Copper River
Regional Energy Plan
Phase II : Stakeholder Engagement

June 2015

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ACKNOWLEDGMENTS

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

Ahtna, Incorporated: *Joe Bovee. Bruce Cain, John Fillman*

Alaska Community Development Corporation: *Pat Shiflea*

Alaska Department of Commerce, Community, and Economic Development, Division of Community and Regional Affairs: *Jake Hamburg*

Alaska Department of Natural Resources, Division of Forestry: *Gary Mullen*

Alaska Energy Authority: *Sara Fisher-Goad, Alan Baldivieso, Katie Conway, Jedediah Drolet, 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 Power and Telephone: *Bob Grimm, Mickey Henton*

Association of Tazlina Residents: *Ben Seifert*

Child Advocacy Center: *Gina Hoke*

Chitina Electric, Inc.: *Martin Finnesand*

Chitina Native Corporation: *Anne Thomas*

Chistochina*: Wilson Justin*

Copper Center Lodge: *Tom Huddleston*

Copper River Basin Regional Housing Authority: *Teri Nutter, Dennis McLaughlin*

Copper River Native Association: *AvaMarie Graybear, Pete Peschang*

Copper River School District: *Michael Johnson, Tim Hands*

Copper Valley Electric: *Robert Wilkinson, John Duhamel, Travis Million, Jamie Matthews*

Crowley Maritime Corporation: *Jerry Lesemann*

Fisher Fuels: *Jordany Sutherland*

Gakona Village Council: *Charlene Nollner, Tim Skiba*

Gulkana Village Council: *Angela Vermillion, Feather Hand, Ray Spears, Sandra Tsinnie*

Hub of Alaska: *James Fields*

Kenny Lake: *Community members*

McCarthy Area Council

Mentasta Tribal Council: *Joeneal Hicks*

Native Village of Kluti-Kaah: *Katherine McConkey, Mark Johns*

Native Village of Tazlina: *Rick Young, Village Council*

Nelchina: *Mary and Jim Odden*

Nelchina/Mendeltna Corporation: *Theresa Noble*

Slana: *Community members*

Southeast Conference: *Robert Venables*

U.S. Department of Energy: *Givey Kochanowski*

Wolf Solar Electric: *Jarrett Humphreys*

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Cover photos (from left): INN Electric Cooperative, National Renewable Energy Laboratory, Wolf Solar Electric, Clickr Bee

Acronyms and Abbreviations

AC	Alternating Current
ACAT	Alaska Center for Appropriate Technology
ACDC	Alaska Community Development Corporation
ACEA	Alaska Commercial Energy Audit (AEA)
ACEP	Alaska Center for Energy and Power (UAF)
ADOLWD	Alaska Deparment of Labor and Workforce Development
AEDG	Alaska Energy Data Gateway (ISER)
AEERLP	Alaska Energy Efficiency Revolving Loan Fund Program (AHFC)
AHFC	Alaska Housing Finance Corporation
AkAES	Alaska Affordable Energy Strategy (AEA)
ALARI	Alaska Local and Regional Infomration (ADOLWD)
ANCSA	Alaska Native Claims Settlement Act
ARIS	Alaska Retrofit Information System (AHFC)
AEA	Alaska Energy Authority
AHFC	Alaska Housing Finance Corporation
ANTHC	Alaska Native Tribal Health Consortium
AP&T	Alaska Power and Telephone
AVTEC	Alaska Vocational Technology Center (ADOLWD)
B/C	Benefit-Cost Ratio
BEES	Alaska Building Energy Efficiency Standard
BTU	British Thermal Unit
CCHRC	Cold Climate Housing Research Center
CRBRHA	Copper River Basin Regional Housing Authority
CRNA	Copper River Native Association
CRSD	Copper River School District
CVEA	Copper Valley Electric Association
DCCED	Alaska Department of Commerce, Community, and Economic Development
DCRA	Alaska DCCED Division of Community and Regional Affairs
DIY	Do It Yourself
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
FERC	Federal Energy Regulatory Commission
ISER	Institute of Social and Economic Research (UAA)
HAARP	High Frequency Active Auroral Research Program
HDD	Heating Degree Days
HER	Home Energy Rebate program (AHFC)
HUD	United States Department of Housing and Urban Development
HVDC	High-Voltage Direct Current
kW	Kilowatt
kWh	Kilowatt hour
kV	Kilovolt
LED	Light-Emitting Diode
LMI	Low and Moderate Income (HUD)
LNG	Liquified Natural Gas
LSR	Light Straight Run (a light naptha fuel)
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
O&M	Operations and maintenance
PCE	Power Cost Equalization
P/V	Photovoltaic
REAP	Rural Energy for America (USDA)
RE Fund	Renewable Energy Fund (AEA)
RPSU	Rural Power System Upgrade (AEA)
SCADA	Supervisory Control and Data Acquisition
UAA	University of Alaska Anchorage
UAF	University of Alaska Fairbanks
ULSD	Ultra Low Sulfur Diesel
USDA	United States Department of Agriculture
VEEP	Village Energy Efficiency Program (AEA)

EXECUTIVE SUMMARY

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

This document summarizes public input received in Phase II. The goal of this phase has been to engage community 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 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 Copper River 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.

During Phase I, stakeholders working with the Copper Valley Development Association recommended four regional strategies for developing the region's resources to meet energy needs. These strategies have been used throughout Phase II as an organizing framework when talking about energy projects and priorities:

- **Energy Efficiency**: Initiate additional energy efficiency projects to reduce the consumption of energy in homes, businesses, organizations and public facilities.
- **Reconnaissance/Feasibility**: Conduct or update studies to identify energy resources and assess their technical and economic feasibility.
- **Resource Development**: Develop projects that are sustainable, economic and technically feasible—biomass, hydro, LNG, wind, solar, human capacity, etc.
- **Transmission Interties**: Connect the region to the Railbelt intertie to reduce electricity costs. Continue to improve the regional grid as resources are developed and opportunities occur.

Phase II Stakeholder Engagement and Public Input

In Phase 2, we spoke with regional stakeholders, community leaders and residents about energy projects and priorities with the potential to advance the broad strategies outlined in Phase I. Outreach activities included community site visits, Stakeholder Advisory Group meetings, additional stakeholder interviews, and a regional Energy Summit in Glennallen on March 7, 2015. During these activities, we listened for common themes that unite the region, as well as for instances where energy needs or priorities differ. Based on this input, the planning team developed the following list of projects and activities designed to meet regional energy goals.

Table 1: Proposed Regional Energy Roadmap

Strategy	Resource	Actions
Short Term		
Energy Efficiency	Energy Efficiency	Establish EE working group to share information, do public education and outreach, offer DIY trainings and workshops, coordinate energy audits, assist with AERRLP loan applications, and consider bulk assessment and purchase of street lights, LEDs, or other materials
		Address barriers to participation in residential EE&C programs including up-front funding of recommended weatherization, audits and retrofits
		Complete recommended retrofits from commercial and public facility 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-builds in the area
Reconnaissance and Feasibility	Oil and Gas	Support Ahtna's natural gas exploration efforts in Tolsona
	Wind	Support community-led 2+ year wind studies, erect 50-m permanent meteorological (met) tower with updated data loggers on Willow Mountain for correlation with other sites and studies, complete AP&T's Chisana Mountain Wind study on the road to Tetlin
		Collect high-quality electrical load data in order to understand power/energy uses and better model wind turbine options in the future.
Resource Development	Hydro	Move Fivemile Creek and Yerrick Creek projects into development
	Biomass	Design and construct biomass district heat projects in Tazlina and Gakona
		Address long-term, regional biomass supply issues by: supporting the completion of Gulkana pellet/briquette mill; taking advantage of fire fuel reductions program in Mentasta, Tazlina and other communities; find method to recover the moose browse enhancement residue; improve access to firewood on state and BLM lands; and continue to improve, support and monitor the regional biomass industry
		Resume Biomass Working Group meetings with focus on supply issues, operations and maintenance, in addition to remaining project development
	Solar	Continue to develop solar P/V and solar thermal projects where economically feasible, especially in off-grid areas and in facilities with high summer energy use

Strategy	Resource	Actions
		Assess interest in a regional solar power network or club to share information and experiences, host workshops, exchange technical support, and consider bulk purchase opportunities
Transmission	Transmission	Document technical issues related to connecting regional electrical grids as a foundation for future discussions.
Workforce Development	Workforce Development	Create partnerships among regional entities to assess skilled labor needs and build capacity for performing energy projects including resource development, operations and maintenance, and energy efficiency.
Medium Term		**Continuation of short-term activities plus…**
Energy Efficiency	Oil and Gas	Maximize heat recovery where economically feasible
Reconnaissance and Feasibility	Oil and Gas	Pursue LNG infrastructure buildout demonstration project, incorporating lessons learned from Fairbanks LNG expansion
Transmission	Transmission	Upgrade transmission infrastructure through planned maintenance and investment to improve reliability and standardization
		Expand access to three-phase power where economically and technically feasible
		Assess options for using HAARP facility to help meet energy generation and distribution needs in the region
Long Term		**Continuation of short and medium-term activities plus…**
Reconnaissance and Feasibility	Hydro	Reassess feasibility of large-scale Tiekel River hydro project to provide year-round renewable energy, given current loads and technology
	Wind	Continue to look for opportunities to develop a megawatt-scale wind project within the region
Transmission	Transmission	Connect utility grids through transmission interties (Sutton, Delta, Tok) to help reduce and levelize energy cost throughout the region, improve reliability and redundancy, and increase opportunities for renewable energy and economic development
Ongoing		
Monitor Technology Development and Funding Opportunities, Advocate for New Resource Development where Feasible	Reconnaissance and Feasibility	Low-temp geothermal
		Heat pumps (especially if new hydro projects bring electric rates down)
	Resource Development	Expansion of LNG supply and distribution systems
		Access to firewood on state forest and BLM lands
	Transmission	Expansion of railbelt power grid. Monitor railbelt ISO discussions.
	Transportation	Completion of Glenn Highway improvements to reduce driving time and transportation costs to Anchorage
	Regional Energy Plan	Continue to prioritize the regional energy planning effort and SAG meetings to keep energy planning, and project analysis at forefront of the region's priorities and increase leverage when seeking funding.

1 | Regional Energy Planning

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

This document summarizes public input received in Phase II. The goal of this phase has been to engage community 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 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 Copper River 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 Copper River region, implementation will likely involve working groups for each of the key regional strategies identified with AEA providing support through its Community Assistance program.

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

Beyond the Current Planning Process

Although the state's Regional Energy Planning project will close in 2015, each regional plan is intended to continue as a living document and be updated as projects are implemented and circumstances change. To this end, a goal of the statewide project has been to develop regional capacity to continue the planning process. In the Copper River region, where there are few government structures, working groups are envisioned as key elements 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).

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 the Ahtna Alaska Native Corporation boundaries (red border in Figure 2) established under the Alaska Native Claims Settlement Act (ANCSA) with the exception of Cantwell, which is included in the Railbelt energy planning region. This area represents the Copper River portion of AEA's Copper River/Chugach energy planning region (light green fill in the inset map).

Figure 2: Ahtna boundary (red) and AEA Energy Planning area (inset, light green fill)

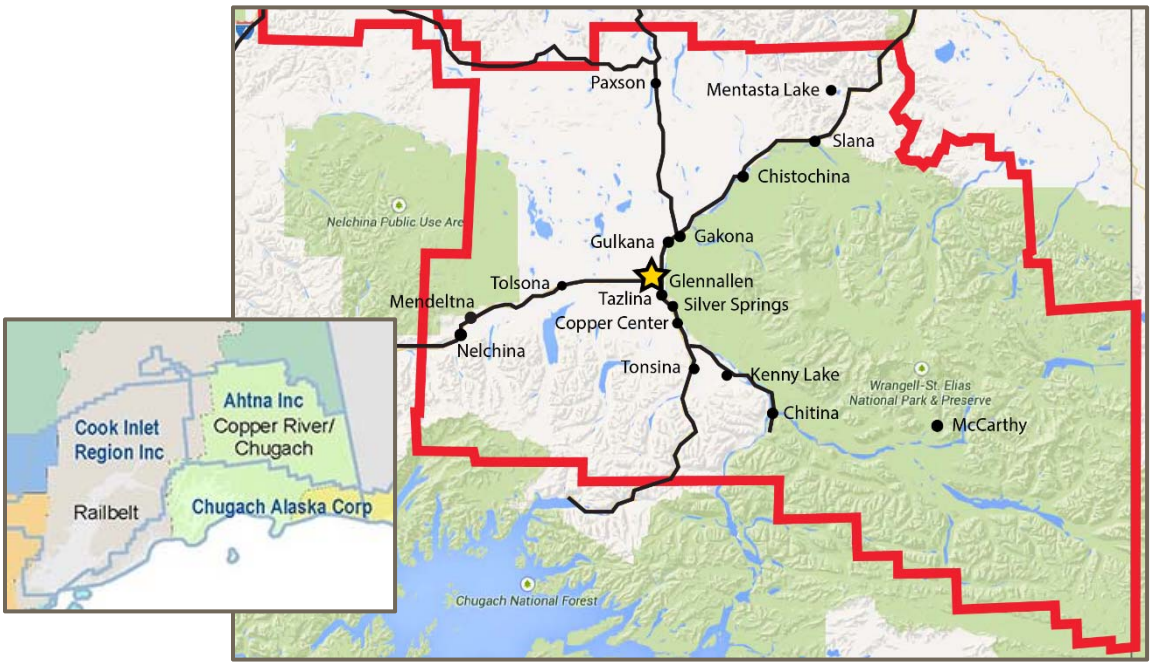


Table 2: Copper River regional boundaries and legislative districts

AEA Energy Planning	ANCSA Region	Borough	Census Area	REAA	Legislative Districts	
Copper River/ Chugach	Ahtna, Incorporated	Unorganized	Valdez-Cordova	Copper River School District	6C Eielson, Denali, Upper Yukon, Border Region	9E Richardson Highway, East Mat-Su

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.
- Comparatively few households in the Ahtna region have taken advantage of these programs to date and relatively few commercial and public facility energy upgrades have been performed in the region. As a result, there is still a lot of opportunity in this area.
- Even without state funding, many 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 638

compactors). Utilities may be able to partner with tribally affiliated entities to leverage these federal funds. To date, no communities in the region have participated in the DOE-IE START program, a competitive technical assistance program that provides three to five years of assistance in energy planning and project development. Every tribe is also eligible for up to 40 hours per year of technical assistance from DOE in a non-competitive program in which the clock restarts each year.

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 Copper River Basin, there are many unifying ideas, which was clear in conversations with regional and community representatives for this project. The creation of 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 working groups in the region. At the end of the project, working groups will need to be self-sustaining or find support from regional partners or entities. Broad goals and objectives for working groups include:

- Bring energy champions together from across the region.
- 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, including youth.
- Keep a clear focus on regional energy goals and priorities.
- Look for ways stakeholders can support the long-term sustainability of energy working groups and regional energy planning.

Based on level of interest and energy-savings opportunity, the two working groups recommended for this region are an Energy Efficiency Working Group and a revived Biomass Working Group.

Pay Attention to Factors for Success

Energy planning and project development are slow and iterative processes. A spirit of optimism is useful for keeping everyone focused on the goal, but it should not prevent clear-eyed vetting of proposed projects in which risks are analyzed as well as benefits. The following lessons learned about developing successful energy projects came from regional energy planners and project developers at the 2013 Alaska Rural Energy Conference (Table 3).

Table 3: Factors for successful energy projects

TO BE SUCCESSFUL…

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

2 | Energy Supply and Demand

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

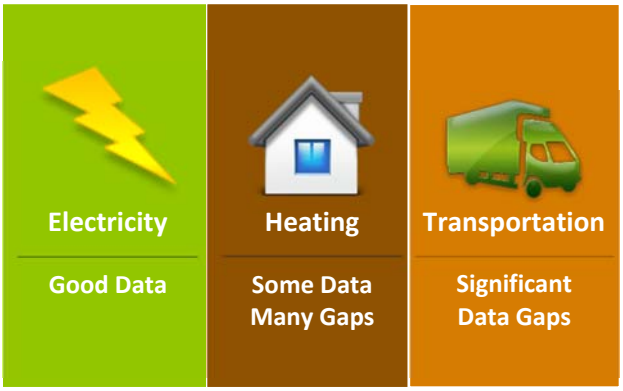


Figure 3: Data availability by energy sector

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

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

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

Power Producers and Rates

Copper Valley Electrical Association

Copper Valley Electric (CVEA) is a nonprofit, member cooperative that supplies electricity for most communities in the region. In 2014, CVEA sold 21.6 MWh of electricity in the region, about 93 percent of total regional sales (Figure 4).

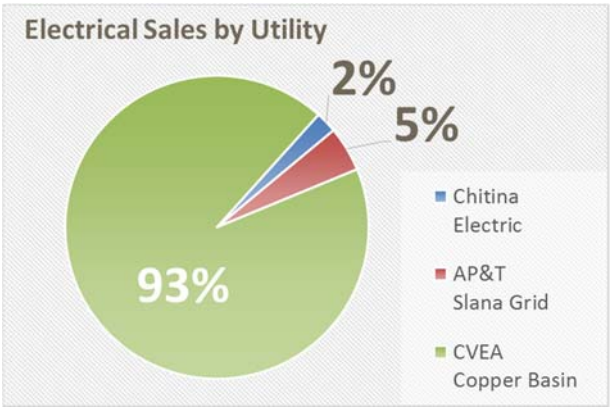


Figure 4: 2014 electrical sales by utility

Over half the electricity produced by CVEA is hydropower generated at the Solomon Gulch hydro plant (formerly part of the state-owned Four Dam Pool) in Valdez. When its Allison Creek project comes online in 2016, hydro generation will increase by 14 percent. Both are run-of-river projects that operate only during ice-free months (May to November). Power is produced in winter at diesel plants in Glennallen and Valdez, and at a cogeneration (cogen) facility at the Petro Star Refinery in Valdez. The cogen facility produces power from Light Straight Run (LSR), a naphtha-like fuel produced in the refinery's distillation tower and which is burned exclusively in the turbine.

CVEA customers are connected by a 106-mile, 138-kilovolt transmission line (see service area map in Appendix C). The transmission line is at risk to avalanches where it crosses Thompson

Pass, and it has suffered extensive damage six times since 1988 (CVEA Transmission Line in the Line of Fire, 2010). Three-phase power is available to customers in downtown Glennallen and up the Tok Cutoff to the HAARP facility at Mile 12 near Gakona. Single phase power is available to customers elsewhere in the rest of the region.

Alaska Power & Telephone

Alaska Power & Telephone (AP&T) provides power to customers along 60 miles of the Tok Cutoff from Chistochina to Mentasta Lake. Power is generated at diesel plants at Chistochina and Slana. (The Slana plant is being rebuilt following an October 2013 fire. The new module is expected to be complete in 2015 and will include new gensets and related equipment, including heat recovery that will serve the Slana school.) AP&T's transmission line in the region starts 28 miles from its Tok grid in the north and ends 21 miles shy of the CVEA grid in the south. (The Slana grid is a small piece of AP&T's statewide operations, which power 21 other rural communities in the Interior and Southeast Alaska from diesel and hydroelectric plants.) In 2014, AP&T generated and sold 1,114 MWh from its diesel plants in the Copper River Basin, accounting for 5 percent of regional electric sales (Alaska Power & Telephone, 2015).

Chitina Electric, Inc.

Chitina Electric, Inc. is a subsidiary of the Chitina Native Corporation. The utility provides power to the Native Village of Chitina from a locally operated diesel power plant. The service area spans a 5-mile radius and is separated from the CVEA grid by 15 miles. In FY 2013, Chitina Electric sold 531 MWh of diesel power, about 2 percent of total electric sales in the region.

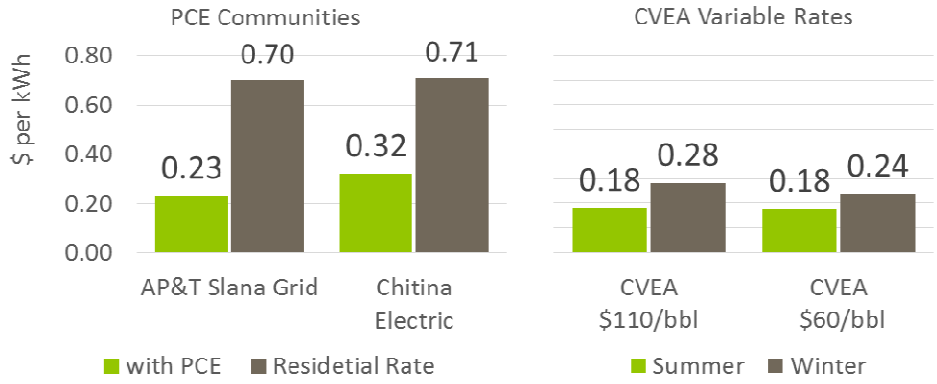
Self-Generation

Many Copper River residents live off-grid by choice or because there is no commercial service in their area. Most off-grid households generate their own electricity with generators, solar panels, batteries and, to a lesser extent, small wind turbines. Communities not served by an electrical utility include McCarthy and Paxson. The McCarthy and Nabesna Roads and portions of the Edgerton, Glenn, and Richardson Highways as well as Tok Cutoff are also without commercial power.

Electric Rates

Electric rates vary considerably across the region from $0.18/kWh on CVEA's grid in summer (when hydropower is produced) to $0.70 to $0.71/kWh in Chitina and the Slana grid after the first 500 kWh of monthly residential use (Figure 5). For comparison, rates were $0.15/kWh in Anchorage and $0.18/kWh in Fairbanks in March 2015.

Figure 5: Electrical rates by utility, 2014



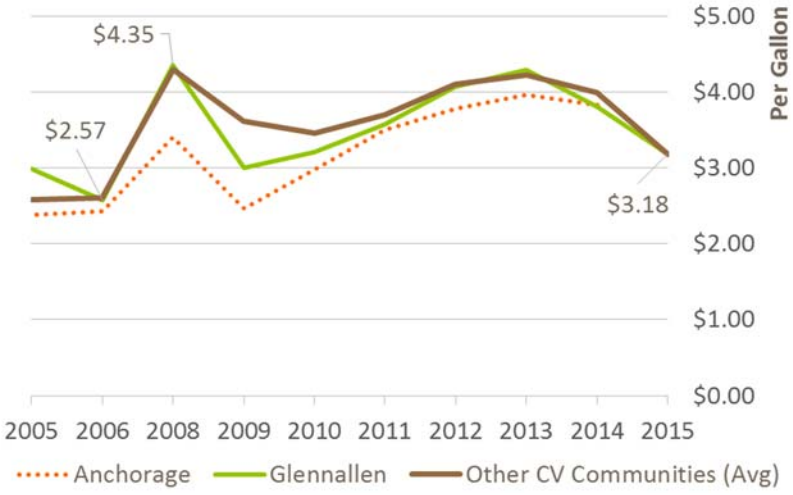
Fuel Vendors and Prices

Home heating oil, unleaded gas, and other petroleum products are available from three vendors in the region. Fisher's Fuel and Crowley have bulk storage and distribution points in Glennallen and deliver fuel by truck throughout the region. (No fee is charged for delivery within vendors' service areas.) Gulkana Fuel delivers home heating oil within the Gulkana area and sells jet fuel at the Gulkana Airport. Most fuel comes into the region from Anchorage, though Crowley occasionally sources fuel from Valdez or North Pole.

Fuel Prices

Looking at the price of #1 heating oil, there has been less variation in prices between communities in the region since 2010, and less of a difference between Anchorage fuel prices and those in Glennallen, compared with the previous five years (Figure 6). Prices are generally highest in the most remote communities, including McCarthy and Mentasta Lake.

Figure 6: Price of #1 fuel oil



Current and Projected Demand

Over 23.1 GWh of electricity are produced and sold in the region annually (Figure 7). Regionwide, 70 percent of electricity is used by commercial customers and 28 percent by residential customers. Public buildings, other government facilities, and utility use account for the remaining two percent, though there is considerable variation by utility, with residential users accounting for 54 percent of use in communities served by AP&T's Slana grid (Figure 8).

Figure 7: Regional electrical sales by utility and resource, 2014

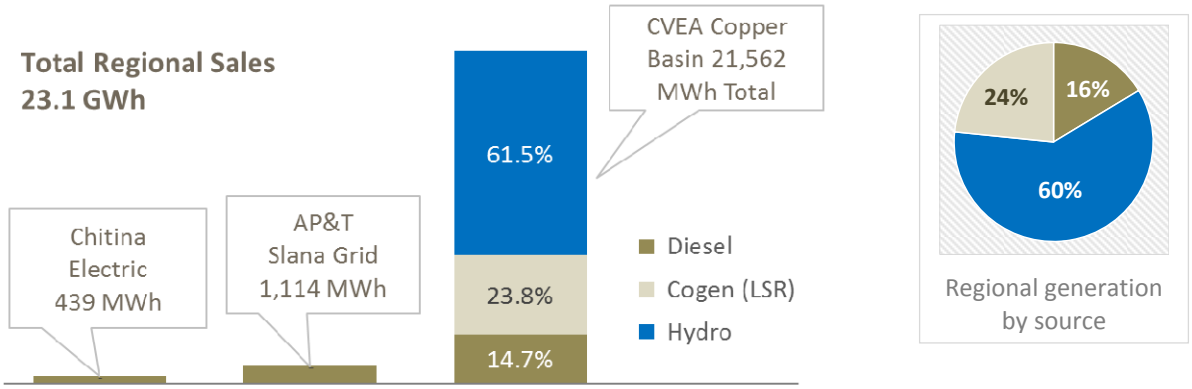
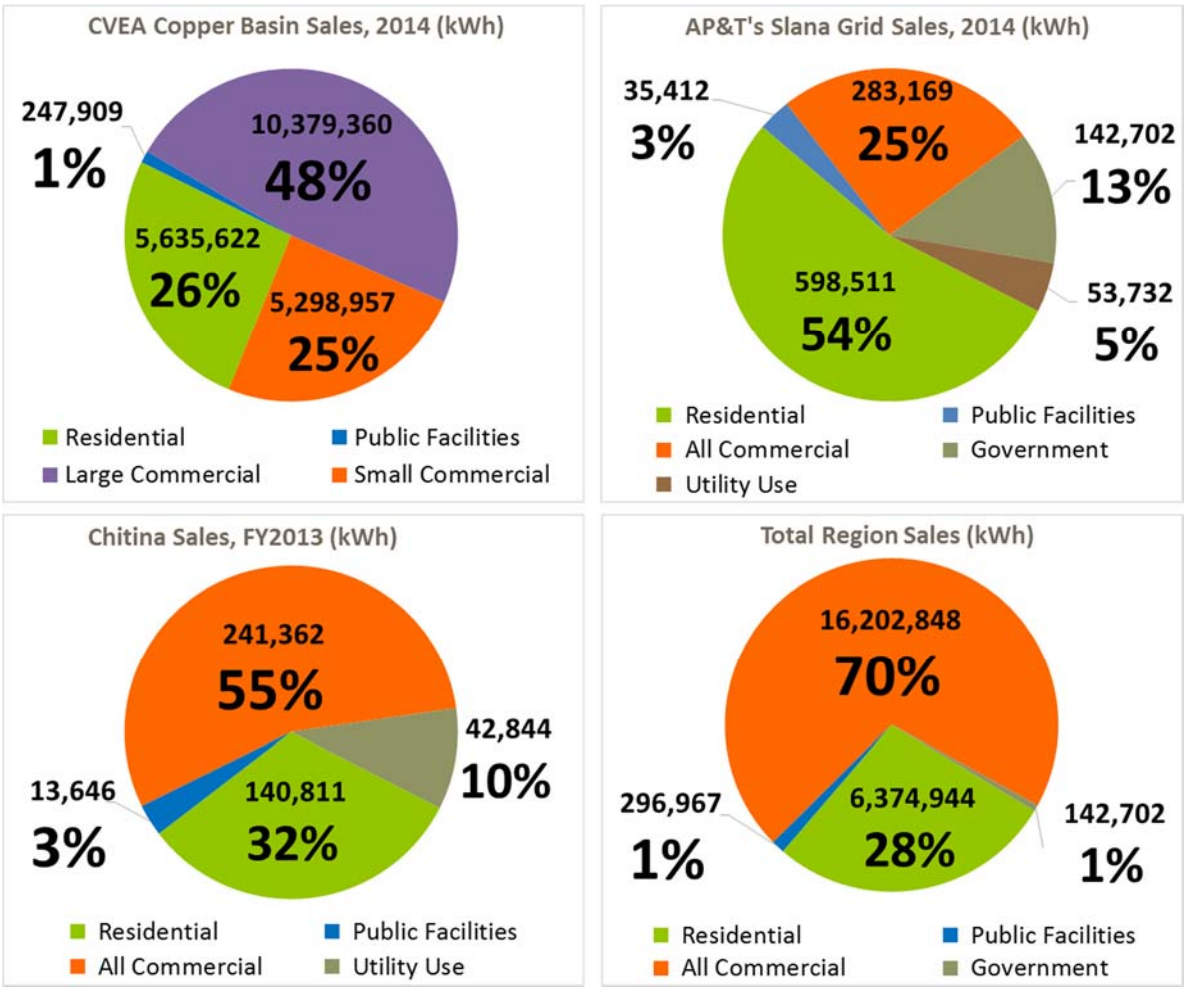


Figure 8: Regional electrical sales by customer type, 2014



Recent Trends in Electrical Use

Overall electrical generation and sales have been relatively flat since 2010, following trends in population (Figure 9). More change is seen in how much electricity customers are using. Except for large commercial accounts, average electrical use has declined over the past 10 years especially in public facilities (-54%) and among residential customers (-18%). This may reflect the impact of higher prices and energy efficiency and conservation incentives (Figure 10).

Figure 9: Regional generation trend by utility vs. population change, 2010-2014

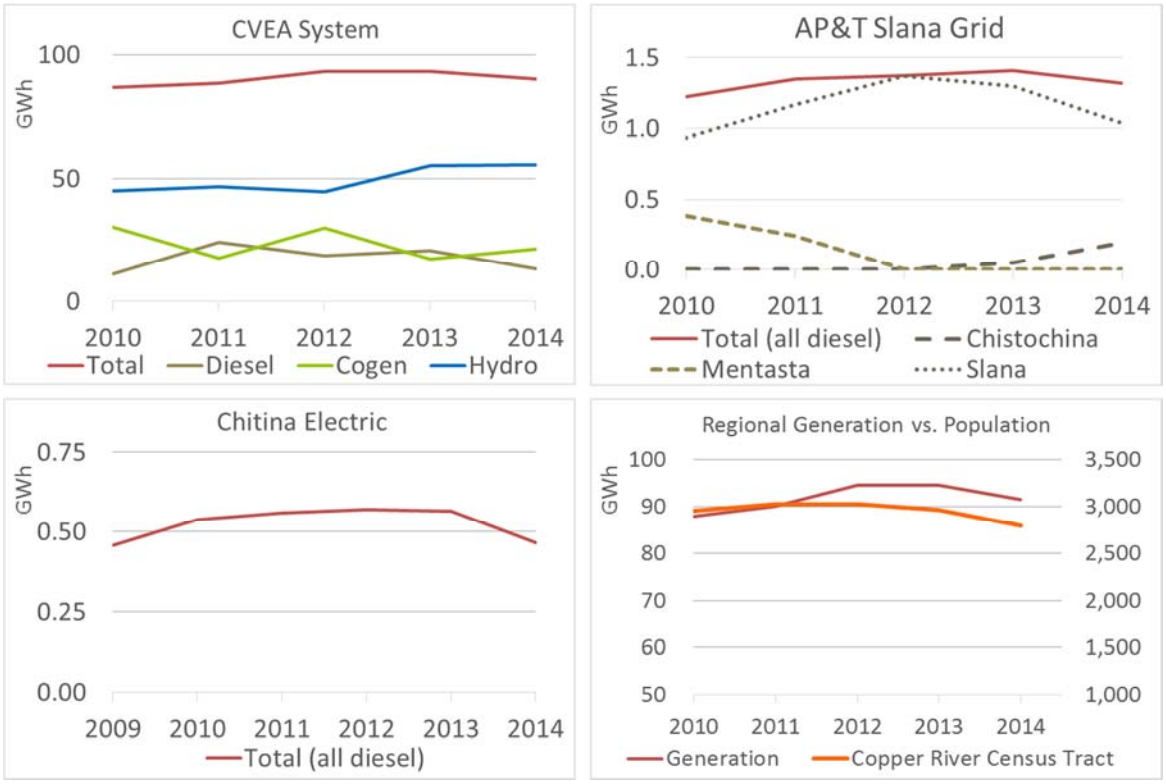
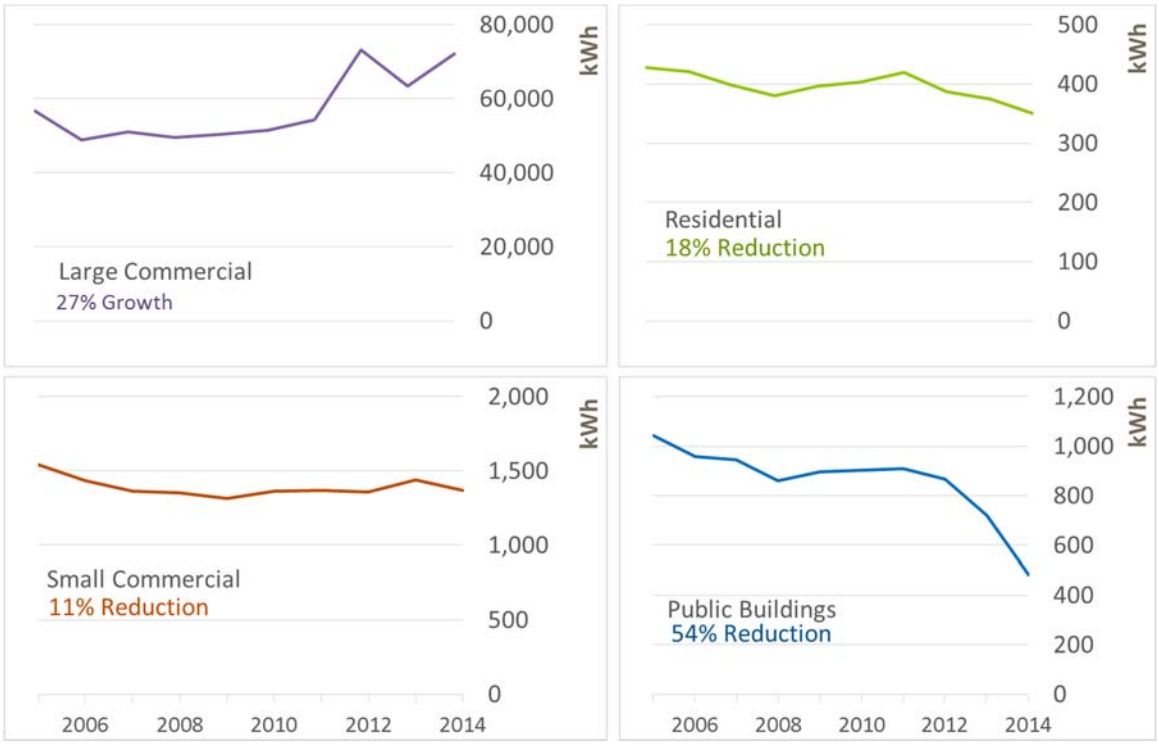


Figure 10: Trends in average monthly use by customer, CVEA Copper Basin 2005-2014



Population Trends and Projections

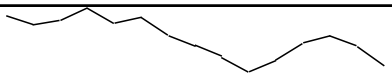
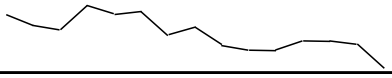
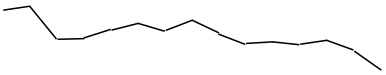
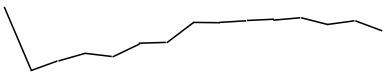
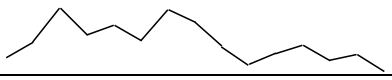
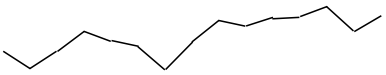
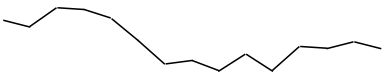
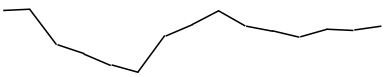
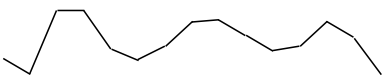
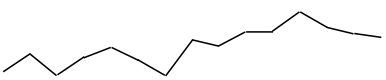
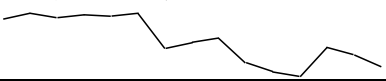
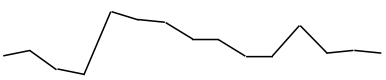
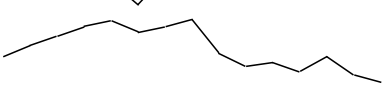
Since 2000, the population in the Copper River Basin has fallen by 13 percent, an average of nearly one percent per year (Figure 11). Areas with the sharpest declines include Nabesna, Paxson, Kenny Lake, Nelchina-Mendeltna, and Copper Center. The communities that have gained population include Gulkana, Slana, Tolsona and Chistochina. Alaska's state demographers predict the region's population will continue to decline over the next several decades through outmigration. The 25-year projection for the Valdez-Cordova Census Area is an 8.8 percent decrease, for a loss of just over 850 people across the census area (ADOLWD, 2014).

Load Forecasts

CVEA reports that the number of large commercial (industrial) customers in the Copper River Basin has dropped by over one-third in the past 10 years. Other customer classes have shown modest increases, but both trends have been offset by changes in average customer use (Figure 10). The net result is that overall kWh sales for CVEA's Copper River sector have declined by 16 percent since 2005. AP&T has lost several large customers on its Slana grid and overall kWh sales have declined by almost 9 percent since 2010.

Combined with recent trends in electrical sales and the overall economic outlook in the state, it is likely that electrical loads will continue to fall or remain flat unless large new industrial users enter the market. Once CVEA's Allison Creek Hydro project comes online in 2016, the utility expects to have excess generation capacity from May to November at current load sizes. The utility is actively looking for new users.

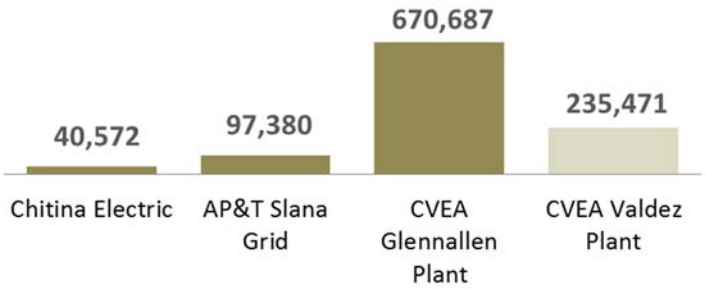
Figure 11: Historical population trends by community, 2000-2014

Population	2000 Census		2014 Est.	Change Since 2000	Avg. Annual Growth
Valdez-Cordova CA	**10,195**		**9,567**	**-6.2%**	**-0.4%**
Copper River Basin	**2,923**		**2,537**	**-13.2%**	**-0.9%**
201 to 500					
Glennallen	**554**		**473**	-14.6%	**-1.0%**
Kenny Lake	**410**		**307**	-25.1%	**-1.7%**
Copper Center	**362**		**283**	-21.8%	**-1.5%**
Tazlina	**328**		**270**	-17.7%	**-1.2%**
Gakona	**215**		**205**	-4.7%	**-0.3%**
100 to 200					
Slana	**124**		**149**	20.2%	**1.3%**
Mentasta Lake	**142**		**125**	-12.0%	**-0.8%**
Silver Springs	**130**		**117**	-10.0%	**-0.7%**
Chitina	**123**		**116**	-5.7%	**-0.4%**
Gulkana	**88**		**114**	29.5%	**2.0%**
Nelchina-Mendeltna	**134**		**102**	-23.9%	**-1.6%**
Under 100					
Chistochina	**93**		**94**	1.1%	**0.1%**
Tonsina	**92**		**85**	-7.6%	**-0.5%**
Under 50					
McCarthy	**42**		**34**	-19.0%	**-1.3%**
Tolsona	**27**		**32**	18.5%	**1.2%**
Paxson	**43**		**29**	-32.6%	**-2.2%**
Nabesna	**16**		**2**	-87.5%	**-5.8%**

Fuel for Electrical Generation

Over 800,000 gallons of diesel fuel are used per year to generate electricity in the Copper River region. With CVEA's Valdez plant, the total is 1.04 million gallons (Figure 12). This number is expected to decrease with improvements in diesel efficiency resulting from generator upgrades currently in progress or planned.

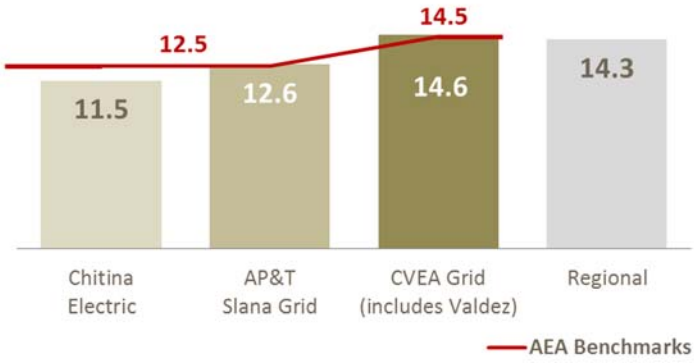
Figure 12: Diesel fuel used for electrical generation, 2014



Diesel Efficiency

Diesel efficiency in the region currently ranges from 11.5 to 14.6 kWh per gallon (Figure 13). The red line showing AEA's benchmark performance targets for small and large systems indicates that diesel efficiency in the region is already within acceptable ranges. The power plant at Slana is in the process of being upgraded following the 2013 fire. CVEA plans to replace its older generators in Valdez with newer, more reliable generators in 2016 that are nearly twice as efficient. The Glennallen plant has already received a similar upgrade, and the powerhouse at Chitina was upgraded in 2011 through AEA's Rural Power System Upgrade program.

Figure 13: Diesel efficiency, 2014



A 10 percent increase in diesel efficiency in Slana would reduce fuel consumption by about 9,000 gallons of fuel annually, a savings of about $0.03/kWh in avoided fuel costs. A 10 percent increase in diesel efficiency across the region would save 95,000 gallons of fuel or about $337,000 in avoided fuel costs annually at 2014 prices.

Transportation and Heating Fuel

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

RENEWABLE ENERGY

Renewable resources currently used to meet energy needs in the region include hydropower for electricity and wood biomass for space heating. In addition, an increasing number of Copper River residents living off-grid have domestic or small-scale commercial solar P/V and solar thermal systems. While several wind studies have been conducted in the region in recent years, no projects have yet been recommended for development though additional reconnaissance is planned. (For information on the potential for other renewable resources, see Table 15.)

Biomass

Four communities received Renewable Energy Fund grants to construct community biomass projects and a fifth was recommended for funding in Round 8. As of 2014, at least eight communities in the region have taken advantage of free Alaska Wood Energy Development Task Group grants to complete pre-feasibility assessments of local wood biomass resources. Residents throughout the region use wood as a primary or secondary source of home heating.

The district heating loop in Gulkana, which has been in operation the longest, reduced diesel consumption in the community by 35,000 gallons, at an estimated savings of $117,000 (Alaska Energy Authority, 2015). Currently, all of the slash/debris used in the two Garn boilers is supplied by the community's Fire Fuel and Native American Lands Environmental Mitigation Program (NALEMP) programs. Pellets are currently purchased to fuel the Tarn pellet boiler, which provides back-up and overnight heat. A pellet mill is under construction in Gulkana, but may need additional funds for completion. Biomass projects in Kenny Lake and Mentasta Lake became operational in 2015.

Table 4: Commercial-scale Wood biomass heating projects completed or in development

Status	Community	Fuel	Project Description
Operational	Gulkana	Cordwood Pellets	District heating loop: 9 buildings with GARN boilers and pellet boiler backup. Cordwood comes from fire mitigation program.
	Kenny Lake	Pellets	Pellet boiler installed in school
	Mentasta Lake	Wood Chips	District heating loop: 5 community buildings with Portage and Main Chip Boiler
Design & Construction	Chistochina	Pellets	District heating loop: 5 buildings
	Gulkana		Pellet & briquette mill
Feasibility	Tazlina		Feasibility complete for district heating loop to heat 3 community buildings, a garage and potentially a greenhouse. The project was recommended for design and construction in RE Fund Round 8.
Reconnaissance	Gakona		Pre-feasibility complete for a biomass project to heat the multi-purpose building. The tribe would like to look at feasibility of a district heating project that includes some housing.
	Copper Center, Glennallen		Pre-feasibility assessment completed

Hydroelectric

About 60 percent of the electricity currently sold in the region is produced at CVEA's 12 MW Solomon Gulch hydroelectric plant in Valdez. CVEA is completing construction on a second run-of-river project at Allison Creek, also in Valdez, which will add 6 MW of hydro capacity. Given the current hydroelectric technology and development costs, AEA believes that most of the economically and technically feasible sites have been identified. Porcupine Creek, near Slana, may have potential, though reconnaissance is needed.

Table 5: Hydroelectric projects in or adjacent to the Copper River region

CVEA	AP&T	Chitina Electric
Operational		
Solomon Gulch 12 MW Run of River Valdez. (Formerly Four Dam Pool)		
Under Construction		
Allison Creek 6 MW Run of River Valdez. Expected completion 2016		
Feasibility & Design		
	Yerrick Creek 1.5 MW Run of River. Tanacross land. Would serve Tok grid. Recommended for partial construction funding in Round 8. Upper Tanana Energy is project lead. No timeframe for completion.	**Fivemile Creek** 300 kW Run of River. Near Chitina. 65% design and majority of permitting complete. Excess electricity in much of the year could be used for space heating.
	Clearwater Creek 1 MW Run of River. Tok. Potential to supply 3.4 GW/year to Tok grid	
Previously Considered		
Tiekel River Mile 45.5 Richardson Hwy. Long-term option for year-round power. High development cost, high dam required.	**Carlson Creek** Near Slana. Not feasible based on preliminary study.	
Silver Lake (15 MW) South of Valdez in Chugach National Forest. Long transmission lines, environmental concerns.		

Solar

Solar is economically marginal in Alaska compared with other renewable technologies. However, less expensive solar panels, federal and state tax credits, and net metering programs where available, have combined to shorten the payback period for solar projects, especially in communities where electric rates are highest, customers pay non-PCE rates or utility lines do not reach.

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. CVEA provides net metering, but the utility has announced it will discontinue it when Allison Creek hydro comes online, which will create excess capacity in the system during the summer. CVEA is not regulated by the RCA.

Many residents in the region have installed small (1 kW or less) solar photovoltaic (P/V) systems to power off-grid cabins and homes. The few larger systems include a 6 kW grid-connected system in Tazlina and a 3.4 kW combined wind and solar off-grid system at the Tiekel River Lodge.

Several new, commercial-scale solar P/V projects are planned or underway in the region (Table 6). Dataloggers monitored by Wolf Solar Electric in Tok have shown that Eastern and Interior Alaska have the highest average solar radiation levels in the state.

Table 6: Commercial-scale solar energy projects planned or in progress

Community	Under Construction	Scheduled or in Planning
Glennallen	**Hub of Alaska gas station** 25 kW solar P/V system. A flat screen TV in the store will display results from the datalogger. Expected completion summer 2015.	**Ahtna, Inc. Corporate Headquarters** Ahtna is considering a solar P/V project to further reduce its electrical costs now that it has reduced its electrical load through lighting upgrades and other EE&C measures.
McCarthy		**McCarthy Mine NPS Site** The National Park Service plans to erect a solar P/V array at the McCarthy mine, which is currently powered by generators and a battery system. Installation planned for summer 2015.

There are few residential solar thermal systems installed in the region. Using solar thermal technologies to reduce heating costs may be more economic than using solar P/V to reduce electric costs, however these systems are significantly more complex to set up and maintain than solar P/V arrays, making the lack of trained and knowledgeable operators in the region a potential barrier.

Wind

While there are currently no wind energy projects operating in the region, AEA wind program analysts believe that the region's location on the road system means that a utility-scale project could be economically feasible if a good wind site is found near existing power lines.

CVEA purchased two 50-m meteorological (met) towers and tested three potential sites, but failed to find a good resource. It decommissioned the towers in 2014 and is not pursing wind in its service area.

Table 7: Wind projects in or adjacent to the Copper River region

CVEA	AP&T	Chitina Electric	Other
Operational			
None			
Design and Construction			
None			
Reconnaissance & Feasibility			
	Chisana Mountain Feasibility Study On road to Tetlin. Would connect to Tok grid. **7-mile Wind Study** Near Tok. May not be economic due to distance from power lines. Would connect to Tok grid.	**Cannon Hill** Confluence of Chitina and Copper Rivers on village corporation lands. 12 months of data are needed to assess winter wind viability. A wind project would be harder to integrate into Chitina's grid than hydro.	**Willow Mountain** Ahtna is seeking funding to erect 50 m met tower on a site on Ahtna land near Willow Mountain to assess potential for utility-scale project and help correlate wind model data in the region.
Previously Considered			
10-mi. Richardson (2011) Not suitable for commercial project due to intermittent winds and high turbulence. **Tolsona Ridge (2012).** 20 miles west of Glennallen on the Glenn Hwy. **Gakona Bluffs (2013).** 2 mi. north of Tok Cutoff Junction.			

ENERGY EFFICIENCY & CONSERVATION

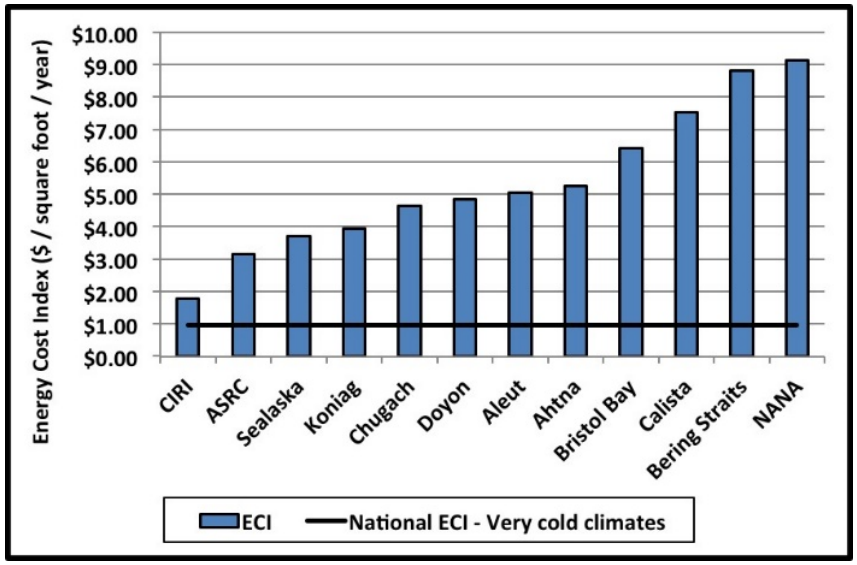
Housing Stock

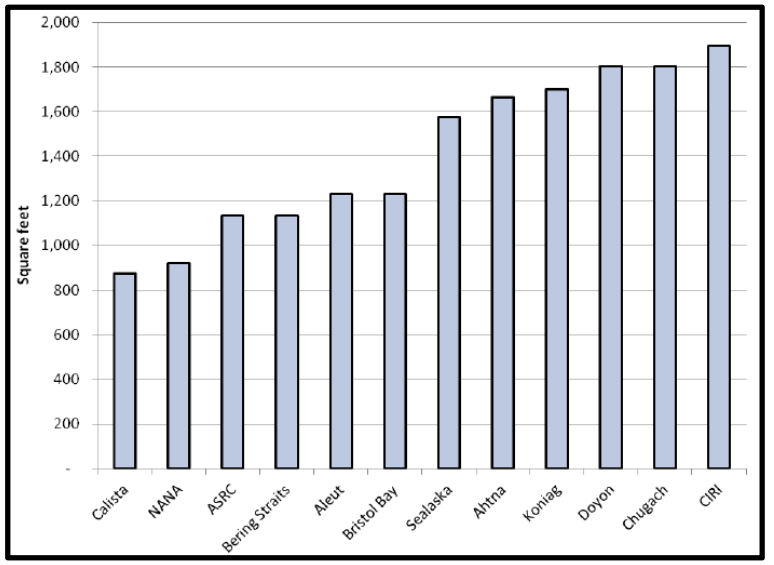
The 2014 Alaska Housing Assessment by the Cold Climate Housing Research Center profiled the housing stock in the Ahtna region (including the community of Cantwell):

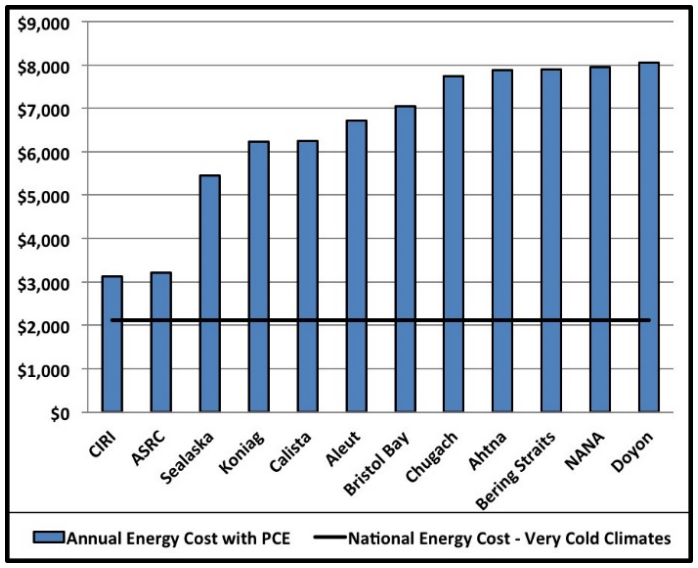
- **Energy Use**: The average home in the region is 1,664 square feet and uses 164,000 BTUs of energy per square foot annually (19% more than the state average). About three-quarters (76%) is used for space heating, 11 percent for hot water, and 13 percent for electricity.
- **Energy Cost**: The average annual energy cost for homes in the Ahtna region is $7,800, approximately 2.8 times more than the cost in Anchorage, and 3.7 times more than the national average. The average annual energy costs constitute approximately 15% of census median area income for occupied housing. Approximately 20 percent of households spend 30 percent or more of their income on housing costs, including rent, water and sewer, and energy costs.
- **Housing Quality**: Within current housing stock, newer homes have better energy performance. On average, homes built in the 1960s are currently rated at 2-stars, compared to a current average rating of 3-stars for homes built after 2000.
- **Air-tightness**: Within current housing stock, newer homes are tighter. On average, homes built in the last decade meet the 2009 BEES standard of 7 air-changes per hour at 50 Pascals. In contrast, homes built in the 1960s are 2.4 times leakier than those built since 2000. About 61 percent of occupied housing are relatively air-tight, but lack a continuous ventilation system, putting these home at higher risk for indoor moisture- and air-quality issues.

Compared with other regions of the state, average annual home energy costs in the Ahtna region are the fourth highest overall and the fifth highest per square foot (out of 12 ANCSA regions). The region ranks third lowest in participation in the state energy efficiency programs, including AHFC's Home Energy Rebate (HER) and weatherization programs and the number of new homes achieving BEES-certification for energy efficient standards (Figure 14). This indicates that there is significant additional potential for energy savings through EE&C in the region.

Figure 14: Ahtna region residential energy costs compared with other regions







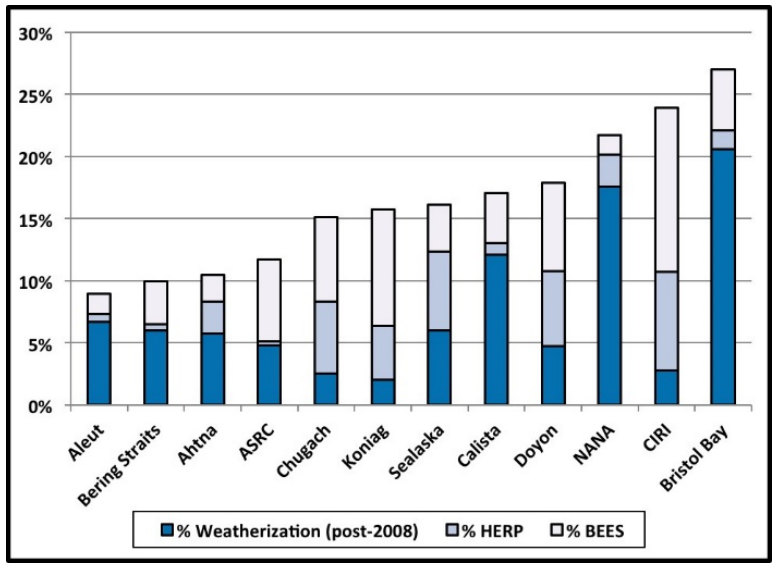


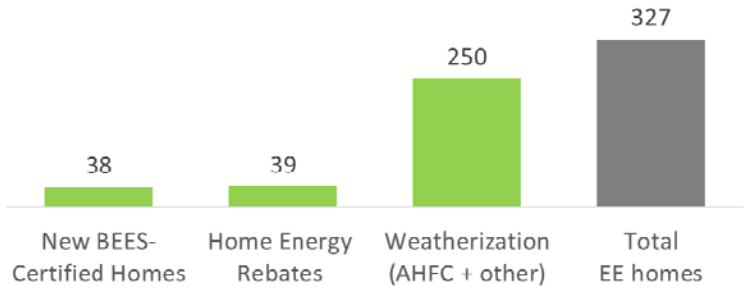
Table 8: Energy characteristics of regional housing stock

Avg. Energy Rating	Avg. House Size	Avg. Annual Energy Use	Avg. Annual Energy Cost	Avg. Energy Use Intensity (EUI)	Avg. Energy Cost Index (ECI)	Avg. Home Heating Index
2-star Plus	1,667 square feet	246 MMBTU	$7,877 (Jan 2013 $)	164 kBTU per square foot	$5.21 per square foot	9.2

Residential EE&C

More than one in four (28%) occupied homes in the region have completed energy upgrades through the Home Energy Rebate program, a low-income weatherization program, or is a newer BEES-certified home (Figure 15). When adding in all homes constructed since 2000, the percent of housing stock assumed to be relatively energy efficient is about 50 percent. Collectively, Copper River residents are saving almost $500,000 per year from residential energy-efficiency upgrades already completed. If all remaining older homes were upgraded, an additional $1.4 million in annual fuel savings could be captured (Table 10).

Figure 15: Energy Efficient Housing Stock



Data sources: (Ord, 2015), (Wiltse, 2014), (Shiflea, 2015), (Nutter, 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 Copper River region about 45 percent of homeowners receiving HER audits have completed upgrades and received rebates.

AHFC's weatherization service provider in the region is the Alaska Community Development Corporation (ACDC). The Copper River Basin Regional Housing Authority (CRBRHA) also weatherizes homes in the region through its NAHASDA Indian Housing Block Grant funds. The investment per home can range from $3,000 to $16,000, but averages $9,280 (ACDC) to $11,000 (CRHRHA). There is no cost to the resident or community for participation in the program. Together the two agencies plan to weatherize an additional 34 homes over the next three years.

The Regional Housing Authority also builds affordable new housing in the region. All of its new homes are BEES-certified and achieve 5-star plus energy ratings. The agency plans to construct 28 new homes in the next few years. The average construction cost is $250,000 per home.

Energy efficiency and weatherization measures completed since 2008 have been saving Copper River households 28% to 35% per year on energy consumption, according to AHFC program data, which translates to over 600 gallons of heating oil per home (Table 9). Most of the energy savings is in home heating, although lighting upgrades result in some electrical savings.

Table 9: Average EE&C savings per household in the Copper River 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	39 rebates + 5 in progress out of 92 audits (45% completion rate)	87.6 MMBTU	28%	629 gallons	$2,829 per year
Weatherization	145 homes	87.4 MMBTU	35%	627 gallons	$2,823 per year

Note: 1/ Fuel savings model assumes all heating is done with fuel oil. It does not include fuel saved in electrical generation due to reduced kWh use. (Ord, 2015).

On a regional basis, residential EE measures account for over 16,000 MMBTU (1 MMBTU = 1 million British Thermal Units) annually in energy savings, nearly 115,500 gallons of heating fuel per year, and $466,250 in avoided fuel costs for the region (Table 10). If the remaining energy inefficient housing stock is upgraded (or in some cases rebuilt), the savings from residential EE&C could save another 49,500 MMBTU per year. This would save another 355,000 gallons of heating oil and over $1.4 million annually in avoided fuel costs. This does not include savings from lighting or appliance upgrades or other measures that reduce electrical use (or the diesel used to generate electricity).

Table 10: Estimated energy savings and potential energy savings from residential EE&C

EE&C Savings Achieved			EE&C Savings Opportunity			
Annual Energy Savings (MMBTU)	Annual Diesel Savings (Gallons)	Annual Fuel Cost Savings ($ millions)	Remaining Residential EE&C Opportunity[1]	Annual Energy Savings[2] (MMBTU)	Annual Diesel Savings[2] (Gallons)	Annual Fuel Cost Savings[2] ($ millions)
16,089	115,522	$ 466,251	50%	49,498	355,397	$ 1,419,493

1/ Assumes all homes built since 2000 are energy efficient. Actual savings opportunity is higher. 2/ 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.

Pubic and Commercial Facilities

NON-RESIDENTIAL BUILDING AUDITS

The savings from energy efficiency and conservation changes in non-residential buildings is also large, though harder to quantify. Public and commercial building owners can typically save 20 percent on energy costs by performing both behavioral changes (like setting back thermostats) and efficiency upgrades identified in energy audits (Table 11). With over 5,000 publicly owned

buildings in Alaska, AHFC estimates the potential statewide annual savings from public buildings alone would exceed $125,000,000 (Waterman, 2015).

The Copper River School District (CRSD) has had all of its schools and the district administration building audited through AHFC's commercial EE&C program. It identified $231,000 in annual savings potential, and to date has made $50,000 in retrofits. The school district is seeking a capital appropriation to complete additional audits.

Another 11 to 12 commercial buildings in the Glennallen area received audits through a Copper Valley Development Association (CVDA) initiative funded with a USDA REAP grant. To date, at least three of the business have completed recommended retrofits. Ahtna has saved $47,000 over two years through LED lighting and upgrades to its boiler system controls at its Glennallen headquarters. The upgrades paid for themselves in less than two years.

AEA's Commercial Building Energy Audit (CBEA) program also funds audits for privately owned buildings. The program will reimburse most or all of the cost of qualifying whole-building energy audits up to a limit based upon the size and type of building. Results from program participants indicate average energy savings of roughly one-third as a result of economic efficiency investments, with average simple paybacks of just over six years. No businesses in the region have received energy audits through the CBEA program.

Table 11: 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

(Waterman, 2014)

COMMUNITY ENERGY EFFICIENCY PROGRAMS

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

In the Copper River region, the tribal governments of Gakona, Gulkana, Kluti Kaah (Copper Center), and Tazlina were the recipients of federal Energy Efficiency Community Block Grants (EECBG) funded through the American Recovery and Reinvestment Act (ARRA) from 2010 to 2012. No communities in the region participated in the state-funded Village Energy Efficiency Program (VEEP) program that continued to fund small community EE&C projects through FY14.

Ahtna Inc. used a portion of the EECBG to fund a regional tribal energy strategy and to hold a regional energy summit. The Native Village of Gakona used its EECBG funds for energy planning and studying the feasibility of a wood boiler system to heat tribal facilities. The Native Village of Tazlina put more energy efficient stoves in homes. Gulkana use its funds to look at the feasibility of using waste heat from boiler system. Kluti Kaah used its EECBG funds for energy upgrades to the community hall.

Water and Sewer

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. Alaska Native Tribal Health Consortium (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).

ANTHC performed energy audits of public facilities in many small communities in Interior, Southwest and Western Alaska as part of its study of energy use in rural Alaska sanitation systems. Table 12 shows average cost and savings by region based on audits of water systems in over 50 rural communities. Gulkana will become the first Copper River community to have ANTHC audit its water and sewer system. Based on the audit, ANTHC will recommend energy efficiency upgrades. The project is expected to be complete in 2016.

Table 12: Potential savings from sanitation system energy efficiency

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

(Dixon, 2014)

Energy Efficient Lighting

INDOOR LIGHTING RETROFITS

Electrical efficiency measures such as lighting retrofits generally have shorter payback periods than other building efficiency measures making them smart investments even without the incentive of grant funding. While communities in the Copper River region may have already funded their own interior lighting upgrades, since no communities in the planning region have done so through the popular EECBG and VEEP programs we assume there remains a significant opportunity in this area for energy efficiency investment and savings.

Table 13: Savings from energy efficient lighting upgrades in 33 small communities

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

Source: Based on VEEP and EECBG-funded lighting upgrades completed through 2013. (Alaska Energy Authority, 2013).

LED STREET LIGHTING

Rural Alaska communities that have replaced street lights with LED lighting are saving an average of $10,000 per year, with an average payback period of 3.7 years. In the Copper River

region, no communities have used EECBG or VEEP grants to do street lighting upgrades. More information is needed on the number and type of street lights in use in the region in order to assess potential savings.

3 | Resource Potential

Phase I of the Regional Energy Planning process included an inventory of all potential energy resources in the Copper River region. In Phase II, a preliminary assessment of resource potential was performed for each community by AEA program managers. 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 energy savings from *additional* project development based on available information. (A resource potential with low certainty has had very little analysis preformed.)

Table 14 shows the results of this assessment for seven energy resources in Copper River communities as well as the potential for savings from energy efficiency measures. A brief description of the criteria used in the analysis is included in Table 15 along with notes on resource potential at the regional level. Appendix B includes more detail and a complete description of criteria.

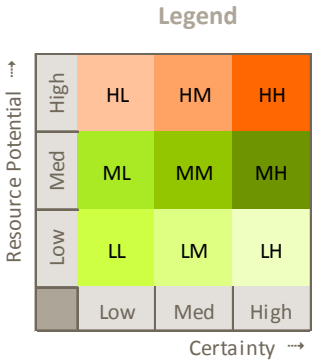


Table 14: Energy resource potential and certainty for community-scale projects

	Chistochina	Chitina	Copper Center	Gakona	Glennallen	Gulkana	Kenny Lake	McCarthy	Mentasta Lake	Nelchina-Mendeltna	Silver Springs	Slana	Tazlina	Tolsona	Tonsina
Hydro	M	H	M	L	L	L	L	H	M	M	L	M	L	L	M
Wind	L	L	L	L	L	L	L	L	L	L	L	L	L	M	L
Biomass	H	M	M	M	M	H	H	M	H	L	L	M	H	L	L
Solar (see Table 15)	L	L	L	L	L	L	L	L	L	L	L	L	L	L	L
Geothermal	L	L	L	L	L	L	L	L	L	L	L	L	L	L	L
Oil and Gas	M	M	M	M	M	M	M	M	M	M	M	M	M	M	M
Coal	L	L	L	L	L	L	L	L	L	L	L	L	L	L	L
Emerging Technology	L	L	L	L	L	L	L	L	L	L	L	L	L	L	L
Heat Recovery	L	M	L	L	H	L	L	L	L	L	L	L	L	L	L
Residential Energy Efficiency (EE)	H	H	M	H	H	M	H	H	H	H	H	H	H	H	H
Commercial /Public Buildingg EE	H	H	H	H	H	H	H	H	H	H	H	H	H	H	H

Notes: Letters refer to resource potential: High (H), Medium (M), Low (L). Resources are rated based on the potential for *new, community-scale projects*. Low certainty generally signifies that no reconnaissance or other resource assessment has been performed. See Table 15 for more explanation.

Table 15: Notes on regional resource potential

Resource	Primary Criteria	Regional Potential
Renewable Resources		
Biomass	Medium or highly productive forest nearby, B/C ratio > 1.5 (H) or 1.0 to 1.5 (M) based on study or rough analysis.	The potential for energy savings from biomass heating is medium to high in most of the region. One to three million acres of woody biomass have been estimated in the Copper River Basin, including stands of beetle-killed spruce. Pre-feasibilities studies have been completed in about half the communities and community-scale projects are under development or operating in a third of the region. Wood is widely used for residential heating throughout the region, though local access to firewood can be an issue.
Geothermal	Significant resource/geologic formation within economic distance (H) or within 20 miles (M).	The potential for energy savings from geothermal resources should be considered low despite the existence of several thermal springs and geologic formations in the region. This is due to their low surface temperatures (less than 100 °F), distance from populations, lack of mature technologies for developing low-temperature geothermal resources, and the high cost of exploration. The state has had low success rates at sites with higher surface temperature (Mt. Spurr, Akutan, Pilgrim Hot Springs, and Manley Hot Springs) none of which has moved on to development, although exploration continues at several locations.
Hydroelectric	Range based on visual inspection, documented opinion, recon or feasibility study.	Reconnaissance of the most likely hydropower resources in the region has been completed, given the current state of technology. The highest potential exists at Chitina (H) and McCarthy (M). While feasibility looks poor at Carlson Creek near Slana, Porcupine Creek appears to have some potential.
Solar	Economic criteria are more important than resource data. Projects should be evaluated on a case-by-case basis.	While solar potential is rated low across Alaska by AEA, Eastern Alaska has one of best solar resources in the state. The economics are best for off-grid installations and for non-PCE customers in grid-connected systems or in areas with higher electric rates and where net metering is available.
Wind	Range based on developability (site access and availability, permitability, and load) with wind class of 5 or higher (H) or 3-4 (M).	Wind models show low wind class near most communities, with the stronger wind sites located on top of steep terrain. Sites located farther from existing power lines or the loads they would serve are less likely to prove economic due to transmission costs. More feasibility work is needed to verify wind resources south of Willow Mountain near Tonsina. A moderate wind resource may exist near Mentasta Lake, but wind data and load analysis are needed. Being on the road system, construction costs for a wind project in Copper River would be lower than in more remote areas, which could make a utility-scale project feasible at lower class winds if a good resource is found.
Fossil Fuel Resources		
Coal	High-quality resource identified with a project in development (H) or further study needed (M)	The region has had too few detailed geologic studies to provide a reliable assessment of potential coal resources. The Bering Field includes high-quality coal but was ranked low for developability due to local structure. In general, coal beds in the region are of limited thickness with low thermal characteristics but most have not been studied in detail (Swenson, Wartes, David, & James, 2012).

Resource	Primary Criteria	Regional Potential
Oil and Gas	Geologic characteristics present (M). Wells drilled and economic resource identified (H).	The Copper River region includes one of six Frontier Basins identified by the State for additional oil and gas exploration. Exploratory drilling by Ahtna, Inc. is in progress near Tolsona. Previous drill sites were not conclusive.
Diesel Power Systems		
Heat Recovery	Based on installed equipment, nearby thermal loads, and recoverable heat remaining (M-H)	Potential for additional diesel heat recovery is low in most of the region, where communities are connected to a grid and have no local power generation or have heat recovery installed (Chitina and Slana) with minimal recoverable heat remaining. CVEA has no plans to install heat recovery in Glennallen based on previous feasibility studies.
Emerging Technologies		
Hydrokinetic	Substantial documented resource adjacent to power system (H) or within 10 miles (M).	In-river hydrokinetic resource potential has been looked at near Chitina, Copper Center and Gakona as part of UAA's RISEC reconnaissance study, funded by AEA's RE Fund. The technology for hydrokinetic power is pre-commercial and more reconnaissance and feasibility work will be needed as it matures and data on the technical challenges and economics of specific devices become available.
Energy Efficiency		
Residential Energy Efficiency	Fewer than 40% (H) or 41 to 70% (M) of homes have done EE upgrades	Substantial opportunity exists for energy savings from increased participation in residential EE&C programs in all communities. While there is interest in Do-It-Yourself (DIY) home energy efficiency projects, for residents who don't want to do retrofits themselves the shortage of skilled building labor for hire in the region is a barrier.
Public & Commercial Energy Efficiency	Completion of community EE &C programs (EECBG, VEEP, AHFC-C), street light retrofit and water/sewer system audits and upgrades.	There is high potential for energy savings from additional non-residential EE&C upgrades in all communities. The potential is unquantified but assumed to be significant for savings from water and sewer system upgrades and street light replacements. No communities have participated in the VEEP program and few used past EECBG grants for energy efficiency projects in community buildings. There is a lack of information on which commercial building energy audits have been followed up by EE upgrades.
Transmission and Distribution		
Interties	N/A	No rating available, but the presence of roads and discontinuous electrical grids with relatively short distances between grids make the potential for transmission lines higher than in other regions of the state, despite technical and economic challenges. An intertie project that is part of a larger infrastructure or resource development project has more potential than a stand-alone project.
Gas Lines	N/A	While no criteria were defined for gas line potential as part of the regional energy planning process, the potential for new gas lines is dependent on the first identifying a reliable and affordable long-term supply of natural gas. In the Copper River region, this could result from new exploration and development within the region, a North Slope natural gas pipeline built within the TAPS right of way, or by shipping and trucking LNG. Until a long-term supply is secured, the probability of gas line construction is low.

4 | Public Outreach

Outreach Activities

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

- Stakeholder Advisory Group meetings
- Community site visits
- Interviews with regional stakeholders
- Project mailings
- Regional Energy Summit
- Online distribution of reports with invitation to submit comments

Stakeholder Advisory Group

The Stakeholder Advisory Group established in Phase I met three times during Phase II (October 4, 2014; December 12, 2014; and January 29, 2015) to provide updates on energy-related projects, discuss common issues and priorities, and help plan the Energy Summit. Major topics of discussion included utility interconnection, LNG trucking and distribution proposals, renewable energy project updates, and regional workforce issues related to energy efficiency. All meetings were held in Glennallen, Alaska. (See Appendix A for a list of Stakeholder Advisory Group members.)

Community Site Visits

Members of the planning team visited communities throughout the region to talk about their energy issues and priorities and get input on regional projects and goals.

Table 16: Community site visits

Dates	Community	Site Visits	Activities
January 29-31	Glennallen	Ahtna, Inc.	Meeting with VP of Lands and Resources, and VP of Administration and Finance
		Copper River School District	Meeting and tour with facilities manager
		Copper River Native Association	Meeting and tour with acting director
	Gulkana	Gulkana Village Council	Meeting with Tribal Administrator and staff and tour of biomass facilities and pellet mill
	Gakona	Gakona Village Council	Meeting with tribal administrator
	Tonsina	Tonsina River Lodge	Tour of lodge and wood boiler installation
	Nelchina-Mendeltna	Nelchina	Public meeting at home of Mary and Jim Odden. Tour of transfer site.

Dates	Community	Site Visits	Activities
February 25–28	Tazlina	Native Village of Tazlina	Board and community meeting and discussions with Tribal Administrator
		Tazlina Residents Association	Discussion with Ben Seifert
	Copper Center	Copper Center Lodge	Discussion with lodge owner and community members
	Gakona	Copper River Basin Child Advocacy Center	Fundraising lunch and board meeting
	Slana	Slana Community Corporation	Tour of community: community building, post office, Midway Store, Slana School, off-grid solar installation at tourist cabins
	Mentasta Lake	Mentasta Tribal Council	Meeting with tribal administrator and biomass operator
	Gulkana	Lloyd Lappi	Residential solar thermal and coal heating
	Kenny Lake	Kenny Lake	Rocket Stove Workshop, energy planning meeting at community hall
May-June	Chitina		Meeting with utility manager and personnel, tour of potential resource sites
	Chistochina		Discussion with Tribal Administrator
	McCarthy		MAC Community meeting
	Native Village of Kluti Kaah		Discussion with tribal administrator and IGAP personal
	Silver Springs		John Fillman

Interviews with Regional Stakeholders

Phone interviews were conducted with additional stakeholders the planning team was not able to meet with during community visits. As with site visits, the primary aim was to learn about each entity's energy-related priorities, identify common challenges, and get input on regional energy projects and goals. A secondary function of interviews was to update data collected in Phase I.

Table 17: Additional Interviews

Date	Organization	Interviewed
December	Copper Valley Electric Association	Robert Wilkinson, CEO
January	Alaska Power & Telephone	Mickey Henton, Manager of Tok Interior Division
February	Copper River School District	Michael Johnson, Superintendent
	Copper River Basin Regional Housing Authority	Teri Nutter, Executive Director
	Fisher Fuels	Jordany Sutherland, Manager
	Crowley Maritime Corporation	Jerry Lesemann, Manager
	Wolf Solar Electric	Jarrett Humphreys, Owner

Project Mailings

To raise broader awareness of the project, project mailings were sent to a large email list that includes community associations, tribal governments, volunteer fire departments, nonprofits, and state and federal agencies with offices in the region. An initial mailing in November included a project flyer with a timeline and information on ways to participate. A second mailing in February publicized the March 7 Energy Summit in Glennallen, which was also advertised on radio, in the Copper River Record, and by posting flyers in communities.

Regional Energy Summit

The Energy Summit on March 7, 2015, in Glennallen was the capstone event of Phase II. Thirty to forty residents attended, representing communities from McCarthy to Nabesna, and the event was considered a success. Presentations by Alaska Energy Authority program managers and members of the planning team covered topics related to the four broad energy strategies developed during Phase I: Energy Efficiency and Conservation, Reconnaissance and Feasibility, Resource Development, and Transmission Lines. Regional success stories on biomass, energy efficiency and solar were presented over lunch. The summit ended with audience polling to collect public input on energy priorities and assess interest in future work groups. Participant demographics and polling results are included at the end of this section (Table 18 and Table 19 respectively).

PUBLIC INPUT

Summary of Energy Issues and Opportunities

Public input gathered throughout this phase of the project has been summarized in Table 18. Issues have been organized under the four broad regional strategies developed in Phase I. The opportunities listed next to each issue include ideas contributed by the Stakeholder Advisory Group, other regional stakeholders, community leaders and residents, AEA program managers, and members of the project team. Most have not been vetted for regional support or technical and economic feasibility, but represent a list of potential activities and ideas for meeting energy needs in the region and which could be adopted by working groups, other regional entities or individual communities.

Table 18: Copper River energy issues and opportunities

Energy Issues	Opportunities
Regional Energy Planning	
Lack of borough government, local municipalities, and absence of any tax base makes it more difficult to address energy needs.	▪ There are many common goals and needs related to energy that unite residents, and there exists significant resource potential and human and organizational capacity in the region. ▪ The concept to of Working Groups to share information and coordinate next steps in energy efficiency, solar and biomass received strong support at the Energy Summit.
No tribes from the region have applied in the past for the U.S. DOE Office of Indian Energy (DOE-IE) START program that helps with strategic community energy planning (whether 20	▪ Any organization with an energy need and tribal affiliation (including ANCSA corps, regional non-profits, and 638 compactors) can apply for the START program. Scope is for a

Energy Issues	Opportunities
year plan or 3-5 year roadmap) or with specific project development.	3-year project window. The same organization can apply for 40 hours of free technical assistance each year through the DOE-IE program. It is assumed that in the future communities applying for START will have already used the free 40 hours of technical assistance to begin development of a strategic community energy plan.
DOE usually sees energy projects fail because of human capacity issues, such as need for more training and expertise in operational management.	▪ Each tribe is eligible for 40-hours per year of technical assistance from DOE-IE. ▪ DOE START applications with workforce development and youth engagement components are encouraged.
Energy Efficiency and Conservation	
Lack of non-residential building inventory is a big data gap that needs to be filled.	▪ A community or regional public building inventory can be used to help identify and prioritize public facility EE&C opportunities and develop an "EE&C Roadmap" for the community or region. Energy use data can be collected using local labor and a standard "benchmarking" form.
Lack of available in-region workforce to do recommended retrofit work (electricians, plumbers, other skilled trades).	▪ Partner with the Alaska Works Partnership to offer free 40-hour electrical and carpentry trainings in Glennallen. ▪ Recruit or support Copper River residents pursing training or apprenticeships in energy and building trades outside region through AVTEC or the Alaska Workforce Partnership. ▪ Reach out to CRNA to explore opportunities to use 477 training funds to meet energy efficiency workforce needs. ▪ Partner with CR Basin Regional Housing Authority to use its trained weatherization workforce to complete energy audit retrofits on a fee for service basis. ▪ Partner with CRSD to use high school shop to offer classes in skilled trades. New shop teacher is focused on job skills. ▪ Do a needs assessment to understand the market for skilled trades in the region. ▪ Develop regional facilities maintenance labor pool or shared services model to use existing facilities maintenance workforce (employed by Ahtna, CRSD, RHA, etc.) to help meet regional EE&C needs. Study lessons learned from Rural Alaska Maintenance Partnership (RAMP) program. ▪ Opportunity may exist for an small business incubator
Lack of knowledge or confidence among homeowners for Do It Yourself (DIY) energy retrofits.	▪ AHFC offers a variety of training classes for homeowners and housing professionals. AHFC will schedule a local training if 10 or more residents indicate intention to attend ▪ Offer week-long trainings on targeted EE skills with Rich Seifert, Alaska Center for Appropriate Technology, or others. ▪ Offer public workshops as part of EE Working Group outreach activities ▪ Partner with CRSD to use high school shop for DIY classes. ▪ Invite Cold Climate Housing Research Center to do an in-region workshop on more advanced EE retrofitting or assist in a strategic planning event. ▪ Open an "Energy Store" in Glennallen with plumbing/heating, electrical, and weatherization tools and materials. Or a roving "energy van" that can loan out supply needed to complete EE work such as ladders and hammers while also selling material such as weather stripping, plastic and spray foam.

Energy Issues	Opportunities
	▪ Partner with other programs, such as Energy Wise, to help conduct education and DIY weatherization in the region.
Lack of awareness about residential EE&C programs and the potential for significant savings.	▪ Educate residents about AHFC's home energy rebate and Weatherization programs and the 28-35% savings achieved in the region from completing EE&C upgrades. ▪ EE Working group could hold informational workshops to raise awareness and help people navigate the programs and options together.
Older homes are not energy efficient, but homeowners using AHFC's Home Energy Rebate program must pay up front for completing recommended retrofits and may only be reimbursed for part of their expenditures. This leads many homeowners to not complete energy saving upgrades that would pay for themselves in a short time. Only 45% of homeowners who had an initial audits completed upgrades and received a rebate.	▪ Hold a workshop and/or find other ways to educate residents about short payback times for energy retrofits and the cost of waiting or doing nothing. ▪ Provide information on state programs for financing residential energy audits and upgrades. ▪ Bring in the USDA to discuss their Home Opportunities Program with interested community members. ▪ There is interest in the region in a low-interest loan program or other options for financing upgrades up front.
Public facility owners and commercial businesses that receive energy audits must pay up front for retrofits. Statewide the percent of audited public/commercial buildings where recommended retrofits have been completed is low resulting in significant missed savings opportunity.	▪ Educate non-residential building owners on the short payback periods for much EE&C work and the cost of waiting or doing nothing. ▪ Provide information on loan programs for financing energy upgrades. ▪ Explore "Public ESCO" (PP-ESCO) model to finance community facilities upgrades. Brainstorm ways Ahtna, CRSD or other regional entities might use an ESCO approach to bundle energy upgrades in smaller buildings into a financeable package. ▪ Educate building owners about short payback times for energy retrofits and the cost of waiting or doing nothing. ▪ Survey public/commercial building owners that have had energy audits done about upgrades they have completed.
State loan programs for EE&C can be difficult to use.	▪ Group multiple facilities in application as done in the past or work on applications together.
Most new energy efficient homes being built by the Regional Housing Authority are medium-sized, 3-bedroom homes. There is a need in at least one community for small, 1-bedroom homes for single, independent people (often elders or young people) who are not interested in apartment living.	▪ Work with CRBRHA and CCHRC to develop design for super energy efficient small or "tiny homes."
Many of the community halls and multipurpose buildings in the region are old and not energy efficient.	▪ Do energy efficiency audits and upgrades before integrating new alternative energy sources (biomass, solar, heat recovery). Benchmarking public buildings is quick and easy way to assess the potential benefit for EE&C retrofits.
CRSD admin building in Glennallen is old and has single pane windows. Cost of replacement and other recommended retrofits is high.	▪ Move admin offices into new more energy efficient K-12 building on same campus. The school was built for a much bigger student body, so has excess capacity. ▪ Look for similar situations to save money and be more efficient.
Most communities in the region have only a few, if any, street lights, but for communities that do there is an opportunity to save money by upgrading to LEDs. No inventory has been done to assess savings potential. There is a federal program communities may be able to use to get street lights at the Federal government price, especially if the request is tied to emergency preparedness.	▪ Inventory street lights in the region and assess community interest in bulk purchase and installation. ▪ Talk with Givey Kochanowski, Alaska Program Manager for the DOE Office of Indian Energy, to request more information about federal discounts on LED street lighting.

Energy Issues	Opportunities
Need for affordable utilities: Water and sewer bills are an increasing burden on households in many communities. There are people in the region that have been living without water and sewer for many years.	▪ Energy is a huge cost in sanitation facilities. ANTHC has a program to conduct water and sewer system energy audits and retrofits in rural Alaska communities. Gulkana is the only community in the region that has an audit scheduled. ▪ Look into using renewables in conjunction with water plants to lower cost of running facilities ▪ Where applicable insure that all public facilities are on PCE.
Declining regional population has resulted in empty public or commercial buildings in some communities. People in many communities offered creative ideas for putting some of these buildings to use.	▪ Gulkana has plans to put a store and laundromat into the gutted water treatment plant building. ▪ Use an empty building to manufacture CGro units for sale.
Reconnaissance and Feasibility	
Geothermal: There are low-temperature geothermal resources in the Copper River region near Glennallen and in Wrangell–Saint Elias NP, including three occurrences of thermal springs above 60°F. While it would be nice to find out if there is a viable resource, reconnaissance drilling would cost millions of dollars, and they State is unlikely to fund feasibility work since exploration of more promising sites at in Alaska (some with temperatures above 165 F) have not yet resulted in a project, although exploration continues at several locations.	▪ Monitor worldwide advancements in low-temperature geothermal power and stay involved in conversations so that if technology improves can reapply for feasibility study funding and assess investment risk.
Hydro: Given current state of technology and development costs, most of the economically and technically feasible hydroelectric sites in the region have been identified.	▪ Support continued development of known resources at Fivemile Creek (Chitina Electric) and Yerrick Creek (AP&T Tok Grid).
Hydrokinetic: Chitina Electric is interest in exploring feasibility for potential in-river hydrokinetic site, but technology is still in its infancy.	▪ Monitor existing demonstration projects and technology development, while pursuing other renewable energy strategies.
LNG: An Alaska natural gas pipeline is at least 10 years away from operations, but there is demand now for a lower cost and cleaner alternative to diesel fuel.	▪ Continue in-region natural gas exploration efforts, especially before state tax credits expire in 2016. ▪ Stay current with ongoing gas initiatives in the state, including natural gas pipeline and LNG import proposals.
LNG: In order to realize benefits of natural gas, a distribution system is needed and residents and businesses need to convert newer boilers to burn gas or replace older boilers. There is a chicken and egg issue to timing construction and investment in supply and demand infrastructure.	▪ Glennallen would be a good lab to try out LNG tank farm and local distribution network. A small scale project on road system using trucked LNG would provide an opportunity to make mistakes and put the region a step ahead in the event that a gas pipeline is built or gas wells are developed in region through current exploration. ▪ Look at incentives to encourage conversion, such as working with Crowley to finance up front conversion costs for fuel customers.
LNG: State's current focus is on Interior region supply and distribution planning. A Copper River project is unlikely to attract state interest or investment until Interior plans are complete.	▪ Learn from Interior region LNG projects ▪ Keep Glennallen LNG demo project as a medium-term goal and pursue more actively once Interior system is off the ground.
Wind: Failure to reliably getting data from anemometer dataloggers due to harsh weather, steep terrain and battery issues.	▪ Upgrade to higher-end datalogger with cell phone download ability.
Wind: Met towers previously erected in the region collected less than 12 months of data which is insufficient to complete wind resource assessments.	▪ Collect 12 months of data from promising wind sites and evaluate other potential sites where local and limited state funding allows.
Wind: Measuring wind in the region requires taller met towers due to abundance of trees. Met towers should be a minimum	▪ Install a 50 m permanent met tower on Willow Mountain for correlating wind data in the area.

Energy Issues	Opportunities
30 meters above trees, but 50 meters is better; this requires a large area.	
Wind/Solar (Chitina): A grid-scale project is only feasible if 50+ kW battery systems were developed. Cannon Hill could be used for wind or solar project, but current technology will not allow utility to reach a "diesels off" situation.	▪ Fivemile Creek hydro project offers greater potential for fuel savings and reducing diesel dependence in Chitina, since it is the only resource with capacity to allow utility to turn off diesel gensets completely for periods of time.
Resource Development / Economic Development	
Biomass: Ahtna lands contain abundant supply of woody biomass, but it is currently being mown and left on ground as part of moose browse enhancement project.	▪ Identify solution for harvesting and drying "20 in. firewood" left behind by moose browse enhancement mowing to make it available for the growing number of community biomass projects.
Biomass: Residents of Mentasta Lake and Nelchina-Mendeltna area have difficulty accessing state lands for cutting firewood. Trails are posted by BLM. Out of region commercial harvesters bid on large tracts of state forest.	▪ Talk with BLM and state DNR Forestry about opening up opportunities for local firewood harvest in areas accessible to population centers.
Biomass: Serious need for fuels reduction in Mentasta Lake. The community has no volunteer fire department and is 30 minutes from Tok or 3 hours from Glennallen.	▪ Community is seeking DNR funds to help with fuel reduction around downtown and BIA funds to help with fire mitigation outside the hub and near residences
Biomass: To make new biomass project successful, Mentasta has immediate need for operators and people with commercial driver's licenses (CDL).	
Biomass: Wood biomass has taken off in the region and there is interest in doing more with it, by expanding existing community projects and doing new projects.	▪ Work with housing authority to develop ideal integration of biomass with apartment buildings, could be example for other regions.
Food Security: There is interest in constructing more of the mobile, hydroponic grow units developed by CVDA in a demonstration project. The demo unit is being used to grow lettuce for sale in Glennallen's supermarket.	▪ Look at the market for manufacturing and selling CGro units or expanding local food production. A project could be incorporated into the local school curriculum, as the initial demo project was, or could be a small business development opportunity for local manufacturing and/or food production.
Food Security: NV of Gakona had a community garden but found that people were not interested.	▪
Solar/Wind: Net metering by CVEA will no longer be available once Allison Creek hydro project comes online in 2016, reducing the economics of residential-scale solar and wind projects for buildings on the CVEA grid.	▪ Continue to develop solar P/V and solar thermal projects where feasible. ▪ Focus on off-grid areas running generators in the summer and areas with high summer load.
Solar/Wind: Net metering regulations are relatively weak in Alaska compared with other states, and a patchwork exists with individual utilities free to set their own policies.	▪ Lobby for consistent, statewide net metering regulations to level the playing field and increase the economics of small scale solar and wind projects. ▪ Consider the economics of individuals choosing to go-off-grid and the need to address an adaptable utility business model if this trend increases.
Generation: Compliance issues at the 10 MW power plant at the HAARP research site near Gakona will require new permitting if/when ownership changes from the federal government.	▪ Despite near-term issues and uncertainty, HAARP should be considered a long-term asset of the region that could be used to back up the CVEA grid and/or generate power to ship north.
Transportation: The widespread perception is that many people have left the region due to the high cost of energy and cost of living. Fuel costs much more than in Anchorage due to transportation cost.	▪ Could reduce transportation and energy costs if the state finishes improving the Glenn Hwy (and reroutes Moose Alley) so it would take 2 ½ to 3 hours to get to Anchorage from Nelchina-Mendeltna area.

Energy Issues	Opportunities
Transmission Lines	
There is renewed interest in the region for connecting to Alaska's Railbelt grid to reduce electrical costs, increase reliability, create more economic opportunity and stem population decline. Past studies looked to load growth to make a project economic, but demand has been mostly flat. Given the current state budget crisis, public investment is unlikely in the near or mid-term, and will be most likely in the long-term in the context of a large, new resource development project (e.g. Sustina-Watana Hydro) or systemwide upgrades to the Railbelt grid.	▪ Continue to upgrade the regional grid to improve service and reliability and prepare for future interconnection. ▪ Look for opportunities to piggyback transmission upgrades onto large-scale resource development projects or utility expansion to serve any new industrial loads. ▪ Monitor discussions of the state and the Railbelt utilities on formation of an Independent Service Organization (ISO) or separate transmission company (Transco) to coordinate upgrades to the Railbelt power grid and adopt statewide standards. After an ISO/Transco is formed, look for opportunities to be part of discussions on future expansion. ▪ Be prepared to lobby for the economic development benefits provided by potential interties in the region.
A regional intertie connecting CVEA and AP&T's Slana grid could make excess renewable energy available seasonally to AP&T customers subject to very high energy costs, but a project that is not economic would not lower rates. State or other outside funding is needed to avoid placing an unreasonable burden on the limited customers who would benefit. According to a recent CVEA analysis, numerous technical issues challenge the economics of a project, including capacity and reliability issues with current single-phase line, voltage incompatibilities, genset balancing, etc., so CVEA is not interested in moving forward at this time.	▪ CVEA is looking for other potential customers for excess electrical capacity that will be available spring through fall once Allison Creek hydro comes online in 2016. ▪ DOE-IE funds could help fund an intertie project if the main requester is an Alaska Native entity. DOE may be able to partner with utilities to leverage USDA RUS or other funds not restricted to tribal entities. ▪ Having an intertie concept ready for investment is in the long-term interests of CVEA and AP&T's Interior service area. Utilities should document the technical challenges, potential solutions and projected costs of interconnection so there is a shared understanding (or at least a written record) that can inform future discussions. ▪ To the extent possible, design planned infrastructure upgrades in each system in ways that help prepare for future interconnection opportunities within region or with Railbelt.
Limited availability of 3-phase power (downtown Glennallen to HAARP site at 12-mile Tok Road) limits opportunities for economic development in other parts of the region (e.g. reopening sawmill in Kenny Lake). The single-phase line along the Edgerton Hwy. is underbuilt, and demand for 3-phase upgrade is likely not sufficient to make a project economic.	▪ Study the market for expanding 3-phase power, focusing on potential new commercial and industrial users, to see is a business case exists for an investment by the CVEA coop. ▪ Current customers interested in acquiring three-phase power should talk to the coop about their interest.
Chitina grid is 15 miles from CVEA transmission line	▪ Assess interest and technical/economic feasibility of connecting utility grids.

Energy Summit Polling Results

The Energy Summit held in Glennallen on March 7, 2015 concluded with audience polling. Thirty-six individuals answered questions on regional energy priorities and working groups, using handheld, electronic voting keypads. Complete results are shown below. For non-demographic questions, choices that total at least 50 percent of all responses are highlighted (starting with those that received the most support and working down until a total of 50 percent or more is reached).

Table 19: Energy Summit audience polling results

Demographics

Who represents you at the local level?

Community association	Tribal government	Both	Other
40.6%	15.6%	15.6%	28.1%

Who are you representing today?

Tribal organization	Community association	Regional organization	Utility
20.0%	8.6%	17.1%	11.4%

Other Business	Federal organization	State organization	Yourself
5.7%	5.7%	2.9%	28.6%

Who supplies your electricity?

CVEA	AP&T	Chitina Electric	Off-grid	Out of region
82.4%	0.0%	0.0%	8.8%	8.8%

Are you on the Regional Energy Planning Stakeholder Advisory Group (SAG)?

Yes	No	Don't know
31.4%	65.7%	2.9%

Energy Efficiency & Conservation

As a region, we should prioritize energy efficiency initiatives at which level…?

Homes	Businesses	Public/ Community Buildings	Public Infrastructure
67.7%	11.8%	8.8%	11.8%

What do you think are the main barriers to participating in energy efficiency programs?

Lack of information	Finding an auditor	Paying up-front for upgrades	Hiring someone to do upgrades	Knowledge to do it yourself	Other
13.9%	0.0%	58.3%	11.1%	2.8%	13.9%

Would you be interested in attending a class on…?

Basic heating, plumbing and electrical skills	Cold climate construction or retrofit skills	Both	Other energy-related class	Not at this time
8.6%	14.3%	57.1%	14.3%	5.7%

Reconnaissance/Feasibility and Resource Development

In which areas should we concentrate feasibility or reconnaissance work?

Biomass	Geothermal	Hydro	LNG
29.1%	8.8%	8.9%	22.2%

Solar	Transmission	Wind	Other
17.7%	8.8%	4.5%	0.0%

In what ways would you support an energy project that benefits your community?

Staff Time	Financial Support	Both	Neither
45.5%	12.1%	33.3%	9.1%

Should connecting the region to the Railbelt intertie continue to be a long-term goal?

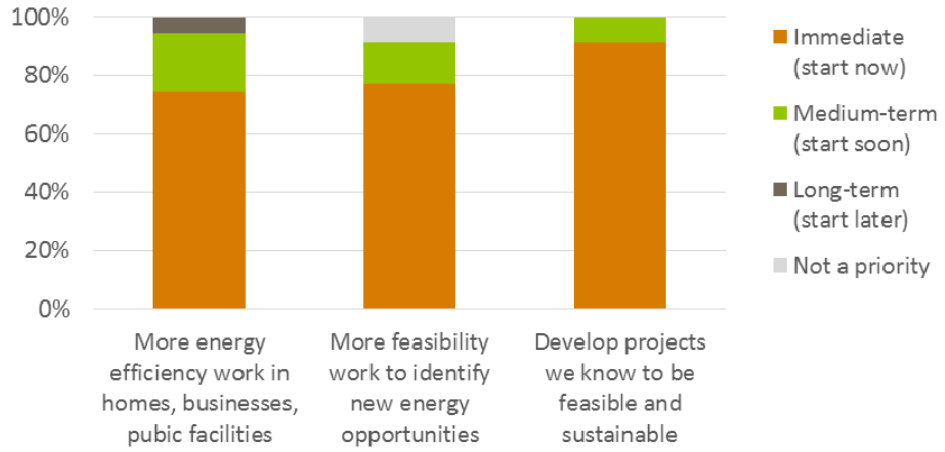
Yes	No	Don't know/ No opinion
55.9%	29.4%	14.7%

Interest in Energy Working Groups

Are you interested in participating in an energy working group?

Biomass resource development	Energy efficiency task force	Energy-related workforce/business development	Not at this time
14.7%	29.4%	32.4%	23.5%

Figure 16: How should we prioritize energy work and investments?



5 | ENERGY PROJECTS & PRIORITIES

Nearly 30 energy-related projects are planned or in progress in the region. The list in Table 20 is based on information provided by project sponsors as well as data published in the Phase I report and Renewable Energy Fund applications and status reports. Projects completed since Phase I are not shown. Additional energy priorities not yet associated with a specific project are included in Table 21.

Table 20: Energy projects planned or in progress

Project	Lead Entity	Communities	Status	Next Step	Output	Timing	Cost	Funding
Planning								
Regional Energy Planning	CVDA	Copper River Basin	In progress	Economic and technical analysis and working groups/how to keep the plan updated and living	Identification of regional projects and priorities with community and stakeholder input/plan for continuing REP into the future	2012-2015		AEA
EE Working Group	CVDA, AEA	Copper River Basin	Planned	Meet to discuss regional EE opportunities, and ways to address needs. Make a plan. Carry out plan	EE&C resource and information sharing, DIY trainings, collaboration on workforce issues and addressing other barriers	First meeting Summer – 2015		ARDOR, AEA
Biomass Working Group	CVDA, AEA	Copper River Basin	Planned	Restart regional biomass meetings on quarterly or biannual basis	Biomass resource and information sharing, collaboration on workforce and supply issues	Fall 2015		ARDOR, AEA
Oil and Gas								
Glennallen LNG Infrastructure Demonstration Project	Ahtna, CVDA	Glennallen	Seeking funding	Feasibility study for LNG project based on Trucked LNG	Feasibility of LNG storage tank with regas unit and piped distribution	Medium term (after Interior AK completed)	$175,000	
Tolsona Natural Gas Development	Ahtna	Copper River Basin	Exploration	Exploratory drilling program and site work	New gas well design and drilling. Development plan	2015-2016	$12 million	New Frontier Basin Tax Credits

Project	Lead Entity	Communities	Status	Next Step	Output	Timing	Cost	Funding
Generator replacement, Valdez plant	CVEA	CVEA Grid	Scheduled	Replace older, inefficient diesel generators	Two-fold increase in diesel efficiency	2016		
Biomass								
Wood Boiler / District Heating	Native Village of Tazlina	Tazlina	Feasibility complete	Design and construction	District heat loop provides jobs and heats 3 community buildings, a garage and potentially a greenhouse.		$314,000	RE Fund, local match. (Recommended for RE Fund Round 8)
Pellet/Briquette Mill	Native Village of Gulkana	Gulkana	Under construction. Need for community engagement and meeting with AEA	Finish construction of pellet mill / Assess existing heat loop connection with residential units	Completed pellet/ briquette mill with 1 or more lines in operation / connection evaluated			USDA, additional funding being sought (options may include DOE or AEA technical assistance programs)
Wood Boiler / District Heating	Native Village of Gakona	Gakona	Pre-feasibility completed (multipurpose building)	Feasibility of pellet or cordwood system for district heating	Biomass district heating loop provides local jobs and connects multipurpose center, garage, up to 7 houses			RE Fund
Chistochina Central Wood Heating	Cheesh'Na Tribal Council	Chistochina	Under construction	Identify funds to complete construction	Pellet-fueled district heating loop connects washeteria, library, community hall, tribal office, and clinic/ multipurpose facility			
Hydro								
Allison Creek Run of River	CVEA	CVEA Grid	Under construction	Operations, identification of new loads	6 MW electricity available April-Sept	2014-2016	$55 million	CVEA, Alaska capital budget, RE Fund
Fivemile Creek Run of River	Chitina Electric	Chitina	65% design and most of permitting completed	Design and construction	300 kW hydroelectric power with excess available for heating		$4.4 million	RE Fund, local match
Yerrick Creek	Upper Tanana Energy	Tok Grid (Slana, Mentasta, Chistochina if	Working on site control issues, business	Construction and commissioning	1.5 MW hydro project on Tanacross Village lands		$24 million	RE Fund, local match (partial funding recom-

Project	Lead Entity	Communities	Status	Next Step	Output	Timing	Cost	Funding
	(support from AP&T)	connected by intertie.)	planning, RCA certification					mended in RE Fund Round 8)
Solar								
NPS Kennecott Mines National Historic Landmark	National Park Service	Kennecott/ McCarthy	Scheduled	Design and installation	Commercial-scale solar P/V project displaces power from diesel generators and uses existing battery storage	Summer 2015		
Ahtna, Inc. Headquarters Solar P/V Project	Ahtna	Glennallen	Preliminary planning	Design and installation	Educational and workforce development opportunity, may be combined with a garden project.			
Hub of Alaska Commercial-scale Solar P/V Project	Hub of Alaska	Glennallen	Scheduled	Design and installation	25kW solar P/V system includes flat screen TV with datalogger in gas station to engage public	2015		
Wind								
Willow Mountain Wind Study	Ahtna, AEA, CVDA	Copper Basin Region	20-m met tower erected, but trouble with reliable data retrieval.	Install a 50-m permanent met tower to assess feasibility of a utility-scale wind farm on the surrounding ridge line. Upgrade to higher-end datalogger with cell-phone download.	Wind study provides decision input for pursuing utility scale wind farm on ridge; will require power sales agreement with CVEA. Data from permanent met tower used to correlate wind model data in region.			
Cannon Hill Wind Study	Chitina Electric, CVDA	Chitina	A wind study was done, but didn't collect sufficient data.	Install a commercial anemometer on Cannon Hill and collect at least 12 months of data. Team from DOE visited site last week in May 2015.	Wind resource assessment that indicates whether wind blows enough in winter. Flat site, with good road access at confluence or Chitina and Copper Rivers.			
Chisana Mountain Wind Feasibility Study	AP&T	Tok Grid (Slana, Mentasta, Chistochina if connected to Tok grid)	50-m met tower installed	Complete wind study. If adequate resource exists, continue with design and development.	Development of a wind project that lowers energy costs in the Tok area and provides opportunity for expansion of grid.		$148,800 feasibility study (All phases $4-5 million est.)	RE Fund, AP&T

Project	Lead Entity	Communities	Status	Next Step	Output	Timing	Cost	Funding
7-Mile Wind Study	AP&T	Tok Grid (Slana, Mentasta, Chistochina if connected to Tok grid)	Wind study In progress	Complete wind resource assessment and feasibility study	Determination of whether project is feasible despite distance from existing power lines			
Energy Efficiency and Conservation								
Residential Weatherization	ACDC	Chitina, Copper Center, Gakona, Glennallen, Slana	Scheduled	Weatherize 26 homes in 5 communities	Energy audits and retrofits completed	2015-2017	$241,000	AHFC
Residential Weatherization	Copper River Basin Housing Authority	Chitina, Copper Center, Gulkana	Scheduled	Weatherize 8 homes in 3 communities	Energy audits and retrofits completed	2015-2017	$88,000	ICDBG, HUD NAHASDA
New Energy Efficient Home Construction	Copper River Basin Housing Authority	Gakona, Glennallen	Scheduled	Build 7 homes in 2 communities	New BEES-certified, 5 star plus homes	2015-2017	$1,750,000	ICDBG, 20% RHA match
Tazlina River Mobile Home Park Redevelopment	Copper River Basin Housing Authority	Tazlina	Pre-development	Energy efficient, mixed income housing	15 energy efficient townhouses or condos			
Energy Efficient Small Home Design	Copper River Basin Housing Authority	Copper Basin Region	Planning	Work with Cold Climate Housing Research Center	Energy efficient 1-bedroom cottage design suited to region's climate			
Sanitation Energy Efficiency	ANTHC	Gulkana	Scheduled, partial funding secured	Energy audit of water and sewer system, and recommended upgrades.	Energy efficiency and conservations recommendations	2015-2016		
Glennallen School and Kenny Lake School Energy Upgrade	Copper River School District	Glennallen, Kenny Lake	CIP funding requested	Implement energy audit recommendations	LED and CFL lighting, HVAC, hot water heaters, other EE upgrades		$2.6 million	Alaska DEED, CRSD
District Office Roof Renovation and Energy Upgrade	Copper River School District	Glennallen	CIP funding requested	Implement energy audit recommendations	Window and roof replacement, other EE upgrades		$1.1 million	Alaska DEED, CRSD
Slana K-12 School Renovation	Copper River School District	Slana	CIP funding requested	Implement energy audit recommendations	Energy upgrades included in school renovation		$1.4 million	Alaska DEED, CRSD

ENERGY PRIORITIES OF LOCAL AND REGIONAL ORGANIZATIONS

Not all energy priorities are associated with specific projects. Additional energy priorities identified through discussions with regional stakeholders, community leaders and businesses are shown in Table 21. (Those related to projects in Table 20 are highlighted.) 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 21: Energy priorities identified by Copper River stakeholders

Organization	Timing	Priority
Goals and Strategy		
Ahtna	Ongoing	Focus on "Food – Fuel – Jobs"
AP&T	Ongoing	Support investigation of local energy resources to increase local jobs and economic well-being of the region.
CRSD	Ongoing	Support broader regional efforts to keep cost of living down and stop exodus from region by using our voice in Juneau to support CVEA and Ahtna, etc.
CVDA	Ongoing	Work to advance natural gas and transmission intertie solutions over the medium and long term, while focusing on energy efficiency and conservation in the short term
National Park Service	Ongoing	Development of wind, solar, and other renewables with goal of "Net Zero" and mandate to buy renewable energy.
Oil and Gas		
Fisher's Fuel	Short	Open credit card outlet in Glennallen for 24 hour gas sales.
Ahtna, CVDA	Short	Gas exploration near Tolsona
Ahtna, CVDA	Medium	Glennallen LNG Demonstration Project Feasibility Study
Ahtna, CVDA	Long	Gas field development; gas-fired electric power generation
Biomass		
Ahtna	Short	Develop cost-effective method to harvest and dry 20" firewood left by Moose Browse Enhancement mowing, for use in biomass heating and further development of local biomass industry
Gulkana VC	Short	Biomass plant to product pellets and briquettes.
Gakona VC, NV of Tazlina	Short	Biomass boilers at multipurpose building and residential district heating loop.
Gakona VC		Community involvement in cordwood harvesting
Mentasta TC	Short	Fuels reduction project (serious need)
Mentasta TC	Medium	Possible interest in a 2nd chip biomass system to provide heat to the apartments near downtown, work with Housing Authority
Geothermal		
Ahtna	Long	Geothermal reconnaissance near Mt. Drum (letter of support from National Park Service)
Hydro		
AP&T	Short	Yerrick Creek hydro development

Organization	Timing	Priority
Chitina	Short/ Medium	Fivemile Creek hydro final design and construction
Solar		
Ahtna	Short	Considering solar P/V installation at Ahtna headquarters in Glennallen now that have reduced load through energy retrofits and LED conversion. Educational and workforce development opportunity. Clearing might be paired with a garden project. Again supporting "Food – Fuel – Jobs"
National Park Service	Short	Kennicott mine solar P/V using existing battery storage
Gakona VC	Short	Look at feasibility of solar P/V project for multipurpose building
Wind		
Ahtna	Short	Erect permanent 50-m met tower on Ahtna land on **Willow Mountain**. Use to correlate wind data from other sites in area to improve wind resource assessments
AP&T	Short	Feasibility assessments in Tetlin, Tok and south of Delta
Chitina	Short	Study site on Cannon Hill on Chitina Corporation land.
Energy Efficiency & Conservation		
CRSD	Short	Fund LED lighting with own money if CIP request not funded (especially bulbs on 24/7)
CRBRHA	Short	Tazlina mobile home park redevelopment
CRBRHA, Gakona VC, NV of Tazlina	Short	Design of small energy efficient homes (1-bedroom cottages) for self-sufficient elders and young people
Gakona VC	Short	LED changeout in multipurpose building (300 bulbs); install 3 street lights (0 now)
Gulkana VC	Short	Higher participation in state weatherization programs, and energy efficiency upgrades to community hall
NV of Kluti Kaah	Short	Complete LED changeout upgrades
NV of Tazlina	Short	Build a bigger and more energy efficient community hall, as multipurpose building, move offices out of inefficient trailer.
NV of Tazlina	Short	Offer DIY classes in LED changeout, other EE retrofits, and small scale solar; find a way to perform electrical work on elders' homes and older homes in danger of becoming hazards
NV of Tazlina	Short	Conduct energy audits of community buildings and homes
Food Security		
Ahtna	Short	Clear land near headquarters for a community garden, and provide summer jobs for youth to help out in garden
Ahtna	Short	Continue moose browse enhancement project
Mentasta TC	Medium	Start a community garden or greenhouse with AmeriCorps help (if community supports)
Transportation		
Mentasta TC	Short	Bike path from apartments to downtown (summer 2015)
NV of Tazlina	Medium	Pedestrian bridge (highest priority after biomass project)
Nelchina-Mendeltna		Complete Glenn Highway improvements and reroute Moose Alley
Transmission		
AP&T	Short	Study the feasibility of interconnecting AP&T's Chistochina/Slana/Mentasta grid to the CVEA system to develop an intertie concept that is ready for investment
AP&T	Long	Interconnect CVEA, Tok, and the Railbelt transmission systems
Ahtna	Long	Connect Chitina to CVEA grid (15-miles)

Abbreviations: Native Village (NV), Tribal Council (TC), Village Council (VC). For others, see Acronyms (p. 6)

6 | COMMUNITY AND ENERGY PROFILES

This section contains profiles for communities in the Copper River 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 December 2014. The profiles in this report include the revisions we received. The summary of community Energy Priorities and Projects on the first page of each profile has also been updated from the Phase I report based on the public input gathered in Phase II, including interviews with community leaders where possible.

Community Profile: Chistochina

Municipality	Unincorporated

Location

Mile 32.7 on the Tok Cutoff to the Glenn Highway, 42 miles northeast of Glennallen.

Longitude	-144.6647	**Latitude**	62.565
ANCSA Region	Ahnta, Incorporated		
Borough	Unorganized		
Census Area	Valdez-Cordova Census Area		
School District	Copper River School District		

Alaska Native Name (definition)

Tsiis Tl'edze' Caegge - represents an area 30 miles up river

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

Historical Setting / Cultural Resources

Chistochina began as an Ahtna fish camp and stopover place for traders and trappers. The village access road later became part of the Valdez-Eagle Trail, constructed by miners during the gold rush to the Eagle area in 1897. Chistochina Lodge was built as a roadhouse for prospectors. Gold was mined along the upper Chistochina River and its runoff creeks. Chistochina is the most traditional of all Copper River Athabascan Indian villages. Subsistence activities are a crucial component of lifestyle in the village.

Economy

Local government, construction, and professional/business services are the main forms of employment. Six business licenses and no commercial fishing permits. Native Crafts

Climate	**Avg. Temp.**	**Climate Zone**	**Heating Deg. Days**
	N/A	7	13,534

Natural Hazards Plan

N/A

Energy Priorities and Projects

Tribe: Residential and community facility EE&C; biomass heating of multiple buildings (in progress, 2013); solar thermal and P/V (feasibility); wind at new airport site (feasibility); help facilitate training and workshops.

Community Plans / Planning Studies	**Year**
Copper River Regional Energy Plan (Phase I)	2013
Chistochina Community Plan	2012
Copper River Resource Management Plan (BLM)	2010
Ahtna Regional Tribal Energy Strategy Overview	2009

Local Contacts	**Email**	**Phone / Fax**
Cheesh-Na Tribal Council	tribaladmin@cheeshna.com	907-822-3503 / 822-5179
Mt. Sanford Tribal Consortium		907-822-5241 / 822-8803
Copper River Native Assoc.		907- 822-3646

Demographics	**2000**	**2010**		
Population	93	93	**Median Household Income (2010)**	$ 24,653
Median Age	38	50	**% of Residents Employed (2013)**	62%
Avg. Household Size	3	3	**Low-Med Income (LMI) Percent (2014)**	70%
% Alaska Native	57%	57%	**Denali Commission Distressed Community (2013)**	No

Electric Utility	**CurrentGeneration Sources**	**Connected by Intertie**	**PCE**
Alaska Power & Telephone Co.	Diesel	Yes	Yes

Landfill	**Class**	**Permitted?**	**Location**	**Condition/Expected life**
Copper Basin Sanitation Co.	2	Yes	Glennallen	Fair

Water/Wastewater System	**Water**	**Sewer**	**Energy Audit**	**Homes Served**	**System Volume**
N/A	Well	18 Individual sewer, 9 w/out sewer			

Road Access Glenn and Richardson Highway - open year round

Air Access	**Runway**	**Surface**	**Lighted**	**Flight Rules**	**Condition**	**Air Miles (to Hub)**
State owned	2060' x 60'	Turf-Gravel	No	IFR	Fair	42 mi (Glennallen)

Dock/Port Facilities	**Ferry Service**	**Barge Access**	**Marine Access Issues**
None	No	No	

Notes

The 2012 Community Plan listed reduced energy costs as a goal. The community is looking into moving the airstrip out of town.

Energy Profile: Chistochina

Power House

Utility	Alaska Power & Telephone		
Engine Make	**Model**	**Rated Capacity**	**Condition/Hrs**
John Deere	6068TF250	110 kW	Good/15,774
John Deere	6068TF250	110 kW	Good/23,165

Line Loss	N/A
Heat Recovery?	See Slana
Upgrades?	See Slana

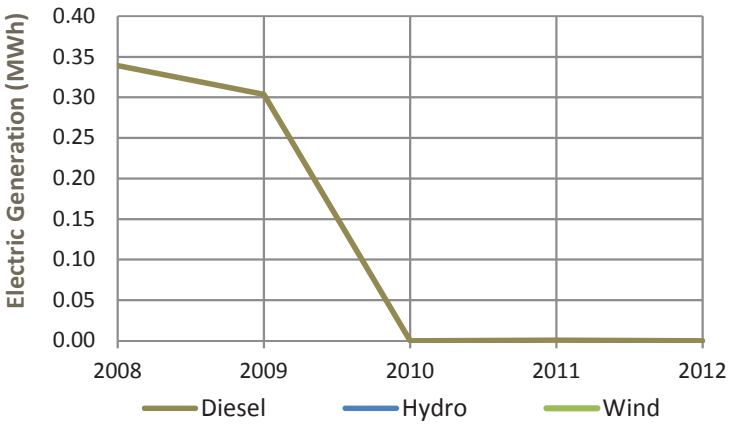
Outage History/Known Issues

All generation now handled by Slana via intertie. Most common cause of outages are from downed lines.

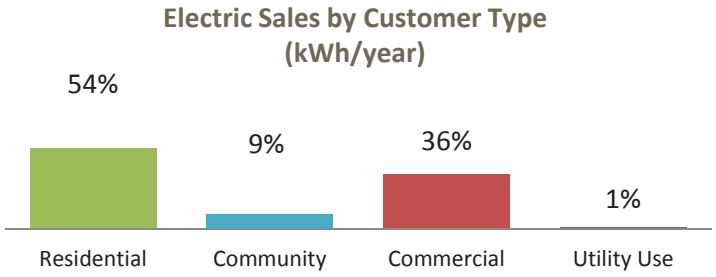
Operators	**No. of Operators**	**Training/Certifications**
	3 (Slana grid)	Power plant operator, Arc flash, Crane, Electronics
Maintenance Planning (RPSU)	Good	

Power Production

Diesel (kWh/yr)	192,120	**Avg. Load (kW)**	35
Wind (kWh/yr)	0	**Peak Load (kW)**	77
Hydro (kWh/yr)	0	**Diesel Eff: kWh/gal**	11.6
Total (kWh/yr)	192,120	**Diesel Use (gals)**	16,494



Electric Sales	**No. of Customers**	**kWh/year**	**kWh/Customer**
Residential	49	202,237	4127.29
Community	2	35,446	17723.00
Commercial	16	136,650	8540.63
Utility Use	N/A	2,493	N/A



Electric Rates ($/kWh)		**Cost per kWh Sold ($/kWh)**	
Rate with PCE	$0.27	**Fuel Cost**	N/A
Residential	$0.69	**Non-fuel Cost**	$0.08
Commercial	N/A	**Total Cost**	$0.08

Fuel Prices ($)	**Utility/Wholesale**	**Retail**	**Month/Year**
Diesel (1 gal)	$3.71	$3.95	FY14; 8-14
Other? (1 gal)			
Gasoline (1 gal)			
Propane (100#)		$89.76	8-14
Wood (1 cord)			
Pellets			
Discounts?			

Resource	**Potential**	**Certainty**	**Notes**
Hydroelectric	Medium	Medium	Moderate potential based on visual assessment.
Wind Diesel	Low	Medium	Wind models show low wind class near community. No met data.
Biomass	High	Medium	Productive forest in area; wood heating project under construction.
Solar	Low	Low	Residential/building-scale projects may be economic. Assess case by case.
Geothermal	Low	Low	No significant resource identified within 20 miles.
Oil and Gas	Medium	Low	Additional drilling in region underway. Previous wells have been inconclusive.
Coal	Low	Low	Known resources are of limited quality but have not been studied in detail.
Emerging Tech	Low	Low	
Heat Recovery	Low	High	No local electric generation.
Energy Efficiency	High	High	Opportunity from residential and commercial/public EE is high.

Bulk Fuel N/A

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

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

Housing Units	**Occupied**	**Vacant (Livable)**	**% Owner-Occup.**
	72	5	64%

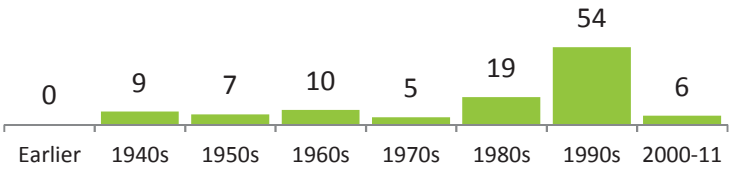
Regional Housing Authority	**Weatherization Service Provider**
Copper River Basin	Copper River Basin

Energy Profile: Chistochina

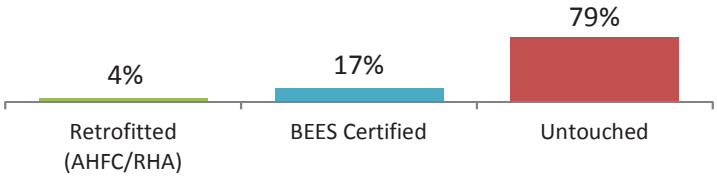
Housing Need	Overcrowded	1-star
	5.6%	N/A
Data Quality	Med.	

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

Age of Housing Stock (includes vacant)



Energy Efficient Housing Stock



Lighting	Owner	Number/Type	Retrofitted?	Year	Notes
N/A					

Non-residential Building Inventory

Building Name or Location	Year Built	Square Feet	Audited?	Retrofits Done?	In ARIS?
Church					
Community Hall					
Dumpster/Recycling Center					
Elementary School					
Fire Equip. Storage					
MSTC Offices					
MSTC Offices					
Power & Tel. Generator					
Rec. Center					
RV/Campground					
Village Office/Clinic					

Community Profile: Chitina

Municipality Unincorporated

Location

Mile 34 of the Edgerton Highway, 53 miles southeast of Copper Center. It lies outside the western boundary of the Wrangell-St. Elias National Park and Preserve, 66 miles southeast of Glennallen.

Longitude	-144.4369	**Latitude**	61.5158
ANCSA Region	Ahtna, Incorporated		
Borough	Unorganized		
Census Area	Valdez-Cordova Census Area		
School District	Copper River School District		

Alaska Native Name (definition)

Tsedi Na ("copper river")

Taxes	**Type (rate)**	**Per Capita Revenue**
	None	$0

Historical Setting / Cultural Resources

Athabascan Indians have reportedly occupied this region for the last 5,000 to 7,000 years. Archaeological sites are located to the south and east of Chitina. Rich copper deposits were discovered at the turn of the century along the northern flanks of the Chitina River Valley, bringing a rush of prospectors and homesteaders to the area.

Economy

Local government, trade/transportation/utilities, and leisure/hospitality are the main forms of employment. Thirty-six business licenses and 1 commercial fishing permit.

Climate	**Avg. Temp.**	**Climate Zone**	**Heating Deg. Day**
	29.2°	7	N/A

Natural Hazards Plan

N/A

Energy Priorities and Projects

Tribe: Five Mile Creek Hydroelectric Project: CDR complete (Next steps: site mapping, permitting, final design); Cannon Hill Wind feasibility; in-river hydrokinetic feasibility (future). CRBRHA and ACDC: Residential weatherization (2015-17).

Community Plans / Planning Studies	**Year**
Copper River Regional Energy Plan (Phase I)	2013
Ahtna Regional Biomass Opportunities (Draft)	2011
Copper River Resource Management Plan (BLM)	2010
Chitina Community Plan	2009

Local Contacts	**Email**	**Phone / Fax**
Chitina Native Corporation		907-823-2223 / 823-2202
Native Village of Chitina	nativevillageofchitina@yahoo.com	907-823-2215 / 823-2233
Copper River Native Assoc.		907- 822-3646

Demographics	**2000**	**2010**		
Population	123	126	**Median Household Income (2010)**	$ 31,250
Median Age	40	44	**% of Residents Employed (2013)**	55%
Avg. Household Size	3	3	**Low-Med Income (LMI) Percent (2014)**	81%
% Alaska Native	33%	31%	**Denali Commission Distressed Community (2013)**	Yes

Electric Utility	**Current Generation Sources**	**Connected by Intertie**	**PCE**
Chitina Electric, Inc.	Diesel	No	Yes

Landfill	**Class**	**Permited?**	**Location**	**Condition/Expected life**
Copper Basin Sanitation Co.	2	Yes	Glennallen	Good

Water/Wastewater System	**Water**	**Sewer**	**Energy Audit**	**Homes Served**	**System Volume**
N/A	Hauled	Private septic			

Road Access Edgerton and Richardson Highway

Air Access	**Runway**	**Surface**	**Lighted**	**Flight Rules**	**Condition**	**Air Miles (to Hub)**
State owned	2850'x75'	Gravel	No	None	good	53 mi (Copper Center)

Dock/Port Facilities	**Ferry Service**	**Barge Access**	**Marine Access Issues**
None	None	No	

Notes Senior bus service to Glennallen 1x/week. Some shuttle bus service. No scheduled air service to Anchorage, but several air taxis provide flights in summer to regional destinations. Improvments to gas station in future.

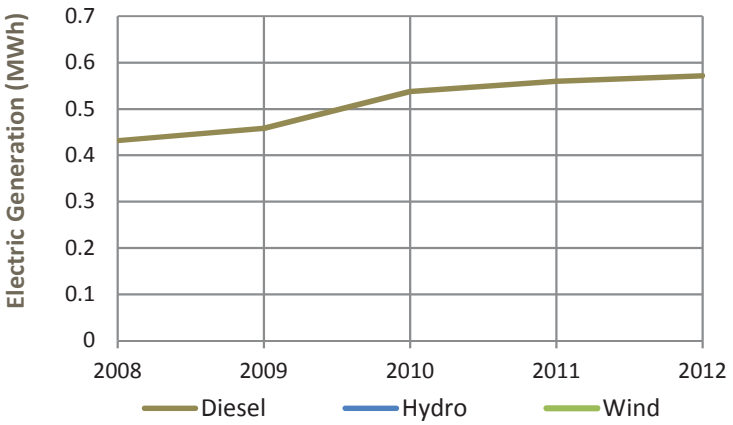
Energy Profile: Chitina

Power House

Utility	Chitina Electric Inc.		
Engine Make	**Model**	**Rated Capacity**	**Condition/Hrs**
Unit 1	Stamford	117KW	Good/11531
Unit 2	Stamford	117KW	Good/10474
Unit 3	Stamford	67KW	Good/2011
Unit 4			
Line Loss		6.10%	
Heat Recovery?	Yes - health clinic. BTU meter in place.		
Upgrades?		RPSU completed in 2011	
Outage History/Known Issues			

Power Production

Diesel (kWh/yr)	565,197	**Avg. Load (kW)**	46
Wind (kWh/yr)	0	**Peak Load (kW)**	102
Hydro (kWh/yr)	0	**Diesel Eff: kWh/gal**	12.21
Total (kWh/yr)	565,197	**Diesel Use (gals)**	46,277

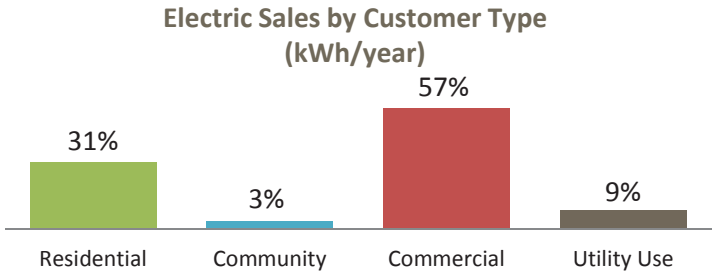


Operators

No. of Operators	Training/Certifications
4/2	PPO/APPO
2	Hydro; Elec. Util. Bus. Train
Maintenance Planning (RPSU)	Excellent

Electric Sales

	No. of Customers	kWh/year	kWh/Customer
Residential	55	166,403	3,026
Community	2	17,870	8,935
Commercial	33	300,970	9,120
Utility Use	N/A	45,658	N/A



Electric Rates ($/kWh)

Rate with PCE	$0.32
Residential	$0.71
Commercial	N/A

Cost per kWh Sold ($/kWh)

Fuel Cost	$0.41
Non-fuel Cost	$0.18
Total Cost	$0.59

Fuel Prices ($)

	Utility/Wholesale	Retail	Month/Year
Diesel (1 gal)	$4.17	$4.06 (#1)	FY14; 8-14
Other? (1 gal)		$3.90 (#2)	8-14
Gasoline (1 gal)			
Propane (100#)		$91.19	8-14
Wood (1 cord)			
Pellets			
Discounts?			

Resource

Resource	Potential	Certainty	Notes
Hydroelectric	High	High	Feasibility study completed for Fivemile Creek (300 kW potential)
Wind Diesel	Low	Medium	Moderate wind resource may exist, but access difficult. Less than 12 mos. data.
Biomass	Medium	Low	Productive forest nearby. Rough Benefit/Cost ratio moderate (1.25).
Solar	Low	Low	Residential/building-scale projects may be economic. Assess case by case.
Geothermal	Low	Low	No significant resource identified within 20 miles.
Oil and Gas	Medium	Low	Additional drilling in region underway. Previous wells have been inconclusive.
Coal	Low	Low	Potential high-quality deposits identified, but long distance to load.
Emerging Tech	Low	Low	Future potential for in-river hydrokinetic. Monitor technology developments.
Heat Recovery	Medium	Low	Heat recovery in place. Excess capacity exists, but no additional loads nearby.
Energy Efficiency	High	High	Opportunity from residential and commercial/public EE is high.

Bulk Fuel

N/A

Tank Owner	Fuel Type(s)	Capacity	Age/Condition

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

Housing Units

Occupied	Vacant	% Owner-Occup.
58	46	53%

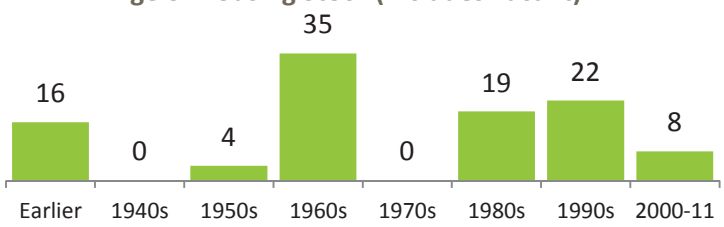
Regional Housing Authority	Weatherization Service Provider
Copper River Basin	Copper River Basin

Energy Profile: Chitina

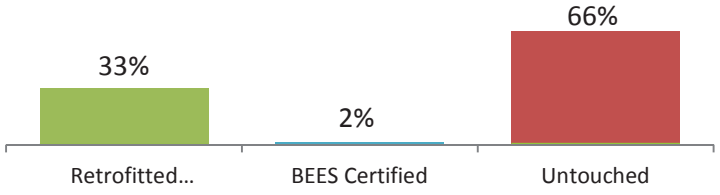
Housing Need	Overcrowded	1-star
	N/A	N/A
Data Quality	Low	

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

Age of Housing Stock (includes vacant)



Energy Efficient Housing Stock



Lighting	Owner	Number/Type	Retrofitted?	Year	Notes
N/A					

Non-residential Building Inventory

Building Name or Location	Year Built	Square Feet	Audited?	Retrofits Done?	In ARIS?
Chitina Community Hall		2,800			
Chitina Corporation Office		360			
Chitina Health Clinic		2,500			
Fire Hall		1,200			
Generator Building		280			
Gilpatrick's Hotel		13,500			
Gilpatrick's Hotel Chitina		8,000			
Holiness Church		1,200			
Maintenance Shop		3,600			
Post Office		576			
Tamal Building		540			
Uncle Tom's Tavern					
Wrangell View Store		400			

Community Profile: Copper Center

Municipality	Unincorporated

Location

Miles 101 and 105 of the Richardson Highway. It is on the west bank of the Copper River at the confluence of the Klutina River. It lies just west of the Wrangell-St. Elias National Park.

Longitude	-145.3053	**Latitude**	61.955
ANCSA Region	Ahtna Incorporated		
Borough	Unorganized		
Census Area	Valdez-Cordova Census Area		
School District	Copper River School District		

Alaska Native Name (definition)

Tl'aticae'e - were it hits the river

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

Historical Setting / Cultural Resources

The Ahtna people have occupied the Copper River basin for the past 5,000 to 7,000 years. Copper Center was a large Ahtna Athabascan village at one time. The Trail of '98 from Valdez joined with the Eagle Trail to Forty Mile and Dawson. Copper Center became the principal supply center for miners in the Nelchina-Susitna region. Athabascan Indians represent the primary Alaska Native group. There are two distinct settlements, a Native area and a non-Native area.

Economy

Local gov., trade, transportation, utilities, tourism and professional/business services are the largest employers. 145 business licenses and 9 comm.l fishing permits.

Climate	**Avg. Temp.**	**Climate Zone**	**Heating Deg. Days**
	26.6°	7	14,101

Natural Hazards Plan

Alaska Fire Plan

Alaska DMVA

Energy Priorities and Projects

Tribe: Develop biomass heating; complete construction of an energy efficient multipurpose recreational building; continue EE lighting upgrades; support development of renewables. CRBRHA and ACDC: Residential weatherization (2015-17).

Community Plans / Planning Studies	**Year**
Copper River Regional Energy Plan (Phase I)	2013
Ahtna Regional Biomass Opportunities (Draft)	2011
Copper River Resource Management Plan (BLM)	2010
Ahtna Regional Tribal Energy Strategy Overview	2009

Local Contacts	**Email**	**Phone / Fax**
Native Village of Kluti Kaah	nvkkadmin@cvinternet.net	907-822-5541 / 822-5130
Copper River Native Assoc.		907-822-5241 / 822-8803
Copper Country Alliance		

Demographics	**2000**	**2010**		
Population	362	328	**Median Household Income (2010)**	$ 59,375
Median Age	31	30	**% of Residents Employed (2013)**	56%
Avg. Household Size	3	3	**Low-Med Income (LMI) Percent (2014)**	57%
% Alaska Native	51%	50%	**Denali Commission Distressed Community (2013)**	No

Electric Utility	**Current Generation Sources**	**Connected by Intertie**	**PCE**
Copper Valley Electric Assoc.	Hydro, Diesel, Cogen	Yes	No

Landfill	**Class**	**Permited?**	**Location**	**Condition/Expected life**
Copper Basin Sanitation Co.	2	Yes	Glennallen	

Water/Wastewater System	**Water**	**Sewer**	**Energy Audit**	**Homes Served**	**System Volume**
Copper Center Safe Water	Wells; haul	Septic tank			

Road Access Richardson Highway

Air Access	**Runway**	**Surface**	**Lighted**	**Flight Rules**	**Condition**	**Air Miles (to Hub)**
State owned	2200' x 55'	Gravel	None	IFR	Fair	13.5 nm (Gulkana)

Dock/Port Facilities	**Ferry Service**	**Barge Access**	**Marine Access Issues**
None	No	No	

Notes

Energy Profile: Copper Center

Power House

Utility	Copper Valley Electric		
Generators	**Make/Model**	**Rated Capacity**	**Condition/Hrs**
Unit 1	N/A		
Unit 2			
Unit 3			
Unit 4			
Line Loss			
Heat Recovery?			
Upgrades?			

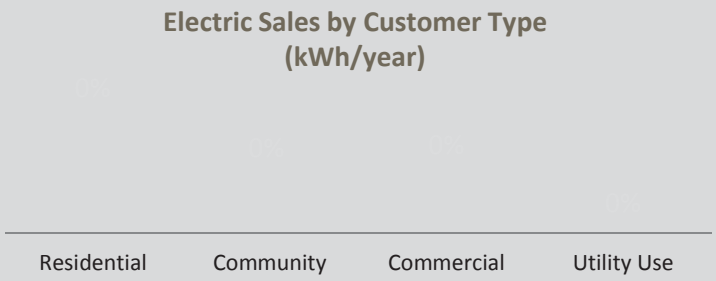
Outage History/Known Issues

No community production, PCE ineligible.

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

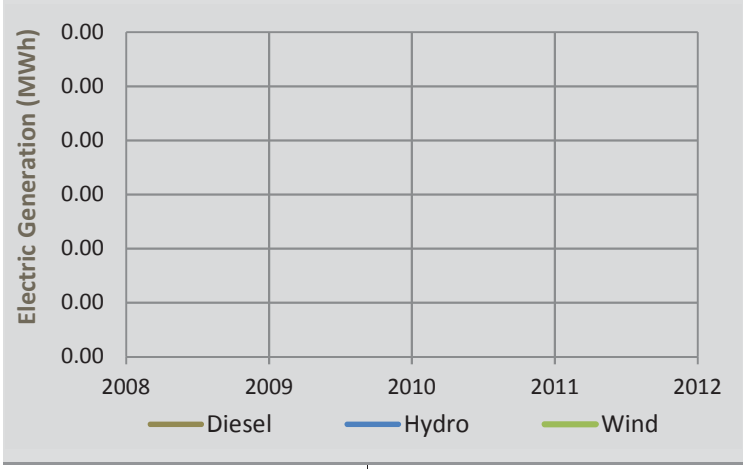
Maintenance Planning (RPSU)

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



Power Production

Diesel (kWh/yr)	0	**Avg. Load (kW)**	357
Wind (kWh/yr)	0	**Peak Load (kW)**	793
Hydro (kWh/yr)	0	**Diesel Eff: kWh/gal**	N/A
Total (kWh/yr)	0	**Diesel Use (gals)**	0



Electric Rates ($/kWh)		**Cost per kWh Sold ($/kWh)**
Rate with PCE	N/A	**Fuel Cost**
Residential	$0.18-$0.28	**Non-fuel Cost**
Commercial	N/A	**Total Cost**

Fuel Prices ($)	**Utility/Wholesale**	**Retail**	**Month/Year**
Diesel (1 gal)	N/A	$4.06	8-14
Other? (1 gal)			
Gasoline (1 gal)			
Propane (100#)		$91.67	8-14
Wood (1 cord)			
Pellets			
Discounts?			

Resource	**Potential**	**Certainty**	**Notes**	**Status**
Hydroelectric	Medium	Medium	Moderate potential based on visual assessment.	
Wind Diesel	Low	Medium	Wind models show low wind class near community. No met data.	
Biomass	Medium	Medium	Productive forest nearby. Pre-feasibility study completed.	
Solar	Low	Low	Residential/building-scale projects may be economic. Assess case by case.	
Geothermal	Low	Low	Nearby resource unlikely to be economically/technically viable (< 55 degrees).	
Oil and Gas	Medium	Low	Additional drilling in region underway. Previous wells have been inconclusive.	
Coal	Low	Low	Known resources are of limited quality but have not been studied in detail.	
Emerging Tech	Low	Low	Future potential for in-river hydrokinetic. Monitor technology developments.	
Heat Recovery	Low	High	No local electric generation.	
Energy Efficiency	High	High	Opportunity from residential EE is medium and commercial/public EE is high.	

Bulk Fuel N/A

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

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

Cooperative Purchasing Agreements

Housing Units	**Occupied**	**Vacant**	**% Owner-Occup.**
	117	97	55%

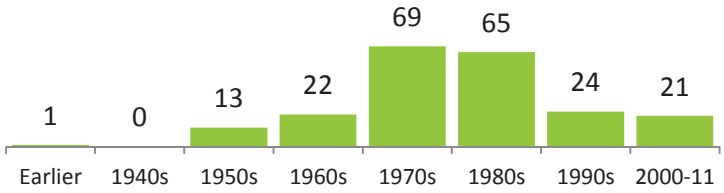
Regional Housing Authority	**Weatherization Service Provider**
Copper River Basin	Copper River Basin

Energy Profile: Copper Center

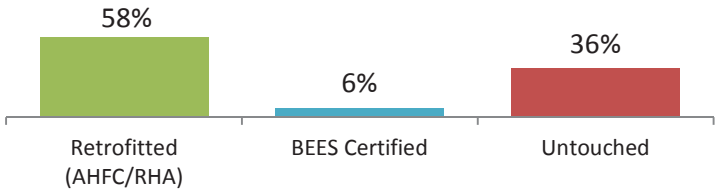
Housing Need	Overcrowded	1-star
	23.9%	12.9%
Data Quality	High	

Energy Use	Average Home Energy Rating	Average Square Feet	Avg. EUI (kBTU/sf)
	2-star plus	2,063	159

Age of Housing Stock (includes vacant)



Energy Efficient Housing Stock

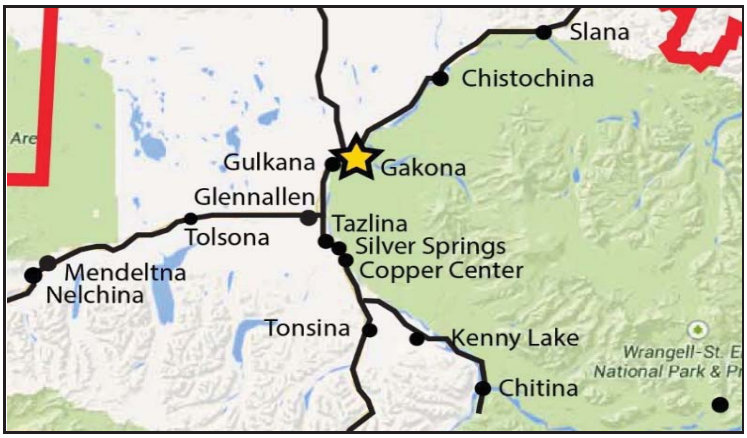


Lighting	Number/Type	Retrofitted?	Recommendation
School	(12) MH 400W Mag	No	Replace with T5 45.2" F28T5 28W Hi Lumen, sensor
School	(4) HPS 150W Mag	No	Replace with LED 20W Module, sensor
School	(4) MV 250W Mag.	No	Replace with LED 25W Module, sensor
School	(16) INCAN A Lamp, Std 75W	No	Replace with FLUOR CFL, Spiral 23W, sensor

Non-residential Building Inventory

Building Name or Location	Year Built	Square Feet	Audited?	Retrofits Done?	In ARIS?
Copper Center Post Office		2,400			
Copper Center School	1980	8,234	AHFC		
Copper River Princess Wilderness Lodge		61,300			
CRNA Office		18,000			
Fire Barn		2,400			
Head Start		2,887			
Kenny Lake Mercantile		1,783			
Kenny Lake Mercantile		1,508			
Kluti Kaah Health Clinic		932			
Kluti Kaah Health Community Hall		4,988			
Princess Lodge Maintenance Shop		3,850			

Community Profile: Gakona



Municipality Unincorporated

Location

At the confluence of the Copper and Gakona Rivers, 15 miles northeast of Glennallen. It lies at mile 2 on the Tok cutoff to the Glenn Highway, just east of the Richardson Highway.

Longitude	-145.3019	**Latitude**	62.3019
ANCSA Region	Ahtna, Incorporated		
Borough	Unorganized		
Census Area	Valdez-Cordova Census Area		
School District	None		

Alaska Native Name (definition)

Ggax Kuna'

Taxes

Type (rate)	Per-Capita Revenue
None	$0.00

Historical Setting / Cultural Resources

Ahtna Athabascans have lived in the Copper River basin for 5,000 to 7,000 years. Gakona served as a wood and fish camp and later became a permanent village. In 1904 Doyle's Roadhouse was constructed at the junction of the Valdez-Eagle and Valdez-Fairbanks Trails and became an essential stopping point for travelers. The community has a commercial district, a non-Native residential area, and an Athabascan village.

Economy

Local government, professional/business services, and natural resources/mining are the main employers. 81 business licenses and 4 commercial fishing permits.

Climate	Avg. Temp.	Climate Zone	Heating Deg. Days
	27.6°	7	13,534

Natural Hazards Plan

N/A

Energy Priorities and Projects

Tribe: Develop biomass heating loop for Buster Green Memorial Facility (BGMF), garage, several homes. Install LED lighting throughout BGMF; study feasibility of adding solar panels. Small EE home design. ACDC: Residential weatherization (2015-17).

Community Plans / Planning Studies	Year
Copper River Regional Energy Plan (Phase I)	2013
Availability of Biomass Fuels on Ahtna Lands (DNR)	2011
Native Village of Gakona Energy Plan	2010
Copper River Resource Management Plan (BLM)	2010

Local Contacts	Email	Phone / Fax
Native Village of Gakona	gakonavc@cvinternet.net	907-822-5777 / 822-5997
Copper River Native Assoc.		907-822-5241 / 822-8803

Demographics	2000	2010		
Population	215	218	Median Household Income (2010)	$ 98,750
Median Age	41	50	% of Residents Employed (2013)	50%
Avg. Household Size	3	3	Low-Med Income (LMI) Percent (2014)	56%
% Alaska Native	18%	20%	Denali Commission Distressed Community (2013)	No

Electric Utility	CurrentGeneration Sources	Connected by Intertie	PCE
Copper Valley Electric Assoc.	Hydro, Diesel, Cogen	Yes	No

Landfill	Class	Permited?	Location	Condition/Expected life
Copper Basin Sanitation Co.	2	Yes	10 miles south of Gakona	

Water/Wastewater System	Water	Sewer	Energy Audit	Homes Served	System Volume
N/A	Wells	Septic tanks			

Road Access Glenn Highway

Air Access	Runway	Surface	Lighted	Flight Rules	Condition	Air Miles (to Hub)
None						

Dock/Port Facilities	Ferry Service	Barge Access	Marine Access Issues
None	No	No	

Notes All home have individual wells and artesian wells are common; water table is relatively shallow.

Tribe manages recycling program with EPA IGAP funds. Pellet stove provides supplemental heat in BGMF multipurpose center.

Energy Profile: Gakona

Power House

Utility	Copper Valley Electric		
Generators	**Make/Model**	**Rated Capacity**	**Condition/Hrs**
Unit 1	N/A		
Unit 2			
Unit 3			
Unit 4			
Line Loss			
Heat Recovery?			
Upgrades?			

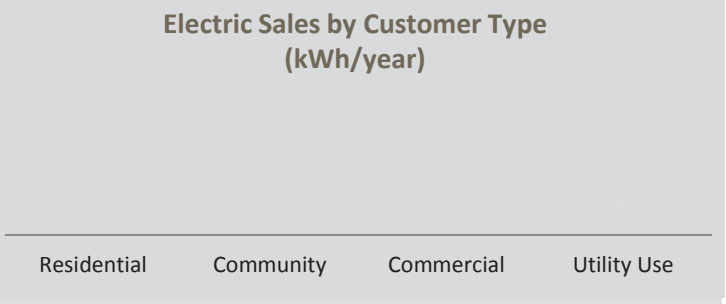
Outage History/Known Issues

No community production, PCE ineligible.

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

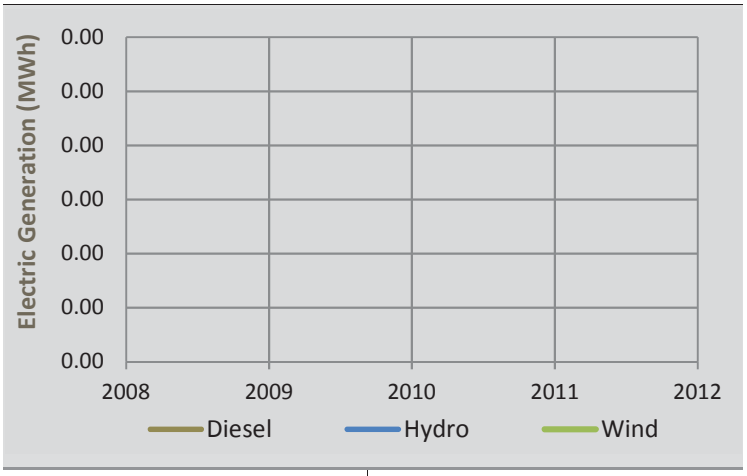
Maintenance Planning (RPSU)

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



Power Production

Diesel (kWh/yr)	0	**Avg. Load (kW)**	267
Wind (kWh/yr)	0	**Peak Load (kW)**	593
Hydro (kWh/yr)	0	**Diesel Eff: kWh/gal**	N/A
Total (kWh/yr)	0	**Diesel Use (gals)**	0



Electric Rates ($/kWh)		**Cost per kWh Sold ($/kWh)**
Rate with PCE	N/A	**Fuel Cost**
Residential	$0.18-$0.28	**Non-fuel Cost**
Commercial	N/A	**Total Cost**

Fuel Prices ($)	**Utility/Wholesale**	**Retail**	**Month/Year**
Diesel (1 gal)	N/A	$3.95	8-14
Other? (1 gal)			
Gasoline (1 gal)			
Propane (100#)		$91.67	8-14
Wood (1 cord)			
Pellets			
Discounts?			

Resource	**Potential**	**Certainty**	**Notes**
Hydroelectric	Low	Medium	Low potential based on visual assessment.
Wind Diesel	Low	High	Low wind class near community based on met tower study.
Biomass	Medium	Medium	Productive forest nearby. Pre-feasibility study completed.
Solar	Low	Low	Residential/building-scale projects may be economic. Assess case by case.
Geothermal	Low	Low	Nearby resource unlikely to be economically/technically viable (< 55 degrees).
Oil and Gas	Medium	Low	Additional drilling in region underway. Previous wells have been inconclusive.
Coal	Low	Low	Known resources are of limited quality but have not been studied in detail.
Emerging Tech	Low	Low	Future potential for in-river hydrokinetic. Monitor technology developments.
Heat Recovery	Low	High	No local electric generation.
Energy Efficiency	High	High	Opportunity from residential and commercial/public EE is high.

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

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

Housing Units	**Occupied**	**Vacant**	**% Owner-Occup.**
	98	55	83%

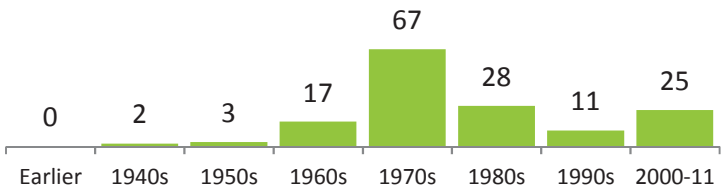
Regional Housing Authority	**Weatherization Service Provider**
Copper River Basin	Copper River Basin

Energy Profile: Gakona

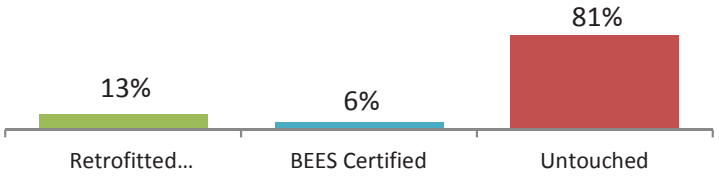
Housing Need	Overcrowded	1-star
	5.1%	11.8%
Data Quality	Med.	

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

Age of Housing Stock (includes vacant)



Energy Efficient Housing Stock



Lighting	Owner	Number/Type	Retrofitted?	Year	Notes
N/A					

Non-residential Building Inventory

Building Name or Location	Year Built	Square Feet	Audited?	Retrofits Done?	In ARIS?
Buster Gene Memorial Facility (NV of Gakona)		6000			
Fire Barn #1		2400			
Fire Office Training Center		928			
Gakona Lodge (comemrcial, summer only)		5900			
Gakona Lodge Bar (commercial)		850			
Recreation Center (NV of Gakona)		276			
Village Council Office					
Child Advocacy Center (OCS)					
New Garage (NV of Gakona)		864			

Community Profile: Glennallen

Municipality Unincorporated

Location

Lies along the Glenn Highway at its junction with the Richardson Highway, 189 road miles east of Anchorage. It is located just outside the western boundary of Wrangell-St. Elias National Park.

Longitude	-145.5464	**Latitude**	62.1092
ANCSA Region	Ahtna, Incorporated		
Borough	Unorganized		
Census Area	Valdez-Cordova Census Area		
School District	Copper River School District		

Alaska Native Name (definition)

Ciisik'e Na'

Taxes

Type (rate)	Per-Capita Revenue
None	$0.00

Historical Setting / Cultural Resources

The name was derived from Maj. Edwin Glenn and Lt. Henry Allen, both leaders in the early American explorations of the Copper River region. It is one of the few communities in the region that was not built on the site of a Native village. The area has historically been occupied by the Ahtna, although Glennallen is currently a non-Native community.

Economy

Trade transportation and utilities, education/health services, and local government are main employers. 200 business licenses and 3 commercial fishing permits.

Climate	Avg. Temp.	Climate Zone	Heating Deg. Days
	23.3°	7	14,167

Natural Hazards Plan

Glennallen Local Hazard Mitigation Plan	2011
Community Wildfire Protection Plan	2009

Energy Priorities and Projects

Ahtna: LNG demo, solar P/V project. CRSD: EE upgrades at school & admin bldg (FY16 CIP request); CVEA: Replace older diesel generators (2016). (2015). Fisher Fuel: 24-hr depot; Hub of Alaska solar P/V. ACDC: Residential weatherization (2015-17).

Community Plans / Planning Studies	Year
Copper River Regional Energy Plan (Phase I)	2013
Copper River Resource Management Plan (BLM)	2010
Forest Resources/State Lands, Preliminary	2010
Copper River Area Plan 2010-2015 (CVDA)	2009

Local Contacts	Email	Phone / Fax
Copper Valley Development Assoc.		907-822-5001 / 822-5009
Copper Valley Chamber		907-822-5555 / 822-5558

Demographics	2000	2010		
Population	554	483	Median Household Income (2010)	$ 45,688
Median Age	33	38	% of Residents Employed (2013)	61%
Avg. Household Size	3	3	Low-Med Income (LMI) Percent (2014)	60%
% Alaska Native	12%	16%	Denali Commission Distressed Community (2013)	No

Electric Utility	Current Generation Sources	Connected by Intertie	PCE
Copper Valley Electric Assoc.	Hydro, Diesel	Yes	No

Landfill	Class	Permited?	Location	Condition/Expected life
Copper Basin Sanitation Co.	2	Yes	Glennallen	

Water/Wastewater System	Water	Sewer	Energy Audit	Homes Served	System Volume
The Glennallen	Wells; piped	Piped; septic tank		197	

Road Access Glenn and Richardson Highway - open year round

Air Access	Runway	Surface	Lighted	Flight Rules	Condition	Air Miles (to Hub)
See Gulkana						

Dock/Port Facilities	Ferry Service	Barge Access	Marine Access Issues
	No	No	

Notes

Energy Profile: Glennallen

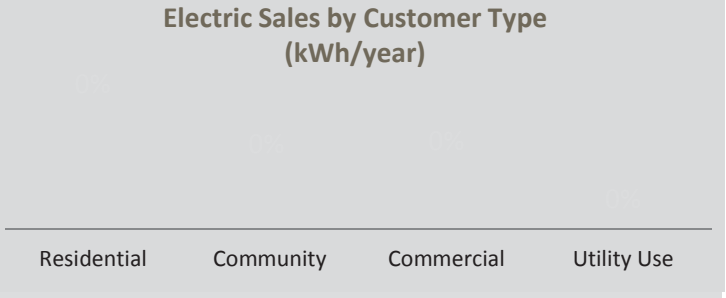
Power House

Utility	Copper Valley Electric		
Generators	**Make/Model**	**Rated Capacity**	**Condition/Hrs**
Unit 1	N/A		
Unit 2			
Unit 3			
Unit 4			
Line Loss	N/A		
Heat Recovery?	No		
Upgrades?			
Outage History/Known Issues			

Operators	No. of Operators	Training/Certifications
N/A		

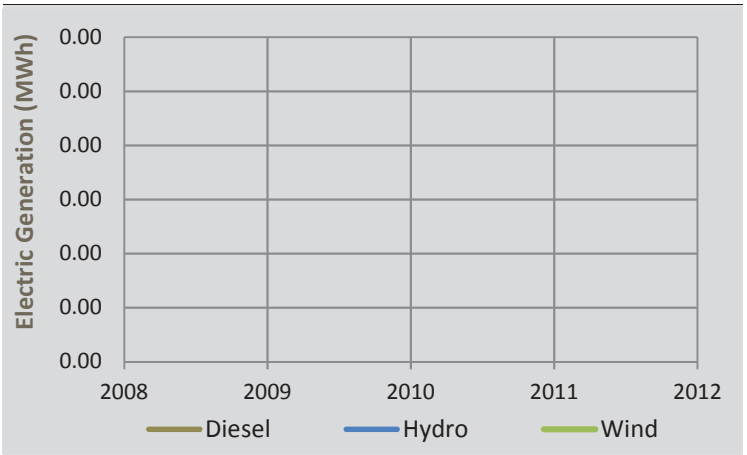
Maintenance Planning (RPSU)

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



Power Production

Diesel (kWh/yr)	N/A	**Avg. Load (kW)**	551
Wind (kWh/yr)	0	**Peak Load (kW)**	1225
Hydro (kWh/yr)	0	**Diesel Eff: kWh/gal**	14.9
Total (kWh/yr)	N/A	**Diesel Use (gals)**	670,687



Electric Rates ($/kWh)		Cost per kWh Sold ($/kWh)	
Rate with PCE	N/A	**Fuel Cost**	N/A
Residential	$0.18-$0.28	**Non-fuel Cost**	N/A
Commercial	N/A	**Total Cost**	N/A

Fuel Prices ($)	Utility/Wholesale	Retail	Month/Year
Diesel (1 gal)	N/A	4.06 (#1)	8-14
Other? (1 gal)		$3.23 (ULSD)	2-15
Gasoline (1 gal)		$2.97 (unleaded)	2-15
Propane (100#)		$91.19	8-14
Wood (1 cord)			
Pellets			
Discounts?			

Resource	Potential	Certainty	Notes
Hydroelectric	Low	Medium	Low potential based on visual assessment.
Wind Diesel	Low	Medium	Wind models show low wind class near community. No met data.
Biomass	Medium	Medium	Productive forest nearby. Pre-feasibility study completed.
Solar	Low	Low	Residential/building-scale projects may be economic. Assess case by case.
Geothermal	Low	Low	Nearby resource unlikely to be economically/technically viable (< 55 degrees).
Oil and Gas	Medium	Low	Additional drilling in region underway. Previous wells have been inconclusive.
Coal	Low	Low	Known resources are of limited quality but have not been studied in detail.
Emerging Tech	Low	Low	
Heat Recovery	High	Medium	Recoverable heat available with nearby thermal loads.
Energy Efficiency	High	High	Opportunity from residential and commercial/public EE is high.

Bulk Fuel

Tank Owner	Fuel Type(s)	Capacity	Age/Condition

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

Housing Units	Occupied	Vacant	% Owner-Occup.
	213	135	85%

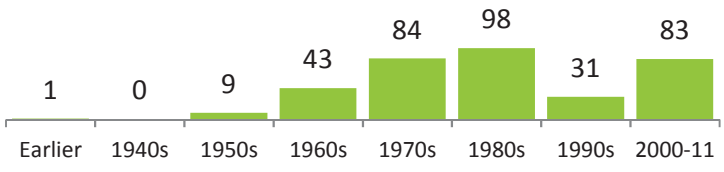
Regional Housing Authority	Weatherization Service Provider
Copper River Basin	Copper River Basin

Energy Profile: Glennallen

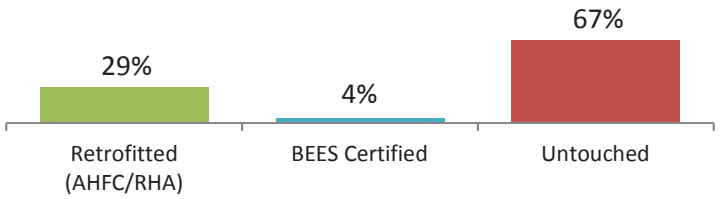
Housing Need	Overcrowded	1-star
	10.8%	11.8%
Data Quality	High	

Energy Use	Average Home Energy Rating	Average Square Feet	Avg. EUI (kBTU/sf)
	2-star plus	1,521	150

Age of Housing Stock (includes vacant)



Energy Efficient Housing Stock



Lighting	Owner	Number/Type	Recommended Replacement	Retrofitted?
CRSD District	CRSD District	See Energy Audit report	See Energy Audit report	N/A
K-12 School	CRSD District	See Energy Audit report	See Energy Audit report	N/A

Non-residential Building Inventory

Building Name or Location	Year Built	Square Feet	Audited?	Retrofits Done?	In ARIS?
ADF&G Offices					
ADF&G Quarters					
ADF&G Storage					
AHTNA Office					
AHTNA Office					
Alascom Bldg.					
Auto Repair Shop					
Auto Shop					
Beauty Shop					
BLM Offices					
BLM Shops					
Bus Garage Storage					
Café					
Caribou Café					
Caribou Gift Store					
Caribou Hotel					
Church					
Church					
Community College					
CRSD District Office	1961		AHFC		
CVCC/Visitor Center					
CVE Co-op Office					
CVE Gen. Plant					
CVE Shops					
Fire Dept.					
Fireworks Stand					
Gas Station					
Gas Station					
Gas Station/Gift Shop					
Glennallen Chiropractic					
Glennallen K-12 School	1975		AHFC		
Grocery Store					
KCAM Radio Station (Old)					
Laundry Mat/DMV					

Energy Profile: Glennallen

Library/Cabin
Library/LIO
Log Cabin
Lumber Yard
Maint. Shop
Medical Center
Office Space
Offices
Park Serv. Shop
Recycle & Storage Van
Rental Cabins
Retail Store
RV Park
School Dist.
SEND Intl. Offices
Shops
Six Plex
State Job Service
Storage
Storage
Telephone Co-op Office/Yard
Tennis Court
Warehouse

Community Profile: Gulkana

Municipality	Unincorporated

Location

Located on the east bank of the Gulkana (Kulkana) River at its confluence with the Copper River. It lies at mile 127 of the Richardson Highway, 14 miles north of Glennallen.

Longitude	-145.3822	**Latitude**	62.2714
ANCSA Region	Ahtna, Inc.		
Borough	Unorganized		
Census Area	Valdez-Cordova Census Area		
School District	Copper River School District		

Alaska Native Name (definition)

C'uul C'ena'

Taxes	**Type (rate)**	**Per-Capita Revenue**
No		

Historical Setting / Cultural Resources

The Ahtna people have occupied this area for 5,000 to 7,000 years. Gulkana was originally established in 1903 as a telegraph station and was named "Kulkana" after the nearby river. Gulkana was originally located across the river from its present site; it was cut in half by construction of the Richardson Highway during World War II. Gulkana is an Athabascan village. Subsistence activities supplement incomes.

Economy

Local government and professional/business services are main employers. No commercial fishing permits or business licenses listed.

Climate	**Avg. Temp.**	**Climate Zone**	**Heating Deg. Days**
	28.2°	7	14,004

Natural Hazards Plan

N/A

Energy Priorities and Projects

Tribe: Complete pellet/briquette mill. Assess connections to existing heat loop. Energy upgrades to community hall. Increase residential EE program use. ANTHC: water and sewer energy audit/upgrades. CRBRHA: Residential weatherization (2015-17).

Community Plans / Planning Studies	**Year**
Copper River Regional Energy Plan (Phase I)	2013
Availability of Biomass Fuels on Ahtna Lands (DN	2011
Ahtna Regional Biomass Opportunities (Draft)	2011
Ahtna Regional Tribal Energy Strategy Overview	2009

Local Contacts	**Email**	**Phone**	**Fax**
Gulkana Village Council	admin@gulkanacouncil.org	907-822-3746	907-822-3976
Copper River Native Assoc.		907-822-5241	907-822-8803

Demographics	**2000**	**2010**		
Population	88	119	**Median Household Income (2010)**	$63,750
Median Age	34	26.3	**% of Residents Employed (2013)**	55%
Avg. Household Size	3	3.31	**Percent Alaska Native/American Indian (2010)**	76%
Median Household Income	N/A	6375000%	**Low and Moderate Income (LMI) Percent (2014)**	80%

Electric Utility	**Current Generation Sources**	**Connected by Intertie**	**PCE**
Copper Vally Electric Assoc.	Hydro, Diesel, Cogen	Yes	No

Landfill	**Class**	2	**Permitted?**	Yes	**Location**	Glennallen

Water/Wastewater System	Gulkana Village	**Homes Served**	**System Volume**
Water	Well	35	10,000- 50,000 gal/day
Sewer	Covered haul	**Energy Audit?**	
Notes		No	

Access

Road	Richardson Highway (open year round)				
Air Access	State owned; asphalt	**Runway**	5001'x100'		
Dock/Port	No	**Barge Access?**	No	**Ferry Service?**	No

Notes

Energy Profile: Gulkana

Power House

Utility	Copper Valley Electric		
Generators	**Make/Model**	**Rated Capacity**	**Condition/Hrs**
Unit 1	N/A		
Unit 2			
Unit 3			
Unit 4			
Line Loss			
Heat Recovery?			
Upgrades?			

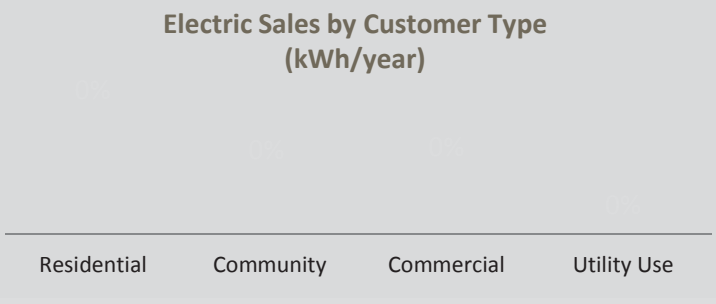
Outage History/Known Issues

No community production, PCE ineligible.

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

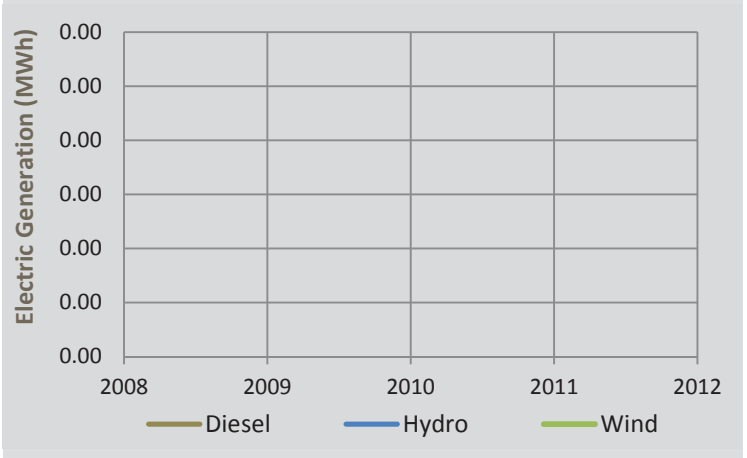
Maintenance Planning (RPSU)

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



Power Production

Diesel (kWh/yr)	0	**Avg. Load (kW)**	271
Wind (kWh/yr)	0	**Peak Load (kW)**	601
Hydro (kWh/yr)	0	**Diesel Eff: kWh/gal**	N/A
Total (kWh/yr)	0	**Diesel Use (gals)**	0



Electric Rates ($/kWh)		**Cost per kWh Sold ($/kWh)**
Rate with PCE	N/A	**Fuel Cost**
Residential	$0.18-$0.28	**Non-fuel Cost**
Commercial	N/A	**Total Cost**

Fuel Prices ($)	**Utility/Wholesale**	**Retail**	**Month/Year**
Diesel (1 gal)	N/A	$3.95	8-14
Other? (1 gal)			
Gasoline (1 gal)			
Propane (100#)		$91.67	8-14
Wood (1 cord)			
Pellets			
Discounts?			

Resource	**Potential**	**Certainty**	**Notes**
Hydroelectric	Low	Medium	Low potential based on visual assessment.
Wind Diesel	Low	Medium	Wind models show low wind class near community. No met data.
Biomass	High	High	Productive forest nearby. Heating project in place. Pellet mill/study underway.
Solar	Low	Low	Residential/building-scale projects may be economic. Assess case by case.
Geothermal	Low	Low	Nearby resource unlikely to be economically/technically viable (< 55 degrees).
Oil and Gas	Medium	Low	Additional drilling in region underway. Previous wells have been inconclusive.
Coal	Low	Low	Known resources are of limited quality but have not been studied in detail.
Emerging Tech	Low	Low	
Heat Recovery	Low	High	No local electric generation.
Energy Efficiency	High	High	Opportunity from residential EE is medium and commercial/public EE is high.

Bulk Fuel N/A

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

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

Cooperative Purchasing Agreements

Housing Units	**Occupied**	**Vacant**	**% Owner-Occup.**
	33	18	85%

Regional Housing Authority	**Weatherization Service Provider**
Copper River Basin	Copper River Basin

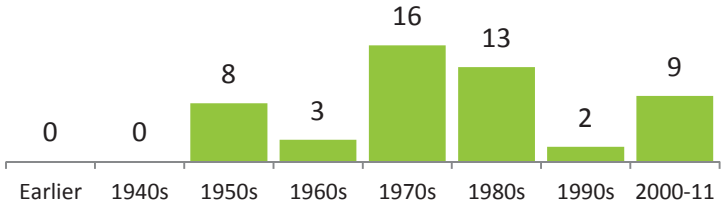
Energy Profile: Gulkana

Housing Need	Overcrowded	1-star
	18.2%	N/A

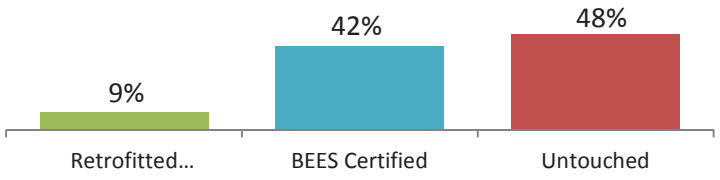
Data Quality	Medium

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

Age of Housing Stock (includes vacant)



Energy Efficient Housing Stock



Lighting	Owner	Number/Type	Retrofitted?	Year	Notes
N/A					

Non-residential Building Inventory

Building Name or Location	Year Built	Square Feet	Audited?	Retrofits Done?	In ARIS?
Community Hall					
Teen Center					
Clinic					
Chapel					
Maint. Shop					

Community Profile: Kenny Lake

Municipality Unincorporated

Location

Lies off of the Richardson Highway, between miles 1 and 22 on the Edgerton Highway and between miles 1 and 11 of the Old Edgerton Highway. It is along the preferred route into the Wrangell-St. Elias National Park.

Longitude	-144.8523	**Latitude**	61.6836
ANCSA Region	Ahtna, Incorporated		
Borough	Unorganized		
Census Area	Valdez-Cordova Census Area		
School District	Copper River School District		

Alaska Native Name (definition)

N/A

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

Historical Setting / Cultural Resources

The Ahtna people occupied the region historically. The area was settled in the 1960s by a number of homesteaders due to the rich fertile soil and agricultural potential. There are still four original homesteaders farming their land. Until the 1970s, the Old Edgerton Highway was the only road into Kenny Lake. Kenny Lake was built as an agricultural community.

Economy

Local government, trade transportation/utilities, and state government are the main employers. 12 business licenses and no commercial fishing permits.

Climate	**Avg. Temp.**	**Climate Zone**	**Heating Deg. Days**
	26.1°	7	14,036

Natural Hazards Plan

N/A

Energy Priorities and Projects

CRSD: EE upgrades at school (FY16 CIP request). Public input: Address need for 3-phase power.

Community Plans / Planning Studies	**Year**
Copper River Regional Energy Plan (Phase I)	2013
Copper River Resource Management Plan (BLM)	2010
Forest Resources/State Lands, Preliminary	2010
Community Plan for the Greater Kenny Lake Area	2007

Local Contacts	**Email**	**Phone / Fax**
Kenny Lake Community League		907-822-5313

Demographics	**2000**	**2010**
Population	410	355
Median Age	37	54
Avg. Household Size	3	3
% Alaska Native	13%	14%

Median Household Income (2010)	$ 63,438
% of Residents Employed (2013)	39%
Low-Med Income (LMI) Percent (2014)	69%
Denali Commission Distressed Community (2013)	Yes

Electric Utility	**Current Generation Sources**	**Connected by Intertie**	**PCE**
Copper Valley Electric Assoc.	Hydro, Diesel, Cogen	Yes	No

Landfill	**Class**	**Permited?**	**Location**	**Condition/Expected life**
Copper Basin Sanitation Co.	2	Yes	Glennallen	

Water/Wastewater System	**Water**	**Sewer**	**Energy Audit**	**Homes Served**	**System Volume**
Kenny Lake Community League	Well; hauled	Septic tanks			

Road Access Edgerton Highway

Air Access	**Runway**	**Surface**	**Lighted**	**Flight Rules**	**Condition**	**Air Miles (to Hub)**
None						

Dock/Port Facilities	**Ferry Service**	**Barge Access**	**Marine Access Issues**
None	No	No	

Notes

Energy Profile: Kenny Lake

Power House

Utility	Copper Valley Electric		
Generators	**Make/Model**	**Rated Capacity**	**Condition/Hrs**
Unit 1	N/A		
Unit 2			
Unit 3			
Unit 4			
Line Loss			
Heat Recovery?			
Upgrades?			

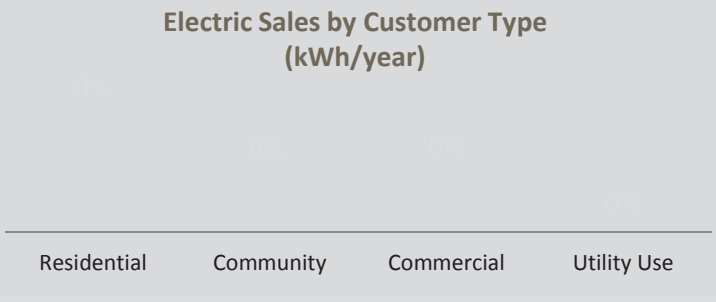
Outage History/Known Issues

No community production, PCE ineligible.

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

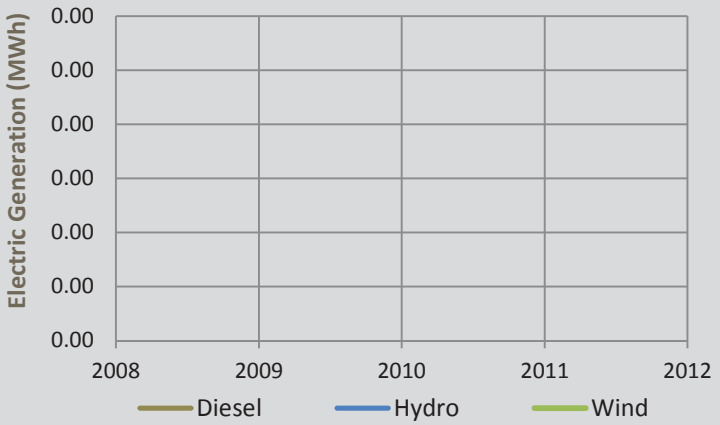
Maintenance Planning (RPSU)

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



Power Production

Diesel (kWh/yr)	0	**Avg. Load (kW)**	522
Wind (kWh/yr)	0	**Peak Load (kW)**	1160
Hydro (kWh/yr)	0	**Diesel Eff: kWh/gal**	N/A
Total (kWh/yr)	0	**Diesel Use (gals)**	0



Electric Rates ($/kWh)		**Cost per kWh Sold ($/kWh)**
Rate with PCE	N/A	**Fuel Cost**
Residential	$0.18-$0.28	**Non-fuel Cost**
Commercial	N/A	**Total Cost**

Fuel Prices ($)	**Utility/Wholesale**	**Retail**	**Month/Year**
Diesel (1 gal)	N/A	$3.95	8-14
Other? (1 gal)			
Gasoline (1 gal)			
Propane (100#)		$92.86	8-14
Wood (1 cord)			
Pellets			
Discounts?			

Resource	**Potential**	**Certainty**	**Notes**
Hydroelectric	Low	Medium	Low potential based on visual assessment.
Wind Diesel	Low	Medium	Wind models show low wind class near community. No met data.
Biomass	High	High	Productive forest nearby; wood heating project (school) in place.
Solar	Low	Low	Residential/building-scale projects may be economic. Assess case by case.
Geothermal	Low	Low	No significant resource identified within 20 miles.
Oil and Gas	Medium	Low	Additional drilling in region underway. Previous wells have been inconclusive.
Coal	Low	Low	Known resources are of limited quality but have not been studied in detail.
Emerging Tech	Low	Low	
Heat Recovery	Low	High	No local electric generation.
Energy Efficiency	High	High	Opportunity from residential and commercial/public EE is high.

Bulk Fuel

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

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

Housing Units	**Occupied**	**Vacant**	**% Owner-Occup.**
	95	117	82%

Regional Housing Authority	**Weatherization Service Provider**
Copper River Basin	Copper River Basin

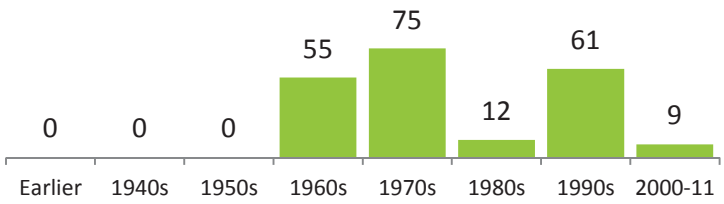
Energy Profile: Kenny Lake

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

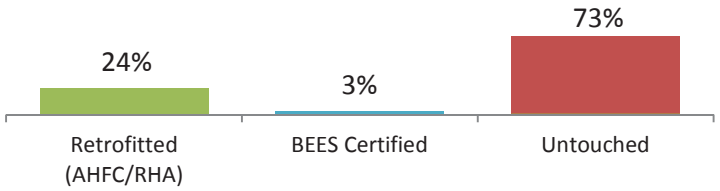
Energy Use	Average Home Energy Rating	Average Square Feet	Avg. EUI (kBTU/sf)
	N/A	N/A	N/A

Data Quality

Age of Housing Stock (includes vacant)



Energy Efficient Housing Stock

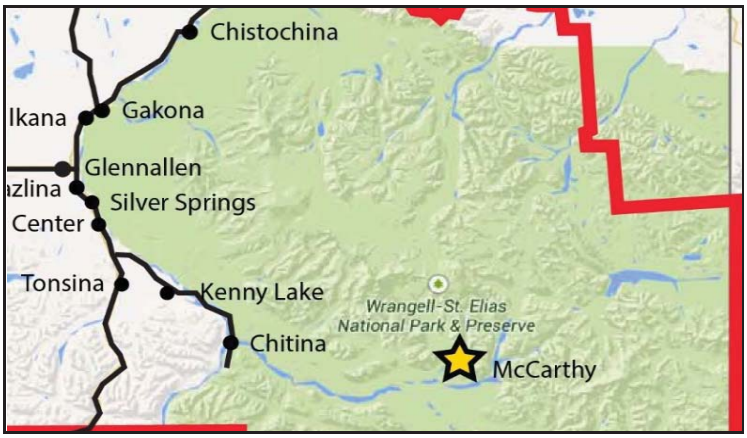


Lighting	Number/Type	Retrofitted?	Recommendation
School	(24) T5 45.2" F54W/T5 HO Std	No	Replace with T5 45.2" F54W/T5 HO HE with sensor
School	Exterior HPS-16 HPS 250W	No	Replace with LED 115W, sensor
School	(36) T8 4' F32T8 32W	No	Replace with F32T8 28W Energy Saver

Non-residential Building Inventory

Building Name or Location	Year Built	Square Feet	Audited?	Retrofits Done?	In ARIS?
Equipment Storage		960			
Fire Hall		2400			
Golden Spruce Cabins		1600			
Kenny Lake Community Chapel		8496			
Kenny Lake Community Hall		1800			
Kenny Lake Laundry and Hotel		1750			
Kenny Lake Library		1500			
Kenny Lake Mercantile		1500			
Kenny Lake School	1975	34170	AHFC		
Manager's Country Store		1800			
Mountain View Baptist Church		1400			
Multi Purpose Bldg		2400			
Old Community Hall		1000			
Regal Enterprises Shop		3200			
Regal Sawmill		3200			
Regal Sawmill Kiln		320			
SAPA School		2880			
SAPA Worship Center		6912			
Terry's Greenhouse		2600			
Warehouse Moulder Bldg		3200			
Wenger's Country Store		1800			

Community Profile: McCarthy



Municipality Unincorporated

Location

Lies 61 miles east of Chitina off the Edgerton Highway. 12 miles northeast of the junction of the Nizina and Chitina Rivers, in the heart of the Wrangell-St. Elias National Park and Preserve.

Longitude	-142.9217	**Latitude**	61.4333
ANCSA Region	Ahtna, Incorporated (not part of Ahtna)		
Borough	Unorganized		
Census Area	Valdez-Cordova Census Area		
School District	None DCRA		

Alaska Native Name (definition)

N/A

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

Historical Setting / Cultural Resources

Kennecott copper mines and camp were established about 1908 across from the Kennicott Glacier, 4.5 miles up the mountain from McCarthy. Since no gambling or drinking were allowed at the town of Kennicott, nearby McCarthy developed as a colorful diversion for the miners. Over its 30-year operation, $200 million in ore was extracted from Kennecott. In 1938, the mines closed and both towns were abandoned. The area ranks as one of the nation's most endangered landmarks by the National Trust for Historic Preservation.

Economy

Education/health services, leisure/hospitality, and construction are top employers. 27 business licenses and no commercial fishing licenses.

Climate	**Avg. Temp.**	**Climate Zone**	**Heating Deg. Days**
	35.9°	7	13,053

Natural Hazards Plan

N/A

Energy Priorities and Projects

NPS: Kennecott Mine solar P/V project (2015). From Phase I: McCarthy Lodge/Ma Johnson's Hotel diesel generation project (feasibility), residental stand alone renewables, recycling and garbage project, FireWIse program.

Community Plans / Planning Studies	**Year**
Copper River Regional Energy Plan (Phase I)	2013
Copper River Resource Management Plan (BLM)	2010
Forest Resources/State Lands, Preliminary	2010
Copper River Area Plan 2010-2015 (CVDA)	2009

Local Contacts	**Email**	**Phone / Fax**
McCarthy Area Council		907-554-4511

Demographics	**2000**	**2010**		
Population	42	28	**Median Household Income (2010)**	$ 145,069
Median Age	47	listed 0	**% of Residents Employed (2013)**	45%
Avg. Household Size	2	2	**Low-Med Income (LMI) Percent (2014)**	91%
% Alaska Native	0%	3%	**Denali Commission Distressed Community (2013)**	Yes

Electric Utility	**Current Generation Sources**	**Connected by Intertie**	**PCE**
None	Individual self-generation (diesel, solar, etc.)	No	No

Landfill	**Class**	**Permited?**	**Location**	**Condition/Expected life**
None available, haul garbage				

Water/Wastewater System	**Water**	**Sewer**	**Energy Audit**	**Homes Served**	**System Volume**
None	Hauled	Septic tanks, outhouses			

Road Access No

Air Access	**Runway**	**Surface**	**Lighted**	**Flight Rules**	**Condition**	**Air Miles (to Hub)**
State owned	3500' x 60'	Gravel	None	None	Fair	61 miles (Chitina)

Dock/Port Facilities	**Ferry Service**	**Barge Access**	**Marine Access Issues**
None	No	No	

Notes

Energy Profile: McCarthy

Power House

Utility	N/A		
Generators	**Make/Model**	**Rated Capacity**	**Condition/Hrs**
Unit 1	N/A		
Unit 2			
Unit 3			
Unit 4			
Line Loss			
Heat Recovery?			
Upgrades?			

Outage History/Known Issues

No community production, PCE ineligible.

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

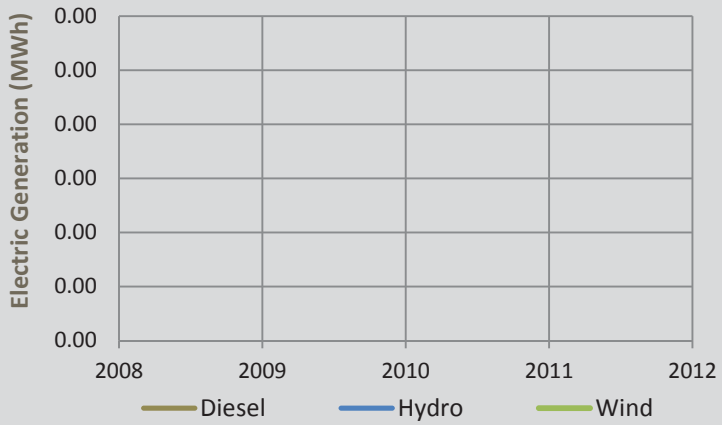
Maintenance Planning (RPSU)

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

Electric Sales by Customer Type (kWh/year)

Power Production

Diesel (kWh/yr)	**Avg. Load (kW)**
Wind (kWh/yr)	**Peak Load (kW)**
Hydro (kWh/yr)	**Diesel Eff: kWh/gal**
Total (kWh/yr)	**Diesel Use (gals)**



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

Fuel Prices ($)	**Utility/Wholesale**	**Retail**	**Month/Year**
Diesel (1 gal)	N/A	$4.46	8-14
Other? (1 gal)			
Gasoline (1 gal)			
Propane (100#)			
Wood (1 cord)			
Pellets			
Discounts?			

Resource	**Potential**	**Certainty**	**Notes**
Hydroelectric	High	Medium	Good hydro resource based on visual assessment. Economic viability unknown.
Wind Diesel	Low	Medium	Wind class 1 based on 2005 wind study.
Biomass	Medium	Low	Moderate forest resource nearby. Rough Benefit/Cost ratio around 1.0.
Solar	Low	Low	Residential/building-scale projects may be economic. Assess case by case.
Geothermal	Low	Low	No significant resource identified within 20 miles.
Oil and Gas	Medium	Low	Additional drilling in region underway. Previous wells have been inconclusive.
Coal	Low	Low	Known resources are of limited quality but have not been studied in detail.
Emerging Tech	Low	Low	
Heat Recovery	Low	High	No local electric generation.
Energy Efficiency	High	High	Opportunity from residential and commercial/public EE is high.

Bulk Fuel

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

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

Housing Units	**Occupied**	**Vacant**	**% Owner-Occup.**
	21	51	33%

Regional Housing Authority	**Weatherization Service Provider**
Copper River Basin	Copper River Basin

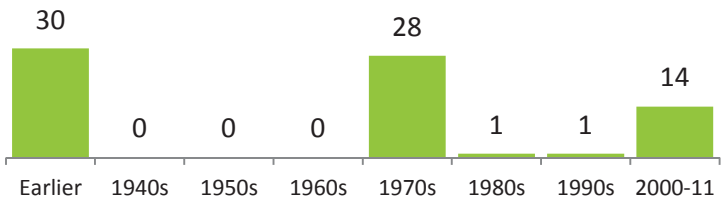
Energy Profile: McCarthy

Housing Need	Overcrowded	1-star
	66.7%	N/A

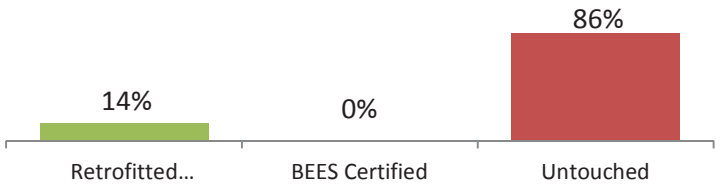
Data Quality	Med.

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

Age of Housing Stock (includes vacant)



Energy Efficient Housing Stock

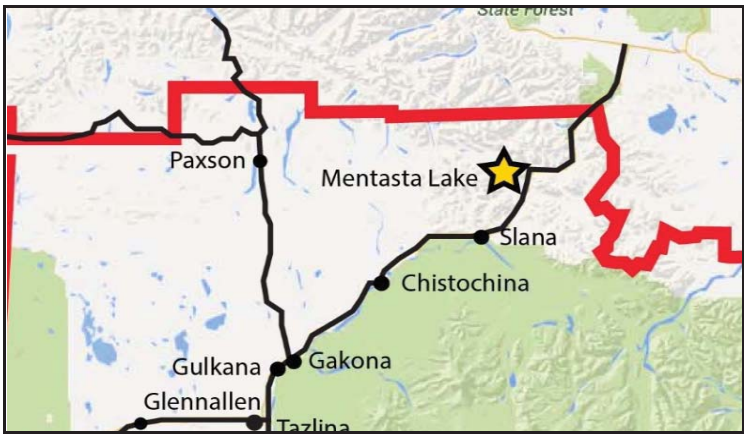


Lighting	Owner	Number/Type	Retrofitted?	Year	Notes
N/A					

Non-residential Building Inventory

Building Name or Location	Year Built	Square Feet	Audited?	Retrofits Done?	In ARIS?
Neil's Generator building		140			
Kennicott Glacier Lodge		16000			
McCarthy Lodge		15000			
Snow removal equipment building		2400			
Church					
Tony Zack's meeting House					
McCarthy Museum					

Community Profile: Mentasta Lake



Municipality Unincorporated

Location

Located 6 miles off the Tok-Slana Cutoff of the Glenn Highway on the west side of Mentasta Pass, 38 miles southwest of Tok Junction.

Longitude	-143.7927	**Latitude**	62.9316
ANCSA Region	Ahtna, Incorporated		
Borough	Unorganized		
Census Area	Valdez-Cordova Census Area		
School District	Alaska Gateway School District		

Alaska Native Name (definition)

Mendaesde

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

Historical Setting / Cultural Resources

The area is reported to have been the best-known route of Native immigration across the Alaska Range. Early village settlements have been located at various sites around the lake. The families that presently reside in Mentasta Lake come from Nabesna, Suslota, Slana, and other villages within the area. The U.S. Army Signal Corps established a telegraph station at Mentasta Pass in 1902. The community is primarily Athabascan, and subsistence activities are important.

Economy

Local government provides more than half the employment, followed by state government, and trade trans/utilities. No business licenses and no commercial fishing permits.

Climate	**Avg. Temp.**	**Climate Zone**	**Heating Deg. Days**
	not listed	7	15,400

Natural Hazards Plan

N/A

Energy Priorities and Projects

Tribe: Fuel reduction project; biomass unit for apartments; bike path to downtown (2015); community garden if interest. From Phase I: energy planning/energy committee (human capacity); public and residential EE&C; study feasibility of renewables.

Community Plans / Planning Studies	**Year**
Copper River Regional Energy Plan (Phase I)	2013
Ahtna Regional Biomass Opportunities (Draft)	2011
Copper River Resource Management Plan (BLM)	2010
Ahtna Regional Tribal Energy Strategy Overview	2009

Local Contacts	**Email**	**Phone / Fax**
Mentasta Traditional Council	mentastatraditionalcouncil@yahoo.com	907-291-2319 / 291-2305
Copper River Native Assoc.		907- 822-3646

Demographics	**2000**	**2010**		
Population	142	112	**Median Household Income (2010)**	$ 23,333
Median Age	32	28	**% of Residents Employed (2013)**	49%
Avg. Household Size	3	3	**Low-Med Income (LMI) Percent (2014)**	85%
% Alaska Native	71%	76%	**Denali Commission Distressed Community (2013)**	Yes

Electric Utility	**Current Generation Sources**	**Connected by Intertie**	**PCE**
Alaska Power & Telephone Co.	Diesel	Yes	Yes

Landfill	**Class**	**Permited?**	**Location**	**Condition/Expected life**
JD Refuse Service	3	Yes	Tok	

Water/Wastewater System	**Water**	**Sewer**	**Energy Audit**	**Homes Served**	**System Volume**
Mentasta Washeteria	Wells	Sewer			

Road Access Glenn Highway

Air Access	**Runway**	**Surface**	**Lighted**	**Flight Rules**	**Condition**	**Air Miles (to Hub)**
None						

Dock/Port Facilities	**Ferry Service**	**Barge Access**	**Marine Access Issues**
None	No	No	

Notes

Energy Profile: Mentasta Lake

Power House

Utility	Alaska Power & Telephone

Genset Engine	Make/Model	Rated Capacity	Condition/Hrs
Unit 1	None		
Unit 2			
Unit 3			
Unit 4			

Line Loss	
Heat Recovery?	
Upgrades?	

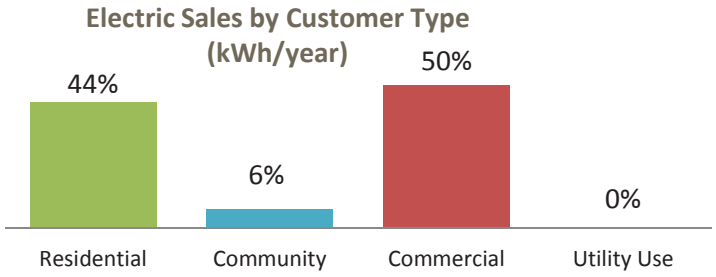
Outage History/Known Issues

No longer has plant. See Tok for powerhouse. Became part of Slana-Chistochina grid 2012.

Operators	No. of Operators	Training/Certifications
No training data available		

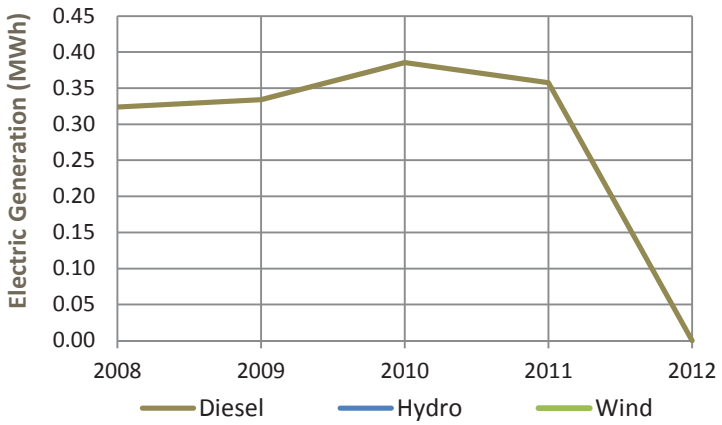
Maintenance Planning (RPSU)	N/A

Electric Sales	No. of Customers	kWh/year	kWh/Customer
Residential	51	157,505	3088.33
Community	5	23,267	4653.40
Commercial	15	179,230	11948.67
Utility Use	N/A	203	N/A



Power Production

Diesel (kWh/yr)	0	Avg. Load (kW)	34
Wind (kWh/yr)	0	Peak Load (kW)	77
Hydro (kWh/yr)	0	Diesel Eff: kWh/gal	N/A
Total (kWh/yr)	0	Diesel Use (gals)	0



Electric Rates ($/kWh)		Cost per kWh Sold ($/kWh)	
Rate with PCE	$0.27	Fuel Cost	N/A
Residential	$0.69	Non-fuel Cost	$0.10
Commercial		Total Cost	$0.10

Fuel Prices ($)	Utility/Wholesale	Retail	Month/Year
Diesel (1 gal)	N/A	$3.95	FY14; 8-14
Other? (1 gal)			
Gasoline (1 gal)			
Propane (100#)		$83.33	8-14
Wood (1 cord)			
Pellets			
Discounts?			

Resource	Potential	Certainty	Notes
Hydroelectric	Medium	Medium	Moderate potential based on visual assessment.
Wind Diesel	Low	Low	Moderate wind resource may exist, but access difficult. No met data.
Biomass	High	Low	Productive forest nearby; wood heating project in operation.
Solar	Low	Low	Residential/building-scale projects may be economic. Assess case by case.
Geothermal	Low	Low	No significant resource identified within 20 miles.
Oil and Gas	Medium	Low	Additional drilling in region underway. Previous wells have been inconclusive.
Coal	Low	Low	Known resources are of limited quality but have not been studied in detail.
Emerging Tech	Low	Low	
Heat Recovery	Low	Medium	Tied to Slana plant. No local electric generation.
Energy Efficiency	High	High	Opportunity from residential and commercial/public EE is high.

Bulk Fuel

Tank Owner	Fuel Type(s)	Capacity	Age/Condition

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

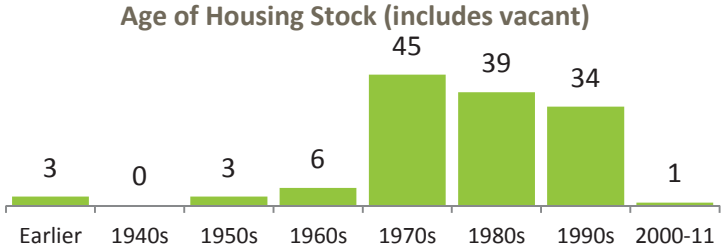
Housing Units	Occupied	Vacant	% Owner-Occup.
	53	78	32%

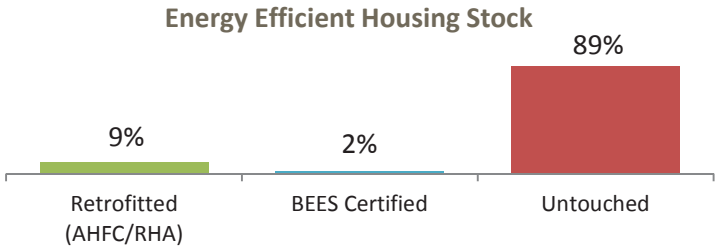
Regional Housing Authority	Weatherization Service Provider
Copper River Basin	Copper River Basin

Energy Profile: Mentasta Lake

Housing Need	Overcrowded	1-star
	13.2%	N/A
Data Quality	Med.	

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





Lighting	Owner	Number/Type	Recommendations	Retrofitted?
School		(109) T8 4' F32T8 32W	Replace with LED	No
School		(5) HPS 100W	Replace with LED, add sensor	No
School		(24) T8 4' F32T8 32W	Replace with LED	No
School		(6) T8 4' F32T8 32W	Add a new occupancy sensoe	No
School		(6) T8 4' F32T8 32W	Replace with LED	No

Non-residential Building Inventory

Building Name or Location	Year Built	Square Feet	Audited?	Retrofits Done?	In ARIS?
Clinic					
Community Garage					
Community Hall					
Council Office					
CVT Building					
Day Care & Elder - Preschool					
Freeze					
Laundromat					
Mentasta Lake School	1982		AHFC		

Community Profile: Nelchina-Mendeltna

Alaska Native Name (definition)

Xaz Ghae Na' (Nelchina River), Bendilna' (Mendeltna)

Historical Setting / Cultural Resources

Nelchina and Mendeltna are Ahtna Athabascan names. Mendeltna was a stop on the trail used by Natives traveling from Lake Tyone to Tazlina Lake. Gold in the creeks of the Chugach Mountains brought prospectors to the area in the late 1800s. Nelchina was established as a mining settlement around 1913. It gave its name to the present community, further east, after the Glenn Hwy was built in 1943. The Nelchina-Mendeltna Community Corporation was organized in 1987 to take care of area garbage and to support local issues and needs of residents.

Energy Priorities and Projects

Public input: Complete Glenn Highway improvements and reroute Moose Alley to reduce transportation costs to Anchorage. Improve access to firewood on state lands. Interest in low-interest loans for residential EE and renewable energy upgrades.

Municipality	Unincorporated

Location

Between mileposts 137.5 and 160 of the Glenn Highway, and adjacent areas to the north and south. It is about 30 to 50 miles west of Glennallen, extending from the Mat-Su Borough boundary in the west to one mile past the Lake Lousie juntion to the east.

Longitude	-146.6266	**Latitude**	62.0282
ANCSA Region	Ahtna, Incorporated		
Borough	Unorganized		
Census Area	Valdez-Cordova Census Area		
School District	Copper River School District		

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

Economy

Residents not self-employed work for state or federal government (natural resources, transportation, education), private business, Native entities, or outside the region (Anchorage, North Slope).

Climate	**Avg. Temp.**	**Climate Zone**	**Heating Deg. Days**
	32.8°	7	N/A

Natural Hazards Plan

Wild fires are the primary natural hazard. Local plans are maintained by the Division of Forestry office in Glennallen.

Community Plans / Planning Studies	**Year**
Copper River Regional Energy Plan (Phase I)	2013
Copper River Resource Management Plan (BLM)	2010
Copper River Area Plan 2010-2015 (CVDA)	2009

See Notes after Energy Profile for additional plans

Local Contacts	**Email**	**Phone / Fax**
Nelchina-Mendeltna Community Corporation		907-822-3116

Demographics	**2000**	**2010**		
Population	71	59	**Median Household Income (2010)**	N/A
Median Age	44	lists 0 DCRA	**% of Residents Employed (2013)**	38%
Avg. Household Size	3	2	**Low-Med Income (LMI) Percent (2014)**	83%
% Alaska Native	10%	11%	**Denali Commission Distressed Community (2013)**	No

Electric Utility	**Current Generation Sources**	**Connected by Intertie**	**PCE**
Copper Valley Electric Assoc.	Hydro, Diesel, Cogen	Yes (CVEA grid)	No

Landfill

Use Glennallen landfill. Transfer site at Mile 149.5 Glenn Highway is maintained by Nelchina-Mendeltna Community Corp.

Water/Wastewater System	**Water**	**Sewer**	**Energy Audit**	**Homes Served**	**System Volume**
None	Haul, delivery	Septic tanks, outhouses			

Road Access Glenn Highway

Air Access	**Runway**	**Surface**	**Lighted**	**Flight Rules**	**Condition**	**Air Miles (to Hub)**
State owned	1200'x40'	Gravel	Yes	IFR	Good	N/A

Dock/Port Facilities	**Ferry Service**	**Barge Access**	**Marine Access Issues**
None	No	No	

Notes The communities of Nelchina and Mendeltna have similar histories and function as one community. The communities are recognized as separate places by the U.S. Census. The division is at mile 150.5 on the Glenn Highway.

Energy Profile: Nelchina-Mendeltna

Power House

Utility	Copper Valley Electric

Generators	Make/Model	Rated Capacity	Condition/Hrs
Unit 1	N/A		
Unit 2			
Unit 3			
Unit 4			

Line Loss	
Heat Recovery?	
Upgrades?	

Outage History/Known Issues

No community production, PCE ineligible.

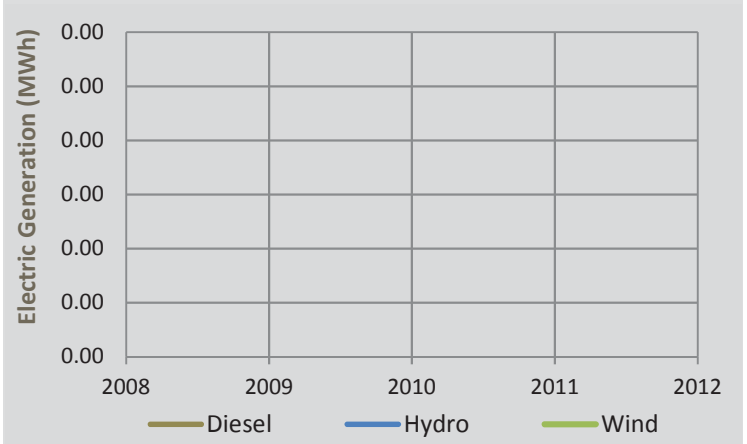
Operators	No. of Operators	Training/Certifications
N/A		

Maintenance Planning (RPSU)

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

Power Production

Diesel (kWh/yr)	0	Avg. Load (kW)	85
Wind (kWh/yr)	0	Peak Load (kW)	189
Hydro (kWh/yr)	0	Diesel Eff: kWh/gal	N/A
Total (kWh/yr)	0	Diesel Use (gals)	0



Electric Rates ($/kWh)		Cost per kWh Sold ($/kWh)	
Rate with PCE	N/A	Fuel Cost	N/A
Residential	$0.18-$0.28	Non-fuel Cost	
Commercial	N/A	Total Cost	

Fuel Prices ($)	Utility/Wholesale	Retail	Month/Year
Diesel (1 gal)	N/A	N/A	
Other? (1 gal)			
Gasoline (1 gal)			
Propane (100#)			
Wood (1 cord)			
Pellets			
Discounts?			

Resource	Potential	Certainty	Notes
Hydroelectric	Medium	Medium	Moderate potential based on visual assessment.
Wind Diesel	Low	Medium	Wind models show low wind class near community. No met data.
Biomass	Low	Low	Moderate forest resource nearby. No reconnaissance study done.
Solar	Low	Low	Residential/building-scale projects may be economic. Assess case by case.
Geothermal	Low	Low	No significant resource identified within 20 miles.
Oil and Gas	Medium	Low	Additional drilling in region underway. Previous wells have been inconclusive.
Coal	Low	Low	Known resources are of limited quality but have not been studied in detail.
Emerging Tech	Low	Low	
Heat Recovery	Low	High	No local electric generation.
Energy Efficiency	High	High	Opportunity from residential and commercial/public EE is high.

Bulk Fuel

Tank Owner	Fuel Type(s)	Capacity	Age/Condition

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

Housing Units	Occupied	Vacant	% Owner-Occup.
	35	41	100%

Regional Housing Authority	Weatherization Service Provider
Copper River Basin	Copper River Basin

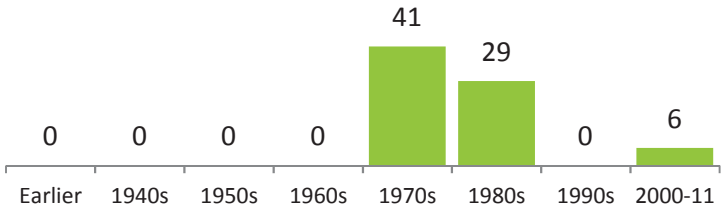
Energy Profile: Nelchina-Mendeltna

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

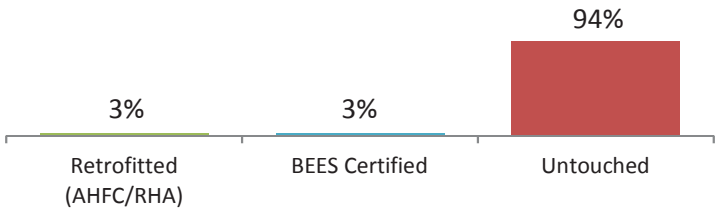
Data Quality	
	Low

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

Age of Housing Stock (includes vacant)



Energy Efficient Housing Stock



Lighting	Owner	Number/Type	Retrofitted?	Year	Notes
N/A					

Non-residential Building Inventory

Building Name or Location	Year Built	Square Feet	Audited?	Retrofits Done?	In ARIS?
Transfer site shed					

Notes

Housing unit data appear inaccurate to residents. An inventory is needed.

Additional regional planning documents

Joint Pacific Alaska Range Complex Modernization and Enhancement EIS (Air Force, 2013)
Copper Valley, Alaska 5-Year Area Plan: 2010-2015 (CVDA, 2009)
Forest Resources/State Lands, Preliminary (2010)
Alternative Energy and Energy Conservation Narrative (2009)
Copper River Salmon Management Study (ISER, 2007)
Copper River Health Needs Assessment Strategic Plan (Institute for Circumpolar Health Studies, 2004)
Susitna Area Plan (DNR, 1985)
Copper River Basin Regional Planning Model (DNR, 1982)
Nelchina Public Use Area (DNR Fact Sheet)

Additional planning groups and activities

Copper Country Alliance (Copper Center-based)
Copper River Watershed Project (Cordova-based)

Community Profile: Silver Springs

Municipality Unincorporated

Location

Located along the Richardson Highway, just south of Glennallen. It is on the west bank of the Copper River, just south of its junction with the Tazlina River.

Longitude	-145.345	**Latitude**	62.0179
ANCSA Region	Ahtna, Incorporated		
Borough	Unorganized		
Census Area	Cordova-Valdez Census Area		
School District	None		

Alaska Native Name (definition)

N/A

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

Historical Setting / Cultural Resources

Economy

Local and state government are the top employers with professional and business services third. No business licenses or commercial fishing permits.

Climate	**Avg. Temp.**	**Climate Zone**	**Heating Deg. Days**
	25.0°	7	N/A

Natural Hazards Plan

N/A

Energy Priorities and Projects

Public input: focus on residential needs and priorities.

Community Plans / Planning Studies	**Year**
Copper River Regional Energy Plan (Phase I)	2013
Copper River Resource Management Plan (BLM)	2010
Forest Resources/State Lands, Preliminary	2010
Copper River Area Plan 2010-2015 (CVDA)	2009

Local Contacts	**Email**	**Phone / Fax**
Association Silver Springs Residents		907-822-4050

Demographics	**2000**	**2010**
Population	130	114
Median Age	35	42
Avg. Household Size	3	3
% Alaska Native	12%	9%

Median Household Income (2010)	$ 80,313
% of Residents Employed (2013)	59%
Low-Med Income (LMI) Percent (2014)	27%
Denali Commission Distressed Community (2013)	No

Electric Utility	**Current Generation Sources**	**Connected by Intertie**	**PCE**
Copper Valley Electric Assoc.	Hydro, Diesel, Cogen	Yes	No

Landfill	**Class**	**Permited?**	**Location**	**Condition/Expected life**
Copper River Basin Sanitation	2	Yes	Glennallen	

Water/Wastewater System	**Water**	**Sewer**	**Energy Audit**	**Homes Served**	**System Volume**
N/A	Wells; hauled	Septic			

Road Access Richardson Highway - open year round

Air Access	**Runway**	**Surface**	**Lighted**	**Flight Rules**	**Condition**	**Air Miles (to Hub)**
None						

Dock/Port Facilities	**Ferry Service**	**Barge Access**	**Marine Access Issues**
None	No	No	

Notes

Energy Profile: Silver Springs

Power House

Utility	Copper Valley Electric		
Generators	**Make/Model**	**Rated Capacity**	**Condition/Hrs**
Unit 1	N/A		
Unit 2			
Unit 3			
Unit 4			
Line Loss			
Heat Recovery?			
Upgrades?			

Outage History/Known Issues

No community production, PCE ineligible.

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

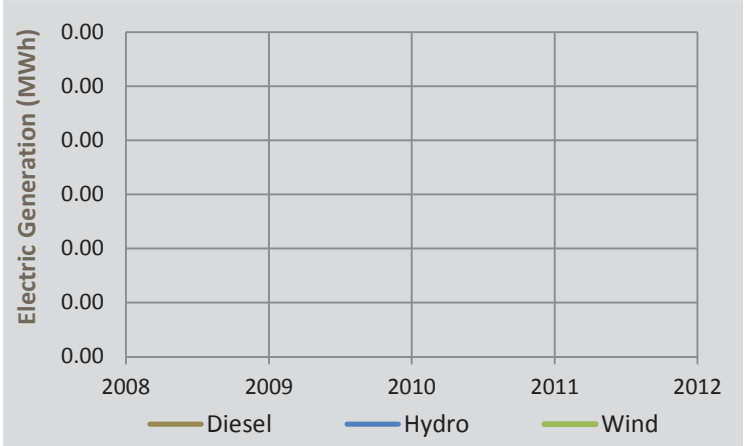
Maintenance Planning (RPSU)

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

Electric Sales by Customer Type (kWh/year)

Power Production

Diesel (kWh/yr)	0	**Avg. Load (kW)**	222
Wind (kWh/yr)	0	**Peak Load (kW)**	494
Hydro (kWh/yr)	0	**Diesel Eff: kWh/gal**	N/A
Total (kWh/yr)	0	**Diesel Use (gals)**	0



Electric Rates ($/kWh)		**Cost per kWh Sold ($/kWh)**
Rate with PCE	N/A	**Fuel Cost**
Residential	$0.18-$0.28	**Non-fuel Cost**
Commercial	N/A	**Total Cost**

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

Resource	**Potential**	**Certainty**	**Notes**
Hydroelectric	Low	Medium	Low potential based on visual assessment.
Wind Diesel	Low	Medium	Wind models show low wind class near community. No met data.
Biomass	Low	Low	Productive forest resource nearby. No reconnaissance study done.
Solar	Low	Low	Residential/building-scale projects may be economic. Assess case by case.
Geothermal	Low	Low	Nearby resource unlikely to be economically/technically viable (< 55 degrees).
Oil and Gas	Medium	Low	Additional drilling in region underway. Previous wells have been inconclusive.
Coal	Low	Low	Known resources are of limited quality but have not been studied in detail.
Emerging Tech	Low	Low	
Heat Recovery	Low	High	No local electric generation.
Energy Efficiency	High	High	Opportunity from residential and commercial/public EE is high.

Bulk Fuel

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

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

Housing Units	**Occupied**	**Vacant**	**% Owner-Occup.**
	49	18	82%

Regional Housing Authority	**Weatherization Service Provider**
Copper River Basin	Copper River Basin

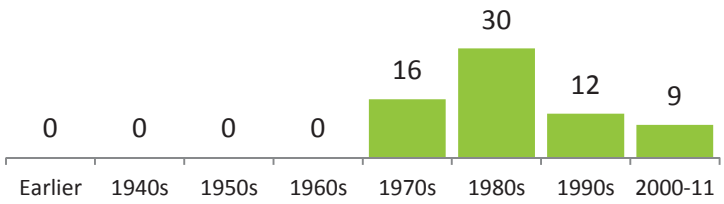
Energy Profile: Silver Springs

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

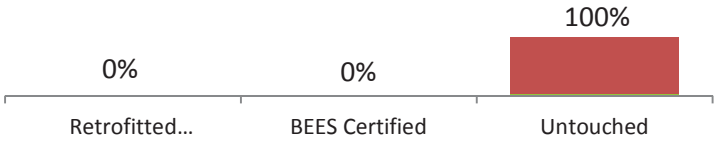
Data Quality	Low

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

Age of Housing Stock (includes vacant)



Energy Efficient Housing Stock

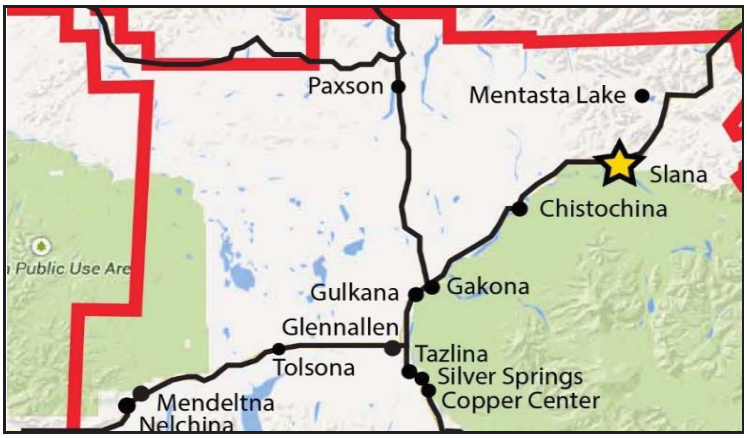


Lighting	Owner	Number/Type	Retrofitted?	Year	Notes
N/A					

Non-residential Building Inventory

Building Name or Location	Year Built	Square Feet	Audited?	Retrofits Done?	In ARIS?
Fire Barn					
Fire Hall		2400			
Mt. Drum Lutheran Church		1600			

Community Profile: Slana



Municipality Unincorporated

Location

Located along the Nabesna Road, which runs south of the Tok Cutoff at mile 63. It lies at the junction of the Slana and Copper Rivers, 53 miles southwest of Tok.

Longitude	-143.9611	**Latitude**	62.7069
ANCSA Region	Ahtna, Incorporated		
Borough	Unorganized		
Census Area	Valdez-Cordova Census Area		
School District	Copper River School District		

Alaska Native Name (definition)

Stl'aa Caegge

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

Historical Setting / Cultural Resources

The Nabesna Mine opened in 1923, which employed 60 people at its height. Over 30 different minerals were extracted from this site, although gold was the primary source of profit. It operated sporadically through the late 1940s. Slana developed rapidly in the 1980s when homesteads were offered for settlement by the federal government. The last location of BLM's homesite program, individuals received five acres of free land in Slana.

Economy

Local government, trade trans/utilities, and state government are the largest employers. No commercial fishing permits and 12 business licenses.

Climate	**Avg. Temp.**	**Climate Zone**	**Heating Deg. Days**
	27.2°	7	13,534

Natural Hazards Plan

N/A

Energy Priorities and Projects

AP&T: Connect Slana grid with CVEA grid. CRSD: K-12 school renovation (FY16 CIP request). ACDC: Residential weatherization (2015-17). Public input: interest in intertie and off-grid sustainability.

Community Plans / Planning Studies	**Year**
Copper River Regional Energy Plan (Phase I)	2013
Copper River Resource Management Plan (BLM)	2010
Forest Resources/State Lands, Preliminary	2010
Copper River Area Plan 2010-2015 (CVDA)	2009

Local Contacts	**Email**	**Phone / Fax**
Slana Community Corporation		907-822-3196 / 822-3543
Slana League		907-822-3426

Demographics	**2000**	**2010**		
Population	124	147	**Median Household Income (2010)**	$ 27,639
Median Age	47	51	**% of Residents Employed (2013)**	37%
Avg. Household Size	2	2	**Low-Med Income (LMI) Percent (2014)**	53%
% Alaska Native	15%	16%	**Denali Commission Distressed Community (2013)**	Yes

Electric Utility	**Current Generation Sources**	**Connected by Intertie**	**PCE**
Alaska Power & Telephone Co.	Diesel	Yes	Yes

Landfill	**Class**	**Permited?**	**Location**	**Condition/Expected life**
Copper Basin Sanitation Co.	2	Yes	Glennallen	

Water/Wastewater System	**Water**	**Sewer**	**Energy Audit**	**Homes Served**	**System Volume**
N/A	Wells	Septic, outhousses, honeybuckets			

Road Access Glenn and Richardson Highway

Air Access	**Runway**	**Surface**	**Lighted**	**Flight Rules**	**Condition**	**Air Miles (to Hub)**
GMAPA Inc.	1200' x 100'	Gravel	No	**None**	Good	53 miles (Tok)

Dock/Port Facilities	**Ferry Service**	**Barge Access**	**Marine Access Issues**
None	No	No	

Notes

Energy Profile: Slana

Power House

Utility	Alaska Power & Telephone		
Engine Make	**Model**	**Rated Capacity**	**Condition/Hrs**
John Deere	6081TA	150 kW	Fair/34,832
John Deere	6068TF250	110 kW	Fair/16,077
John Deere	6081AF-001	127 kW	Fair/14,173

Line Loss	0.62
Heat Recovery?	In progress - will provide heat to Slana School
Upgrades?	Expected completion by year end 2015

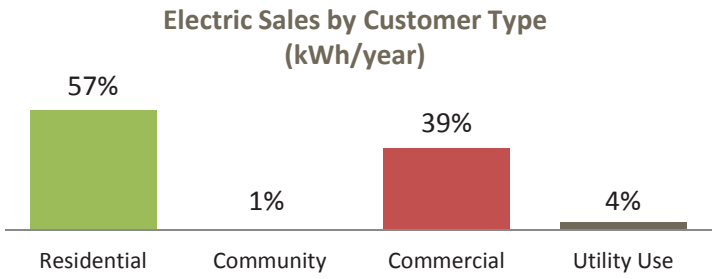
Replace Slana module with new power plant building, switchgear, gensets, and related equipment.

Outage History/Known Issues

Operators	**No. of Operators**	**Training/Certifications**
	3 (Slana grid)	Power plant operator, Arc flash, Crane, Electronics

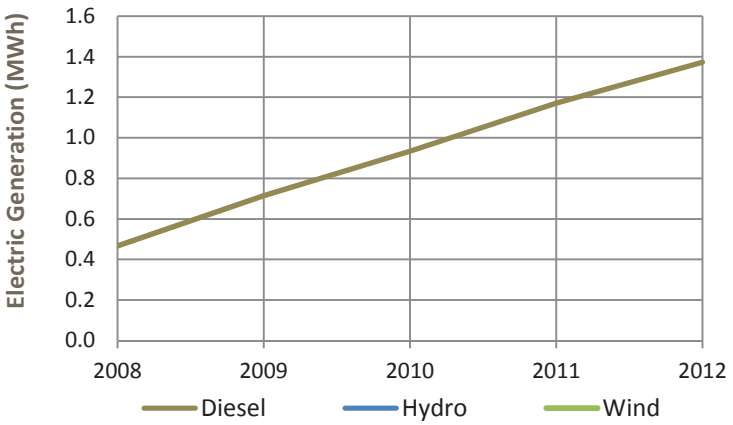
Maintenance Plan	Yes

Electric Sales	**No. of Customers**	**kWh/year**	**kWh/Customer**
Residential	79	300,917	3809.08
Community	1	2,744	2744.00
Commercial	17	205,536	12090.35
Utility Use	N/A	20,112	N/A



Power Production

Diesel (kWh/yr)	1,393,344	**Avg. Load (kW)**	36
Wind (kWh/yr)	0	**Peak Load (kW)**	79
Hydro (kWh/yr)	0	**Diesel Eff: kWh/gal**	11.96
Total (kWh/yr)	1,393,344	**Diesel Use (gals)**	116,522



Electric Rates ($/kWh)		**Cost per kWh Sold ($/kWh)**	
Rate with PCE	$0.27	**Fuel Cost**	$0.86
Residential	$0.69	**Non-fuel Cost**	$0.29
Commercial		**Total Cost**	$1.15

Fuel Prices ($)	**Utility/Wholesale**	**Retail**	**Month/Year**
Diesel (1 gal)	$3.71	$3.95	FY14; 8-14
Other? (1 gal)			
Gasoline (1 gal)			
Propane (100#)		$96.90	
Wood (1 cord)			
Pellets			
Discounts?			

Resource	**Potential**	**Certainty**	**Notes**
Hydroelectric	Medium	Medium	Poor potential at Carlson Creek. Porcupine Creek may have some potential.
Wind Diesel	Low	Medium	Wind models show low wind class near community. No met data.
Biomass	Medium	Low	Productive forest nearby. Rough Benefit/Cost ratio moderate (1.11).
Solar	Low	Low	Residential/building-scale projects may be economic. Assess case by case.
Geothermal	Low	Low	No significant resource identified within 20 miles.
Oil and Gas	Medium	Low	Additional drilling in region underway. Previous wells have been inconclusive.
Coal	Low	Low	Known resources are of limited quality but have not been studied in detail.
Emerging Tech	Low	Low	
Heat Recovery	Low	Low	Heat recovery in operation at power plant. No additional recoverable heat.
Energy Efficiency	High	High	Opportunity from residential and commercial/public EE is high.

Bulk Fuel

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

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

Housing Units	**Occupied**	**Vacant**	**% Owner-Occup.**
	108	152	100%

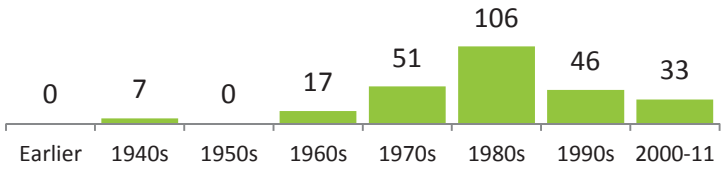
Regional Housing Authority	**Weatherization Service Provider**
Copper River Basin	Copper River Basin

Energy Profile: Slana

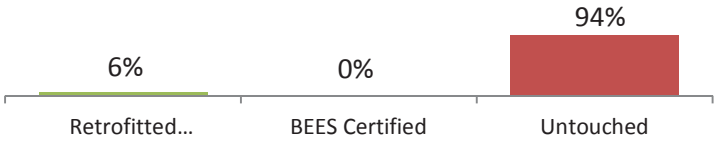
Housing Need	Overcrowded	1-star
	N/A	N/A
Data Quality	Med.	

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

Age of Housing Stock (includes vacant)



Energy Efficient Housing Stock



Lighting	Owner	Number/Type	Retrofitted?	Recommendations
Slana K-12	See Energy Audit Report		N/A	See Energy Audit Report

Non-residential Building Inventory

Building Name or Location	Year Built	Square Feet	Audited?	Retrofits Done?	In ARIS?
Slana K-12 School	1993		AHFC		

Community Profile: Tazlina

Municipality Unincorporated

Location

Located 5 miles south of Glennallen on the Richardson Highway, at mile 110.5.

Longitude	-145.4359	**Latitude**	62.0508
ANCSA Region	Ahtna, Incorporated		
Borough	Unorganized		
Census Area	Valdez-Cordova Census Area		
School District	None DCRA		

Alaska Native Name (definition)

Tezdlen Na' ("Swift water")

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

Historical Setting / Cultural Resources

The village reportedly was a fishing camp of the Ahtna Indian tribes who historically moved up and down the Copper River and its tributaries. During the pipeline era, Tazlina developed around the old Copper Valley School, built to board students from all over the state. It closed in 1971, when local high schools were constructed in the remote areas of the state and boarding schools were discontinued. Two organizations represent Tazlina: the Native Village of Tazlina and the Association of Tazlina Residents.

Economy

Trade trans/utility, state government, and local government are the main employers. No commercial fishing permits and 5 business licenses.

Climate	**Avg. Temp.**	**Climate Zone**	**Heating Deg. Days**
	not listed	7	14,067

Natural Hazards Plan

N/A

Energy Priorities and Projects

Tribe: Woodchip biomass heating loop - 4 buildings, wood from brush crews (RE Fund 8 award); pedestrian bridge. CRBRHA: mobile home park redevelopment (15 EE units). Public input: Electrical work in older homes/safety issues; EE audits/retrofits, DIY classes.

Community Plans / Planning Studies	**Year**
Copper River Regional Energy Plan (Phase I)	2013
Availability of Biomass Fuels on Ahtna Lands (DNR)	2011
Ahtna Regional Biomass Opportunities (Draft)	2011
Ahtna Regional Tribal Energy Strategy Overview	2009

Local Contacts	**Email**	**Phone / Fax**
Native Village of Tazlina	tazlina@cvinternet.net	907-822-4375 / 822-5865
Assoc. of Tazlina Residents		907-259-4112
Copper River Native Assoc.		907-822-5241 / 822-8803

Demographics	**2000**	**2010**		
Population	149	297	**Median Household Income (2010)**	$ 63,667
Median Age	35	49	**% of Residents Employed (2013)**	61%
Avg. Household Size	3	3	**Low-Med Income (LMI) Percent (2014)**	34%
% Alaska Native	30%	40%	**Denali Commission Distressed Community (2013)**	No

Electric Utility	**Current Generation Sources**	**Connected by Intertie**	**PCE**
Copper Valley Electric Assoc.	Hydro, Diesel, Cogen	Yes	No

Landfill	**Class**	**Permited?**	**Location**	**Condition/Expected life**
Copper Basin Sanitation Co.	2	Yes	Glennallen	

Water/Wastewater System	**Water**	**Sewer**	**Energy Audit**	**Homes Served**	**System Volume**
N/A	Wells; Hauled	Septic system			

Road Access Glenn Highway - open year round

Air Access	**Runway**	**Surface**	**Lighted**	**Flight Rules**	**Condition**	**Air Miles (to Hub)**

Dock/Port Facilities	**Ferry Service**	**Barge Access**	**Marine Access Issues**
None	No	No	Seaplane facility at Smokey Lake

Notes

Energy Profile: Tazlina

Power House

Utility	Copper Valley Electric		
Generators	**Make/Model**	**Rated Capacity**	**Condition/Hrs**
Unit 1	N/A		
Unit 2			
Unit 3			
Unit 4			
Line Loss			
Heat Recovery?			
Upgrades?			

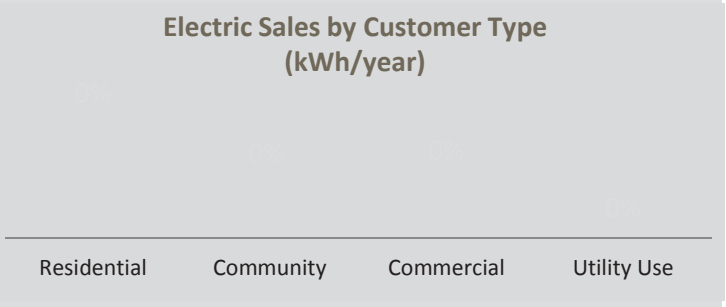
Outage History/Known Issues

No community production, PCE ineligible.

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

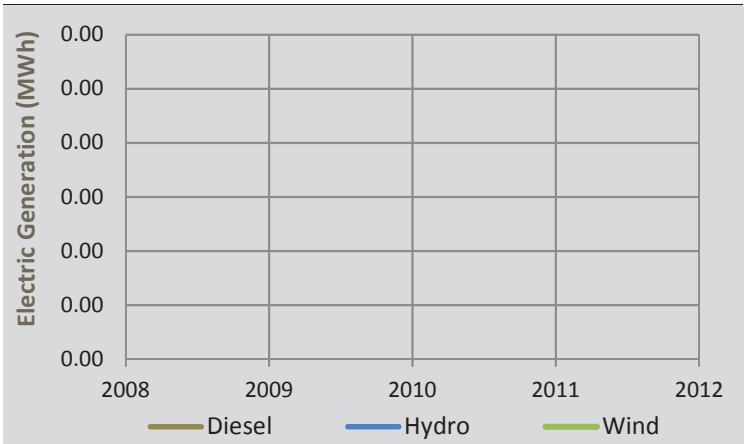
Maintenance Planning (RPSU)

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



Power Production

Diesel (kWh/yr)	0	**Avg. Load (kW)**	252
Wind (kWh/yr)	0	**Peak Load (kW)**	561
Hydro (kWh/yr)	0	**Diesel Eff: kWh/gal**	N/A
Total (kWh/yr)	0	**Diesel Use (gals)**	0



Electric Rates ($/kWh)		**Cost per kWh Sold ($/kWh)**
Rate with PCE	N/A	**Fuel Cost**
Residential	$0.18-$0.28	**Non-fuel Cost**
Commercial	N/A	**Total Cost**

Fuel Prices ($)	**Utility/Wholesale**	**Retail**	**Month/Year**
Diesel (1 gal)	N/A	$3.95	8-14
Other? (1 gal)			
Gasoline (1 gal)			
Propane (100#)		$89.76	8-14
Wood (1 cord)			
Pellets			
Discounts?			

Resource	**Potential**	**Certainty**	**Notes**
Hydroelectric	Low	Medium	Low potential based on visual assessment.
Wind Diesel	Low	Low	Wind models show low wind class near community. No met data.
Biomass	High	Medium	Productive forest in area; wood heating project planned
Solar	Low	Low	Residential/building-scale projects may be economic. Assess case by case.
Geothermal	Low	Low	Nearby resource unlikely to be economically/technically viable (< 55 degrees).
Oil and Gas	Medium	Low	Additional drilling in region underway. Previous wells have been inconclusive.
Coal	Low	Low	Known resources are of limited quality but have not been studied in detail.
Emerging Tech	Low	Low	
Heat Recovery	Low	High	No local electric generation.
Energy Efficiency	High	High	Opportunity from residential and commercial/public EE is high.

Bulk Fuel

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

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

Housing Units	**Occupied**	**Vacant**	**% Owner-Occup.**
	144	53	78%

Regional Housing Authority	**Weatherization Service Provider**
Copper River Basin	Copper River Basin

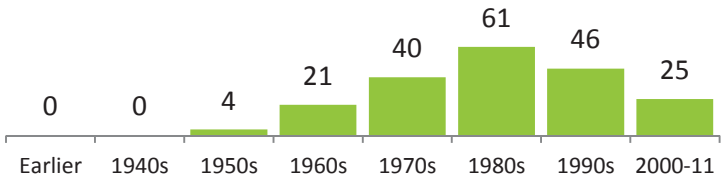
Energy Profile: Tazlina

Housing Need	Overcrowded	1-star
	5.6%	N/A

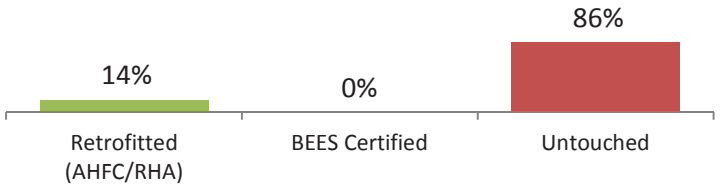
Energy Use	Average Home Energy Rating	Average Square Feet	Avg. EUI (kBTU/sf)
	N/A	N/A	N/A

Data Quality

Age of Housing Stock (includes vacant)



Energy Efficient Housing Stock



Lighting	Owner	Number/Type	Retrofitted?	Year	Notes
N/A					

Non-residential Building Inventory

Building Name or Location	Year Built	Square Feet	Audited?	Retrofits Done?	In ARIS?
Assembly of God Church					
Carpenter Shop		960			
Emergency Power Plant		96			
Fire Barn		2400			
Health Clinic		1176			
Housing Authority Office		2000			
Maintenance Shop		11200			
Sand shed		5000			
Soil Lab #3		320			
Soil Test Lab #1		500			
Soil Test Lab #2		320			
Storage Building		768			
Tazlina Community Hall		2184			
Tazlina River Campground		672			
Tazlina Trading Post		3790			
Tire Storage Building		500			
Tribal Office		840			
Warehouse		1000			
Tire Storage Building		512			

Community Profile: Tolsona

Municipality	Unincorporated

Location

Located around milepost 170 of the Glenn Highway, about 17 miles west of Glennallen, at the foot of Tolsona Mountain

Longitude	-146.0997	**Latitude**	62.089
ANCSA Region	Ahtna, Incorporated		
Borough	Unorganized		
Census Area	Valdez-Cordova Census Area		
School District	None DCRA		

Alaska Native Name (definition)

/təlˈsoʊnə/

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

Historical Setting / Cultural Resources

Tolsona is an Athabascan Indian name, attributed to Tolsona Lake and River. Many homes in Tolsona are seasonally occupied.

Economy

Construction, leisure/hospitality, and state and local government are the main employers. There are no commercial fishing permits or business licenses.

Climate	**Avg. Temp.**	**Climate Zone**	**Heating Deg. Days**
	not listed	not listed	N/A

Natural Hazards Plan

N/A

Energy Priorities and Projects

Ahtna: Continue natural gas exploration near Tolsona. Next steps: exploratory drilling and site work, development plan (2015-2016).

Community Plans / Planning Studies	**Year**
Copper River Regional Energy Plan (Phase I)	2013
Copper River Resource Management Plan (BLM)	2010
Copper River Area Plan 2010-2015 (CVDA)	2009
Alternative Energy&Energy Conservation Narrative	2009

Local Contacts	**Email**	**Phone / Fax**
Tolsona Community Corp.		907-822-3865 / 822-3165

Demographics	**2000**	**2010**		
Population	27	30	**Median Household Income (2010)**	not listed
Median Age	33	lists 0 DCRA	**% of Residents Employed (2013)**	60%
Avg. Household Size	3	2	**Low-Med Income (LMI) Percent (2014)**	100%
% Alaska Native	15%	0%	**Denali Commission Distressed Community (2013)**	Yes

Electric Utility	**Current Generation Sources**	**Connected by Intertie**	**PCE**
Copper Valley Electric Assoc.	Hydro, Diesel, Cogen	Yes	No

Landfill	**Class**	**Permited?**	**Location**	**Condition/Expected life**
Tolsona Community Corp.	3	No	Glennallen	

Water/Wastewater System	**Water**	**Sewer**	**Energy Audit**	**Homes Served**	**System Volume**
N/A	Wells; Hauled	Septic system			

Road Access Glenn Highway

Air Access	**Runway**	**Surface**	**Lighted**	**Flight Rules**	**Condition**	**Air Miles (to Hub)**
State owned	4000'x1500'	Water	No	IFR	N/A	

Dock/Port Facilities	**Ferry Service**	**Barge Access**	**Marine Access Issues**
None	No	No	

Notes

Energy Profile: Tolsona

Power House

Utility	Copper Valley Electric

Generators	Make/Model	Rated Capacity	Condition/Hrs
Unit 1	N/A		
Unit 2			
Unit 3			
Unit 4			

Line Loss	
Heat Recovery?	
Upgrades?	

Outage History/Known Issues

No community production, PCE ineligible.

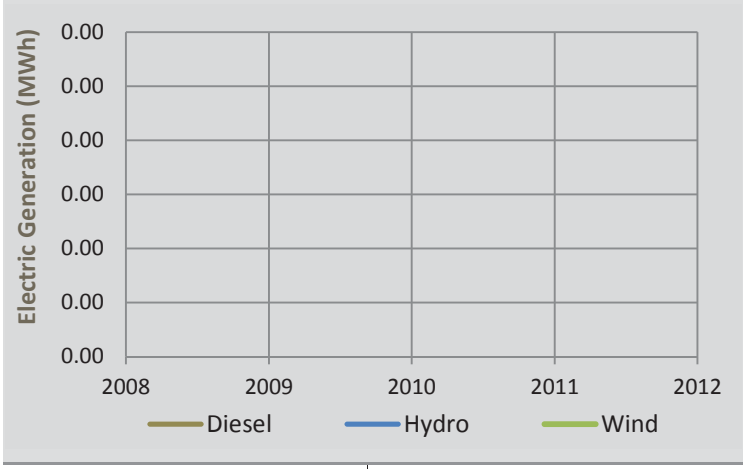
Operators	No. of Operators	Training/Certifications
N/A		

Maintenance Planning (RPSU)

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

Power Production

Diesel (kWh/yr)	0	Avg. Load (kW)	78
Wind (kWh/yr)	0	Peak Load (kW)	173
Hydro (kWh/yr)	0	Diesel Eff: kWh/gal	N/A
Total (kWh/yr)	0	Diesel Use (gals)	0



Electric Rates ($/kWh)		Cost per kWh Sold ($/kWh)
Rate with PCE	N/A	Fuel Cost
Residential	$0.18-$0.28	Non-fuel Cost
Commercial	N/A	Total Cost

Fuel Prices ($)	Utility/Wholesale	Retail	Month/Year
Diesel (1 gal)	N/A	N/A	
Other? (1 gal)			
Gasoline (1 gal)			
Propane (100#)			
Wood (1 cord)			
Pellets			
Discounts?			

Resource	Potential	Certainty	Notes
Hydroelectric	Low	Medium	Low potential based on visual assessment.
Wind Diesel	Medium	High	Moderate wind resource on developable site on Tolsona Ridge.
Biomass	Low	Low	Productive forest resource nearby. No reconnaissance study done.
Solar	Low	Low	Residential/building-scale projects may be economic. Assess case by case.
Geothermal	Low	Low	No significant resource identified within 20 miles.
Oil and Gas	Medium	Low	Additional drilling in area is underway. Previous wells have been inconclusive.
Coal	Low	Low	Known resources are of limited quality but have not been studied in detail.
Emerging Tech	Low	Low	
Heat Recovery	Low	High	No local electric generation.
Energy Efficiency	High	High	Opportunity from residential and commercial/public EE is high.

Bulk Fuel

Tank Owner	Fuel Type(s)	Capacity	Age/Condition

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

Housing Units	Occupied	Vacant	% Owner-Occup.
	18	N/A	10%

Regional Housing Authority	Weatherization Service Provider
Copper River Basin	Copper River Basin

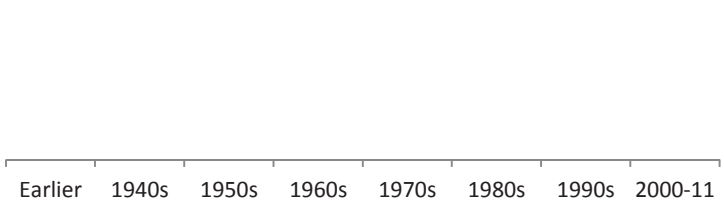
Energy Profile: Tolsona

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

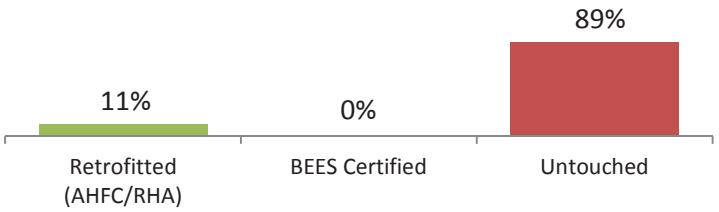
Energy Use	Average Home Energy Rating	Average Square Feet	Avg. EUI (kBTU/sf)

Data Quality

Age of Housing Stock (includes vacant)



Energy Efficient Housing Stock



Lighting	Owner	Number/Type	Retrofitted?	Year	Notes
N/A					

Non-residential Building Inventory

Building Name or Location	Year Built	Square Feet	Audited?	Retrofits Done?	In ARIS?
N/A					

Community Profile: Tonsina

Municipality Unincorporated

Location

Located at mile 79 on the Richardson Highway, south of the Tonsina River, next to Kenny Lake, 52 miles northeast of Valdez.

Longitude	-145.1753	**Latitude**	61.6558
ANCSA Region	Ahtna, Incorporated		
Borough	Unorganized		
Census Area	Valdez-Cordova Census Borough		
School District	None DCRA		

Alaska Native Name (definition)

/tɒnˈsiːnə/

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

Historical Setting / Cultural Resources

A post office, general store, and U.S. Army Signal Corps telegraph station were established here in 1902. Development began during the oil era. Pump Station 12 was constructed nearby to move oil over Thompsen Pass to the pipeline terminal in Valdez. There is no clearly-defined community in Tonsina; it is best characterized as an occupied geographic area.

Economy

Roadhouses and the State Highway Maintenance are the nearest employers. Subsistence activities supplement income. No commercial fishing permits and 1 business license.

Climate	**Avg. Temp.**	**Climate Zone**	**Heating Deg. Days**
	26.7°	7	N/A

Natural Hazards Plan

N/A

Energy Priorities and Projects

Community Plans / Planning Studies	**Year**
Copper River Regional Energy Plan (Phase I)	2013
Copper River Resource Management Plan (BLM)	2010
Copper River Area Plan 2010-2015 (CVDA)	2009
Community Plan for the Greater Kenny Lake Area	2007

Local Contacts	**Email**	**Phone / Fax**

Demographics	**2000**	**2010**		
Population	92	78	**Median Household Income (2010)**	$ 103,295
Median Age	43	24	**% of Residents Employed (2013)**	39%
Avg. Household Size	3	2	**Low-Med Income (LMI) Percent (2014)**	56%
% Alaska Native	10%	10%	**Denali Commission Distressed Community (2013)**	Yes

Electric Utility	**Current Generation Sources**	**Connected by Intertie**	**PCE**
Copper Valley Electric Assoc.	Hydro, Diesel, Cogen	Yes	No

Landfill	**Class**	**Permited?**	**Location**	**Condition/Expected life**
Copper Basin Sanitation Co.	2	Yes	Glennallen	

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

Road Access Richardson Highway

Air Access	**Runway**	**Surface**	**Lighted**	**Flight Rules**	**Condition**	**Air Miles (to Hub)**
None						

Dock/Port Facilities	**Ferry Service**	**Barge Access**	**Marine Access Issues**
None	No	No	

Notes

Energy Profile: Tonsina

Power House

Utility	Copper Valley Electric		
Generators	**Make/Model**	**Rated Capacity**	**Condition/Hrs**
Unit 1	N/A		
Unit 2			
Unit 3			
Unit 4			
Line Loss			
Heat Recovery?			
Upgrades?			

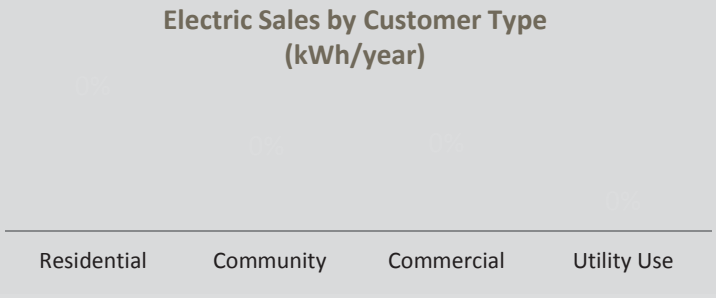
Outage History/Known Issues

No community production, PCE ineligible.

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

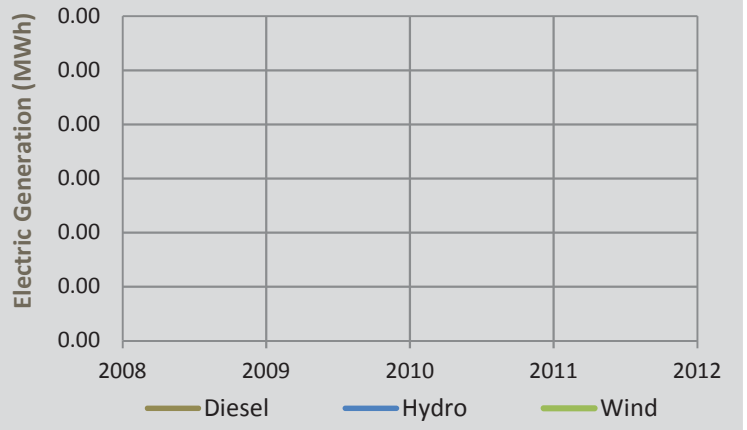
Maintenance Planning (RPSU)

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



Power Production

Diesel (kWh/yr)	0	**Avg. Load (kW)**	92
Wind (kWh/yr)	0	**Peak Load (kW)**	205
Hydro (kWh/yr)	0	**Diesel Eff: kWh/gal**	N/A
Total (kWh/yr)	0	**Diesel Use (gals)**	0



Electric Rates ($/kWh)		**Cost per kWh Sold ($/kWh)**
Rate with PCE	N/A	**Fuel Cost**
Residential	$0.18-$0.28	**Non-fuel Cost**
Commercial	N/A	**Total Cost**

Fuel Prices ($)	**Utility/Wholesale**	**Retail**	**Month/Year**
Diesel (1 gal)	N/A	$3.95	8-14
Other? (1 gal)			
Gasoline (1 gal)			
Propane (100#)		$96.90	
Wood (1 cord)			
Pellets			
Discounts?			

Resource	**Potential**	**Certainty**	**Notes**
Hydroelectric	Medium	Medium	Moderate potential based on visual assessment.
Wind Diesel	Low	Low	Possible wind resource south of Willow Mtn. No met data.
Biomass	Low	Low	Productive forest resource nearby. No reconnaissance study done.
Solar	Low	Low	Residential/building-scale projects may be economic. Assess case by case.
Geothermal	Low	Low	No significant resource identified within 20 miles.
Oil and Gas	Medium	Low	Additional drilling in region underway. Previous wells have been inconclusive.
Coal	Low	Low	Known resources are of limited quality but have not been studied in detail.
Emerging Tech	Low	Low	
Heat Recovery	Low	High	No local electric generation.
Energy Efficiency	High	High	Opportunity from residential and commercial/public EE is high.

Bulk Fuel

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

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

Housing Units	**Occupied**	**Vacant**	**% Owner-Occup.**
	37	48	100%

Regional Housing Authority	**Weatherization Service Provider**
Copper River Basin	Copper River Basin

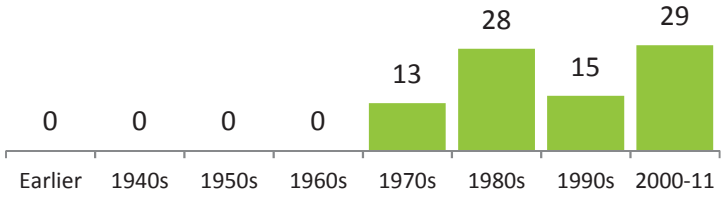
Energy Profile: Tonsina

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

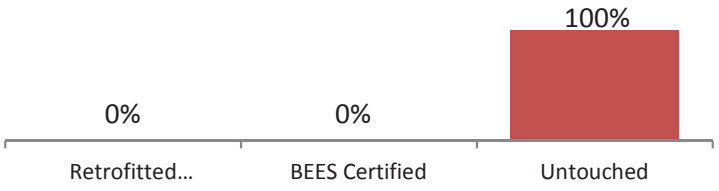
Energy Use	Average Home Energy Rating	Average Square Feet	Avg. EUI (kBTU/sf)
	N/A	N/A	N/A

Data Quality

Age of Housing Stock (includes vacant)



Energy Efficient Housing Stock



Lighting	Owner	Number/Type	Retrofitted?	Year	Notes
N/A					

Non-residential Building Inventory

Building Name or Location	Year Built	Square Feet	Audited?	Retrofits Done?	In ARIS?
N/A					

A | STAKEHOLDER ADVISORY GROUP

Ahtna, Inc.| Joe Bovee, Bruce Cain

Alaska Department of Natural Resources, Division of Forestry | Gary Mullen

Alaska Power & Telephone | Bob Grimm, Mickey Henton, Greg Mickelson

AVAK / Glennallen Improvement Corporation | James Fields

Cheesh'Na Tribal Council | Karen Linnel

Chitina Electric, Inc. | Martin Finnesand

Copper River Basin Regional Housing Authority | Teri Nutter

Copper River School District | Michael Johnson

Copper Valley Chamber of Commerce | Naomi Young

Copper Valley Development Association | Jason Hoke

Copper Valley Electric Association | Robert Wilkinson, John Duhamel, Travis Million

Copper River Native Association | Ava Graybear

Crowley Maritime Corporation | Jerry Lesemann

Gulkana Village Council | Angela Vermillion

McCarthy Community Association | Mark Vail

Native Village of Tazlina | Rick Young

U.S. Bureau of Land Management Alaska, Forestry Program | Ben Siefert

Wolf Solar Electric | Jarrett Humphreys

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 Services report, Fossil Fuel and Geothermal Energy Sources for Local Use in Alaska (Swenson, Wartes, David, & James, 2012), personal communication with Alaska Energy Authority program managers for Biomass Energy, Geothermal Energy, Heat Recovery, Hydroelectric Power, and Wind Energy, and data shared by Ahtna, Inc. and 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, and except in the case of energy efficiency, it does not look at opportunity from residential- or building-scale projects. This is an important caveat especially in the area of solar and biomass technologies, where a low rating given to a community does not mean that there is not the potential to save money from residential-scale projects.

The rating criteria for individual resources were developed in collaboration with AEA program managers. See Table 30 for an explanation of the criteria used in the analysis.

Table 22: Wood biomass resource potential

	20-Year Average Diesel Fuel Price ($)	Resource Potential	Productive Forest	Project in Operation	Rough B/C Ratio	Existing Study (R,F) or Development (D,C)	Certainty
Chistochina	4.18	H	H		1.11	C	M
Chitina	4.53	M	H		1.25		L
Copper Center	3.56	M	H		0.84	R	M
Gakona	3.45	M	H		0.80	R	M
Glennallen	3.56	M	H		0.84	R	M
Gulkana	3.45	H	H	Y	0.80	C	H
Kenny Lake	3.45	H	H	Y	0.80		H
McCarthy	3.96	M	M		1.01		L
Mentasta Lake	4.18	H	H	Y	1.11		L
Nelchina-Mendeltna	3.56	L	M		0.84		L
Silver Springs	3.56	L	H		0.84		L
Slana	4.18	M	H		1.11		L
Tazlina	3.45	H	H		0.80	F	M
Tolsona	3.56	L	H		0.84		L
Tonsina	3.45	L	H		0.80		L

See B-1 for data sources and notes.

Table 23: Geothermal resource potential

	Resource Potential	Identified Resource within 20 Miles	Significant Resource within 20 Miles	Certainty
Chistochina	L			L
Chitina	L	Y	N	L
Copper Center	L	Y	N	L
Gakona	L	Y	N	L
Glennallen	L	Y	N	L
Gulkana	L			L
Kenny Lake	L			L
McCarthy	L			L
Mentasta Lake	L			L
Nelchina-Mendeltna	L			L
Silver Springs	L	Y	N	L
Slana	L			L
Tazlina	L			L
Tolsona	L			L
Tonsina	L			L

See page B-1 for data sources and notes.

Table 24: Hydropower resource potential

	Resource Potential	Projects in Operation	Hydro Resource	Identified in Pathway	Existing Study (R,F) or Development (D,C)	Viable Resource based on Visual Assessment	Certainty
Chistochina	M		Y			M	M
Chitina	H		Y	Y	F	H	H
Copper Center	M		Y	Y		M	M
Gakona	L		Y	Y		L	M
Glennallen	L		Y	Y		L	M
Gulkana	L		Y	Y		L	M
Kenny Lake	L		Y	Y		L	M
McCarthy	H		Y	N/A		H	M
Mentasta Lake	M		Y			M	M
Nelchina-Mendeltna	M		Y	Y		M	M
Silver Springs	L		Y	Y		L	M
Slana	M		Y	Y	R	M	M
Tazlina	L		Y			L	M
Tolsona	L		Y	Y		L	M
Tonsina	M		Y	Y		M	M

See page B-1 for data sources and notes.

Table 25: Wind energy resource potential

	Resource Potential	Wind Resource	Developability	Site Accessible	Permitability	Site Availability	Load	Certainty	Notes
Chistochina	L	L	L	Y	Y	Y		M	
Chitina	L	M	L		Y	Y		M	Less than 12 mos. data from prior study
Copper Center	L	L	H	Y	Y	Y	Y	M	
Gakona	L	L	M		Y	Y	Y	H	Wind study with 12+ month's data.
Glennallen	L	L	H	Y	Y	Y	Y	M	
Gulkana	L	L	H	Y	Y	Y	Y	M	
Kenny Lake	L	L	H	Y	Y	Y	Y	M	
McCarthy	L	L	L	Y	Y	Y		M	
Mentasta Lake	L	M	L	Y	Y	Y		L	
Nelchina-Mendeltna	L	L	H	Y	Y	Y	Y	M	
Silver Springs	L	L	H	Y	Y	Y	Y	M	
Slana	L	L	L	Y	Y	Y		M	
Tazlina	L	L	H	Y	Y	Y	Y	L	
Tolsona	M	M	H	Y	Y	Y	Y	H	Tolsona Ridge: Wind class 2, CF=22
Tonsina	L	L	H	Y	Y	Y	Y	L	Possible resource south of Willow Mtn.

See page B-1 for data sources and notes.

Table 26: Coal resource potential

	Resource Potential	Potential Deposits Identified	High Quality/ Developability	Project Planned or in Development	Certainty	Notes
Chistochina	L				L	Region has had too few detailed geologic studies to provide a reliable assessment of potential coal resources.
Chitina	L	Y	N		L	
Copper Center	L				L	
Gakona	L				L	
Glennallen	L				L	
Gulkana	L				L	
Kenny Lake	L				L	
McCarthy	L	Y	N		L	
Mentasta Lake	L				L	
Nelchina-Mendeltna	L				L	
Silver Springs	L				L	
Slana	L				L	
Tazlina	L				L	
Tolsona	L				L	
Tonsina	L				L	

See page B-1 for data sources and notes.

Table 27: Oil and gas resource potential

	Resource Potential	Source Rock, Traps and Reservoirs Present	Wells Drilled, Economic Resource Identified	Certainty	Notes
Chistochina	M	Y		L	Additional drilling may be warranted
Chitina	M	Y		L	
Copper Center	M	Y		L	
Gakona	M	Y		L	
Glennallen	M	Y		L	
Gulkana	M	Y		L	
Kenny Lake	M	Y		L	
McCarthy	M	Y		L	
Mentasta Lake	M	Y		L	
Nelchina-Mendeltna	M	Y		L	
Silver Springs	M	Y		L	
Slana	M	Y		L	
Tazlina	M	Y		L	
Tolsona	M	Y		L	
Tonsina	M	Y		L	

See page B-1 for data sources and notes.

Table 28: Heat recovery (HR) resource potential

	Resource Potential	HR Equipment at Powerhouse	HR in Operation	Recoverable Heat Available	Nearby thermal loads	Certainty	Notes
Chistochina	L					H	On Slana grid. No local generation
Chitina	M	Y	Y	Y	N	H	Heats clinic. Additional potential if another building is constructed nearby. Possible hydro HR.
Copper Center	L					H	On CVEA grid. No local generation
Gakona	L					H	On CVEA grid. No local generation
Glennallen	H	N	N	Y	Y	M	CVEA decision not to proceed based on reconnaissance.
Gulkana	L					H	On CVEA grid. No local generation
Kenny Lake	L					H	On CVEA grid. No local generation
McCarthy	L					H	No central power system
Mentasta Lake	L					M	Tied to Slana
Nelchina-Mendeltna	L					H	On CVEA grid. No local generation
Silver Springs	L					H	On CVEA grid. No local generation
Slana	L	Y	Y	N		L	Heat sales to Slana school
Tazlina	L					H	On CVEA grid. No local generation
Tolsona	L					H	On CVEA grid. No local generation
Tonsina	L					H	On CVEA grid. No local generation

See page B-1 for data sources and notes.

Table 29: Energy Efficiency savings potential

	Resource Potential	Residential EE Potential	% of Homes without HER or AHFC/RHA Weatherization	Commercial/Public Building EE Potential	Water/Sewer System Audit	School Audit	Street Light Upgrades	Community EE Program (VEEP, EECBG, etc.) or Multiple Commercial Building Audits	Certainty
Chistochina	H	H	79%	H					H
Chitina	H	H	66%	H				Y	H
Copper Center	H	M	36%	H		Y		Y	H
Gakona	H	H	81%	H				Y	H
Glennallen	H	H	67%	H		Y		Y	H
Gulkana	H	M	48%	H				Y	H
Kenny Lake	H	H	73%	H		Y			H
McCarthy	H	H	86%	H					H
Mentasta Lake	H	H	89%	H					H
Nelchina-Mendeltna	H	H	94%	H					H
Silver Springs	H	H	100%	H					H
Slana	H	H	94%	H		Y			H
Tazlina	H	H	86%	H				Y	H
Tolsona	H	H	89%	H					H
Tonsina	H	H	100%	H					H

See page B-1 for data sources and notes.

Table 30: 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	No river, tidal or wave energy potential documented within 10 miles.	Substantial resource documented within 10 miles.	Substantial resource adjacent to power system.	"	"	"
Oil & Natural Gas	Resource development and power generation	No source rock, traps or reservoirs present.	Source rock, traps or reservoirs present. Needs investigation.	Wells drilled and economic resource identified.	"	"	"
Solar	Photovoltaic	Economic criteria are more important than resource data. Projects should be evaluated on a case-by-case basis. See notes on solar technologies following table.					
Wind	Resource development and power generation	Wind resource or developability low***.	"	Project in operation, or wind resource and developability high***.	"	Based on recon level study.	Resource based on 12+ months onsite resource assessment, hourly load data, feasibility or higher level study.
Other	Nuclear, emerging energy technology	Low (See notes on emerging technologies following table.)					

Resource		Potential			Certainty		
Resource	What it Includes	Low	Medium	High	Low	Medium	High
Heat							
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	More than 70% of homes have received recent EE upgrades	41 - 70% of homes have NOT received recent EE upgrades.	Less than 40% 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.
Transmission							
Interties	Power lines between communities or to remote generation						
Gas Lines	Natural gas or LNG lines						

Resource		Potential			Certainty		
Resource	What it Includes	Low	Medium	High	Low	Medium	High
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?						
	c. Site availability: Is there suitable land that is available for siting wind turbines?						
	d. Load: Is there sufficient load such that wind can be integrated economically with the existing diesel system (X: less than 50 kW average load)?						
**** Rough analysis of biomass project benefit/cost estimated based on these assumptions:	1. Fuel price estimated as simple 20-year average of ISER projections of power-sector fuel price plus an adder of $0.50 per gallon for heating fuel (ftp://www.aidea.org/REFund/Round%208/Documents/EvaluationModel.xlsm)						
	2. Fuelwood with an energy content of 20 MMBtu/cord and price of $250/cord						
	3. Wood and oil combustion efficiency equal						
	4. Installed cost of system estimated at $35/gallons per year of displaced fuel						
	5. O&M cost of 1% installed cost						
Energy Efficiency Rating^	The rating is conservative in giving a high potential for communities with any high rating whether in residential or public/commercial. Medium ratings are used for communities with two mediums or a low and a high. No community is rated as low for overall energy efficiency potential.						
Energy Efficiency Low^^	Low is not used as a resource potential for public and commercial building energy efficiency because even if all programs and audits are completed there is substantial work left to be done on implementing retrofits. Where information on audits especially for public and commercial buildings is sufficient, information on whether retrofits have been implemented is often lacking. To reflect that these criteria are not the full story of energy efficiency in commercial and public infrastructure, this the low potential rating is not used.						
Energy Efficiency Certainty^^^	The assumption is audits and streetlights that have been completed are recorded by AHFC and EE programs are recorded in multiple locations - REAP, AK Energy Efficiency, and AEA. Therefore, these ratings are based on collected data and have a high level of certainty.						

NOTES ON SPECIFIC TECHNOLOGIES

Solar P/V and Thermal

In Alaska, the sun's energy is abundant in the summer when daylight hours are long. Owners and residents of off-grid lodges, fish camps, and remote cabins may find solar photovoltaic or solar thermal systems to be viable options. However, long, dark winters with six or more months of snow cover in most of the state make the economics of solar energy challenging. This is particularly true when the economics of solar energy are compared to those of energy efficiency and conservation, which can provide similar fuel-saving benefits at a fraction of the cost of solar energy.

The Alaska Energy Authority has funded the construction of one solar photovoltaic and one solar thermal project through the Renewable Energy Fund in recent years. Each of these projects was designed and constructed properly and is operating as anticipated. The Kaltag solar photovoltaic project cost $126,000 and saved $2,600 in energy costs in FY2014. The McKinley Village solar thermal project cost more than $190,000 and saved approximately $7,000 in FY2014. Once operations and maintenance costs are factored in, neither of these projects is likely to pay for itself over its expected life.

The National Renewable Energy Laboratory (NREL) has developed a valuable tool for analyzing solar photovoltaic performance and economics. It is called PVWatt's Calculator and is available at http://pvwatts.nrel.gov. Alaskans interested in learning about the potential for solar photovoltaic development can use PVWatt's as a preliminary analysis tool to analyze solar potential at their site. NREL also has a tool for analyzing solar thermal projects called System Advisor Model (SAM) and is available at https://sam.nrel.gov. Alaska residents can request assistance from the Alaska Energy Authority (David Lockard at 907-771-3062) in performing either solar P/V or solar thermal analysis.

Heat Pumps in Communities with Diesel Electrical Generation

Given the high installation costs and efficiency limitations of current technology, heat pumps do not appear economically competitive with fuel oil heaters in rural communities that rely on diesel for electrical generation.

Heat pumps use a working fluid in a refrigeration cycle to move heat from a lower temperature source to a higher temperature load, consuming electricity in the process. Heat sources can include the ground (via glycol filled loops in vertical boreholes or horizontal trenches), air, ground water, lakes, and seawater. Heat pump performance is expressed as a ratio of thermal energy delivered to electrical energy consumed which is referred to as the Coefficient of Performance (COP).

Unit oil fuel heaters typical of rural Alaska operate at approximately 90% efficiency. Diesel genset conversion efficiencies typical of rural Alaska communities are in the range of 30-35% (in other words, 30-35% of the energy available in diesel fuel is converted to electricity). Based on these assumptions, a heat pump would need to operate with a minimum average COP greater than 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:

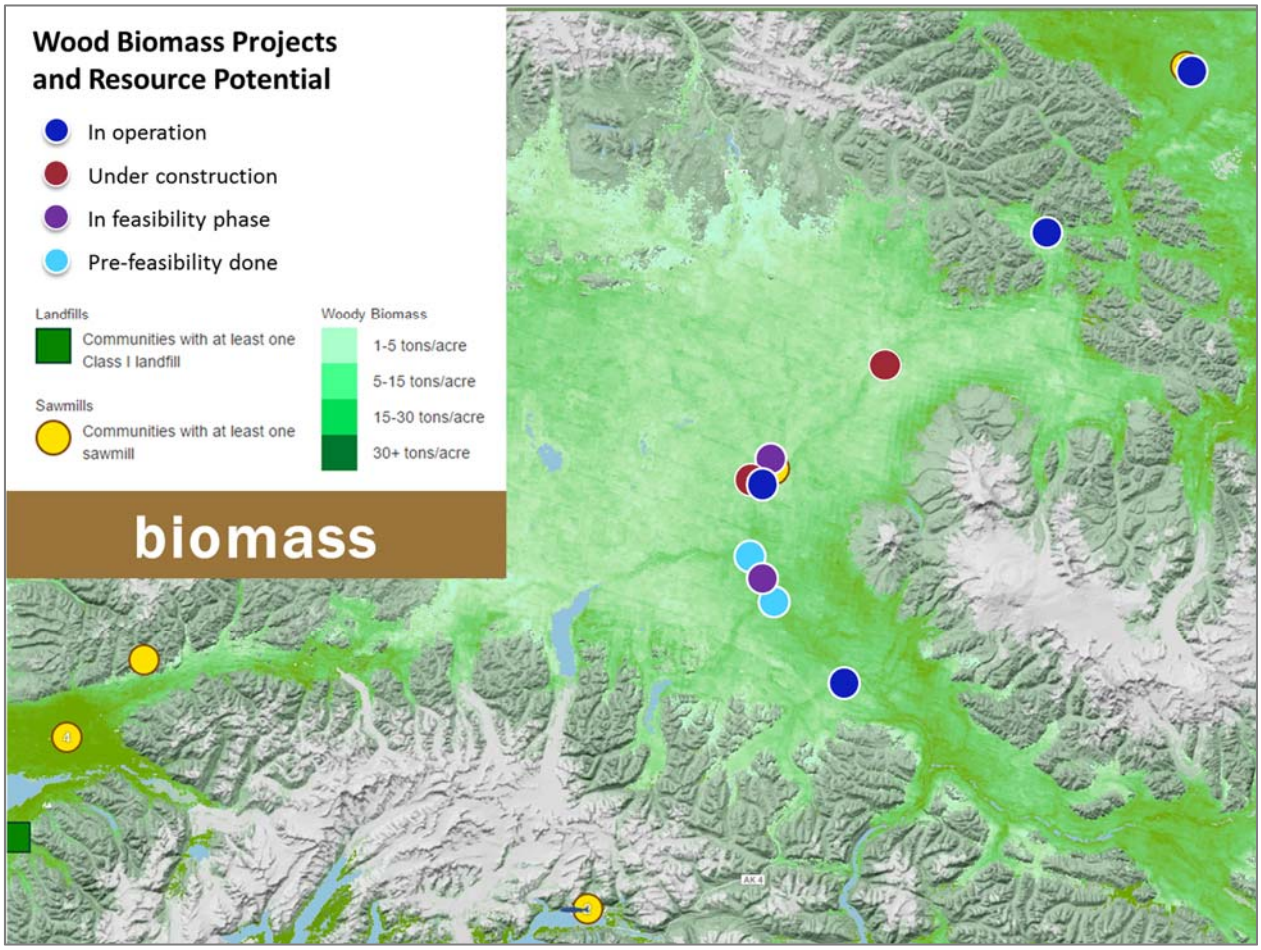
- Powerhouse heat recovery adds significant additional value to each gallon of diesel consumed for electricity generation.
- Transmission losses reduce the amount of electrical energy actually available per gallon of diesel.
- Maintenance requiring specially trained technicians and equipment further 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.

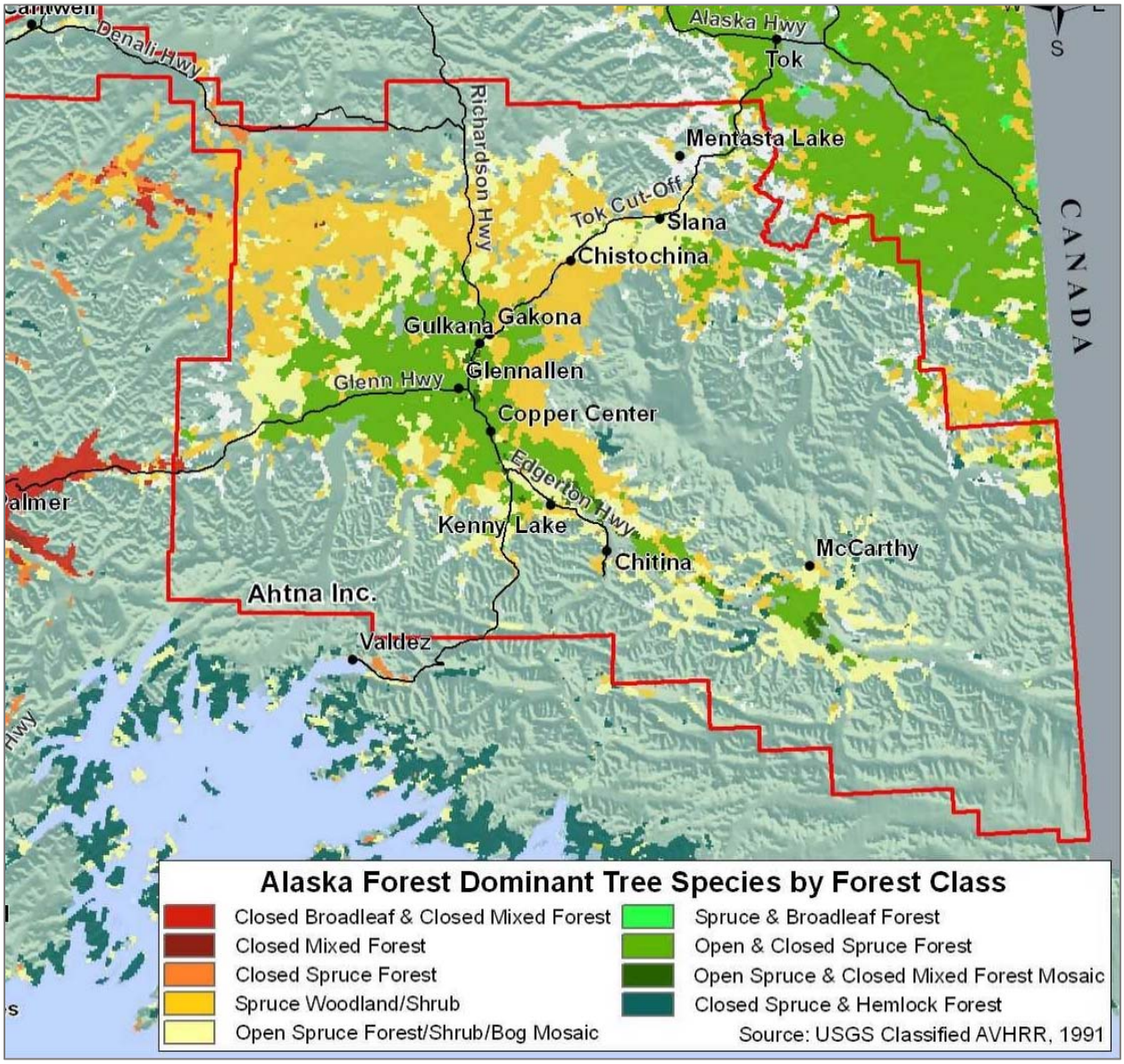
C | Resource Maps

Figure 17: Map of wood biomass projects and resource potential in the Copper River Basin



Adapted from the online *Renewable Energy Atlas of Alaska* (Geographic Information Network of Alaska, 2013)

Figure 18: Map of dominant tree species by forest class, 1991

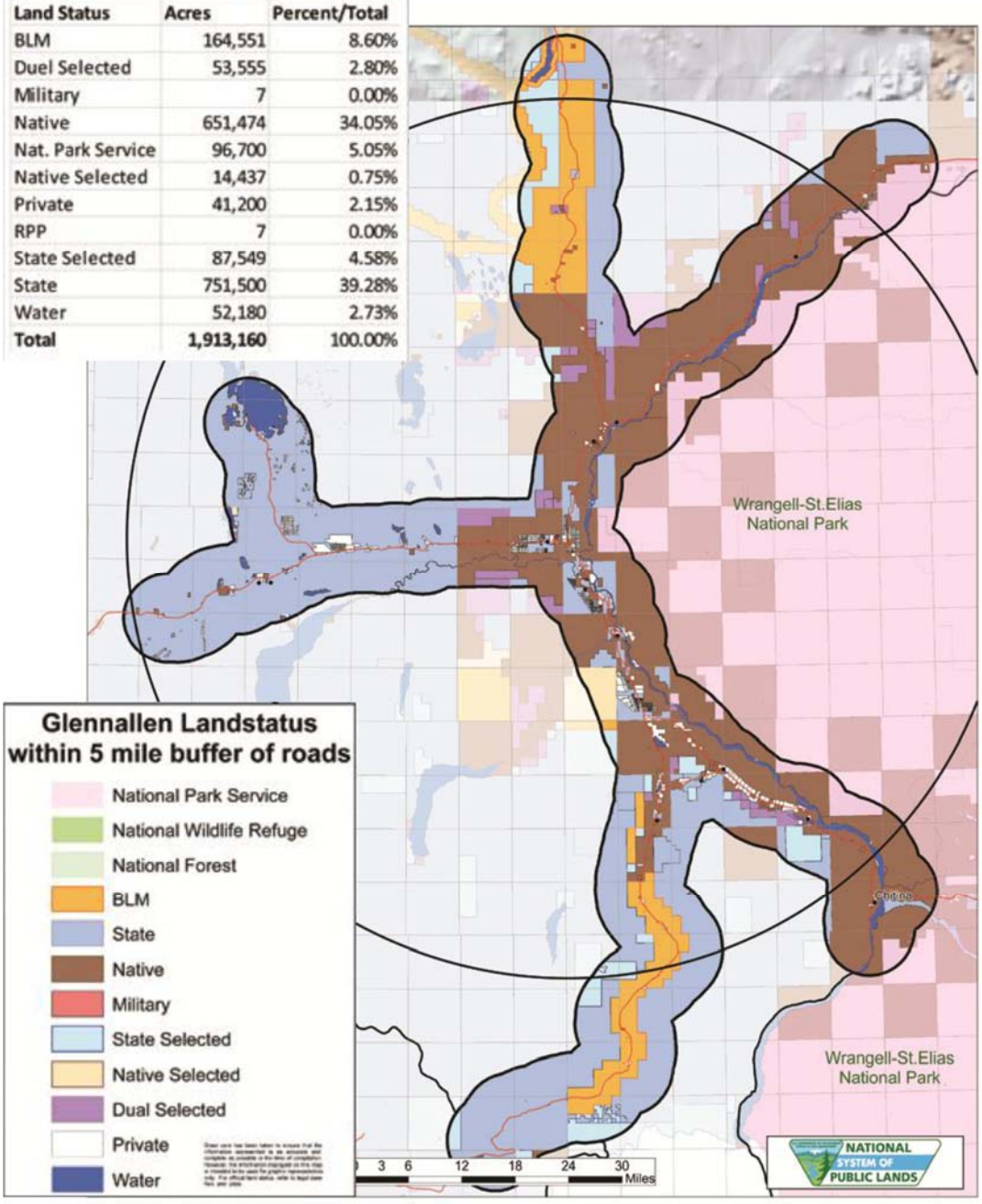


(WHPacific, Inc., 2010)

Figure 19: Map of land status within 5-miles of major roads in the Copper River Basin

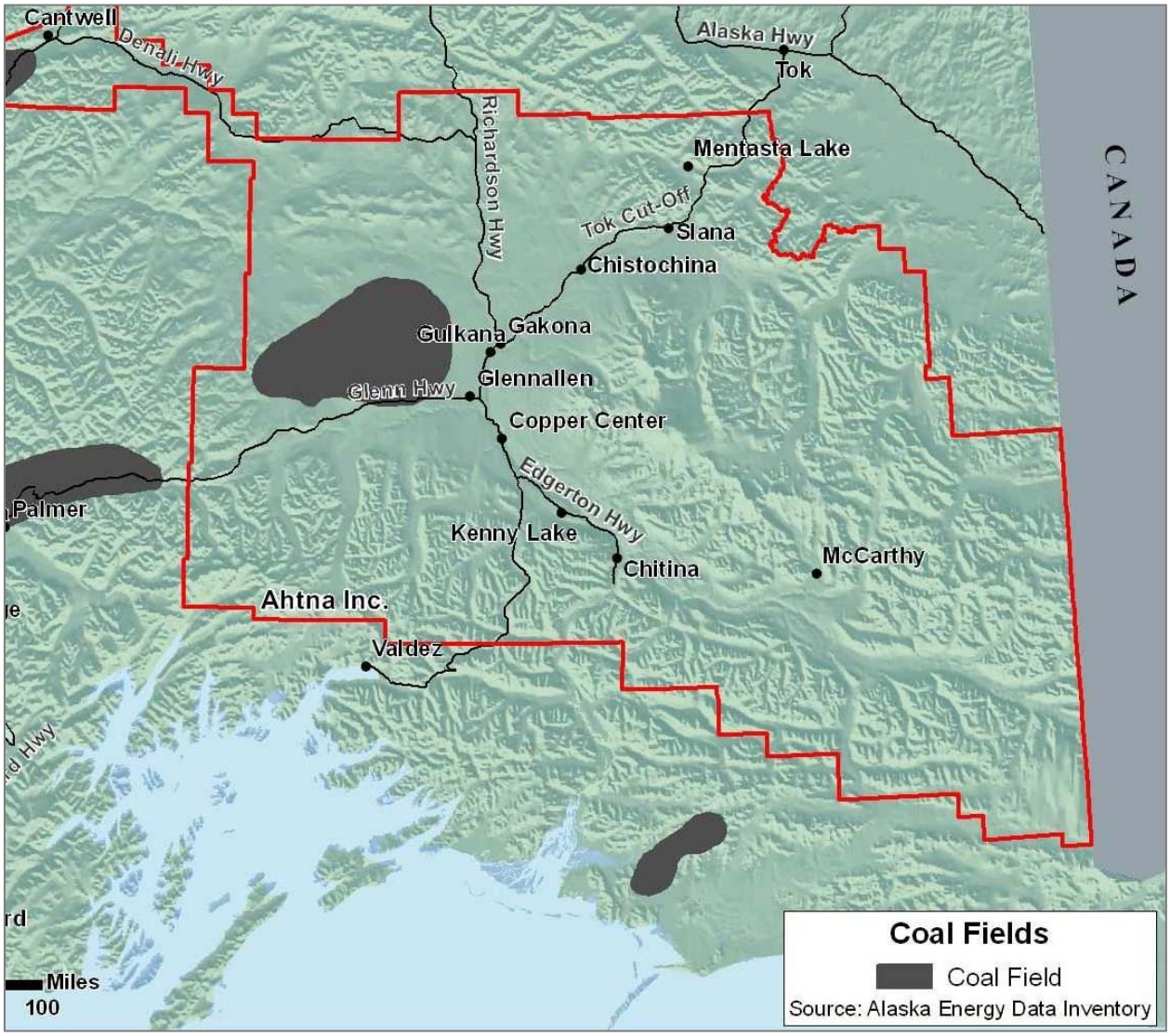
Area of Land Status within a 5 mile buffer of Major Roads in Copper River Basin

Land Status	Acres	Percent/Total
BLM	164,551	8.60%
Duel Selected	53,555	2.80%
Military	7	0.00%
Native	651,474	34.05%
Nat. Park Service	96,700	5.05%
Native Selected	14,437	0.75%
Private	41,200	2.15%
RPP	7	0.00%
State Selected	87,549	4.58%
State	751,500	39.28%
Water	52,180	2.73%
Total	**1,913,160**	100.00%



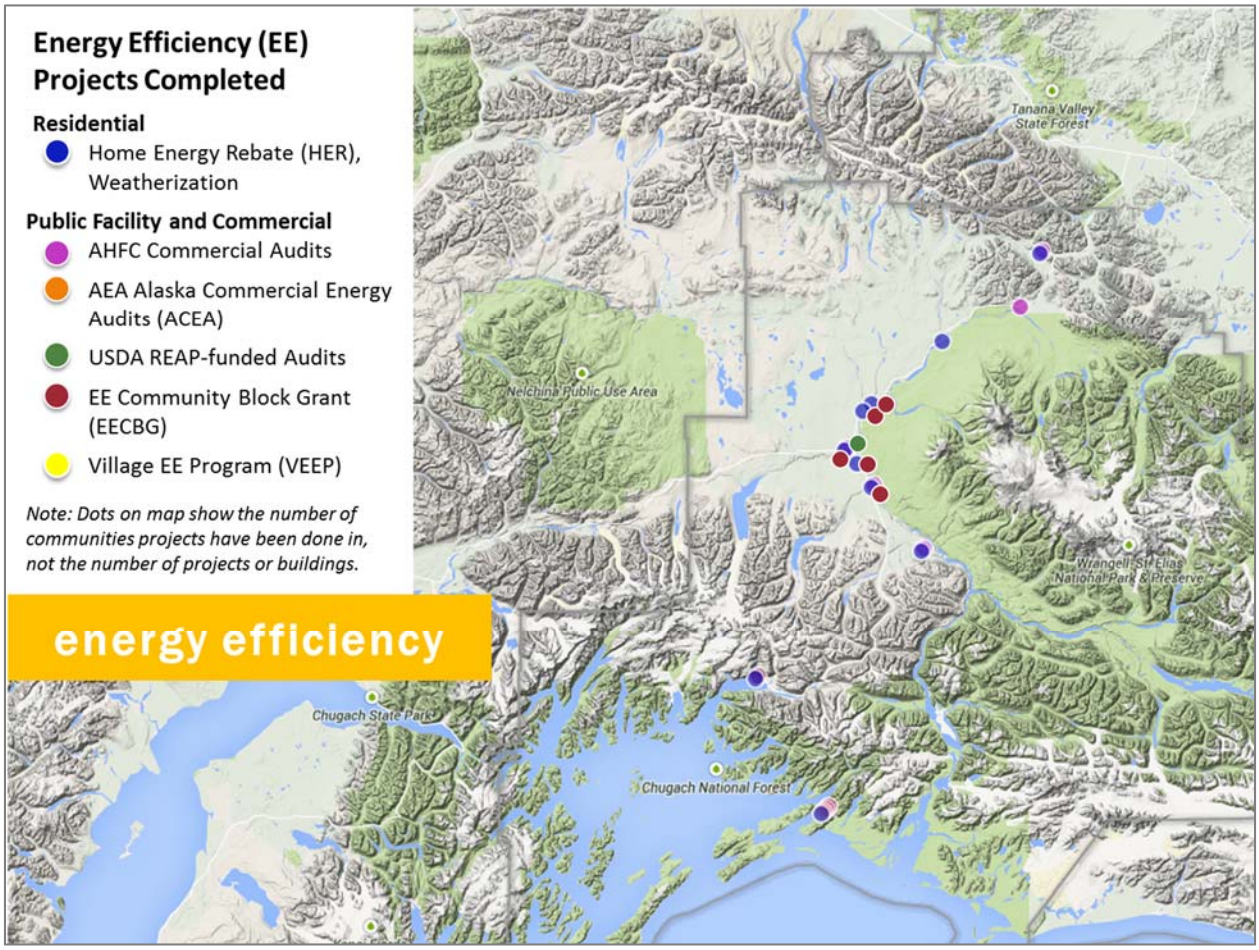
(Seifert, 2012)

Figure 20: Map of coal fields in the Copper River Basin



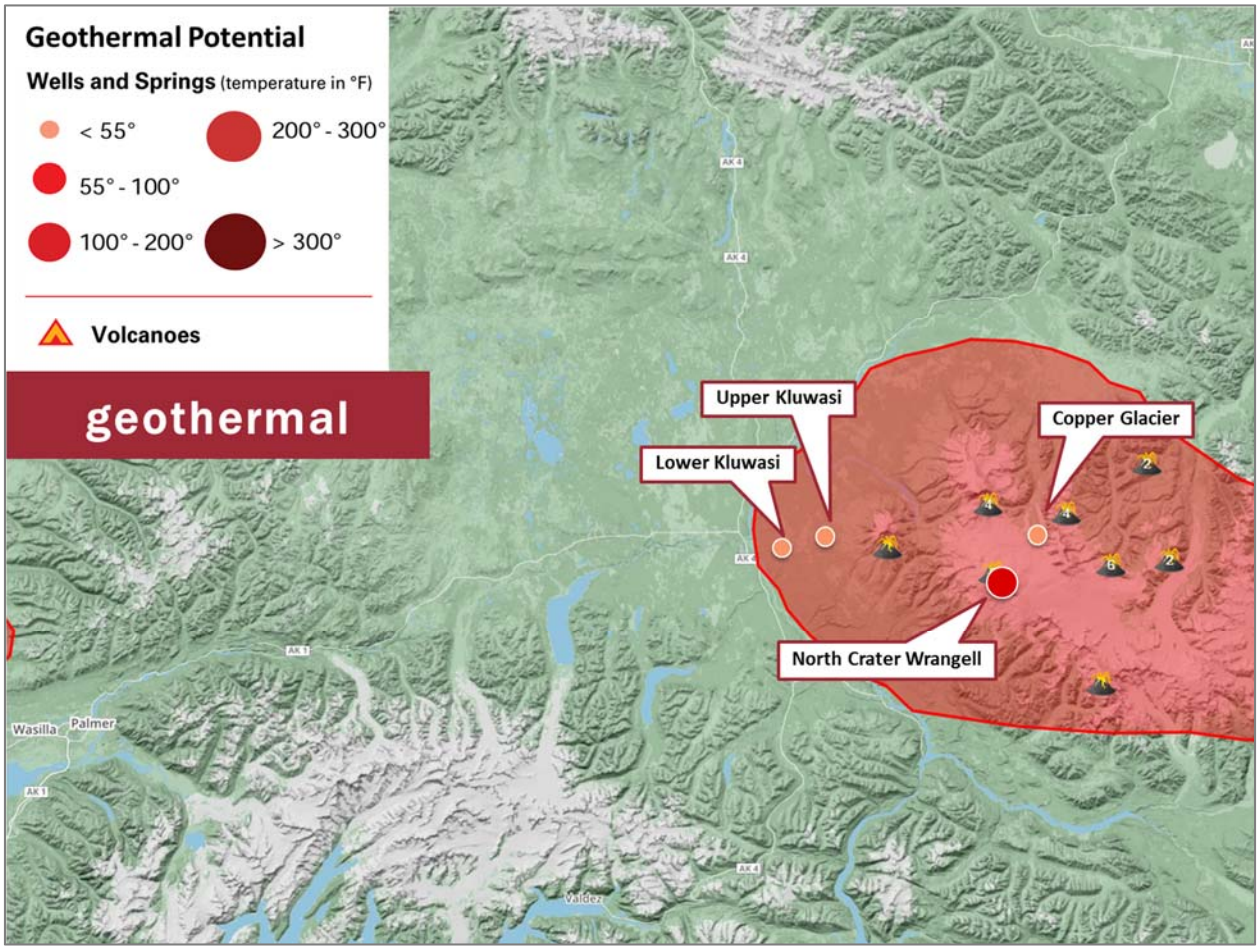
(WHPacific, Inc., 2010)

Figure 21: Map of Energy Efficiency program participation in the Copper River Basin



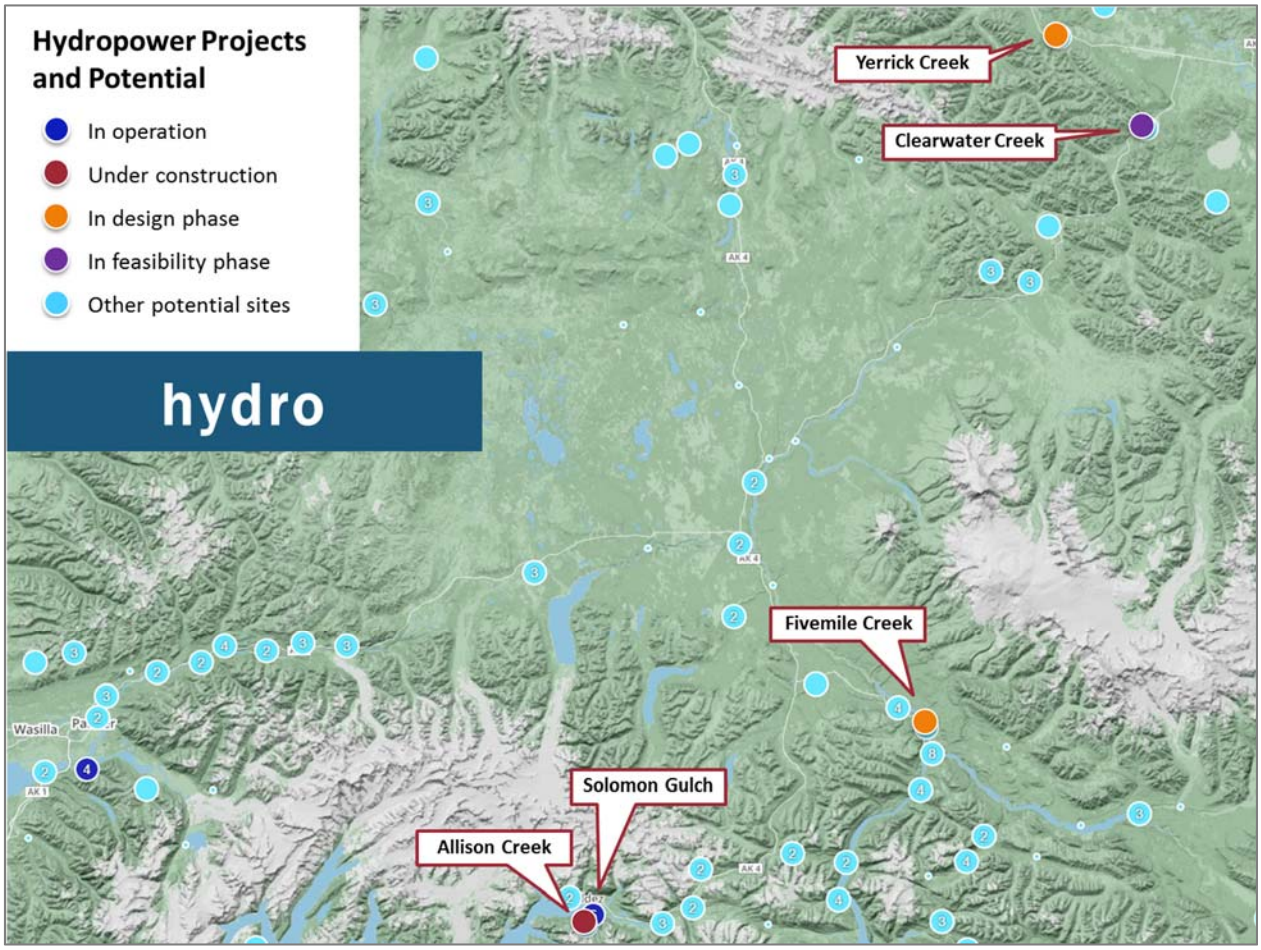
Adapted from the online *Alaska Energy Efficiency Map* (Alaska Energy Authority, 2013)

Figure 22: Map of geothermal resource potential in Copper River Basin



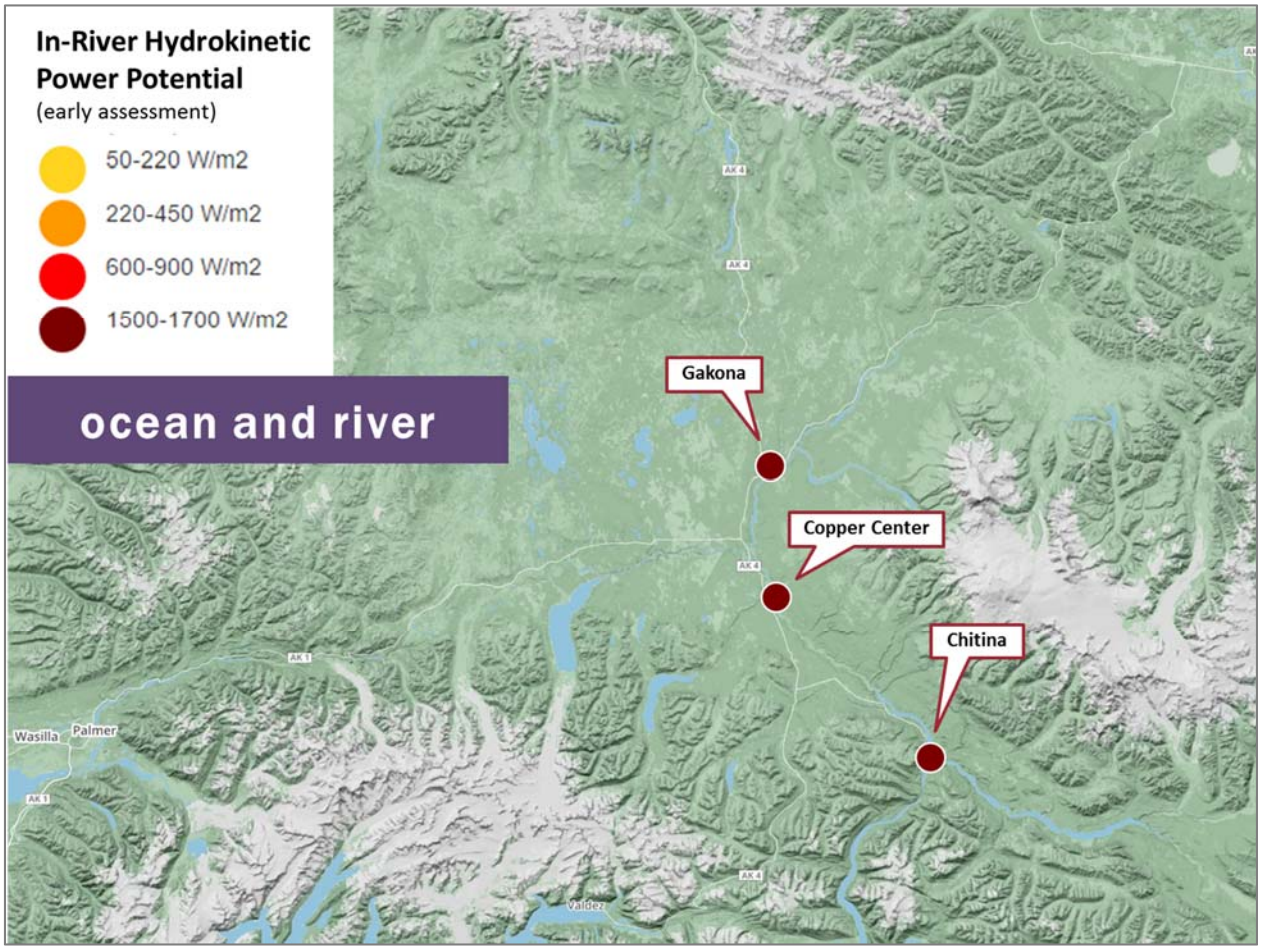
Adapted from the online *Renewable Energy Atlas of Alaska* (Geographic Information Network of Alaska, 2013)

Figure 23: Map of hydropower projects and resource potential in Copper River Basin



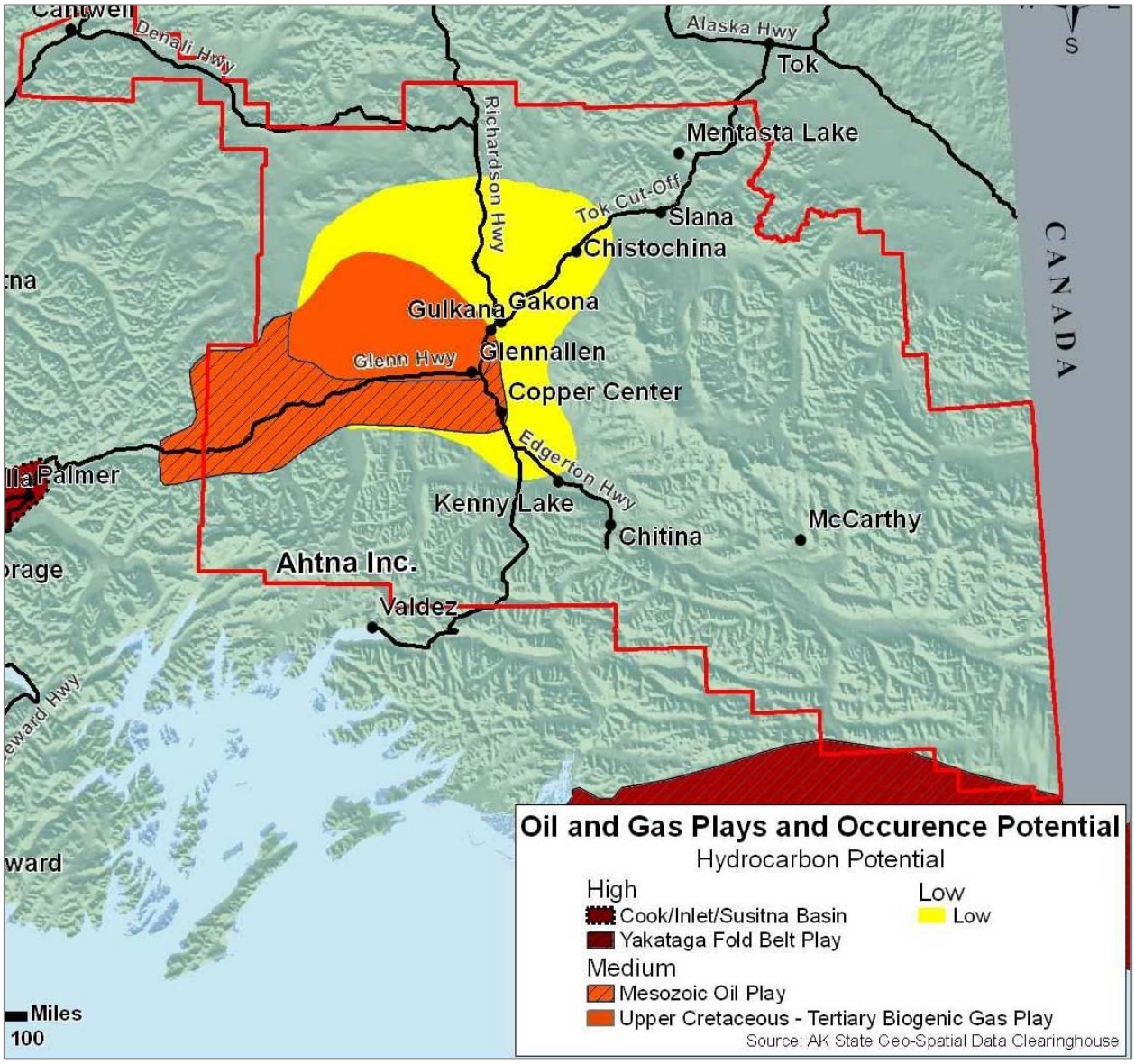
Adapted from the online *Renewable Energy Atlas of Alaska* (Geographic Information Network of Alaska, 2013)

Figure 24: Map of preliminary in-river hydrokinetic potential in Copper River Basin



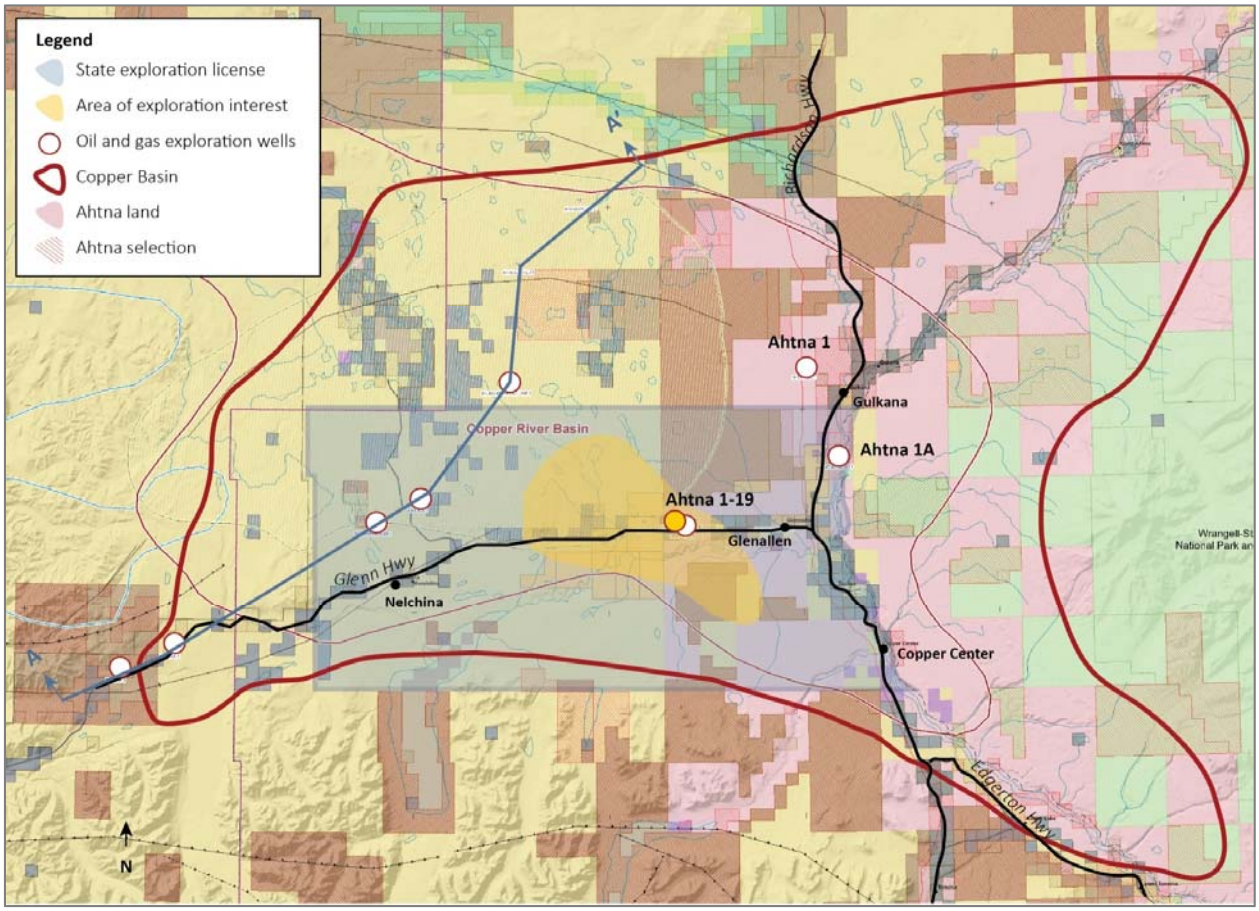
Adapted from the online *Renewable Energy Atlas of Alaska* (Geographic Information Network of Alaska, 2013)

Figure 25: Map of oil and gas potential in Copper River Basin



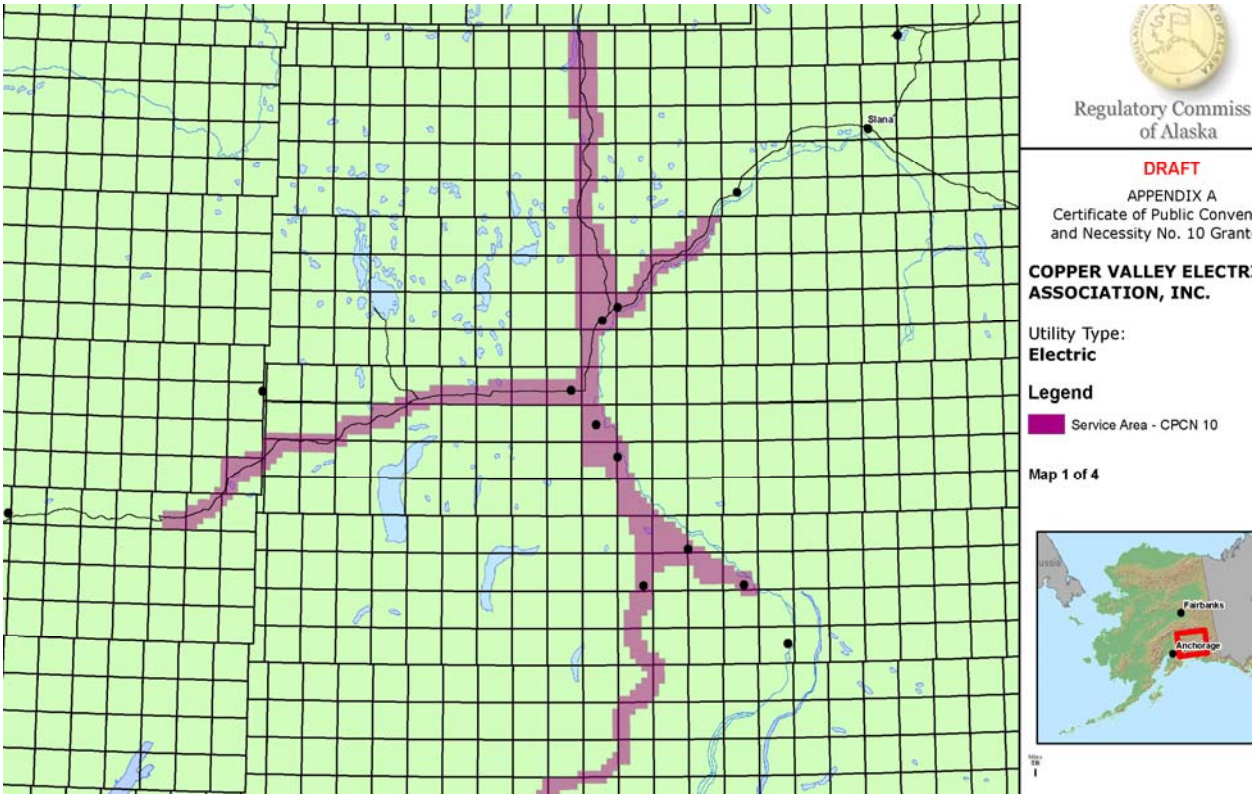
(WHPacific, Inc., 2010)

Figure 26: Map of Ahtna oil and gas exploration interest and wells in Copper River Basin



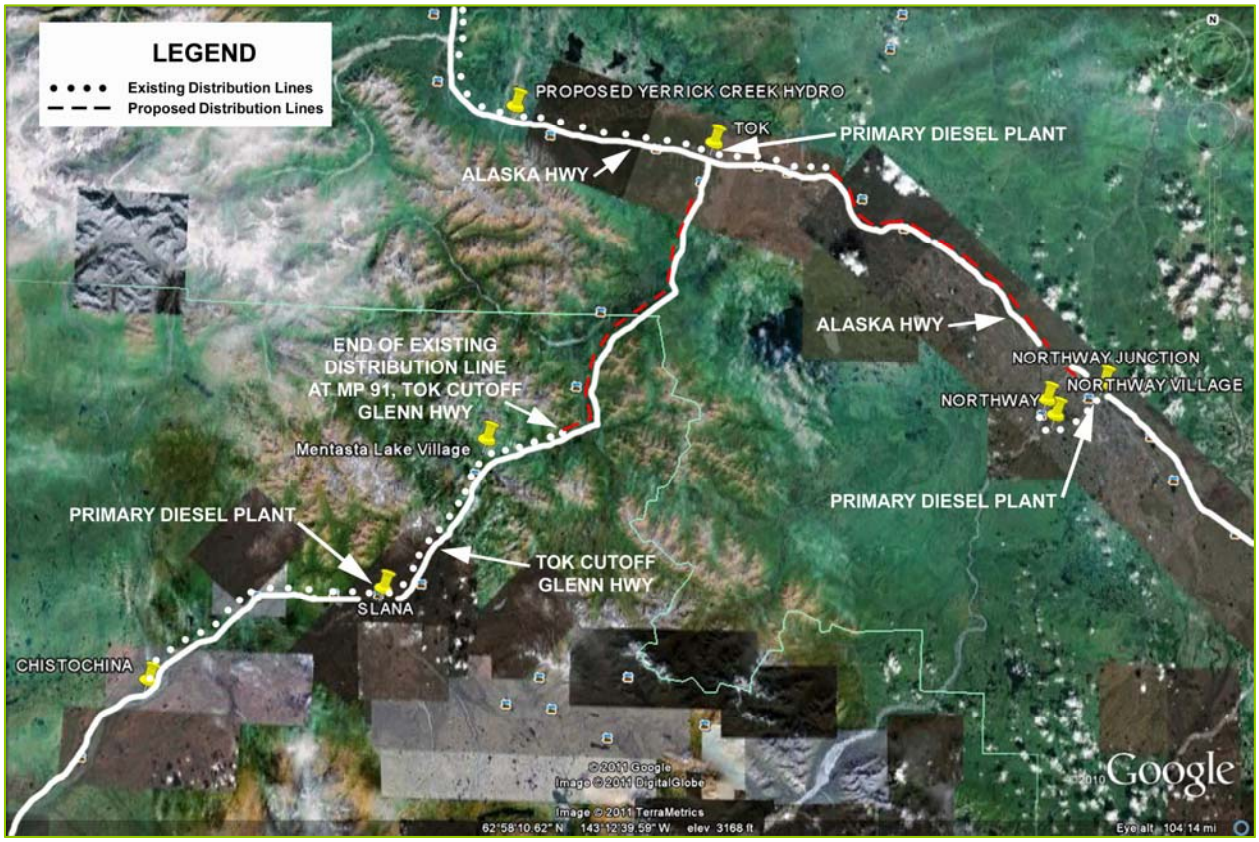
(Ahtna, Inc., 2015)

Figure 27: Map of CVEA service area



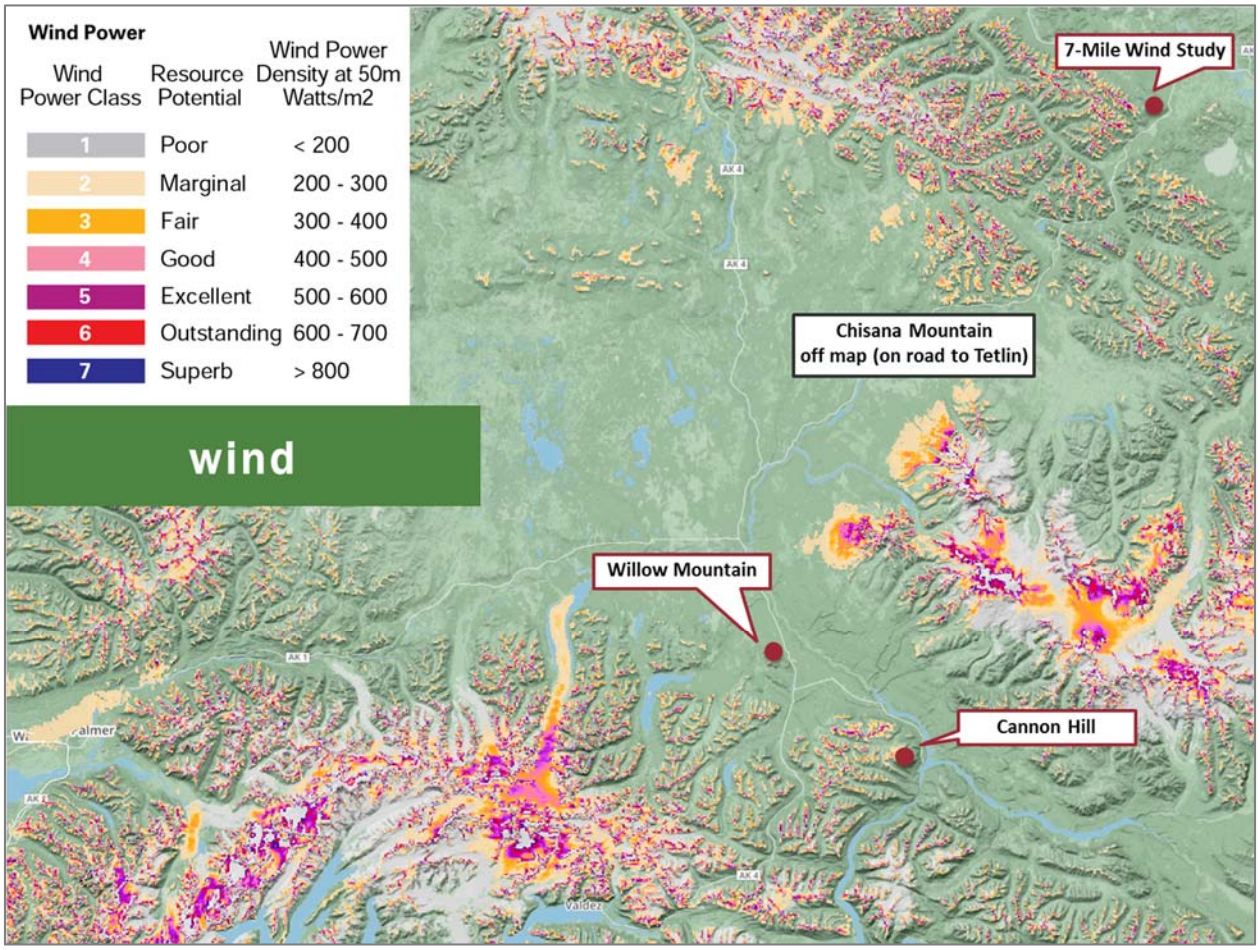
Courtesy Copper Valley Electric Association, Inc.

Figure 28: Map of AP&T Upper Tanana power grid



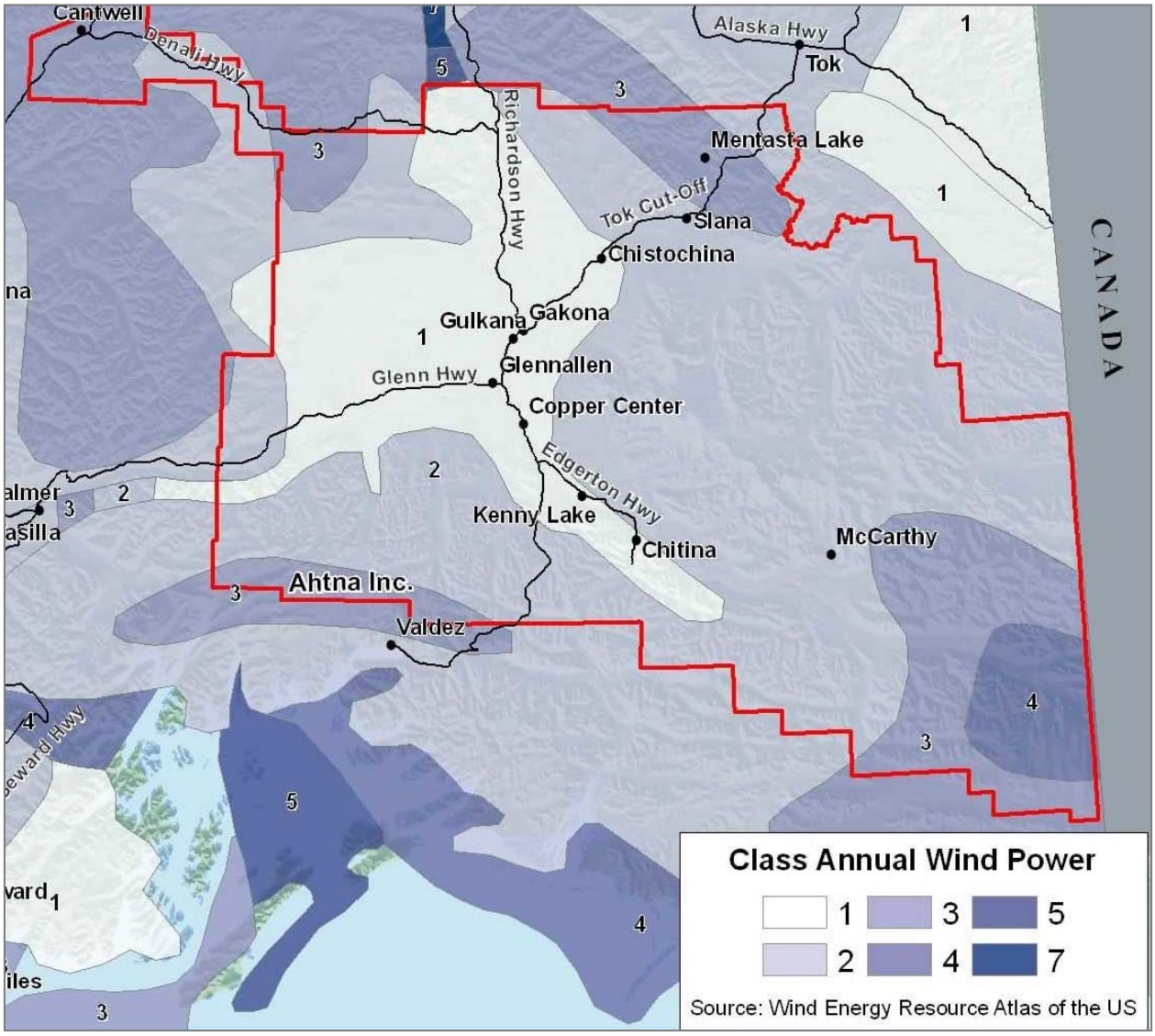
Courtesy Alaska Power & Telephone

Figure 29: Map of wind power projects and potential in Copper River Basin



Adapted from the online *Renewable Energy Atlas of Alaska* (Geographic Information Network of Alaska, 2013)

Figure 30: Wind class map for Copper River Basin



(WHPacific, Inc., 2010)

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E | DATA SOURCES

Table 31: Data sources for community profiles

		Source	Date
Alaska Native Name		UAF	2014
Historical Setting		DCRA	2014
Cultural Resources		DCRA	2014
Energy Priorities		Phase I rpt, Phase II input	2015
Contacts	City	DCRA	2014
	Tribal	DCRA	2014
	Village Corp	DCRA	2014
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	2014
	Permitted	DCRA	2014
W/W System	Water	Phase I Report	2013
	Sewer	Phase I Report	2013
	Condition	Phase I Report	2013
Road Access		DCRA	2014
Air Access	Owner	DCRA	2014
	Runway (lxw)	FAA	2014
	Surface	FAA	2014
Dock/Port Facilities			
	Ferry Service	DCRA	2014
	Barge Access	DCRA	2014

		Source	Date
Location		DCRA	2014
Climate	Avg. Temp	ACRC; weatherbase.com	
	Climate Zone	CCHRC	2014
	HDD	CCHRC	2014
Taxes		Alaska Taxable	2013
Economy		DCRA	2014
Natural Hazards Plan		DMVA	2014
Community Plans		DCRA	2014
Demographics (cont.)			
	HH Income	DCRA	2010
	% Employed	ALARI	2013
	LMI%	HUD	2014
	Distressed	Denali Commission	2013
Landfill	Location	DCRA	2014
	Condition/Life	DCRA	2014
W/W Sys.	Audited?		
	Homes Served		
	Gallons		
Interties			
Air Access	Lighted	FAA	2014
	Flight Rules	FAA	2014
	Condition	FAA	2014
Notes		Phase II public input	2015

Note: See page 6 for a list of acronyms.

Table 32: Data sources for energy profiles

		Source	Date
Utility	Name	DCRA	2014
Power House			
	Engine Make	RPSU (2012), Utilities (2015)	
	Line Loss	PCE	2014
	Heat Recovery	RPSU	2012
	Upgrades	RPSU (2012), Utilities (2015)	
	Outages/Issues	RPSU	2012
Operators			
	Number		
	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		
	Purchasing		
	Coop Purchase		
	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)	

		Source	Date
Power Production			
	Diesel	PCE, Utilities	2014
	Wind	PCE, Utilities	2014
	Hydro	PCE, Utilities	2014
	Avg Load	Alaska Energy Pathway	2010
	Peak Load	Alaska Energy Pathway	2010
	Diesel Eff.	PCE	2014
	Diesel Use	PCE	2014
	5-yr Trend	AEDG	2014
Electric Rates	Residential	PCE, Utilities	2014
	Commercial	PCE	2014
Cost per kWh	All	PCE	2014
Fuel Prices	Utility	AEDG, PCE	2014
	Retail	AEDG	2014
	Discounts		
	Other sources	Fuel Vendor interviews	2015
Regional Housing Authority		AHFC	2014
Wx Service Provider		AHFC	2014
Energy Use			
	Avg Star Rating	CCHRC	2014
	Avg Sq Feet	CCHRC	2014
	Avg. EUI	CCHRC	2014
EE Housing Stock			
	Retrofitted	CCHRC, AHFC	2014
	Retrofitted	Regional Housing Auth.	2014
	Retrofitted	Wx Service Provider	2014
	BEES Certified	CCHRC, AHFC	2014
Lighting	All	AHFC audit reports	

Note: See page 6 for a list of acronyms.