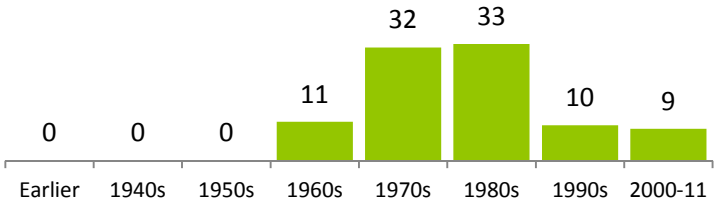
Regional Housing Authority	Weatherization Service Provider
IRHA	IRHA

Housing Need	Overcrowded	1-star
	25.0%	N/A

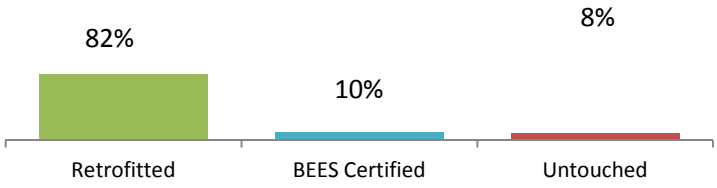
Energy Use	Average Home Energy Rating	Average Square Feet	Avg. EUI (kBTU/sf)
	N/A	N/A	N/A

Data Quality	
	Med.

Age of Housing Stock



Energy Efficient Housing Stock

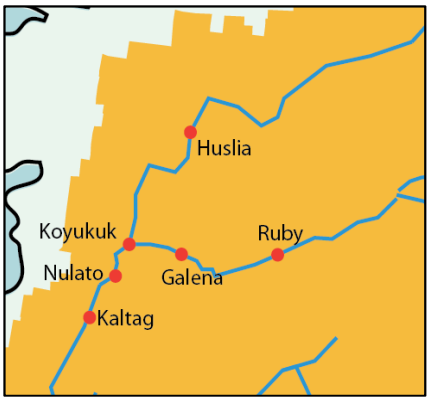


Street Lighting	Owner	Number/Type	Retrofitted?	Year	Notes
		19/HPS	Yes	2012	Replaced with LEDs

Non-residential Building Inventory

Building Name or Location	Year Built	Square Feet	Audited?	Retrofits Done?	In ARIS?
Airport Electrical		96			No
City Office	1982	2,176			Yes
Clinic	1994	1,125			Yes
Community Hall		4,500			Yes
Fire Hall	1984	2,048			Yes
Heritage Center		2,400			Yes
Kaltag Fish Plant	1999	4,800			Yes
Kaltag School	1980	15,248	Yes; Nortech		Yes
Post Office					No
Power House		384			No
Ski House		320			No
SRE Bldg.		1,200			Yes
Storage		900			No
Tribal Office		4,000			No
Vocational Education		2,400			No
Washeteria & Water Treatment Plant		2,048			Yes
Youth & Learning Center		736			Yes

Community Profile: Koyukuk



Alaska Native Name (definition)

Meneelghaadze' T'oh

Historical Setting / Cultural Resources

The Koyukon Athabascans traditionally had camps, moving as game migrated. A 1900 measles epidemic and food shortages reduced the Native population by about 1/3rd. The first school in Koyukuk was constructed in 1939. Following the school start-up, families began to live at Koyukuk year-round. It is said among Native people that Koyukuk is the land of the beautiful people, a place that people like to visit, and have a good time. Koyukuk also has a tradition of many storytellers, musicians, singers and songwriters.

Energy Priorities and Projects

Add solar to clinic; complete power plant upgrades & heat recovery system; biomass heating installed for washeteria, clinic, city &tribal offices; Add BTU meter for recovered heat sales; address high line loss & distribution upgrade; EE upgrades to clinic & community bldgs

Incorporation	2nd Class City

Location

Koyukuk is located on the Yukon River near the mouth of the Koyukuk River, 30 miles west of Galena and 290 air miles west of Fairbanks. It lies adjacent to the Koyukuk National Wildlife Refuge and the Innoko National Wildlife Refuge.

Longitude	-157.701	**Latitude**	64.8809
ANCSA Region	Doyon, Limited		
Borough/CA	Yukon-Koyukuk Census Area		
School District	Yukon-Koyukuk School District		
AEA Region	Yukon-Koyukuk/Upper Tanana		

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

Economy

Local government (City, Tribe), the school, and TCC provide more than 60% employment with health care services and leisure/hospitality rounding out top three employers.

Climate	**Avg. Temp.**	**Climate Zone**	**Heating Deg. Days**
	24	8	14,847

Natural Hazard Plan	**Year**
Yes	2008

Notes

Community Plans	**Year**
Comprehensive Community Develop. Plan	2008

Local Contacts	**Email**	**Phone**	**Fax**
City of Koyukuk	koyukuk_ak@hotmail.com; city clerk:	927-2215	927-2230
Koyukuk Native Village	cynthia.pilot@tananachiefs.org	927-2253	927-2220
Gana-A'Yoo, Limited	bhuntington@ganaayoo.com		
YKSD Sup. Of Maintenance	gbourne@yksd.com		

Demographics	**2000**	**2010**
Population	101	96
Median Age	31	32
Avg. Household Size	3	3
Median Household Income		$20,313

	2013
Percent of Residents Employed	77.9%
Denali Commission Distressed Community	Yes
Percent Alaska Native/American Indian (2010)	96.9%
Low and Moderate Income (LMI) Percent (2014)	77.7%

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

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

Water/Wastewater System		**Homes Served**	**System Volume**
Water	Drawn from well, and hauled from Wash.	100%	
Sewer	Sewage lagoon	**Energy Audit?**	
Notes		Yes, several	

Access

Road	No				
Air Access	Yes	**Runway**	4000' x 75'		
Dock/Port	No	**Barge Access?**	Yes	**Ferry Service?**	No

Notes The river is heavily traveled when ice-free. Cargo is delivered by barge about four times each summer.

Energy Profile: Koyukuk

Diesel Power System

Utility	City of Koyukuk		
Engine	**Make/Model**	**Condition/Hrs**	**Gen Capacity**
Unit 1	John Deere	Fair/24,413	64 KW
Unit 2 (not working	John Deere	Fair/17,152	75
Unit 3	John Deere	Fair/13,291	37
Unit 4	John Deere	Fair/40,876	37
Line Loss	17.2% (unbalanced, overheats, inconsistent)		
Heat Recovery?	Yes; School. City needs to meter.		

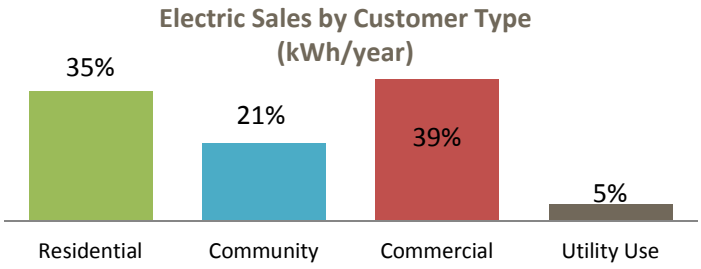
Upgrades	**Priority**	**Projects**	**Status**
RPSU Powerhouse	High		Upgraded 2007
RPSU Distribution	High		

Outage History/Known Issues

Gen. 2 inop. Service meter nonfunct.

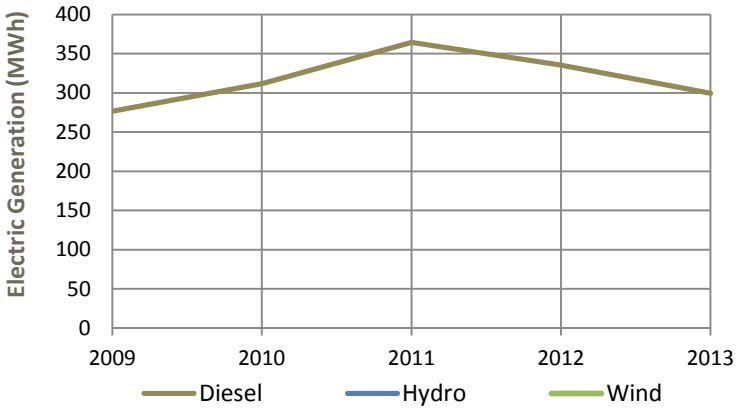
Operators	**No. of Operators**	**Training/Certifications**
	4	BFO, Elec. Util, Bus. Train, Itin. BFO, PPO, Utility Clerk
Maintenance Planning (RPSU)		Unacceptable, money set aside. Fuel p

Electric Sales	**No. of Customers**	**kWh/year**	**kWh/Customer**
Residential	60	84,533	1,409
Community	5	50,630	10,126
Commercial	6	92,243	15,374
Utility Use (broken)		10,851	



Power Production

Diesel (kWh/yr)	287,133	**Avg. Load (kW)**	26
Wind (kWh/yr)	0	**Peak Load (kW)**	57
Hydro (kWh/yr)	0	**Efficiency (kWh/gal)**	9
Total (kWh/yr)	287,133	**Diesel Used (gals/yr)**	31,073



Electric Rates ($/kWh)		**Cost per kWh Sold ($/kWh)**	
Rate with PCE	$0.46	**Fuel Cost**	$0.57
Residential Rate	$0.95	**Non-fuel Cost**	$0.07
Commercial Rate	$0.95	**Total Cost**	$0.64

Fuel Prices ($)	**Utility/Wholesale**	**Retail**	**Month/Year**
Diesel (1 gal)	$4.25	$6.50	6-15
Other Fuel? (1 gal)			
Gasoline (1 gal)		$7.00	6-15
Propane (100#)		$200.00	6-15
Wood (1 cord)		$300.00	6-15
Pellets			
Discounts?			

Alternative Energy	**Potential**	**Projects**	**Status**
Hydroelectric	Low		
Wind Diesel	Low		
Biomass	Medium	Garn 2000 Boiler for Wash., Clinic & City/Tribe Off.	Operational
Solar	High	Solar PV array on City/Tribal Off. & Washeteria	Operational/Clinic PV pending
Geothermal	Low		
Oil and Gas	Low		
Coal	Low		
Emerging Tech	Not Rated		
Heat Recovery	High	HR to school, BTU meters needed	Operational
Energy Efficiency	Medium	1) VEEP 2) Washeteria EE Upgrades/Training	Both Complete

Bulk Fuel

Tank Owner	**Fuel Type(s)**	**Capacity**	**Age/Condition**
City	Diesel	60,000	Good
City	Gasoline	30,000	Good
KYSD	Diesel	30,000	Good

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

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

Cooperative Purchasing Agreements

High (potential partner with Dineega Corp)

Notes

Barge delivery in Aug. or Sept. School does yearly order. Airport buys from City.

Energy Profile: Koyukuk

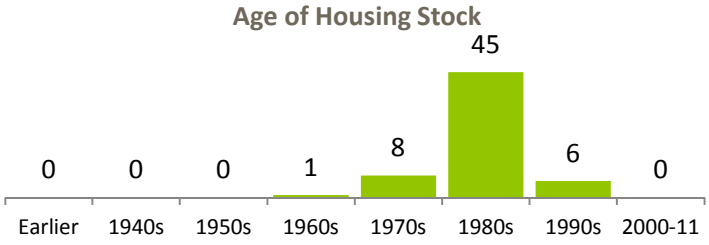
Housing Units	Occupied	Vacant	% Owner-Occup.
	60	9	55%

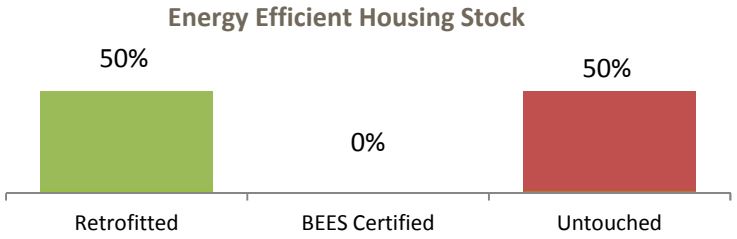
Regional Housing Authority	Weatherization Service Provider
IRHA	TCC

Housing Need	Overcrowded	1-star
	25.0%	N/A

Data Quality	Medium

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





Street Lighting	Owner	Number/Type	Retrofitted?	Year	Notes
	City		Yes		EECBG funded LED streetlight retrofit, burnt out bulbs

Non-residential Building Inventory

Building Name or Location	Year Built	Square Feet	Audited?	Retrofits Done?	In ARIS?
Airport Electrical	2008?	144			No
City & Tribal Office	1990	2,050	Yes; EAoA	2014	Yes
Clinic	2015	1,407	Yes; EAoA	New	Yes
Community Center/Hall	1981	1,661	Yes; EAoA		Yes
Ella B. Vernetti School	1979	13,896	Yes; EAoA		Yes
Gas Station					No
Headstart Bldg/residential building	1980s	912	Yes; EAoA		Yes
Kateel Enterprise	1980s				
National Guard Armory					No
Post Office					No
Power House	2004	512	Yes; EAoA		No
SRE Bldg.		2,000			No
St. Patrick's Church					
Storage 1		192			No
Storage 2					No
Storage 3					No
Teacher Housing	1979		Yes; EAoA		No
Washeteria/Water Treatment Plant	1987	1,089	Yes; ANTHC/EAoA		Yes

Community Profile: Manley Hot Springs

Incorporation Unincorporated

Location

Manley Hot Springs is located about 5 miles north of the Tanana River on Hot Springs Slough, at the end of the Elliott Highway, 160 road miles west of Fairbanks.

Longitude	-150.6339	**Latitude**	65.0011
ANCSA Region	Doyon, Limited		
Borough/CA	Yukon-Koyukuk Census Area		
School District	Yukon-Koyukuk School District		
AEA Region	Yukon-Koyukuk/Upper Tanana		

Alaska Native Name (definition)

Too Naaleł Denh

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

None

Historical Setting / Cultural Resources

In 1903, Sam's Rooms and Meals, now Manley Roadhouse, opened. In 1907, miner Frank Manley built the Hot Springs Resort Hotel. Due to the resort and area mining, the town prospered. In 1913, the resort burned to the ground. Mining was also declining by 1920. The name was changed to Manley Hot Springs in 1957. In 1982, the state began maintaining the hwy for year-round use. Native residents are Athabascan.

Economy

Local tribal government, school, construction, and trade/transportation are main employers for the community.

Climate	**Avg. Temp.**	**Climate Zone**	**Heating Deg. Days**
	24.8	8	14,593

Natural Hazard Plan	**Year**
DOT Safety Plan	In Progress

Notes

Energy Priorities and Projects

Extend electrical lines to existing homes & areas of development; additional Wx on homes; Install street lights (LED); Install synchornous switchgear for all generators

Community Plans	**Year**
Community Plan Draft (TCC)	In Progress

Local Contacts	**Email**	**Phone**	**Fax**
Manley Traditional Council	emwoods57@gmail.com	672-3177	672-3200
Bean Ridge Corporation		458-2176	

Demographics	**2000**	**2010**		**2013**
Population	72	89	**Percent of Residents Employed**	52.8%
Median Age	45	50	**Denali Commission Distressed Community**	No
Avg. Household Size	2	3	**Percent Alaska Native/American Indian (2010)**	25.2%
Median Household Income		$43,125	**Low and Moderate Income (LMI) Percent (2014)**	N/A

Electric Utility	**Generation Sources**	**Interties**	**PCE?**
TDX Manley Generating LLC	Diesel	No	Yes

Landfill	**Class**	3	**Permitted?**	Yes	**Location**	Manley Hot Springs

Water/Wastewater System	**None**	**Homes Served**	**System Volume**
Water	Hauled from well house, and ind. wells		
Sewer	Individual septic systems	**Energy Audit?**	
Notes		No	

Access

Road	Yes				
Air Access	Yes	**Runway**	3401' x 60'		
Dock/Port	No	**Barge Access?**	No	**Ferry Service?**	No

Notes Goods and fuel are typically delivered by truck. The Tanana River Landing is used to launch boats. Barge services was occasionally provided during summer months, but there is no docking facility due to erosion.

Energy Profile: Manley Hot Springs

Diesel Power System

Utility	TDX Manley Generating LLC		
Engine	**Make/Model**	**Condition/Hrs**	**Gen Capacity**
Unit 1	John Deere	Good	150
Unit 2	John Deere	Good	90
Unit 3	John Deere	Good	140
Unit 4			
Line Loss	12.1%		
Heat Recovery?	Yes; Trading Post, Hangar		

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

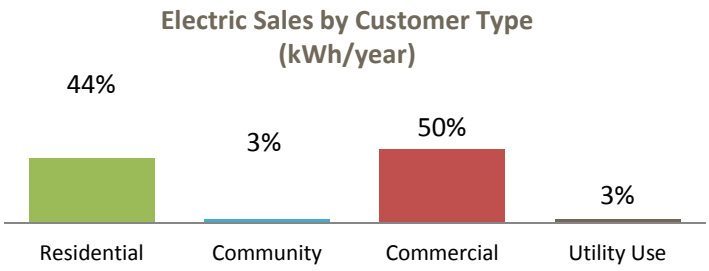
Outage History/Known Issues

Unit 1 Komatsu gen. blew up in 2014. Replacement in service in 2015.

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

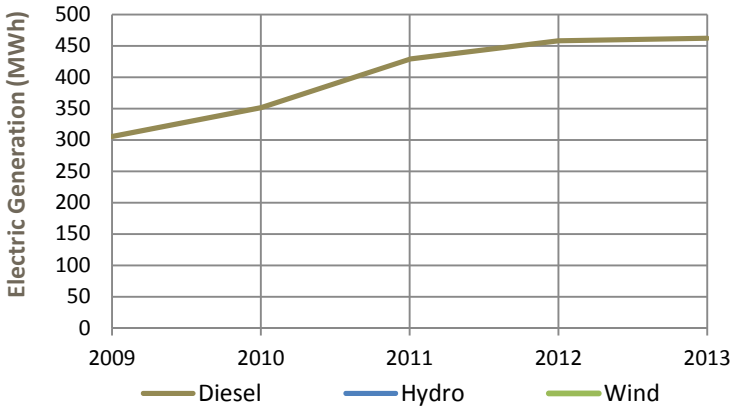
Maintenance Planning (RPSU)	Acceptable

Electric Sales	**No. of Customers**	**kWh/year**	**kWh/Customer**
Residential	87	170,952	1,965
Community	6	11,249	1,875
Commercial	16	193,123	12,070
Utility Use		11,440	



Power Production

Diesel (kWh/yr)	440,077	**Avg. Load (kW)**	27
Wind (kWh/yr)	0	**Peak Load (kW)**	60
Hydro (kWh/yr)	0	**Efficiency (kWh/gal)**	11
Total (kWh/yr)	440,077	**Diesel Used (gals/yr)**	40,739



Electric Rates ($/kWh)		**Cost per kWh Sold ($/kWh)**	
Rate with PCE	$0.16	**Fuel Cost**	$0.41
Residential Rate	$0.83	**Non-fuel Cost**	$0.30
Commercial Rate		**Total Cost**	$0.71

Fuel Prices ($)	**Utility/Wholesale**	**Retail**	**Month/Year**
Diesel (1 gal)	$4.03	$4.48	6-13; 8-14
Other Fuel? (1 gal)			
Gasoline (1 gal)		~$5.30	6-15
Propane (100#)			
Wood (1 cord)		$200.00	6-15
Pellets			

Discounts? Free wood available summer 2015; council cleared property & giving away wood.

Alternative Energy	**Potential**	**Projects**	**Status**
Hydroelectric	Low		
Wind Diesel	Low		
Biomass	Low	Pre-feasibility in 2012	Complete, not feasible
Solar	High	3kW PV Array each on Clinic & Tribal Office	Operational
Geothermal	Medium	Geological & geophysical explorations	TDX-Not econ. viable at present.
Oil and Gas	Low		
Coal	Low		
Emerging Tech	Not Rated		
Heat Recovery	Medium	HR to Trading post, hangar	Operational
Energy Efficiency	High		

Bulk Fuel

Tank Owner	**Fuel Type(s)**	**Capacity**	**Age/Condition**
Council	Diesel	5,000	
Trading post	Gas		
TDX	Diesel	5,000	

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

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

Cooperative Purchasing Agreements

Notes

Energy Profile: Manley Hot Springs

Housing Units	Occupied	Vacant	% Owner-Occup.
	20	70+	50%

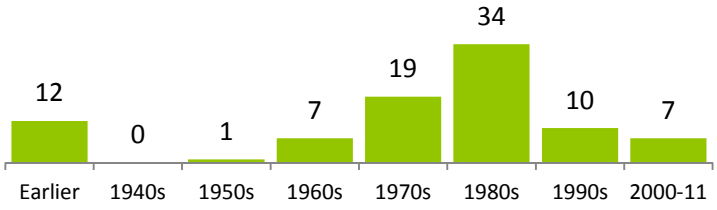
Regional Housing Authority	Weatherization Service Provider
IRHA	TCC

Housing Need	Overcrowded	1-star
	20.0%	N/A

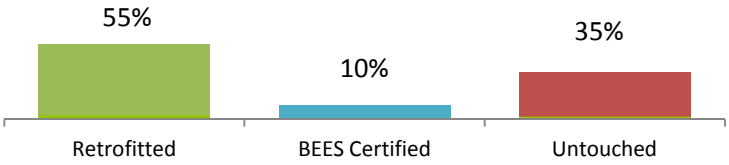
Data Quality	Med.

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

Age of Housing Stock



Energy Efficient Housing Stock



Street Lighting	Owner	Number/Type	Retrofitted?	Year	Notes
		No street lights			May install LEDs, Village Council intersted
	TDX	1	No		At powerplant, illuminates the street

Non-residential Building Inventory

Building Name or Location	Year Built	Square Feet	Audited?	Retrofits Done?	In ARIS?
Bus Barn					No
Clinic/Washeteria MVC	1997	1,400			No
Cold Storage Bldg.		288			Yes
Generator Shed		360			No
Gladys Dart School		8,323			Yes
Maintenance Shop/Bunkhouse		3,300			Yes
MVC Offices		820			No
Old School Storage		1,200			No
Shed		100			No
Transit Shop (School)	2009	2,000			No
Tribal Hall	~2000	1,200			No

Community Profile: McGrath

Alaska Native Name (definition)
Tochak'

Historical Setting / Cultural Resources

Served as a meeting and trading place for Big River, Nikolai, Telida, and Lake Minchumina residents. In 1906, gold was discovered. The Kuskokwim River became a regional supply center. Mining sharply declined after 1925. After a flood in 1933, residents moved to the south bank of the river. In 1940, the FAA built a communications complex. Used as an refueling stop during World War II. Population is Athabascan and Eskimo. Subsistence remains important: moose, fish, caribou, berry picking, greens, fowl and gardening.

Energy Priorities and Projects

Add solar PV to homes & community bldgs; interest in run of river hydro; IASD interested in EE upgrades for schools; replace electrical meters; road to Ruby

Incorporation	2nd Class City

Location

McGrath is located 221 miles northwest of Anchorage and 269 miles southwest of Fairbanks in Interior Alaska. It is adjacent to the Kuskokwim River, directly south of its confluence with the Takotna River.

Longitude	-155.5958	**Latitude**	62.9564
ANCSA Region	Doyon, Limited		
Borough/CA	Yukon-Koyukuk Census Area		
School District	Iditarod Area School District		
AEA Region	Yukon-Koyukuk/Upper Tanana		

Taxes	**Type (rate)**	**Per-Capita Revenue**
	10% bed tax	

Economy

Local government, trade/transportation, and state government provide the majority of employment for the village.

Climate	**Avg. Temp.**	**Climate Zone**	**Heating Deg. Days**
	27.4	8	14,574

Natural Hazard Plan	**Year**
Yes	2007

Notes	River shoreline erosion is a critial problem.

Community Plans	**Year**
McGrath Community Plan	2013
McGrath Community Strategic Plan	2003

Local Contacts	**Email**	**Phone**	**Fax**
City of McGrath	mcgrathcityclerk@gmail.com	524-3825	524-3536
McGrath Native Village	tmd1ak@yahoo.com	524-3024	524-3899
MTNT, Limited	votte@mtnt.net	524-3391	524-3062

Demographics	**2000**	**2010**		**2013**
Population	401	346	**Percent of Residents Employed**	64.8%
Median Age	34	39.8	**Denali Commission Distressed Community**	No
Avg. Household Size	3	3	**Percent Alaska Native/American Indian (2010)**	46.0%
Median Household Income	$43,056	$64,896	**Low and Moderate Income (LMI) Percent (2014)**	51.3%

Electric Utility	**Generation Sources**	**Interties**	**PCE?**
McGrath Light and Power	Diesel	No	Yes

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

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

Access

Road	No				
Air Access	Yes	**Runway**	2000' x 60'	5936' x 100'	
Dock/Port	No	**Barge Access?**	Yes	**Ferry Service?**	No

Notes Winter trails are marked to Nikolai and Takotna. Residents rely on air service and barges for cargo. Barge service is limited now due to low water levels. A boat launch ramp site is available. The river is used when frozen.

Energy Profile: McGrath

Diesel Power System

Utility	McGrath Light & Power		
Engine	**Make/Model**	**Condition/Hrs**	**Gen Capacity**
Unit 1	Caterpillar	Fair/10,932	670
Unit 2	Caterpillar	Poor/7,453	560
Unit 3	Caterpillar	Good/20,260	455
Unit 4	Caterpillar	Good/17,204	455
Line Loss	7.6%		
Heat Recovery?	Yes; School, Clinic, Offices, AC Str, Hotel, Innoko Bldg		

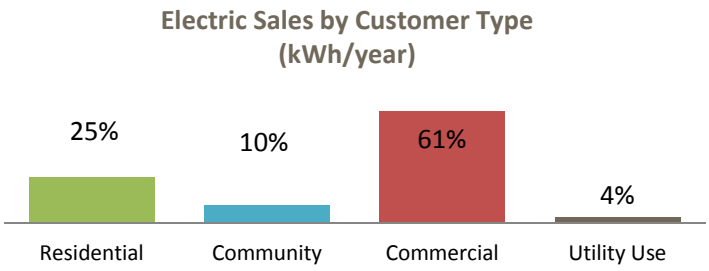
Upgrades	**Priority**	**Projects**	**Status**
RPSU Powerhouse	Low		
RPSU Distribution	Medium		

Outage History/Known Issues

New gen. vibrate, causing damage.

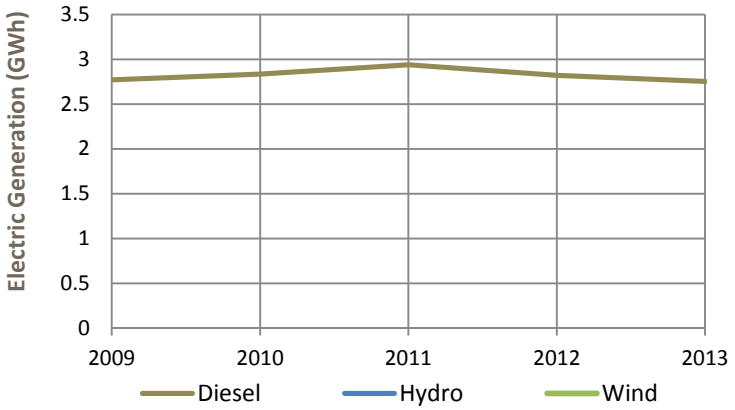
Operators	**No. of Operators**	**Training/Certifications**
	2	APPO, BFO, PPO, Utility Clerk

Maintenance Planning (RPSU)	Good		
Electric Sales	**No. of Customers**	**kWh/year**	**kWh/Customer**
Residential	186	594,372	3,196
Community	14	236,283	16,877
Commercial	96	1,449,344	15,097
Utility Use		83,034	



Power Production

Diesel (kWh/yr)	2,619,660	**Avg. Load (kW)**	289
Wind (kWh/yr)	0	**Peak Load (kW)**	642
Hydro (kWh/yr)	0	**Efficiency (kWh/gal)**	14
Total (kWh/yr)	2,619,660	**Diesel Used (gals/yr)**	180,739



Electric Rates ($/kWh)		**Cost per kWh Sold ($/kWh)**	
Rate with PCE	$0.23	**Fuel Cost**	$0.37
Residential Rate	$0.71	**Non-fuel Cost**	$0.14
Commercial Rate	$0.57	**Total Cost**	$0.49

Fuel Prices ($)	**Utility/Wholesale**	**Retail**	**Month/Year**
Diesel (1 gal)	$4.83	$8.31	7-15; 6-15
Other Fuel? (1 gal)			
Gasoline (1 gal)		$7.68	6-15
Propane (100#)		$239.52	8-14
Wood (1 cord)		$350	6-15
Pellets			
Discounts?			

Alternative Energy	**Potential**	**Projects**	**Status**
Hydroelectric	Low		
Wind Diesel	Low		
Biomass	Medium	Central Wood Heating	CDR Complete/ Project on hold
Solar	High		
Geothermal	Low		
Oil and Gas	Low		
Coal	Low		
Emerging Tech	Not Rated		
Heat Recovery	Low (Limited expansion opps)	HR to IASD, Clinic, & Commercial Bldgs.	Operational
Energy Efficiency	High	1) VEEP 2) Sanitation EE Audit	1) In progress - 2014 2) in 2015

Bulk Fuel

Tank Owner	**Fuel Type(s)**	**Capacity**	**Age/Condition**
City	Diesel	42,000	Good
City	Gasoline	5,000	Good
Utility	Diesel	227,000	Good

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

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

Cooperative Purchasing Agreements

Notes

Barge delivery in Spring to City, June-Sept. to utility

Energy Profile: McGrath

Housing Units	Occupied	Vacant	% Owner-Occup.
	157	40	59%

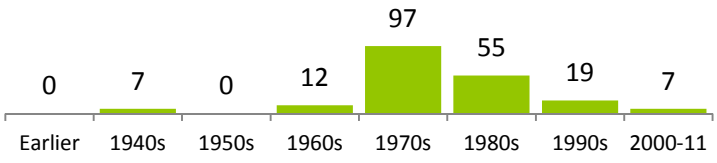
Regional Housing Authority	Weatherization Service Provider
IRHA	IRHA

Housing Need	Overcrowded	1-star
	4.5%	N/A

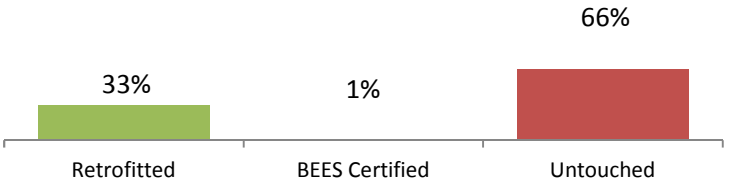
Data Quality	Med.

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

Age of Housing Stock



Energy Efficient Housing Stock



Street Lighting	Owner	Number/Type	Retrofitted?	Year	Notes
	City McGrath	68/HPS & MV	Yes	2012-2014	LEDs installed

Non-residential Building Inventory

Building Name or Location	Year Built	Square Feet	Audited?	Retrofits Done?	In ARIS?
8-Ball Teen Center		2,000			Yes
AC Commercial Company Store		5,363			No
Athletic Equipment Storage		410			No
Captain Snow Center		14,300			Yes
Cold Storage					No
Equipment Shop		2,000			Yes
Garage & Maintenance Shop		1,500			No
Hotel McGrath					No
Iditarod Area School District Office	1982	9,830	Yes; Nortech		Yes
Maintenance Shop/SEF		4,048			Yes
McGrath Biologist House		2,384			Yes
McGrath Health Center	2010	6,100			No
McGrath Public Safety Storage					Yes
McGrath RTH					Yes
McGrath School	1964	38,100	Yes; Nortech		Yes
McGrath Shed		500			Yes
MNV Tribal Office		6,000			Yes
Multipurpose Bldg.		9,360			No
Pre-School					No
Sand Storage		3,200			Yes
Warehouse/Shop		3,200			No

Community Profile: Minto

Incorporation Unincorporated

Location

Minto is located on the west bank of the Tolovana River, 130 miles northwest of Fairbanks. It lies on an 11-mile spur road off of the Elliott Highway.

Longitude	-149.3369	**Latitude**	65.1533
ANCSA Region	Doyon, Limited		
Borough/CA	Yukon-Koyukuk Census Area		
School District	Yukon-Koyukuk School District		
AEA Region	Yukon-Koyukuk/Upper Tanana		

Alaska Native Name (definition)

Benti - Among the Lakes

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

None

Historical Setting / Cultural Resources

During late 1800s, members of the Minto band traveled to Tanana, Rampart, and Fort Yukon to trade furs for goods. With the discovery of gold steamboats began to navigate the Tanana River. The Minto band was eventually joined by families from Nenana, Toklat, Crossjacket, and Chena. Minto was relocated in 1969 from the Tanana to Tolovana due to flooding and erosion. Minto residents are mainly Tanana Athabascans. Families have seasonal fishing/hunting camps on the Tolovana and Tanana River and Goldstream Creek.

Economy

Over 50% of employment is provided by local government with leisure/hospitality, and trade rounding out the top 3.

Climate	**Avg. Temp.**	**Climate Zone**	**Heating Deg. Days**
		8	15,528

Natural Hazard Plan	**Year**
None	

Notes

Energy Priorities and Projects

Biomass heating for multipurpose bldg; do another wind study in different site; utility scale solar PV project with AVEC; truck needed for fuel delivery

Community Plans	**Year**
Minto Community Plan	2005
Draft Environmental Assessment Minto Airport	2003

Local Contacts	**Email**	**Phone**	**Fax**
Native Village of Minto	mintovillagecouncil@hotmail.com	798-7112	798-7627
Seth-De-Ya-Ah Corporation	sethdeyaahcorp@gci.net	798-7181	798-7556

Demographics	**2000**	**2010**		**2013**
Population	258	210	**Percent of Residents Employed**	72.5%
Median Age	25	30	**Denali Commission Distressed Community**	Yes
Avg. Household Size	4	4	**Percent Alaska Native/American Indian (2010)**	90.9%
Median Household Income	$21,250	$25,417	**Low and Moderate Income (LMI) Percent (2014)**	N/A

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

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

Water/Wastewater System		**Homes Served**	**System Volume**
Water	Drawn from wells and piped	64	
Sewer	Piped	**Energy Audit?**	
Notes		No	

Access

Road	Yes				
Air Access	Yes	**Runway**	3400' x 75'		
Dock/Port	Yes	**Barge Access?**	No	**Ferry Service?**	No

Notes The Tolovana River provides boat access to the Tanana and Nenana Rivers. The area is too shallow for barge service. Minto receives funds (Essential Air Services) that subsidizes the cost of commercial flights.

Energy Profile: Minto

Diesel Power System

Utility	AVEC		
Engine	**Make/Model**	**Condition/Hrs**	**Gen Capacity**
Unit 1	Cummins	Fair/2,287	168
Unit 2	Detroit Diesel	Fair/34,450	229
Unit 3	Cummins	Fair/6,083	250
Unit 4			
Line Loss	4.0%		
Heat Recovery?	Yes; Water Treatment Plant		

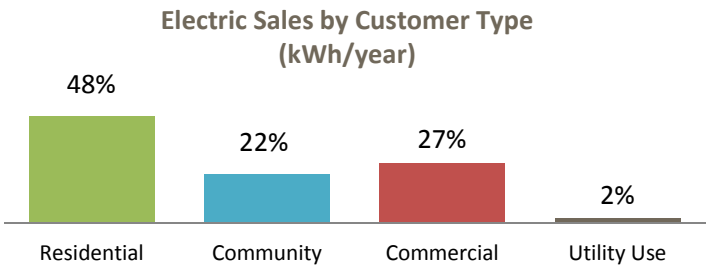
Upgrades	**Priority**	**Projects**	**Status**
RPSU Powerhouse	Med.		
RPSU Distribution	Low		

Outage History/Known Issues 8 short unscheduled outages in 2015; one 2 day outage in 2015 due to mechanical failure

Operators	**No. of Operators**	**Training/Certifications**
	2 FT	PPO
	2 PT/Back-up	

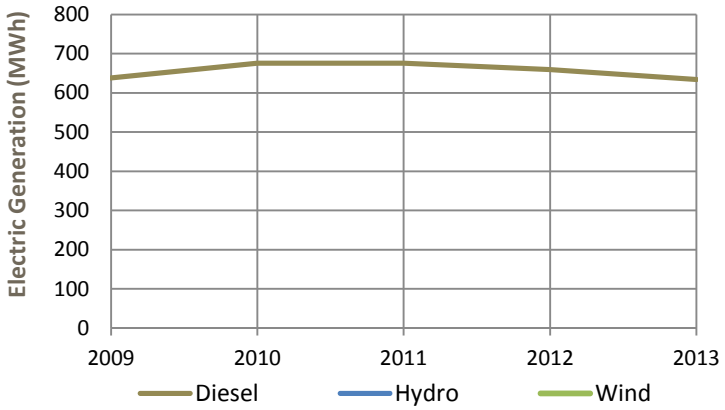
Maintenance Planning (RPSU) Good

Electric Sales	**No. of Customers**	**kWh/year**	**kWh/Customer**
Residential	73	277,830	3,806
Community	5	128,600	25,720
Commercial	19	156,023	8,212
Utility Use		13,480	



Power Production

Diesel (kWh/yr)	599,890	**Avg. Load (kW)**	71
Wind (kWh/yr)	0	**Peak Load (kW)**	194
Hydro (kWh/yr)	0	**Efficiency (kWh/gal)**	14
Total (kWh/yr)	599,890	**Diesel Used (gals/yr)**	43,585



Electric Rates ($/kWh)		**Cost per kWh Sold ($/kWh)**	
Rate with PCE	$0.20	**Fuel Cost**	$0.28
Residential Rate	$0.61	**Non-fuel Cost**	$0.23
Commercial Rate	$0.34	**Total Cost**	$0.51

Fuel Prices ($)	**Utility/Wholesale**	**Retail**	**Month/Year**
Diesel (1 gal)	$3.57	$5.65	6-13; 6-15
Other Fuel? (1 gal)			
Gasoline (1 gal)		$5.85	6-15
Propane (100#)		$135.71	8-14
Wood (1 cord)		$250.00	6-15
Pellets			

Discounts? School orders separately, corp orders and manages supply

Alternative Energy	**Potential**	**Projects**	**Status**
Hydroelectric	Medium		
Wind Diesel	Low	Wind Feasibility Study	Complete, More recon needed
Biomass	High	Biomass Heat for Lodge & Clinic	Design/Construction
Solar	High		
Geothermal	Low		
Oil and Gas	Low		
Coal	Low		
Emerging Tech	Not Rated		
Heat Recovery	High	HR to water treatment plant	Operational
Energy Efficiency	Medium	1) DOE EE upgrades 2) VEEP 3) Sanitation EE	1&2) Complete 3) ANTHC 12/15

Bulk Fuel

Tank Owner	**Fuel Type(s)**	**Capacity**	**Age/Condition**
AVEC			
Northfork Store & Fu	gas &diesel	10,000 gals	1988
Minto School			

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

Purchasing	**Deliveries/Year**	**Gallons/Delivery**	**Vendor(s)**
By Barge			
By Truck		Via Road from AK Petrol; Crowley	
By Air			

Cooperative Purchasing Agreements

Notes

Energy Profile: Minto

Housing Units	Occupied	Vacant	% Owner-Occup.
	66	25	77%

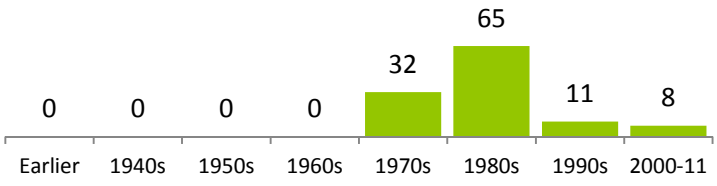
Regional Housing Authority	Weatherization Service Provider
IRHA	TCC

Housing Need	Overcrowded	1-star
	80.0%	N/A

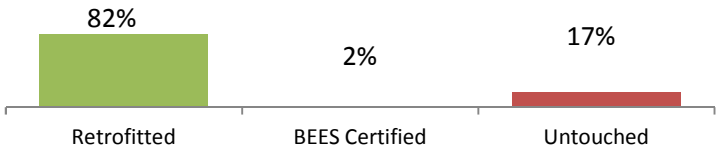
Data Quality	Med.

Energy Use	Average Home Energy Rating	Average Square Feet	Avg. EUI (kBTU/sf)
	N/A	800-1000	N/A

Age of Housing Stock



Energy Efficient Housing Stock

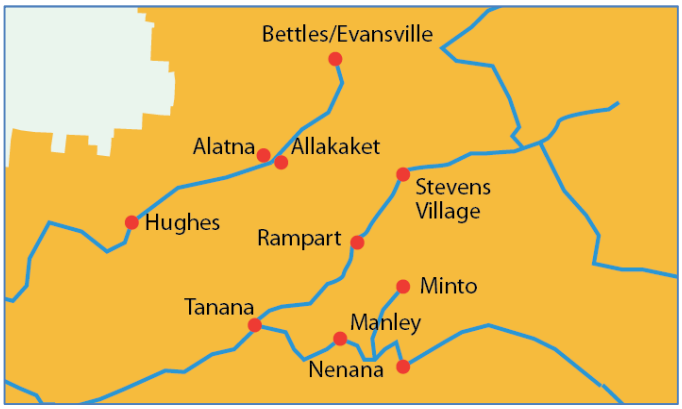


Street Lighting	Owner	Number/Type	Retrofitted?	Year	Notes
	Tribe	6	Yes, all		6 more requested

Non-residential Building Inventory

Building Name or Location	Year Built	Square Feet	Audited?	Retrofits Done?	In ARIS?
Airport Electrical	2009	166			No
Arts and Crafts	1985		Yes		
Assembly of God	1970	1,400			
Community Hall	2001	3,000			
Fire Hall	1984		Yes	On track 2015	
Health Clinic	2007	2,076			Yes
Minto Episcopal Church	1970	1,000			
Minto Lakeview Lodge	1981	10,000	Yes	Yes	
Minto Northfork Store and Fuel	1970s	33x52			
Minto School	1980s	14,392			Yes
Power House	1971	320			No
SRE Bldg.		2,000			Yes
Storage 5		320			No
Storage 6		320			No
Tribal Hall	2004				
Vocational Education Shop					No
Water Plant	1971		Yes		
Worship Center	2005	2,000			

Community Profile: Nenana



Alaska Native Name (definition)

Toghotili "mountain that parallels the river"

Historical Setting / Cultural Resources

Nenana is in the western-most portion of Tanana Athabascan territory. The Nenana Valley is the site of one of the earliest archaeological sites, about 11-12,000 yrs old. In 1915, construction of the Alaska Railroad doubled Nenana's population. The Nenana Ice Classic began in 1917. During the 1925 diphtheria epidemic in Nome, serum was transported to Nenana by train before being sent by dogsled to Nome. The population is a mixture of non-Natives and Athabascans. Residents participate in subsistence activities.

Energy Priorities and Projects

Continue with pellet boiler for community bldgs & expand; interest in district heating; street light retrofits to LED; More energy audits and retrofits needed on all public buildings and school buildings; support hydrokinetic turbines; oil & gas development

Incorporation	Home Rule City

Location

Located in Interior Alaska, 55 road miles southwest of Fairbanks on the George Parks Highway at mile 412 of the Alaska Railroad, on the south bank of the Tanana River, just east of the mouth of the Nenana River.

Longitude	-149.0391	**Latitude**	64.5639
ANCSA Region	Doyon, Limited		
Borough/CA	Yukon-Koyukuk Census Area		
School District	Nenana City School District		
AEA Region	Railbelt		

Taxes	**Type (rate)**	**Per-Capita Revenue**
	Sales 4%, Property 12 Mills	$ 930

Economy

Local government, leisure/hospitality, and trade/transportation are main employers for the village.

Climate	**Avg. Temp.**	**Climate Zone**	**Heating Deg. Days**
	25	8	14,539

Natural Hazard Plan	**Year**
Yes	2010

Notes

Community Plans	**Year**
Nenana Community Develop. Plan 2013-18	2013

Local Contacts	**Email**	**Phone**	**Fax**
City of Nenana	nenana1@nenana.net	832-5441	832-5503
Nenana Native Association	nenananativecouncil@gmail.com	832-5461	832-1077
Toghotthele Corporation	info@toghotthele.com	832-5832	832-5834

Demographics	**2000**	**2010**		**2013**
Population	402	378	**Percent of Residents Employed**	63.4%
Median Age	41	48	**Denali Commission Distressed Community**	No
Avg. Household Size	3	3	**Percent Alaska Native/American Indian (2010)**	40.4%
Median Household Income	$33,333	$56,250	**Low and Moderate Income (LMI) Percent (2014)**	58.7%

Electric Utility	**Generation Sources**	**Interties**	**PCE?**
GVEA	Coal, Wind, Oil, Hydro, Gas	Yes	No

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

Water/Wastewater System	**City of Nenana**	**Homes Served**	**System Volume**
Water	Piped	432	50,001 - 100,000
Sewer	Piped	**Energy Audit?**	
Notes	High levels of arsenic in well systems	Yes	

Access

Road	Yes				
Air Access	Yes	**Runway**	4600' x 100'	2520' x 60'	
Dock/Port	Yes	**Barge Access?**	Yes	**Ferry Service?**	No

Notes The railroad provides daily freight service. The Tanana River is shallow, with a maximum draft for loaded river barges of 4.5 feet. Daily buses to Fairbanks and Anchorage are available year-round.

Energy Profile: Nenana

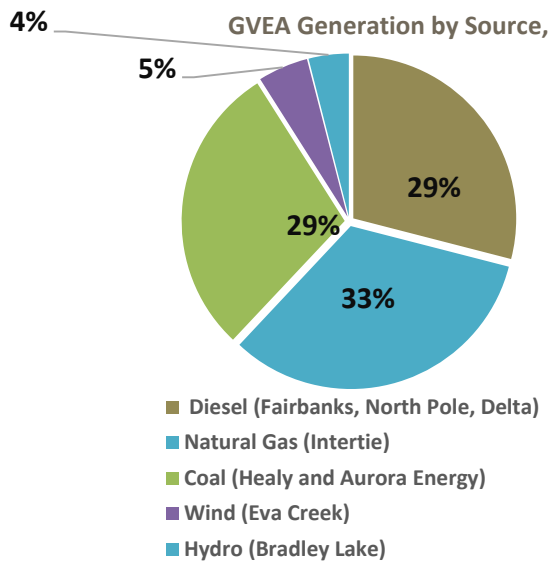
Diesel Power System | **PCE**

Utility	GVEA	Ineligible
No generation in Nenana		

Upgrade Plans

Outage History/Known Issues

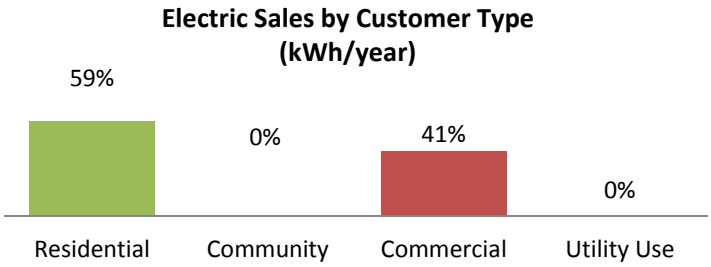
Annual Power Production (2013)



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

Maintenance Planning (RPSU) N/A

Electric Sales	**No. of Customers**	**kWh/year**	**kWh/Customer**
Residential	189	1,225,838	6,486
Community	N/A	N/A	N/A
Commercial	53	843,859	15,922
Utility Use			



Electric Rates ($/kWh)		**Cost per kWh Sold ($/kWh)**
Rate with PCE	N/A	**Fuel Cost**
Residential Rate	$0.1788	**Non-fuel Cost**
Commercial Rate		**Total Cost**

Fuel Prices ($)	**Utility/Wholesale**	**Retail**	**Month/Year**
Diesel (1 gal)		$4.50	8-14
Other Fuel? (1 gal)			
Gasoline (1 gal)		$1 more than FAI	
Propane (100#)		$113.10	8-14
Wood (1 cord)		$250.00	6-15
Pellets			
Discounts?			

Alternative Energy	**Potential**	**Projects**	**Status**
Hydroelectric	Low	Bradley Lake via intertie	Operational
Wind Diesel	Medium	Eva Creek via intertie	Operational
Biomass	Medium	Pellet Boiler - clinic/tribal office/hall	Operational
Solar	Medium	4.4 kW PV array on Nenana Teen Center	Operational
Geothermal	Low		
Oil and Gas	Low	Natural Gas via intertie	Operational
Coal	Low	Healy unit 2	Operational
Emerging Tech	Not Rated	Experimental Hydrokinetic Turbine	Pilot Phase
Heat Recovery	Low		
Energy Efficiency	High	1) EE Audits -Public Bldgs 2) Interior Light Upgrades	Complete

Bulk Fuel

Tank Owner	**Fuel Type(s)**	**Capacity**	**Age/Condition**
Nenana Heating	lF, gas, on/off diesel		4 miles south

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

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

Cooperative Purchasing Agreements

Notes

Energy Profile: Nenana

Housing Units	Occupied	Vacant	% Owner-Occup.
	171	58	67%

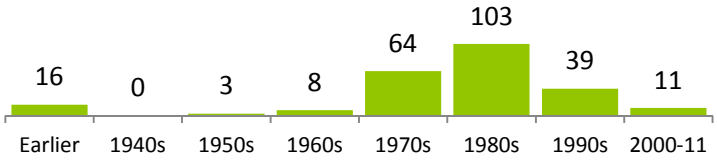
Regional Housing Authority	Weatherization Service Provider
IRHA	Interior Weatherization Inc

Housing Need	Overcrowded	1-star
	8.0%	15.3%

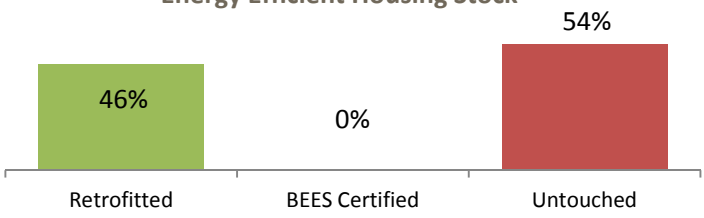
Data Quality	High

Energy Use	Average Home Energy Rating	Average Square Feet	Avg. EUI (kBTU/sf)
	2 star	1,152	186

Age of Housing Stock



Energy Efficient Housing Stock



Street Lighting	Owner	Number/Type	Retrofitted?	Year	Notes
	City	50/HPS	No		18 working; Burn out a lot, great upgrade opp

Non-residential Building Inventory

Building Name or Location	Year Built	Square Feet	Audited?	Retrofits Done?	In ARIS?
Admin. Office	2004	2,039			Yes
Bars (2)					
City Hall	1955	3,680	Yes; Nortech		Yes
Civic Center	1948-1990s	7,000	Yes; Nortech		Yes
Clinic					No
Community Hall					No
Cultural Center	1997	3,600			Yes
Fire Station/Hall	1964	5,848	Yes; Nortech		Yes
GVEA Office		800			No
Hotel					
Library	1988	2,250			Yes
Main Shop	2004	2,200			Yes
Maintenance Shop		3,800			Yes
Mayor's Office					
Multipurpose Bldg. (Clinic)	2000	3,250	Yes; ANTHC		No
Multipurpose Bldg. (Kitchen)	2000	1,075	Yes; ANTHC		No
Multipurpose Bldg. (Tribal Office)	2000	1,075	Yes; ANTHC		No
Nenana City School & Gym	1960	108,700	Yes; Nortech		Yes
Nenana RTH					Yes
Old Airport Shop	1958	3,600			Yes
Post Office					No
Railbelt Mental Health Bldg.					No
Sand Storage		1,600			No
Sewer Treatment Plant	1979	5,000			Yes
Storage Bldg.		1,071			No
Store					
Student Living Center	2001	31,734			Yes
Teen Recreation Center					No
Tribal Hall					No
Visitor Center					No
Water Treatment Plant		5,000	Yes		Yes

Community Profile: Nikolai

Incorporation	2nd Class City

Location

Nikolai is located in Interior Alaska on the south fork of the Kuskokwim River, 46 air miles east of McGrath.

Longitude	-154.375	**Latitude**	63.0133
ANCSA Region	Doyon, Limited		
Borough/CA	Yukon-Koyukuk Census Area		
School District	Iditarod Area School District		
AEA Region	Yukon-Koyukuk/Upper Tanana		

Alaska Native Name (definition)

Nikolai

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

Historical Setting / Cultural Resources

Nikolai is an Upper Kuskokwim Athabascan village and has been relocated at least twice since the 1880s, present site established in 1918. Nikolai was the site of a trading post and roadhouse during the gold rush. It was situated on the Rainy Pass Trail, which connected the Ophir gold mining district to Cook Inlet. It became a winter trail station along the Nenana-McGrath Trail, which was used until 1926. Nikolai is an Athabascan community. Residents are active in subsistence food-gathering.

Economy

Local government provides more than 70% of the employment with education/health services, and state government rounding out top 3.

Climate	**Avg. Temp.**	**Climate Zone**	**Heating Deg. Days**
	28.2	8	15,214

Natural Hazard Plan	**Year**
None	

Notes

Energy Priorities and Projects

Biomass project with city/school& tribe; solar PV for buildings & homes, energy efficiency programs to reduce electricity usage

Community Plans	**Year**
Nikolai Community Development Plan	2012

Local Contacts	**Email**	**Phone**	**Fax**
City of Nikolai	cityofnikolai@yahoo.com	293-2113	293-2120
Nikolai Village	beverly.gregory@tananachiefs.or	293-2311	293-2481
MTNT, Limited	votte@mtnt.net	524-3391	524-3062

Demographics	**2000**	**2010**		**2013**
Population	100	94	**Percent of Residents Employed**	73.2%
Median Age	40	39	**Denali Commission Distressed Community**	Yes
Avg. Household Size	3	3	**Percent Alaska Native/American Indian (2010)**	82.9%
Median Household Income		$29,167	**Low and Moderate Income (LMI) Percent (2014)**	90.8%

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

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

Water/Wastewater System		**Homes Served**	**System Volume**
Water	Individual wells		
Sewer	Piped, and ind. septic systems	**Energy Audit?**	
Notes		Yes	

Access

Road	No				
Air Access	Yes	**Runway**	4021' x 75'		
Dock/Port	Yes	**Barge Access?**	Yes	**Ferry Service?**	No

Notes Access is by air or water. Barges used to supply fuel and heavy equipment but the river is now too low. A winter trail is marked to McGrath. Nikolai is a checkpoint for the Iditarod Trail Sled Dog Race and Iron Dog.

Energy Profile: Nikolai

Diesel Power System

Utility	Nikolai Light and Power (City)		
Engine	**Make/Model**	**Condition/Hrs**	**Gen Capacity**
Unit 1			100
Unit 2			100
Unit 3			100
Unit 4			
Line Loss	13.8%		
Heat Recovery?			

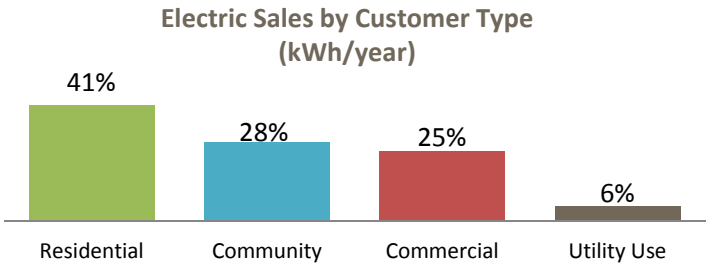
Upgrades	**Priority**	**Projects**	**Status**
RPSU Powerhouse	Medium		
RPSU Distribution	Low		

Outage History/Known Issues

Pre-paid electric meters installed in 2011

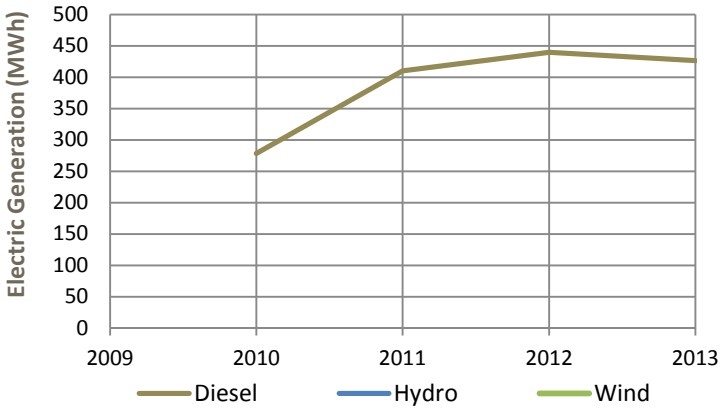
Operators	**No. of Operators**	**Training/Certifications**
	7	APPO, BFO, Itin. BFO, PPO

Maintenance Planning (RPSU)	N/A		
Electric Sales	**No. of Customers**	**kWh/year**	**kWh/Customer**
Residential	39	150,537	3,860
Community	10	102,219	10,222
Commercial	7	91,365	13,052
Utility Use		20,106	



Power Production

Diesel (kWh/yr)	422,535	**Avg. Load (kW)**	43
Wind (kWh/yr)	0	**Peak Load (kW)**	96
Hydro (kWh/yr)	0	**Efficiency (kWh/gal)**	11
Total (kWh/yr)	422,535	**Diesel Used (gals/yr)**	39,668



Electric Rates ($/kWh)		**Cost per kWh Sold ($/kWh)**	
Rate with PCE	$0.28	**Fuel Cost**	$0.71
Residential Rate	$0.90	**Non-fuel Cost**	$0.10
Commercial Rate		**Total Cost**	$0.81

Fuel Prices ($)	**Utility/Wholesale**	**Retail**	**Month/Year**
Diesel (1 gal)	$6.39	$8.00	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		
Biomass	High	Community Biomass Project	Seeking Funding
Solar	High		
Geothermal	Low		
Oil and Gas	Low		
Coal	Low		
Emerging Tech	Not Rated		
Heat Recovery	Medium	HR to City Shop	Unknown
Energy Efficiency	Medium	1) VEEP 2) ANTHC EE Audit	1) Complete 2) Complete (11-16)

Bulk Fuel

Tank Owner	**Fuel Type(s)**	**Capacity**	**Age/Condition**
City	Diesel	96,000	Good
City	Gasoline	31,000	Good
Schools		15,300	

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

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

Cooperative Purchasing Agreements

Notes

Barge delivery.

Energy Profile: Nikolai

Housing Units	Occupied	Vacant	% Owner-Occup.
	37	11	51%

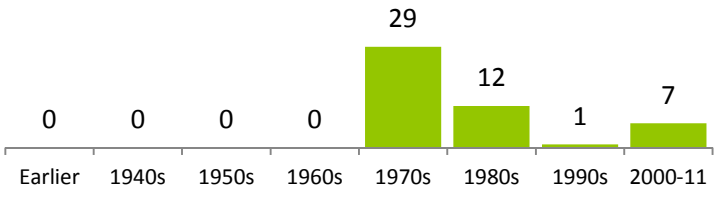
Regional Housing Authority	Weatherization Service Provider
IRHA	IRHA

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

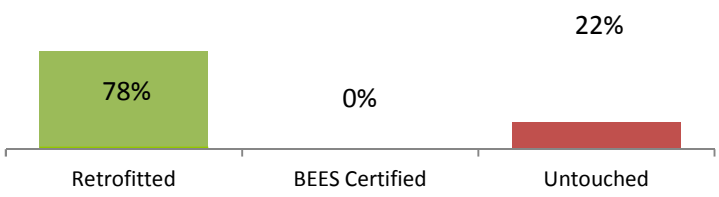
Energy Use	Average Home Energy Rating	Average Square Feet	Avg. EUI (kBTU/sf)
	N/A	N/A	N/A

Data Quality	Low

Age of Housing Stock



Energy Efficient Housing Stock

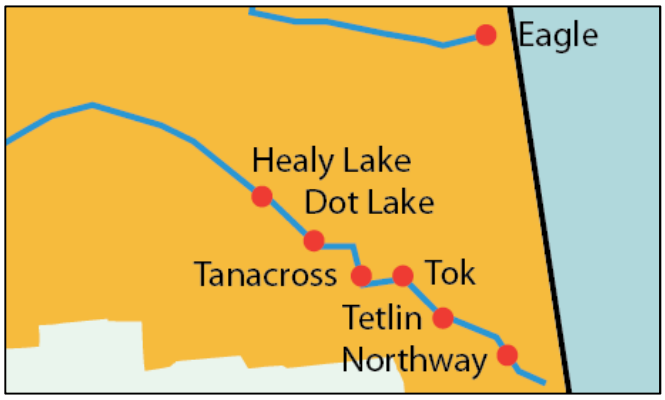


Street Lighting	Owner	Number/Type	Retrofitted?	Year	Notes
		18/HPS	Yes		Replaced with 47W LEDs

Non-residential Building Inventory

Building Name or Location	Year Built	Square Feet	Audited?	Retrofits Done?	In ARIS?
Boiler Room Bldg.					No
City Office Bldg.		4,050	Yes; Ameresco		No
Clinic					
Generator Bldg.		80			No
Maintenance Shop			Yes; Ameresco		No
Nikolai Community Center	1983				No
Post Office					
Shop Bldg.		216			No
SRE Bldg. 1		800			Yes
SRE Bldg. 2 (Heated)		2,700			Yes
Top of the Kuskokwim School	1975	12,349	Yes; Nortech		Yes

Community Profile: Northway



Incorporation	Unincorporated

Location

Located on the east bank of Nabesna Slough, 50 miles SE of Tok, 42 miles from the Canadian border in the Tetlin National Wildlife Refuge. Consists of three separate communities: Northway Junction (MP 1264), Northway, and Northway Village (2 miles north).

Longitude	-141.9372	**Latitude**	62.9617
ANCSA Region	Doyon, Limited		
Borough/CA	Southeast Fairbanks Census Area		
School District	Alaska Gateway School District		
AEA Region	Yukon-Koyukuk/Upper Tanana		

Alaska Native Name (definition)

K'ehtthiign

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

None

Historical Setting / Cultural Resources

The area was first utilized by semi-nomadic Athabascans who pursued seasonal subsistence activities in the vicinity of Scottie and Gardiner Creeks and Chisana, Nabesna, and Tanana Rivers. The development and settlement of Northway was due to construction of the airport during World War II. The Northway airport was a link in the Northwest Staging Route, a cooperative project between the U.S. and Canada. The area was traditionally Athabascan, though road construction and the airport have brought non-Native population.

Economy

Local government, education/health services, and trade/transportation/utilities are the main employers.

Climate	**Avg. Temp.**	**Climate Zone**	**Heating Deg. Days**
	21	8	15,763

Natural Hazard Plan	**Year**
None	

Notes

Energy Priorities and Projects

Solar panels for community hall addition; basic training on home weatherization & maintenance; geothermal feasibility study; working with AP&T on solar farm; add community facilities to PCE

Community Plans	**Year**
Northway Community Plan	2015

Local Contacts	**Email**	**Phone**	**Fax**
Northway Natives Inc.		778-2298	778-2498
Northway Village	nicholr@aptalaska.net	778-2311	778-2220

Demographics	**2000**	**2010**		**2013**
Population	274	223	**Percent of Residents Employed**	53.6%
Median Age	30	35	**Denali Commission Distressed Community**	Yes
Avg. Household Size	4	3	**Percent Alaska Native/American Indian (2010)**	75.3%
Median Household Income		$47,515	**Low and Moderate Income (LMI) Percent (2014)**	N/A

Electric Utility	**Generation Sources**	**Interties**	**PCE?**
Alaska Power and Telephone Company	Intertie	Northway Jct. and Village	Yes

Landfill	**Class**	3	**Permitted?**	Yes	**Location**	3 mi from Northway

Water/Wastewater System	**None**	**Homes Served**	**System Volume**
Water	Water haul for fee; Individual wells, community we	40	
Sewer	Sewage haul for fee; Individual septic, outhouses	**Energy Audit?**	
Notes	2 sewage lagoons; 2 wells; NVC hauls water and sewer for a fee.	Yes	

Access

Road	Yes				
Air Access	Yes	**Runway**	5100' x 100'		
Dock/Port	Yes - informal gravel boat landing	**Barge Access?**	No	**Ferry Service?**	No

Notes Northway is connected to the Alaska Highway by an unpaved road. Scheduled buses are available, and trucking services deliver freight to the community. Regular flights are available to Fairbanks.

Energy Profile: Northway

Diesel Power System

Utility	Alaska Power & Telephone Company

Engine	**Make/Model**	**Condition/Hrs**	**Gen Capacity**
Unit 1	Caterpillar		330
Unit 2	Caterpillar	9 yrs in service	300
Unit 3	Caterpillar	8 yrs in service	400
Unit 4			

Line Loss	7.8%
Heat Recovery?	

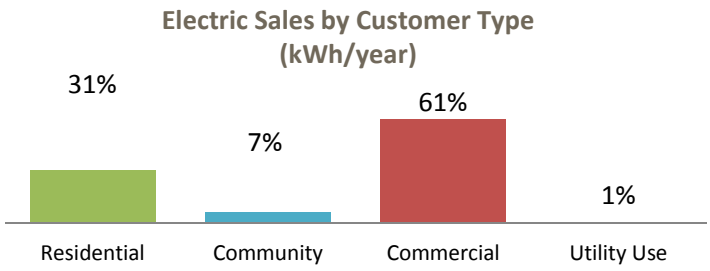
Upgrades	**Priority**	**Projects**	**Status**
RPSU Powerhouse	Low		
RPSU Distribution	Low		

Outage History/Known Issues Conceptual Phase for transmission line between Northway & Tok

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

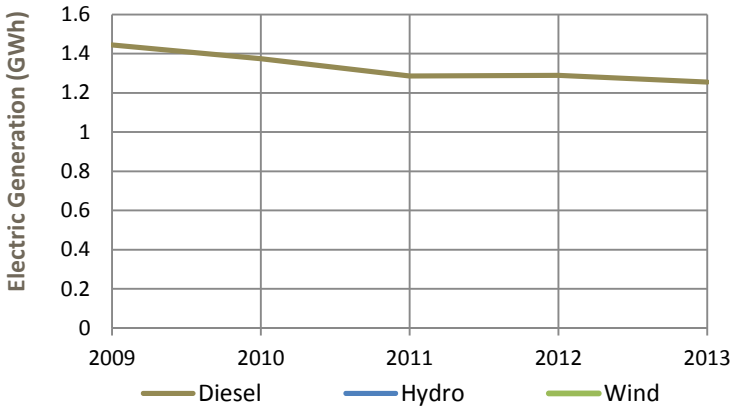
Maintenance Planning (RPSU)	N/A

Electric Sales	**No. of Customers**	**kWh/year**	**kWh/Customer**
Residential	85	346,301	4,074
Community	5	75,006	15,001
Commercial	34	673,882	19,820
Utility Use		11,160	



Power Production

Diesel (kWh/yr)	1,200,000	**Avg. Load (kW)**	27
Wind (kWh/yr)	0	**Peak Load (kW)**	61
Hydro (kWh/yr)	0	**Efficiency (kWh/gal)**	13
Total (kWh/yr)	1,200,000	**Diesel Used (gals/yr)**	92,329



Electric Rates ($/kWh)		**Cost per kWh Sold ($/kWh)**	
Rate with PCE	$0.23	**Fuel Cost**	$0.33
Residential Rate	$0.68	**Non-fuel Cost**	$0.10
Commercial Rate		**Total Cost**	$0.43

Fuel Prices ($)	**Utility/Wholesale**	**Retail**	**Month/Year**
Diesel (1 gal)	$3.90	$4.60	6-13; 8-14
Other Fuel? (1 gal)			
Gasoline (1 gal)		$4.35	10-14
Propane (100#)		$108.81	8-14
Wood (1 cord)		$150.00	
Pellets			
Discounts?			

Alternative Energy	**Potential**	**Projects**	**Status**
Hydroelectric	Low	**Renewable energy options available with transmission line to Tok**	
Wind Diesel	Low		
Biomass	Low	Biomass Feasibility Studies In Public Facilities	Not Feasible
Solar	High	1) AP&T investigation 2) PV array on home	1) Feasibility 2) Operational
Geothermal	Low		
Oil and Gas	Low	Alternative fuel under utility investigation	Feasibility
Coal	Low		
Emerging Tech	Not Rated		
Heat Recovery	Medium		
Energy Efficiency	High	1) LED interior light retrofits 2) TCC EE Project	1) Complete 2) In progress

Bulk Fuel

Tank Owner	**Fuel Type(s)**	**Capacity**	**Age/Condition**
AP&T	Diesel	10,000	20 yrs
Village	Heating Fuel	12,300	multiple tanks

Purchasing	**Deliveries/Year**	**Gallons/Delivery**	**Vendor(s)**
By Road	1/2 X per month		Northern Energy
By Air			

Cooperative Purchasing Agreements

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

Notes

Energy Profile: Northway

Housing Units	Occupied	Vacant	% Owner-Occup.
	71	10	68%

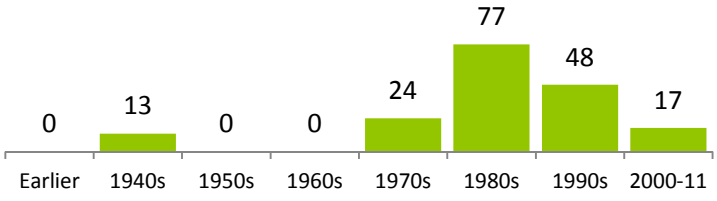
Regional Housing Authority	Weatherization Service Provider
IRHA	IRHA, TCC, ACDC

Housing Need	Overcrowded	1-star
	50.0%	12.1%

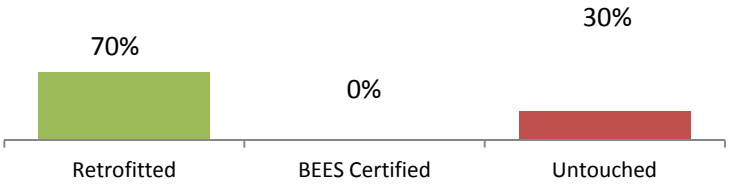
Data Quality	High

Energy Use	Average Home Energy Rating	Average Square Feet	Avg. EUI (kBTU/sf)
	2 star plus	1,232	239

Age of Housing Stock



Energy Efficient Housing Stock

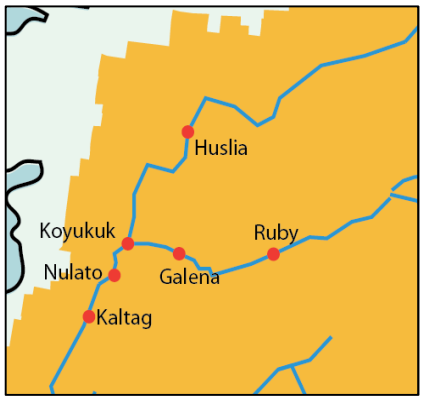


Street Lighting	Owner	Number/Type	Retrofitted?	Year	Notes

Non-residential Building Inventory

Building Name or Location	Year Built	Square Feet	Audited?	Retrofits Done?	In ARIS?
Airport & Equipment Storage		2,400			No
BIA Office					No
Clinic & Washeteria	1995				No
Community Hall					No
Fire Hall					No
Maintenance Shop		5,653			Yes
Naabia Niign, Store					No
Northway Pentecostal Church					No
Northway Sewer Plant		510			Yes
Post Office					No
School Garage		1,280			Yes
Shop & Garage		5,653			No
Teacher Housing Duplex	2010				No
Walter Northway School	1985	28,654	Yes; Nortech		Yes
Water/Sewer truck garage					No

Community Profile: Nulato



Alaska Native Name (definition)
Noolaaghe Doh

Historical Setting / Cultural Resources
Trading site for Athabascans and Inupiat Eskimos. A smallpox epidemic struck the region in 1839. Disputes over local trade may have been partly responsible for the Nulato massacre of 1851, Koyukuk River Natives decimated a large portion of the Nulato Native population. Epidemics took heavy tolls after the gold rush in 1884. Food shortages and measles epidemic killed one-third of the Nulato population during 1900. Gold seekers left the Yukon after 1906. Nulato residents are Koyukon Athabascans, with a subsistence life.

Energy Priorities and Projects
Solar PV for community buildings

Incorporation	2nd Class City

Location
Nulato is located on the west bank of the Yukon River, 35 miles west of Galena and 310 air miles west of Fairbanks. It lies in the Nulato Hills, across the river from the Innoko National Wildlife Refuge.

Longitude	-158.1031	**Latitude**	64.7194
ANCSA Region	Doyon, Limited		
Borough/CA	Yukon-Koyukuk Census Area		
School District	Yukon-Koyukuk School District		
AEA Region	Yukon-Koyukuk/Upper Tanana		

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

Economy
Local government provides almost 70% employment with education/health care and construction rounding out top 3.

Climate	**Avg. Temp.**	**Climate Zone**	**Heating Deg. Days**
	16	8	14,847

Natural Hazard Plan	**Year**
Yes	2010

Notes

Community Plans	**Year**
Nulato Community Comprehensive Plan revisiting in 2015	2007

Local Contacts	**Email**	**Phone**	**Fax**
City of Nulato	nulatoclerk@gmail.com	898-2205	898-2203
Nulato Village	nulatotribe@yahoo.com	898-2339	898-2207
Gana-A'Yoo, Limited	bhuntington@ganaayoo.com	569-9599	569-9699

Demographics	**2000**	**2010**		**2013**
Population	336	264	**Percent of Residents Employed**	71.8%
Median Age	23	34	**Denali Commission Distressed Community**	Yes
Avg. Household Size	4	3	**Percent Alaska Native/American Indian (2010)**	94.3%
Median Household Income	$25,114	$34,375	**Low and Moderate Income (LMI) Percent (2014)**	72.0%

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

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

Water/Wastewater System		**Homes Served**	**System Volume**
Water	Piped		
Sewer	Piped	**Energy Audit?**	
Notes	This is for the new townsite (old site just school)	Yes	

Access					
Road	No				
Air Access	Yes	**Runway**	4000' x 100'		
Dock/Port	No	**Barge Access?**	Yes	**Ferry Service?**	No
Notes	The river is the primary mode of local transportation. Barges deliver cargo during summer months, an ice road during winter for vehicles. Cars, trucks, snow machines, ATVs, and skiffs are used by residents.				

Energy Profile: Nulato

Diesel Power System

Utility	AVEC		
Engine	**Make/Model**	**Condition/Hrs**	**Gen Capacity**
Unit 1	Cummins		397
Unit 2	Detroit Diesel		229
Unit 3	Detroit Diesel		363
Unit 4			
Line Loss	5.4%		
Heat Recovery?			

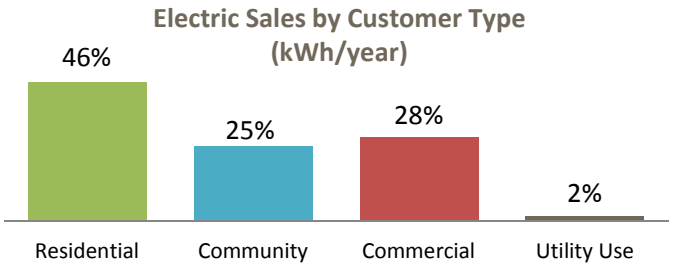
Upgrades	**Priority**	**Projects**	**Status**
RPSU Powerhouse	High		
RPSU Distribution	Medium		

Outage History/Known Issues 4 short unscheduled outages in 2015; multihour outage due to fire activity in 2015

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

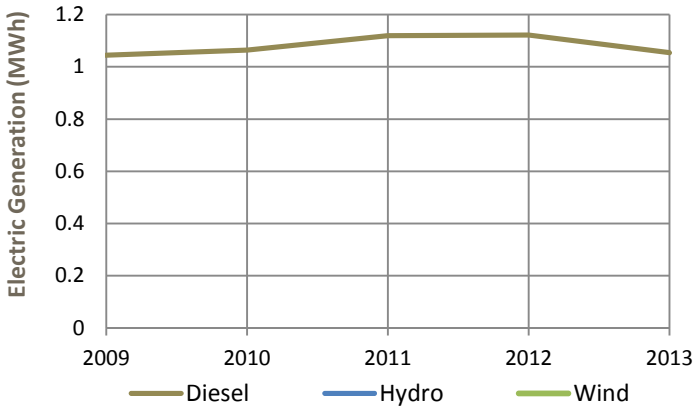
Maintenance Planning (RPSU)	N/A

Electric Sales	**No. of Customer**	**kWh/year**	**kWh/Customer**
Residential	107	452,649	4,230
Community	18	243,227	13,513
Commercial	15	273,054	18,204
Utility Use		18,097	



Power Production

Diesel (kWh/yr)	1,043,128	**Avg. Load (kW)**	120
Wind (kWh/yr)	0	**Peak Load (kW)**	324
Hydro (kWh/yr)	0	**Efficiency (kWh/gal)**	13
Total (kWh/yr)	1,043,128	**Diesel Used (gals/yr)**	77,305



Electric Rates ($/kWh)		**Cost per kWh Sold ($/kWh)**	
Rate with PCE	$0.20	**Fuel Cost**	$0.30
Residential Rate	$0.62	**Non-fuel Cost**	$0.23
Commercial Rat	$0.36	**Total Cost**	$0.54

Fuel Prices ($)	**Utility/Wholesale**	**Retail**	**Month/Year**
Diesel (1 gal)	$3.90	$5.40	7-15;7-15
Other Fuel? (1 gal)			
Gasoline (1 gal)	$3.78	$5.50	7-15
Propane (100#)		$205.00	7-15
Wood (1 cord) (energy assistance)		$250.00	6-15
Pellets			
Discounts?		No discounts	

Alternative Energy	**Potential**	**Projects**	**Status**
Hydroelectric	Low		
Wind Diesel	Low		
Biomass	Medium		
Solar	High		
Geothermal	Low		
Oil and Gas	Low		
Coal	Low		
Emerging Tech	Not Rated		
Heat Recovery	Low		
Energy Efficiency	Medium	1) ANTHC EE Upgdes 2) Audits laundry & rec bldgs	1) Complete 2) Done/upgrades on hold

Bulk Fuel

Tank Owner	**Fuel Type(s)**	**Capacity**	**Age/Condition**
City	Gas	60,000 (3 tanks)	
City	#1 heating	44,000 (2 tanks)	

Purchasing	**Deliveries/Year**	**Gallons/Delivery**	**Vendor(s)**
By Barge	3		Ruby Marine
By Air			

Cooperative Purchasing Agreements

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

Notes

Energy Profile: Nulato

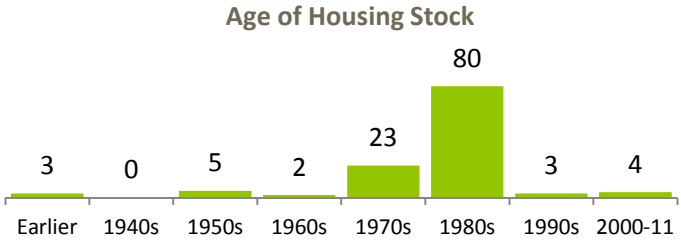
Housing Units	Occupied	Vacant	% Owner-Occup.
	84	36	74%

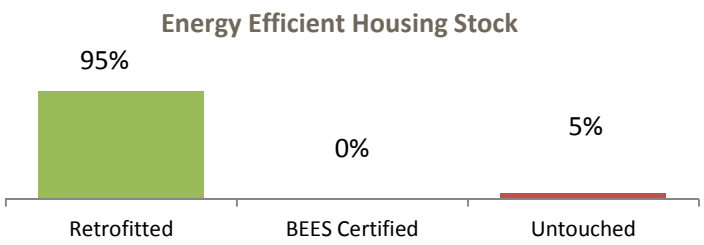
Regional Housing Authority	Weatherization Service Provider
IRHA	TCC

Housing Need	Overcrowded	1-star
	10.7%	N/A

Data Quality	Low

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





Street Lighting	Owner	Number/Type	Retrofitted?	Year	Notes
	City	28	No		City working on switchout

Non-residential Building Inventory

Building Name or Location	Year Built	Square Feet	Audited?	Retrofits Done?	In ARIS?
Adult Rec Center					
Airport Electrical		96			No
Airport Equipment Storage		1,600			No
Andrew K. Demoski School		24,971	Yes; Nortech		Yes
Bus Barn/Storage		1,536			No
City Council Office					
City Maintenance Shop		4,800			No
Nulato City Office					
Nulato Downtown Water Plant & Laundromat	1980				No
Nulato Health Clinic	2004	2,340	Yes; ANTHC		No
Nulato Liquor Store					
Nulato New Town Water Plant	1970		Yes; ANTHC		No
Nulato Tribal Office	1976		Yes; ANTHC		No
Old State Shop					
Small Depot Buildings					
Store					
Teen Rec Center					
VPSO Office					

Community Profile: Rampart

Alaska Native Name (definition)

Dleł Taaneets , where the moose hides hang

Historical Setting / Cultural Resources

Established in 1897 as a river supply point for gold placer mines in the hills and creek valleys south of the Yukon. Over time, the population gradually increased as people migrated from Minook Creek. A salmon cannery was established in the 1940s, a sawmill and logging operation was built in the 1950s. Residents continued to work in nearby gold mines, and the local store served as supply point for area operations. The population of Rampart is predominantly Koyukon Athabascan and is active in subsistence.

Energy Priorities and Projects

Heat recovery system; hydro assessment; biomass heating for community bldgs.; new generator; solar for homes & buildings; complete LED street light retrofits; repair electrical poles (leaning); road to Eureka

Incorporation	Unincorporated

Location

Rampart is located on the south bank of the Yukon River, approximately 75 miles upstream from its junction with the Tanana River, 100 miles northwest of Fairbanks.

Longitude	-150.1700	**Latitude**	65.5050
ANCSA Region	Doyon, Limited		
Borough/CA	Yukon-Koyukuk Census Area		
School District	Yukon Flats School District		
AEA Region	Yukon-Koyukuk/Upper Tanana		

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

Economy

Local government provides 37% of the employment for the village with accomodation/food services, and mining next highest employers.

Climate	**Avg. Temp.**	**Climate Zone**	**Heating Deg. Days**
	22.3	8	15,528

Natural Hazard Plan	**Year**
None	

Notes: Maryann Weihl did hazard plan in 2014, not in state database

Community Plans	**Year**
Rampart Community Plan	2014

Local Contacts	**Email**	**Phone**	**Fax**
Rampart Village	paw.rvc@gmail.com	358-3312	358-3115
Baan O Yeel Kon Corporation	boyk@mospuitonet.com	456-6259	456-4486

Demographics	**2000**	**2010**		**2013**
Population	45	24	**Percent of Residents Employed**	50.0%
Median Age	34	40	**Denali Commission Distressed Community**	No
Avg. Household Size	3	3	**Percent Alaska Native/American Indian (2010)**	95.8%
Median Household Income		$45,000	**Low and Moderate Income (LMI) Percent (2014)**	N/A

Electric Utility	**Generation Sources**	**Interties**	**PCE?**
Rampart Village	Diesel	No	No

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

Water/Wastewater System	**None**	**Homes Served**	**System Volume**
Water	Hauled (laundramat)		
Sewer		**Energy Audit?**	
Notes		Scheduled for June 2015	

Access

Road	No				
Air Access	Yes	**Runway**	3520' x 75'		
Dock/Port	No	**Barge Access?**	Yes	**Ferry Service?**	No

Notes Air transportation is the only year-round access. A 30-mile winter trail exists from the Elliott Highway north to Rampart. Goods are delivered by air only.

Energy Profile: Rampart

Diesel Power System

Utility	Rampart Village Council		
Engine	**Make/Model**	**Condition/Hrs**	**Gen Capacity**
Unit 1	John Deere		90 kW
Unit 2	John Deere		120 kW
Unit 3	John Deere	N/O	65 kW
Unit 4			
Line Loss			
Heat Recovery?			

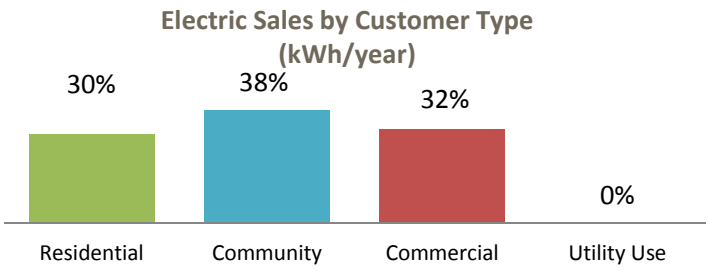
Upgrades	**Priority**	**Projects**	**Status**
RPSU Powerhouse	High		
RPSU Distribution	Low		

Outage History/Known Issues

PCE inactive

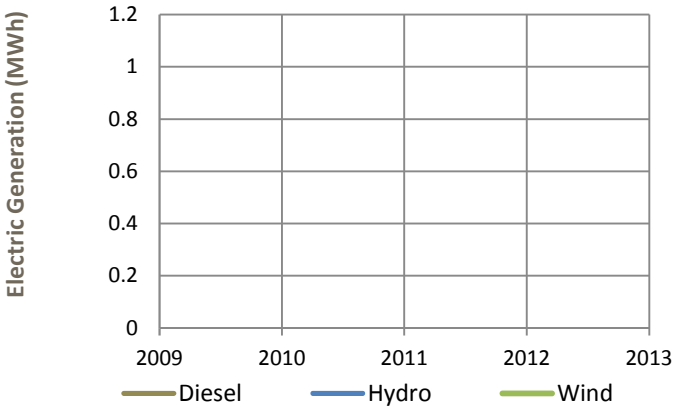
Operators	**No. of Operators**	**Training/Certifications**
	1	Utility Clerk
	1	Operator
Maintenance Planning (RPSU)	N/A	

Electric Sales	**No. of Customers**	**kWh/year**	**kWh/Customer**
Residential	30	57,600	1,920
Community	6	73,440	12,240
Commercial	5	61,200	12,240
Utility Use			



Power Production

Diesel (kWh/yr)	262,000	**Avg. Load (kW)**	9
Wind (kWh/yr)		**Peak Load (kW)**	19
Hydro (kWh/yr)		**Efficiency (kWh/gal)**	
Total (kWh/yr)	262,000	**Diesel Used (gals/**	27,200



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

Fuel Prices ($)	**Utility/Wholesale**	**Retail**	**Month/Year**
Diesel (1 gal)		$6.50	6-15
Other Fuel? (1 gal)			
Gasoline (1 gal)		$6.00	6-15
Propane (100#)			
Wood (1 cord)		$350.00	6-15
Pellets			
Discounts?			

Alternative Energy	**Potential**	**Projects**	**Status**
Hydroelectric	Medium	Assessing Hydro Site	In process Summer 2015
Wind Diesel	Low		
Biomass	Medium	Pre-feasibility Study	In process Summer 2015
Solar	Not Rated		
Geothermal	Low		
Oil and Gas	Low		
Coal	Medium		
Emerging Tech	Not Rated		
Heat Recovery	Medium	Assessing HR Options	In process Summer 2015
Energy Efficiency	High	Sanitation EE audit	Complete

Bulk Fuel

Tank Owner	**Fuel Type(s)**	**Capacity**	**Age/Condition**
RVC	Diesel	10,000	Good
RVC	Diesel	25,000	Good
RVC	Diesel	4,000	Good

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

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

Cooperative Purchasing Agreements

Notes

Energy Profile: Rampart

Housing Units	Occupied	Vacant	% Owner-Occup.
	35	5	29%

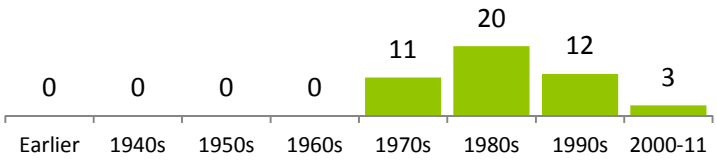
Regional Housing Authority	Weatherization Service Provider
IRHA	IRHA

Housing Need	Overcrowded	1-star
	30.0%	N/A

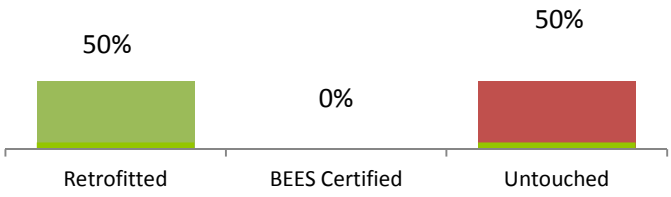
Data Quality	Med.

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

Age of Housing Stock



Energy Efficient Housing Stock

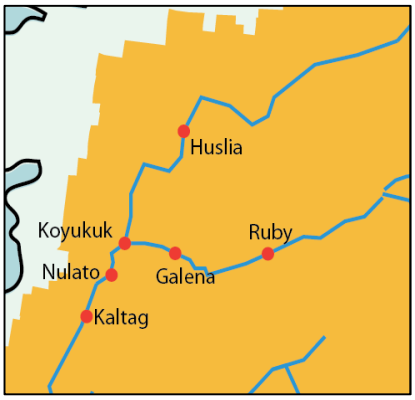


Street Lighting	Owner	Number/Type	Retrofitted?	Year	Notes
	City	15/HPS	Partial	2011	6 retrofitted to LEDS; remaining not working

Non-residential Building Inventory

Building Name or Location	Year Built	Square Feet	Audited?	Retrofits Done?	In ARIS?
Airport Electrical		96	None	None	No
Airport Equipment Storage		1,200	None	None	No
Clinic	1998	672	None	None	No
Community Hall	1975	1,020	None	None	No
Laundromat	1998	6,000	None	None	No
Multipurpose Bldg/School	1982	7,200			
Post Office	1975	1,020	None	None	No
Tribal Office	1998	1,600	None	None	No

Community Profile: Ruby



Alaska Native Name (definition)
Tl'aa'ologhe

Historical Setting / Cultural Resources

Ruby's current residents are Koyukon Athabascans of the Nowitna-Koyukuk band, a nomadic group who followed game with the changing seasons. Ruby developed as a supply point for gold prospectors. During World War II, the mining operations were shut down, and most of the white residents left. After the war, the remaining residents of nearby Kokrines relocated to Ruby. The traditional Athabascan culture and subsistence practices are the focal point of village life.

Energy Priorities and Projects

Add solar PV to homes; address lineloss/replace transformers; Additional weatherization on homes, doors and windows; complete/re-do street light retrofit; wood stove change out program

Incorporation	2nd Class City

Location

Ruby is located on the south bank of the Yukon River, in the Kilbuck-Kuskokwim Mountains. It is about 50 air miles east of Galena and 230 air miles west of Fairbanks. Ruby lies adjacent to the Nowitna National Wildlife Refuge.

Longitude	-155.4869	**Latitude**	64.7394
ANCSA Region	Doyon, Limited		
Borough/CA	Yukon-Koyukuk Census Area		
School District	Yukon-Koyukuk School District		
AEA Region	Yukon-Koyukuk/Upper Tanana		

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

Economy

Local government, trade/utilities, and construction are main employers for the village.

Climate	**Avg. Temp.**	**Climate Zone**	**Heating Deg. Days**
		8	13,858

Natural Hazard Plan	**Year**
Yes	2010

Notes

Community Plans	**Year**

Local Contacts	**Email**	**Phone**	**Fax**
City of Ruby	jenniehopson@gmail.com	468-4401	468-4401
Native Village of Ruby	rubynativecouncil@hotmail.com	468-4479	468-4474
Dineega Corporation		468-4405	468-4403

Demographics	**2000**	**2010**		**2013**
Population	188	166	**Percent of Residents Employed**	66.4%
Median Age	33	38	**Denali Commission Distressed Community**	No
Avg. Household Size	3	3	**Percent Alaska Native/American Indian (2010)**	89.2%
Median Household Income		$24,464	**Low and Moderate Income (LMI) Percent (2014)**	76.9%

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

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

Water/Wastewater System		**Homes Served**	**System Volume**
Water	Hauled from washeteria (75%), Individual wells (25		
Sewer	Individual septic, Outhouses	**Energy Audit?**	
Notes		Yes	

Access

Road	No				
Air Access	Yes	**Runway**	4000' x 100'		
Dock/Port	No	**Barge Access?**	Yes	**Ferry Service?**	No

Notes There are no docking facilities on the Yukon River, but a boat launch and barge off-loading area are available. Barges make several deliveries each summer. Float planes land on the Yukon River.

Energy Profile: Ruby

Diesel Power System

Utility	City of Ruby		
Engine	**Make/Model**	**Condition/Hrs**	**Gen Capacity**
Unit 1	Deere	Excellent/ 3,000	160 kW
Unit 2	Deere	Fair/ 10,000	160 kW
Unit 3	Deere	Excellent/ 3,000	120 kW
Unit 4			
Line Loss	17.4%		
Heat Recovery?	Yes, washeteria, clinic, public safety building		

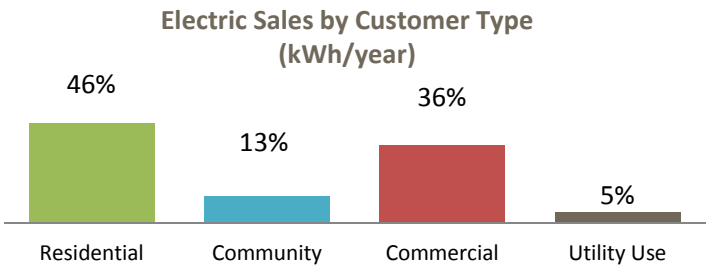
Upgrades	**Priority**	**Projects**	**Status**
RPSU Powerhouse	Low		Upgraded 2013
RPSU Distribution	High		

Outage History/Known Issues

Well-functioning, few outages since upgrade

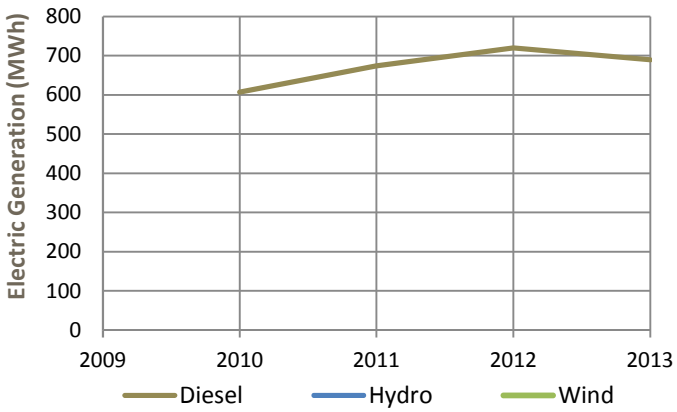
Operators	**No. of Operators**	**Training/Certifications**
	1 FT/ 2 PT	BF Manager, PPO
	1	Utility Clerk
Maintenance Planning (RPSU)	N/A	

Electric Sales	**No. of Customers**	**kWh/year**	**kWh/Customer**
Residential	111	260,727	2,349
Community	14	71,735	5,124
Commercial	31	202,344	6,527
Utility Use		30,340	



Power Production

Diesel (kWh/yr)	684,313	**Avg. Load (kW)**	63
Wind (kWh/yr)	0	**Peak Load (kW)**	140
Hydro (kWh/yr)	0	**Efficiency (kWh/ga**	13
Total (kWh/yr)	684,313	**Diesel Used (gals/**	53,763



Electric Rates ($/kWh)		**Cost per kWh Sold ($/kWh)**	
Rate with PCE	$0.45	**Fuel Cost**	$0.44
Residential Rate	$0.84	**Non-fuel Cost**	$0.24
Commercial Rate		**Total Cost**	$0.68

Fuel Prices ($)	**Utility/Wholesale**	**Retail**	**Month/Year**
Diesel (1 gal)	$4.36	$6.00	6-13; 8-14
Other Fuel? (1 gal)			
Gasoline (1 gal)			
Propane (100#)		$242.14	8-14
Wood (1 cord)			
Pellets			
Discounts?			

Alternative Energy	**Potential**	**Projects**	**Status**
Hydroelectric	Medium		
Wind Diesel	Low		
Biomass	Medium	Bioomass heating for school	Not pursuing
Solar	High	Multiple IRHA-installed Solar PV Arrays	Operational
Geothermal	Low		
Oil and Gas	Low	Waste oil boiler in city building	Operational
Coal	Low		
Emerging Tech	Not Rated	Experimental Hydrokinetic Turbine, 5 kW	Discontinued
Heat Recovery	Low	HR to clinic, washeteria, public safety building	Operational
Energy Efficiency	High	Sanitation System EE Upgrades	In Progress (Dec 2015)

Bulk Fuel

Tank Owner	**Fuel Type(s)**	**Capacity**	**Age/Condition**
Dineega Corp	Diesel 1 & 2	130,000 gallons	2009
Dineega Corp	Gasoline	30,000 gallons	2009

Purchasing	**Deliveries/Year**	**Gallons/Delivery**	**Vendor(s)**
By Barge	2 to 3		Ruby Marine
By Air			

Cooperative Purchasing Agreements

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

Notes

Energy Profile: Ruby

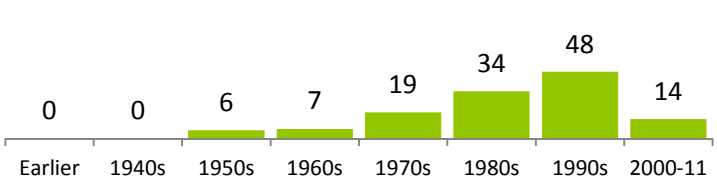
Housing Units	Occupied	Vacant	% Owner-Occup.	Regional Housing Authority	Weatherization Service Provider
	82	46	74%	IRHA	IRHA

Housing Need	Overcrowded	1-star
	15.9%	N/A

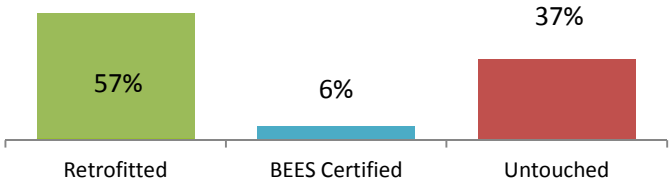
Data Quality	Med.

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

Age of Housing Stock



Energy Efficient Housing Stock



Street Lighting	Owner	Number/Type	Retrofitted?	Year	Notes
	City	22/HPS	Partial	2012	8 HPS replaced with LEDs/ LEDS do not work

Non-residential Building Inventory

Building Name or Location	Year Built	Square Feet	Audited?	Retrofits Done?	In ARIS?
Airport Maintenance Bldg.		2,400			Yes
City Shop					Yes
Clinic	2000	1,000			Yes
Dineega Duplex					Yes
Equipment Storage		2,400			No
Fire Hall/ambulance garage		1,500			Yes
Main Bus Storage		1,344			No
Merreline A. Kangas School	1978	13,847	Yes; Nortech		Yes
Power House		720			No
Ruby City Office		3,200			Yes
Ruby Community Hall		1,200			Yes
Ruby Washeteria		2,600			Yes
Ski Shed		912			No
VPSO Building (not open in 2015)					

Community Profile: Shageluk

Incorporation	2nd Class City

Location

Shageluk is located on the east bank of the Innoko River, approximately 20 miles east of Anvik and 34 miles northeast of Holy Cross. The Innoko is a tributary of the Yukon River.

Longitude	-159.6822	**Latitude**	62.6822
ANCSA Region	Doyon, Limited		
Borough/CA	Yukon-Koyukuk Census Area		
School District	Iditarod Area School		
AEA Region	Yukon-Koyukuk/Upper Tanana		

Alaska Native Name (definition)

Edixi

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

Historical Setting / Cultural Resources

Shageluk is an Ingalik Indian village first reported as "Tie'goschitno" in 1850 by Lt. Zagoskin of the Russian Navy. In 1861, a historian for the Russian American Company reported six villages on the Innoko. These were collectively called the "Chageluk settlements" during the 1880 Census. Shageluk became one of the permanent communities in the area. Residents of Shageluk moved in 1966 from a flood-prone location to a higher site two miles southeast. Deg Hit'an Athabascan community that relies on subsistence.

Economy

Local government provides more than 60% employment for the village with professional/business services, and trade rounding out the top 3.

Climate	**Avg. Temp.**	**Climate Zone**	**Heating Deg. Days**
		8	13,462

Natural Hazard Plan	**Year**
None	

Notes

Energy Priorities and Projects

Energy audits, energy efficiency, upgrades, awareness and education, and upgrade schools; get the solar thermal system on the washeteria working again

Community Plans	**Year**
Shageluk Community Plan	2005
Shageluk Community Plan Implementation Grid	2005

Local Contacts	**Email**	**Phone**	**Fax**
City of Shageluk	shagelukcity2010@gmail.com	473-8221	473-8220
Shageluk Native Village	shageluktribe@gmail.com	473-8239	473-8295
Zho-Tse, Incorporated		473-8262	473-8217

Demographics	**2000**	**2010**		**2013**
Population	129	83	**Percent of Residents Employed**	78.6%
Median Age	26	38	**Denali Commission Distressed Community**	Yes
Avg. Household Size	4	3	**Percent Alaska Native/American Indian (2010)**	90.9%
Median Household Income		$25,833	**Low and Moderate Income (LMI) Percent (2014)**	86.6%

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

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

Water/Wastewater System	**None**	**Homes Served**	**System Volume**
Water	Hauled from Wash.		
Sewer		**Energy Audit?**	
Notes		Yes	

Access

Road	No				
Air Access	Yes	**Runway**	3400' x 75'		
Dock/Port	Yes	**Barge Access?**	Yes	**Ferry Service?**	No

Notes Access to Shageluk is by air or water. A state-owned gravel airstrip and a seaplane base are available. Locals use ATVs, snow machines, and dog sleds. Every other year, it is a checkpoint for the Iditarod dogsled race.

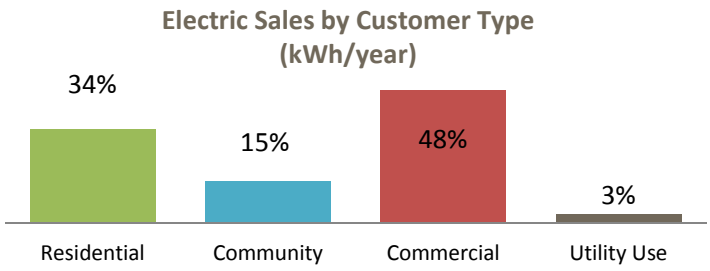
Energy Profile: Shageluk

Diesel Power System

Utility	AVEC		
Engine	**Make/Model**	**Condition/Hrs**	**Gen Capacity**
Unit 1	Cummins		142
Unit 2	Allis Chalmers		75
Unit 3	Cummins		168
Unit 4			
Line Loss	5.2%		
Heat Recovery?	No		
Upgrades	**Priority**	**Projects**	**Status**
RPSU Powerhouse	Medium		
RPSU Distribution	High		
Outage History/Known Issues			

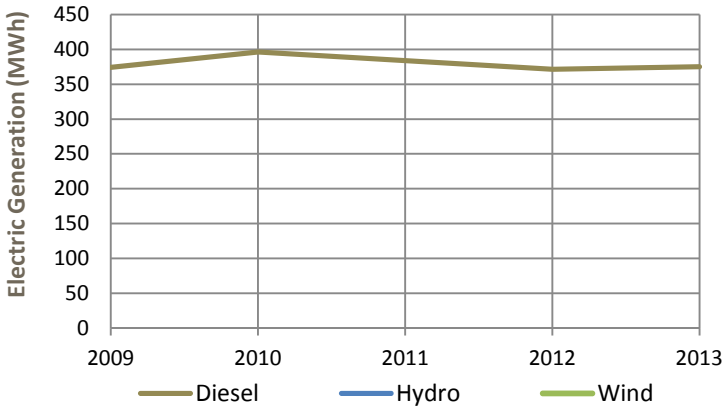
Operators	**No. of Operators**	**Training/Certifications**
	7	BFO, Itin. BFO

Maintenance Planning (RPSU)	N/A		
Electric Sales	**No. of Customers**	**kWh/year**	**kWh/Customer**
Residential	36	122,689	3,408
Community	7	55,421	7,917
Commercial	9	172,576	19,175
Utility Use		11,488	



Power Production

Diesel (kWh/yr)	382,178	**Avg. Load (kW)**	45
Wind (kWh/yr)	0	**Peak Load (kW)**	116
Hydro (kWh/yr)	0	**Efficiency (kWh/gal)**	12
Total (kWh/yr)	382,178	**Diesel Used (gals/yr)**	30,720



Electric Rates ($/kWh)		**Cost per kWh Sold ($/kWh)**	
Rate with PCE	$0.20	**Fuel Cost**	$0.32
Residential Rate	$0.66	**Non-fuel Cost**	$0.23
Commercial Rate	$0.41	**Total Cost**	$0.56

Fuel Prices ($)	**Utility/Wholesale**	**Retail**	**Month/Year**
Diesel (1 gal)	$3.69	$7.00	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		
Biomass	Low	Biomass heatinf for community hall	Planning
Solar	High	Solar thermal on washeteria	Not operational
Geothermal	Low		
Oil and Gas	Low		
Coal	Low		
Emerging Tech	Not Rated		
Heat Recovery	Low		
Energy Efficiency	High	VEEP	Complete

Bulk Fuel

Tank Owner	**Fuel Type(s)**	**Capacity**	**Age/Condition**
AVEC	Diesel	57,066	
School			
Zho-Tse Corp.			
City			
Bulk Fuel Upgrade	**Priority**	**Project**	**Status**

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

Energy Profile: Shageluk

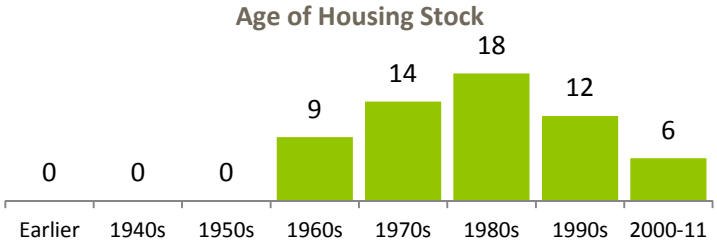
Housing Units	Occupied	Vacant	% Owner-Occup.
	31	23	77%

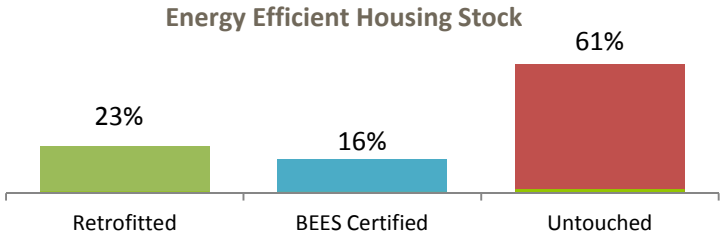
Regional Housing Authority	Weatherization Service Provider
IRHA	IRHA

Housing Need	Overcrowded	1-star
	22.6%	N/A

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

Data Quality	
	Med.





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?
Airport Electrical		96			No
ANICA Store		2,016			No
City Office	1980	1,800	Yes; Ameresco		Yes
Clinic	2002	1,400			Yes
Garage		432			No
Generator Bldg.		864			No
Innoko River School	1980	14,025	Yes; Nortech		Yes
Post Office	2001	1,500			Yes
Shageluk Classroom		1,004			No
SRE Bldg.		2,000			Yes
Washeteria	1994	1,504	Yes; Ameresco		No

Community Profile: Stevens Village

Alaska Native Name (definition)

Dinyea "mouth of the canyon"

Historical Setting / Cultural Resources

Founded by three Athabascan brothers from the Koyukon region: Old Jacob, Gochonayeeya, and Old Steven. The village was named for Old Steven when he was elected chief in 1902. During the gold rush, residents cut wood for mining operations and to fuel steamboats plying the Yukon River. A trading post was established in the early 1900s. A post office began operations in 1936, and scheduled air service was initiated in 1939. The Native population is predominantly Kutchin Natives, who depend upon subsistence.

Energy Priorities and Projects

Generator upgrade; repair of village's powerhouse switchgear & recommission powerhouse; repair barge landing bulkhead; add solar PV on homes and community buildings; partner with school to use empty bulk fuel tanks.

Incorporation	Unincorporated

Location

Stevens Village is located on the north bank of the Yukon River, 17 miles upstream of the Dalton Highway bridge crossing and 90 air miles northwest of Fairbanks.

Longitude	-149.0908	**Latitude**	66.0064
ANCSA Region	Doyon, Limited		
Borough/CA	Yukon-Koyukuk Census Area		
School District	Yukon Flats School District		
AEA Region	Yukon-Koyukuk/Upper Tanana		

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

Economy

Local government, construction, and leisure/hospitality are the top employers for the village.

Climate	**Avg. Temp.**	**Climate Zone**	**Heating Deg. Days**
	20.3	8	15,528

Natural Hazard Plan	**Year**

Notes

Community Plans	**Year**

Local Contacts	**Email**	**Phone**	**Fax**
Stevens Village IRA Council		478-7228	478-7229
Dinyea Corporation		452-5063	474-8224

Demographics	**2000**	**2010**		**2013**
Population	87	78	**Percent of Residents Employed**	79.1%
Median Age	36	31	**Denali Commission Distressed Community**	Yes
Avg. Household Size	4	3	**Percent Alaska Native/American Indian (2010)**	85.5%
Median Household Income		$18,125	**Low and Moderate Income (LMI) Percent (2014)**	N/A

Electric Utility	**Generation Sources**	**Interties**	**PCE?**
Native Village of Stevens	Diesel	No	No

Landfill	**Class**	3	**Permitted?**	Yes	**Location**	Stevens Village

Water/Wastewater System	**None**	**Homes Served**	**System Volume**
Water	Hauled from watering point		
Sewer		**Energy Audit?**	
Notes		No	

Access

Road	No				
Air Access	Yes	**Runway**	4000' x 75'		
Dock/Port	No	**Barge Access?**	Yes	**Ferry Service?**	No

Notes Fuel is shipped by barge at least three times each summer; goods are offloaded at the barge landing. Residents use skiffs, ATVs, snow machines, and dog teams for recreation and subsistence.

Energy Profile: Stevens Village

Diesel Power System

Utility	Stevens Village IRA Council		
Engine	**Make/Model**	**Condition/Hrs**	**Gen Capacity**
Unit 1	John Deere		97kW
Unit 2	John Deere	Poor/7,725	78kW
Unit 3	John Deere	N/O	78kW
Unit 4	John Deere	Fair/13,911	37kW
Line Loss			
Heat Recovery?	Yes; WTP		

Upgrades	Priority	Projects	Status
RPSU Powerhouse	Medium		
RPSU Distribution	Medium		

Outage History/Known Issues

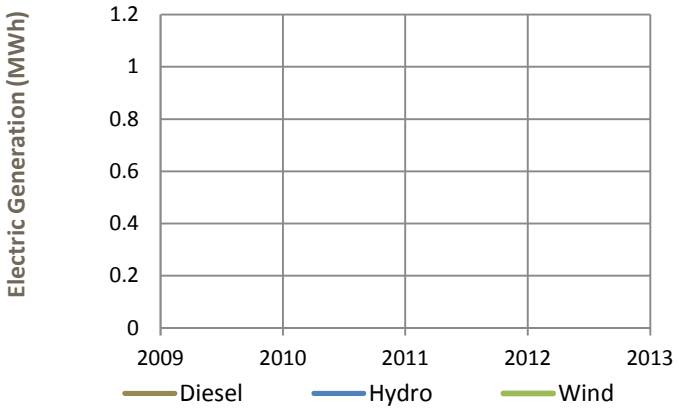
PCE inactive; seal is out on unit #2; lineman up in 2015

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

Maintenance Planning (RPSU)	N/A		
Electric Sales	**No. of Customers**	**kWh/year**	**kWh/Customer**
Residential	6		
Community	3		
Commercial	4		
Utility Use	2		

Power Production

Diesel (kWh/yr)		Avg. Load (kW)	13
Wind (kWh/yr)		**Peak Load (kW)**	63
Hydro (kWh/yr)		**Efficiency (kWh/gal)**	
Total (kWh/yr)		**Diesel Used (gals/yr)**	



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

Fuel Prices ($)	Utility/Wholesale	Retail	Month/Year
Diesel (1 gal)		$6.76	1-12
Other Fuel? (1 gal)			
Gasoline (1 gal)			
Propane (100#)			
Wood (1 cord)		$350.00	
Pellets			

Discounts? No fuel sales in village; most residents burn wood only.

Alternative Energy	Potential	Projects	Status
Hydroelectric	Low		
Wind Diesel	Low		
Biomass	Low	2008 Pre-Feasibility study	Options not cost effective
Solar	High	IRHA installed Solar PV array on Tribal Bldg.	Operational
Geothermal	Low		
Oil and Gas	Low		
Coal	Low		
Emerging Tech	Not Rated		
Heat Recovery	Medium	HR system to WTP	Operational
Energy Efficiency	Medium	VEEP	

Bulk Fuel

Tank Owner	Fuel Type(s)	Capacity	Age/Condition
Native Village	Diesel	39,000	Good

Bulk Fuel Upgrade	Priority	Project	Status

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

Cooperative Purchasing Agreements

Notes

Barge deliveries are very rare.

Energy Profile: Stevens Village

Housing Units	Occupied	Vacant	% Owner-Occup.
	30	9	50%

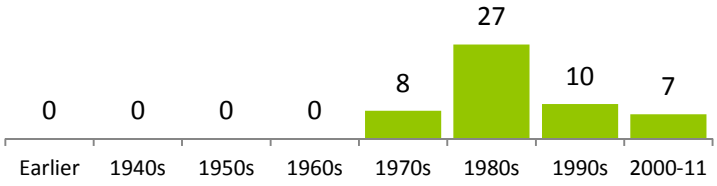
Regional Housing Authority	Weatherization Service Provider
IRHA	IRHA

Housing Need	Overcrowded	1-star
	16.7%	N/A

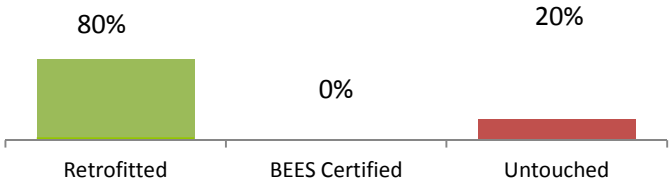
Data Quality	Med.

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

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?
Airport Equipment Bldg.		1,040			No
Barge Ramp Pad Bldg.		768			No
Clinic/IRA Offices				Yes; VEEP	No
Community Hall				Yes; VEEP	No
Electrical Bldg.		144			No
Generator Shed				Yes; VEEP	No
Sewer Lift Station				Yes; VEEP	No
SRE Bldg.		2,000			Yes
Stevens School Gym				Yes; VEEP	No
Stevens Village School (closed)		9,200		Yes; VEEP	No
Storage (Old VPSO)				Yes; VEEP	No
Washeteria/Water Treatment Plant				Yes; VEEP	No

Community Profile: Takotna

Alaska Native Name (definition)
Tochotno'

Historical Setting / Cultural Resources
Takotna has been known as Berry Landing, Portage City, Takotna City, Takotna Station, and Tocotna. Gold discoveries in the upper Innoko Region enabled the town to prosper. In 1921 the Alaska Road Commission improved the Takotna-Ophir road, and an airfield was constructed. In 1949, construction was begun on nearby Tatalina Air Force Station. Takotna is a mixed population of non-Natives, Ingalik Athabascans, and Eskimos. Subsistence is a prevalent activity.

Energy Priorities and Projects
Reduce line loss

Incorporation	Unincorporated

Location
Takotna is located in Interior Alaska on the north bank of the Takotna River in a broad scenic river valley, 17 air miles west of McGrath in the Kilbuck-Kuskokwim Mountains.

Longitude	-156.0642	**Latitude**	62.9886
ANCSA Region	Doyon, Limited		
Borough/CA	Yukon-Koyukuk Census Area		
School District	Iditarod Area School District		
AEA Region	Yukon-Koyukuk/Upper Tanana		

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

Economy
Local government and trade/transportation/utilites each provide 38.5% of employment in the village.

Climate	**Avg. Temp.**	**Climate Zone**	**Heating Deg. Days**
	25.3	8	14,424

Natural Hazard Plan	**Year**
None	

Notes

Community Plans	**Year**
Takotna Community Plan	2005

Local Contacts	**Email**	**Phone**	**Fax**
Takotna Village	takotnatribalcouncil@gmail.com	298-2212	298-2314
MTNT, Limited	votte@mtnt.net	524-3391	524-3062

Demographics	**2000**	**2010**		**2013**
Population	50	52	**Percent of Residents Employed**	78.8%
Median Age	34	28	**Denali Commission Distressed Community**	No
Avg. Household Size	3	3	**Percent Alaska Native/American Indian (2010)**	37.9%
Median Household Income		$64,167	**Low and Moderate Income (LMI) Percent (2014)**	N/A

Electric Utility	**Generation Sources**	**Interties**	**PCE?**
Takotna Community Association	Diesel	No	Yes

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

Water/Wastewater System	**None**	**Homes Served**	**System Volume**
Water			
Sewer		**Energy Audit?**	
Notes		No	

Access

Road	No				
Air Access	Yes	**Runway**	3300' x 60'	3820' x 150'	
Dock/Port	Yes	**Barge Access?**	Yes	**Ferry Service?**	No

Notes Cargo is offloaded at Sterling Landing, 24 miles SE of Takotna. Community has 80 miles of roads that connect with Tatalina AFS, Sterling Landing, and existing mines. Check point for the Iditarod Trail Sled Dog Race.

Energy Profile: Takotna

Diesel Power System

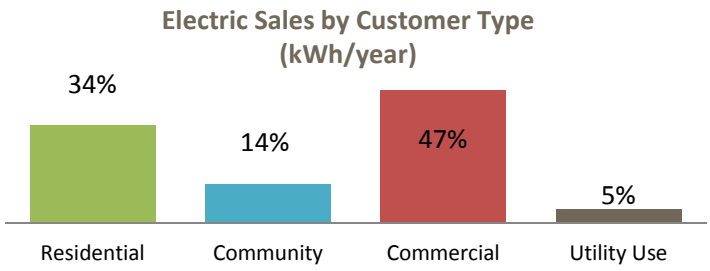
Utility	Takotna Community Association Inc.		
Engine	**Make/Model**	**Condition/Hrs**	**Gen Capacity**
Unit 1			
Unit 2			
Unit 3			
Unit 4			
Line Loss			
Heat Recovery?			

Upgrades	**Priority**	**Projects**	**Status**
RPSU Powerhouse	Medium		
RPSU Distribution	Low		
Outage History/Known Issues			

Operators	**No. of Operators**	**Training/Certifications**
	2	Utility Clerk

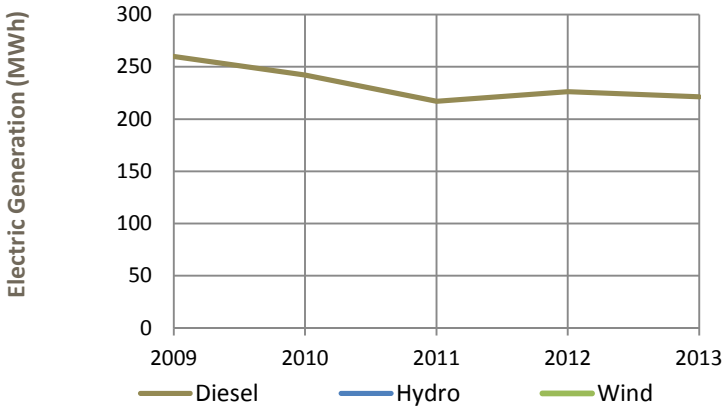
Maintenance Planning (RPSU)	N/A

Electric Sales	**No. of Customers**	**kWh/year**	**kWh/Customer**
Residential	25	64,103	2,564
Community	6	25,645	4,274
Commercial	12	86,677	7,223
Utility Use		9,456	



Power Production

Diesel (kWh/yr)	148,503	**Avg. Load (kW)**	24
Wind (kWh/yr)	0	**Peak Load (kW)**	54
Hydro (kWh/yr)	0	**Efficiency (kWh/gal)**	9
Total (kWh/yr)	148,503	**Diesel Used (gals/yr)**	15,911



Electric Rates ($/kWh)		**Cost per kWh Sold ($/kWh)**	
Rate with PCE	$0.38	**Fuel Cost**	$0.47
Residential Rate	$0.64	**Non-fuel Cost**	$0.31
Commercial Rate		**Total Cost**	$0.78

Fuel Prices ($)	**Utility/Wholesale**	**Retail**	**Month/Year**
Diesel (1 gal)	$5.22	$5.71	6-13; 9-10
Other Fuel? (1 gal)			
Gasoline (1 gal)			
Propane (100#)		$171.43	9-10
Wood (1 cord)			
Pellets			
Discounts?			

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

Bulk Fuel

Tank Owner	**Fuel Type(s)**	**Capacity**	**Age/Condition**
Comm. Assoc.	Diesel	72,000	Good
Comm. Assoc.	Gasoline	20,000	Good

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

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

Notes

Barge or fuel truck delivery June through Sept.

Energy Profile: Takotna

Housing Units	Occupied	Vacant	% Owner-Occup.
	22	19	50%

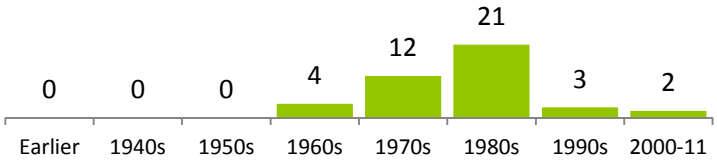
Regional Housing Authority	Weatherization Service Provider
IRHA	IRHA

Housing Need	Overcrowded	1-star
	37.5%	N/A

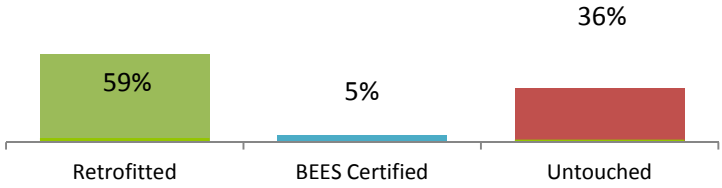
Data Quality	Med.

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

Age of Housing Stock



Energy Efficient Housing Stock

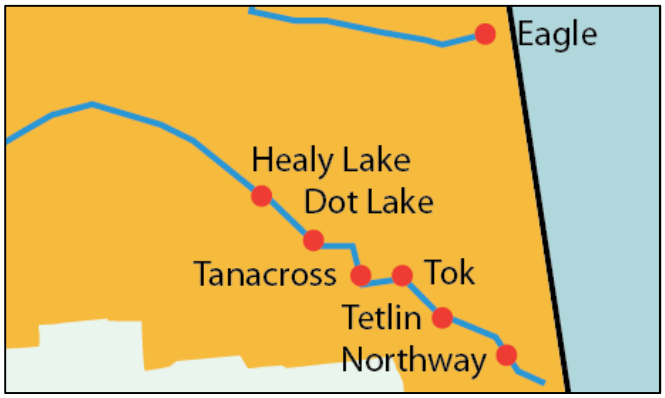


Street Lighting	Owner	Number/Type	Retrofitted?	Year	Notes

Non-residential Building Inventory

Building Name or Location	Year Built	Square Feet	Audited?	Retrofits Done?	In ARIS?
Church				Yes; VEEP	No
Clinic	2006				
Community Center				Yes; VEEP	No
Fire Hall				Yes; VEEP	No
Generator Bldg.		540			No
Gymnasium					
Library				Yes; VEEP	No
Old Generator Bldg.				Yes; VEEP	No
Old High School				Yes; VEEP	No
Old Shop		1,200			No
Power Plant		54			No
School Garage/Generator Plant				Yes; VEEP	No
School Storage Bldg.				Yes; VEEP	No
Shop/Garage		768			No
SRE Bldg. (Heated)		2,200			Yes
Store				Yes; VEEP	No
Takotna Community Assoc. Office Bldg./Lodge				Yes; VEEP	No
Takotna K-12 School				Yes; VEEP	No
Takotna Tribal Office				Yes; VEEP	No
Tire Shop				Yes; VEEP	No
Washeteria/Water Treatment Plant				Yes; VEEP	No
Woodshop				Yes; VEEP	No

Community Profile: Tanacross



Incorporation	Unincorporated

Location

Tanacross is located on the south bank of the Tanana River, 12 miles northwest of Tok, at milepost 1324 of the Alaska Highway.

Longitude	-143.3464	**Latitude**	63.3853
ANCSA Region	Doyon, Limited		
Borough/CA	Southeast Fairbanks Census Area		
School District	Alaska Gateway School District		
AEA Region	Yukon-Koyukuk/Upper Tanana		

Alaska Native Name (definition)

Taats'altęy

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

Historical Setting / Cultural Resources

Residents are Tanah Athabascan Indians. Located where Eagle Trail crossed the Tanana River. In the mid-1930s, an airfield was built. In 1941, the village gave the military permission to use its airfield during World War II, thousands of troops were deployed. Villagers served as volunteer scouts and backup support for the army. After the war, the airfield was closed. In 1972, due to water contamination, the village relocated from the north bank of the Tanana River to the south bank. Traditional village with a subsistence lifestyle.

Economy

Local government provides more than 60% employment, with construction and education/health services other top employers. There are no fishing permits issued.

Climate	**Avg. Temp.**	**Climate Zone**	**Heating Deg. Days**
	22.8	8	15,479

Natural Hazard Plan	**Year**
Yes	2013

Notes

Energy Priorities and Projects

Yerrick Creek hydro; biomass system almost operating for multiuse building; add solar PV to community buildings & homes; Energy efficiency audits and upgrades of homes and commercial buildings

Community Plans	**Year**
None	

Local Contacts	**Email**	**Phone**	**Fax**
Native Village of Tanacross	isaacgalen@gmail.com	883-5024	883-4497
Tanacross Incorporated		883-4130	883-4129

Demographics	**2000**	**2010**		**2013**
Population	140	136	**Percent of Residents Employed**	72.7%
Median Age	33	39	**Denali Commission Distressed Community**	Yes
Avg. Household Size	4	3	**Percent Alaska Native/American Indian (2010)**	81.9%
Median Household Income		$47,708	**Low and Moderate Income (LMI) Percent (2014)**	N/A

Electric Utility	**Generation Sources**	**Interties**	**PCE?**
Alaska Power and Telephone Company	Intertie	Tetlin, Dot Lake, Tok	Yes

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

Water/Wastewater System		**Homes Served**	**System Volume**
Water	Piped	45	
Sewer	Piped	**Energy Audit?**	
Notes		Yes	

Access

Road	Yes				
Air Access	Yes	**Runway**	5100' x 150'	5000' x 150'	
Dock/Port	No	**Barge Access?**	Yes	**Ferry Service?**	No

Notes Tanacross has a federally-maintained public airport with an asphalt runway in poor condition. Tanacross is a mile north of the Alaska Highway. Regular air and bus services are available from Tok.

Energy Profile: Tanacross

Diesel Power System

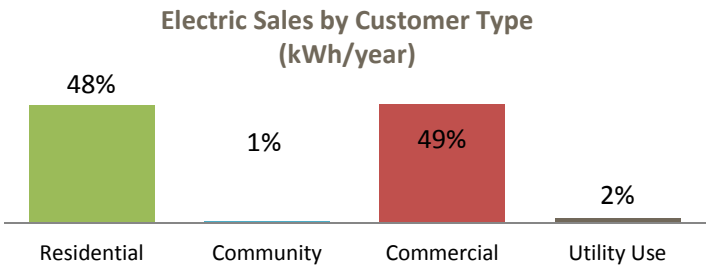
Utility	Alaska Power & Telephone Company		
Engine	**Make/Model**	**Condition/Hrs**	**Gen Capacity**
	Intertie to AP&T Powerhouse in Tok		
Line Loss			
Heat Recovery?			
Upgrades	**Priority**	**Projects**	**Status**
RPSU Powerhouse			
RPSU Distribution			

Outage History/Known Issues

PCE includes Tok & Tanacross.

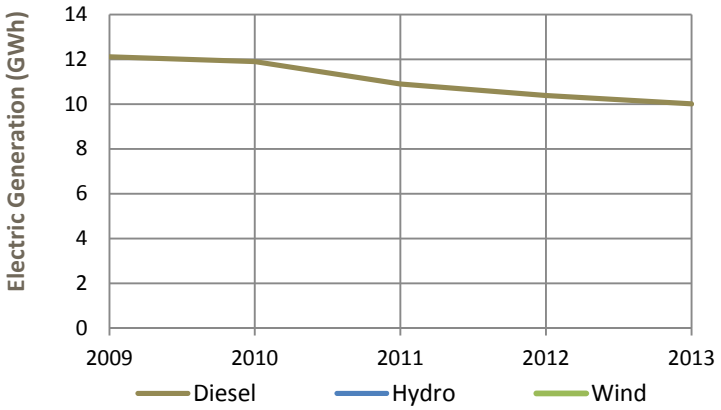
Operators	**No. of Operators**	**Training/Certifications**

Maintenance Planning (RPSU)	N/A		
Electric Sales	**No. of Customers**	**kWh/year**	**kWh/Customer**
Residential	750	3,835,129	5,114
Community	7	78,369	11,196
Commercial	213	3,869,111	18,165
Utility Use		158,640	



Power Production

Diesel (kWh/yr)	9,499,440	**Avg. Load (kW)**	134
Wind (kWh/yr)	0	**Peak Load (kW)**	299
Hydro (kWh/yr)	0	**Efficiency (kWh/gal)**	14
Total (kWh/yr)	9,499,440	**Diesel Used (gals/yr)**	657,326



Electric Rates ($/kWh)		**Cost per kWh Sold ($/kWh)**	
Rate with PCE	$0.21	**Fuel Cost**	$0.31
Residential Rate	$0.45	**Non-fuel Cost**	$0.19
Commercial Rate		**Total Cost**	$0.50

Fuel Prices ($)	**Utility/Wholesale**	**Retail**	**Month/Year**
Diesel (1 gal)	$3.75	$4.53	6-13; 8-14
Other Fuel? (1 gal)			
Gasoline (1 gal)			
Propane (100#)			
Wood (1 cord)			
Pellets			
Discounts?			

Alternative Energy	**Potential**	**Projects**	**Status**
Hydroelectric	High	1) Yerrick Creek, 1.5 MW, Tanacross 2) Clearwater Creek	1) Final design/ permitting; 2) Secure funds, develop post YC
Wind Diesel	Medium	1) Chisana Mt Feasibility 2) Tok- 7 Mile Wind	1) Feasibility/Met Tower 2) Feasible, securing funds
Biomass	Medium	GARN 2000 heat multipurpse bldg, WTP, safe house	Commissioned
Solar	High	AP&T utility-scale investigation	Feasibility
Geothermal	Low		
Oil and Gas	Low	Alternative fuel under utility investigation	Feasibility
Coal	Low		
Emerging Tech	Not Rated		
Heat Recovery	Low		
Energy Efficiency	High	1) AHFC-C 2) ANTHC EE Audit	1) Complete 2) In Progress (11-16)

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

Energy Profile: Tanacross

Housing Units	Occupied	Vacant	% Owner-Occup.
	47	23	100%

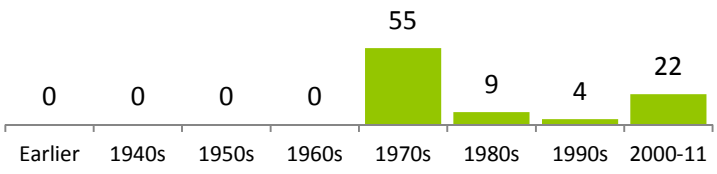
Regional Housing Authority	Weatherization Service Provider
IRHA	ACDC

Housing Need	Overcrowded	1-star
	8.5%	19.0%

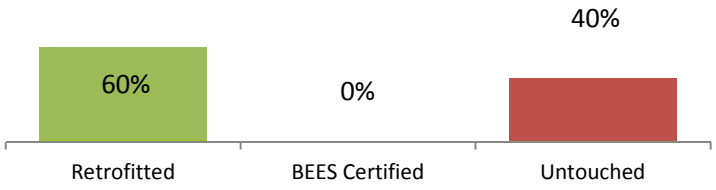
Data Quality	
	High

Energy Use	Average Home Energy Rating	Average Square Feet	Avg. EUI (kBTU/sf)
	2 star plus	968	248

Age of Housing Stock



Energy Efficient Housing Stock



Street Lighting	Owner	Number/Type	Retrofitted?	Year	Notes
		12/HPS	No		

Non-residential Building Inventory

Building Name or Location	Year Built	Square Feet	Audited?	Retrofits Done?	In ARIS?
Church					
Fire Safety VPSO					
Garage					
Multipurpose building					
Post Office					
Safe House					
Tanacross Inc. Building					
Tanacross School	1982	7,538	Yes; Nortech		Yes
Village Council					
Washeteria					

Community Profile: Tanana

Alaska Native Name (definition)

Nochalawoyya, where the two rivers meet

Historical Setting / Cultural Resources

Due to its location, Tanana was a traditional trading settlement for Koyukon and Tanana Athabascans long before European contact. It became an important source of services and social change along both rivers. In 1898 Fort Gibbon was founded at Tanana to maintain the telegraph line between Fairbanks and Nome. Gold seekers left the Yukon after 1906. Ft. Gibbon was abandoned in 1923. During World War II, an air base was established near Tanana as a refueling stop. Traditional Athabascan ways of life persist.

Energy Priorities and Projects

Complete forestry harvest plan; operator training; road connection near Manley Hot Springs; wind and hydro (long term)

Incorporation	1st Class City

Location

Tanana is located in Interior Alaska about two miles west of the junction of the Tanana and Yukon Rivers, 130 air miles west of Fairbanks.

Longitude	-152.0789	**Latitude**	65.1719
ANCSA Region	Doyon, Limited		
Borough/CA	Yukon-Koyukuk Census Area		
School District	Tanan City School District		
AEA Region	Yukon-Koyukuk/Upper Tanana		

Taxes	**Type (rate)**	**Per-Capita Revenue**
	Sales 2%	$ 120

Economy

Local government (Tanana Tribal Council and City of Tanana) provides over 60% of employment. Education/ health services and construction are the other top sectors.

Climate	**Avg. Temp.**	**Climate Zone**	**Heating Deg. Days**
	23	8	15,024

Natural Hazard Plan	**Year**
Yes	2011

Notes

Community Plans	**Year**
Community Plan	2015

Local Contacts	**Email**	**Phone**	**Fax**
City of Tanana	jeffreyweltzin@gmail.com	366-7159	366-7169
Native Village of Tanana	serhart@tananatribe.org	366-7160	366-7195
Tozitna, Limited	ninaheyano@gmail.com	366-7255	366-7122

Demographics	**2000**	**2010**		**2013**
Population	308	246	**Percent of Residents Employed**	72.7%
Median Age	35	43	**Denali Commission Distressed Community**	No
Avg. Household Size	3	3	**Percent Alaska Native/American Indian (2010)**	86.6%
Median Household Income	$29,750	$45,000	**Low and Moderate Income (LMI) Percent (2014)**	68.2%

Electric Utility	**Generation Sources**	**Interties**	**PCE?**
Tanana Power Company Incorporated	Diesel	No	Yes

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

Water/Wastewater System		**Homes Served**	**System Volume**
Water	Piped	98	
Sewer	Piped	**Energy Audit?**	
Notes	Residents off piped system haul water from washetria and use outhouses/honey buckets.	Yes	

Access					
Road	No				
Air Access	Yes	**Runway**	4400' x 100'		
Dock/Port	Yes	**Barge Access?**	Yes	**Ferry Service?**	No
Notes	Work on a road to Tanana will complete Sept. 2015. The city operates a dock on the river. Groceries and other small items are shipped to the village by air, or by barge during the barging season.				

Energy Profile: Tanana

Diesel Power System

Utility	Tanana Power Company Inc.		
Engine	**Make/Model**	**Condition/Hrs**	**Gen Capacity**
Unit 1	Detroit Diesel	8,000	300 kW
Unit 2	Caterpillar	40,000	425 kW
Unit 3	Caterpillar	40,000	425 kW
Unit 4	Detroit Diesel	12,000	175 kW
Line Loss	6.8%		
Heat Recovery?	Yes		

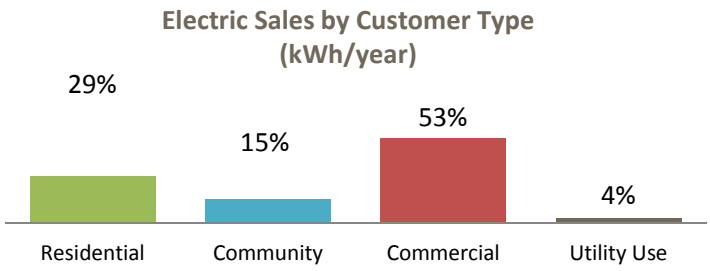
Upgrades	**Priority**	**Projects**	**Status**
RPSU Powerhouse	High		
RPSU Distribution	High		

Outage History/Known Issues

Units 2 & back-up; very reliable. Occasional short outages

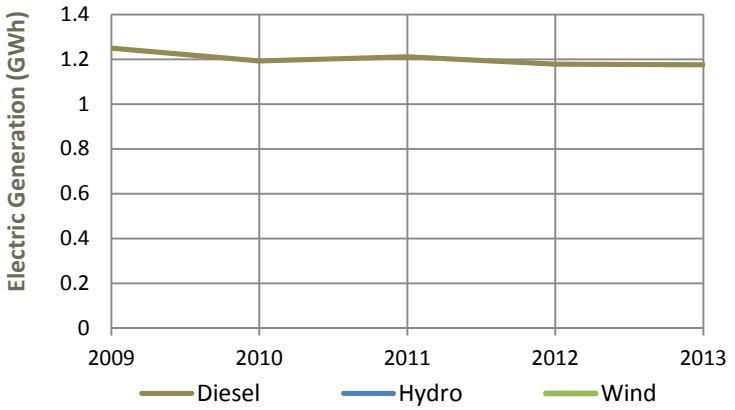
Operators	**No. of Operators**	**Training/Certifications**
	1	On the job training

Maintenance Planning (RPSU)	N/A		
Electric Sales	**No. of Customers**	**kWh/year**	**kWh/Customer**
Residential	106	304,286	2,871
Community	7	158,383	22,626
Commercial	42	552,952	13,166
Utility Use		36,935	



Power Production

Diesel (kWh/yr)	1,129,254	**Avg. Load (kW)**	137
Wind (kWh/yr)	0	**Peak Load (kW)**	305
Hydro (kWh/yr)	0	**Efficiency (kWh/gal)**	13
Total (kWh/yr)	1,129,254	**Diesel Used (gals/yr)**	85,480



Electric Rates ($/kWh)		**Cost per kWh Sold ($/kWh)**	
Rate with PCE	$0.22	**Fuel Cost**	$0.32
Residential Rate	$0.70	**Non-fuel Cost**	$0.48
Commercial Rate		**Total Cost**	$0.80

Fuel Prices ($)	**Utility/Wholesale**	**Retail**	**Month/Year**
Diesel (1 gal)	$3.65	$5.75	6-13; 8-14
Other Fuel? (1 gal)			
Gasoline (1 gal)		$6.61	6-15
Propane (100#)		$194.29	8-14
Wood (1 cord)		$300.00	6-15
Pellets			
Discounts?			

Alternative Energy	**Potential**	**Projects**	**Status**
Hydroelectric	Medium		
Wind Diesel	Medium		
Biomass	Medium	Garn Boilers to heat washeteria, school, firehall	Operational
Solar	High	PV Array on washeteria	Operational since 2007
Geothermal	Low		
Oil and Gas	Low		
Coal	Low		
Emerging Tech	Not Rated		
Heat Recovery	Medium		
Energy Efficiency	High	1)AHFC-C 2) ANTHC Sanitation EE Audit	1) Complete 2) In Progress (Oct. 2016)

Bulk Fuel

Tank Owner	**Fuel Type(s)**	**Capacity**	**Age/Condition**
Tanana Power	diesel	46,500	
Tanana Trib. Council		191,100	
School/City		25,000	

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

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

Cooperative Purchasing Agreements

Notes

Occassionally fly in fuel

Energy Profile: Tanana

Housing Units	Occupied	Vacant	% Owner-Occup.
	118	63	79%

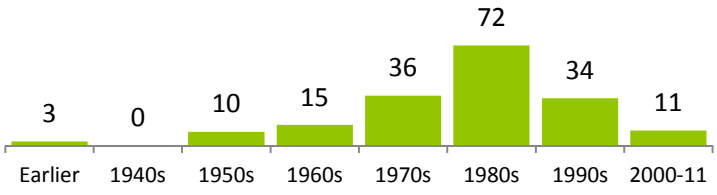
Regional Housing Authority	Weatherization Service Provider
IRHA	TCC

Housing Need	Overcrowded	1-star
	16.9%	N/A

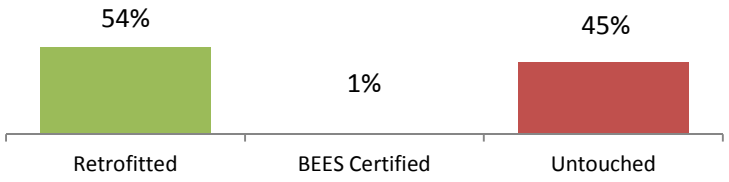
Energy Use	Average Home Energy Rating	Average Square Feet	Avg. EUI (kBTU/sf)
	N/A	N/A	N/A

Data Quality	
	Med.

Age of Housing Stock



Energy Efficient Housing Stock



Street Lighting	Owner	Number/Type	Retrofitted?	Year	Notes
	Tanana Power	23/LED	yes	2010	

Non-residential Building Inventory

Building Name or Location	Year Built	Square Feet	Audited?	Retrofits Done?	In ARIS?
Airport Electrical		144			No
Bus Barn	2001	714			Yes
Catholic Church		2,000			No
City Hall		1,600			No
City Office	1967	1,300			Yes
City Shop		2,400			Yes
Elders Residential facility/Dina'Dilna'Kka'Ya					
Fire Hall/VPSO	1985	1,536			Yes
Laundromat/Water Treatment Plant	2001	3,000			Yes
Liquor Store	2009	932			Yes
Maudrey J. Sommer K-12 School 1	1940	26,632	Yes; AHFC		Yes
Mechanical/Laundry Bldg.	1971	320			Yes
Post office					
Power Bldg.		310			No
Public Safety Bldg. (Jail)		900			Yes
School Shop	1978	1,500			Yes
SRE Bldg.		2,000			Yes
St. James Episcopal Church		954			No
Storage Trailer 2		720			No
Storage Trailer 3		720			No
Store					No
Tanana Health Center					
Tozitna					
Tribal Office					
Vocational Education Bldg.	1978	1,500			Yes

Community Profile: Telida

Incorporation	Unincorporated

Location

Telida is located on the south side of the Swift Fork (McKinley Fork) of the Kuskokwim River, about 50 miles northeast of Medfra.

Longitude	-153.2822	**Latitude**	63.3839
ANCSA Region	Doyon, Limited		
Borough/CA	Yukon-Koyukuk Census Area		
School District	N/A		
AEA Region	Yukon-Koyukuk/Upper Tanana		

Alaska Native Name (definition)

Tilayadi "lake whitefish"

Historical Setting / Cultural Resources

Athabascan Indian folklore indicates Telida's descendants are from two sisters, survivors of a Yukon Indian attack, who fled from the McKinley. The women were later discovered by stragglers from the Yukon party, who married the women and settled. When the course of the Swift Fork changed, the first site was abandoned. In 1958 villagers constructed an airstrip. Many families moved to Takotna during the school year and lived in Telida only during summer months. An Upper Kuskokwim Athabascan village, subsistence lifestyle.

Energy Priorities and Projects

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

Economy

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

Natural Hazard Plan	**Year**
None	
Notes	
Community Plans	**Year**

Local Contacts	**Email**	**Phone**	**Fax**
Telida Village	kuskoyim@aol.com	293-2641	524-3163
MTNT, Limited	votte@mtnt.net	524-3391	524-3062

Demographics	**2000**	**2010**		**2013**
Population	N/A	N/A	**Percent of Residents Employed**	
Median Age			**Denali Commission Distressed Community**	N/A
Avg. Household Size			**Percent Alaska Native/American Indian (2010)**	N/A
Median Household Income			**Low and Moderate Income (LMI) Percent (2014)**	N/A

Electric Utility	**Generation Sources**	**Interties**	**PCE?**
No			No

Landfill	**Class**	N/A	**Permitted?**	**Location**

Water/Wastewater System	**N/A**	**Homes Served**	**System Volume**
Water			
Sewer		**Energy Audit?**	
Notes		No	

Access

Road	No				
Air Access	Yes	**Runway**	1900' x 40'		
Dock/Port	No	**Barge Access?**	No	**Ferry Service?**	No

Notes Access to Telida is primarily by air. Small boats can reach Telida, but snags and sticks downriver prevent large boat access. There is no road connection, but a winter trail connects the village with Nikolai.

Energy Profile: Telida

Diesel Power System

Utility			
Engine	**Make/Model**	**Condition/Hrs**	**Gen Capacity**
Unit 1			
Unit 2			
Unit 3			
Unit 4			
Line Loss			
Heat Recovery?			

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

Outage History/Known Issues

No RPSU or PCE Data

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

Maintenance Planning (RPSU)

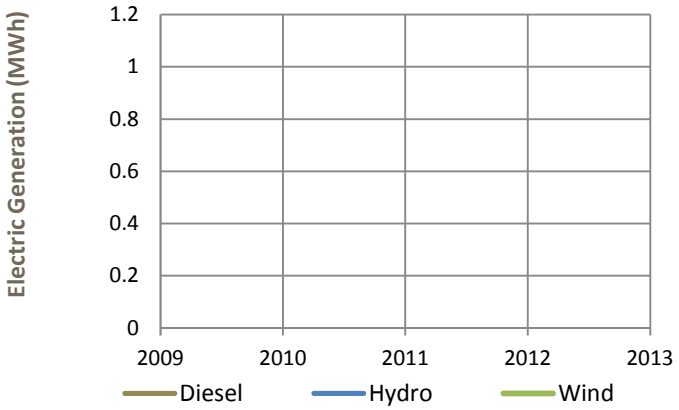
Electric Sales	**No. of Customers**	**kWh/year**	**kWh/Customer**
Residential			
Community			
Commercial			
Utility Use			

Electric Sales by Customer Type (kWh/year)

Residential | Community | Commercial | Utility Use

Power Production

Diesel (kWh/yr)		**Avg. Load (kW)**	
Wind (kWh/yr)		**Peak Load (kW)**	
Hydro (kWh/yr)		**Efficiency (kWh/gal)**	
Total (kWh/yr)	0	**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)			
Other Fuel? (1 gal)			
Gasoline (1 gal)			
Propane (100#)			
Wood (1 cord)			
Pellets			
Discounts?			

Alternative Energy	**Potential**	**Projects**	**Status**
Hydroelectric	Low		
Wind Diesel	Low		
Biomass	High		
Solar	High		
Geothermal	Low		
Oil and Gas	Low		
Coal	Low		
Emerging Tech	Not Rated		
Heat Recovery	Medium	Small system, RPSU Inventory not complete	
Energy Efficiency	Medium		

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

Energy Profile: Telida

Housing Units	Occupied	Vacant	% Owner-Occup.
	1	7	0%

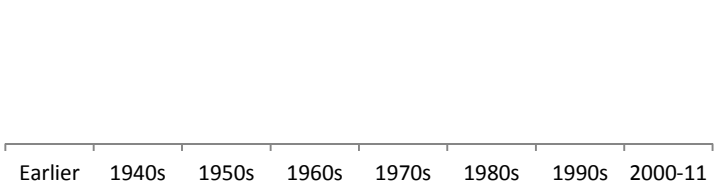
Housing Need	Overcrowded	1-star

Data Quality

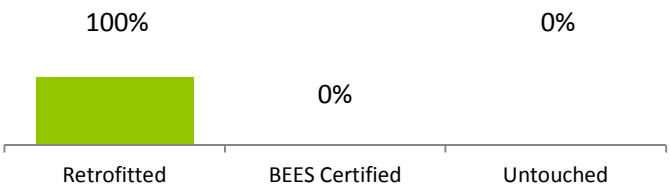
Regional Housing Authority	Weatherization Service Provider

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

Age of Housing Stock



Energy Efficient Housing Stock

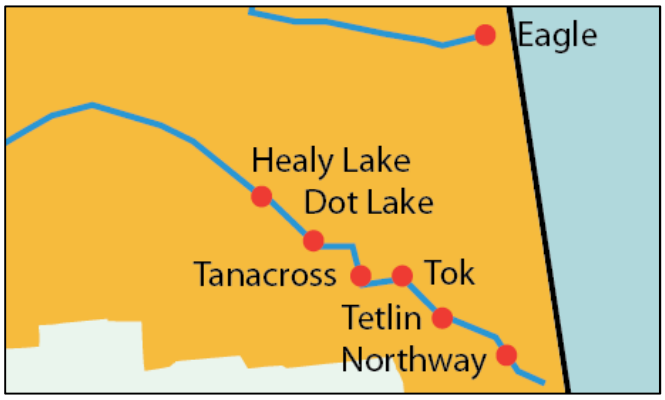


Street Lighting	Owner	Number/Type	Retrofitted?	Year	Notes

Non-residential Building Inventory

Building Name or Location	Year Built	Square Feet	Audited?	Retrofits Done?	In ARIS?

Community Profile: Tetlin



Incorporation	Unincorporated

Location

Tetlin is located along the Tetlin River, between Tetlin Lake and the Tanana River, 20 miles southeast of Tok. It lies in the Tetlin National Wildlife Refuge. The village is connected by road to the Alaska Highway.

Longitude	-142.5161	**Latitude**	63.1372
ANCSA Region	N/A		
Borough/CA	Southeast Fairbanks Census Area		
School District	Alaska Gateway School District		
AEA Region	Yukon-Koyukuk/Upper Tanana		

Alaska Native Name (definition)

Teełąy

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

None

Historical Setting / Cultural Resources

The semi-nomadic Athabascan Indians have historically lived in this area. During the Chisana gold stampede in 1913, a trading post was established across the river from Tetlin. The 786,000-acre Tetlin Indian Reserve was established in 1930. When the Alaska Native Claims Settlement Act (ANCSA) was passed in 1971, the reserve was revoked. Residents are able to pursue a traditional Athabascan culture and lifestyle. Tetlin owns its own surface and subsurface rights. Corporation owns their own set of land.

Economy

Local government provides over 60% of employment for the village with education/health services, and construction rounding out top three.

Climate	**Avg. Temp.**	**Climate Zone**	**Heating Deg. Days**
	23.6	8	15,400

Natural Hazard Plan	**Year**
None	

Notes

Energy Priorities and Projects

Biomass for community buildings; energy efficiency upgrades to buildings; Interest in EPA wood stove change out;

Community Plans	**Year**
Community Plan (Draft)	2015

Local Contacts	**Email**	**Phone**	**Fax**
Tetlin Native Corporation	tetlin.native.corp@gmail.com		
Native Village of Tetlin	tetlinvillagecouncil@gmail.com		883-1267

Demographics	**2000**	**2010**		**2013**
Population	117	127	**Percent of Residents Employed**	72.7%
Median Age	30	31	**Denali Commission Distressed Community**	No
Avg. Household Size	3	3	**Percent Alaska Native/American Indian (2010)**	90.2%
Median Household Income		$21,875	**Low and Moderate Income (LMI) Percent (2014)**	N/A

Electric Utility	**Generation Sources**	**Interties**	**PCE?**
Alaska Power and Telephone Company	Intertie	Tok	Yes

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

Water/Wastewater System		**Homes Served**	**System Volume**
Water	Hauled from school or washeteria	43	
Sewer	Sewage Lagoon	**Energy Audit?**	
Notes		No	

Access

Road	Yes				
Air Access	Yes	**Runway**	3300' x 75'		
Dock/Port	No	**Barge Access?**	No	**Ferry Service?**	No

Notes Located 220 miles SE of Fairbanks on the Tetlin River. Scheduled and charter flights are available from Tok. Many residents own cars, trucks, skiffs, and snow machines for hunting, fishing, and hauling wood.

Energy Profile: Tetlin

Diesel Power System

Utility	Alaska Power & Telephone Company		
Engine	**Make/Model**	**Condition/Hrs**	**Gen Capacity**
Unit 1	Intertie to AP&T Powerhouse in Tok		
Unit 2			
Unit 3			
Unit 4			
Line Loss			
Heat Recovery?			

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

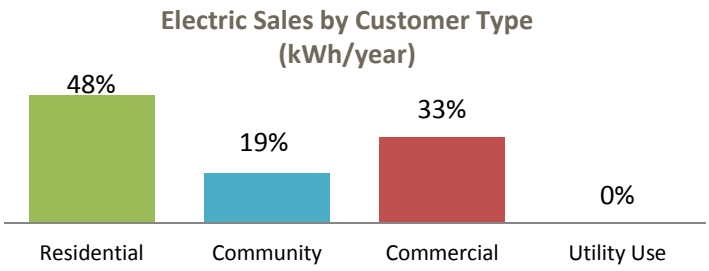
Outage History/Known Issues

Receives power from Tok/Tanacross.

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

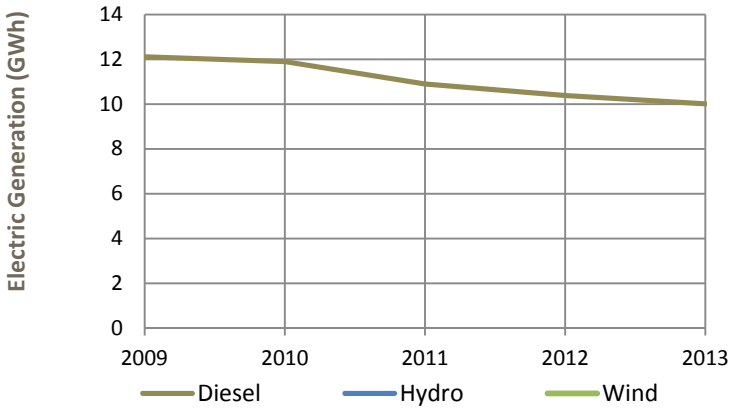
Maintenance Planning (RPSU)	N/A

Electric Sales	**No. of Customers**	**kWh/year**	**kWh/Customer**
Residential	46	165,960	3,608
Community	4	64,845	16,211
Commercial	7	112,311	16,044
Utility Use		0	



Power Production

Diesel (kWh/yr)	9,499,440	**Avg. Load (kW)**	40
Wind (kWh/yr)	0	**Peak Load (kW)**	89
Hydro (kWh/yr)	0	**Efficiency (kWh/gal)**	14
Total (kWh/yr)	9,499,440	**Diesel Used (gals/yr)**	657,326



Electric Rates ($/kWh)		**Cost per kWh Sold ($/kWh)**	
Rate with PCE	$0.21	**Fuel Cost**	N/A
Residential Rate	$0.45	**Non-fuel Cost**	$0.05
Commercial Rate		**Total Cost**	$0.05

Fuel Prices ($)	**Utility/Wholesale**	**Retail**	**Month/Year**
Diesel (1 gal)	$3.75	$4.40	6-13; 8-14
Other Fuel? (1 gal)			
Gasoline (1 gal)			
Propane (100#)		$83.33	8-14
Wood (1 cord)			
Pellets			
Discounts?			

Alternative Energy	**Potential**	**Projects**	**Status**
Hydroelectric	High	1) Yerrick Creek, 1.5 MW, Tanacross 2) Clearwater Creek	1) Final design/ permitting; 2) Secure funds, develop post YC
Wind Diesel	Medium	1) Chisana Mt Feasibility 2) Tok- 7 Mile Wind	1) Feasibility/Met Tower 2) Feasible, securing funds
Biomass	Medium	Biomass Heating in School (2012)	Not operational (2013)
Solar	High	AP&T utility-scale investigation	Feasibility
Geothermal	Low		
Oil and Gas	Low	Alternative fuel under utility investigation	AP&T Feasibility
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

Energy Profile: Tetlin

Housing Units	Occupied	Vacant	% Owner-Occup.
	29		69%

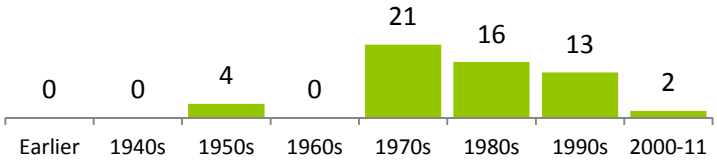
Regional Housing Authority	Weatherization Service Provider
IRHA	TCC, ACDC

Housing Need	Overcrowded	1-star
	44.8%	N/A

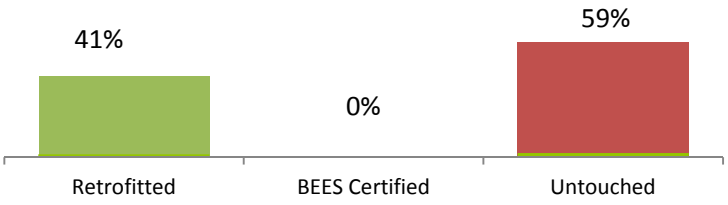
Energy Use	Average Home Energy Rating	Average Square Feet	Avg. EUI (kBTU/sf)
	N/A	N/A	N/A

Data Quality	
	Low

Age of Housing Stock



Energy Efficient Housing Stock

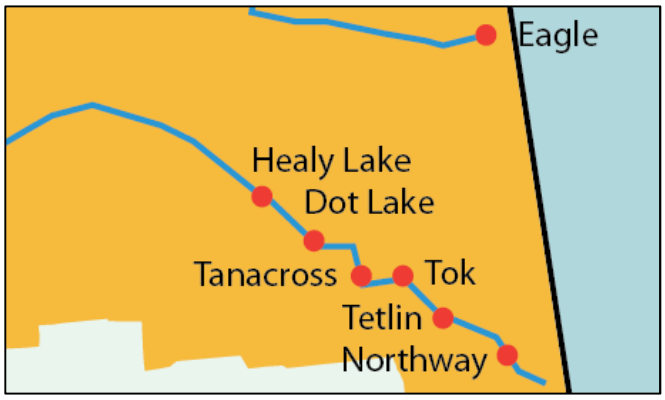


Street Lighting	Owner	Number/Type	Retrofitted?	Year	Notes
APT		10+	No		Vandalism on-going

Non-residential Building Inventory

Building Name or Location	Year Built	Square Feet	Audited?	Retrofits Done?	In ARIS?
Airport Electrical		96	No	No	No
Airport SRE Bldg.		2,000	No	No	Yes
Old Hall/Community Center	1970s		No	No	
Recycle Center (no power)			No	No	
Sewer Haul	2000	11,776	No	No	Yes
Tetlin Hall	2005		No	No	
Washeteria	2003		No	No	

Community Profile: Tok



Alaska Native Name (definition)

Incorporation	Unincorporated

Location

Tok is located at the junction of the Alaska Highway and the Tok Cutoff to the Glenn Hwy 200 miles SE of Fairbanks. It is called the "Gateway to Alaska," the first major community upon entering Alaska, 93 miles from the Canadian border.

Longitude	-142.9856	**Latitude**	63.3367
ANCSA Region	N/A		
Borough/CA	Southeast Fairbanks Census Area		
School District	Alaska Gateway School District		
AEA Region	Yukon-Koyukuk/Upper Tanana		

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

Historical Setting / Cultural Resources

Began in 1942 as an Alaska Road Commission camp. The U.S. Customs Office was located in Tok between 1947 and 1971, when it was moved to Alcan at the border. Between 1954 and 1979, a U.S. Army fuel pipeline operated from Haines to Fbks, with a pump station in Tok. Current population is primarily non-Native. Known as the 'Sled Dog Capital.'

Economy

Trade/transportation/utilities, local government, and leisure and hospitality are main employers for the village.

Climate	**Avg. Temp.**	**Climate Zone**	**Heating Deg. Days**
	24.4	8	15,400

Natural Hazard Plan	**Year**
Yes	2009

Notes

Energy Priorities and Projects

Biomass in Tok school; Yerrick Creek hydro; Wind studies - Chisana Mt. & 7-Mile; Investigate options for utility scale solar; wood stove change-out program; monitor trucking of LNG ; expand solar PV on homes & private buildings;

Community Plans	**Year**
DNR Forest Fuel Fire Plan	

Local Contacts	**Email**	**Phone**	**Fax**
Tok Native Association		883-3718	883-3719
Tok Community Umbrella Assc.		883-5321	883-4481

Demographics	**2000**	**2010**		**2013**
Population	1393	1258	**Percent of Residents Employed**	56.6%
Median Age	36	45	**Denali Commission Distressed Community**	No
Avg. Household Size	3	3	**Percent Alaska Native/American Indian (2010)**	18.6%
Median Household Income	$37,941	$47,946	**Low and Moderate Income (LMI) Percent (2014)**	N/A

Electric Utility	**Generation Sources**	**Interties**	**PCE?**
Alaska Power and Telephone Company	Diesel	Tanacross, Tetlin, Dot Lake	Yes

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

Water/Wastewater System	**None**	**Homes Served**	**System Volume**
Water	Well		
Sewer	Septic	**Energy Audit?**	
Notes		Yes	

Access

Road	Yes				
Air Access	Yes	**Runway**	2509' x 50'		
Dock/Port	No	**Barge Access?**	No	**Ferry Service?**	No

Notes Tok is located on the Alaska Highway about 200 miles southeast of Fairbanks. Tok has two private airports and one state-maintained public airport with a 2509' x 50' asphalt runway in good condition.

Energy Profile: Tok

Diesel Power System

Utility	Alaska Power & Telephone Company		
Engine	**Make/Model**	**Condition/Hrs**	**Gen Capacity**
Unit 1	Caterpillar	16 yrs in service	1320
Unit 2	Caterpillar	26 yrs in service	1135
Unit 3	Caterpillar	20 yrs in service	1135
Unit 4	Caterpillar	30 yrs in service	440
Unit 5	Caterpillar	7 yrs in service	1050
Line Loss	16.4%		
Heat Recovery?	No		

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

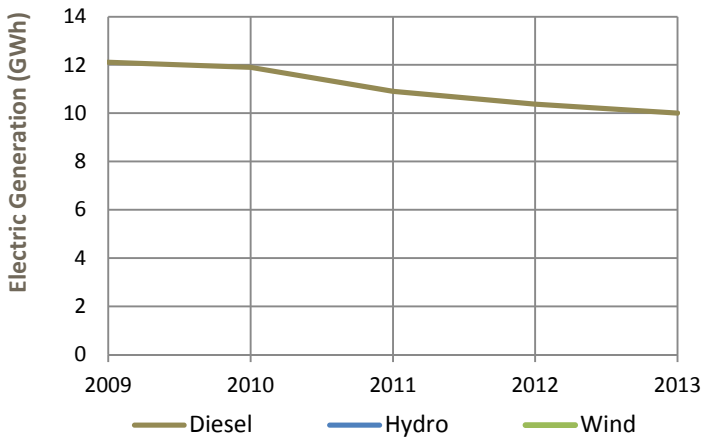
Outage History/Known Issues

PCE includes Tok & Tanacross. Gen. incl. DL, DL Village, & Tetlin.

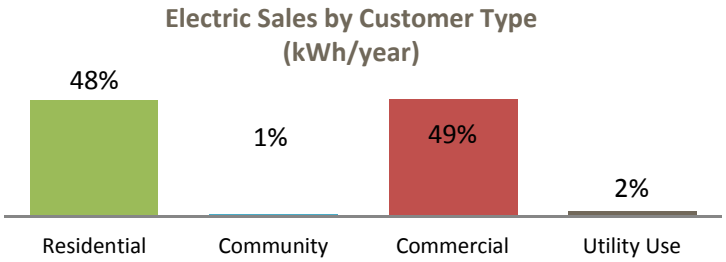
Operators	**No. of Operators**	**Training/Certifications**

Power Production

Diesel (kWh/yr)	9,499,440	**Avg. Load (kW)**	1,052
Wind (kWh/yr)	0	**Peak Load (kW)**	2,337
Hydro (kWh/yr)	0	**Efficiency (kWh/gal)**	14
Total (kWh/yr)	9,499,440	**Diesel Used (gals/yr)**	657,326



Maintenance Planning (RPSU)	N/A		
Electric Sales	**No. of Customers**	**kWh/year**	**kWh/Customer**
Residential	750	3,835,129	5,114
Community	7	78,369	11,196
Commercial	213	3,869,111	18,165
Utility Use		158,640	



Electric Rates ($/kWh)		**Cost per kWh Sold ($/kWh)**	
Rate with PCE	$0.21	**Fuel Cost**	$0.31
Residential Rate	$0.45	**Non-fuel Cost**	$0.19
Commercial Rate		**Total Cost**	$0.50

Fuel Prices ($)	**Utility/Wholesale**	**Retail**	**Month/Year**
Diesel (1 gal)	$3.75	$4.53/4.43	6-13; 8-14/6-13
Other Fuel? (1 gal)			
Gasoline (1 gal)		$4.23	6-13
Propane (100#)		$85.00/$82.62	8-14/6-13
Wood (1 cord)		$250.00	1-15
Pellets			
Discounts?			

Alternative Energy	**Potential**	**Projects**	**Status**
Hydroelectric	High	1) Yerrick Creek, 1.5 MW, Tanacross 2) Clearwater Creek	1) Final design/ permitting; 2) Secure funds, develop post YC
Wind Diesel	Medium	1) Chisana Mt Feasibility 2) Tok- 7 Mile Wind	1) Feasibility/Met Tower 2) Feasible, securing funds
Biomass	Medium	Tok School Biomass Heating Project	Operational
Solar	High	1)AP&T utility investigation; 2) private buildings	1) Feasibility 2) Operational
Geothermal	Low		Have looked at
Oil and Gas	Low	AP&T utility-scale investigation	Feasibility
Coal	Low	Coal lease at Jarvis Creek	AP&T investigating
Emerging Tech	Not Rated		
Heat Recovery	Medium		
Energy Efficiency	High	1) AHFC-C 2) AHFC-R	Complete

Bulk Fuel

Tank Owner	**Fuel Type(s)**	**Capacity**	**Age/Condition**
AP&T	Diesel	30,000	20+ yrs old

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

Cooperative Purchasing Agreements

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

Notes

Energy Profile: Tok

Housing Units	Occupied	Vacant	% Owner-Occup.
	547	253	78%

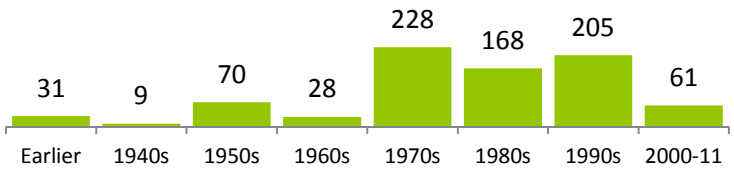
Regional Housing Authority	Weatherization Service Provider
IRHA	ACDC

Housing Need	Overcrowded	1-star
	8.0%	7.3%

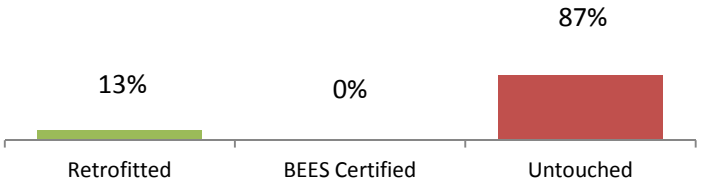
Data Quality	High

Energy Use	Average Home Energy Rating	Average Square Feet	Avg. EUI (kBTU/sf)
	2 star plus	1,736	193

Age of Housing Stock



Energy Efficient Housing Stock

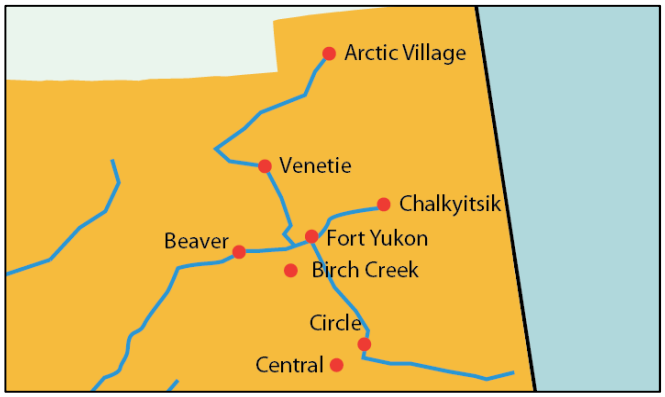


Street Lighting	Owner	Number/Type	Retrofitted?	Year	Notes
Intersection	DOT				
Security Lighting (powered by AP&T)			Mostly		

Non-residential Building Inventory

Building Name or Location	Year Built	Square Feet	Audited?	Retrofits Done?	In ARIS?
Building Maintenance Shop		2,240			Yes
Combined Facility		10,934			Yes
District Wide Storage		650			Yes
Fish and Game (new)					
Fish and Game (old)					
Maintenance Shop		9,600			Yes
RurALCAP Head Start and Service Center					
State Court House					
Tok Area Office		1,674			Yes
Tok Athletic Facility	1982	30,050	Yes; Nortech		Yes
Tok Dog Musher's Hall					
Tok Main Office		2,500			Yes
Tok School	1994	74,619	Yes; Nortech		Yes
Tok School Garage		1,408			Yes
Tok Visitors Center					
Tox School Boardroom Bldg.		2,400			Yes
Upper Tanana Health Center (TCC)					
USPS					
Warm Storage Bldg		8,660			Yes
Weigh Station, Inspection Bldg.		4,260			Yes
Weigh Station, Scale House		1,320			Yes
West Office Shop		2,500			Yes

Community Profile: Venetie



Alaska Native Name (definition)

Vįįhtąįį

Historical Setting / Cultural Resources

Venetie was founded in 1895 by a man named Old Robert, who chose Venetie because of its plentiful fish and game. In 1943 the Venetie Indian Reservation was established working together to protect their land for subsistence use. ANCSA passed in 1971, Venetie and Arctic Village opted for title to the 1.8 mil acres of land in the former reservation. Venetie is comprised largely of descendants of the Neets'ai Gwich'in and, to a lesser extent, the Gwichyaa and Dihaii Gwich'in. Subsistence activities are important to local culture.

Energy Priorities and Projects

Repair heat recovery to washeteria; additional fuel storage at airport; address high line loss; Generator replacement or rebuild needed; utility clerk training; PV panels on washeteria - expand use if possible

Incorporation	Unincorporated

Location

Venetie is located on the north side of the Chandalar River, 45 miles northwest of Fort Yukon.

Longitude	-146.4186	**Latitude**	67.0139
ANCSA Region	Doyon, Limited		
Borough/CA	Yukon-Koyukuk Census Area		
School District	Yukon Flats School District		
AEA Region	Yukon-Koyukuk/Upper Tanana		

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

Economy

Local government provides over 60% employment with natural resource/mining, and construction rounding out top 3 employers.

Climate	**Avg. Temp.**	**Climate Zone**	**Heating Deg. Days**
		8	16,465

Natural Hazard Plan	**Year**
None	
Notes	

Community Plans	**Year**
Venetie Community Development Plan	2013

Local Contacts	**Email**	**Phone**	**Fax**
Native Village Venetie Tribal Gov't	venetietribal@yahoo.com	849-8212	
Council of Athabascan Tribal Gov't		849-8165	849-8097

Demographics	**2000**	**2010**		**2013**
Population	202	166	**Percent of Residents Employed**	67.6%
Median Age	25	31	**Denali Commission Distressed Community**	Yes
Avg. Household Size	4	3	**Percent Alaska Native/American Indian (2010)**	90.3%
Median Household Income		$15,625	**Low and Moderate Income (LMI) Percent (2014)**	N/A

Electric Utility	**Generation Sources**	**Interties**	**PCE?**
Venetie Village Electric	Diesel	No	Yes

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

Water/Wastewater System	**None**	**Homes Served**	**System Volume**
Water	Hauled from storage tank		
Sewer	Flush & haul system	**Energy Audit?**	
Notes		Yes	

Access

Road	No				
Air Access	Yes	**Runway**	4000' x 75'		
Dock/Port	No	**Barge Access?**	No	**Ferry Service?**	No

Notes The Venetie Tribal Council owns and operates the dirt/gravel airstrip. The Chandalar River provides limited access by boat from May-Oct. Barges can't reach due to shallow water. Fuel and goods are shipped by air.

Energy Profile: Venetie

Diesel Power System

Utility	Venetie Village Electric		
Engine	**Make/Model**	**Condition/Hrs**	**Gen Capacity**
Unit 1	John Deere	Good	
Unit 2	John Deere	62,486	190
Unit 3	John Deere	43,675	125
Unit 4			
Line Loss	20.3%		
Heat Recovery?	No		

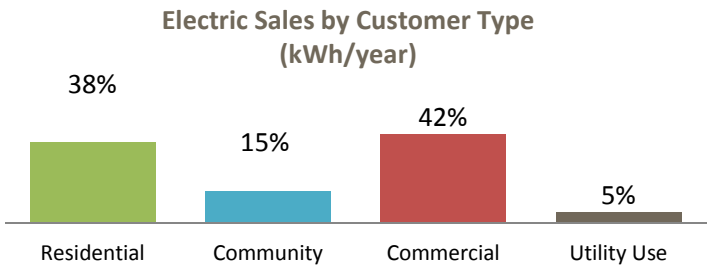
Upgrades	**Priority**	**Projects**	**Status**
RPSU Powerhouse	High		
RPSU Distribution	Low		

Outage History/Known Issues

Generator 3 needs overhaul

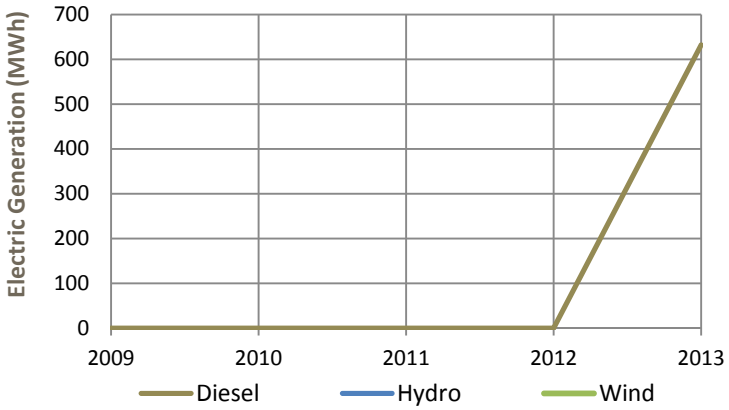
Operators	**No. of Operators**	**Training/Certifications**
	2	
	1	Utility Clerk
Maintenance Planning (RPSU)	N/A	

Electric Sales	**No. of Customers**	**kWh/year**	**kWh/Customer**
Residential	94	211,538	2,250
Community	8	82,752	10,344
Commercial	13	233,043	17,926
Utility Use		30,339	



Power Production

Diesel (kWh/yr)	700,100	**Avg. Load (kW)**	54
Wind (kWh/yr)	0	**Peak Load (kW)**	120
Hydro (kWh/yr)	0	**Efficiency (kWh/gal)**	10
Total (kWh/yr)	700,100	**Diesel Used (gals/yr)**	71,943



Electric Rates ($/kWh)		**Cost per kWh Sold ($/kWh)**	
Rate with PCE	$0.37	**Fuel Cost**	$0.75
Residential Rate	$0.90	**Non-fuel Cost**	$0.20
Commercial Rate		**Total Cost**	$0.95

Fuel Prices ($)	**Utility/Wholesale**	**Retail**	**Month/Year**
Diesel (1 gal)	$5.48	$8.50	6-13; 8-14
Other Fuel? (1 gal)			
Gasoline (1 gal)			
Propane (100#)		$287.62	8-14
Wood (1 cord)			
Pellets			
Discounts?			

Alternative Energy	**Potential**	**Projects**	**Status**
Hydroelectric	Low		
Wind Diesel	Low		
Biomass	High	Pre-FS on biomass system options	Complete; Not pursuing
Solar	High	PV panels on washeteria	
Geothermal	Low		
Oil and Gas	Low	Yukon Flats oil & gas exploration in 2013.	Potential uncertain
Coal	Low		
Emerging Tech	Not Rated		
Heat Recovery	Low	Venetie Clinic Heat Recovery, HR to New Clinic	in Progress (Summer 2016)
Energy Efficiency	Medium		

Bulk Fuel

Tank Owner	**Fuel Type(s)**	**Capacity**	**Age/Condition**
	Gas/Diesel	1,500/1,500	20 yrs
Airport	Diesel	5,145	14 yrs
Petroleum Red	Diesel	14,000 (2 tanks)	20 yrs

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

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

Cooperative Purchasing Agreements

Notes

Energy Profile: Venetie

Housing Units	Occupied	Vacant	% Owner-Occup.
	57	29	74%

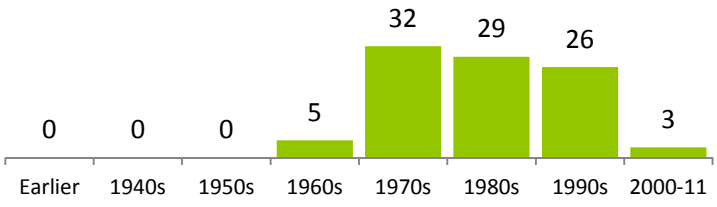
Regional Housing Authority	Weatherization Service Provider
IRHA	TCC

Housing Need	Overcrowded	1-star
	26.3%	N/A

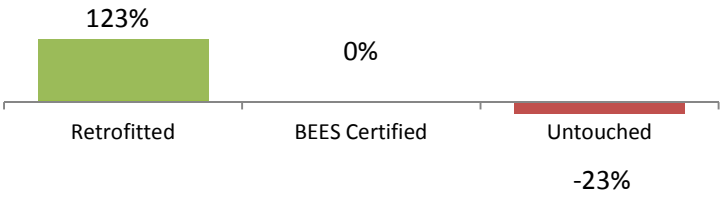
Data Quality	Med.

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

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?
ANICA Store		1,500			No
Community Hall	1990s				No
John Fredson School	1979-1986	21,920	Yes; Nortech		Yes
Myra Roberts Clinic	1990s				No
Washeteria	1993/2003				No

A | Energy Meeting Participants

Stakeholder Kickoff Meeting

Fairbanks, March 18, 2015

Attendees

Christine Rifredi, Ft. Yukon
Violet Titus-Mayo, Minto
Raymond Titus, Minto
Cindy Pilot, Tribal Council, Koyukuk
Jack Hebert, CCHRC
Don Honea, Jr. Tribe, Ruby
Bill McCarty, Tribe, Ruby
Joe Wallace, Tribe, Tetlin
Andy Simon, Jr., Tribe, Allakaket
Angela Demintieff, Holy Cross
Malinda Chase, Village Corp - Deloy Ges, Inc, Anvik
Donna May Folger, City of Tanana
Carl Gregory, Tribal Council, Nikolai
Jana George, IRHA, Fairbanks
Kelvin Long
Vera Weiser, Minto
James Ross, Canada
Josh Weiser, Minto
Shaun Adomo, Tanacross
Paul Mountain, Tribe, Nulato
Brent Sheets, ACEP
Will Putman, TCC Forestry
Jennifer Fate, Doyon Board
Dorothy Shockley, Intertribal Agriculture Council
Raymond Woods, Manley
J.R. Kettendorf
James Nathaniel, Doyon
Phyllis Erhart, Tanana
Bob Albert, Koyukuk
Bessie Titus, Minto
Roy Charlie, Minto
Joe Young, Tok
Don Charlie, Nenana
Art Eveland, Arctic Village
Danny Powers, CCHRC, Fairbanks
Stephanie Nial, Tanana
Frannie Hughes, GZGTG, Council
Kimberly Carlo, IRHA
James Kelly, CATG
Kelda Britton, CATG
Aaron Petruska, Village Council of Beaver
Jason Custer, Alaska Power and Telephone
Wilmer Beetus, Hughes
Chris Simm, Doyon & K'Oyitl'Ots'Ina Limited
Harding Sam, Tribe, Alatna
Judy Kangas, Tribe, Tanana
Laree Fields, Fairbanks
Susie Charlie, Minto
Shirley Lee, Tanana
Rose Fields, Fairbanks
Givey Kochanowski, DOE Office of Indian Energy, Anchorage
Eric Hanssen, ANTHC, Anchorage
Anna Sattler, AVEC, Anchorage
Scott McManus, AGSD, Tok

YUKON FLATS SUBREGIONAL MEETING

Fort Yukon, April 21, 2015

Attendees

Tamara Henry, Tribal Administrator, Chalkitsik Village Council
Gavin Dixon, ANTHC
Sheila Symons, Gold Country Energy
Representatives from Venetie Village Council
Tony Peter, Yukon Flats School District
James Kelly, IGAP Coordinator for CATG
Christine Rifredi, City of Fort Yukon
Frannie Hughes, GZ Utility Co.
Nancy James, First Chief, Gwichyaa Zhee Gwich'in Tribal Government
Julie Mahler, resident
Marilyn Savage, GZGTG
Ronn Englishoo, Tribal member
Shirley Fields, GZGTG
CATG Natural Resource Department Director
Dave Pelunis - Messier, TCC
Jamie Hansen, Information Insights
Jed Drolet, Alaska Energy Authority
Jackie Schaeffer, WHPacific

UPPER TANANA SUBREGIONAL MEETING

Tok, June 5, 2015

Attendees

Thomas Teasdale, Northway Village Council
Chad Albert, Northway Village Council
Nichol Rallo, Northway Tribal Administrator
Patricia Young, Tok
Wesley Hamilton, Tanacross Village
Joanne E. Wallis, Native Village of Eagle
Rebecca J. Malcom, Eagle Village Council
Frank Cook, Tok
Galen Isaac, Tanacross
Julia L. Nay, Tanacross
Ray Fifer, Healy Lake
Robert Brean, Tanacross Inc
Catherine Edwardsen, Healy Lak
Arron Atchley, Tok
Monica Lisa Isaac, Tanacross
Heather Gross, Tok
Mickey Henton, Tok
Jarrett Humphreys, Tok
Dave Pelunis, Messier, TCC
Jamie Hansen, Information Insights
Jana Peirce, Information Insights
Jed Drolet, Alaska Energy Authority
Jessie Huff, Alaska Energy Authority
Stephanie Ashcraft, TCC
Mandy Sullivan, TCC
Brianna Gray, TCC
Jason Custer, AP&T

YUKON KOYUKUK SUBREGIONAL MEETING

Galena, June 11, 2015

Attending (in person & over phone)

Paul Mountain, Nulato
Katherine Dozette, Ruby
Jennie Peter, Ruby
Clifford C., Ruby
Edward Sarten, Ruby
Betty Huntington, Galena
Larry Hausmann, Galena
Cindy Pilot, Koyukuk
Josie Dayton, Koyukuk
Katherine Quirk, Koyukuk
Richard Miller, Galena
Karin Bodony, Galena
Jon Korta, Galena
Phil Koontz, Galena
Brian Landren, Galena
Brad Scotton, Galena
Dave Messier, TCC
Jamie Hansen, Information Insights
Jackie Schaeffer, WHPacific
Jed Drolet, Alaska Energy Authority
Mandy Sullivan, TCC
Brianna Gray, TCC
Eric Hanssen, ANTH

KUSKOKWIM SUBREGIONAL MEETING

McGrath, June 15, 2015

Attending

Natalie Baumgartner, Former City-now resident
Roberta Strick, McGrath Native Village Council
Gina D. McKindy, McGrath NVC- Tribal Admin
Craig Losby, McGrath City Council
Ernie Baumgartner, MKEC
Sharon Gurtler Strick, McGrath Native Council
Steven Graham, I.A.S.D.
Tiana Gibbens, MTNT & MLP
Dawn Magnuson, McGrath Native Village Council
Dave Messier, TCC
Jackie Schaeffer, WHPacific
Jed Drolet, Alaska Energy Authority
Mandy Sullivan, TCC
Brianna Gray, TCC

LOWER YUKON SUBREGIONAL MEETING

Holy Cross, June 16, 2015

Attending

Brenda Sims, Holy Cross Tribal-IGAP
Rebecca Elswick, Holy Cross Tribe
Sandra Sims, Holy Cross City & Tribe

Dylan Peters, Holy Cross Youth Worker-IGAP
Katie Turner, Holy Cross Youth Worker-IGAP
Garrett Sims, Holy Cross Tribe
Maryann Peters, Holy Cross Tribe
Cecilla Turner, Holy Cross Tribe
Ester Peters, Holy Cross Tribe
Andrea Turner, Holy Cross Tribe
Eugene Paul, Holy Cross Tribe
Peyton Turner, Holy Cross Tribe
Kristi Turner, Holy Cross Tribal/City Council
Elsie Sims, Holy Cross-IGAP
Michelle Sims, Holy Cross City Clerk
Rebecca Demientieff, Holy Cross City Mayor
Harvey Turner, Holy Cross City & Tribe
Matthew Berkett, Holy Cross Tribal Council
Angela Demientieff, Holy Cross Elder
Alfred Demientieff Jr, Holy Cross Tribal Council
John B. Gregory, Holy Cross Tribal Maintenance
James P. Anthony III, Holy Cross Member
Theresa Demientieff, Holy Cross Member
Dave Messier, TCC
Jackie Schaeffer, WHPacific
Jed Drolet, Alaska Energy Authority
Mandy Sullivan, TCC

YUKON TANANA SUBREGIONAL MEETING

Fairbanks, June 18, 2015

Attending (in person & over phone)

Patty Wiehl, Rampart
Kathleen Zuray, Tanana
Carla Smith, Minto
Glenn Carlo, FNA
Dan Bishop, GVEA
Jack Hebert, CCHRC
Steve Ginnis, FNA
Roy Charlie, Minto
Bessie Titus, Minto
Bart Garber, Toghotthele
Blanche Sam, K'Oyitl'Ots'Ina Limited
Hugh BiFelt, Hughes
Frank Thompson, Evansville Tribal Council
Elizabeth Woods, Manley
Harding Sam, Alatna
Michelle Moses, Alatna
Don Eller, Tanana Power Co.
Jason Custer, AP&T
Anna Sattler, AVEC
Dave Messier; TCC
Jamie Hansen, Information Insights
Jackie Schaeffer, WHPacific
Jed Drolet, Alaska Energy Authority
Mandy Sullivan, TCC
Charlisa Attla, TCC
Eric Hanssen, ANTHC

B | Analysis of Resource Potential

The data in the following tables has been compiled from multiple sources including the Alaska Energy Data Gateway (Institute of Social and Economic Research, 2015), the Renewable Energy Atlas of Alaska (Geographic Information Network of Alaska, 2013), the Alaska Energy Efficiency Map (Alaska Energy Authority, 2013), the Division of Geological & Geophysical Surveys report, Summary of Fossil Fuel and Geothermal Resource Potential in the Yukon-Koyukuk/Upper Tanana Energy region (LePain & Wartes, 2012), NREL's PVWatts (NREL, 2015), 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 34 at the end of this appendix for an explanation of the criteria used in the analysis.

Table 25: 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
Alatna	6.18	L	M	N	1.96	R	M
Allakaket	6.18	L	M	N	1.96	R	M
Anvik	4.91	M	M	N	1.42		L
Arctic Village	5.41	L	L	N	0.00		L
Beaver	5.36	M	M	N	1.61	R	M
Bettles/Evansville	4.52	M	M	N	1.25		L
Birch Creek	5.41	H	M	N	1.63		L
Central	4.00	M	M	N	1.03		L
Chalkyitsik	5.41	H	M	N	1.63	R	M
Circle	4.08	M	M	N	1.07		L
Dot Lake	4.11	M	H	Y	1.08	C	M
Eagle	4.51	M	M	N	1.25		L
Fort Yukon	5.41	H	M	Y	1.63	D	H
Galena	4.52	H	M	Y	1.25	F	H
Grayling	4.75	L	M	N	1.35		M
Healy Lake	4.12	H	H	N	1.08		M
Holy Cross	4.85	M	M	N	1.39		L
Hughes	6.64	H	M	N	2.15		L
Huslia	4.83	H	M	N	1.38	R	M
Kaltag	4.60	M	M	N	1.29	R	M
Koyukuk	4.92	M	M	N	1.42		L
Manley Hot Springs	4.61	L	H	N	1.29	R	M
McGrath	4.80	H	H	N	1.37	R	M
Minto	4.48	H	H	N	1.23	R	M
Nenana	3.10	M	H	N	0.65		M
Nikolai	5.85	H	M	N	1.82		L
Northway	4.20	L	H	N	1.12	R	M
Nulato	4.73	M	M	N	1.34		L
Rampart	4.58	M	M	N	1.28		L
Ruby	5.07	M	M	N	1.48		L
Shageluk	4.75	L	M	N	1.35	R	M
Stevens Village	5.36	L	M	N	1.61	R	M
Takotna	6.02	H	M	N	1.89		L

Tanacross	4.13	M	H	Y	1.09	C	M
Tanana	4.58	M	H	Y	1.28	C	M
Telida	5.85	H	M	N	1.82		L
Tetlin	4.75	M	H	N	1.35		L
Tok	4.13	M	H	Y	1.09	C	M
Venetie	5.41	H	M	N	1.63	R	M

Table 26: Geothermal resource potential

	Potential	Source Rock, Traps and Reservoirs Present	Wells Drilled & Resource Identified	Certainty
Alatna	L	N	N	L
Allakaket	L	N	N	L
Anvik	L	N	N	L
Arctic Village	L	N	N	L
Beaver	L	N	N	L
Bettles/Evansville	L	N	N	L
Birch Creek	L	N	N	L
Central	L	N	N	L
Chalkyitsik	L	N	N	L
Circle	L	N	N	L
Dot Lake	L	N	N	L
Eagle	L	N	N	L
Fort Yukon	L	N	N	L
Galena	L	N	N	L
Grayling	L	N	N	L
Healy Lake	L	N	N	L
Holy Cross	L	N	N	L
Hughes	L	N	N	L
Huslia	L	N	N	L
Kaltag	L	N	N	L
Koyukuk	L	N	N	L
Manley Hot Springs	L	N	N	L
McGrath	L	N	N	L
Minto	L	N	N	L
Nenana	L	N	N	L
Nikolai	L	N	N	L
Northway	L	N	N	L

Nulato	L	N	N	L
Rampart	L	N	N	L
Ruby	L	N	N	L
Shageluk	L	N	N	L
Stevens Village	L	N	N	L
Takotna	L	N	N	L
Tanacross	L	N	N	L
Tanana	L	N	N	L
Telida	L	N	N	L
Tetlin	L	N	N	L
Tok	L	N	N	L
Venetie	L	N	N	L

Table 27: 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
Alatna	L		Y			L	M
Allakaket	L		Y			L	M
Anvik	L		N			L	M
Arctic Village	M		Y			M	M
Beaver	L		N			L	M
Bettles/Evansville	L		Y			L	M
Birch Creek	L		Y			L	M
Central	M		Y			M	M
Chalkyitsik	L		Y			L	M
Circle	L		Y			L	M
Dot Lake	H		Y			L	M
Eagle	M		Y			M	M
Fort Yukon	L		Y			L	M
Galena	L		Y			L	M
Grayling	L		Y			L	M
Healy Lake	M		Y			M	M
Holy Cross	L		Y			L	M
Hughes	M		Y			M	M
Huslia	L		N			L	M
Kaltag	L		Y			L	M
Koyukuk	L		Y			L	M

Manley Hot Springs	L		Y			L	M
McGrath	L		Y			L	M
Minto	M		Y			M	M
Nenana	L		Y			L	M
Nikolai	L		N			L	M
Northway	L		Y			L	M
Nulato	L		Y			L	M
Rampart	M		Y			M	M
Ruby	M		Y			M	M
Shageluk	L		Y			L	M
Stevens Village	L		Y			L	M
Takotna	L		Y			L	M
Tanacross	H		Y		F	M	M
Tanana	M		Y			M	M
Telida	L		Y			L	M
Tetlin	H		Y			L	M
Tok	H		Y			L	M
Venetie	L		Y			L	M

Table 28: Wind energy resource potential

	Potential	Wind-Resource	Wind Developability	Site Accessible	Permittability	Site Availability	Load	Certainty
Alatna	L	L	L	Y	Y	Y	X	M
Allakaket	L	L	L	Y	Y	Y	X	M
Anvik	L	L	L	Y	Y	Y	X	M
Arctic Village	L	L	L	Y	Y	Y	X	M
Beaver	L	L	L	Y	Y	Y	X	M
Bettles/Evansville	L	L	L	N	Y	Y	X	M
Birch Creek	L	L	L	Y	Y	Y	X	M
Central	L	L	L	Y	Y	Y	X	M
Chalkyitsik	L	L	L	Y	Y	Y	X	M
Circle	L	L	L	Y	Y	Y	X	M
Dot Lake	M	L	H	Y	Y	Y	Y	M
Eagle	L	L	L	Y	Y	Y	X	M
Fort Yukon	L	L	H	Y	Y	Y		M
Galena	L	L	H	Y	Y	Y		M
Grayling	L	L	L	Y	Y	Y	X	M

Healy Lake	L	L	L	Y	Y	Y	X	M
Holy Cross	L	L	L	Y	Y	Y	X	M
Hughes	L	L	L	Y	Y	Y	X	L
Huslia	L	L	H	Y	Y	Y		M
Kaltag	L	L	L	Y	Y	Y	X	M
Koyukuk	L	L	L	Y	Y	Y	X	L
Manley Hot Springs	L	M	L	Y	Y	Y	X	L
McGrath	L	L	H	Y	Y	Y		M
Minto	L	M	L	Y	Y	Y	X	L
Nenana	M	M	H	Y	Y	Y		L
Nikolai	L	L	L	Y	Y	Y	X	M
Northway	L	L	H	Y	Y	Y		M
Nulato	L	L	H	Y	Y	Y		M
Rampart	L	L	L	Y	Y	Y	X	M
Ruby	L	L	L	Y	Y	Y	X	M
Shageluk	L	L	L	Y	Y	Y	X	M
Stevens Village	L	L	L	Y	Y	Y	X	M
Takotna	L	M	L	Y	Y	Y	X	L
Tanacross	M	L	H	Y	Y	Y		M
Tanana	M	M	H	Y	Y	Y		L
Telida	L	L	L	Y	Y	Y	X	M
Tetlin	M	M	H	Y	Y	Y		L
Tok	M	M	H	Y	Y	Y		M
Venetie	L	L	L	Y	Y	Y	X	M

Table 29: Coal resource potential

	Potential	Identified Deposits	Quality/High subsurface volume	Long Distance to Load	Project Planned or in Development	Certainty
Alatna	L	N	N	N	N	L
Allakaket	L	N	N	N	N	L
Anvik	L	N	N	N	N	L
Arctic Village	L	N	N	N	N	L
Beaver	L	N	N	N	N	L
Bettles/Evansville	L	N	N	N	N	L
Birch Creek	L	N	N	N	N	L
Central	L	N	N	N	N	L
Chalkyitsik	L	N	N	N	N	L

Circle	L	N	N	N	N	L
Dot Lake	L	N	N	N	N	L
Eagle	L	N	N	N	N	L
Fort Yukon	L	N	N	N	N	L
Galena	L	Y	N	N	N	L
Grayling	L	N	N	N	N	L
Healy Lake	L	N	N	N	N	L
Holy Cross	L	N	N	N	N	L
Hughes	L	N	N	N	N	L
Huslia	M	Y	N	N	N	L
Kaltag	M	Y	N	N	N	L
Koyukuk	M	Y	N	N	N	L
Manley Hot Springs	L	N	N	N	N	L
McGrath	L	N	N	N	N	L
Minto	L	N	N	N	N	L
Nenana	M	Y	Y	N	N	L
Nikolai	L	N	N	N	N	L
Northway	L	N	N	N	N	L
Nulato	M	Y	N	N	N	L
Rampart	M	Y	N	N	N	L
Ruby	M	Y	N	N	N	L
Shageluk	L	N	N	N	N	L
Stevens Village	L	N	N	N	N	L
Takotna	L	N	N	N	N	L
Tanacross	L	N	N	N	N	L
Tanana	L	N	N	N	N	L
Telida	L	N	N	N	N	L
Tetlin	L	N	N	N	N	L
Tok	L	N	N	N	N	L
Venetie	L	N	N	N	N	L

Table 30: Oil and gas resource potential

	Potential	Source Rock, Traps and Reservoirs Present	Wells Drilled & Resource Identified	Certainty
Alatna	L	N	N	L
Allakaket	L	N	N	L

Anvik	L	N	N	L
Arctic Village	L	N	N	L
Beaver	L	N	N	L
Bettles/Evansville	L	N	N	L
Birch Creek	L	N	N	L
Central	L	N	N	L
Chalkyitsik	L	N	N	L
Circle	L	N	N	L
Dot Lake	L	N	N	L
Eagle	L	N	N	L
Fort Yukon	L	N	N	L
Galena	L	N	N	L
Grayling	L	N	N	L
Healy Lake	L	N	N	L
Holy Cross	L	N	N	L
Hughes	L	N	N	L
Huslia	L	N	N	L
Kaltag	L	N	N	L
Koyukuk	L	N	N	L
Manley Hot Springs	L	N	N	L
McGrath	L	N	N	L
Minto	L	N	N	L
Nenana	L	N	N	L
Nikolai	L	N	N	L
Northway	L	N	N	L
Nulato	L	N	N	L
Rampart	L	N	N	L
Ruby	L	N	N	L
Shageluk	L	N	N	L
Stevens Village	L	N	N	L
Takotna	L	N	N	L
Tanacross	L	N	N	L
Tanana	L	N	N	L
Telida	L	N	N	L
Tetlin	L	N	N	L
Tok	L	N	N	L
Venetie	L	N	N	L

Table 31: Heat recovery (HR) resource potential

	Potential	HR Equipment at Powerhouse	HR In Operation	Recoverable Heat Available	Thermal Loads Nearby	Certainty
Alatna	L	N	N	N		H
Allakaket	L	Y	Y	N		H
Anvik	H	Y	Y	Y	Y	H
Arctic Village	L	N	N	Y	N	M
Beaver	L	Y	Y	N		H
Bettles/Evansville	H	Y	Y	Y	Y	M
Birch Creek	M	N				L
Central	H	Y	Y	Y	Y	L
Chalkyitsik	L	Y	Y	N		L
Circle	M	N	N			L
Dot Lake	L	N	N	N		H
Eagle	L	Y	Y	N		M
Fort Yukon	L	Y	Y	N		H
Galena	H	Y	Y	Y	Y	H
Grayling	H	N	N	Y	Y	M
Healy Lake	L	N	N	N		L
Holy Cross	H	Y	Y	Y	Y	H
Hughes	H	Y	Y	Y	Y	M
Huslia	L	Y	Y	Y	N	M
Kaltag	H	Y	Y	Y	Y	M
Koyukuk	H	Y	Y	Y	Y	L
Manley Hot Springs	M	Y	Y			L
McGrath	L	Y	Y	N	N	H
Minto	H	Y	Y	Y	Y	M
Nenana	L	N	N	N		H
Nikolai	M	Y				L
Northway	M	N	N			L
Nulato	L	N	N	Y	N	M
Rampart	M	N	N			L
Ruby	L	Y	Y	N		H
Shageluk	L	Y	Y		N	M
Stevens Village	M	Y	Y			L
Takotna	M	Y	Y			L

Tanacross	L	N	N	N		H
Tanana	M	Y	Y			L
Telida	M	N	N			L
Tetlin	L	N	N	N		H
Tok	M	Y	Y	Y	N	M
Venetie	L	Y	Y	N	N	H

Table 32: Energy Efficiency savings potential

	Potential	Residential Potential	Commercial & Public Potential
Alatna	M	L	H
Allakaket	M	L	H
Anvik	H	M	H
Arctic Village	M	L	H
Beaver	M	L	H
Bettles/Evansville	H	M	H
Birch Creek	M	L	H
Central	H	H	H
Chalkyitsik	H	M	H
Circle	M	L	H
Dot Lake	M	L	H
Eagle	H	H	H
Fort Yukon	H	M	H
Galena	H	H	H
Grayling	M	L	H
Healy Lake	H	M	H
Holy Cross	M	L	H
Hughes	M	L	H
Huslia	M	L	H
Kaltag	M	L	M
Koyukuk	M	M	M
Manley Hot Springs	H	M	H
McGrath	H	H	H
Minto	M	L	M
Nenana	H	M	H
Nikolai	M	L	H
Northway	H	M	H

Nulato	M	L	H
Rampart	H	H	H
Ruby	H	M	H
Shageluk	H	H	H
Stevens Village	M	L	H
Takotna	H	M	H
Tanacross	H	M	H
Tanana	H	M	H
Telida	M	L	H
Tetlin	H	M	H
Tok	H	H	H
Venetie	M	L	H

Table 33: Solar resource potential

	Potential	2014 Residential Rate	Installed Cost ($/Wdc)	Cost of Electricity Generated by System (PVWATTS)	Difference between Residential Rate & LCOE	Selected Weather Data for Location	Certainty
Alatna	H	0.91	5	0.41	-0.5	(TMY2) BETTLES, AK	H
Allakaket	H	0.91	5	0.41	-0.5	(TMY2) BETTLES, AK	H
Anvik	H	0.64	5	0.43	-0.21	(TMY2) BETHEL, AK	H
Arctic Village	H	0.9	5	0.41	-0.49	(TMY2) BETTLES, AK	H
Beaver	H	0.9	5	0.41	-0.49	(TMY2) FAIRBANKS, AK	H
Bettles/Evansville	H	0.8	5	0.41	-0.39	(TMY2) BETTLES, AK	H
Birch Creek	H		5				H
Central	H	0.65	5	0.41	-0.24	(TMY2) FAIRBANKS, AK	H
Chalkyitsik	H	0.95	5	0.41	-0.54	(TMY2) FAIRBANKS, AK	H
Circle	H	0.81	5	0.41	-0.4	(TMY2) FAIRBANKS, AK	H
Dot Lake	H	0.45	5	0.39	-0.06	(TMY2) BIG DELTA, AK	H
Eagle	H	0.72	5	0.39	-0.33	(TMY2) BIG DELTA, AK	H
Fort Yukon	H	0.64	5	0.41	-0.23	(TMY2) FAIRBANKS, AK	H
Galena	H	0.67	5	0.41	-0.26	(TMY2) MCGRATH, AK	H
Grayling	H	0.64	5	0.41	-0.23	(TMY2) MCGRATH, AK	H
Healy Lake	H		5				H
Holy Cross	H	0.59	5	0.43	-0.16	(TMY2) BETHEL, AK	H
Hughes	H	0.71	5	0.41	-0.3	(TMY2) BETTLES, AK	H
Huslia	H	0.59	5	0.41	-0.18	(TMY2) BETTLES, AK	H
Kaltag	H	0.59	5	0.41	-0.18	(TMY2) MCGRATH, AK	H
Koyukuk	H	0.95	5	0.41	-0.54	(TMY2) MCGRATH, AK	H

Manley Hot Springs	H	0.83	5	0.41	-0.42	(TMY2) BETTLES, AK	H
McGrath	H	0.73	5	0.41	-0.32	(TMY2) MCGRATH, AK	H
Minto	H	0.61	5	0.41	-0.2	(TMY2) FAIRBANKS, AK	H
Nenana	M	0.1788	5	0.41	0.2312	(TMY2) FAIRBANKS, AK	H
Nikolai	H	0.9	5	0.41	-0.49	(TMY2) MCGRATH, AK	H
Northway	H	0.68	5	0.39	-0.29	(TMY2) GULKANA, AK	H
Nulato	H	0.62	5	0.41	-0.21	(TMY2) MCGRATH, AK	H
Rampart	H		5				M
Ruby	H	0.84	5	0.41	-0.43	(TMY2) MCGRATH, AK	H
Shageluk	H	0.66	5	0.41	-0.25	(TMY2) MCGRATH, AK	H
Stevens Village	H		5				M
Takotna	H	0.64	5	0.41	-0.23	(TMY2) MCGRATH, AK	H
Tanacross	H	0.45	5	0.39	-0.06	(TMY2) BIG DELTA, AK	H
Tanana	H	0.7	5	0.41	-0.29	(TMY2) BETTLES, AK	H
Telida	H		5				H
Tetlin	H	0.45	5	0.39	-0.06	(TMY2) BIG DELTA, AK	H
Tok	H	0.45	5	0.39	-0.06	(TMY2) BIG DELTA, AK	H
Venetie	H	0.9	5	0.41	-0.49	(TMY2) BETTLES, AK	H

Table 34: 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	PVWatts estimated levelized cost of energy+ > residential electric rate; no net metering available.	PVWatts estimated levelized cost of energy+ is > residential electric rate; net metering available.	PVWatts estimated levelized cost of energy+ is < residential electric rate	No information documented.	No information documented.	Electric rates and PVWatts weather data available.
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?						
	b. Permitability: Can habitat, FAA, or other factors be resolved without significant difficulty?						

<table>
<tr><th colspan="2">Resource</th><th colspan="3">Potential</th><th colspan="3">Certainty</th></tr>
<tr><th>Resource</th><th>What it Includes</th><th>Low</th><th>Medium</th><th>High</th><th>Low</th><th>Medium</th><th>High</th></tr>
<tr><td></td><td colspan="7">c. Site availability: Is there suitable land that is available for siting wind turbines?</td></tr>
<tr><td></td><td colspan="7">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)?</td></tr>
<tr><td rowspan="5">**** Rough analysis of biomass project benefit/cost estimated based on these assumptions:</td><td colspan="7">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)</td></tr>
<tr><td colspan="7">2. Fuelwood with an energy content of 20 MMBtu/cord and price of $250/cord</td></tr>
<tr><td colspan="7">3. Wood and oil combustion efficiency equal</td></tr>
<tr><td colspan="7">4. Installed cost of system estimated at $35/gallons per year of displaced fuel</td></tr>
<tr><td colspan="7">5. O&M cost of 1% installed cost</td></tr>
<tr><td>Energy Efficiency Rating^</td><td colspan="7">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.</td></tr>
<tr><td>Energy Efficiency Low^^</td><td colspan="7">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.</td></tr>
<tr><td>Energy Efficiency Certainty^^^</td><td colspan="7">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.</td></tr>
<tr><td>Solar Potential Rating+</td><td colspan="7">This ratings is based on the PVWatts (http://pvwatts.nrel.gov/pvwatts.php) calculation of the Cost of Electricity Generated by System or levelized cost of energy. The system specifications used for the calculation for all communities is as follows:

System Specifications
<table><tr><td>DC System Size (kW):</td><td>4</td></tr><tr><td>Module Type</td><td>Standard</td></tr><tr><td>Array Type</td><td>Fixed (open rack)</td></tr><tr><td>System Losses (%)</td><td>14</td></tr><tr><td>Tilt (deg)</td><td>70</td></tr><tr><td>Azimuth (deg)</td><td>180</td></tr></table>
Initial Economic Assumptions
<table><tr><td>System Type</td><td>Residential or Commercial</td></tr><tr><td>Average Cost of Electricity Purchased from Utility ($/kWh)</td><td>2014 Residential Rate for each community</td></tr><tr><td>Initial Cost ($/Wdc)*</td><td>$5 / Wdc</td></tr></table>*The initial cost is an average of the installed cost of systems in Galena, Fort Yukon, and Manley Hot Springs. No tax credits were used in the calculation.

PVWatts Assumptions for Levelized Cost of Energy calculation:
<table><tr><td>Debt Amount</td><td>100% of installed cost</td></tr><tr><td>Loan Term</td><td>25 years</td></tr><tr><td>Loan Interest Rate</td><td>7.5%</td></tr><tr><td>Analysis Period</td><td>25 years</td></tr><tr><td>Inflation Rate</td><td>2.5%</td></tr></table></td></tr>
</table>

Resource		Potential			Certainty		
Resource	What it Includes	Low	Medium	High	Low	Medium	High

Real Discount Rate	8%
Federal Income Tax Rate	28%/year
State Income Tax Rate	7%/year

This potential rating does not attempt a full analysis of economic viability. To do so, a community by community estimate of installed cost would be needed as well as an average of projected electric rates for the coming 25 years. The system used instead is a far simpler snapshot to determine resource potential at present using the average electric rate for 2014. The unsubsidized rate is used to reflect actual costs, whether to the consumer or the state.

The potential ratings for communities not served by public electric utilities, Birch Creek, Healy Lake, and Telida, are assumed to have high potential given the cost/need for self-generation.

NOTES ON SPECIFIC TECHNOLOGIES

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 of 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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D | Data Sources

Table 35: Data sources for community profiles

Field		Source	Date
Alaska Native Name		UAF; Input	2014; 2015
Historical Setting		DCRA; Community Plans	2015
Cultural Resources		DCRA; Community Plans	2015
Energy Priorities		Phase II input; Community Plans	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	Phase I Report; Community Plans; Input	2013; 2015
	Sewer	Phase I Report; Community Plans; Input	2013; 2015
	Condition	Phase I Report; Community Plans; Input	2013; 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	Phase I Report; Community Plans; Input	2013; 2015
	Gallons		
Electric Utility		DCRA	2015
	Gen. Sources	AEDG	2015
	Interties	DCRA	2015
	PCE	DCRA	2015
Notes		Phase II input	2015

Note: See page 7 for a list of acronyms.

Table 36: Data sources for energy profiles

		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, Utilities	2014
	kWh sold	PCE, Utilities	2014
Resources	All	See Appendix B	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); Hazard Mit. Plans (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; Utilities	2014
	Commercial	PCE; Utilities	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		TCC	2015
Energy Use			
	Avg Star Rating	CCHRC	2014
	Avg Sq Feet	CCHRC	2014
	Avg. EUI	CCHRC	2014
EE Housing Stock			
	Retrofitted	CCHRC, AHFC	2014
	Retrofitted	TCC	2015
	Retrofitted		
	BEES Certified	CCHRC, AHFC	2014
Lighting	All	Ak EE Maps; VEEP reports; Input	2015

Note: See page 7 for a list of acronyms.