Strategic Energy Planning

A GUIDE FOR RURAL ALASKA COMMUNITIES

Rev. 6/2015

The **Strategic Energy Planning Guide for Rural Alaska Communities** was produced by the Denali Commission. The primary author was Carolyn F. Gove, part-time Program Manager at the Commission, with input from various federal, state, tribal and non-profit energy partners. This Guide is intended to assist communities in developing a comprehensive understanding of local energy use, mapping out long-term goals, and prioritizing energy projects. Through a community driven process that includes all the appropriate energy stakeholders and with the assistance of appropriate technical experts, strategic energy planning can lead the way to a sustainable, affordable, and reliable energy future for rural Alaskans.

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A. Sample Community Energy Profile -Technical Report of Community Energy Data
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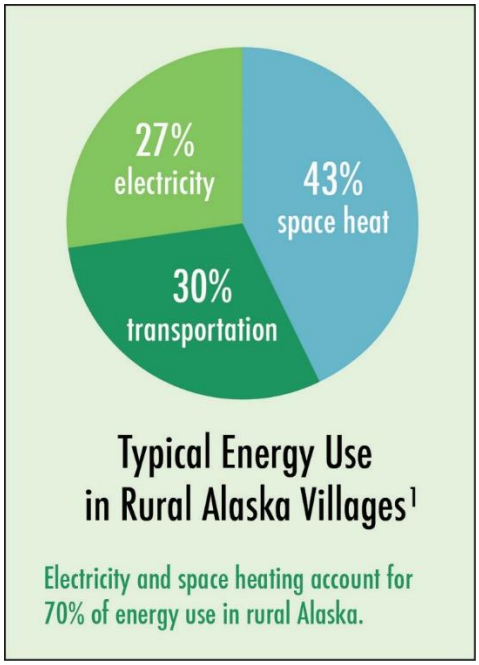
Introduction

The high cost of energy is one of the biggest challenges of sustaining viable communities in rural Alaska. The purpose of this guide is to help Alaskan villages chart their own pathways to an independent, reliable, and affordable energy future.

Rural Alaska is largely dependent on imported fossil fuel for electricity, heating and transportation. Fuel must be barged to roadless communities resulting in the highest per capita fuel costs in the U.S. The high cost of energy ripples through local economies, consuming the income that families need for food and other necessities, straining the budgets of tribes and local governments, and costing school districts scarce dollars that could go toward teaching students.

Some aspects of energy cost and distribution communities can't control, such as the price of oil, and declining state and federal funding. In rural Alaska, electricity, heating, and transportation each account for roughly one third of fuel consumption. While less can be done to affect the cost of transportation, communities can greatly impact the amount of fuel needed for electricity and heating.

Communities all over Alaska are implementing creative solutions to reducing energy costs. Successful projects have one thing in common: they all begin with a planning process that brings the community together with regional, state, and federal energy partners to systematically map out solutions to achieve the community's long-term energy goals.



Why do strategic energy planning?

Strategic planning enables Alaskan communities to reduce energy costs through projects that improve efficiency:

Statewide, the annual average savings for participants in the Home Energy Rebate program who make **energy efficiency improvements** is about **$1,500.**[1]

Energy audits on public schools conducted by Alaska Housing Finance Corporation throughout Alaska showed that on average, **schools** could save **$33,300 per year** on energy by implementing cost-effective energy saving retrofits.[2]

[1] Alaska Housing Finance Corporation
[2] Alaska Housing Finance Corporation, Energy Efficiency of Public Buildings in Alaska: Schools, Nov 2014

And Alaska communities are demonstrating the potential of renewable energy sources:

Elim's **biomass heating system** for the water plant saves the City **$24,000** annually in diesel fuel costs. The City saves $10,000 directly, and $14,000 goes to pay local woodcutters, keeping the money in the community. [3]

Solar powered water and sewer plants in the Northwest Arctic Borough save each community an estimated **$6,000-$8,000** per year.[4]

Wind turbines in Toksook Bay, Kasigluk, and Selawik displaced **77,257 gallons** of diesel fuel in 2014, saving Alaska Village Electric Cooperative more than **$308,000** in diesel generating costs.[5]

Wind turbines and residential **heat recovery** in Kongiganak, part of the Chaninik Wind Group, have displaced approximately 80,000 gallons of diesel both in the power plant and residential homes. With diesel fuel prices at the pump in Kongiganak at $6.19/gallon, altogether they have displaced almost **half a million dollars** of diesel since the wind turbines started spinning.[6]

Each of the examples above addresses at least one of five main areas of energy demand in rural Alaska villages: Power plant, water and sewer system, housing, community buildings, and schools. Communities with fishing, mining, timber and tourism industries may have commercial and industrial facilities that are also high energy users. (Transportation also accounts for a significant amount of energy use, but because the use of vehicles is largely under individual control, it is not within the scope of this guide, which is focused on community-based planning.)

Energy planning improves the quality of life in villages through putting energy savings to use in the community, and better health from affordable clean water and quality housing. Sustainable energy projects provide local jobs and support economic growth.

Strategic energy planning is a holistic way of thinking that

- Is **forward looking**, mapping out long term goals, rather than a piecemeal approach to individual projects.
- Is **community driven**, based on respect for local culture, knowledge, skills, and resources, and is supported by regional, state, and federal partners.
- **Brings together and builds relationships among all stakeholders**: energy users, payers, and suppliers – individuals, communities, and agency and organization partners.

[3] "Innovation in Rural Sanitation" ANTHC and Village Safe Water Lunch & Learn Legislature presentation sponsored by House Rep. Bryce Edgmon, Feb. 2014
[4] Northwest Arctic Borough nwarbor.org/energy/html
[5] Steve Gilbert, Alaska Village Electric Cooperative
[6] Roderick Phillip, Chaninik Wind Group

- Incorporates strategies that **reduce demand and improve efficiency**, as well as developing **new sources** of energy.

"If you don't have a plan, you can't go anywhere."

Roderick Phillip, Chaninik Wind Group Kongiganak, Kwigillingok, Kipnuk, Tuntutuliak

Strategic energy planning is first and foremost a process to direct action. This Strategic Energy Planning Guide provides a framework that takes you step by step through the process to create a long-term energy plan that is based on a comprehensive set of data and develops a priority list of energy projects.

First, a data set is compiled as the ***Community Energy Profile.*** It is a technical report that describes community characteristics and energy infrastructure, and defines the baseline of energy use and projected future demand. The Energy Profile combines information from agencies and the community. A sample Community Energy Profile is found in Appendix A.

Next, a ***Priority List of Energy Projects and Activities*** is developed that is based on an assessment of needs, resources, and capabilities. Priority projects or activities are those that are likely to have the most impact, are consistent with community goals, and are endorsed by the community.

Finally, the data, process, and decisions are documented in a ***Strategic Energy Plan,*** which provides a road map to guide decisions to achieve the community's energy vision and goals. A basic template is provided in Appendix B.

This guide describes the process through deciding which projects will comprise the priority list. Completing the planning steps to assure that the community has done a thorough analysis of its energy needs, capacity, and resources, and come to agreement on priorities is a requirement for most funders before they will support individual projects.

The next steps in planning examine in more depth the priority projects to determine whether they should move forward or not. Project studies look at feasibility, available funding, and the best sequence for implementation. Once you have developed a Strategic Energy Plan, there are other tools and resources to help you with the more detailed analysis of the projects on your priority list.

How much time will it take?

Strategic energy planning requires a sustained effort, but lays the groundwork for multiple projects for years to come. The data gathering phase can be completed in six months to a year, if stakeholders are brought together to coordinate efforts. The real work of strategic planning is getting stakeholders together and coming to agreement. It may take one to three years of dedicated effort to gather the information, hold the discussions, and explore the issues to complete all the steps in comprehensive strategic energy

planning. It is worth the time and commitment it takes for the long-term benefits of growing a stronger, more secure economic future.

Alaskan villages that have engaged in strategic energy planning confirm that it brings the community closer together, and increases local expertise, capacity, and leadership.

Who can help?

The strategic energy planning process outlined in this guide is designed to connect communities with energy partners at the regional, state, and federal levels. Through this process, stakeholders work together to inform each other and find local solutions using collective resources.

It is expected that most communities will need assistance with some aspects of strategic energy planning, from convening partners to facilitating the planning process, to collecting and analyzing data. **The Denali Commission** is a central point of contact for coordinating technical assistance to connect you with the right people in all the agencies to meet your particular needs.

Technical assistance for energy planning is available through many state and federal agencies and non-profits with an energy focus. Two programs that offer technical assistance for strategic energy planning are the Department of Energy's Office of Indian Energy, and the Alaska Energy Authority's Community Assistance Program. Regional organizations and utilities also have experience and expertise to share with your community. Coordination with regional utilities works to the benefit of both the member communities and the region as a whole, improving efficiencies and achieving economies of scale.

You can find a list of energy programs and resources to help Alaskan communities in planning and capacity building in the Resources section at the end of this guide.

"Lots of times you are not quite sure which agency to work with, federal or state, and who is the main contact person. Knowing those agencies and what they can provide for the community makes it a lot easier to pursue our goals."

Roderick Phillip, Chaninik Wind Group Kongiganak, Kwigillingok, Kipnuk, Tuntutuliak

What is the strategic energy planning process?

Strategic energy planning can be described as sequential steps, but each step also reflects a continuous process, as shown in this diagram. As the community understanding grows, new questions may arise, requiring more research. As energy projects are completed, the plan is reviewed and new decisions are made.

Your **Community** is at the center, and owns the process.

Learning supports decision-making. Information about energy supply, distribution, use, and cost; operations and maintenance; administration and finance; is needed to understand the local energy picture. Much of the information can be compiled from state resources and accessed online. Other information will require new research, through interviews, surveys, and walking around the community. Learning about the energy knowledge, needs and desires of community members is equally important.

With the input of community members and the support of other partners, the community **decides** where you want to go, and where you see your future. Considering your strengths and challenges provides perspective on your choices.

Planning involves investigating the feasibility of priority projects, potential funding options, and what it will take to complete successful projects.

Moving plans into **action** means applying for funding, and designing and completing projects. **Learning** continues as you review and revise projects, and revisit community priorities.

All of these processes are applied as planning proceeds through a series of steps. The following pages outline seven steps, with questions to be investigated and key points to consider. The steps are listed on a single summary page following this section, and explained in more detail below.

Step 1 is organizing the planning effort and identifying and engaging stakeholders. The leadership of community champions who are passionate about energy and committed to action is essential.

Step 2 is gathering the data on the local existing energy systems, historical energy use, and projected demand. This information is compiled as the Community Energy Profile.

Step 3 is analyzing the technical information on baseline energy use and identifying trends and issues. The information is analyzed for each of the main energy uses (heat and electricity): power plant, water & sewer, housing, community buildings, schools, and industry, if applicable. The total energy use for the community as a whole is also calculated. It is important to be able to communicate this information in a way that all community members can understand.

Monitoring generator performance.

Step 4 is bringing the community together to review the Energy Profile and consider community strengths and challenges. Using this knowledge, the community then comes to agreement on the energy vision and goals.

Step 5 is brainstorming strategies to achieve the energy goals through energy efficiency, improving existing infrastructure, conservation, and alternative energy supply.

Step 6 is further defining strategies into proposed projects and comparing the advantages and disadvantages. This decision-making process will result in a preliminary list of prioritized projects.

Step 7 is bringing it all together—compiling the plan in a basic template or more narrative document and sharing it with stakeholders. Then you can prepare to put the plan into action.

The Strategic Energy Plan should be reviewed on a regular basis and updated as projects and activities are completed.

Energy community meeting in Ruby.

Overview of the Strategic Planning Process

1. Organize	**Who will be involved? How will we proceed?** • Identify and convene Stakeholders • Establish a Leadership Team • Plan for stakeholder involvement • Document the process
2. Gather Information	**What is our Community Energy Profile?** • Compile the technical report from agency sources • Gather information from community sources
3. Interpret Data	**What can we conclude from our Energy Profile? How do we compare?** • With the help of energy specialists, analyze the information in the Energy Profile • Summarize the results for the community to review
4. Community Dialogue	**Where do we see our energy future? What is most important to us?** • Review the Energy Profile • Assess community strengths and challenges • Create the community energy vision and goals
5. Consider Strategies	**What approaches can help us achieve our energy vision and goals?** • Brainstorm strategies for energy efficiency and reliability; improving existing energy infrastructure; and alternative energy supply
6. Prioritize Projects	**What do we want to do first?** • Develop a ranking system for comparing the advantages and disadvantages of projects • Develop a preliminary list of projects to pursue
7. Compile the Plan	**What are our next steps?** • Compile the Strategic Energy Plan • Prepare for putting the plan into action

Step 1: Organize

Who needs to be involved?

A list of some of the Regional, State, and Federal energy partners can be found in the Resources section at the end of this guide.

Identify and Convene Stakeholders

Stakeholders with different roles each have important contributions to make to the strategic energy planning process. Stakeholders include:

- All the people who will be affected. People who live in the community have the most direct stake in the success of energy planning. The wisdom and experience of elders is needed. The involvement of youth is also needed to give voice to the next generation.
- Experts on energy efficiency, conservation, existing energy infrastructure, and renewable energy sources are needed to provide technical expertise.
- Community partners whose buy-in will be needed for potential projects have to feel ownership in the planning process.
- Energy champions must share their passion and motivate others.

Input is needed from organizations involved in all aspects of energy use, including:

- Supply
- Distribution
- Use
- Regulation
- Financing

Representation from the major energy users is essential.

Power Plant - The power plant is the lifeline of the community and is a substantial investment. Ensuring that the power plant operates at its highest capacity and lasts for the full design life is good stewardship of this investment.

Water and Sewer System - Affordable clean water is essential for healthy communities. Energy accounts for about 40% of the cost of operating water and sewer systems in northern Alaska.[7] Energy audits show that communities can save significant amounts through better operations and maintenance, and retrofits that can be locally done, as well as larger projects such as waste heat recovery. Small efficiency investments can yield big savings.

Housing - Improving energy efficiency through weatherization saves money on heating and electricity bills for families, as well as making homes safer and more comfortable.

Community Buildings - The cost of heat and electricity are a substantial portion of the operations and maintenance budgets of buildings that serve important community needs, such as city and tribal offices, the health clinic, community hall, washeteria, village store, and churches. There are many opportunities for improving energy efficiency in existing buildings and designing planned buildings to reduce energy costs.

Schools - A huge portion of the cost of running schools in rural Alaska is spent on energy. Although school districts often operate their own power systems, the community benefits when energy costs are lowered because that means there is more money for teaching kids.

Industry - For communities with fish processing plants, mining or timber operations, understanding industry energy use and identifying cost saving opportunities is essential for economic growth.

Stakeholder representation is also needed from the following groups:

- City and tribal leadership
- Local energy sector representatives
- Community members
- School district representatives
- Local businesses
- Regional organization representatives
- State and federal agency energy partners

Field inspection of a marine header pipe system.

Looking at generator performance. (Photo credit: AEA)

Washeteria in Tutuntuliak.

Who will lead the strategic energy planning process?

Establish a Leadership Team

Effective leadership is essential for the success of strategic energy planning. Leaders must champion the effort and provide continuity across diverse stakeholders and interests. Having clear and visible leadership that can motivate others is vital to success.

[7] Nichols, et al., "Energy Solutions for Rural Alaska Water Systems," The Military Engineer, 2015.

The energy planning effort must have top-down commitment from tribal and municipal leaders. Communities may typically assign energy issues to one department, such as the planning department, but broad-based support and authority is needed to engage people and assure community buy-in. The leadership team should include a cross-cutting group of other leaders who represent key stakeholder groups.

The leadership team must:

- Have the power to make decisions
- Promote the strategic energy plan throughout the process
- Direct the funding resources

Leadership team members should share a consistent message about the value of the plan at every opportunity.

The planning effort also needs a **Coordinator** who has the time to manage the planning process, coordinate the day-to-day activities, keep records, and most importantly, communicate well. The coordinator should be a non-elected official, and someone who will be able to provide continuity and see the project through to completion. It is a good idea to have a primary and alternate person dedicated to fulfill this role to ensure the process stays on track. Coordination will require a significant amount of work.

How will we proceed?

Make a plan for stakeholder involvement

Along with identifying the stakeholder groups whose input is needed and the leaders who will sponsor it, the way in which people can take part should be defined. What information is needed from whom? How will you communicate with each other? How will you inform, educate, and involve the community?

Consider the following functions and who can help:

- **Facilitation** - A neutral, trusted person is needed to keep meetings focused and ensure that all voices are heard in group discussions.
- **Recordkeeping** - One person should be responsible for maintaining records of meetings, participants, key discussion points and decisions. Documenting the planning activities is important because it gives people confidence in the process. People and positions change and knowing what's been done before can jumpstart future efforts.

Engaging Youth

AK EnergySmart is a free curriculum resource designed to give Alaskan youth an understanding of the high economic and environmental costs of power generation and the importance of conserving energy at home and school.

The resources listed on the AK EnergySmart website include many that are Alaska-specific. For example, the UNITE US curriculum focuses on Arctic climate and interweaves Native and Western perspectives to instill cultural pride and increase climate literacy for Interior Alaskan students in grades 7 through 12.

AK EnergySmart is owned by the Alaska Housing and Finance Corporation and can be accessed at:

http://www.akenergysmart.org/

Energy Fair in Minto. (Photo credit: Alaska Energy Authority)

- **Youth Engagement** - Youth have the most at stake in the economic and environmental vitality of the community. They also bring home the lessons they learn. Strategic energy planning is an opportunity to empower the next generation of energy champions.
- **Training Needs** - Are there critical functions of planning that the community needs training for? See the list of Resources for training assistance.

Dialogue among stakeholders is needed at many phases of the process:

- Introducing the strategic energy planning effort
- Educating the community on energy issues
- Gaining support for energy planning, and
- Investigating and exchanging information.

Some ways to inform and gather input across stakeholder groups include:

- Community meetings and workshops
- School activities
- Energy fairs
- Interviews and discussion groups
- Surveys and questionnaires
- Attending and speaking at meetings of other groups
- Participating in energy conferences
- Information campaigns using radio ads, flyers, posters, etc.

Host an Energy Fair

RurAL CAP has created a simple guide to having a fun and experimental energy fair geared to students in rural Alaska.

This and other educational resources can be found under the Community tab on the Alaska Energy Efficiency.org website.

http://www.akenergyefficiency.org/

Shishmaref Energy Fair. (Photo credit: RurAL CAP)

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Step 2: Gather Information

What is our Energy Profile?

A Community Energy Profile defines the baseline of energy use and projected demand. It is the starting point for analysis of the issues and planning the solutions. The Community Energy Profile is the technical report that will be attached as a reference to your Strategic Energy Plan.

Start with your Community Energy Profile from your Regional Plan

Community Energy Profiles were created as part of the Alaska Energy Authority Regional Energy Plans and provide a starting point for a more complete community report. Much of the technical information on infrastructure and energy use- power plant, bulk fuel storage facilities, water and sanitation-has been compiled from state databases. Your Community Energy Profile will have information from the Alaska Energy Data Gateway and the Alaska Community Database Online. First review and verify the information in this report, and then add information from regional utilities and local sources.

Gather information from Community Sources

Other information will need to be gathered locally, through collecting records, interviewing key informants, and field work. The amount and detail of community information gathered will depend on what is easily obtainable and whether resources are available to research what information is missing. Community information adds to the Energy Profile an overview of how systems are functioning, factors affecting future energy needs, and how other community plans address energy needs.

Alaska Housing Finance Corporation has information on many public facilities in Alaska, but doesn't have a complete list of all community buildings.

Complete the **inventory of community buildings** in your Energy Profile**.** Who owns the buildings? Who owns the land? Who operates and maintains them? (Community buildings include those owned and operated by municipal, tribal, and non-profit organizations. Examples include offices, community hall, washeteria, clinic, schools, churches, etc.).

Complete the **inventory of energy audit reports** for public buildings and housing. What is the age and condition of the buildings? Is building use metered? For facilities that are not monitored, begin tracking energy use for heating and electricity.

Make a plan to meet with a qualified commercial energy auditor to determine the level of energy audits necessary for the facilities in your community. Energy audits are a systematic approach to analyzing energy use in order to

Alaska Energy Data Gateway
University of Alaska Institute of Social and Economic Research
https://akenergygateway.alaska.edu/

Alaska Energy Data Gateway is an online database with community level energy data from many sources. The system tracks data over time and allows for comparisons among communities.

Community Database Online
State of Alaska Dept of Commerce, Community, & Economic Development, Division of Community & Regional Affairs
http://commerce.state.ak.us/dnn/dcra/communityinformation.aspx

Community Database Online also compiles information from many agencies to produce community reports. These reports include information on demographics, infrastructure, historical energy use, feasibility studies, energy audits, Power Cost Equalization, and more.

make management decisions that balance total energy input with energy use. Energy audits identify opportunities for better energy performance through operational and equipment improvements.

The four main objectives of energy audits are:

- To establish an energy consumption baseline;
- To quantify energy usage;
- To benchmark with similar facilities under similar weather conditions; and
- To identify opportunities for reducing energy costs.[8]

There are three levels of energy audits, ranging in complexity from a simple walk-through to identify major problem areas to a comprehensive analysis of capital investments.

Interview maintenance personnel to identify problems or challenges with existing **power generation, transmission, and bulk fuel storage systems.** Ensuring that systems operate at their optimal level is essential to getting the most out of investments in infrastructure and having them last their full design life.

Understanding community **financial and administrative capacity** is important to setting realistic goals. Alaska Division of Community and Regional Affairs Local Government Specialists are key contacts for this information.

Reviewing all your current **community plans** helps in predicting future energy needs. Does your Comprehensive Community Plan include energy goals? Are there plans for new housing or industry developments?

Are any energy projects underway or completed, such as weatherization or other upgrades?

Fieldwork will reveal on-the-ground conditions that may otherwise be missed. Walk around the community and note things such as the type of outdoor lighting, physical obstacles blocking a distribution system, or obvious energy leaks.

Housing surveys noting weatherization needs, obsolete lighting, or old appliances can provide information important to assessing opportunities for energy savings for individual families.

Key Contacts for Energy Audits:

- ANTHC- Water & sewer; clinics
- AHFC & AEA- public and commercial buildings
- Regional Housing Authority- houses

Key Contacts for Administrative & Financial reports:

Division of Community & Regional Affairs- State of Alaska

- Local Government Specialists
- Rural Utility Business Advisors

Key Contacts for Community Plans:

- Division of Community & Regional Affairs- State of Alaska
- Economic Development Administration-US Dept of Commerce

[8] Energy Advantage http://www.energyadvantage.com/blog/2011/05/the-difference-between-ahsrae-level-1-2-3-energy-audits/

Step 3: Interpret Data

What can we conclude from our energy profile? How do we compare?

The information gathered through databases, field surveys, interviews, energy audits and reports needs to be interpreted and summarized to create a general understanding of energy issues and opportunities. The community will need to rely on the help of technical experts to interpret the data gathered on the power plant, water and sewer system and community buildings.

What do historical trends show?

What issues have been identified?

What changes are anticipated? Is the population growing or shrinking? Are projects such as ports, canneries, or mining or other economic development being planned? Are new energy projects underway?

How does the community fit into the regional energy picture?

If you have collected information on fuel for transportation, how is it purchased, transported, stored, and distributed?

With the help of technical experts, summarize your Community Energy Profile by using key measures and benchmarks. Compare energy use within the community and compare to communities that have similar size and climate.

Key questions include:

Are your diesel generators operating efficiently?

Is your power transmission line operating with limited loss (energy waste resulting from the transmission of electrical energy across power lines)?

Do energy audits show houses and communities are using heat and electricity inefficiently?

What are the findings of the audit by ANTHC of your water and sewer system?

Benchmarks quantify energy performance to allow for comparisons. The baseline, or initial measure, establishes a starting point from which to measure changes. Comparisons can also be made to the performance of similar facilities in other communities. It is important to have a baseline to measure the effectiveness of future improvements and to monitor systems so that future problems can be detected right away.

Cost of energy is one measure of comparison, but because the price of diesel goes up and down and the price varies among communities, it is not the best measure.

Standard measures of power and heat are **kilowatt hours (kWh)** and **British thermal units (BTUs).** A common benchmark is the **Energy Use Index (EUI)**. The EUI measures the amount of energy used for heat and electricity per square foot. These are typical units used in energy databases.

A summary table such as the example below may be a helpful tool to highlight overall energy use in the community. Comparison standards give a number to compare your community's energy performance against. Comparison may be against an average or ideal, against other similar communities, or against your system over time. The particular standards used for each category can be explained by the technical experts helping you analyze and interpret the energy data.

POWER PLANT

What we are Measuring	Measurement	Comparison Standards
Efficiency	kWh per gallon of diesel burned	14 kWh/gal
How much energy is lost in the transmission lines	Percent line loss	12% or less (Power Cost Equalization standard)
Waste heat recovery	Is there a working waste heat recovery system? Yes/No Is there additional capacity? Yes/No	Waste heat recovery fully utilized
Alternative energy produced	Total kWh produced annually Percent of total generation Gallons of diesel displaced	
Operator capacity	Number of operators fully certified and trained	All operators fully certified and trained

Data sources: *Alaska Energy Data Gateway, Local utility, Regional utility cooperative*

WATER & SEWER SYSTEM

What we are Measuring	Measurement	Comparison Benchmark
Efficiency	**Heat:** Gallons fuel burned/year; **Electricity:** kWh/year consumed	Depends on the type of system. ANTHC has cold weather averages for fuel and electricity use.
Waste heat recovery	Is there a working waste heat recovery system that serves the sanitation system? Yes/No	
Alternative energy utilized	Gallons of diesel displaced	
Operator capacity	Number of operators fully certified and trained	All operators fully certified and trained

Data sources: *ANTHC, ARUC, Local utility manager*

HOUSING

What we are Measuring	Measurement	Comparison Benchmark
Efficiency	**Heat**: Gallons fuel burned per year;	

	Electricity: kW/year divided by square feet Percent homes weatherized Percent low energy lighting	
Alternative energy utilized	Percent homes using alternative energy	
Energy Awareness	Percent students exposed to education about wise energy use	

Data sources: *Regional Housing Authority, Alaska Housing Finance Corporation ARIS database, local survey*

COMMUNITY BUILDINGS & SCHOOLS

What we are Measuring	Measurement	Comparison Benchmark
Efficiency	**Heat:** BTU per square foot/year **Electricity:** kW/year divided by square feet Percent buildings weatherized Percent low energy lighting	79,199 BTU/sq ft/year (AHFC standard) 9.95 kWh/sq ft/year (AHFC standard)
Waste heat recovery	Is there a working waste heat recovery system? Yes/No	
Alternative energy utilized		
Operator capacity		

Data sources: *Alaska Housing Finance Corporation ARIS database, School District*

Step 4: Community Dialogue

Where do we see our energy future? What is most important to us?

Bring the community together to share what has been learned and decide on an energy vision, goals, and strategies to achieve your vision and goals.

Review the Community Energy Profile

Share with the community what has been learned from compiling the Community Energy Profile.

What is the breakdown of **fuel use** and **cost** among the main energy users:

- Power plant
- Water and sewer system
- Community buildings
- Housing
- Schools
- Industry

How does our **past usage compare to the present**?

What can we predict about **future demand**? Is the population growing or shrinking? Are there economic development activities underway that will change energy demands?

What **problems** have we identified? Is energy infrastructure at risk because of climate change?

What **potential sources of energy** have we identified or want to explore?

What do we do best? What do we struggle with?

Assess Community Strengths and Challenges

Assessing strengths and weaknesses of your community and opportunities and threats facing it will help you reach decisions that are grounded in reality.

Taking stock of positive and negative influences within the community as well as in the external environment helps create a full awareness of possibilities, revealing forces that can work together and potential problems that need to be addressed or at least recognized.

Assessing strengths and challenges can be useful at any stage of planning for:

- Exploring possibilities
- Determining where change is possible
- Adjusting plans to respond to new opportunities, or devise solutions to previously unrecognized barriers

Resources for Community Dialogue:

The Community Toolbox is a free-online resource with a collection of practical, step-by-step tools for taking action in communities. http://ctb.ku.edu/en

Sustainable Energy Opportunities: Best Practices for Alaska Tribes provides background, case studies, and resources for sustainable energy project planning in Alaska Native communities.

http://www.epa.gov/region10/pdf/tribal/Sustainable_Energy_Opportunities_Resource_Guide.pdf

Local Government Specialists can facilitate meetings, and conduct trainings and assessments at the request of communities.

http://commerce.state.ak.us/dca/lga/lga.htm

A classic tool named for the acronym: SWOT Strengths, Weaknesses, Opportunities, and Threats categorizes thoughts in a matrix of four opposing boxes. You can also use a simpler matrix, such as the one below.

Often a course of action may have both benefits and harmful effects, or unintended consequences. Or the community may have control over one aspect of a resource and not another.

The point is to open up discussion to consider areas where you have the power to effect change, and where you may need to adapt.

Positives	Negatives
• Strengths • Assets • Resources • Opportunities • Prospects	• Weaknesses • Limitations • Restrictions • Threats • Challenges

Record perspectives on both positive and negative aspects of **people, processes**, and **technology** throughout the planning process.

Dedicate some time for a community dialogue on strengths and challenges. Allow several hours in a group meeting to have time for both open brainstorming, and then a more focused discussion. It is helpful to have a facilitator ask questions and a recorder write down the responses. If a large group participates, you may want to have break out groups for initial ideas and then come together to explore the ideas.

Internal strengths and weaknesses are assets and experiences within the community. Consider things such as:

- **Human resources**- What kinds of skills, expertise, and leadership does the community have?
- **Community attitudes** –Are people enthusiastic or reluctant to adopt energy saving measures?
- **Experiences**- Are there lessons learned from other planning efforts that can be applied to energy planning? Can past successes provide momentum?
- **Finances**-Are there outstanding loans? What is the status of PCE eligibility? Are there dedicated funds in repair and renovation accounts, operations and maintenance accounts? What existing grants are there? Is there a tax base?

- **Physical resources**- Consider infrastructure both in terms of assets and liabilities.

External factors- opportunities and threats are forces and facts that the community is influenced by but does not control. Consider such things as:

- **Environment and natural resources**- Are there issues related to climate change, such as erosion, flooding, thawing of permafrost?
  Is there local potential for renewable energy sources such as wind, water, or biofuels?
  Has there been a natural disaster that threatens existing energy infrastructure?
  How does the ebb and flow of subsistence harvests impact energy use?
- **Land ownership**-Who owns the land? Are there issues of contention between different entities?
- **Regulatory challenges**- What are the positive and negative aspects of current state regulations and utility policies? What state and federal permitting requirements would have to be fulfilled?
- **Funding sources**
- **Economy**

Create an Energy Vision

Coming together to develop a vision of where you want to be in the future is a key step in strategic energy planning. A vision statement helps focus efforts on what matters the most and inspires people to work towards common goals. Your vision statement defines your values as a community and what you are trying to accomplish.

The energy vision should be broad enough to encompass a variety of perspectives but specific enough to provide direction in setting goals. It should be easy to communicate and understood and shared by community members.

Examples of benefits that could be included are:

- Affordable energy supply
- Reliable energy source
- Energy conservation and efficiency
- Minimize environmental harm
- Build the workforce and job skills
- Strengthen the economy
- Build resilience to the threat of disasters

Toksook wind turbine.

Establish Energy Goals

Establishing goals defines the scope of your energy plan. The goals provide the framework for choosing strategies and designing actions to accomplish your vision. Goals should:

- Be **measureable** so that you will know when you have achieved them. The benchmarks and baselines that you have established in the Community Energy Profile are the starting point from which you measure progress.
- **Specify a timeframe** for completion.
- Be **realistic**, reflecting what you have learned through the energy profile and assessment of community strengths and weaknesses, opportunities and threats.

High level goals address long-term overall aims.

Examples might be:

> Obtain____% of energy from renewable or local resources within 10 years.
>
> Reduce the cost to produce energy by____% within 5 years.
>
> The energy infrastructure will be in place to supply (*a planned economic development project*) in the next 5 years.
>
> _____% of vehicles in the village run on alternative fuel or electricity in 10 years.

More targeted goals might address more specific needs in areas such as training, weatherization, or administration and financial capacity.

Examples are:

> Every critical energy position in the community has a trained primary and alternate worker within 2 years.
>
> _____% of community facilities and homes are weatherized within 5 years.
>
> Within 10 years, the utility has a sufficient capital reserve fund for routine or scheduled maintenance.
>
> By 2025, 100% of appliances in the community are Energy Star.
>
> Community bulk fuel loans are fully paid off in ____ years.

"The Minto Village Council, with support and assistance from the community and stakeholders, will lead in efforts to conserve energy and reduce the high cost of energy for the whole tribe.

Minto Village will optimize local infrastructure for improved efficiencies, weatherize community facilities, facilitate residential weatherization and integrate new technology wherever possible to utilize local energy resources such as biomass and solar energy to improve the health and welfare of our community."

Minto Strategic Energy Plan 2014

Alaska State Goals:

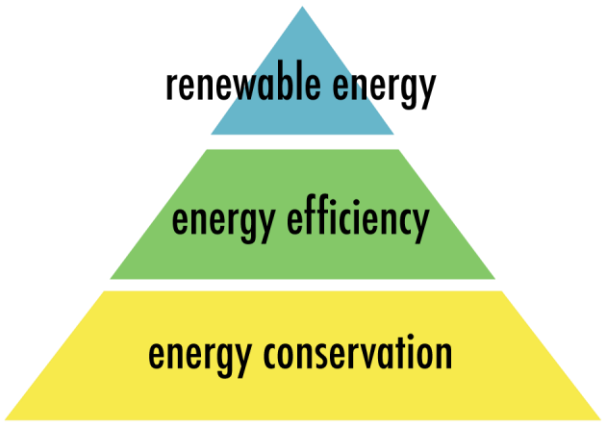
Improve per capita energy efficiency by 15% between 2010 and 2020

Achieve 50 Percent Renewable Energy Sources by 2025

Step 5: Consider Strategies

What approaches can help us achieve our vision and our goals?

The steps up until now have defined where you want to go; strategies define *how* you are going to get there.



The Energy Efficiency Pyramid[9] shows priorities for saving energy. Actions at the bottom are more cost effective and should be undertaken first.

Energy conservation and energy efficiency both mean using less energy. Energy conservation is behavior that results in not using energy at all. Energy efficiency is a technological approach to using less energy to perform the same function.

Energy Conservation is achieved through actions with no or little cost. Examples are unplugging appliances when not in use, and keeping engines and machinery properly maintained for efficient operation.

Energy Efficiency is accomplished through high efficiency equipment or technology. Examples include weatherization, replacing incandescent lighting with compact fluorescents or LEDs, and addressing deficiencies identified in energy audits.

Renewable Energy systems such as solar, wind, geothermal, or hydro increase the energy supply or replace less efficient sources. Renewable energy systems are more effective after other energy saving measures have already been taken.

[9] Teller Energy.com http://www.tellerenergy.com/?p=584

For each of your energy goals, explore a broad range of approaches to achieve them such as those outlined below. Consult with energy experts and use the Resource list at the end of this guide for recommendations.

Education and Awareness

- A community energy campaign to help people adopt energy wise habits
- Installing pre-pay or energy use meters to monitor electricity use and make people aware of what they use and how much it costs

Workforce Development

- Training for operations and maintenance workers to maximize building efficiency and reduce repair or replacement costs
- Training to meet anticipated needs when new technology or industry is online
- Sharing maintenance specialists among several communities

Administrative Capacity

- Addressing business management, reporting, data tracking
- Improving maintenance management
- Addressing readiness to apply for financing

Processes and Policies

- Coordination and collaboration within the community and with other communities to achieve efficiencies in fuel purchase and transport
- Establish a preventive maintenance program
- Ensuring participation in Power Cost Equalization

Infrastructure and Technology

- Repairs and improvements to existing power production and transmission systems, fuel storage, and heating systems
- Retrofitting existing infrastructure to optimize efficiency
- Waste heat recovery
- Planning for energy efficient design in new buildings
- Developing renewable energy sources or interties

Step 6: Prioritize Projects

What do we want to do first?

Develop a Preliminary List of Projects to Pursue

Using the information from the Community Energy Profile and guidance from the community vision and strategies, the next step is to develop a preliminary list of projects to pursue. Consider projects that will achieve the greatest community impact with the least amount of investment in terms of effort, time, and money. Be realistic about what you need, what you can afford, and what you can reasonably expect to finance.

Projects selected as priorities at this stage will be investigated further. If it is determined a project is viable, timely, and sustainable, it will move on to design and business planning. If the project is not determined to be feasible, the next priority will move to the top of the list.

Develop a Ranking System

The Alaska Energy Authority uses the following list of criteria for statewide regional planning prioritization of local and regional projects. You may want to consider these criteria for your community-level prioritization.

1. **Health, Safety, and Environmental:** Is the current infrastructure at risk or posing a public health or safety hazard? These issues should be the highest priority.

2. **Community Viability:** Energy security is vital, especially in rural communities that have seasonal fuel supplies. Sufficient fuel storage, a stable power source and a reliable distribution network are critical. A community should not be at risk of prolonged blackouts or insufficient heating fuel supplies.

3. **Affordability:** Affordable energy keeps people living in a community, increases economic development and should provide stable prices into the future. A utility's financial health and viability is important, as is the capacity of a community to support O&M needs, training and utility management.
--Predictability is a key component for the ratepayer and business community.
--Will the proposed project stabilize the energy costs and/or resource use?
--What are the total cost savings for heating and electricity?

4. **Economic Development**: Stable and affordable energy creates the environment where economic development can occur and keeps money in a community.
--Will the project create jobs in the community after construction? Can direct jobs be identified?

5. **Local and Regional Support:** Is there commitment to provide dedicated staff time and resources, other stakeholder contributions, and operations & maintenance? This will include letters of support and resolutions.

There are various methods to weigh the costs and benefits of projects. Bring together all of the energy audits and the prioritized actions listed for each one.

High level questions to start with might be:

What can we do now with the resources we have? (E.g., building energy awareness, cooperative purchasing agreements),

What types of programs have we identified that we could apply for? (E.g., weatherization)

What projects do we want to seek funding for? (E.g., Infrastructure) Do we have the capacity to operate and maintain the project?

Costs

What are the direct costs—capital and operations and maintenance?

Are there potential harmful effects to the environment? How can they be minimized?

What unintended consequences might result from the project? (E.g., reduced energy demand may not result in reduced cost to consumers, because of fixed power production costs. Reducing home electric costs will reduce PCE.)

Are there site issues? (E.g., Multiple landowners that will have to come to agreement. Does the best site for the project conflict with cultural uses?)

What are the consequences of doing nothing?

Benefits

What will have the most long-term impact?

Who will benefit- Will there be savings to individuals, savings to the community as a whole? Will the project bring new jobs, supporting businesses and industry? Does the project have the potential to generate revenue?

Projects that involve significant investment can be ranked using more detailed methods. The community will need to work with technical experts using various tools available.

Best practice models are:

Total Resource Cost, which considers life-cycle benefits for projects.

Levelized Cost of Energy, which allows comparison across different technologies, considering capital costs, operations and maintenance, performance, and fuel costs.

Benefit/Cost Ratio, used by the Alaska Energy Authority for the Renewable Energy Fund, compares lifetime benefits of a project in avoided fuel costs to total lifetime costs of the project, including both initial capital costs and ongoing operating costs.

Cost Effectiveness Resources:

NREL Levelized Cost of Energy Calculator

The levelized cost of energy (LCOE) calculator provides a simple calculator for both utility-scale and distributed generation (DG) renewable energy technologies. It compares the combination of capital costs, operations and maintenance, performance, and fuel costs.

http://www.nrel.gov/analysis/tech_lcoe.html

EPA Paper on Five Cost-Effectiveness Tests

Understanding Cost Effectiveness of Energy Efficiency Programs: Best Practices, Technical Methods, and Emerging Issues for Policy Makers.

http://www.epa.gov/cleanenergy/documents/suca/cost-effectiveness.pdf

Next Steps

Where do we go from here?

Compile the Strategic Energy Plan

The Strategic Energy Plan Template in Appendix B will give you a basic format. Funders appreciate hearing the community's story, so you may want to invest the time and effort to write a more descriptive narrative. Keep it simple, easy to understand, and realistic. Whatever form you use, the plan should include:

- The Community Energy Profile - the technical report with detailed energy performance data and community characteristics;
- A plan for tracking energy use and reporting on an annual basis; and
- A plan for periodic review of the Strategic Energy Plan, as changes occur, and as projects in the Strategic Energy Plan go forward.

Celebrate and communicate with everyone the achievement of this important milestone!

"We have concluded that it is extremely important to develop our own energy plan. Make the plan for everyone in the tribe, and do it in such a way that everyone understands and supports it. … Believe in your people."

Organized Village of Kasaan

Prepare for Putting the Plan into Action

Develop action plans for implementing projects and initiatives. Begin with:

- Energy education, conservation and energy efficiency projects;
- Actions that can be completed first, with local people and existing resources; and
- Actions that need to be completed before others can.

Decide:

- Who will carry out the action,
- When it will be completed and how it will be maintained,
- What resources (money and staff) are needed, and
- Who needs to be informed and how you will communicate.

For specific projects that require further study and outside resources, the next steps are to work with energy partners to:

- Conduct feasibility and cost studies,
- Identify loan and grant opportunities, and
- Develop financing strategies.

Using this information, your community will decide whether individual projects are sustainable and will achieve the energy plan goals or whether it is better to pursue a different project on the priority list. If the decision is made to go ahead with a project, the next steps are contacting potential funders, completing business plans (including operations and maintenance), and designing the project.

Resources

The following list is a selection of agencies and organizations that are good sources of information and technical assistance for strategic energy planning.

FEDERAL AGENCIES

Denali Commission
907-271-1414
www.denali.gov

Department of Energy (DOE)
907-271-1423
http://energy.gov/

Environmental Protection Agency (EPA)
Region 10 office: 1-800-424-4372
http://www.epa.gov/

U.S. Dept of Agriculture Rural Development (USDA RD)
State office: 907-761-7705
www.rd.usda.gov/ak

STATE AGENCIES

Alaska Energy Authority (AEA)
907-771-3000
Community Assistance
http://www.akenergyauthority.org/Programs/CommunityAssistance

Alaska Housing Finance Corporation (AHFC)
800-478-2432
http://www.ahfc.us/

Division of Community & Regional Affairs (DCRA)
For phone numbers, see Staff Directory webpage:
www.comerce.state.ak.us/dnn/dcra/StaffDirectory.aspx
http://commerce.state.ak.us/dnn/dcra/home.aspx

ORGANIZATIONS

Alaska Energy Efficiency Partnership (AEEP)
Akenergyefficiency.org
Homepage lists Partnership members, the programs they offer, and contacts.
http://www.akenergyefficiency.org/

Alaska Native Tribal Health Consortium (ANTHC)
Tribal Utility Support
907-729-1301
Alaska Rural Utility Collaborative (ARUC) 866-205-7581
http://www.anthc.org/cs/dehe/sustops/

Cold Climate Housing Research Center (CCHRC)
907-457-3454
http://www.cchrc.org/

Renewable Energy Alaska Project (REAP)
907-929-7770
http://alaskarenewableenergy.org/

Rural Alaska Community Action Program (RurAL CAP)
907-279-2511
http://ruralcap.com/

University of Alaska, Institute of Social and Economic Research, Alaska Energy Data Gateway
https://akenergygateway.alaska.edu/

Appendix A

Sample Energy Profile

Technical Report of Community Energy Data

Source:

Alaska Energy Authority (AEA)

907-771-3000

Community Assistance

http://www.akenergyauthority.org/Programs/CommunityAssistance

Community Profile: Name of Community

Alaska Native Name (definition)

Incorporation

Location

Longitude	**Latitude**
ANCSA Region	
Borough/CA	
School District	
AEA Region	

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

Historical Setting / Cultural Resources

Economy

Climate	**Avg. Temp.**	**Climate Zone**	**Heating Deg. Days**

Natural Hazards

Mission

Community Plans **Year**

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

Demographics	**2000**	**2010**		**2013**
Population			**Percent of Residents Employed**	#DIV/0!
Median Age			**Denali Commission Distressed Community**	
Avg. Household Size			**Percent Alaska Native/American Indian (2010)**	
Median Household Income			**Low and Moderate Income (LMI) Percent (201x)**	

Electric Utility	**Generation Sources**	**Interties**	**PCE?**

Landfill **Class**	**Permitted?**	**Location**	
Water/Wastewater System		**Homes Served**	**System Volume**
Water			
Sewer		**Energy Audit?**	
Notes			

Access

Road			
Air Access		**Runway**	
Dock/Port		**Barge Access?**	**Ferry Service?**
Notes			

Energy Profile: Name of Community

Power House

Utility

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

Heat Recovery?

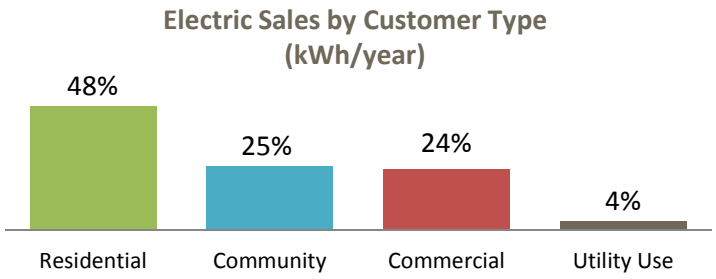
Upgrades?

Outage History/Known Issues

Operators	No. of Operators	Training/Certifications

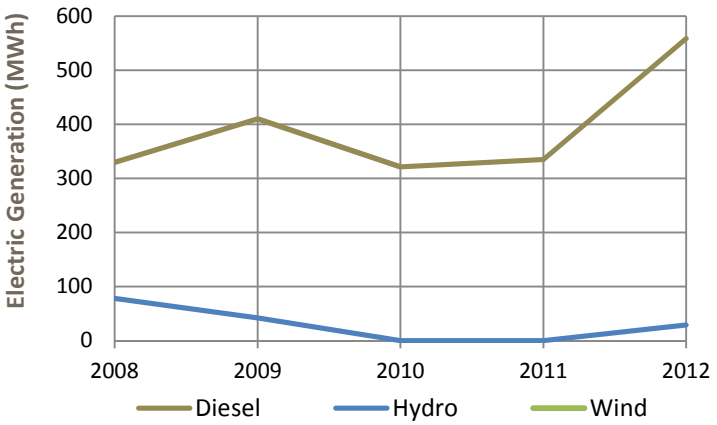
Maintenance Planning (RPSU)

Electric Sales	No. of Customers	kWh/year	kWh/Customer
Residential			#DIV/0!
Community			#DIV/0!
Commercial			#DIV/0!
Utility Use			



Power Production

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



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

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

Discounts?

Alternative Energy	Potential	Projects	Status
Hydroelectric			
Wind Diesel			
Biomass			
Solar			
Geothermal			
Oil and Gas			
Coal			
Emerging Tech			
Heat Recovery			
Energy Efficiency			

Bulk Fuel

Tank Owner	Fuel Type(s)	Capacity	Age/Condition

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

Cooperative Purchasing Agreements

Notes

Energy Profile: Name of Community

Housing Units	Occupied	Vacant	% Owner-Occup.

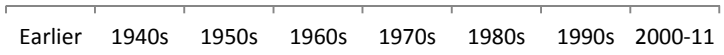
Regional Housing Authority	Weatherization Service Provider

Housing Need	Overcrowded	1-star

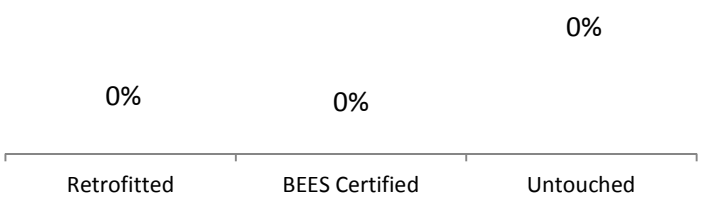
Energy Use	Average Home Energy Rating	Average Square Feet	Avg. EUI (kBTU/sf)

Data Quality

Age of Housing Stock



Energy Efficient Housing Stock



Non-residential Building Inventory

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