Juneau Renewable Energy Strategy

Setting the scene and priority actions

This revised version incorporates technical amendments to background information on the Juneau electricity system as approved by the Juneau Commission on Sustainability on March 14, 2018. These technical amendments replaced text in the version approved by Assembly Resolution 2808. The amendments do not alter the recommended actions or goal of 80% renewable by 2045.

CBJ Resolution 2808
February 12, 2018

Stantec

City and Borough of Juneau
Juneau Commission on Sustainability
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LIST OF ACRONYMS, ABBREVIATIONS, AND UNITS

ADOLWD	ALASKA DEPARTMENT OF LABOR AND WORKER DEVELOPMENT
AEA	ALASKA ENERGY AUTHORITY
AEL&P	ALASKA ELECTRIC LIGHT AND POWER
AHFC	ALASKA HOUSING FINANCE CORPORATION
BAU	BUSINESS AS USUAL
CBJ	CITY AND BOROUGH OF JUNEAU
CIP	CAPITAL IMPROVEMENT PROGRAM
COW	COMMITTEE OF THE WHOLE
EIA	ENERGY INFORMATION ADMINISTRATION
EV	ELECTRIC VEHICLE
FERC	FEDERAL ENERGY REGULATORY COMMISSION
Gal	GALLON
GCMC	HECLA GREENS CREEK MINE
GHG	GREENHOUSE GAS
GWh	GIGA WATT HOUR
HDD	HEATING DEGREE DAYS
IBEW	INTERNATIONAL BROTHERHOOD OF ELECTRICAL WORKERS
JCAIP	JUNEAU CLIMATE ACTION AND IMPLEMENTATION PLAN
JCOS	JUNEAU COMMISSION ON SUSTAINABILITY
JEDC	JUNEAU ECONOMIC DEVEVLOPMENT COUNCIL
JRES	JUNEAU RENEWABLE ENERGY STRATEGY
KM	COEUR ALASKA KENSINGTON GOLD MINE
KWETICO	KWAAN ELECTRIC TRANSMISSION INTERTIE COOPERATIVE, INC
KWh	KILOWATT HOUR
LED	LIGHT EMITTING DIODE
LEED	LEADERSHIP IN ENERGY AND ENVIRONMENTAL DESIGN
LNG	LIQUIFIED NATURAL GAS
MMBTU	MILLION BRITISH THERMAL UNIT
MMCO2e	MILLION TONNES CARBON DIOXIDE EQUIVELANT
QF	QUALIFYING FACILITY
RCA	REGULATORY COMMISSION OF ALASKA
SEIRP	SOUTHEAST INTERGRATED RESOURCES PLAN
USCG	UNITED STATES COAST GUARD

EXECUTIVE SUMMARY

Juneau has benefited from clean renewable energy – hydroelectricity - for 100 years. Hydropower gives Juneau the lowest, most stable electric rates in the state, supplying 20% of the total energy used in the community.

Low costs for hydroelectricity have helped offset Juneau's dependence on the fuel oil, diesel and gasoline that supply the other 80% of the energy used in the community, but we still send more than $140 million out of the local economy annually to import these fuels.

Juneau has an opportunity to increase its energy independence, lower energy costs, and support economic development, by expanding use and supplies of renewable energy. The CBJ can encourage this long-term transition from fossil fuels to renewable sources by taking a leadership role and adopting an ambitious goal to guide public policy and encourage private choices.

This strategy plan recommends that the CBJ adopt a target of obtaining 80% of our energy from renewable sources by the year 2045. General strategies for achieving this target include increasing energy efficiency, shifting transportation and space heating to renewable energy, and increasing supplies of renewable energy.

The Juneau Economic Development Plan (2015) identifies hydro resources as one of the community's significant assets. Strengthening the renewable energy sector can contribute to each of the plan's overarching goals: building a more resilient and diversified economy, providing infrastructure that supports and strengthens the economy, leveraging natural competitive advantages to create new wealth, and enhancing qualify of life attributes.

Replacing fossil fuels substantially with renewable energy will have a wide range of benefits for Juneau. Our long distances from fuel suppliers, and our small, captive market with little competition means Juneau residents pay higher prices for these imported fuels than the rest of the country. Our dependence on barges, ferries, and jet travel for most of our access and supplies means our living expenses and business costs are greatly affected by high fuel costs, and by spikes in fuel prices. Major industries and employers such as tourism and fishing are also affected directly by fuel costs.

Juneau is therefore particularly vulnerable to spikes in fossil fuel prices resulting from national and international political and economic responses to world events and climate change. As the costs of climate change grow in coming decades, an obvious policy response may be to tax carbon emissions to discourage their use and pay for mitigation measures. Such measures, beyond CBJ or Juneau's control, would have a disproportionate impact on Juneau's economy.

This strategic plan provides background information on Juneau's energy use and supplies, discusses alternative energy paths, and recommends targets and strategies. It sets direction and a general path forward. It is not intended to be a detailed guideline or tactical action plan, but is instead a general roadmap for more detailed planning and budgeting.

While Juneau can't influence the costs of imported fossil fuels, it can take a wide range of actions to influence energy consumption, supplies, and costs within the community. Reducing dependence on fossil fuels, through energy efficiency and substitution of renewable energy sources, can help create new jobs and businesses, reduce costs, and increase community resilience, while reducing climate impacts.

Juneau has considerable experience in reducing costs through energy efficiency and shifting from fossil fuels to renewable hydroelectricity. After avalanches cut off Juneau's hydroelectric supplies in 2008 and 2009, Juneau residents cut their electricity use by 25% short term, and by 8% longer term. During this period Juneau residents implemented energy efficiency measures that continue to affect energy use patterns.

The CBJ, together with other organizations and households, have made many successful investments in efficiency and renewable energy. Our airport has achieved substantial cost savings by replacing runway lighting with LED's and by installing a ground-source heat pump system for heating buildings and melting ice. The NOAA Ted Stevens Marine Research Institute helped pioneer seawater heat pump systems in the U.S. A growing number of Juneau businesses and households are saving on heating bills by converting to heat pumps. Local heat pump installation and service companies have expanded significantly in the past 5 years.

Similarly, Juneau has become a leader in adoption of electric vehicles (EV), ranking in the top communities in the nation in terms of per capita EV ownership. In 2016-2017 two EV's are arriving per week in the community, with rapid Juneau acceptance of electrical vehicle transportation. A growing number of EV charging stations have been installed through cooperative efforts between the CBJ and other agencies and businesses. Several private and public/private charging stations are also being planned. Gastineau Guiding put the first electric hybrid tour bus went into service in 2016 and there is growing community interest in electric buses to reduce operating and maintenance costs.

Building on this experience to increase local energy security and resilience will help keep more of the $140 million that we now spend on fossil fuels circulating in the community to reduce energy costs for residents and businesses, grow local businesses and jobs, and reduce vulnerability to volatile fuel prices.

This strategy can enhance economic development in other ways, by supporting innovators through business and technology research, incubation, and demonstration; by targeting key events and organizations that represent clean tech and renewable energy; and by attracting "green capital" and enabling more innovative financing for clean and renewable businesses. These are all goals identified in the Juneau Economic Development Plan.

Juneau is in good company in shifting toward renewable energy and can learn from the experience of other communities. Cities across the United States, and Canada, and nations such

as Norway and Sweden, are moving toward 100% renewable energy by mid-century. Our neighbor to the south, Vancouver, B.C., has set a goal of replacing 100% of fossil fuels with renewable energy by mid-century.

Juneau has a head start in transitioning toward renewable energy. We have a great opportunity to use local resources to create a stronger, more resilient economy, while helping reduce carbon emissions, and reducing energy costs for local government, schools, businesses and households.

STRATEGY DEVELOPMENT

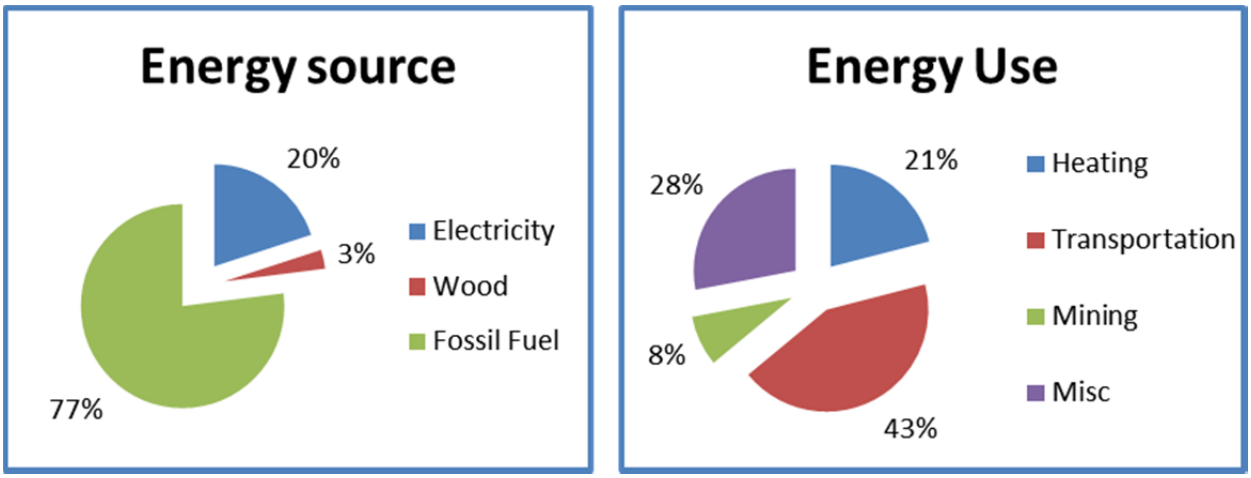
This strategic plan originated as a priority recommendation in the Juneau Climate Action and Implementation Plan (CBJ Resolution 2593, Nov. 2011). In 2015 the CBJ contracted with the energy consulting firm Stantec to develop an initial draft of this strategy which was completed in 2016. The Energy Committee of the Juneau Commission on Sustainability (JCOS) served as a sounding board, and assisted CBJ staff in reviewing and revising the draft. JCOS also assisted in conducting an extensive public review process between July 2016 and January 2017.

In addition to an introductory public meeting, presentations were made, and discussions were held with the CBJ Assembly COW, the CBJ Planning Commission, and many groups and organizations, including the Downtown Improvement Group, the JEDC Renewable Energy Cluster Working Group, the Alaska Climate Action Network, Renewable Juneau, and the Juneau Chamber of Commerce. JCOS also co-sponsored a series of seven "Energy Forums" as part of their Sustainability Session Outreach Program with assistance from the city manager, JEDC, the Capital City Engineers, the USFS, the Juneau Electric Vehicle Association, Juneau Hydropower, Juneau District Heating, and AEL&P. These were well attended, and provided information and opportunities for discussing issues raised in the strategy.

This document addresses four key questions relating to Juneau's energy future:

Where are we now? What is Juneau's energy use today?

Juneau currently derives almost 100% of its electricity from hydropower, which provides economical renewable energy while limiting climate impacts. This hydroelectricity provides about 20% of the total energy used in Juneau. Another 3% of Juneau's total energy use comes from wood, a renewable heating source. The remaining 77% comes from fossil fuels, which are the primary energy source for heating buildings (which account for about 21% of fossil fuel use), transportation (accounting for about 43%), and mining (about 8%).



Where are we going?

The business-as-usual path is derived from historical trends. Total energy use in Juneau is projected to rise at about the same rate as population growth, historically averaging about 1% per year. Gradual growth in energy use is tied to population change, driven primarily by costs and the choices of private utility and fuel providers. The mix of energy supplies is projected to remain similar to today. Existing trends of slow growth in energy efficiency, and some level of electric vehicle adoption continue.

Where do we want to go? What energy future would we like to see?

The plan examines two scenarios for Juneau's desired energy future - "Do Something", and "Do More".

The *"Do Something"* path is based on Resolution 2593, in which the CBJ Assembly in 2011 adopted a goal of reducing Greenhouse Gas (GHG) emissions 25% over 20 years. This would be roughly equivalent to replacing 25% of fossil fuels with renewable energy. The Juneau Climate Action and Implementation Plan (JCAIP) identifies a wide array of approaches and actions that could reduce GHG emissions and fossil fuel use. The 'Do-something' path modelled the potential impact of implementing a list of higher priority JCAIP actions. The result was a stabilization of 2007 GHG and energy use. While progress has been made, this target is not being met because the recommended actions are not being implemented quickly enough.

The *"Do More"* path resulted from discussions between Stantec and the Juneau Commission on Sustainability (JCOS), which served as the steering committee for the energy plan in 2015 and 2016. Since the adoption of Resolution 2593 it has become increasingly clear that significantly greater cuts to carbon emissions will need to be made in order to successfully achieve our community goals. This scenario considers a path toward substantially replacing fossil fuels, creating new economic opportunities and jobs around renewable energy development, and reducing community vulnerability to increases in fossil fuel costs. These discussions resulted in the

recommended target of 80% of all Juneau's energy use to be provided by renewable sources by 2045. This proposed target received strong community support in public comments and discussions.

How Can We Get There?

The plan identifies four broad strategies for achieving the 80% renewable energy target:

A. Implement a CBJ energy management program to make the organization a leader in energy efficiency and adoption of renewable energy

The CBJ spends about $8 million per year on energy. Adopting a formal energy management program, including tracking energy use and costs, implementing energy efficiency best practices, and implementing recommendation of energy audits could result in substantial savings. Consolidating the CBJ vehicle fleet and converting to electric vehicles is another area of potential energy and cost savings. The CBJ could also provide examples and information to the public on opportunities for energy savings. These provide the mechanics for CBJ to lead by example.

The JCOS has developed the outline of energy management program for the CBJ (see **Appendix E**), which summarizes specific recommendations from the JCAIP that address city operations, recommends procedures and financing options, and outlines the potential for $500,000 in annual savings over the first 3 years.

B. Reduce Juneau's dependence on fossil fuels for space heating.

Space heating accounts for about 21% of the fossil fuels used in Juneau. Significant shifts to electric heat have occurred over the years, particularly when fuel oil costs were high relative to electric rates, so today almost 25% of Juneau homes are heated by electricity.

District heating for the downtown core and other parts of town could reduce heating costs and use of fuel oil. Heat pumps are becoming more common, are more energy efficient, and save money for homes, businesses and government. Energy efficiency is a cost effective strategy for stretching existing renewable resources. For example replacing electric resistance/baseboard heating systems with air-source heat pumps could provide 2-3 times more heating capacity for the same amount of hydroelectricity used. Given Juneau's older housing stock, there are opportunities for energy retrofits as older buildings are updated and renovated. Innovative financing mechanisms could assist in saving money on space heating, while supporting a variety of businesses.

C. Reduce Juneau's dependence on fossil fuels for transportation.

Transportation is the largest (43%) use of fossil fuels in Juneau. Electrification of transportation provides a major opportunity to transform transportation to renewable energy, and Juneau already has one of the most rapid rates of EV adoption in the country. Other significant opportunities to reduce fossil fuel use include supporting energy efficient, compact, mixed use development, improving and electrifying the CBJ transit system, and supporting non-motorized transportation.

D. Support efforts to provide new renewable energy supplies for Juneau.

Expansion of hydropower resources is the most obvious opportunity for increasing the supply of renewable energy in Juneau. Rain and the power that it creates is one of our major resources. New small and mid-sized hydroelectric sites have been identified by AEL&P and Juneau Hydropower. These projects require large up front investments and coordination of demand growth.

More research, development and economic viability studies are needed to identify the potential of other local renewable energy sources, including wind, solar, tidal and biomass, as well as energy storage. Some of these studies may have been done already but are commercially confidential. Currently there are few apparent incentives or economic conditions that would allow these to compete with local hydropower or fossil fuels imported to the community. Electrification of local mining operations using hydropower has played a key role in financing existing renewable sources, and may continue to play such a role in the future.

Implementation

Each of these broad strategies requires substantial work to pull together appropriate actors and organizations, and to develop specific action and implementation plans. Many priority actions are identified in the 2011 Juneau Climate Action and Implementation Plan (JCAIP) (CBJ Resolution 2593), while others were identified during development of this plan.

There is no silver bullet, or simple path, for accomplishing the ambitious goal of transitioning from fossil fuels to renewable sources, and no single entity or organization that can implement it. Instead, a wide variety of actors are involved in making energy choices, including individual home and vehicle owners, businesses, energy suppliers such as AEL&P and fuel companies, and government agencies.

This plan emphasizes the role of the CBJ, both because it can take actions that save public money while reducing fossil fuel use, and because it represents community values and interests. But expanding use and supplies of local renewable energy can only be achieved through cooperation and collaboration between a range of private and public entities.

Fortunately Juneau has many individuals and groups experimenting with, and tackling these issues. The Renewable Energy Cluster Working Group, JEDC, with its work on incentives for

electric vehicles, and the development of concepts for a Juneau heating district provide good models. Other local examples come from innovative local businesses such as the Alaska Brewing Company, with its "beer-powered beer", using waste products to improve energy efficiency and increase profits.

Energy efficiency is frequently the most cost-effective way to reduce and shift energy use. Land use policies supporting compact, mixed use development are also important for reducing energy costs, as well as being a key solution to housing affordability problems, as identified in the 2016 CBJ Housing Action Plan (CBJ Resolution 2780).

The strategies recommended here are consistent with, and support recommendations concerning affordable housing in the 2015 Juneau Economic Development Plan (Ordinance 2015-10) and the CBJ Housing Action Plan. Costs for space heating and domestic hot water significantly affect housing affordability. Many homes, and most multi-family rental units, use expensive and wasteful electric resistance heat. Improving energy efficiency and shifting from electric baseboard heat to heat pumps can substantially reduce heating costs. Developing ways to encourage and finance conversions would be a win-win for AEL&P, renters, landlords, and Juneau's climate impacts.

Greater attention to land use and compact development are also major recommendations made in the Juneau Economic Development Plan and the CBJ Housing Action Plan

"CBJ's plans, zoning ordinance, development codes, and Land Management Plan, must all stress the value of utilizing existing infrastructure before building new and maximizing old and new infrastructure through higher densities and greater concentrations of uses wherever appropriate. " p. 20.

Recommendations

This strategy document recommends that the Mayor and Assembly take the following actions to move forward in developing the Juneau Renewable Energy Strategy and delivering on identified priority strategies:

1. Adopt a community target of transforming Juneau's energy use to 80% renewable sources by the year 2045. This guideline will provide direction for further planning and action, position Juneau as a national leader in the transition to renewable energy, and support CBJ, business, and government efforts to obtain financing, including grant assistance, for these purposes.

2. Require development of action plans for each of the strategies identified, and to begin implementing priority near-term actions using the priority action list as a guide to direct early efforts. Direct the Juneau Commission on Sustainability, with CBJ staff help, to seek assistance from the public, JEDC, Juneau Chamber of Commerce, and other organizations to develop and obtain support for these plans

3. Direct the CBJ organization to implement a formal energy management program. This recommendation will require all departments and independent boards to identify and

monitor energy use and costs; evaluate potential energy savings and implement cost effective efficiency measures; explicitly incorporate energy usage into operational decision making and the Capital Improvement Program (CIP), as recommended in the CBJ Comprehensive Plan and the JCAIP; and implement a Sustainable Indicators program for energy use, consistent with Policy 2.2 of the Comprehensive Plan. A proposal for a CBJ Energy Management Program is included in Appendix E.

4. Direct the CBJ, through the JCOS, to monitor community energy use as a whole, by updating the JCAIP Energy and GHG Emissions Inventory at least every three years. *Develop mechanism to gather fuel sales data.*

5. Provide funding direction and CBJ staff allocations to accomplish these recommendations, with the understanding that committed and effective management will ensure that energy savings and energy-related grants will more than offset additional expenses.

6. Direct JCOS, with CBJ staff assistance, to review progress annually on these recommendations, highlighting successful community achievements, dynamically incorporating lessons learned to become more successful in meeting our community energy values as expressed in the JRES and reporting to the Assembly and to the public.

1 INTRODUCTION

1.1 WHAT IS THE JUNEAU RENEWABLE ENERGY STRATEGY?

The Juneau Renewable Energy Strategy (JRES) provides information to the community on the issues related to local energy supply and consumption. It identifies three possible scenarios for reducing reliance on fossil fuels and then recommends strategies for achieving these goals.

The plan identifies how the following can be achieved in the context of the existing situation while still allowing for growth of the local economy:

- Increase predictability and reliability in the price of energy.
- Reduce community vulnerability to fossil fuel costs.
- Deliver on Juneau's commitment to reduce greenhouse gases.

The JRES addresses four key questions and provides the following information (**Figure 1**).

Figure 1: Scope of Juneau Renewable Energy Strategy

Issues Addressed by JRES	Description of Activities
Where are we now?	• A profile of the physical and socio-economic features of CBJ. • An inventory of energy consumption using latest available data. • Description of existing energy sources.
Where are we going?	• A business as usual forecast of energy use from the baseline year 2010 to 2045. • Discussion of the implications of choosing particular energy sources.
Where do we want to go?	• A proposed energy target to work towards. • An overarching framework and key strategies, including CBJ's role and the community partners that will contribute to the strategies' success.
`How will we get there?	• Several high level strategies and a collaborative approach to implementation. • Specific next steps to develop further that will advance energy use reductions with in each of the strategies.

1.2 HOW WAS THE STRATEGY DEVELOPED?

CBJ has addressed environmental sustainability and climate change through a number of initiatives over the past decade. These initiatives are inter-related, with goals to improve the livability and long-term resiliency of Juneau. Based on these previous efforts, the CBJ sustains an array of initiatives consistent with the theme of "living more and using less. Extensive community work has gone into developing the platform required for Juneau to begin to practically address local energy and climate vulnerabilities, including:

- CBJ Resolution 2528: *'The City and Borough of Juneau is committed to a sustainable future that meets today's needs without compromising the ability of future generations to meet their needs'*.
- Juneau Commission on Sustainability (JCOS).
- Juneau Climate Action Plan (JCAIP), including ambitious emission reduction goals (CBJ Resolution 2593).
- Juneau Economic Development Plan's 10-year vision that encourages energy innovation and job creation.

The process for developing the JRES built on these existing and ongoing initiatives. The JRES formally began in February 2015 and included extensive involvement of the Juneau Commission on Sustainability (JCOS) to guide the development of the plan. Five workshops were convened with JCOS members to obtain input and feedback into the plan.

JCOS past and current members involved in the development of the JRES include:

- Amy Skilbred
- Bob Deering
- Clint Gundelfinger
- Darrell Wetherall
- Kate Troll, Assembly Liaison
- Maria Gladziszewski, Assembly Liaison
- Rob Edwardson, Assembly Liason
- Percy Frisby, Planning Commission Liaison
- Michael LeVine, Planning Commission Liaison
- Ben Haight, Planning Commission Liaison
- John Smith
- Greg Smith
- Kate Bevegni
- Duff Mitchell
- Steve Behnke
- Sara Truitt
- Ed King
- Myrna Gardner
- Kaley Bangston

CBJ staff involved in development of this plan includes:

- Rob Steedle, Director, Community Development
- Beth McKibben, AICP, Planning Manager
- Tim Felstead, Planner II
- Allison Eddins, Planner II
- Holly Kveum, Administrative Assistant II
- Marjorie Hamburger, Administrative Assistant II
- Megan Daniels, Administrative Assistant I
- Bhagavati Braun, Administrative Assistant I

1.2.1 Acknowledgements

This Renewable Energy Strategy was developed with extensive input from JCOS members, City staff, and the local electricity utility AEL&P (a wholly owned subsidiary of Avista Corporation, Spokane WA[1]), and Juneau Hydropower, a local hydropower developer. The contribution of these organizations to the development of this plan is gratefully acknowledged.

1.3 INITIAL JUNEAU COMMUNITY ENERGY PLAN OBJECTIVES

The JRES is based on a scope of work developed by JCOS. The 2011 Juneau Climate Action and Implementation Plan (JCAIP) noted as one of the top ten implementing actions a need for an Energy Plan. Specifically, the JCAIP recommended:

> *"Develop an Energy Plan for Juneau. This plan would identify and evaluate the technical and economic feasibility of renewable energy sources (including hydroelectric, biomass, solar, tidal, and wind) that will be available to meet the community's future need. The Energy Plan will need to be flexible enough to respond to changing conditions and will need to examine the full range of renewable energy options and the relative costs. Completion of an Energy Plan would require input from other levels of government and the private sector."*[2]

Based on this recommendation a scope of work was drafted by JCOS. It became apparent during the scoping process that JRES should consider broader issues than identified in the JCAIP. The scope of work was drafted with the expectation of a larger budget than was ultimately available. Additionally, a considerable amount of time was spent trying to obtain data to update the 2010 Juneau energy and emissions inventory from local energy suppliers. Only the local electric utility released data on energy usage. Oil and gas suppliers were reluctant despite having previously provided the information for the earlier inventories.

The result is a high level document providing background on the potential decisions and illustrating the possible trade-offs needed to realize the recommendations in both the JCAIP and 2013 Comprehensive Plan for an 'Energy Plan'. As work on an Energy Plan progressed it became clear that what was more urgently needed was a new take on what had already been presented in the JCAIP since it was apparent that progress had been slow and not particularly proactive. It also became clear that a technical review of different renewable energy supply options would not be possible. It is anticipated that the more detailed studies and implementation plans needed to deliver the four strategy areas identified in this plan will be occur as resources become available. Areas for future study are identified throughout this document.

[1] On July19, 2017 Avista announced that Hydro One, a utilities company based in Ontario, Canada, would purchase Avista.
[2] Juneau Climate Action and Implementation Plan Pg. v, Nov, 2011

Discussion of GHG and climate change has intentionally been kept to a minimum in this document because this strategy is intendeds to focus primarily on energy impacts although reduced GHG emissions is the driver for the final goals.

1. **Public outreach** - Develop and implement public outreach and education programs at appropriate times during the drafting process to enable public comment before it is finalized.
2. **Establish an energy usage baseline** – Based on relevant sources of background data and previous studies, update the baseline for Juneau's energy use as a community.
3. **Interpret collected energy data** - To make rational decisions about energy supply and infrastructure, it is necessary to collect data on existing energy consumption and take into account projected changes in energy requirements.
4. **Identify and evaluate efficiency and conservation measures** – To determine how CBJ can influence both the adoption rates of efficiency and conservation measures, as well as the specific measures that individuals and businesses seek to adopt, in order to achieve optimum utilization of Juneau's energy infrastructure and supply.
5. **Understand the expected need and demand for energy –** Understanding the future demand for energy and mix of energy sources, and the implications of using one energy supply over another, is crucial to make sound decisions as individuals and as a community.
6. **Explore potentially viable sources of energy in Juneau** - Consider the economics of energy sources including hydroelectricity, biomass, natural gas, solar electricity or thermal energy, geothermal, tidal, and wind, and assess how they can meet the community's needs in the future.
7. **Identify and prioritize measures which the community should pursue** – Should include policy tools, capital improvement projects and potential funding resources.

Given the limited resources available for the development of this plan, some objectives have been covered with greater detail than others. Areas for future study are identified throughout this document.

1.4 RELATED PLANNING INITIATIVES

Prior to CBJ formally committing to reducing GHG emissions in 2007, a number of coordinated community planning efforts were completed. These efforts are continue to guide community action and investment (excerpts of key planning documents are presented in the Appendices). While these goals and actions are still relevant, they need to be re-evaluated through a broader community process. While numerous initiatives are identified the level of implementation is less clear. There is very little done to monitor the numerous goals, actions etc. included in these plans.

1.4.1 Juneau Climate Action and Implementation Plan, Adopted 2011, CBJ Assembly Resolution 2593

Juneau's Climate Action and Implementation Plan (JCAIP) outlines goals and a path for reducing community emissions 25% by 2032, and proactively addresses local climate vulnerabilities. It inventories (using 2010 data) current community energy uses and emissions, sets targets, and presents a set of actions and implementation strategies.

Key baseline data compilations and technical findings of the plan include:

- 2007 and 2010 summaries of Juneau's total energy use and greenhouse gas emissions (JCAIP, page 10).
- 2010 total energy use statistics for Juneau including greenhouse gas emissions by source and sector (JCAIP, page 11).
- 2007 to 2035 emission baseline and forecasts, both with and without implementation of local targets and action (JCAIP, page 19).

The JRES is ultimately building its analysis starting from this plan's 2010 data, and extending/reinforcing the JCAIP recommendations and targets as a framework for community direction in these specific areas:

- State and federal weatherization programs.
- Local building code updates to more stringent energy standards.
- Encouraging federal, state, and local government agencies to conserve energy.
- Partnering to develop local professional expertise.
- Supporting energy efficiency and renewable energy pilot projects in Juneau.
- Seeking various energy cost savings related to energy efficient transportation, including electric vehicles for personal use and transit, and human-powered alternatives.
- Implementing public outreach and education.
- Prioritizing implementation and capacity-building.

1.4.2 Juneau Economic Development Plan, Adopted 2015, CBJ Ordinance 2015-10

This recently adopted plan considers Juneau economic trends and provides strategies that address the community's economic and strategic strengths, weaknesses, opportunities, and threats. Although the plan is not specifically related to energy, elements of this plan and its' implementation remain critical in terms of CBJ having both the tax base to invest in energy conservation and renewable alternatives, and overall population stability. Key elements of this plan include:

- Reducing the cost of living (including affordable energy prices, efficiency savings, and local energy supply).
- Supporting business development and job creation.
- Identifying opportunities for energy infrastructure investments.
- Supporting industry cluster development (potentially including in the renewable energy field, and an "Energy Innovation District").

Additionally, the plan strongly supports expanding Juneau's limited settlement base, primarily into West Douglas, which would both require extension of urban services (water and sewer) and add new housing and building stock that will require an energy supply.

1.4.3 GHG Policy and Sustainability Initiatives

To use a local slogan, Juneau is proactively focusing on "living more and using less" at all levels within the community. Policies are an important aspect of mobilizing the community to make short term investments that achieve cost savings over time, and move the community closer to its emission goals. Following are a number of formal policies and initiatives that indicate a local willingness to reduce local GHG emissions and enhance local sustainability:

- (2007) CBJ Resolution 2397 - The CBJ Assembly endorsed a 1% greenhouse emission reduction target for municipal buildings and operations and a 20% emission reduction for the entire community by 2012 using 2007 emission levels as a baseline.
- (2007) CBJ Resolution 2401AM (later extended and superseded by CBJ Resolution 2755 in 2015) created the Juneau Commission on Sustainability (JCOS) whose mission is to promote the economic, social, environmental, and governmental well-being of Juneau and all its inhabitants, now and in the future.
- (2009) CBJ Resolution 2502 - Assembly endorsement of previous GHG goals and preparation of a Climate Action Plan.
- (2011) CBJ Resolution 2593 - Juneau adopted the Juneau Climate Action & Implementation Plan with a community goal of reducing emissions 25% by 2032.
- Juneau Unplugged. Juneau Unplugged was a response to loss of the majority of electricity supply to Juneau when transmission lines were damaged by avalanches in 2008 and 2009 that suddenly pushed electricity prices up to five times the usual. The initiative was directed by local non-profits and the City in partnership with community groups, local media, the business community, AEL&P, and local schools. With the dual goals of providing information and support, the campaign endeavors to provide the community with information about conservation, safely reducing electricity consumption, progress on efforts to repair damaged lines, political and administrative responses to the crisis, and education about energy alternatives. The campaign was instrumental in helping to cut local energy consumption during the crisis.
- Renewable Energy Cluster Working Group, Juneau Economic Development Council. A Southeast initiative with specific Renewable Energy Action Initiatives, including expanded use of electric vehicles in Juneau, and Renewable Energy Education and Outreach in conjunction with the U.S. Forest Service and the Mendenhall Glacier Recreation Area.
- (2015) Resolution 2722 – Expressed support for the advancement of electrified transportation vehicles and supporting infrastructure in Juneau. This was based on recognition of the limited road network, low cost hydroelectricity, and community support for electric vehicle use.
- Ordinance 2010-42 required both new and renovated CBJ buildings with a cost of over $5m to be meet LEED standards.

Additional formal and informal community initiatives and programs include:

- Federal biomass and renewable energy initiatives.
- State programs to encourage and help fund efficiency investments.
- Community energy and conservation project implementation in key community facilities.
- Businesses creatively reducing their carbon footprint.
- Individual and homeowner daily actions and investments in efficient technologies.
- Local businesses and the electric utility exploring additional hydroelectric resources and uses such as electric vehicles and district heating.

2 WHERE ARE WE NOW?

2.1 COMMUNITY CONTEXT

Community data and relevant plans, policies, and initiatives are summarized in this section to provide context for developing this document. The intent is to ensure that this plan is informed by local opportunities and trends, aligns with previously adopted community goals and policies and builds off work that has been completed.

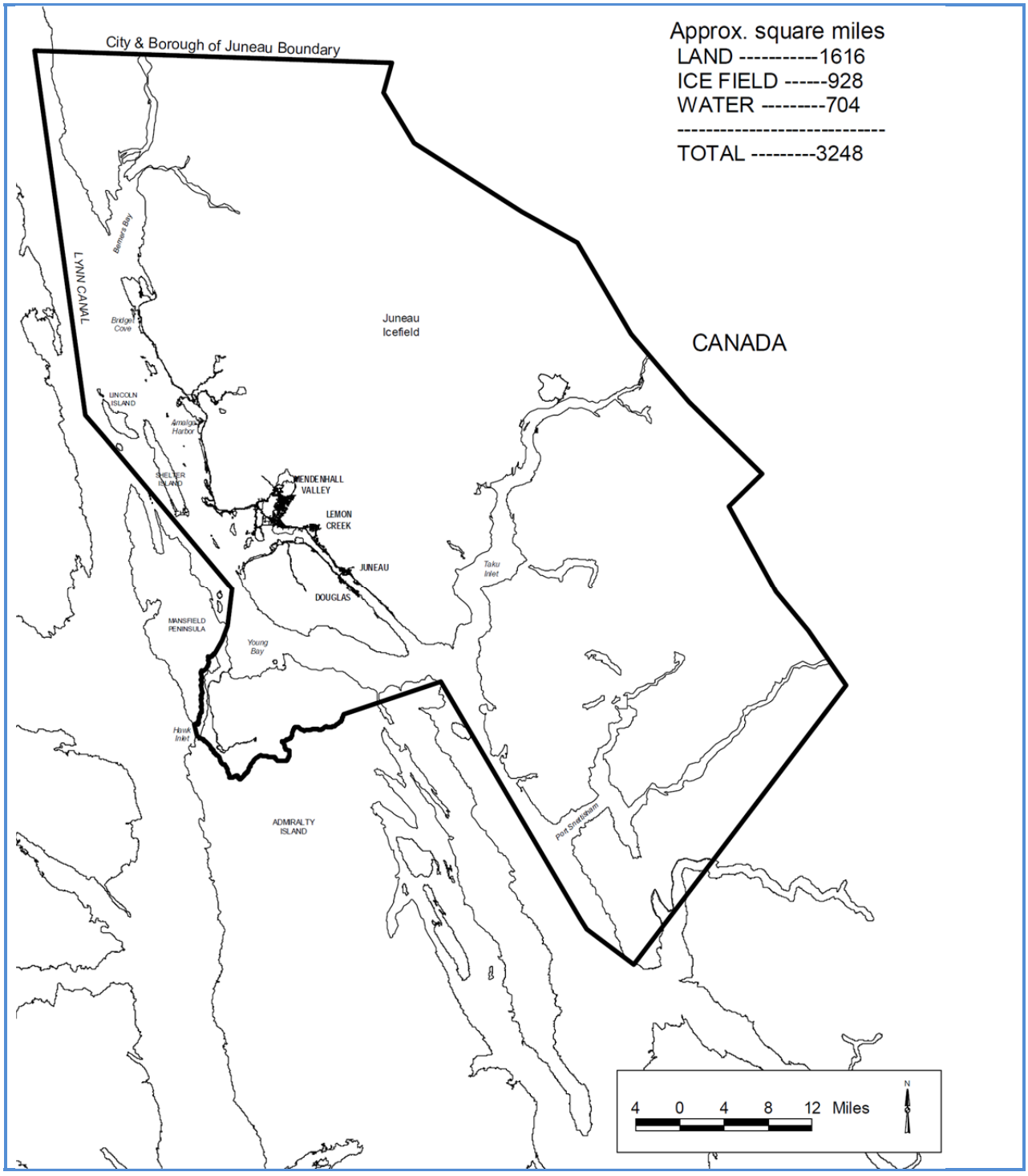
2.1.1 Geography

The CBJ covers 3,255 square miles (80% land, 20% water) along Stephens Passage, Gastineau Channel and Lynn Canal, from Tracy Arm to the south and to just beyond the north shore of Berners Bay (See **Figure 2**). Juneau's separation from other regions by significant bodies of water and its rugged terrain significantly impact community energy use. Non-local energy sources, such as fossil fuels must be barged in, increasing their cost. Juneau's geography, bordered by water on one side and mountains on the other, has created a linear settlement pattern rather than a more compact one resulting in long supply lines and longer travel distances.

Despite these challenges, Juneau's geography and topography also provides significant renewable energy opportunities, with large tides averaging 16 feet and extensive mountain peaks at greater than 8,200 feet in the Coast Range along the Canadian border. These mountains are covered by the Juneau Ice field, a large ice mass from which more than 30 glaciers begin.

Where are we now?

Figure 2 - City and Borough of Juneau



Source: CBJ

2.1.2 Climate

Local climate is a significant driver of Juneau's energy profile with the greatest heating demand in the winter and little demand for air conditioning in the summer. Juneau's maritime climate is milder than its' 58° northern latitude may suggest due to the moderating influence of the Pacific Ocean which has a mean annual temperature of 42° F, based on 63 years of record[3]. Historically, the community has on average 8,574[4] annual Heating Degree Days (HDD)[5], and experiences a yearly average of 87.4 inches of snowfall at sea level and significantly higher amounts at higher elevations. Annual snowmelt and rain feed streams and subsequently hydro-electric generation operations, Juneau's primary electrical source. Hydroelectric peak production takes place between May and October.

For context, a comparison of heating degree days for different US locations is presented in **Figure 3**. According to global climate models, Juneau's temperatures are predicted to rise by 10° F before the current century ends.[6] Warming effects are expected to be the largest during the coldest part of the year, with potentially 50 to 70 fewer frost days per year. This will reduce the number of heating degree days therefore reducing space heating requirements. Other energy reductions may be observed due to reduced snow removal operations and a reduction in of cold engine starts, which reduces vehicle fuel consumption.

Figure 3: Comparison of Heating Degree Days (HDD) by Location

City	Average annual heating degree days (1981-2010)
Barrow, AK	19,893
Anchorage, AK	10,470
Juneau, AK	8,574
Seattle, WA	4,615
Portland, OR	4,366
Phoenix, AZ	1,040
Honolulu, HI	0

Juneau's latitude and lower sun angle, along with its coastal rainforest climate mean that air conditioning is generally not a contributor to local energy use patterns. The community has generally moderate temperatures, moderate levels of sunshine, and abundant precipitation, as Juneau's coastal mountains intercept moist air masses as they arrive from the Gulf of Alaska. Juneau annually averages between 55 and 92 inches of rainfall, depending on the location.

2.1.3 Climate Action and Energy Efficiency

Juneau, like many coastal communities, is concerned about the potential long-term threat of climate change. To better anticipate and respond to projected climate changes, CBJ

[3] 2007 *Climate Change: Predicted Impacts on Juneau,* CBJ Scientific Panel on Climate Change, (page 15).
[4] http://ggweather.com/ccd/nrmhdd.htm based on NOAA datasets.
[5] Heating Degree Days is derived from the cumulative number of degrees, averaged over a day; the outside temperature is below 65°F for each day of the year.
[6] 2007 *Climate Change: Predicted Impacts on Juneau*, CBJ Scientific Panel on Climate Change (p.4).

convened a Scientific Panel on Climate Change in 2007. A report of their findings highlights possible warming effects, and recommends enhancing local energy efficiency to realize "immediate economic benefits, as well as reduce the long-term costs associated with large scale environmental changes."[7]

In 2007 Juneau formally made a commitment to reducing local carbon dioxide (CO2) and other GHG emissions. In the years since, CBJ has embarked upon a number of initiatives to reduce GHG emissions in the community:

- 2007 – Juneau became a signatory to the 2007 US Conference of Mayors Climate Protection Agreement and joined Cities for Climate Protection Campaign sponsored by the International Council for Local Environmental Initiatives
- 2009 – CBJ performed a baseline inventory of greenhouse gas emissions based on 2007 data.
- 2009 – The CBJ Assembly endorsed a 1% greenhouse emission reduction target for municipal buildings and operations and a 20% emission reduction for the entire community by 2012 using 2007 emission levels as a baseline (Resolution 2502).
- 2011 – Juneau adopted the Juneau Climate Action & Implementation Plan (2011), with a community goal of reducing emissions 25% by 2032.

2.2 POPULATION AND ECONOMIC TRENDS

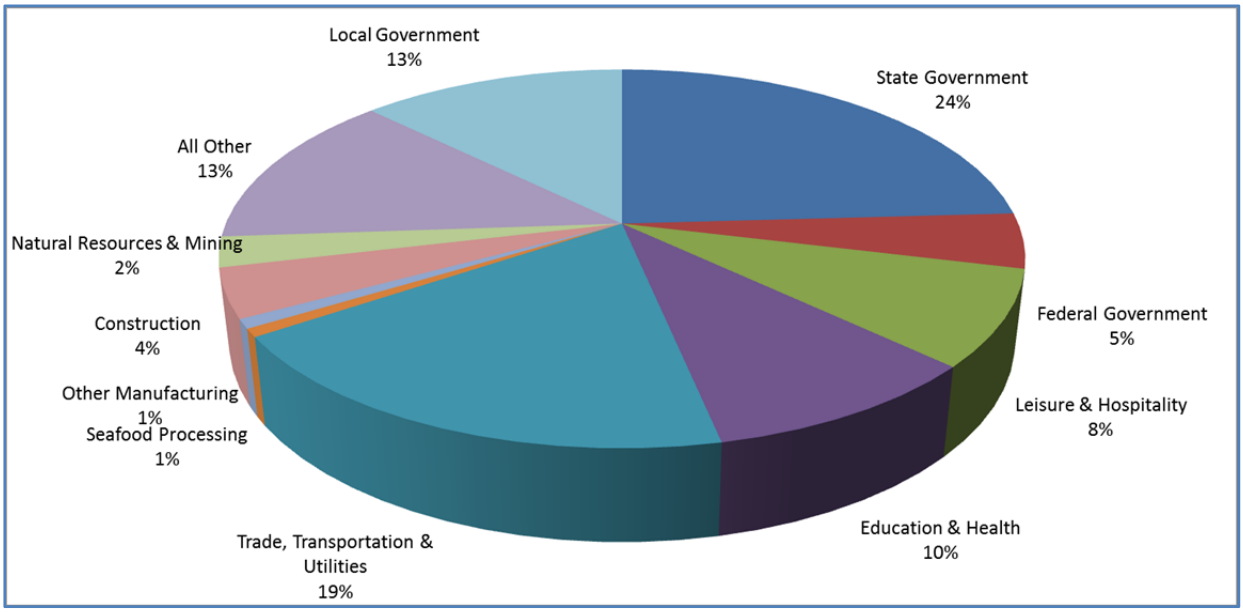
Population is a driver of energy consumption and has a direct effect on the number of homes, business, and vehicles that travel in the region. Juneau's population grew substantially in the last 50 years with a population of 6,050 in 1970 growing to 19,528 by 1980[8]. It is currently estimated to have 33,026 residents (a 546% increase)[9]. Although for many decades Juneau grew at a steady annual rate of about 2.4 percent, a number of trends have slowed this growth to 0.1% over recent years[10], a trend that is expected to persist into the future based on a number of variables, including:

- ***Demographics***. Future demographic trends will see relatively lower birth and migration rates, and an aging population. Within a decade, 20 percent of Juneau's population will be over 65 years of age (up from about 13 percent today)[11].
- ***Growth Barriers***. Juneau's growth is impacted by the real and perceived lack of affordable housing, high cost of living, and geographic characteristics (e.g., the community's limited land base to support new settlement, physical separation from other communities, and dependence on expensive supply chains and modes of regional transport).

[7] 2007 *Climate Change: Predicted Impacts on Juneau*, CBJ Scientific Panel on Climate Change, (page 73).
[8] US Census (June, 2015).
[9] 2014 Alaska Department of Labor and Workforce Development <http://labor.state.ak.us/research/pop/popest.htm>
[10] *Alaska Economic Trends*, June 2014, (page 7).
[11] 2015 Juneau Economic Plan, (page 11).

- ***Economic Changes***. As the State Capitol and a regional hub, Juneau has the largest and most stable employment base in the region, and enjoys one of the state's lowest unemployment rates. At the same time, Juneau has seen a steady decline in government employment over the past decade, and a shift toward seasonal, non-resident private sector workforce (38% of total employment)[12]. Low oil prices and reduced State tax revenues also are likely to reduce the number of stable government jobs in the Juneau, which in 2011 totaled 41.5% of the workforce, as shown in **Figure 4**. Because of the local multiplier effect, this is likely to affect other job sectors. Smaller job markets, such as leisure and hospitality, natural resources, mining, and seafood processing, may not be as heavily impacted.

Figure 4: Juneau Employment by Sector [13]



2.2.1 Population Projections 2012 to 2042 for the City and Borough of Juneau

Population projections for Juneau over the next several decades indicate stable population levels well into the future, with nearer term population growth generally off-set by later longer term reductions.

Population projections are based on the current population and historical trends in birth, death, and migration levels (see **Figure 5**).

[12] 2015 Juneau Economic Plan, (page 11).
[13] Alaska Department of Labor and Workforce Development, 2011.

Figure 5: CBJ Population Forecast[14]

Year	2012	2017	2022	2027	2032	2037	2042
Population	32,832	33,419	33,839	34,045	34,042	33,879	33,617

2.2.2 Housing

According to the Juneau City Assessor, there were 12,774 housing units in 2012. Approximately half (49%) of these housing units are single-family homes, and nearly one-fifth (18%) are apartments. **Figure 6** provides a breakdown of housing by type.

Figure 6: Housing Profile – Juneau Assessors Data[15]

Housing Unit Type	2012 Total Units	2012 %
Apartments	2,319	18
Multi-Unit Housing	1,500	12
Condos & Townhomes	1,216	10
Cabin or Mobile Home	1,372	11
Single Family Homes	6,367	50
Total	***12,774***	

Source: 2012 City & Borough of Juneau Housing Needs Assessment

In general, new construction activity is influenced by population growth. The modest growth projection for population suggests the residential stock will remain relatively stable. However, while projections show population growth being relatively flat over the next 25 years, there is currently an identified need for additional housing stock in Juneau[16]. Depending on the nature of the additional housing stock, while more energy efficient compared to older buildings, it could result in an overall increase in energy usage per capita. Larger houses will tend to be less energy efficient than smaller homes while detached housing tends to be less energy efficient than multi-family or common-wall dwellings.

2.2.3 Space Heating in Homes

To place the use of energy for space heating into context, a recent study of energy end use in Alaska estimated that 78% of household energy in communities in Climate Zone 6 (which includes Juneau) is used for space heating (**Figure 9**).

Nearly 70% of households use fuel oil for heating, and are supported by private delivery service (see **Figure 7**). A relatively high proportion (~25%) of households use electricity for home heating. This is likely because the low cost of hydro-powered electricity. Around 10% of households use heat source alternatives such as wood or propane.

[14] Alaska Department of Labor and Workforce Development, 2014.
[15] 2012 City & Borough of Juneau Housing Needs Assessment.
[16] Draft Juneau Housing Action Plan, 2016.

Figure 7: Main Home Heating Fuel used by household[17]

Fuel	2014 5 year census		AEL&P Electric Rate (2012)	
	Number of households	% of households	Number of households	% of households
Gas/Propane	*592*	*5*	**9,996**	**72.4**
Fuel Oil	*7,859*	*65.1*		
Coal or Coke	*12*	*0.1*		
Wood	*404*	*3.3*		
Solar energy	*0*	*0*		
Other fuel	*152*	*1.3*		
No fuel used	*72*	*0.6*		
Non-Electric	**9091**	**75.2**		
Electricity	**2,980**	**24.7**	***3,184***	***27.6***
Total	***12,801***		***13,810***	

New residential electrical connections per year by Juneau's electric utility provider are shown in **Figure 8**. The connections are separated by source of space heating and hot water provision each year. In recent years there has been an increase in the number of new connections where electricity is identified as the primary source of space heating[18]. This shift can be explained by:

1. A higher proportion of multi-family units being connected in recent years; typically these units use electric heat rather than a collective fuel oil boiler system[19].
2. Changes in energy price making electricity more competitive with fuel oil as a heat source.

[17] 2014 US Census American Community Survey 5 year estimates and Electric Utility data based on number of connections.

[18] This data is derived from the residential tariff a dwelling signs up to when they are first connected by the utility provider (Rate 11 - electric heat and water, Rate 12 - electric water only, and Rate 13 - no electric heat or water).

[19] Personal Communication with Alec Mesdag, AEL&P 12/04/15.

An important caveat on using this data is that the counts identified by the electric utility may not fully describe the source(s) of heat in a residential housing unit. Home owners and landlords are not required to notify the utility when they make changes to their space heating source or hot water arrangement. Additionally, the three categories of residential customers all have the same electricity rate. Another challenge of understanding residential heating is not knowing the size of dwellings using electric heat versus those using other fuel sources. Furthermore, it is not uncommon for homes to have more than one form of heating (e.g. Monitor/ Toyo/ Wood/ Pellet stove). There is a recent trend in the use of air source heat pumps in Juneau[20] for all, or a portion, of home heating. There is no robust dataset to identify the heating source that is being replaced by these new installations.

Uncertainty in the data hinders projections of potential future electric energy demand if more of Juneau's dwellings use electricity for their space heating and hot water demands. While a precise figure of energy use for space heating is not possible, it is possible, using the 2010 emissions inventory, to reasonably estimate the current amount of energy required to fulfill all of Juneau's space heating needs.

SPOTLIGHT: INVESTING IN ENERGY EFFICIENCY

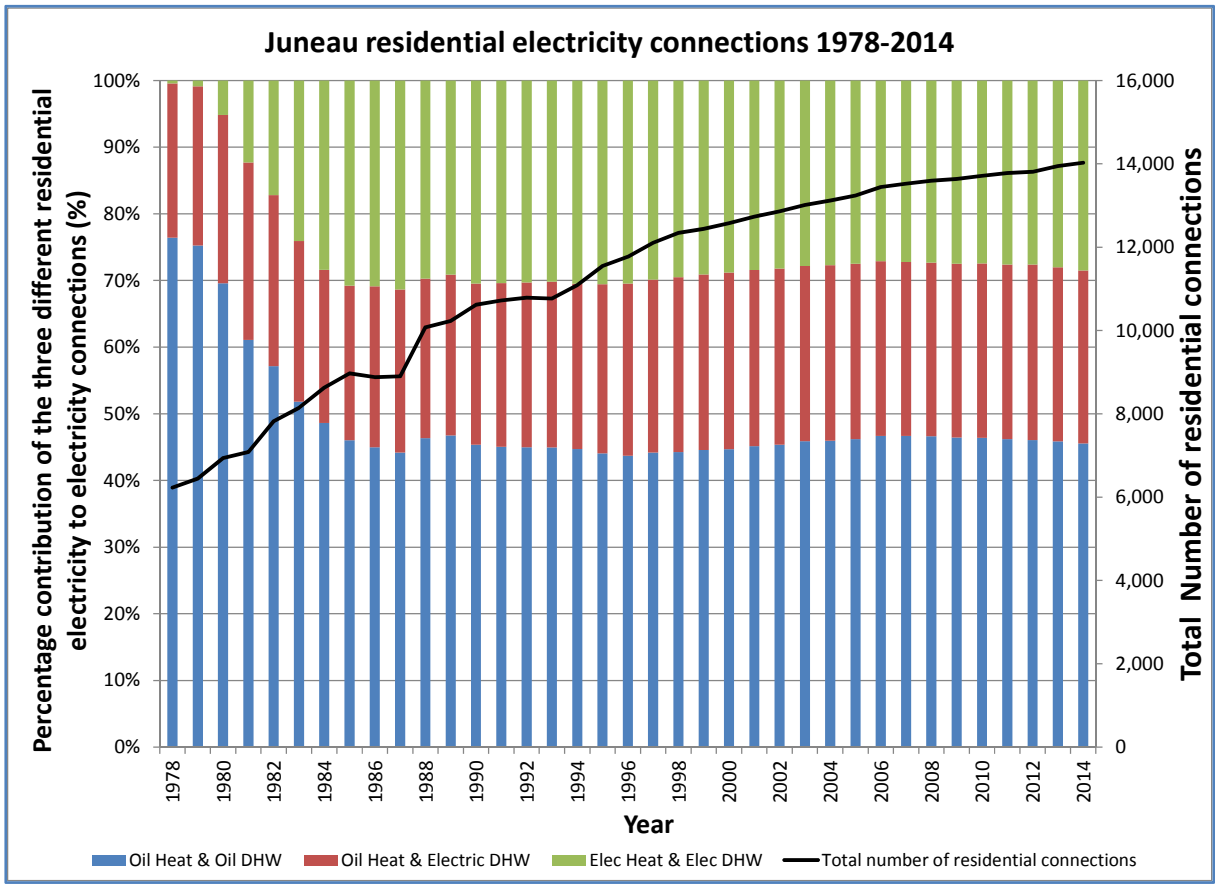
It has been shown that the cheapest method to provide additional energy is to reduce what is currently being used by making existing buildings and new buildings more energy efficient.

The Alaska Housing Finance Corporation (AHFC) provides a number of programs to encourage energy efficiency in homes. Alaska's Home Energy Rebate, Weatherization, Energy Efficiency Loan Rate Reduction, and Second Mortgages for Energy Conservation Programs are Alaska State funded programs that have provided funding or incentives in recent years to help home owners make their dwellings more energy-efficient or purchase homes which are more energy efficient. To date, 4.5% of Juneau's households have participated in efficiency upgrades. Compared with other participants in the state, Juneau's homes were typically older and smaller, reflecting historical settlement patterns; the average age of the participating home was 40 years, and average size 1,792 square feet.[21]

Administered by the AHFC, the Alaska Energy Efficiency Revolving Loan Program provides financing for permanent energy-efficient improvements to buildings owned by Regional Educational Attendance Areas, the University of Alaska, the State and local municipalities. Borrowers obtain an Investment Grade Audit as the basis for making cost-effective energy improvements, selecting from the list of energy efficiency measures identified. All of the improvements must be completed within a year of the loan being provided. The guaranteed savings from energy efficiency improvements are used to repay the loan.

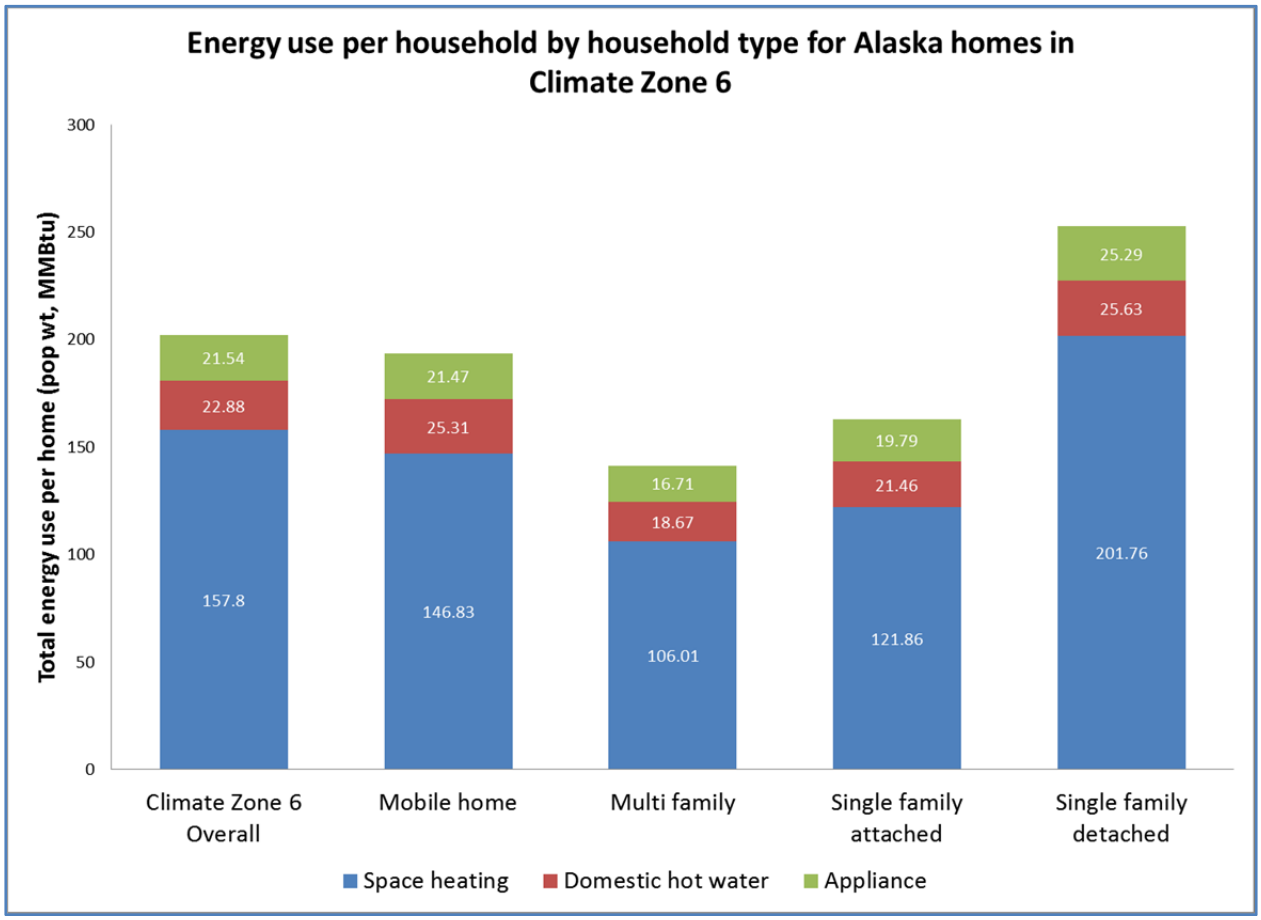
[20] Juneau Empire Article 'Bringing LNG to the CBJ' Nov 1 2015; and Personal Communication with John Howard, Local Installer of Air Source Heat Pump Systems.
[21] 2012 *Snapshot: The Home Energy Rebate Program,* ISER.

Figure 8: Space Heating Fuel Trend[22]



[22] Data from Electric Utility provider as reported to Regulatory Commission of Alaska

Figure 9: Estimate of energy used per household type[23]



[23] Alaska Energy Authority, 'End of use study' 2012

2.2.4 Institutional and Commercial Buildings

As Alaska's Capital City, Juneau supports many State offices and the legislature when in session. The community is an important hub for government and regional services. Downtown Juneau has a compact core and cultural center featuring civic, historic, hospitality, and retail buildings. Commercial building and public facilities also serve the local community.

In 2010, Alaska's Legislature passed House Bill (HB) 306 establishing a statewide energy policy including the goal of "decreasing public building energy consumption through energy-efficient technologies.

That year the State Legislature also passed Senate Bill 220 establishing a $250 million Energy Efficiency Revolving Loan Fund to help fund these retrofits. In 2011, Alaska Housing Finance Corporation used American Recovery and Reinvestment funds to conduct energy audits on 327 public facilities throughout Alaska.

Eighteen Juneau public facilities have had full audits[25]. Based on a 25 year lifecycle, potential monetary savings were identified that could be made by implementation of the energy efficiency measures highlighted

SPOTLIGHT: CRUISE SHIPS

The cruise ships that visit Juneau primarily use diesel-electric propulsion systems. This uses an onboard diesel generator to produce electricity which is then used by electric motors for propulsion and for on-board electricity. Requirements to meet local air quality emissions standards have been the greatest driver in designing cruise ships that accept shore side power instead of burning onboard fossil fuel to provide their own power. In 2001, though an initiative led by Princess Cruises, shore power infrastructure was installed at the Franklin Dock, making Juneau the first port worldwide to provide shore side generated electricity to cruise ships. Since this time, the industry has worked hard to develop Exhaust Gas Cleaning Systems and use of alternative fuels to reduce air quality pollutants.

In 2015, the city had 443 large cruise ships visit its docks. However, only some of these ships are able to receive shore side electric power (estimated to be 43% of all visiting large cruise ships[24]). The three other large cruise ships docks in Juneau do not currently provide shore side power. The CBJ cruise ship berths currently under construction will not provide shore side electricity, but their design provides for addition of shore side power infrastructure at a later date. The provision of shore side electricity has a number of benefits to both cruise ships and local users but there are additional costs associated with installing necessary infrastructure improvements. A study for CBJ has estimated that it would cost $35M to provide facilities which all ships could use. The variety of system voltages and location available for connections on the ships adds complexity to the design.

The Alaska Cruise Industry aims to continue to reduce its energy consumption and improve its environmental stewardship through technologies utilized 24/7. Given destinations such as California and Washington either require or incentivize dock electrification, it might be premature to abandon the goal of shore power. However, other strategies may deliver greater results than an in-port only solution. There have been proposals and one USCG registration for tourism oriented electric vessels. Dock and Harbor collaborative electrification would be necessary for Juneau developing these operations.

[24] Figure provide by Juneau Hydropower
[25] A White Paper on Energy Use in Alaska's Public Facilities, 2012. Individual audit reports can be found at http://www.akenergyefficiency.org/southeast_audits/

(although fossil fuel energy prices used were higher than present). The overall savings to Investment Ratio (SIR) ranged from 1.9 to 9.6. More detailed audit information may be needed by CBJ to confirm these costs and savings. A number of these buildings, including many schools and the airport, have been upgraded for greater efficiency.

Additionally, the CBJ Land Use Code (49.35.800) requires a LEED standard for all new construction and renovation of CBJ buildings and facilities costing more than $5 million.

2.2.5 Self-generating Users

Some businesses operating inside the borough boundaries are not connected to Juneau's electric system and therefore provide their own electricity with diesel generators. Converting these operators to renewable energy would help to reduce the total emissions associated with Juneau's energy sector. However, to provide these businesses with a renewable source of electricity may require investment in new renewable sources of electricity, new standby sources of electricity if the businesses did not choose to maintain their on-site supply, and/or transmission and distribution infrastructure.

SPOTLIGHT: MINES

Historically, Juneau's first hydroelectric sources were developed for the mining industry that established the city. The HECLA Greens Creek Mine (GCMC) is connected to the Juneau electricity distribution network via overhead and undersea transmission between West Juneau to the mine site on Admiralty Island. The undersea cable and overhead transmission on Admiralty Island are owned and operated by Kwaan Electric Transmission Intertie Cooperative (KWETICO), which receives a wheeling charge for the energy traveling through their transmission infrastructure to the mine. This extension is intended to one day connect to Hoonah. $13M of the funding of this project was provided by the Denali Commission. The connection to the Greens Creek mine was funded by a combination of federal funding provided to KWETICO and investments by AEL&P and GCMC. The Hecla mine used 72,559,050 KWh in 2015.

The cost of electricity production for a mining operation can be a deciding factor in whether the operation will be financially viable or not.

Any company operating within AEL&P's service territory not currently connected to Juneau's electric system may elect to become a firm customer of AEL&P, subject to the line-extension policy within AEL&P's tariff. A recent example of this is the Eaglecrest Ski Area, which relied on generation from a small hydropower generator fed from Cropley Lake and, primarily, on-site diesel generators until choosing to connect to Juneau's electric system in 2008. The cost of the extension of facilities – including engineering, permitting, surveying, environmental study, infrastructure upgrades – was around $1.55 million, which was borne by the ski area. This replaced much of the diesel generation at Eaglecrest, decreasing the annual cost of electricity and reducing emissions associated with its operation. The Black Bear chairlift at the ski area remains powered by a diesel generator – it is estimated it would require $500,000 of additional infrastructure to connect it to Juneau's grid.

Another example is the Coeur Alaska Kensington Mine (KM), located outside AEL&P's service territory on the northern side of Berners Bay. KM is not connected to the Juneau electric grid and supplies its own electricity with diesel generators. A locally-formed transmission corporation recently proposed constructing a transmission line from AEL&P's Lena substation to KM to link the mine with Juneau's electric system. This effort is coordinated with Juneau Hydropower's plan to construct a hydroelectric generation plant at Sweetheart Lake, which intends to connect to the Snettisham transmission line at the southern end of Juneau's electric system. Once these facilities are constructed, the energy must "wheel" through the existing Snettisham and AEL&P transmission systems, which requires an interconnection agreement between the parties. This example differs from the Eaglecrest example because KM does not intend to become a firm customer of AEL&P, which would require KM to pay for all necessary infrastructure upgrades upfront. Instead, KM would purchase power through a power sales agreement with Juneau Hydropower, and Juneau Hydropower and other entities will own the bulk of new equipment required to enable this offset of diesel generation at the mine.

SPOTLIGHT: ELECTRIC VEHICLES

Juneau has a growing number of electric vehicles (EVs). In 2017, an estimated 200 EVs could be found on Juneau's roads.[26] The growth in EVs was aided by a grant awarded to the CBJ and Juneau Community Foundation to enable the installation of public charging infrastructure. Funds from that grant enabled the installation of 14 charge ports at 11 locations, with the initial objective to allow a battery-only EV to make a round trip from any starting point on Juneau's limited road system.

In 2017, AEL&P converted its experimental EV rate schedule into a permanent EV rate schedule and added an option to rent a charging station for a monthly fee. Providing for an off-peak incentive rate encourages EV owners to charge their vehicles when electricity consumption is low, allowing for more efficient use of existing electric infrastructure, and the equipment rental option makes it easier for some customers to participate in the off-peak rate.

2.2.6 Transportation system

Local Ground Transportation

Juneau's downtown is compact and relatively walkable for the residents living there, and for the hundreds of thousands of tourists who arrive each summer by cruise ship. Beyond this core area development is more suburban in nature, and is primarily served by automobile, bus (including public school and transit services), and to some degree bicycle. Settlement extends from

[26] Juneau Economic Development Council, Renewable Energy Cluster Working Group; data provided by AK Department of Motor Vehicles. Vehicle registration data does not require a propulsion type to be indicated and so the number of vehicles is estimated from vehicle models. This approach will become less accurate in the future as plugin electric drivetrains are offered on more 'standard' vehicle models.

downtown Juneau north along the community's 40 mile long Veteran's Highway, and also across Gastineau Channel on Douglas Island including the 11 mile long North Douglas Highway. A breakdown of population by neighborhood is presented in **Figure 10**.

Figure 10: Juneau Population Distribution by Neighborhood[27]

Neighborhood	2014 Estimated population	Percentage of total estimated population (%)
Auke Bay/Lynn Canal	5,339	16.2
Mendenhall Valley	12,972	39.3
Lemon Creek/Salmon Creek	5,287	16.0
Downtown Juneau	3,658	11.1
Douglas Island	5,770	17.5
Total	***33,026***	

The amount of fuel used in ground transportation is affected by fuel efficiency and by miles driven. Recent years have seen a modest increase in overall US fleet average[28] and model year fuel efficiency.[29] Nationally, there is expected to be some continued improvement in vehicle fuel efficiency into to the future.[30] More efficient, conventionally fueled vehicles, as well as advanced hybrid and all electric propulsion systems, are all creating improvements in average fleet emissions in the lower 48, particularly on the West Coast. Average vehicle mileage also strongly influences overall fuel use in the transportation sector. This in turn is influenced by the general economy in particular fuel prices. How national trends translate into the future Juneau fleet is unknown since the make-up of the general Juneau vehicle fleet may be very different from the rest of the US in terms of vehicle type (e.g. a greater percentage of trucks and 4WD vehicles), mileage, and age. Currently there is little known about the composition of Juneau's vehicle fleet.

Other Transportation.

Juneau can only be accessed by air and water. Long travel distances and supply lines add significantly to the energy footprint of the community. It is challenging to quantify Juneau's energy use and GHG emissions for air and water transportation because of the community's role as a transportation hub. For example, the 2010 energy use baseline in the Juneau Climate Action & Implementation Plan included all marine fuel sales based using quantifiable data from receipts. The data therefore only includes:

- Fishing boats that use Juneau as a home port, but that are likely to leave CBJ boundaries to access fisheries;

[27] ADOLWD, Trends Bulletin Feb 2015
[28] http://www.rita.dot.gov/bts/sites/rita.dot.gov.bts/files/publications/national_transportation_statistics/html/table_04_09.html
[29] http://www.rita.dot.gov/bts/sites/rita.dot.gov.bts/files/publications/national_transportation_statistics/html/table_04_09.html
[30] https://www.eia.gov/todayinenergy/detail.cfm?id=16871

- Refueling vessels that are traveling up the coast, and only stopping temporarily in Juneau, including freight, recreational boaters, and large tourism cruise boats (although this is seldom necessary for the larger cruise ships); and
- Vessels that use Juneau as a main port for passenger and freight service, with regional service lines, such as the Alaska Marine Highway system.

Similarly, the Juneau International Airport is a regional and state hub for air travel. Only refueling events that occur in Juneau are captured by the 2010 emissions inventory. A total of 321,573 air passengers boarded or arrived in Juneau in 2013.[31] Ground operations at the airport are examined in the 2010 emissions inventory including energy used by the airport terminal. The municipality-owned airport facility has installed an innovative ground source heat pump system and LED runway and terminal lighting upgrades. Facility energy uses are considered within all City-owned buildings.

2.3 ENERGY PROFILE

To understand the future energy needs of Juneau it is important to understand the current supply and demand profile.

2.3.1 Electricity

Hydroelectricity currently provides relatively low-cost electricity that meets around 25% of Juneau's energy needs but nearly 100% of electricity needs. Juneau benefits from some of Alaska's lowest electrical costs with a 2014 residential price of about 11 cents per kilowatt-hour. The community relies on five plants operated by Alaska Electric Light & Power (AEL&P), Juneau's privately owned utility (see **Figure 11**).

Figure 11: Hydroelectricity Generating Resources[32]

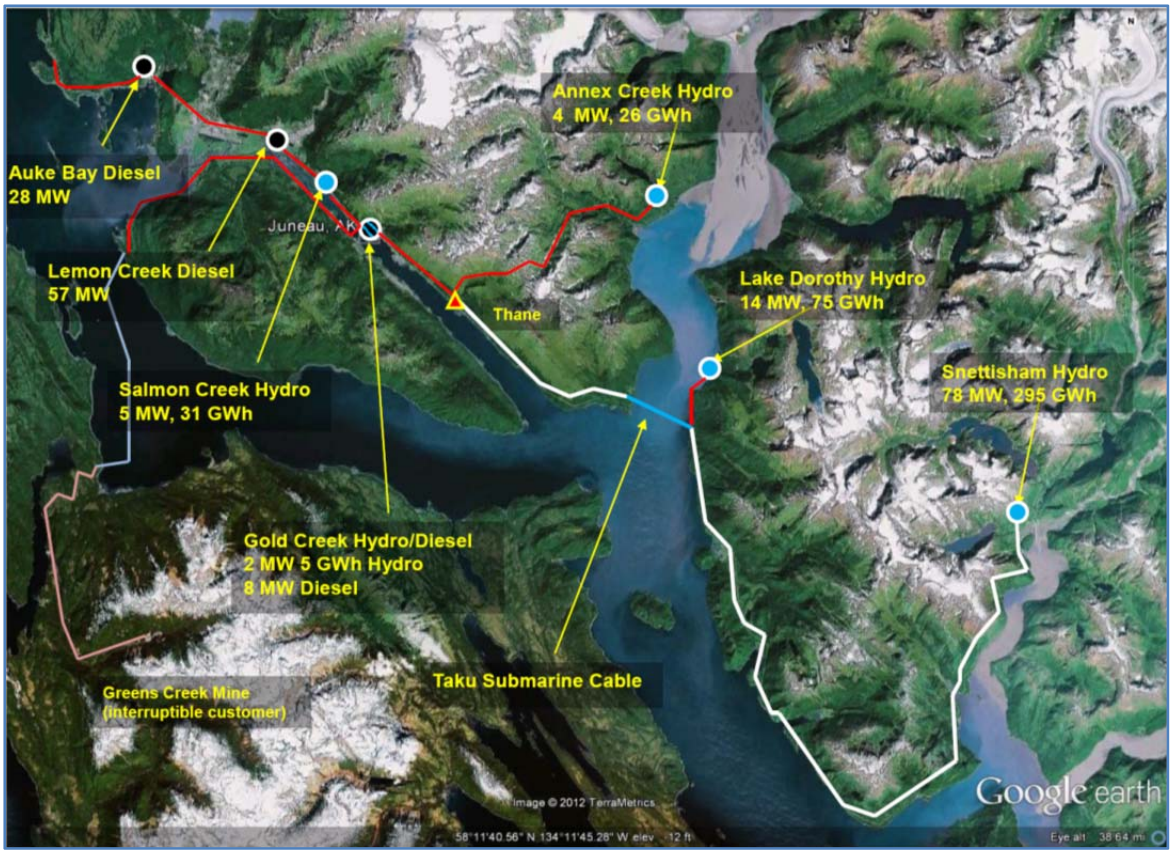
Hydro Plant	% Power	Annual Average	Capacity	Distance from CBJ	Type	Built
Snettisham	70%	295 GWh	78.2 Mw	28 miles south	Lake-fed	1973/ 1990
Lake Dorothy	17%	75 GWh	14.3 Mw	15 miles south	Stair-step lake fed	2009
Salmon Creek	7%	31 GWh	5 Mw	3 miles northwest	Dam	1914
Annex Creek	5%	24 GWh	3.2 Mw	11 miles east	Lake-fed	1916

[31] Air Carrier Activity Information System
[32] Figures provided by AEL&P.

Gold Creek	1%	5 GWh	1.6 Mw	Downtown	Run-of-the-river (May–Sept.)	1914

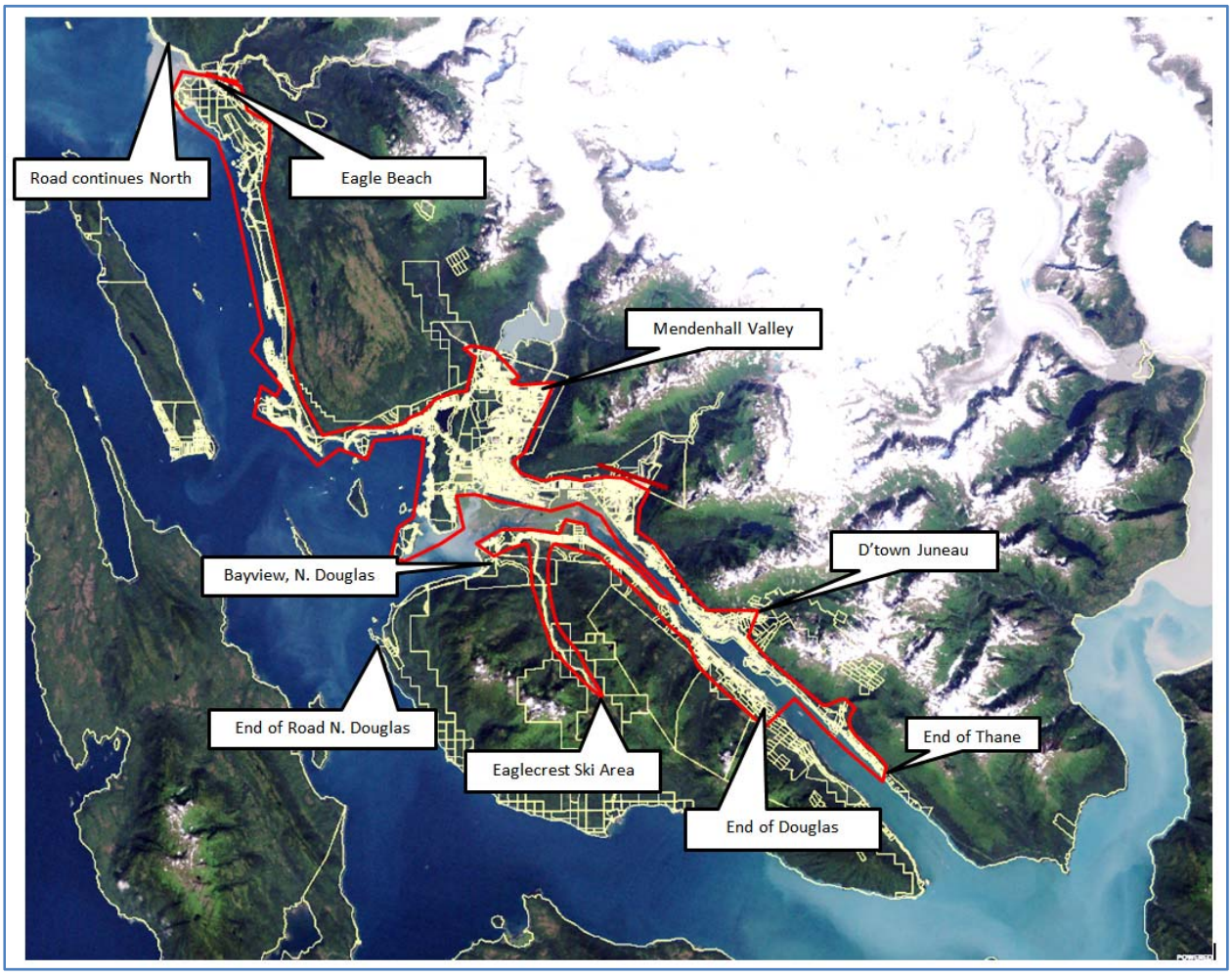
The current transmission line network and approximate extent of electrical service provision is highlighted in the maps below (**see Figure 12 and Figure 13**).

Figure 12: Electricity Distribution Extent[33]



[33] RCA U-14-120 May 15, 2015.

Figure 13: Local Electric Utility Service Area Boundary[34]



Additionally, there are recent efforts to extend the Juneau electrical grid to connect the Coeur Alaska Kensington Mine. The Lynn Canal Transmission Corporation,[35] a local non-profit corporation has previously filed a certificate of convenience and necessity with the Regulatory Commission of Alaska for a high voltage transmission license to develop and operate the system.[36] This application was dismissed as incomplete. The non-profit corporation is free to resubmit another application in the future. Additionally the CBJ supports (Resolution 2632 December 5, 2012) an electrical extension to extend power along the Veterans Memorial Highway which would extend power toward the Coeur Alaska Kensington mine.

[34] Based on information provided by AEL&P.
[35] Members are Alaska Power and Telephone, Juneau Hydropower, American Transmission Company, and Coeur Alaska Kensington Mine.
[36] Regulatory Commission of Alaska, Docket R-15-109.

Transmission of electricity from remote locations has some risk involved. In 2008 and 2009 the main transmission line from the Snettisham Dam was brought down by avalanches leaving Juneau heavily reliant on back-up diesel generation. While the local utility has since implemented significant mitigation efforts, strategic vulnerabilities remain, particularly in certain sections on the main Snettisham transmission line that brings power to Juneau.

Regional interties have been proposed, both to deliver hydro-electric power to towns in South East Alaska and to export hydropower from the region. Connection with the Yukon Territory, Canada has also been promoted to aid energy security for Juneau in the event that transmission lines from resources south of Juneau fail. It has been argued that interties could also provide a larger demand base for new hydroelectricity projects thus making then instantly more economical. The concept of interties has been supported at the CBJ[37] and the State level.

Interties with other Southeast Alaska communities and the Yukon have been examined in a number of past studies with the most recent study being the Draft Southeast Integrated Resources Plan.[38] The study determined that the economics of constructing such an intertie were not favorable based on the information available. It argued that money would be better spent on other, more localized energy infrastructure improvements including the displacement of heating oil with biomass for space heating. Locally, the intertie would deliver little benefit to the local electric utility unless it provided access to a significant number of additional customers. The 2003 intertie study for Southeast Conference[39] (an umbrella organization for Southeast Alaska communities) was more positive, arguing it would provide a useful economic benefit to the entire Southeast region by providing cheap energy. However, the report also acknowledged that for the concept to be cost-effective the construction costs would have to be borne by grants which did not need to be paid back. Additionally, the CBJ is on record of supporting the Southeast Alaska Intertie in CBJ Resolution 1881dated August 18, 1997.

Juneau Hydro Supply and Demand

Existing electricity supply

All of Juneau's hydroelectricity is owned and/or operated by the local electricity utility (AEL&P). The Salmon Creek and Annex Creek hydroelectric plants were built in 1914-16 to provide electricity to gold mining operations in Juneau, and as these industries closed down, the electricity generated was available to the city. The Snettisham electric facility was constructed in two phases by the Federal Government - 1973 (Long Lake) and 1990 (Crater Lake). It was sold to the State of Alaska in 1998, with AEL&P responsible for maintenance and operation of the plant. AEL&P is also responsible for repayment of the bonds issued for its purchase. The bonds

[37] CBJ Resolution 1882, A resolution supporting a twenty year power grid plan for Southeast Alaska. August 18, 1997 and CBJ Resolution 2203, A resolution supporting the Southeast Alaska intertie project, April 14, 2003.

[38] Alaska Energy Authority, Draft Southeast Alaska Integrated Resource Plan, July 2012. *That this relatively comprehensive study remains a draft illustrates that not all parties interests and beliefs can be supported in energy studies that can only rely on the best available data and energy market forecasts to support the conclusions.*

[39] Southeast Alaska Intertie Study – Phase 2 Final Report; December 2003.

are due to be paid off by 2034. It is unclear how repayment of the bonds will affect future electricity rates. The Snettisham assets are currently tax exempt from property taxes as long as the assets are held by the State of Alaska.

Gold Creek is a run-of-the-river facility, meaning its power output depends on the flow of the creek. Power production drops off almost completely in winter when the creek freezes though a warming climate may reduce these occurrences. Its contribution is not counted when the utility measures annual energy capacity. The current plant was built in 1914 and upgraded in the early 1950s.

Lake Dorothy Phase I is the latest hydroelectric project to be constructed and began providing power in 2009.

In general, the capacity from existing hydroelectric supply is largely governed by the ability to store sufficient water in the reservoirs throughout a year. Supply of water to the dam reservoirs is lowest during the winter months when much of the precipitation is held in the snow pack on the surrounding mountains.

Instantaneous hydroelectric supply from dams is 103MW and diesel generators can provide an additional 70MW. However, this maximum output cannot be supplied at all times or water would be drained from the dam at a greater rate than it would be replenished. When maximum is not required from the hydroelectric dams, water can be accumulated to reach full storage capacity again (mostly in summer months) and 'spilled' from the dam without generating electricity when storage capacity is exceeded.

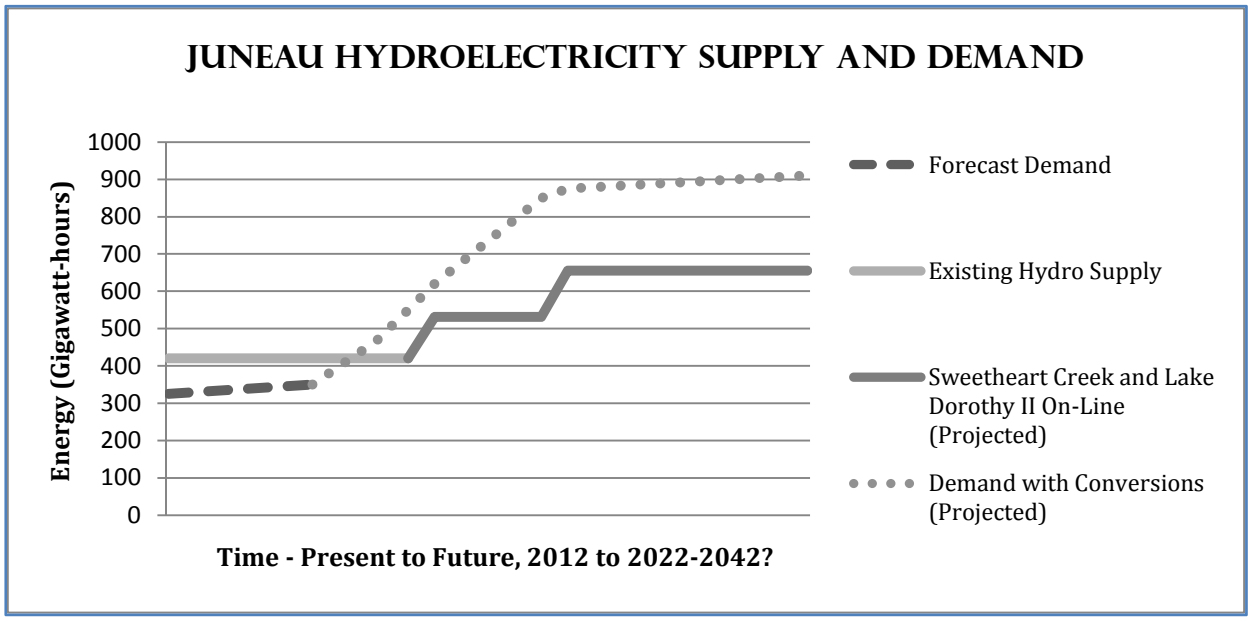
Annual demand and peak load demand

Demand on the electricity system can be considered in terms of **annual total** energy requirement in GWh, or by **instantaneous** energy requirement for electricity in terms of load on the system (MW). The **peak load** is the highest instantaneous demand seen in the year.

An illustration of Juneau's annual hydro capacity compared to projected demand is presented in **Figure 14** – the timescale for this illustration would change depending on demand. Juneau's 2014 annual electrical energy consumption (including interruptible sales) was 399 GWh[40] and the current average annual hydro electric supply capacity is approximately 425 GWh.[41] Juneau's **peak load** is estimated to be 75MW (including interruptible customers) in any given year.

[40] AEL&P 2014 Sales and Distribution Report. RCA TA 433-1, February 12, 2015
[41] Gold Creek production is excluded as it is not available year round when creek freezes in the winter.

Figure 14: Juneau Electricity Supply and Demand illustration[42]



Future growth in demand from industrial activity, a trend of increasing use in the residential sector due to fuel switching, switching to electric vehicles, and of moving existing non-firm customers to become firm customers suggests that additional electricity capacity will need to be added over the study period unless significant energy consumption reductions can be made.

The current electricity supply model has some customers who can be interrupted should there be a shortage of energy (eg: low water in reservoirs) or capacity (eg: loads are high). These customers are referred to as 'non-firm' or 'interruptible' customers. The largest non-firm customers are the Greens Creek Mine and Princess Cruises at the Franklin Cruise Ship Dock.[43]

The future demand for electricity is difficult to predict because it is sensitive to weather, fossil fuel prices, and is affected by economic and technological changes. The addition or subtraction of an industrial load, such as a local mine opening or closing, development of an electric based district heating, new construction, or shore power for cruise ships could have *large* impacts on demand, as could growth in numbers of electric vehicles and shifts in thermal loads. Short-term shifts can be considerable. Energy efficiency measures reduced electricity demand by about 8% after the 2008 and 2009 avalanches, while in 2017 electricity use increased by 5% over 2016 due to weather[44].

[42] Source: *2013 Juneau Comprehensive Plan.*
[43] Combined, the 'non-firm' Greens Creek mine and Franklin Dock cruise ship power use is estimated to reduce Juneau rate payers bills by 20% - AEL&P communication March 10, 2016.
[44] 2016 was the warmest year since at least 1960, according to AELP records, and 2016 was the third consecutive year of declining firm sales. HDD in 2017 were at or near the 30-year average for Juneau and

AEL&P does not include speculative loads in its forecasting because, as previously discussed, large industrial loads seeking to connect to AEL&P's system would be subject to the line extension policy in the tariff, which requires the entity seeking to connect to pay for the infrastructure necessary to connect them. Because AEL&P's investment in the system becomes incorporated into rates, making speculative investments in infrastructure that ultimately may not be required to meet the needs of firm customers would create an undue rate burden to electric customers in Juneau.

While AEL&P is the only entity authorized to make retail sales of electricity within its service territory, there are two other types of entities that may play a role in the production of electricity. Independent Power Producers (IPPs) are entities that operate electricity generation facilities to sell electricity to one or more customers, often to utilities or large industrial customers, through a power-sales agreement, or to a wholesale market. Net-metering customers are utility customers who generate on-site and may occasionally have excess generation that flows back into the utility grid. IPPs and net-metering customers operate under different sets of federal and state laws and regulations. [45] [46]

SPOTLIGHT: REDUCING ELECTRICITY USE - LIGHTING

The U.S. Energy Information Administration (EIA) estimates that approximately 5% of household energy is dedicated to lighting. According to the EIA[45] the cost of LED lights will be about equal to the cost of incandescent and fluorescent bulbs by 2020, but will use only 1/10th or 1/5th the electricity respectively. They will also last for ~25 years. It is forecasted that 50% of lumen –hour sales will be fulfilled with LED lights by 2020. This will result in a 15% reduction in energy use for lighting by 2020 and 40% by 2030. The largest relative reductions are expected to come from the commercial and residential sectors.

The switch to LED runway lights at the Juneau International Airport caused a noticeable reduction in community electricity load when the lights were switched on and off.

CBJ is undertaking a systematic replacement of street lighting throughout the Borough. Some CBJ street lights are on a metered system while others are charged by the local Electricity utility based on estimated electricity usage per light fixture per year (non-metered). Of ~1350 CBJ street lights, 108 have been converted to LED. Figures have not yet been collected to determine energy savings but at least a 50% reduction is expected. Switching to LED street lights also appears to have reduced maintenance costs.[46]

In 2016, the Downtown Marine Parking Garage upgraded the entire lighting system to a 'smart' LED system that provides significantly improved levels of illumination, enhancing security, and reducing energy used by the facility by 90% (131,365KWH to 12,816KWH). Annual maintenance costs will also be reduced. The 'smart' element of the design uses sensors and timers to dim lighting during daylight hours and when no motion is detected during darkness hours.

significantly higher than 2016. The increase in firm sales in 2017 relative to 2016 is associated with the colder temperatures. AEL&P TA 464-1 November 2017 Distribution Report Sales Report

[45] U.S. Energy Information Administration, Annual Energy Outlook 2014 Early Release.

[46] Personal Communication, Ed Foster, CBJ Streets Superintendent Jan 27 2016.

Rather than own shared transmission assets, IPPs typically build only the lines required to connect to a larger grid and, from there, utilize existing transmission networks by working with the affected owner(s) of the transmission pathway from its generation plant to a utility, other customer(s), or wholesale market. Federal and state laws and regulations govern the conditions under which the owners of transmission assets provide access to their lines, as well as the conditions under which a utility makes purchases from an IPP. In general, an IPP may request and receive access to transmission lines and sell power to its customer by ensuring safe and reliable interconnection with the larger electric grid, and by fairly compensating the affected owner(s) for use of the grid. If the IPP's customer is an electric utility, the utility may be required to provide the IPP with compensation equal to its avoided cost, which can be described as the amount of money the utility would save if the IPP's energy were delivered for free.

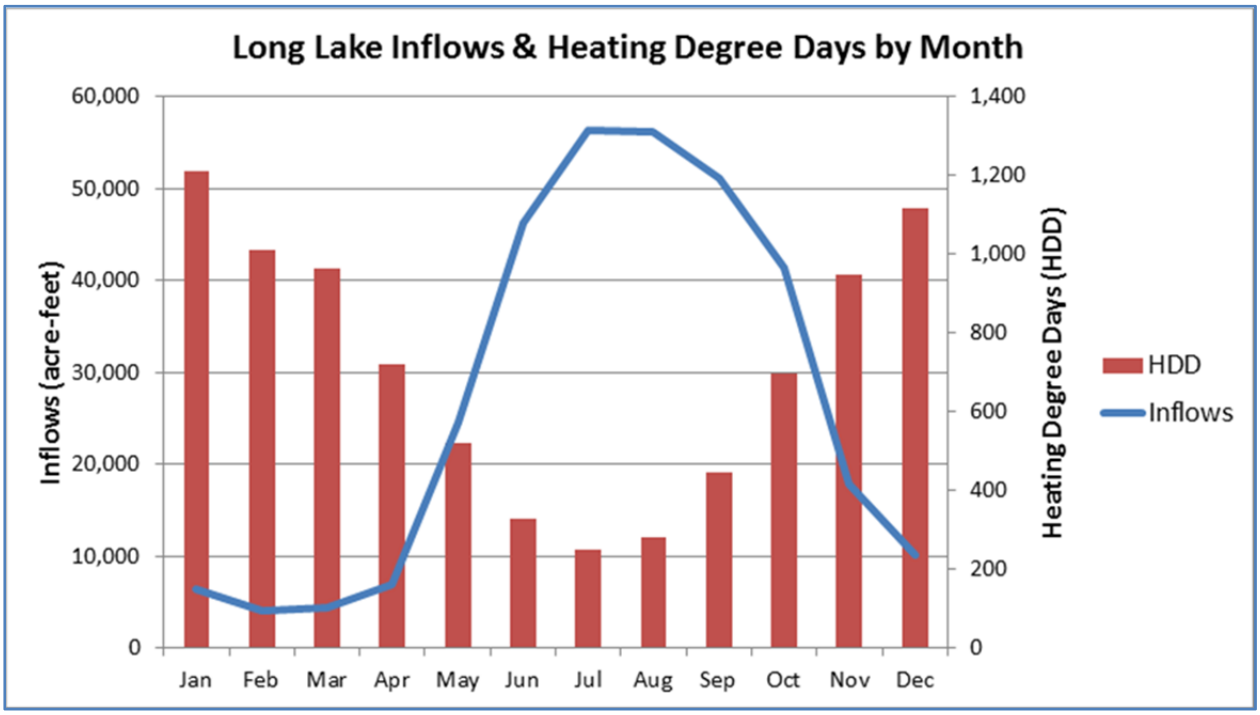
Net-metering customers rely on a separate set of enabling laws and regulations than IPPs. Net-metering customers operate a small generator on their property and connect through their existing electric service. The on-site generators reduce the total amount of energy required from the serving utility and, if generation output exceeds on-site loads at any moment, some energy is exported to the grid. In many cases, the customer exporting energy receives one-for-one credit for each kilowatt-hour sent back into the utility grid, but net-metering rules vary by state. In Alaska, utilities below a certain size and utilities generating with renewable energy are exempt from net-metering rules. Alaska's largest utilities in the Railbelt, who generate much of their electricity with natural gas or coal, must provide compensation to customers who send excess renewable electricity onto the electric grid. AEL&P operates under an exemption from state net-metering rules because its generation is nearly 100% renewable.

The annual balance of supply and demand

Electricity demand for light and space heating is highest during the winter due to darker days and colder temperatures. Supply of water at the reservoirs is lowest in the spring, when lake levels have fallen because of increased winter time loads and much of the precipitation remains held in the snow pack on the surrounding mountains. As the snow pack melts and runs into the resorvoir during the summer months, the available supply can exceed the relativly low demand. With the existing capacity, the electricity utility has to balance between selling electricity to non-firm customers with ensuring water levels are high enough to maintain reserves for the winter months. **Figure 15** illustrates mismatch of the total monthly inflows to a specific reservoir and the heating demand in Juneau.

A certain amount of generation capacity is reasonably guaranteed based on historic rainfall patterns and a relatively certain load demand. The supply of electricity to non-firm customers allows the local utility to make the most of circumstances in which they have excess water.

Figure 15: Illustration of mismatch of Long Lake inflows vs HDD (used to represent demand)[47]



Providing additional supply capacity while maintaining low electric rates - striking the balance

As summarized in the 2011 JCAIP the community challenge is to: "Use its clean energy wisely in order to stretch existing hydroelectric capacity as far as possible, limiting the need to use back-up diesel generators."

Using the existing capacity more efficiently will delay the need for additional infrastructure and the associated costs to private industry or the community.

Timing the construction of new hydroelectric projects - Often, during discussions regarding Juneau's community greenhouse gas emissions, or at times of high oil prices, use of hydroelectricity is touted as the solution. At present there is not enough surplus electricity to handle a complete community level switch from fossil fuels to electricity. In addition to finding suitable locations for additional hydroelectric resources there are also private industry or community cost implications if additional hydroelectric capacity is built too large or too early. It may be more financially viable to use diesel generation if demand exceeds hydroelectric capacity for short periods only (e.g. during daily peak periods). While diesel is expensive to operate due to high fuel costs running it for short periods may be cheaper than a new hydroelectric source used for only short periods.

[47] Provided by AEL&P

Hydroelectricity projects commonly require a development period of five to ten years, so early recognition of deficiencies of energy supply for firm customers is necessary. Some plans for additional hydroelectric capacity in Juneau are being explored and are in various stages of design and permitting. Juneau Hydropower received a FERC license in 2016 to construct a storage project at Sweetheart Lake, which would produce 116 GWh per year[48], and Juneau Hydropower is actively pursuing development of that project. AEL&P's Lake Dorothy Project could, with an amendment to its FERC license, add a second phase that would increase its annual output from about 80 GHh per year to 169 GWh per year. AEL&P has also explored a smaller "run-of-river" project at Sheep Creek, which would not require a FERC license, but AEL&P has no immediate plans to construct any new hydro generation facilities.

The cost of new hydroelectricity projects - When new hydroelectric projects are constructed they often have large surpluses of energy as they are 'oversized' to account for future growth in energy demand and because topography surrounding lakes or dams lend themselves to being a particular size. The construction cost of the facility is fixed once completed and operation and maintenance can be well predicted. Therefore the total cost of the facility can be estimated as a fixed amount over a specified lifetime. The local electric utility is allowed to set its rates to pay for operation and maintenance costs and any costs related to new infrastructure and facilities – this rate is agreed with the Regulatory Commission of Alaska (RCA). Over the medium term, regardless of how much electricity is sold, the utility will be able to recover its costs. With this in mind, the total cost for construction of the new facility is recouped by selling electricity – the more electricity is sold the lower the cost per KWh for the consumer. However, the facility is actually selling electricity generated by water so in effect it is selling captured water. Any water that is captured but NOT used to generate electricity is potential revenue lost. It is in the consumer's interest for all captured water to be used. Often, large new loads are sought out to use as much of the surplus and share in the cost of the new facility. The ideal demand is constant throughout the year, opposes the timing of the peak load (i.e. used at night time) and is guaranteed to exist for a long time. The charging of a mature electric vehicle market is a good example of this.

To match increases in demand, in addition to building new facilities, new capacity in the transmission and distribution network may be required. There are already some existing bottlenecks in Juneau's distribution system which, in some situations, may limit distribution capacity at various locations in Juneau[49]. If Juneau were to see large growth in peak loads, upgrades to the distribution system would be required. The costs of these upgrades would likely be passed on to the customer.

[48] Sweetheart Lake Hydroelectric Project, Environmental Impact Statement P-13563, October 29, 2015. Federal Energy Regulatory Commission.

[49] Personal communication, Alec Mesdag, AEL&P, January 14, 2016.

The role of private energy suppliers - As noted above, Juneau Hydropower is developing a hydroelectric project at Sweetheart Lake, 35 miles south of Juneau. Juneau Hydropower and AEL&P are currently studying the technical requirements for connecting the Sweetheart Lake facility with Juneau's electric system and wheeling energy through the Snettisham and AEL&P transmission system.

Diesel Electricity Generation

In years with low rainfall, AEL&P disconnects interruptible (non-firm) customers, and if loads continue to outpace inflows, hydropower is supplemented with diesel generation. Other emergency situations, such as another avalanche, may require supplemental diesel generation. Use of diesel is more costly than existing hydroelectricity. The local electric utility has a mechanism that the RCA has approved, where the rate charged can incorporate any instances where diesel power is used. The availability of this back-up power generation solution is crucial to Juneau. In 2008 after avalanches interrupted hydropower and forced the use of diesel generation, electricity costs per KWh increased fivefold. The sudden price hike and impressive education and outreach effort reduced the community's daily electrical use by 25% from the same time in 2007[50].

Since this event, the Juneau community has expanded its dialogue around energy vulnerability. AEL&P has added new capacity (Lake Dorothy I hydroelectric facility), as well as developed a rigorous avalanche mitigation program, which includes active avalanche control, diversion structures, tower relocation, and other measures.

Until electricity capacity is significantly increased using diesel generators may be the most cost-effective method to provide the required electricity. There is point when it becomes more economical to build additional hydropower capacity than using diesel generated electricity.

2.3.2 Oil Heating Fuel

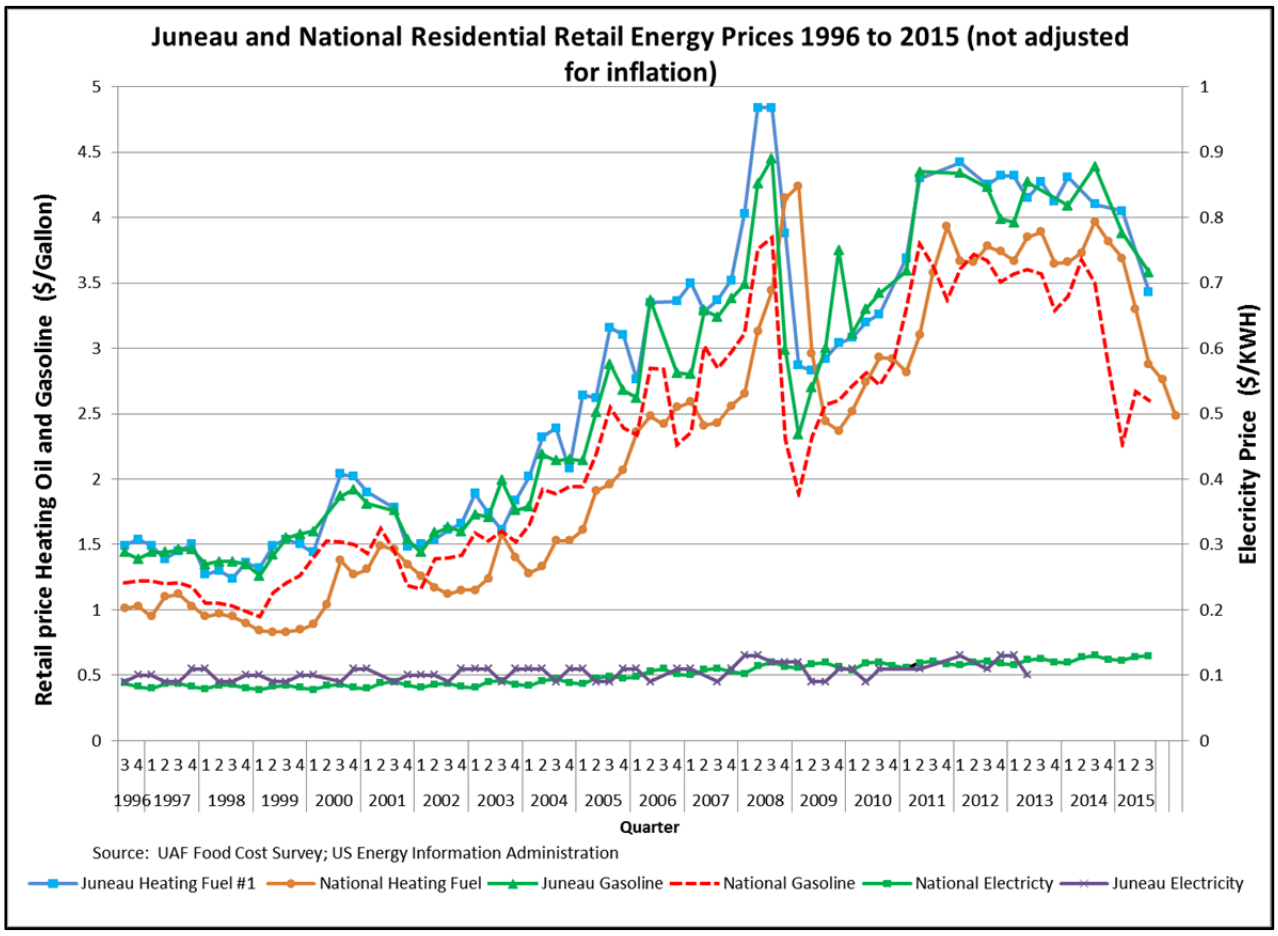
Approximately 80% of Juneau's energy is derived from petroleum products[51] which are shipped in by barge. This is mainly used to supply heat and transportation for Juneau's 33,026 residents.[52]

It is estimated that the average Juneau home that is heated by fuel oil uses 780 gallons of heating fuel per year.[53] Based on a January 2016 local heating fuel oil price of $3.00 per gallon,

[50] Leighty and Meier 'Short-term electricity conservation in Juneau, Alaska: A study of household activities' Paper presented at 2010 ACEEE Summer Study on Energy Efficiency in Buildings. Data provided to author by AEL&P.
[51] http://www.juneau.org/sustainability/
[52] 2013 Juneau Comprehensive Plan.
[53] Assuming that the heating system is 78% efficient, a typical home uses 86 million/Btu per year. The amount of heating energy required by a home will depend on variables such as insulation, the size of the building, specific climate and many others. Juneau uses 9.5 million gallons of home heating fuel per Steve Colt, ISER, University of Anchorage that he based on census housing and other studies. This number was

this means the average Juneau home is spending $2,340 per year on heating. As with many petroleum fuels the price of heating oil has been subject to significant variation over recent years. **Figure 16** shows the variability in heating oil, gasoline and electricity prices both locally and nationally since 1996. This chart highlights Juneau's vulnerability to external influences on its energy supply.

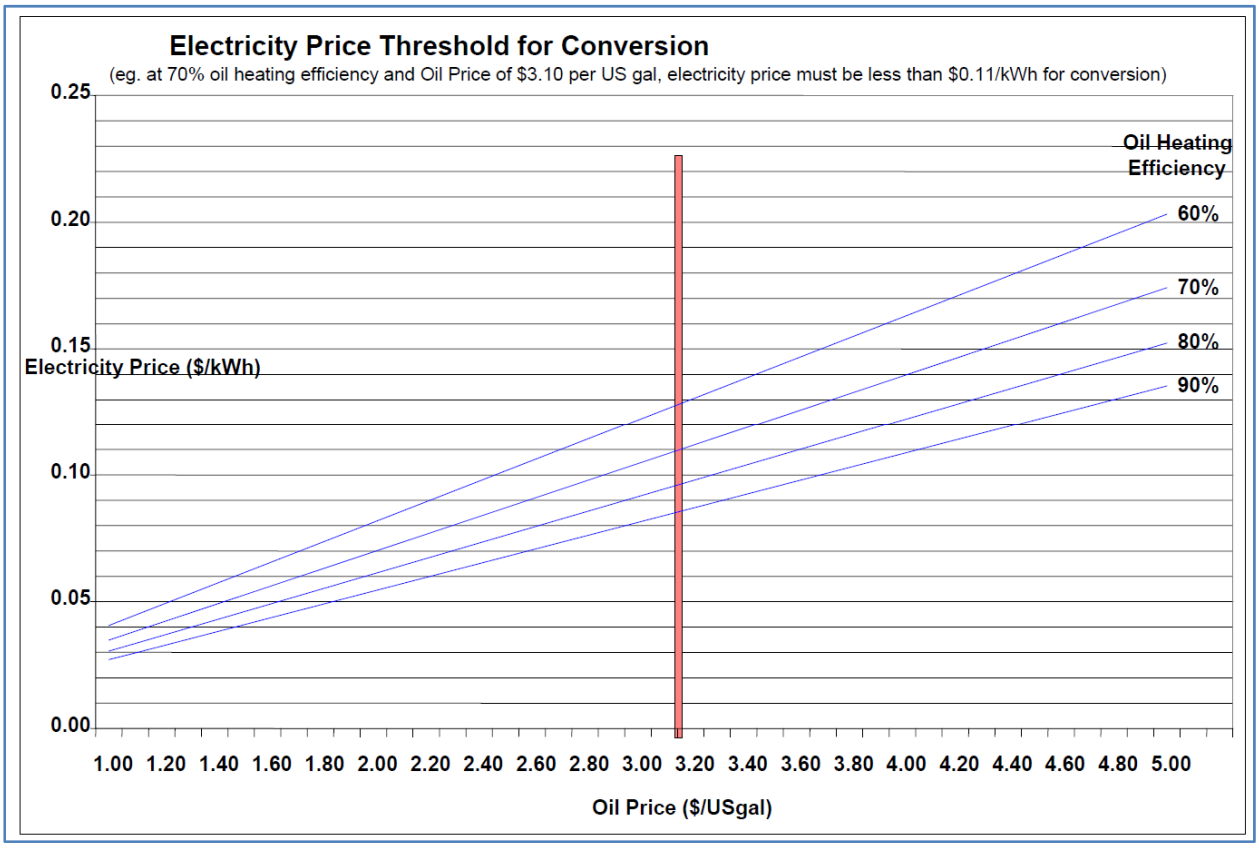
Figure 16: Trends in Fuel Pricing[54]



divided by 2010 US Census that Juneau had 12,187 households to determine that the average CBJ household heated by fuel oil consumes an average of 780 gallons of home heating fuel per year.

[54] UAF Food Cost Survey; Energy Information Administration

Figure 17: Cost effectiveness of electric baseboard versus Fuel Oil for Space Heat[55]



SPOTLIGHT: ELECTRIC HEAT VERSUS FUEL OIL FOR SPACE HEATING

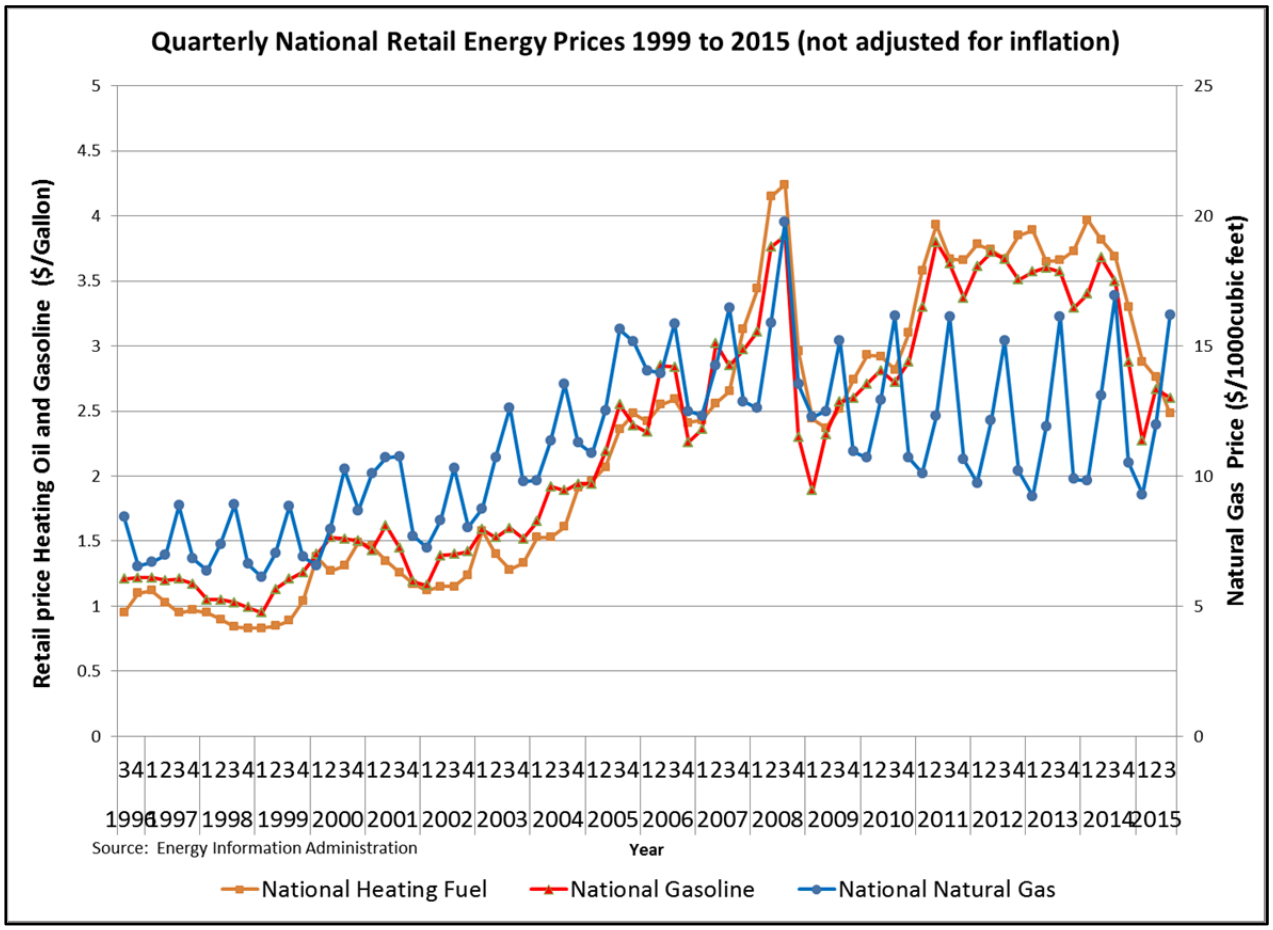
An example of this relationship is shown in **Figure 17**. This chart shows the breakeven point of using electricity for space heating over fuel oil. Some households with both electric and fuel oil space heating options can readily switch between the two fuel sources. Those households that only have one heating source are often committed to the incumbent heating source until prices are different enough, for long enough, to make a switch in their heating system financially worthwhile. Heat pumps, with more efficient use of electricity to provide heat, can move the relationship much more favorably to electricity (see Spotlight on Heat pumps).

[55] City of Sitka Electric Department

2.3.3 Natural Gas

Currently, there is no natural gas service or infrastructure in Juneau. In 2015-2016, during the development of this document, Avista, AEL&P's parent company, was actively considered the potential for bringing liquefied natural gas from British Columbia to Juneau. They conducted studies, and developed planning scenarios. They also discussed a need for long term local tax exemptions to allow them to provide financial assistance for new installations with this cost being repaid through property tax abatement on the gas facility. In February 2017, as this document was being finalized, Avista formally announced that it had dropped its interest in bringing LNG to Juneau, citing Alaska's economic uncertainties, rising costs for natural gas, and the low cost of heating alternatives[56].

Figure 18: Natural Gas Price[57]



[56] Alaska Energy Desk, http://www.alaskapublic.org/2017/02/28/juneaus-electric-utility-says-natural-gas-not-in-the-plans-anymore/

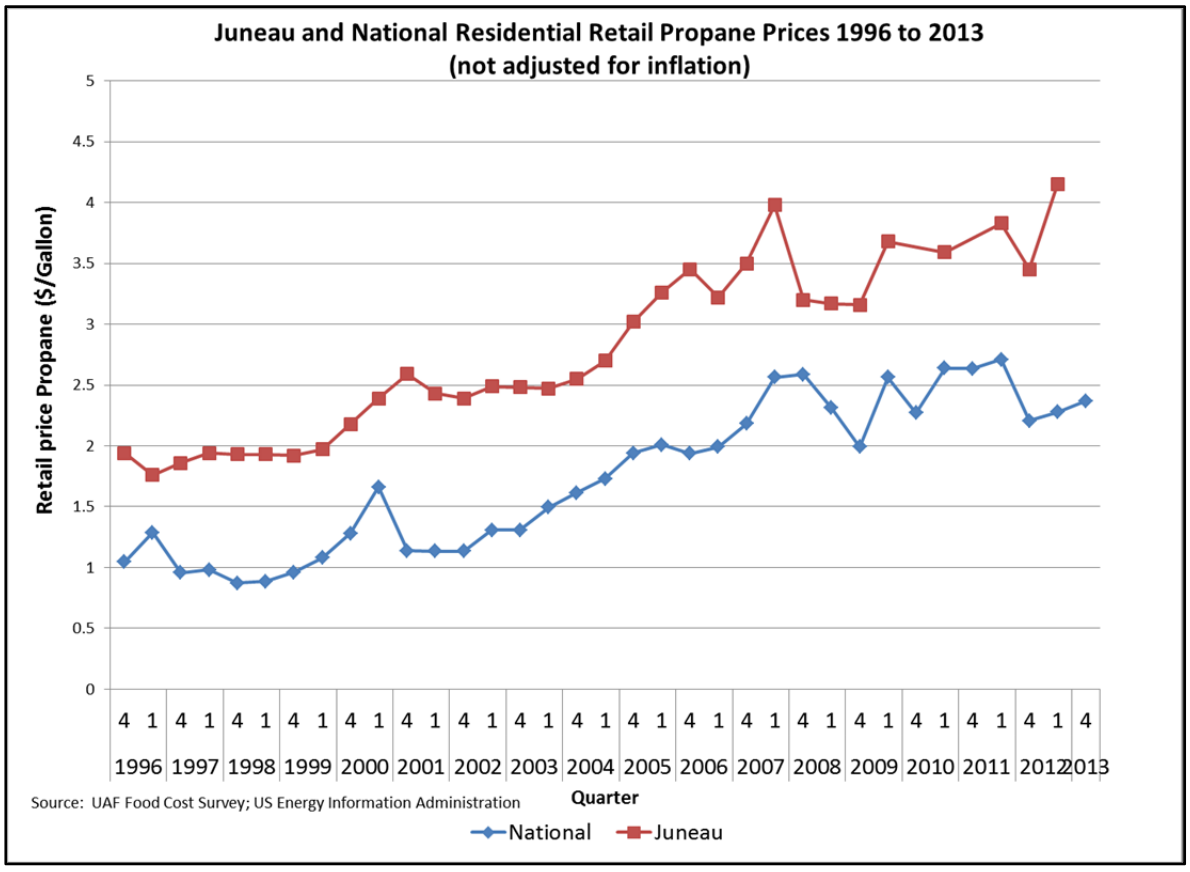
[57] Energy Information Administration

If natural gas was offered at a competitive price, it could have an impact on the choice of fuel for heating buildings, residential and commercial cooking, and other appliance use. It could possibly provide peak load and backup power for electricity generation. Natural gas prices are subject to similar volatility in price as heating oil. **Figure 18** shows national residential consumer prices for natural gas.

2.3.4 Propane

The 2010 Juneau emissions inventory estimated that propane has a 2% share of Juneau's energy market. With no piping infrastructure, the two current Juneau vendors deliver via tankers to tanks that are on the customer's properties. There are number of residences as well as commercial buildings and businesses that use propane. Propane boilers and stand-alone space heaters can be highly efficient. As with all Juneau fossil fuels, it is transported in bulk via the barge system which adds to the price a Juneau consumer would pay compared to the Lower 48. See **Figure 19**.

Figure 19: Propane Price[58]



[58] UAF Food Cost Survey; US Energy Information Administration

2.3.5 Biomass (including Wood)

Wood is estimated to provide approximately 3% of Juneau's energy. The use of wood is primarily provides space heating although more sophisticated systems are available that can also provide hot water. Woody biomass can be used for space heating as cord wood, wood chips, or processed wood pellets. Wood pellets systems are most akin to fuel oil systems in terms of the minimal day to day involvement in its operation. Pellet stoves also produce the lowest smoke exhaust of the three options since they are able to use a more uniform fuel source compared to larger cord wood. This is important in the Mendenhall Valley where, in response to particulate air quality issues, there are times of the year where operation of wood stoves is banned.[59] Pellet stoves are exempt from this ban to reflect the cleaner smoke emitted by these systems. In residential situations, wood is often used as a secondary heat source for a specific room. Currently the nearest pellet production facility is in Ketchikan but much of the cord wood burnt is obtained locally. Like diesel and propane, pellets must be shipped in to Juneau by barge.

SPOTLIGHT: USE OF BIOMASS

A 2012 draft regional energy plan for Southeast Alaska [60] funded by the Alaska Energy Authority (AEA) advocated for a greater use of wood sourced pellets for space heating in Southeast Alaska specifically including Juneau.

One of the key drivers for the AEA study was to understand how Southeast communities can reduce their dependence on imported fuel oil and the associated price uncertainties. Another was to respond to concerns that some Southeast communities were reaching the limit of their hydroelectric resources. To deal with both concerns the AEA study notes that if fuel oil is to be replaced for space heating purposes, the use of wood pellets might be a preferred option over conversion to electric space heating since the latter has implications for electricity demand.

The study argues that it is important to reserve electricity for uses which have no viable alternative such as lighting and power of appliances. The use of electricity for replacing fuel oil space and water heating may require additional capacity to be provided unless significant electricity efficiency savings can be found from other uses.

Depending on the level of switching that occurs from fuel oil to wood heating and the ability of a local supply market to grow, it is possible that supply of the pellets may be required from outside of Southeast Alaska. This would again bring into play the influence of external market forces and shipping costs on the fuel price.

In Juneau, several of commercial buildings already use wood pellets for heating purposes including the Sealaska Building, and the Walter Soboleff Center.

[59] Ord. 2008-28 – An Ordinance amending the wood smoke control program regarding solid fuel-fired burning devices.
[60] Southeast Integrated Resources Plan, 2012 - http://www.akenergyauthority.org/Policy/RegionalPlanning.

2.3.6 Transportation Fuels

The transportation sector is the largest energy consumer in Juneau. The 2010 emissions inventory showed it accounts for 43% of Juneau's total energy use. Juneau's transportation system is almost completely fueled by gasoline or diesel although there are a growing number of electric vehicles in Juneau.

Gasoline and diesel prices have been subject to the same volatility in price as heating oil (see **Figure 16**). The use of electricity in the transportation sector is still small although local initiatives are in place to encourage its use. As with heating oil, there is an economic tipping point at which electricity is financially more attractive for vehicle use. Traditionally, electric alternatives are more expensive than the equivalent combustion engine vehicle but this difference is decreasing. It is expected to soon be reversing, as a result of vehicle manufacturers subsidizing the purchase cost of electric vehicles to meet fleet average emissions targets, and the decrease of battery technology price. Technology in conventional internal combustion engines is also improving but these benefits do not always result in fleet fuel efficiency improvements if consumers choose heavier, higher powered vehicles.

SPOTLIGHT: ALASKAN BREWING CO.

Most breweries sell the spent grain left over from brewing processes as cattle feed, but Juneau is a long way from such customers.

In 2013 the Alaskan Brewing Company completed the final stage of a process it calls "Beer Powered Beer," when it fired up its unique new steam boiler, fueled by the grain left over from the brewing process. The $1.8 million furnace turns a low value by-product into steam that powers much of the brewery's operations. The company is continuing to fine tune the boiler system, with a goal of saving approximately $450,000 annually and cutting the use of oil by 60%.

This is the latest in a series of steps the company has taken toward greater sustainability since 1995, when they installed a grain dryer, which allowed them to ship spent grain south for cattle feed. About half of this byproduct was used as a fuel source to heat the dryer itself, allowing them to burn grain effectively. In 2008, the brewery installed a $1.7 million mash filter press to produce a finer grain with less moisture, making it a better fuel source. This inspired them to invest in the boiler which would convert all of the waste to energy.

The value of a spent grain as a fuel versus its value just as a waste material goes from a net value of $30 per ton up to $350 per ton.

Reducing demand for transportation fuels can be achieved with improved vehicle fuel efficiency and reduced mileage per passenger or ton of freight. The land use pattern is the biggest influence on travel demand since it determines how effective mass transit services can be and the ability of residents to walk/cycle to jobs/services/retail. Land use patterns are also the hardest to change since spatial pattern and densities have often already been determined and many years would be required for redevelopment of infrastructure configurations and buildings. Juneau's geography mandates a long linear community, making it even more challenging to reduce transportation demand.

Demand management tools can encourage people to reduce their travel miles or to travel using carpools or public transit. These are often collections of incentives/disincentives regarding parking, transit provision, non-motorized infrastructure, and teleworking. The use of electric transportation is growing in Juneau. According to the JEDC renewable energy cluster there are now over 150 electric vehicles and growing.

2.4 RENEWABLE AND ALTERNATIVE ENERGY SUPPLY TECHNOLOGIES

There are a range of renewable energy technologies that provide space heat, domestic hot water, electricity, space cooling etc. Examples include:

- Solar photovoltaic
- Tidal and wave energy
- Micro hydro and run-of-river
- Wind turbines
- Ground source and air source heat pumps
- Biomass

These technologies are technically feasible and depending on site specific factors, they may be more cost effective relative to conventional resources. A recent summary of the cost of renewable based electricity is summarized in **Figure 20.** Based on this data, the cost of on-shore wind and utility scale solar photovoltaic- based electricity is cost competitive to current utility rates in Juneau. This information is general to the US and further analysis is required to estimate the costs and resource potential of renewable resources specific to Juneau since economic or climatic conditions, which make it favorable in Lower 48 states, may not exist. For example, although thought of as a windy city (e.g. Taku Winds) the variable weather of Juneau means the cost per kWh would be much higher than presented in **Figure 20**.

SPOTLIGHT: DISTRICT HEATING

The idea of a district heating system for the relatively dense Willoughby District and downtown Juneau has been a community discussion for some time. This could replace a significant portion of Juneau's total fuel oil consumption if the large buildings in the Willoughby area converted. Other areas in Juneau may also be appropriate. District heating systems can be supplied by an array of fuel sources from traditional fossil fuels, traditional renewable energy source and even geothermal or sea water heat pumps.[61] District heating depends on energy source for centralized distribution and could lower consumer costs.

Recently, Juneau District Heating (associated with Juneau Hydropower Inc.) has announced their intent to develop a seawater heat pump based district heating system for downtown Juneau [62] The system has a letter of support from the CBJ but would require permitting, construction of a central sea water pump, and installation of a significant distribution network which will require excavation of some streets.

[61] Drammen, Norway is a coastal community with similar sea temperatures as Juneau that has been using sea water heat pumps as part of a district heating system since 2011.

In addition, because of the highly renewable nature of the existing electricity supply there is no requirement for the local electric utility to provide for net metering or feed-in tariffs.[63] Self-contained generation and use may still be cost-effective but storage is a limiting factor although this will cease to be an issue as battery technology becomes cheaper.

Figure 20: Annualized, costs of delivered electricity (2013 U.S. $ per kWh-delivered)[64]

Resource	Levelized[65] Cost of Energy, 2013 [$/kWh]
Municipal Solid Waste	$0.24
On-shore Wind	$0.09
Off-shore wind	$0.16
PV Utility Scale	$0.09
PV Rooftop Scale	$0.13
Wave Power	$0.24

To put the above costs into context, two recent studies[66] have shown the levelized cost for energy efficiency measures to be ~$0.04/kWh. **Reducing energy use through efficiency measures is the cheapest form of additional electricity capacity.**

2.5 REGIONAL VIEW – SOUTHEAST ALASKA INTEGRATED RESOURCES PLAN (SEIRP)

In 2011-2012, a draft energy plan for Southeast Alaska, the Southeast Integrated Resource Plan (SEIRP)[67], was developed, funded by the Alaska Energy Authority. While not adopted as state policy, the SEIRP provides valuable information and perspectives on regional energy use. Some of the conclusions of the plan were received with mixed reactions from interested parties from around the region. The JRES has drawn extensively from the information and issues raised in the SEIRP.

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[62] Juneau Empire February 13, 2016.
[63] *Net metering* is when the serving utility provides a 1:1 kilowatt-hour credit for energy delivered to the system through a customer meter. The customer typically cannot receive credit for more than they consume on their meter on an annual basis. There is no exchange of money for the value of the energy produced by a customer-owned renewable energy source - it is a form of energy trading.
Feed-in tariff is which is when the metered output of a customer owned supply is purchased at a set price by the serving electric utility.
[64] Ref Jacobson et Al, 100% clean and renewable wind water and sunlight all sector energy roadmaps for the 50 United States
[65] Levelized costs take into account the total energy saved/produced during the lifetime of the measure.
[66] Berkeley Lab Technical Brief ' The total cost of saving electricity through utility customer funded energy efficiency programs' April 2015, and American Council for Energy Efficient Economy 'The Best Value for America's Energy Dollar: A National Review of the Cost of Utility Energy Efficiency Programs' March 2014.
[67] Southeast Integrated Resources Plan, 2012 - http://www.akenergyauthority.org/Policy/RegionalPlanning

The overriding conclusion was that the region should aggressively pursue energy efficiency and demand management measures, and biomass conversion (see Spotlight on Biomass) to address issues of the shortage of hydroelectric storage capacity.

To help move forward in the face of lack of regional consensus, the AEA developed a 'next steps' document[68] which outlined how it intended using the SEIRP in *'working with regional organizations to advance their development goals and meet anticipated increase in energy demand'*. AEA outlined five main areas they intended to work on with Southeast Alaska communities:

Technical Assistance to Develop Regional Energy Efficiency Programs– This recognizes the need to use existing energy sources more efficiently. The need for increased energy efficiency in the Juneau community, and CBJ operations is discussed in a number of places in the JRES and is a one of the identified strategy areas.

Standardizing development of new hydro power resources– Based on the conclusions of a range of future energy demand growth projections the AEA notes a *'moderate view can be taken that the future will entail development of new hydro power resources, and as such the plan suggests the need for the region to continue to identify and develop the best hydropower projects'*. A lack of consistent, standardized information on potential hydroelectric resources in the region is seen as a barrier to their development.

The Southeast Intertie Initiative – The SEIRP was not supportive of development of interties across the region noting a poor financial case (estimated as $1Bn). However, AEA does not want to dismiss the concept in its entirety and recognizes that interties should be continually considered as opportunities (e.g. mining operations or connection with the Yukon) may support their construction. A more in depth of regional interties are discussed in **Section 2.3.1.**

Addressing the Space Heating Issue – the AEA summarize the SEIRP findings on this issue:

1. 'the rising heating costs are causing economic distress in all Southeast communities'.

2. 'a 'crossover' economic phenomenon was described as occurring in communities with low cost hydro power. Here, consumers are converting (crossing over) from oil heat to less expensive electric heat'.

AEA note the latter as an issue because while switching to electricity may deliver immediate benefits to an individual, wide scale switching at a community level has the potential to deplete hydroelectric resources during the winter months when renewal of water is lowest. New supply is needed to meet any demand the current infrastructure is unable to meet. Rather than adopting the SEIRP's focus on energy efficiency, demand management, and biomass as heating solutions the AEA 'next steps' note that heat pumps and biomass energy were considered the most promising. They suggest they should provide factual information on local alternative heating possibilities, and assist with conversion of public and commercial buildings where alternative heating sources (presumably because they may be more commercially viable).

[68] http://www.akenergyauthority.org/Content/Publications/SEIRP/SEIRP-NextSteps090712.pdf

General Technical Assistance and Project Development – To help in the development of renewable energy projects the AEA intended to expand its capability to assist communities in determining the best technology for their specific situation.

2.6 JUNEAU ENERGY BASELINE

This planning effort attempted to update the 2010 Emissions Inventory included in the Juneau Climate Action Plan. Despite significant efforts to collect the data from all vendors that had provided information in 2010, only one of the fossil fuel vendors provided information. 2013 electricity data is used to supplement the 2010 inventory.

It would appear vendors are much more guarded about releasing sales information even with guarantees the data would only be examined in an aggregate manner and no individual vendors would be identified. Without the ability to collect this data it will be nearly impossible track overall energy use and emissions in the community of Juneau. One possible alternative approach is for tracking through CBJ sales tax data.

A comparison of the community's total emissions and energy for 2007, 2010, and 2013, by source is presented in Table 2. In 2010 Juneau consumed 6.3 million MMBTU and released almost 397,000 $MTCO2_e$.

A breakdown of energy use by fuel and segment is presented in **Figure 22**, while **Figure 23** provides a breakdown by fuel. Transportation related energy consumption dominates the energy use pattern in Juneau, highlighting the significance of gasoline and diesel in Juneau's energy use patterns.

The 2010 Greenhouse Gas Emissions Inventory summarizes 2010 baseline information using Juneau's internal energy economy (energy consumed within the community's boundaries). This baseline excluded external energy consumption related to activities essential to the economy and existence of the community such as barging of freight, some ferry travel, and some air travel fueling.

Figure 21: 2007, 2010, & 2013 Community Total Emissions and Energy, by Source[69]

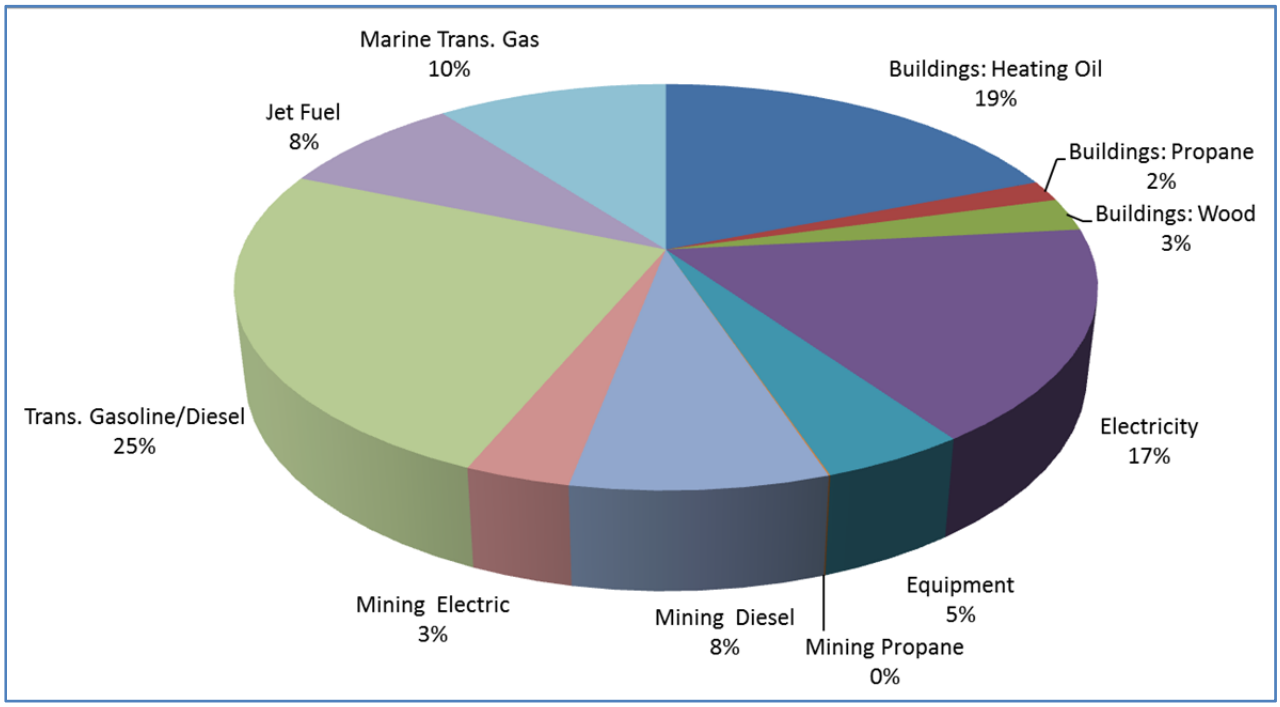
	2007		2010[70]		2013	
Source	**MMBtu**	**MTCO$_2$e**	**MMBtu**	**MTCO$_2$e**	**MMBtu**	**MTCO$_2$e**
Electricity	1,236,029	4,358	1,265,687	670	1,286,718	1,098
Petroleum	5,822,075	423,074	4,712,380	365,815	No Data	
Propane	63,800	4,032	107,293	6,652		
Wood	90,276	9,081	164,010	16,686		
Waste	0	8,194[71]	0	6,925		
Total	***7,212,180***	***436,999***	***6,249,370***	***396,748***		

[69] 2007 and 2010 Greenhouse Gas Emissions Inventories, City and Borough of Juneau and 2013 electricity data provided by AEL&P

[70] Some of the difference in the 2007 and 2010 figures can be attributed to changes made to emissions factors used in the two methodologies. These differences do not alter the general order of magnitude observed.

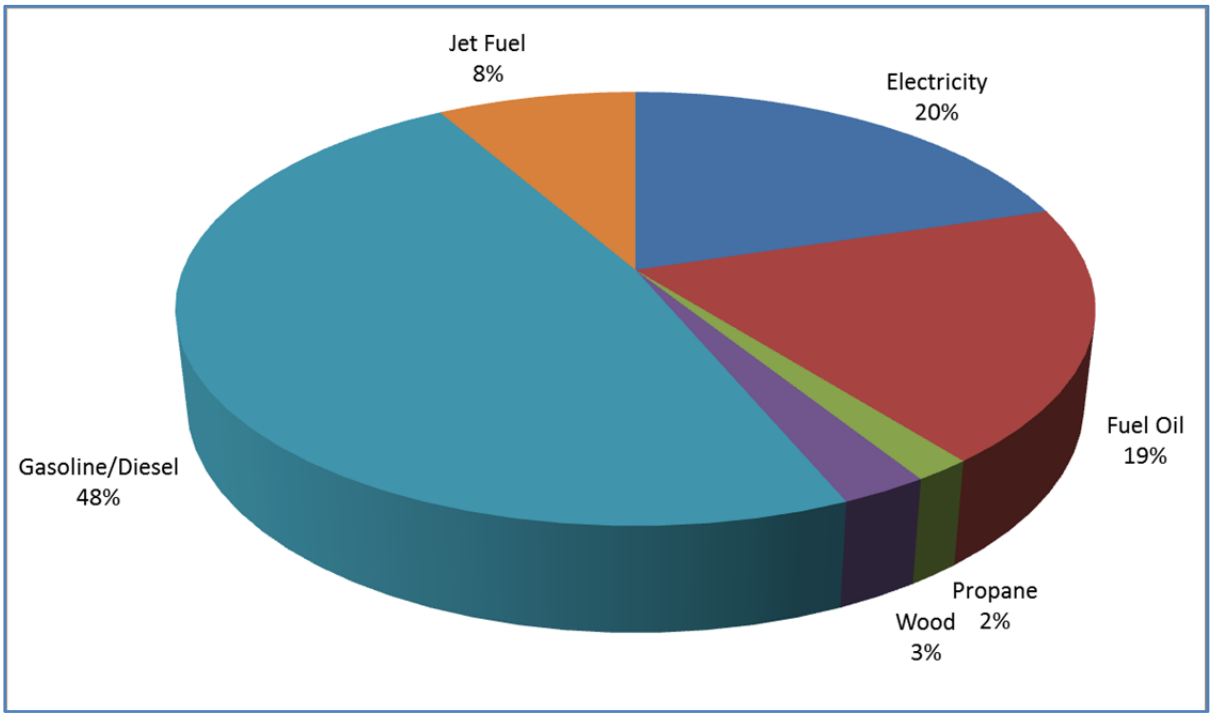
[71] This number is based on a recalculation of the 2007 number using the 2010 Emissions inventory methodology.

Figure 22: Energy Consumption by Fuel and Segment, 2010[72]



[72] 2010 Greenhouse Gas Emissions Inventory, City and Borough of Juneau.

Figure 23: Energy Consumption by Fuel, 2010[73]



2.6.1 Energy Expenditures

Energy expenditures were estimated for Juneau by combining 2010 energy consumption data with energy price data in **Figure 24.** It is estimated that Juneau spends over $181 million dollars per year on energy. Of this it is estimated that over $140 million per year leaves the community to pay for imported fuels.

In 2017, Juneau had the second highest cost of living when compared to Fairbanks, Kodiak, and Anchorage[74]. Compared to the rest of the US, household expenditure on utilities was 121.7% of the national average. With electricity prices comparable to those in the lower 48, the use of petroleum fuel sources with its relatively high cost must be contributing to this (Anchorage's cost of utilities was 104.6% of the national average).

[73] 2010 Greenhouse Gas Emissions Inventory, City and Borough of Juneau.
[74] ADOWLD, *Alaska Economic Trends*, July 2017

Figure 24: Juneau energy Price by type (January 2016)

Fuel	Price
Electricity	$0.11/KWh[75]
Heating Fuel Oil #1	$3.00/Gal[76]
Propane	$3.03/Gal[77]
Gasoline	$3.23/Gal[78]
Wood pellets	$294.75/ton[79]
Jet A Fuel	$6.61/Gal[80]

[75] Electricity rate is seasonal to reflect demand and generation capacity (~$0.12/KWh in winter and ~$0.10/KWh in summer)
[76] Local heating fuel supplier, January 15 2016. Price for minimum purchase of 100 gallons.
[77] Local propane fuel supplier, January 15 2016. Price for minimum purchase of 50 gallons.
[78] Local gas station price, January 23, 2016. Price per gallon of Regular Grade gasoline.
[79] Local pellet supplier, January 15 2016.
[80] Reported price for Juneau International Airport, December 11 2015 (https://www.airnav.com/fuel/local.html)

3 WHERE ARE WE GOING?

3.1 BUSINESS AS USUAL FORECAST

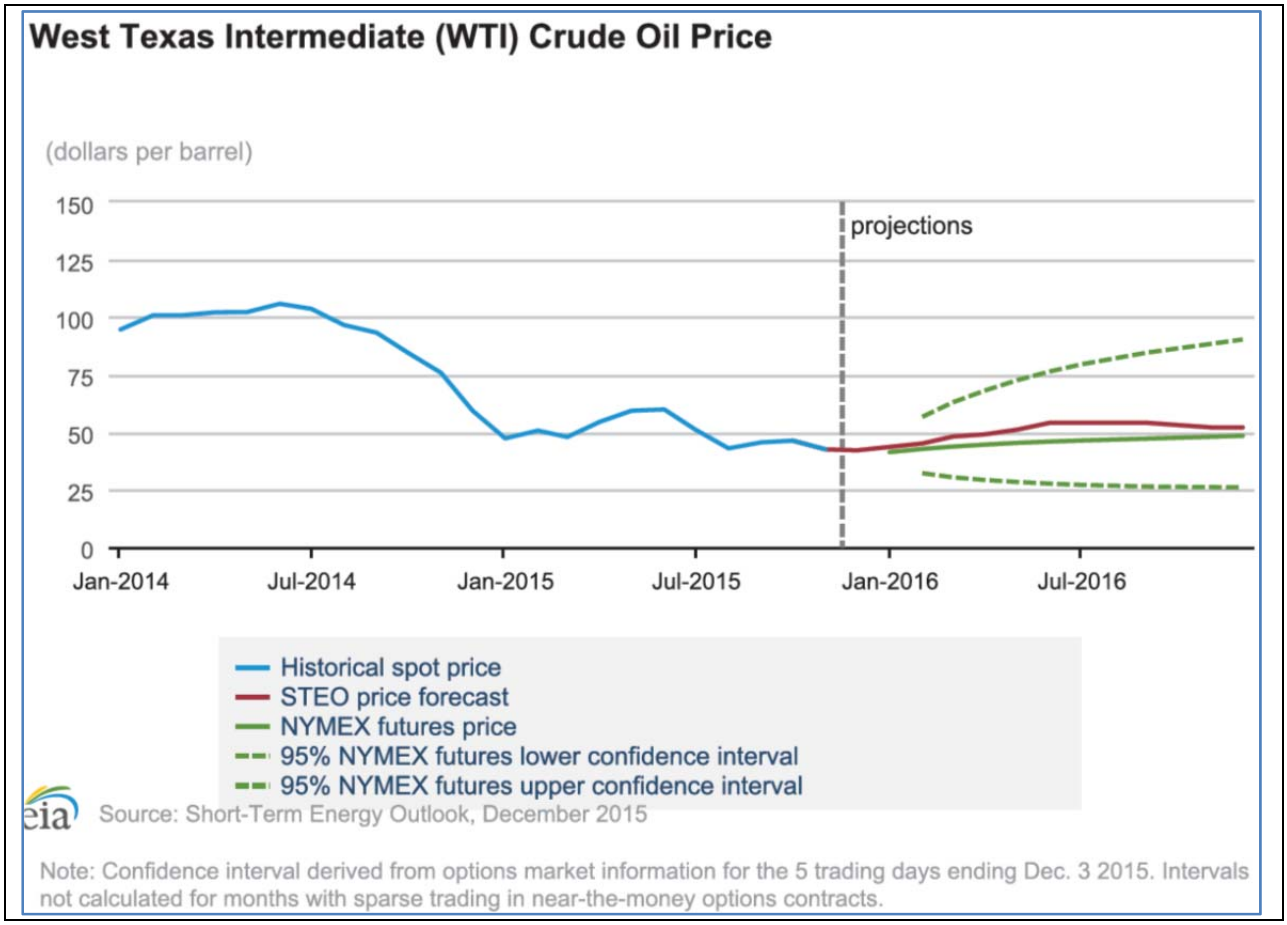
A 'business as usual' (BAU) forecast estimates energy use and GHG emissions in the City and Borough of Juneau to 2045. This analysis provides an outlook for community-wide energy use based on projected population growth, planned development and land-use patterns, expected technology advancements and anticipated legislation regarding energy efficiency. The forecast includes projections for total energy demand by energy type and provides an analysis of:

- Energy use by sector (e.g. residential, commercial, industrial, infrastructure).
- Anticipated loads by end-use (e.g. space heating / cooling, lighting, process / plug etc.).
- Anticipated loads by energy type (e.g. electricity, natural gas or other energy types).

The purpose of the BAU forecast is to develop a reference case against which future scenarios can be compared. It presents the expected trend based on what has been observed in the past and estimates of how these trends may alter in the future. The vast range of influences on energy use, from energy prices to technology development, means the energy market is notoriously difficult to predict and expert agencies produce wide ranging forecasts to account for this (and even these can be wrong).

As an example the 2015 EIA forecast on future oil prices in 2016 is presented in **Figure 25.** This figure shows not only the forecast value but also an estimate of the region in which the actual price is expected to fall (the 95% confidence intervals). The range is relatively wide and this is only looking ahead to the next year which should offer more certainty. Long term forecasts have also been made by the US Energy Information Administration – the expected fuel price varies considerably based upon the global economic scenario.

Figure 25: Prediction of oil prices in 2016[81]



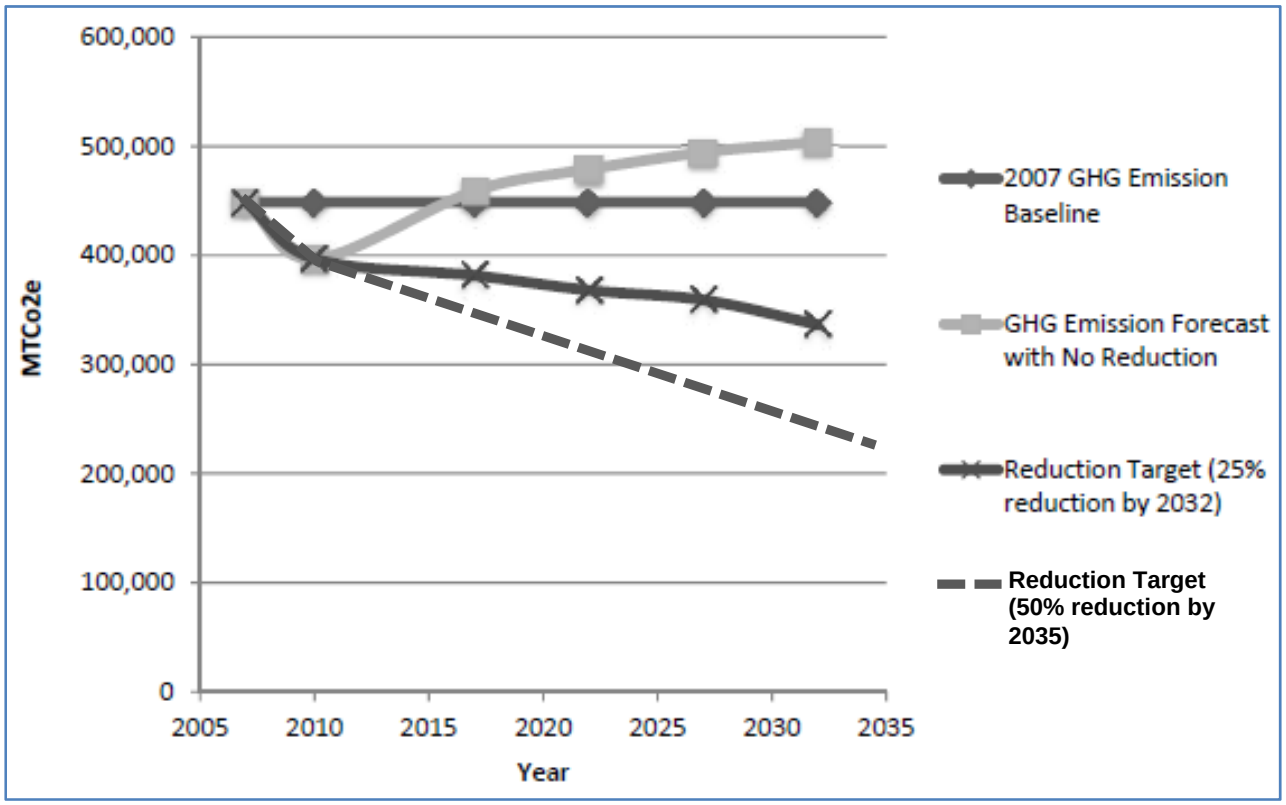
[81] Energy Information Agency, Short term Energy Outlook, December 2015.

3.1.1 Assumptions

The Energy Plan Business As Usual forecast was developed as follows:

1. **Use the JCAIP Business As Usual forecast by continuing the projected trend to 2045.** The JCAIP forecast was based on 2011 'high' population growth forecast by ADOLWD (36,584 residents by 2032). The 2011 JCAIP forecasts emissions to increase by ~25% between 2010 and 2032 (**see Figure 26**) – This trend was continued to 2045 and converted to energy equivalent. The latest 2014 population forecasts show less population growth (33,617 by 2042). A revised JCAIP BAU based on the lower population growth would forecast lower emission growth and it follows energy consumption will also be lower – but the scale of energy use would be the same. The Energy Plan BAU has intentionally chosen to use the same growth rate as original JCAIP forecast to allow assumed reductions from JCAIP strategies to be transferred into the Energy Plan forecasts.
2. **Add further detail to the energy BAU, the total projected increase has been apportioned to different sectors and fuel types**. These growth rates are based on best estimates from the consultant team and were reviewed with JCOS. Approximated growth rates have been used that allow estimates for the potential reduction by fuel and segment that could result from the Priority Strategies discussed later in the document.

Figure 26: Juneau Community Emissions Forecast[82]



The Energy BAU forecast is presented in **Figure 26**. Energy consumption is forecast to increase from 6.2 million MMBtu in 2010 to 8.5 million MMBtu in 2045 representing a 34% increase in total energy consumption. Based on this forecast, the most significant growth is in transportation energy and electricity consumption in buildings.

[82] Juneau Climate Action & Implementation Plan Pg18, 2011

4 WHERE DO WE WANT TO GO?

4.1 TWO SCENARIOS FOR JUNEAU'S RENEWABLE ENERGY FUTURE

What kind of energy future does Juneau want? We have benefited from past investments in renewable energy — hydroelectricity — which have resulted in low cost reliable power that provides 20% of our community energy. With increasing electrification of transportation and heating locally, which parallel national and worldwide trends, it is a good time for Juneau to be thinking about its future energy mix. In this planning process the JCOS examined two scenarios for Juneau's desired renewable energy future, which they termed "Do Something" and "Do More".

The "Do Something" path is derived from the goal of the Juneau Climate Action and Implementation Plan (JCAIP), and CBJ Resolution 2593, in which the Assembly in 2011 adopted a goal of reducing GHG emissions 25% over 20 years (by 2032). This would be roughly equivalent to replacing 25% of fossil fuel use with renewable energy or implementing energy efficiency measures. The JCAIP identifies a wide array of actions that could reduce energy use (including fossil fuels) and expand use of renewables. As described below in Section 4.2, consultant Stantec developed a list of priority actions from it modeled a "Do Something" path.

The "Do More" path resulted from discussions between Stantec and the JCOS, in its role of steering committee for the energy plan in 2015 and 2016. This scenario involves substantially expanding use and supplies of renewable energy, while creating new economic opportunities and jobs around energy efficiency and renewable energy development, and reducing energy costs and community vulnerability to fluctuating energy prices.

4.2 "DO SOMETHING": TOWARD A 25% REDUCTION IN GHG

A GHG emissions target reduction of 25% of the 2007 value by 2032 was defined in the JCAIP. This provided a documented target that received some degree of consensus by the community. Community energy use can only increase without increasing GHG if renewable forms of energy are used. The only other way to reduce GHG is to cease doing the activities that produce GHG, or use the energy used for existing and new activities more efficiently. When the actions previously recommended by the JCAIP were reviewed it was apparent they were not being implemented quickly enough or as effectively as they could be to achieve the GHG targets. Stantec advised that to be more effective in achieving the 25% GHG reduction CBJ must concentrate on a smaller number of initial actions.

4.2.1 Development of Priority Strategies

Stantec and JCOS reviewed and prioritized implementation actions recommended in the JCAIP. Stantec helped develop a set of evaluation criteria, which JCOS members used to review and rank the list of two hundred actions in the JCAIP. This criteria involved more than just examining

the potential to reduce GHG and acknowledged broader considerations such as cost and benefits to the community resilience.

JCOS participated in a work session to identify the priority strategies. The priority rankings were reviewed again following public consultation on a draft of this document. An initial screening filtered out actions that did not directly impact reducing energy use/GHG production. Actions that passed through this screening were then rated against 5 other evaluation criteria (summarized in **Figure 27**). The higher priority actions (a score of 4 or higher) were then grouped into broad strategy areas. It should be noted that some actions impact on more than one strategy area. A full list of the JCAIP actions, the relevant strategy area and their score is given in **Appendix B**[83]. Initially, eight DRAFT strategy areas were identified, following public consultation on the draft JRES, this was revised and consolidated to four FINAL strategy areas.

Figure 27: Renewable Energy Strategy priorities used to rank JCAIP actions.

Evaluation Criteria	Rationale
Direct Energy/GHG Savings	A primary objective for completing the JRES was to reduce GHG emissions. Recognizing that the majority of GHG emissions in CBJ derive from consumption of fossil fuels, the connection between energy and GHG emissions is relatively direct.
Return on Investment	This evaluation criterion ensures that priority strategies are cost effective, in that the strategy reduces energy consumption, increases energy efficiency, saves money, or both. This criterion provides a qualitative assessment of the economic feasibility of actions.
Reduced Vulnerability	JCOS members expressed a strong desire to increase the reliability and resilience of energy supply in CBJ. In particular the impact of price shocks from fuels imported into the community. If more local energy is used, the potential of service disruption should be minimized.
Significant energy savings	Reduced energy consumption achieved through demand side management activities was viewed to be a significant opportunity and priority of the plan.
Energy savings within reasonable timeframe	Making sure that energy savings or clean energy project provide tangible benefits in the near terms of energy and cost saving was generally endorsed.
Implemented by/with CBJ	Implementation involvement by or with CBJ was deemed to increase the potential for implementation, rather than waiting for private sector or state and federal levels of government to initiate the strategies.

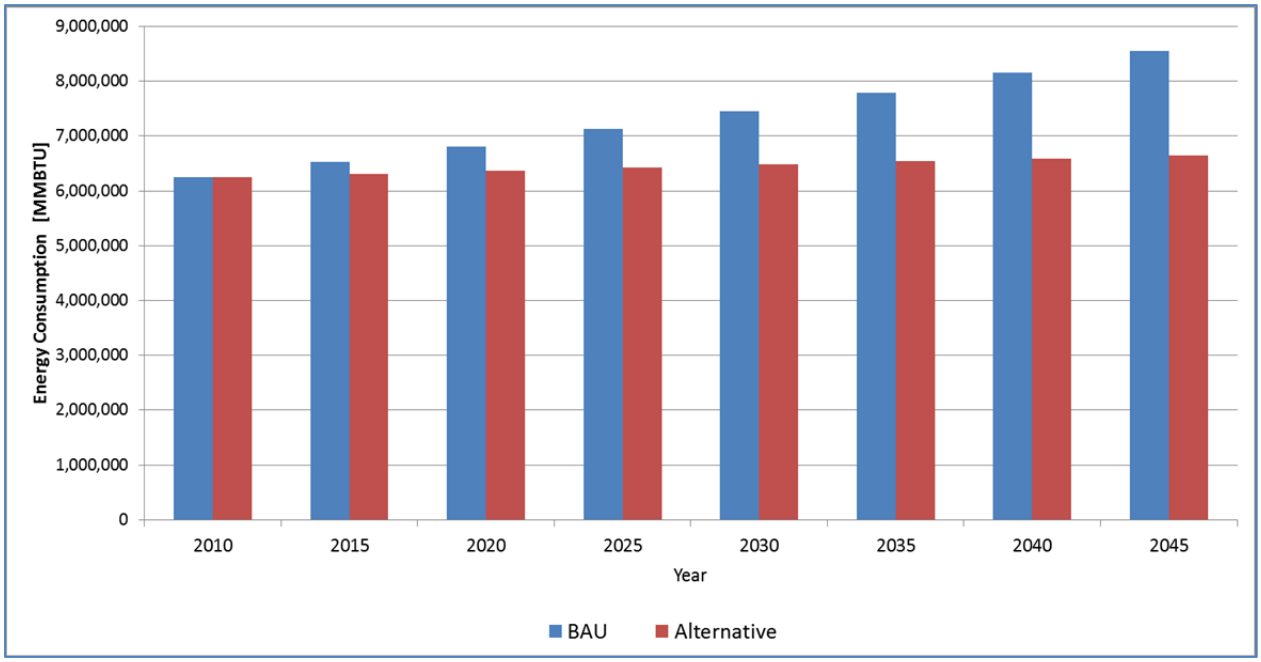
[83] Appendix B table was amended based on comments made on Draft document

4.2.2 Impacts of the Priority Strategies on the 2045 Energy Baseline

The Stantec modeled future energy use based on simplified assumptions about increases in community energy use by different sectors by 2045 – this is the Business as Usual (BAU) scenario. The BAU showed community energy use increasing by 34% between 2010 and 2045. Stantec then modeled the assumed reduction in energy use if the strategies and their priority actions were implemented to the extent suggested in the JCAIP – this is the Do Something scenario. The modelling suggested that even with implementation of the priority JCAIP actions there would still be a small increase in community energy use (6%), but at a far lower rate than the BAU – see **Figure 28**. Unless additional renewable energy sources is used in the future energy 'mix' the 25% reduction in 2007 GHG emissions that was established in the 2011 JCAIP will be missed.

Implementation of the priority actions would be a good start and could set the community on the path to meeting the JCAIP goals. However, the message is clear, more renewables need to be added to replace some of the existing fossil fuels if the JCAIP goal is to be met.

Figure 28: Modeled forecast of the Business as Usual (BAU) and Do Something alternative



Following the public consultation, the eight DRAFT priority strategies were revised to four strategies but covered nearly all the high priority JCAIP actions identified previously. As mentioned above, a few actions were moved up or down in priority based on feedback during the public consultation.

4.3 "DOING MORE": 80% RENEWABLE ENERGY

This scenario presents a more ambitious, longer term, choice with an emphasis on using renewable sources. Energy efficiency measures are a tool to minimize the additional renewable energy needed. It does not suggest limits on community energy use. Under this scenario, Juneau would seek to have renewable energy providing 50% of the community's energy by 2035, and 80% by 2045. Replacing fossil fuels would reduce Juneau's vulnerability to changes in fossil fuel prices, keep dollars in the community, and create new economic development opportunities while balancing the impact of higher energy costs which may result. This scenario also recognizes the need to globally replace fossil fuel with renewable energy by mid-century in order to reduce the risk of overshooting a 2 degree C (3.6 degrees F.) increase in global average temperature. Many US cities are adopting goals of reducing fossil fuel reliance by 80-100% by the year 2050.[84]

4.3.1 Rationale

Juneau, like other Alaskan communities, is highly reliant on fossil fuels and vulnerable to price volatility and supply interruptions. Fuel oil, diesel, and gasoline provide about 80% of our total "internal" energy, for heating buildings

SPOTLIGHT: HEAT PUMP TECHNOLOGIES

CBJ is successfully using ground source heat pump technology at the Juneau Airport, Dimond Park Swimming Pool, Auke Bay School, and the Mendenhall Valley Public Library.

A simple explanation of a heat pump is that it takes low levels of residual heat in the air, ground or a water body and concentrates this heat using a combination of compressors and refrigerants that boil at low temperatures to output temperatures greater than the source. They are often described as refrigerators running in reverse. The effect is to produce more heat than would be produced from the electric energy used to operate the heat pump. This efficiency ratio is known as the Coefficient of Performance (COP). For example, a heat pump with a COP of 3.0 would deliver 3 kilowatt-hours of heat for every 1 kilowatt-hour of electricity consumed to run the heat pump. Efficiency of heat pumps varies due to many factors. For example, air source heat pump efficiency decreases as the outside air temperature gets colder (i.e. below freezing temperatures) until eventually a point is reached where they are no more efficient than standard resistance heating. Whether climate change effects will reduce the frequency of such events is unknown.

Individual households and businesses would save money by switching to lower cost heat pumps. However, at a community level, electricity demand would be reduced when conventional electric heat is converted to a heat pump. This could help defer construction of electrical generation capacity. However, households switching from fuel oil heat would create an increase in demand for electricity, particularly creating impacts on peak load.[85] Additional electrical generation capacity would be needed if a large number of fuel oil heat systems were converted.

Air Source Heat Pump (ASHP) technology provides heat in Juneau for both commercial and residential buildings. For example, both the Foodland IGA center and the Tram Plaza building recently converted to air source heat pumps. A Juneau news article suggests that air source heat pump sales are increasing due to the energy cost savings that air source heat pumps can achieve.[86]

[84] WWF/ICLEI, 2015 'Measuring up 2105: How US Cities are accelerating progress toward National climate goals'
[85] Alaska Energy Authority 'Air Source Heat Pump Potential in Alaska', 2015
[86] Juneau Empire November 1, 2015

and local transportation. Additionally, we depend completely on fossil fuels for transportation of goods and people in and out of the community, including barge and ferry service, air transport, and cruise ship traffic, which are not included in the internal energy budget. This strong dependence makes Juneau vulnerable to price increases for imported fuels, including future potential carbon taxes or regulatory mandates that may be imposed to reduce GHG emissions as has happened in other countries around the world.

Increasing energy conservation and efficiency can have substantial economic benefits. Energy efficiency and conservation can be the single best investment for low- and fixed-income households struggling to pay their utility bills although upfront costs can be discouraging. Further, investments in efficiency by some large customers could actually lower future rates for all customers on the system as it may delay the need to build expensive additional capacity. Conservation and efficiency increases can result in expansion of green collar jobs and careers, such as energy auditors, insulators, air sealers, heating and air conditioning mechanics, district energy pipe fitters, educators, carpenters, solar technicians and electricians just to name a few. Local engineers, architects, and planners may be encouraged to specialize in these fields.

Renewable resource development has economic benefits through the creation of jobs, and by displacing imported fuel sources can potentially keep more energy dollars circulating in the local economy and create new economic opportunities. Further, locally developed and locally owned energy resources keep energy revenue in the community.

Another benefit to the community of replacing fossil fuels would be improvements in local air quality. Cruise ship and bus emissions in the downtown area could be reduced, and Mendenhall Valley air quality during winter inversions could be improved.

Finally, this path would enable Juneau to do its part in helping to avoid the worst impacts of climate change. An increasing number of communities have adopted goals of 80-100% reduction in fossil fuel use by 2050. In the US these communities include places as diverse as Boston, Cleveland, Madison, Sacramento, and Portland.

5 HOW WILL WE GET THERE? CONCLUSIONS AND RECOMMENDATIONS

5.1 APPROACH

For Juneau to achieve a transformation to an 80% renewable energy economy, our community would need to go significantly beyond the priority strategies identified in the Do Something scenario, particularly through increasing efficiencies in heating and transportation, and increasing the supply of local renewable energy. The strategy areas are broadly the same as in the "Do Something" scenario, but the level of implementation will have to go much further and deeper.

The general approach for accomplishing this transformation would be to:

- Reduce and transform energy use:
  - Improve efficiency and conservation efforts - the most cost-effective route to a renewable energy future is to use our existing renewable energy more wisely.
  - Incorporate energy efficiency and conservation into all CBJ programs. Reach out to learn from, encourage and coordinate with State and Federal agencies, as well as businesses, and homeowners.
  - Reduce fossil fuel energy use or transform to renewable energy in all buildings by 80 percent.
  - Develop and re-develop to produce compact, walkable and bikeable neighborhoods.

- Increase the use of renewable energy:
  - Convert/transform at least 80% of local transportation to electric vehicles.
  - Replace/transform at least 80% of the fossil fuel heating load in buildings through a combination of efficiency and renewable energy.

- Increase the supply of renewable energy:
  - Develop more hydropower.
  - Support biomass heating.
  - Support greater use of district heating
  - Develop waste to energy conversion.
  - Encourage and support micro-power production. Monitor and share information on developments in wind, solar and micro-hydro power.

5.2 STRATEGIES FOR MOVING TOWARD 80% RENEWABLE ENERGY

After reviewing and discussing public comments on the initial draft, the JCOS consolidated the priority strategies and actions identified in Section 4.2 into four broad strategies for moving toward a renewable energy future for Juneau. Each of these encompasses the related strategies and action steps in the JCAIP and the priorities identified in Section 4.2. They are generalized here in recognition of the need for further work to develop specific action and implementation plans.

A. Implement a CBJ energy management program to make the organization a leader in energy efficiency and adoption of renewable energy

The CBJ spends about $8 million per year on energy. Adopting a formal energy management program, including tracking energy use and costs, implementing energy efficiency best practices, and implementing recommendation of energy audits could result in substantial savings. Consolidating the CBJ vehicle fleet and converting to electric vehicles is another area of potential energy and cost savings. The CBJ could also provide examples and information to the public on opportunities for energy savings. These provide the mechanics for CBJ to lead by example.

The JCOS has developed the outline of energy management program for the CBJ (see **Appendix E**), which summarizes specific recommendations from the JCAIP that address city operations, recommends procedures and financing options, and outlines the potential for $500,000 in annual savings over the first 3 years.

B. Reduce Juneau's dependence on fossil fuels for space heating.

Space heating accounts for about 21% of the fossil fuels used in Juneau. Significant shifts to electric heat have occurred over the years, particularly when fuel oil costs were high relative to electric rates, so today almost 25% of Juneau homes are heated by electricity.

District heating for the downtown core and other parts of town could reduce heating costs and use of fuel oil. Heat pumps are becoming more common, are more energy efficient, and save money for homes, businesses and government. Energy efficiency is a cost effective strategy for stretching existing renewable resources. For example replacing electric resistance/baseboard heating systems with air-source heat pumps could provide 2-3 times more heating capacity for the same amount of hydroelectricity used. Given Juneau's older housing stock, there are opportunities for energy retrofits as older buildings are updated and renovated. Innovative financing mechanisms could assist in saving money on space heating, while supporting a variety of businesses.

C. Reduce Juneau's dependence on fossil fuels for transportation.

Transportation is the largest (43%) use of fossil fuels in Juneau. Electrification of transportation provides a major opportunity to transform transportation to renewable energy, and Juneau already has one of the most rapid rates of EV adoption in the country. Other significant opportunities to reduce fossil fuel use include supporting energy efficient, compact, mixed use development, improving and electrifying the CBJ transit system, and supporting non-motorized transportation.

D. Support efforts to provide new renewable energy supplies for Juneau.

Expansion of hydropower resources is the most obvious opportunity for increasing the supply of renewable energy in Juneau. Rain and the power that it creates is one of our major resources. New small and mid-sized hydroelectric sites have been identified by AEL&P and Juneau Hydropower. These projects require large up front investments and coordination of demand growth.

More research, development and economic viability studies are needed to identify the potential of other local renewable energy sources, including wind, solar, tidal and biomass, as well as energy storage. Some of these studies may have been done already but are commercially confidential. Currently there are few apparent incentives or economic conditions that would allow these to compete with local hydropower or fossil fuels imported to the community. Electrification of local mining operations using hydropower has played a key role in financing existing renewable sources, and may continue to play such a role in the future.

5.3 IMPLEMENTATION

Each of these broad strategies requires substantial work to pull together appropriate actors, champions, and organizations, and to develop specific action and implementation plans. Many priority actions are identified in the Juneau Climate Action and Implementation Plan, while others were identified during development of this plan.

There is no silver bullet, or simple path, for accomplishing the ambitious goal of transitioning from fossil fuels to renewable sources, and no single entity or organization that can implement it alone. Instead, a wide variety of actors are involved in making energy choices, including individual home and vehicle owners, businesses, energy suppliers such as AEL&P, Juneau Hydropower, Juneau District Heating, fuel companies, and government agencies.

This plan emphasizes the role of the CBJ, both because it can take actions that save public money while reducing fossil fuel use, and because it represents community values and interests. But expanding use and supplies of local renewable energy can only be achieved through cooperation and collaboration between a range of private and public entities.

Fortunately Juneau has many individuals and groups experimenting with, and tackling these issues. The Renewable Energy Cluster Working Group, JEDC, with its work on incentives for electric vehicles, and the development of concepts for a Juneau heating district provides a good model. Other local examples come from innovative local businesses such as the Alaska Brewing Company, with its "beer-powered beer", using waste grain products to improve energy efficiency, lower operating costs and increase profits.

Energy efficiency is frequently the most cost-effective way to reduce and transition energy use. Land use policies supporting compact, mixed use development are also important for reducing energy costs, as well as being a key solution to housing affordability problems, as identified in the CBJ Housing Action Plan (2016).

The strategies recommended here are consistent with, and support recommendations concerning affordable housing in the Juneau Economic Development Plan (2015) and the CBJ Housing Action Plan (2016). Costs for space heating and domestic hot water significantly affect housing affordability. Many homes, and most multi-family rental units, use less cost effective electric resistance heat. Improving energy efficiency and shifting from electric baseboard heat to heat pumps can substantially reduce heating costs. Developing ways to encourage and finance conversions would be a win-win for AEL&P, renters, landlords, and Juneau's climate impacts.

Greater attention to land use and compact development are also major recommendations made in the Juneau Economic Development Plan and the CBJ Housing Action Plan

> *"CBJ's plans, zoning ordinance, development codes, and Land Management Plan, must all stress the value of utilizing existing infrastructure before building new and maximizing old and new infrastructure through higher densities and greater concentrations of uses wherever appropriate. " p. 20, Housing Action Plan.*

While the recommended priority actions might change from time to time as new information becomes available, the strategies provide a more constant direction of what the CBJ and our community is working towards. It is therefore recommended that the strategies be used as the basis for reporting progress to the CBJ Mayor and Assembly.

5.4 ROLE OF CBJ

As a local government, the CBJ can use powers granted by legislation and within their mandate to help direct the future of the community to mobilize action on Energy. The City should work jointly with its partners and residents. Beyond its regulatory capabilities, CBJ is in a position to lead by example, through implementing energy efficiency actions within its own operations. Finally, in areas where CBJ has limited control but significant influence, CBJ can impact the uptake of the priority actions

In general, it is recommended that the CBJ act as the lead agency coordinating and monitoring the implementation of the JRES and JCAIP. While the JRES identifies actions that fall within the

City's authority, it also identifies actions that rely on community partners and organizations to succeed. The City's role is to help coordinate various efforts and partners in the community around the issues and specific actions that fall outside of its mandate.

5.5 CBJ ENERGY MANAGER

While it may be possible for existing CBJ staff to support implementation of the priority strategies and associated actions, the experience of other municipalities, and the slow pace of JCAIP implementation, teaches that dedicated staff with authority are needed for effective energy programs. The CBJ should hire an Energy Manager whose authority and responsibility is to directly implement, coordinate and participate in the implementation of the actions identified in this document and the JCAIP.

The Energy Manager will also be the key person and point of contact responsible for monitoring and reporting on implementation progress of the strategies identified here and also those in JCAIP. The annual reporting process is an opportunity to review progress on actions and to identify new action priorities for the upcoming year.

The Energy Manager would also:

- Undertake periodic energy use audits for CBJ facilities and operations.
- Develop measurable energy sub-goals for Juneau.
- Assess cost-effectiveness of energy efficiency related improvements/upgrades.
- Seek and win grants to support recommended actions, and potentially fund the position.
- Bring together relevant CBJ divisions and organizations outside CBJ to implement recommended actions.
- Promote energy conservation practices to CBJ employees.
- Integrate energy and sustainability decisions into all CBJ operations.

Together with savings identified (both immediate and future years) and grants won for CBJ, it is envisioned that this position would support itself through energy cost savings. However, initial funding could use the CBJ energy fund to finance this position. Accordingly, the position could be for an initial two year period and reviewed annually thereafter. The Juneau School district is an excellent example of what can be achieved an Energy Manager as proven with their energy and financial savings success.

5.6 CONCLUSIONS

This renewable energy strategy provides background information on current energy use in Juneau and a discussion of the implications of optimizing more resilient and more efficient approaches to satisfying the community's energy requirements. The plan identifies prioritized actions that CBJ can directly implement which will deliver energy and cost savings within the CBJ organization and assist community level energy initiatives and solutions. The plan is designed to provide flexibility to respond to changing conditions while providing a platform to encourage

and support energy conservation, energy transformation and a range of renewable energy options.

Overall, the JRES proposed actions and recommendations are consistent with those that would be necessary to address the general aim of the 2011 Juneau Climate Action and Implementation Plan, including reducing Juneau's dependence on imported fossil fuels and its GHG emissions. The Renewable Energy Strategy adds emphasis on the vulnerability of the community given its heavy reliance on fuels that are imported and are subject to external forces on supply price. Using hydroelectricity to replace existing fossil fuels has a number of implications for electricity availability and costs, with new generation and distribution infrastructure required with community energy transformation and growth. Alternative means to providing energy for uses such as space heating are required.

CBJ can undertake a number of actions within its own organization to deliver significant energy and cost savings. It is expected there are many situations where aggressively pursuing the actions now will deliver greater lifecycle savings over time.

Pursuing priority strategies identified in this plan will provide changes in Juneau's energy profile that either represent best value, are most enduring, or provide the quickest means to achieve the desired benefits (hopefully all three of these). However, Juneau must go much further to deliver the savings identified in the 2011 JCAIP to achieve the proposed 80% reduction target in 2045.

Implementation of this plan will require commitment and investment by CBJ, although resulting energy savings could offset this upfront investment. Providing an energy manager tasked with the authority and responsibility for implementing the priority strategies and actions is an overarching, and all encompassing, recommendation.

5.7 RECOMMENDATIONS

This strategy document recommends that the Mayor and Assembly take the following actions to move forward in developing the Juneau Renewable Energy Strategy and delivering on identified priority strategies:

1. Adopt a community target of transforming Juneau's energy use to 80% renewable sources by the year 2045. This guideline will provide direction for further planning and action, position Juneau as a national leader in the transition to renewable energy, and support CBJ, business, and government efforts to obtain financing, including grant assistance, for these purposes.

2. Require development of action plans for each of the strategies identified, and to begin implementing priority near-term actions using the priority action list as a guide to direct early efforts. Direct the Juneau Commission on Sustainability, with CBJ staff help, to seek assistance from the public, JEDC, Juneau Chamber of Commerce, and other organizations to develop and obtain support for these plans

3. Direct the CBJ organization to implement a formal energy management program. This recommendation will require all departments and independent boards to identify and monitor energy use and costs; evaluate potential energy savings and implement cost effective efficiency measures; explicitly incorporate energy usage into operational decision making and the Capital Improvement Program (CIP), as recommended in the CBJ Comprehensive Plan and the JCAIP; and implement a Sustainable Indicators program for energy use, consistent with Policy 2.2 of the Comprehensive Plan. A proposal for a CBJ Energy Management System is included in Appendix E.

4. Direct the CBJ, through the JCOS, to monitor community energy use as a whole, by updating the JCAIP Energy and GHG Emissions Inventory at least every three years. *Develop mechanism to gather fuel sales data.*

5. Provide funding direction and CBJ staff allocations to accomplish these recommendations, with the understanding that committed and effective management will ensure that energy savings and energy-related grants will more than offset additional expenses.

6. Direct JCOS, with CBJ staff assistance, to review progress annually on these recommendations, highlighting successful community achievements, dynamically incorporating lessons learned to become more successful in meeting our community energy values as expressed in the JRES and reporting to the Assembly and to the public.

APPENDIX A: JCAIP GOALS, STRATEGIES AND ACTIONS

APPENDIX A: JCAIP GOALS, STRATEGIES AND ACTIONS

The JRES also presents community emission reduction targets for 2032, with detailed goals and strategies by sector:

Sector	2010 Emissions	2032 Reduction Target	Goals and Strategies		Direct Energy /GHG Savings	Return on Investment	Resilience	Significant energy savings	Implemented by/with CBJ	Energy savings vs timeframe	Score
Building	**112,000 MTCO2e**	**46,000 MTCO2e**	**pages 27 - 35**								
Goal B-1: Reduce energy consumption in, and GHG emission produced by, Borough government buildings. *Estimate: 30% emission reduction for CBJ buildings; potential GHG reduction 2,000 MTCO2e.*											
Strategy B1-A. Set energy efficiency standards for all new local government buildings, leased space, and equipment.											
Short-Term Actions			**Responsible Party**								
Set energy efficiency standards for all new local government buildings. Use specific standards that exceed the minimum baselines of such standards as the American Society of Heating, Refrigeration and Air-Conditioning Engineers Energy Efficiency Standard (ASHRAE 90.1 or 90.2), for example, the 10 BTUs per square foot of heated floor area standard. New buildings should aim to achieve a 50% reduction in energy use per square foot compared to existing buildings. GHG emissions abatement and energy efficiency need to be incorporated into the early stages of building design.			CBJ		Y	Y	N	N	Y	N	**3**
Establish a policy that sets minimum energy efficiency standards for space leased by local government. The base standard could be set at 10 BTUs per square foot of heated floor area.			CBJ		Y	N	N	N	Y	Y	**3**
Establish a policy that requires equipment purchased or leased by local government to meet specified energy efficiency standards, such as Energy Star.			CBJ		Y	Y	N	N	Y	Y	**4**
When new construction or upgrades are completed, commission the systems to ensure they are working at maximum efficiency.			CBJ		Y	Y	N	N	Y	Y	**4**
Adopt a policy requiring that all new CBJ government buildings undergo a life cycle analysis and that this information be used to make decisions about energy efficiency and alternative systems.			CBJ		Y	Y	N	N	Y	N	**3**
Strategy B1-B. Reduce energy consumed in and GHG emissions produced by local government buildings.											

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Sector	2010 Emissions	2032 Reduction Target	Goals and Strategies		Direct Energy /GHG Savings	Return on Investment	Resilience	Significant energy savings	Implemented by/with CBJ	Energy savings vs timeframe	Score
Short-Term Actions			**Responsible Party**								
Over the next two years, conduct energy audits on 75% of CBJ buildings (including schools and the hospital). AHFC is currently offering a program that will fund the audits in exchange for providing building data as part of their benchmarking efforts. Audits should be completed on "worst energy offenders" first, and lighting and appliances should be included. Based on the recommended energy conservation opportunities identified in the energy audits, create a schedule for increasing each building's energy efficiency. Implement identified efficiency measures, starting with high priority recommendations.			CBJ		Y	Y	N	N	Y	N	**3**
Establish a local government-wide energy efficiency policy that provides employees with guidelines and requirements for efficient use of the facility, such as by turning off unneeded lights and computers, setting thermostats appropriately, and other energy saving behaviors.			CBJ		Y	N	N	N	Y	Y	**3**
Mount a campaign to educate employees on the importance of saving energy. Give rewards to employees or departments that make quantifiable contributions toward meeting the government's energy conservation goals.			CBJ		Y	Y	N	N	Y	Y	**4**
Commit to an annual maintenance program and ongoing monitoring for local government building heating systems to ensure systems are running at optimum efficiency.			CBJ		Y	Y	N	N	Y	Y	**4**
Support CBJ staff in becoming Association of Energy Engineers Energy Managers LEED-accredited professionals. Ensure personnel responsible for maintaining systems receive the required training.			CBJ		Y	Y	N	N	Y	N	**3**
Set up a system to monitor heating oil, water, and electricity use. Determine if tracking should be done by building, division, or department, and select a system that is easy to install, wireless, and web-based (for example, www.esightenergy.com).			CBJ		Y	Y	N	N	Y	N	**3**
Long-Term Actions			**Responsible Party**								
As staffing and space needs change, ensure space is not wasted in offices, workshops, garages, and storage areas. Consider setting guidelines for the amount of space in square feet required for each office.			CBJ		Y	Y	N	N	Y	N	**3**
Require departments or divisions to pay for fuel/energy out of their own budgets. Designate a staff person to be responsible for overall energy use in each department, division, or building.			CBJ		Y	N	N	N	Y	N	**2**

APPENDIX A: JCAIP GOALS, STRATEGIES AND ACTIONS

Sector	2010 Emissions	2032 Reduction Target	Goals and Strategies		Direct Energy /GHG Savings	Return on Investment	Resilience	Significant energy savings	Implemented by/with CBJ	Energy savings vs timeframe	Score
Continue to implement high, medium, and low-priority measures recommended by the energy audits for local government buildings.			CBJ		Y	Y	N	N	Y	N	**3**
Continue to seek funding from state, federal, and other sources for energy efficiency upgrades. Currently, loans are available for this purpose from the Alaska Energy Efficiency Revolving Loan Fund Program. Consider using Energy Savings Performance Contracts—a method of financing capital projects whereby a private contractor will guarantee a minimum level of energy cost savings resulting from capital upgrades. Make grant writing for energy efficiency-related projects a priority.			CBJ		Y	Y	N	N	Y	N	**3**
Goal B-2: Reduce energy consumed in and emissions produced by state and federal buildings *Estimate: 30% emission reduction for state and federal buildings; potential GHG reduction 3,000 MTCO2e.*											
Strategy B2-A. Reduce energy use in and GHG emissions from new and existing State buildings.											
Short-Term Actions			**Responsible Party**								
Encourage the State to continue to update energy efficiency standards for new State buildings. New buildings should show a 50% reduction in energy requirements per square foot compared to existing buildings.			Local and state governments		Y	Y	N	Y	N	N	**3**
Encourage the State to update policies regarding leased buildings to set minimum enclosure energy efficiency standards for leased space.			Local and state governments		Y	N	N	N	N	N	**1**
Encourage the State to continue to make energy upgrades to existing buildings by securing funding and considering the use of Energy Savings Performance Contracts.			Local and state governments		Y	Y	N	N	N	N	**2**
Consider ways to reduce energy used by the State's computer network. (Examples include purchasing Energystar machines and using virtualization to reduce the number of physical servers, thus reducing the energy required to power and cool them.)			Local and state governments		Y	Y	N	N	N	N	**2**
Long-Term Actions			**Responsible Party**								

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Sector	2010 Emissions	2032 Reduction Target	Goals and Strategies		Direct Energy /GHG Savings	Return on Investment	Resilience	Significant energy savings	Implemented by/with CBJ	Energy savings vs timeframe	Score
Encourage the State to continue to update energy efficiency standards for new State buildings.			Local and state governments		Y	Y	Y	Y	N	Y	**5**
Strategy B2-B. Increase collaboration among the CBJ, State, and Federal Governments.											
Short-Term Actions			**Responsible Party**								
Set up regular meetings with representatives from local, state, and federal government to share ideas, resources, strategies, and innovations for decreasing energy use in public buildings.			Local, state, and federal governments		Y	N	N	N	N	N	**1**
Goal B-3: Reduce energy consumption in, and GHG emissions produced by, commercial buildings (private sector non-residential buildings). *Estimate: 30% emission reduction for state and federal buildings; potential GHG reduction 14,000 MTCO2e.*											
Strategy B3-A. Reduce energy use and GHG emissions in new commercial and industrial buildings.											
Short-Term Actions			**Responsible Party**								
Update the building code to increase energy efficiency requirements for new commercial and industrial buildings. Code should look to exceed minimum standards, such as those laid out by the American Society of Heating, Refrigeration and Air-Conditioning Engineers Energy Efficiency Standard (ASHRAE 90.1 and 90.2).			CBJ		Y	Y	Y	Y	Y	Y	**6**
Strategy B3-B. Reduce energy use and GHG emissions in existing commercial and industrial buildings.											
Short-Term Actions			**Responsible Party**								
Launch a community awareness campaign to promote energy efficiency. Actions could include the installation and use of programmable thermostats, weatherization strategies, and new and/or alternative heating systems. Connect businesses and nonprofits with information on state, federal, or other resources that provide financing for energy efficiency improvements.			CBJ/Community		Y	N	Y	N	Y	N	**3**

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Sector	2010 Emissions	2032 Reduction Target	Goals and Strategies		Direct Energy /GHG Savings	Return on Investment	Resilience	Significant energy savings	Implemented by/with CBJ	Energy savings vs timeframe	Score
Identify largest local energy/heating fuel consumers and work with them to establish and meet energy efficiency targets.			CBJ/Community		Y	Y	N	Y	Y	N	**4**
Set up an award program for business/building owners that have implemented innovative measures to reduce energy consumption. Organize annual tour of award winners to showcase changes local businesses are making.			CBJ/Community		Y	N	Y	N	Y	N	**3**
Encourage real estate agents to include information about energy usage and energy efficiency upgrades when selling commercial buildings.			Private Sector		Y	N	N	N	N	N	**1**
Research financing options to support an incentive program to encourage building owners to undertake energy retrofits. Incentives could include low interest/no interest loans, property tax breaks, or one-time grants. Consider adding new tax on fuel/electricity and using revenue to fund energy efficiency incentives. (Note: Changes to taxes may need to be supported by state statute.)			CBJ		Y	N	N	N	Y	N	**2**
Long-Term Actions			**Responsible Party**								
Implement ongoing financial incentives for energy efficiency measures taken by commercial and industrial building owners.			CBJ/Community		Y	N	Y	N	Y	N	**3**
Goal B-4: Reduce energy consumption in, and GHG emissions produced by, residential buildings. *Estimate: 30% of existing houses completed AFHC-type weatherization; 25% of new houses super-insulated; 75% of new houses meet new energy efficiency standards; potential GHG reduction 27,000 MTCO2e).*											
Strategy B4-A. Reduce energy use and GHG emissions in new residential buildings.											
Short-Term Actions			**Responsible Party**								
Update the building code to increase energy efficiency requirements for new residential buildings. Code should include specific standards, such as those laid out by the American Society of Heating, Refrigeration and Air-Conditioning Engineers (ASHRAE 90.1). New buildings should show 50% reduction in energy requirements per square foot as compared to existing buildings.			CBJ		Y	Y	Y	N	Y	Y	**5**
Promote energy savings technologies by incorporating them into CBJ projects and disseminating information to the public.			CBJ		Y	N	Y	N	Y	Y	**4**
Long-Term Actions			**Responsible Party**								

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Sector	2010 Emissions	2032 Reduction Target	Goals and Strategies		Direct Energy /GHG Savings	Return on Investment	Resilience	Significant energy savings	Implemented by/with CBJ	Energy savings vs timeframe	Score
Work with the State to update the Alaska Building Energy Efficiency Standard (BEES) to require more energy efficient buildings. The BEES is the standard that must be met for a new home to qualify for financing through the Alaska Housing and Finance Corporation. (Current standard is the 2006 International Energy Conservation Code (IECC) with Alaska Specific Amendments).			Local and state governments		Y	N	Y	N	N	N	**2**
Strategy B4-B. Reduce energy use and GHG emissions in existing residential buildings.											
Short-Term Actions			**Responsible Party**								
Educate the community on measures with the most potential to reduce energy consumption and save on heating costs including weatherization, thermostat management, renewable sources, micro-energy production systems, efficient electrical heating, and other new technology. Increase citizens' awareness of Energy Star products. Work with community partners, such as hardware stores, Alaska Energy Authority, and community groups on energy education. Hold annual workshop on how to get homes ready for winter. Sponsor a "button up your home" weekend around the second weekend in September. Include information on how to reduce electrical energy and water use. Participate in Energy Awareness Month (designated as October by the State of Alaska). Participate in the home show or create a new energy home show. Develop a forum for home owners to exchange information.			CBJ/Community		Y	N	Y	N	N	N	**2**
Provide homeowners with information about State and Federal funding opportunities. Actively support continued funding of energy efficiency incentive programs.			CBJ/Community		Y	N			N		**1**
Evaluate possible incentives local government could offer for home energy and heating efficiency improvements. (Incentives could include no/low interest loans, property tax reduction, waiving permit fees for innovative projects, using a Property Assessed Clean Energy program where the City offers a loan that is paid back through property taxes over 15 to 20 years.) Include incentives aimed at low-income residents and landlords.			CBJ		Y	N	N	N	Y	N	**2**
Lobby the State to continue the Alaska Housing Finance Corporation's Home Energy Rebate program. Investigate and come up with plan to get through the long waiting list and inertia that occurs with current program, where actions taken by owners prior to acceptance into the program have no rebate value.			Local and state governments		Y	Y	N	N	N	N	**2**
Develop an annual award for homeowners who complete innovative energy projects involving both retrofits and new construction and organize a tour of worthy projects.			CBJ		Y	N	N	N	Y	N	**2**

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Sector	2010 Emissions	2032 Reduction Target	Goals and Strategies		Direct Energy /GHG Savings	Return on Investment	Resilience	Significant energy savings	Implemented by/with CBJ	Energy savings vs timeframe	Score
Evaluate ways to provide incentives to home owners to carry out innovative energy projects (including solar hot water, micro-hydro, etc). Consider an annual competitive granting process.			CBJ		Y	N	Y	N	Y	N	**3**
Long-Term Actions			**Responsible Party**								
Implement energy efficiency incentive packages for homeowners.			CBJ		Y	N	Y	N	Y	N	**3**
Strategy B4-C. Support training in energy efficient systems, installation, and maintenance for local builders, electricians, and other tradespersons											
Short-Term Actions			**Responsible Party**								
Set up award program from local companies that excel at completing energy efficiency upgrades and building very energy efficient houses.			CBJ/community partners		Y	N	Y	N	N	N	**2**
Consider local government incentives to encourage local energy-related training courses.			CBJ		Y	N	N	N	Y	N	**2**

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Sector	2010 Emissions	2032 Reduction Target	JCAIP Goals and Strategies		GHG Savings	Bang for buck	Resilience	Significant energy savings	Implemented by/with CBJ	Energy savings vs timeframe	Score
Transportation & Land Use	8,500 MTCO2e	2,300 MTCO2e	pages 47 - 55								
Goal T-1: 25% reduction in emissions from CBJ fleet. *Estimate: 25% emission reduction from CBJ fleet; potential GHG reduction 900 MTCO2e.*											
Strategy T1-A. Expand local government fleet with the most energy efficient vehicles practicable.											
Short-Term Actions			Responsible Party								
Add minimum fuel efficiency standards to criteria for purchasing bids for new vehicles so that lowest bid alone does not win the contract. Standards could include mileage, emissions, and noise.			CBJ		Y	N	Y	N	Y	Y	4
Purchase low or zero-emission vehicles or renewable fuel vehicles to test for fleet use.			CBJ		Y	Y	Y	Y	Y	Y	2
Revise the surplus system within city government so that older less fuel efficient vehicles are no longer shifted from one department to another but removed from the fleet.			CBJ		Y	N	N	N	Y	N	2
Ensure fleet is expanded only for essential purposes.			CBJ		Y	N	N	N	Y	N	2
Long-Term Actions			Responsible Party								
Consider using vehicles from a car sharing organization to reduce the Borough fleet size.			CBJ		Y	Y	Y	Y	Y	Y	6
Modify transportation contracts to incentivize alternative/renewable fuel use (school buses, construction contracts, etc.).			CBJ		Y	Y	Y	Y	Y	Y	6
Strategy T1-B. Reduce emissions associated with existing CBJ fleet.											
Short-Term Actions			Responsible Party								
Improve and increase training for fleet mechanics, especially in newer energy efficient vehicles and technologies, such as hybrids and electric vehicles, and ensure required vehicle tune-ups and maintenance occur in a timely manner.			CBJ		Y	Y	Y	N	Y	N	4
Work with the ADEC, Juneau School Board, and school bus service providers to retrofit school bus fleet with equipment (such as oxidate catalysts) that reduces emissions.			CBJ		N	N	N	N	Y	N	0

APPENDIX A: JCAIP GOALS, STRATEGIES AND ACTIONS

Sector	2010 Emissions	2032 Reduction Target	JCAIP Goals and Strategies		GHG Savings	Bang for buck	Resilience	Significant energy savings	Implemented by/with CBJ	Energy savings vs timeframe	Score
Implement and enforce an anti-idling campaign to restrict idling of CBJ municipal vehicles, allowing flexibility for cold conditions or other situations where increasing the number of starts would be counterproductive.			CBJ		Y	Y	N	N	Y	N	3
Goal T-2: Increase Capital Transit ridership. *Estimate: 40% increase in ridership; potential GHG reduction 4,300 MTCO2e.*											
Strategy T2-A. Expand transit service using most energy efficient vehicles practical.											
Short-Term Actions			Responsible Party								
Update and work to secure funding needed to implement the "optimum scenario" in the Transit Development Plan. Focus on the actions that will have the biggest impact on reducing GHG emissions and energy use.			CBJ		Y	Y	Y	Y	Y	N	5
Long-Term Actions			Responsible Party								
Purchase only alternative/renewable fuel or hybrid transit vehicles in the future.			CBJ		Y	N	Y	N	Y	N	3
Implement all recommendations for the "optimum scenario" in the Transit Development Plan.			CBJ		Y	Y	Y	N	Y	N	4
Build a new maintenance facility to house expanding hybrid/electrical fleet.			CBJ		Y	N	N	N	Y	N	2
Strategy T2-B. Increase public education and provide incentives to increase transit ridership.											
Short-Term Actions			Responsible Party								
Increase public education about the benefits of public transit.			CBJ		Y	Y	N	N	Y	N	3
Offer incentives for CBJ employees to use Capital Transit. Could include discounted bus passes, prizes for individuals or departments with highest rate of transit use, etc.			CBJ		Y	N	N	N	Y	N	2
Encourage employers to offer incentives for employees to use transit (e.g., discount on bus pass, etc.).			Community/Federal State/UAS/CBJ		Y	Y	N	Y	N	Y	4
Work with large employers to set flexible and/or staggered work hours to coordinate with transit schedule and/or reduce crowding on buses.			Community/Federal State/UAS/CBJ		Y	Y	N	N	N	N	2

APPENDIX A: JCAIP GOALS, STRATEGIES AND ACTIONS

Sector	2010 Emissions	2032 Reduction Target	JCAIP Goals and Strategies		GHG Savings	Bang for buck	Resilience	Significant energy savings	Implemented by/with CBJ	Energy savings vs timeframe	Score
Goal T-3: Reduce emissions per vehicle mile driven. *Estimate: 750 electric vehicles replace existing vehicles and 25% of people switch to cars with at least 14mpg efficiency; potential GHG reduction 900 MTCO2e.*											
Strategy T3-A. Reduce emissions associated with existing vehicles.											
Short-Term Actions			Responsible Party								
Pass an ordinance to restrict idling of all vehicles, mount public education campaign, and enforce the ordinance. Students at JDHS launched an anti-idling campaign, and there are now anti-idling signs posted in school pick-up areas; work with students to place signs at all schools.			CBJ/Community		Y	Y	N	N	N	Y	3
Implement city-sponsored driver training program to improve driving habits in order to reduce fuel consumption and emissions.			CBJ		Y	N	N	Y	Y	Y	4
Hold free public workshops on climate friendly driving and vehicle maintenance techniques (e.g., correcting tire pressure).			CBJ/Community		Y	N	N	N	N	N	1
Work with local tour companies to ensure that tour buses are properly equipped and maintained to run as efficiently and cleanly as possible.			CBJ/Tour Companies		Y	N	N	N	N	N	1
Long-Term Actions			Responsible Party								
Set vehicle emissions standards similar to those in California.			CBJ/State		N	Y	N	N	N	N	0
Strategy T3-B. Encourage the use of low-carbon emitting vehicles.											
Short-Term Actions			Responsible Party								
Create free or designated parking spaces and metered charging stations for electric and plug-in hybrid vehicles.			CBJ		Y	N	Y	N	Y	N	3
Develop local incentives for the purchase of fuel efficient vehicles. Examples include free parking for hybrid electric vehicles (Los Angeles), a rebate for purchase of new hybrid electric vehicles (City of Riverside, CA, and an exemption from local sales tax for purchase of new fuel efficient vehicle (many communities).			CBJ		Y	Y	Y	N	Y	N	4
Require every public building to have a minimum number of vehicle plug-ins in each parking lot and parking garage.			CBJ		Y	N	Y	N	Y	N	3

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Sector	2010 Emissions	2032 Reduction Target	JCAIP Goals and Strategies		GHG Savings	Bang for buck	Resilience	Significant energy savings	Implemented by/with CBJ	Energy savings vs timeframe	Score
Reduce parking fees in government-owned garages for vehicles that reach a certain high threshold of fuel-efficiency.			CBJ		Y	Y	Y	N	Y	N	4
Long-Term Actions			Responsible Party								
Make some convenient parking areas only usable by small cars, forcing large vehicles to find parking further away.			CBJ		Y	N	N	N	Y	N	2
Work with tour companies to replace tour buses with more energy efficient models. Consider the feasibility and economic viability of replacing existing fleet with electric buses.			CBJ/Private Sector		Y	Y	N	N	N	N	2
Add low-speed vehicle corridor from Downtown to the Valley by filling in the gaps at Salmon Creek and McNugget intersections			CBJ/State		Y	N	N	N	N	N	1
Goal T-4: Increase bicycle and pedestrian trips. *Estimate: 1000 weekly trips switched from driving to walking, 1000 weekly trips switched from driving to biking, 10% of students walk or bike to and from school 25% emission reduction from CBJ fleet; potential GHG reduction 200 MTCO2e.*											
Strategy T4-A. Implement the Juneau Non-Motorized Transportation Plan.											
Short-Term Actions			Responsible Party								
Work to secure funding for high priority non-motorized transportation projects outlined in the Non-Motorized Transportation Plan.			CBJ/ State DOT		Y	Y	Y	N	N	N	3
Continue to implement recommendations in Non-Motorized Transportation Plan. CBJ government Long-Term Actions.			CBJ		Y	Y	Y	N	Y	N	4
Long-Term Actions			Responsible Party								
Implement the recommendations from the Safe Routes to Schools Plan.			CBJ/ State DOT/School District		Y	N	Y	N	N	N	2
Begin with implementing high priority infrastructure recommendations from the Non-Motorized Transportation Plan. Once completed, work to implement medium and low priority recommendations from the Plan.			CBJ		Y	Y	Y	N	Y	N	4
Strategy T4-B. Use public education and incentives to encourage residents to walk and bike.											

APPENDIX A: JCAIP GOALS, STRATEGIES AND ACTIONS

Sector	2010 Emissions	2032 Reduction Target	JCAIP Goals and Strategies		GHG Savings	Bang for buck	Resilience	Significant energy savings	Implemented by/with CBJ	Energy savings vs timeframe	Score
Short-Term Actions			Responsible Party								
Work with employers to establish incentives for employees to commute via nonmotorized transportation.			State/UAS/ Community		Y	Y	Y	N	N	N	**3**
Install bicycle racks, showers, and other amenities at City facilities to promote bicycle use by agency employees and visitors.			CBJ		Y	N	Y	N	Y	N	**3**
Host or support bike rodeos, bike to work, and other events to promote nonmotorized transportation.			CBJ/ Community Partners		Y	N	Y	N	N	N	**2**
Implement community enforcement, education, and encouragement programs to promote bicycling and walking.			CBJ/ Community Partners		Y	N	Y	N	N	N	**2**
Goal T-5: Reduce overall vehicle miles driven *Estimate: Car pooling incentives offered to 1000 employees, with a 15% reduction in vehicle trips, 100 people join a car sharing organization, public education results in an 8% decrease in vehicle miles driven; potential GHG reduction 16,200 MTCO2e.*											
Strategy T5-A. Develop a car sharing and ride sharing programs.											
Short-Term Actions			Responsible Party								
Designate free on-street parking and convenient spaces in commercial and workplace parking lots for van pool and car pool vehicles.			CBJ/major employers		Y	Y	N	N	N	N	2
Work with community partners to set up a website for car pool networking.			CBJ/ Community		N	Y	N	N	N	N	0
Work with community partners to bring a car sharing program to Juneau.			CBJ/ Community		N	Y	N	N	N	N	0
Work with the community's largest employers to develop van pooling and car pooling programs.			CBJ		N	Y	N	N	Y	N	0
Strategy T5-B. Encourage vehicle trip consolidation.											
Short-Term Actions			Responsible Party								

APPENDIX A: JCAIP GOALS, STRATEGIES AND ACTIONS

Sector	2010 Emissions	2032 Reduction Target	JCAIP Goals and Strategies		GHG Savings	Bang for buck	Resilience	Significant energy savings	Implemented by/with CBJ	Energy savings vs timeframe	Score
Educate the public to plan ahead and consolidate vehicle trips in order to reduce vehicle miles driven.			CBJ/Community		Y	Y	N	N	N	N	2
Goal T-6: Reduce emissions associated with marine transportation. *Estimate: 22% decrease in marine emissions; potential GHG reduction 15,700 MTCO2e.*											
Strategy T6-A. Work with recreational and commercial boaters to reduce emissions and energy use associated with marine transportation.											
Short-Term Actions			Responsible Party								
Work with community partners to hold annual workshops to teach boaters to maintain engines and boats properly for enhanced energy efficiency.			CBJ/ Community Partners		Y	Y	N	N	N	N	2
Work with community partners to hold workshops to inform boaters of enhanced energy efficiency engine maintenance and new technologies.			CBJ/ Community Partners		Y	Y	N	N	N	N	2
Develop a program to encourage the replacement of 2-stroke engines with 4-stroke engines.			CBJ/ Community		Y	Y	N	N	N	N	2
Long-Term Actions			Responsible Party								
Discourage use of 2-stroke engines within the Borough. (Alaska Department of Natural Resources has prohibited 2-stroke engines on the Kenai River.)			CBJ/ Community		Y	Y	N	N	N	N	**2**
Require all cruise ships and other large commercial ships to have the capacity to plug in to Juneau's electric energy supply when in port.			State and local governments/ Cruise Ship Companies		Y	N	Y	Y	N	N	**3**
Mandate new commercial docks to provide electric plug-ins for cruise ships and other commercial vessels, and require that ships use electric power whenever it is available.			CBJ		Y	N	N	Y	N	N	**3**
Select energy efficient designs when choosing new vessels for the Alaska Marine Highway System			State		Y	Y	N	Y	N	Y	**4**
Goal T-7: Reduce emissions associated with air transportation *Estimate: 30% emission reduction in aviation emissions; potential GHG reduction 13,200 MTCO2e.*											
Strategy T7-A. Work with the aviation industry to reduce emissions and energy use.											

APPENDIX A: JCAIP GOALS, STRATEGIES AND ACTIONS

Sector	2010 Emissions	2032 Reduction Target	JCAIP Goals and Strategies		GHG Savings	Bang for buck	Resilience	Significant energy savings	Implemented by/with CBJ	Energy savings vs timeframe	Score
Short-Term Actions			Responsible Party								
Work with local aviation companies to reduce fuel consumption in aviation.			CBJ/ Air service providers		Y	Y	N	Y	N	Y	**4**
Bring local aviation companies, and possibly airplane manufacturers, together to share ideas to reduce fuel use in jets and small aircraft.			CBJ/ Air service providers		Y	Y	N	Y	N	Y	**4**
Goal T-8: Reduce vehicle miles driven by increasing mixed-use development. *Estimate: 550 new transit-oriented dwelling units; potential GHG reduction 400 MTCO2e.*											
Strategy T8-A. Plan compact, mixed-use neighborhoods.											
Short-Term Actions			Responsible Party								
Review the zoning ordinance to determine if updates are needed to promote compact, mixed-use, higher density development and provide realistic green belts or transition areas to reduce impacts from neighborhoods.			CBJ		Y	Y	Y	Y	Y	Y	**6**
Consider increasing building height minimums or minimum residential density in transit served areas.			CBJ		Y	Y	Y	Y	Y	Y	**6**
Provide extra assistance, and possibly an expedited permitting process, for transit oriented development			CBJ		Y	Y	Y	Y	Y	Y	**6**
Long-Term Actions			Responsible Party								
Continue to support development of mixed-use, walkable neighborhoods in Downtown Juneau and Douglas, West Juneau, and Lemon and Switzer Creeks, around schools, Mendenhall Mall, Auke Bay and UAS. Invest in public infrastructure that will support residential development in these areas.			CBJ		Y	Y	Y	Y	Y	Y	6
Strategy T8-B. Manage parking effectively to minimize driving demand and to encourage alternative modes of transportation.											
Short-Term Actions			Responsible Party								
Evaluate the fee structure for public on-street and off-street parking in Downtown Juneau and support efforts to account for and capture the true and market rate for parking.			CBJ		Y	Y	Y	N	Y	Y	5

APPENDIX A: JCAIP GOALS, STRATEGIES AND ACTIONS

Sector	2010 Emissions	2032 Reduction Target	JCAIP Goals and Strategies		GHG Savings	Bang for buck	Resilience	Significant energy savings	Implemented by/with CBJ	Energy savings vs timeframe	Score
Update zoning regulations to set parking maximums instead of parking minimums only.			CBJ		Y	Y	Y	N	Y	Y	5
Long-Term Actions			Responsible Party								
Continue to reduce parking requirements, consider car-lite or car-free development in certain transit served areas; set parking maximums.			CBJ		Y	Y	Y	N	Y	N	4
Strategy T8-C. Improve the pedestrian environment to encourage people to take more trips on foot.											
Short-Term Actions			Responsible Party								
Update the land use code to require better streetscaping and pedestrian amenities with new development. Changes could include requiring landscaping within parking lots, street trees, crosswalks, and pedestrian routes within parking lots, and requiring parking to be located behind, beside, in, or under new buildings so that buildings front the sidewalk.			CBJ		N	Y	Y	N	Y	N	0
Update road and street standards to include wider sidewalks, traffic calming measures in high-pedestrian areas, and shortened pedestrian crossing distances.			CBJ		Y	N	Y	N	Y	N	3
Long-Term Actions			Responsible Party								
Implement recommendations from the Juneau Non-Motorized Transportation Plan to improve the pedestrian environment, including crosswalk and streetscape improvements at specific locations.			CBJ		Y	N	Y	N	Y	N	**3**
Strategy T8-D. Include evaluation of projected GHG emissions in the development review process.											
Short-Term Actions			Responsible Party								
Incorporate an analysis and evaluation of the potential GHG emissions from proposed projects undergoing a development review process. Applicants wishing to develop a building or operation over a certain size threshold could be required to include potential GHG emissions for Planning Commission consideration. Update the land use code appropriately.			CBJ		Y	Y	Y	Y	Y	N	5

APPENDIX A: JCAIP GOALS, STRATEGIES AND ACTIONS

Sector	2010 Emissions	2032 Reduction Target	JCAIP Goals and Strategies		GHG Savings	Bang for buck	Resilience	Significant energy savings	Implemented by/with CBJ	Energy savings vs timeframe	Score
Utilities (CBJ lights, water, wastewater, solid waste)	38,000 MTCO2e	7,600 MTCO2e	page 57								
Goal U-1: Reduce energy consumption and GHG emissions from wastewater treatment. *Estimate: 25% emission reduction from wastewater treatment; potential GHG reduction 600 MTCO2e.*											
Strategy U1-A. Reduce GHG emissions and energy use associated with disposal of sewage sludge.											
Short-Term Actions			Responsible Party								
Evaluate the feasibility of composting all sewage sludge. Consider adding other compostables, such as fish or brewery waste.			CBJ		N	y	y	n	Y	n	0
Long-Term Actions			Responsible Party								
If feasible, develop a system for composting sewage sludge.			CBJ		N	y	y	n	Y	n	0
Strategy U1-B. Reduce GHG emissions and energy use associated with existing wastewater system.											
Short-Term Actions			Responsible Party								
Install Supervisory Control Data Acquisition System in lift stations, to eliminate the need for a staff person to visit on a daily basis.			CBJ		Y	y	n	n	Y	y	4
Complete the high priority Energy Conservation Opportunities outlined in the 2009 Juneau-Douglas and Mendenhall Treatment Plant Energy Audits			CBJ		Y	y	n	n	Y	y	4
Long-Term Actions			Responsible Party								
Complete the medium priority Energy Conservation Opportunities outlined in the 2009 Juneau-Douglas and Mendenhall Treatment Plant Energy Audits.			CBJ		Y	y	n	n	Y	y	4
Goal U-2: Reduce GHG emissions and energy use related to the water system.											
Strategy U2-A: Implement the recommendations of the 2008 energy audit to reduce energy use and emissions related to the existing water system.											
Short-Term Actions			Responsible Party								
Implement the High Priority actions listed in the 2008 Water System Energy Audit.			CBJ		Y	y	n	n	Y	y	4
Long-Term Actions			Responsible Party								
Implement the Low priority actions listed in the 2008 Water System Energy Audit.			CBJ		Y	n	n	n	Y	y	3

APPENDIX A: JCAIP GOALS, STRATEGIES AND ACTIONS

Sector	2010 Emissions	2032 Reduction Target	JCAIP Goals and Strategies		GHG Savings	Bang for buck	Resilience	Significant energy savings	Implemented by/with CBJ	Energy savings vs timeframe	Score
Goal U-3: Reduce overall water use in Juneau											
Strategy U3-A. Implement education programs and incentives to encourage residents to conserve water.											
Short-Term Actions			Responsible Party								
Expand public awareness of the importance of conserving water, including detecting and repairing leaks.			CBJ		N	y	y	n	Y	n	0
Long-Term Actions			Responsible Party								
Adopt incentive program to encourage installation of water conservation measures in existing businesses and homes.			CBJ		N	y	y	n	Y	n	0
Strategy U3-B. Carry out ongoing maintenance and repairs to minimize leaks in the water system.											
Short-Term Actions			Responsible Party								
Expand leak detection and ongoing maintenance and repairs to the water distribution system.			CBJ		N	y	y	n	Y	n	0
Long-Term Actions			Responsible Party								
Upgrade and retrofit CBJ plumbing systems with water conserving technology.			CBJ		N	y	y	n	Y	n	0
Assess, maintain, and repair existing plumbing fixtures and pipes in all government buildings and facilities, including building and parking lot landscaping, public restrooms, and parks and other recreational facilities, to reduce borough-wide water consumption.			CBJ		N	y	y	n	Y	n	0
Strategy U3-C. Consider water metering and increasing charges to encourage water conservation.											
Long-Term Actions			Responsible Party								
Consider introducing a residential water metering program.			CBJ		N	y	y	n	Y	n	0
Goal U-4: Reduce GHG emissions and energy use related to street lighting											
Strategy U4-A. Install energy efficient street lamps.											
Short-Term Actions			Responsible Party								

APPENDIX A: JCAIP GOALS, STRATEGIES AND ACTIONS

Sector	2010 Emissions	2032 Reduction Target	JCAIP Goals and Strategies		GHG Savings	Bang for buck	Resilience	Significant energy savings	Implemented by/with CBJ	Energy savings vs timeframe	Score
Work with AEL&P to maximize the number of energy efficient lights in Juneau. Research what lighting technology is the best for this climate, is economical from a lifecycle perspective, and provides good lighting (Sitka has recently completed a similar study).			CBJ		Y	y	n	y	Y	y	5
For new CBJ fixtures, install only energy efficient fixtures and bulbs.					Y	y	n	n	Y	y	4
Encourage the state DOT&PF to adopt a policy requiring all new bulbs and fixtures to be energy efficient.					Y				N		1
Goal U-5: Reduce GHG emissions and energy use from solid waste processing. *Estimate: Reduce material entering landfill by 25%; potential GHG reduction 1,700 MTCO2e.*											
Strategy U5-A. Reduce the amount of solid waste generated in Juneau.											
Short-Term Actions			Responsible Party								
Mount a campaign to educate residents about the importance of waste reduction. Campaign could encourage use of reusable bags, coffee cups, and plastic water bottles.			CBJ/Community		N				N		0
Promote the utilization of reuse and repair businesses in outreach to businesses and residents.			CBJ		N				Y		0
Work with businesses to reduce/eliminate use of disposable containers or increase use of compostable containers if composting facilities are provided.			CBJ		N				Y		0
Discourage use of single-use plastic bags.			CBJ/Community		N				N		0
Strategy U5-B. Reduce waste associated with local government facilities and operations.											
Short-Term Actions			Responsible Party								
Work with CBJ departments to identify strategies for increasing recycling at Borough facilities.			CBJ/ Friends of Recycling		N				N		0
Complete an audit of waste from various departments and use results to make changes that will reduce waste.			CBJ		N				Y		0
Increase reuse of surplus items. Use freecycle or other giveaway processes for non-salable surplus items.			CBJ		N				Y		0
Consider updating procurement policies to promote purchasing of fewer disposable and more durable items			CBJ		N				Y		0

APPENDIX A: JCAIP GOALS, STRATEGIES AND ACTIONS

Sector	2010 Emissions	2032 Reduction Target	JCAIP Goals and Strategies		GHG Savings	Bang for buck	Resilience	Significant energy savings	Implemented by/with CBJ	Energy savings vs timeframe	Score
Adopt a sustainable procurement policy that seeks to procure all supplies, services, maintenance, construction, and architect-engineer services in a manner that promotes increased energy efficiency and reduced GHG emissions.			CBJ		N				Y		0
Strategy U5-C. Increase the rate of recycling in Juneau and expand capacity to process recycled material.											
Short-Term Actions			Responsible Party								
Educate the public about opportunities for waste reduction and recycling.			CBJ/ Friends of Recycling/Waste Contractor		N				N		0
Make recycling a condition of permits issued by local government for special use and festivals and other events. Increase awareness around best practices and resources for waste reduction at events.			CBJ/Community		N				N		0
Support efforts to increase recycling in public spaces such as the airport and Centennial Hall.			CBJ		N				Y		0
Target commercial operations and institutions to increase participation in waste reduction and recycling efforts.			CBJ/ Friends of Recycling		N				N		0
Keep clothing and fabric out of the landfill by encouraging residents to recycle clothes. Consider innovative options for cloth recycling.			CBJ/Community		N				N		0
Place recycling collection bins in neighborhoods throughout the community, e.g., at schools, shopping centers, or publicly-owned buildings.			CBJ/Recycling Contractor		N				N		0
Add a free store or take-it-or-leave-it location at the landfill where reusable items can be dropped off and picked up.			CBJ/ Waste Contractor		N				N		0
Extend recycling contract from 3 years to 10 years to allow bidder to invest in new infrastructure, increase space, etc.			CBJ		N				Y		0
Implement a curb-side recycling service in Juneau.			CBJ/Recycling Contractor		N				N		0
Encourage businesses to use "deconstruction" services when undertaking demolition and renovation projects, including selective dismantlement of building components for reuse and recycling.			CBJ		N				Y		0
Long-Term Actions			Responsible Party								
Increase capacity of the recycling center and expand the types of items that are recycled, especially plastics.			CBJ/Recycling Contractor		N				N		0
Support local efforts to recycle paper or glass. Update the recycling contract to			CBJ/Recycling		N				N		0

APPENDIX A: JCAIP GOALS, STRATEGIES AND ACTIONS

Sector	2010 Emissions	2032 Reduction Target	JCAIP Goals and Strategies		GHG Savings	Bang for buck	Resilience	Significant energy savings	Implemented by/with CBJ	Energy savings vs timeframe	Score
require contractor to use recyclables locally where possible.			Contractor								
Support a Re-Build facility where construction materials can be salvaged and recycled. Could include construction materials, glass jars, etc. CBJ could donate land or provide an old warehouse or provide land for a building or use a portion of an existing warehouse.			CBJ/Community Partners		N				N		0
Strategy U5-D. Develop a municipal composting system.											
Short-Term Actions			Responsible Party								
Research and develop a municipal composting facility in a central location. Consider composting sewage sludge, fish waste, brewery waste, wood scraps, yard waste, and household compostables, drawing on the composting experiences of other communities in the region, e.g., Gustavus, Haines, and Whitehorse.			CBJ		N				Y		0
Long-Term Actions			Responsible Party	2015							
Consider the feasibility of developing a commercial biomass recovery facility that could accept various biomass waste streams such as sewage sludge, landscape/tree residue, waste/recycled paper and cardboard, and cooking grease, for energy recovery.			CBJ		N				Y		0
Strategy U5-E. Consider a waste-to-energy system for Juneau.											
Long-Term Actions			Responsible Party	2015							
Consider the economic feasibility of developing a waste-to-energy facility in Juneau.			CBJ/Waste Contractor		Y				N		1

Sector	2010 Emissions	2032 Reduction Target	JCAIP Goals and Strategies	2015 Progress:	GHG Savings	Bang for buck	Resilience	Significant energy savings	Implemented by/with CBJ	Energy savings vs timeframe	Score
Mining Non-highway equipment goals	20,477 MTCO2e	5,200 MTCO2e	page 58	2015 Progress: no action							

Goal MC-1: Decrease GHG emissions associated with mining operations. *Estimate: 20% in emissions associated with mining operations; potential GHG reduction 7,600 MTCO2e.*		ongoing completed							
Strategy MC1-A. Work with local mines to reduce GHG emissions and energy use.									
Short-Term Actions	Responsible Party	2015							
Support/provide incentives to encourage the use of renewable energy sources for local industrial operations.	CBJ / Private sector		Y	Y	N	Y	N	Y	4
Incentivize and reward companies that reduce energy use, GHG emissions, and waste.	CBJ		Y	N	N	Y	N	Y	3
Encourage local operations to implement best energy management practices to reduce energy use (e.g. turning off equipment when not in use, keeping motors in good repair, etc.).	CBJ / Private sector		Y	Y	N	Y	N	Y	4
Long-Term Actions	Responsible Party	2015							
When evaluating proposals for new mines or other large industrial projects, consider the potential impact on the community's GHG emissions.	CBJ		Y	N	N	N	Y	N	2
Work with Coeur Alaska to bring a source of renewable energy to the Kensington mine site.	CBJ/Coeur Alaska		Y	Y	Y	Y	N	Y	5
Goal MC-2: Decrease GHG emissions associated with non-highway equipment. *Estimate: 30% emission reduction from non-highway equipment; potential GHG reduction 5,200 MTCO2e.*									
Strategy MC2-A. Work with local companies to reduce GHG emissions and energy use from non-highway equipment.									
Short-Term Actions	Responsible Party	2015							
Support/provide incentives to encourage the use of renewable energy sources for local construction and related operations.	CBJ/Private sector		Y	N	Y	N	N	Y	3
Incentivize and reward companies that reduce energy use, GHG emissions, and waste.	CBJ		Y	N	N	N	Y	Y	3
Encourage local operations to implement best energy management practices to reduce energy use (e.g. turning off equipment when not in use, keeping motors in good repair, etc.).	CBJ/Private sector		Y	Y	N	N	N	Y	3
Long-Term Actions	Responsible Party	2015							
When evaluating proposals for road building or other large industrial projects, consider the potential impact on the community's GHG emissions of both construction and ongoing operation of a project.			Y	N	N	N	N	N	1

APPENDIX A: JCAIP GOALS, STRATEGIES AND ACTIONS

Sector	2010 Emissions	2032 Reduction Target	JCAIP Goals and Strategies		GHG Savings	Bang for buck	Resilience	Significant energy savings	Implemented by/with CBJ	Energy savings vs timeframe	Score
Renewable Energy	20,477 MTCO2e	5,200 MTCO2e	page 59-61								
Goal RE-1: Increase the use of alternative forms of renewable energy for residential and commercial development. *Estimate: 5% emission reduction from buildings; potential GHG reduction 6,900 MTCO2e.*											
Strategy RE1-A. Add incentives for and remove barriers to renewable energy projects.											
Short-Term Actions			Responsible Party	2015							
Update land use code and permitting regimens to allow for micro-hydroelectric and wind projects in all districts.			CBJ		Y	Y	Y	Y	Y	Y	6
Work with AEL&P and the State to implement net metering or energy buy back systems that will allow owners of small renewable systems to receive a credit for energy they produce.			Community partners/ AEL&P		Y	Y	Y	Y	Y	Y	6
Develop a competitive grant process to assist businesses in installing renewable energy systems.			CBJ/Community Partners		Y	Y	Y	Y	Y	Y	6
Long-Term Actions			Responsible Party	2015							
Consider property tax exemption for buildings with renewable energy pilot projects. (Note: Changes to taxes may require changes to state statute.)			CBJ		Y	Y	Y	Y	Y	Y	6
Explore commercial use of energy produced by solid waste treatment.			CBJ/Community Partners		Y	Y	Y	Y	Y	Y	6
Goal RE-2: Develop district heating projects in Juneau.											
Strategy RE2-A. Develop district heating pilot projects.											
Short-Term Actions			Responsible Party	2015							
Evaluate subdivision and other permitting and development codes to ensure that there are no barriers to the use of district heating.			CBJ		Y	Y	Y	Y	Y	Y	6
Evaluate options for implementing a district heating system (possibly using a seawater heat pump) in the Willoughby District. This area would be good for a pilot project as there is a high density of publically owned properties and several properties that are ready for redevelopment.			Local, state, federal governments/ Private Sector Partners		Y	Y	Y	Y	Y	Y	6

APPENDIX A: JCAIP GOALS, STRATEGIES AND ACTIONS

Sector	2010 Emissions	2032 Reduction Target	JCAIP Goals and Strategies		GHG Savings	Bang for buck	Resilience	Significant energy savings	Implemented by/with CBJ	Energy savings vs timeframe	Score
Perform a city-wide study investigating district heating options for such complexes as UAS, Vintage Park, the prison complex, the Hospital area, etc.			Local, state, federal governments/ Private Sector Partners		Y	Y	Y	Y	Y	Y	6
Long-Term Actions			Responsible Party	2015							
If feasible, implement a district heating system in the Willoughby District.			Local, state, federal governments/ Private Sector Partners		Y	Y	Y	Y	Y	Y	6
Pursue funding to implement other feasible district heating projects in Juneau.			CBJ		Y	Y	Y	Y	Y	Y	6
Goal RE-3: Increase Juneau's supply of renewable energy.											
Strategy RE3-A. Develop an energy plan for Juneau to ensure sufficient renewable energy resources for future growth that reduce/eliminate GHG emissions.											
Short-Term Actions			Responsible Party	2015							
Develop an Energy Plan for the community to identify and evaluate the economics of renewable energy sources (including hydroelectric, biomass, solar, tidal, and wind) that will be able to meet the community's needs in the future. The Energy Plan will need to be flexible enough to respond to changing conditions and will need to examine the full range of renewable energy potential and relative costs.			Local, state, federal governments/ Private Sector Partners		Y				N		1
Long-Term Actions			Responsible Party	2015							
Consider the feasibility of other potential hydroelectric sources to meet future needs such as Phase 2 Lake Dorothy (capacity of 94 GWh) and Sweetheart Lake (136 GWh).			AEL&P/Juneau Hydropower Inc/Other Private Sector		Y	Y	Y	Y	N	Y	5
Implement the recommendations of the Energy Plan to identify and develop local renewable energy sources.			Local, state, federal governments/ Private Sector Partners		Y				N		1

APPENDIX A: JCAIP GOALS, STRATEGIES AND ACTIONS

Sector	2010 Emissions	2032 Reduction Target	JCAIP Goals and Strategies		GHG Savings	Bang for buck	Resilience	Significant energy savings	Implemented by/with CBJ	Energy savings vs timeframe	Score
Food Production	(no estimate, minimal GHG emission reduction)		page 62-63								
Goal F-1: Increase local food production.											
Strategy F1-A. Increase access to locally produced organic food for the community by supporting efforts to build more complete and sustainable local food production and distribution systems.											
Short-Term Actions			Responsible Party	2015							
Promote and continue to expand the Juneau farmers market. Consider developing an outdoor covered space that could be used as a market and for other uses.			CBJ/ Community partners		N				N		0
Support/promote commercial agriculture at a scale that the available land in Juneau can support. Focus on agriculture that does not require large land areas.			CBJ/ Community partners		N				N		0
Update land use codes to allow for increased personal use animal husbandry, agriculture, and community gardens.			CBJ		N				Y		0
Encourage and support existing community gardens as well as neighborhood initiatives to launch additional community gardens. Consider avalanche chutes as possible locations.			CBJ/ Community partners		N				N		0
Support local efforts to provide training to residents in farming and gardening techniques.			CBJ/ Community partners		N				N		0
Support local seafood sales on or near the downtown waterfront.			CBJ/ Community partners		N				N		0
Provide gardening information to residents. This could include information on techniques, seeds, local tips and other resources. Work with local partners such as 4H, UAS agriculture, and the Jensen-Olson Arboretum.			CBJ/ Community partners		N				N		0
Long-Term Actions			Responsible Party	2015							
Partner with other Southeast Alaska communities to develop a regional food production plan.			CBJ		N				Y		0
Increase the amount of local food (including local or regional fish) served in school lunches. (Examples of school greenhouses found in Barrow and Sitka school lunch programs.)			CBJ/Community Partners		N				N		0
Consider planting edible plants instead of ornamentals on CBJ lands.			CBJ		N				Y		0
Consider innovative techniques, such as using waste heat for greenhouses or growing vegetables in old mine shafts			CBJ/Community Partners		N				N		0

Finally, the 2011 plan clearly established the need and scope for a Juneau Energy Plan:

Develop an Energy Plan for Juneau. *This plan would identify and evaluate the technical and economic feasibility of renewable energy sources (including hydroelectric, biomass, solar, tidal, and wind) that will be available to meet the community's future need. The Energy Plan will need to be flexible enough to respond to changing conditions and will need to examine the full range of renewable energy options and the relative costs. Completion of an Energy Plan would require input from other levels of government and the private sector (page 26).*

APPENDIX B: RANKED JCAIP ACTIONS THAT FORMED PRIORITY STRATEGIES

APPENDIX B: RANKED JCAIP ACTIONS THAT FORMED PRIORITY STRATEGIES

The following table presents the ranked list of JCAIP actions according to the criteria described in **Section 3.1.2**.

Energy Plan Strategy	JCAIP Goal	JCAIP Strategy	Renewable Energy Strategy KEY 1= CBJ, 2= Buildings, 3 = Transportation, 4= Renewable Energy JCAIP ACTION	Direct Energy/GHG Savings	Return on investment	Resilience	Significant energy savings	Implemented by/with CBJ	Within reasonable timeframe	Score
2	B3	B3-A	Update the building code to increase energy efficiency requirements for new commercial and industrial buildings. Code should look to exceed minimum standards, such as those laid out by the American Society of Heating, Refrigeration and Air-Conditioning Engineers Energy Efficiency Standard (ASHRAE 90.1 and 90.2).	Y	Y	Y	Y	Y	Y	6
2, 3	T8	T8-A	Review the zoning ordinance to determine if updates are needed to promote compact, mixed-use, higher density development and provide realistic green belts or transition areas to reduce impacts from neighborhoods.	Y	Y	Y	Y	Y	Y	6
2,3	T9	T8-A	Consider increasing building height minimums or minimum residential density in transit served areas.	Y	Y	Y	Y	Y	Y	6
3	T10	T8-A	Provide extra assistance, and possibly an expedited permitting process, for transit oriented development	Y	Y	Y	Y	Y	Y	6
3	T11	T8-A	Continue to support development of mixed-use, walkable neighborhoods in Downtown Juneau and Douglas, West Juneau, and Lemon and Switzer Creeks, around schools, Mendenhall Mall, Auke Bay and UAS. Invest in public infrastructure that will support residential development in these areas.	Y	Y	Y	Y	Y	Y	6
4	T12	RE1-A	Update land use code and permitting regimens to allow for micro-hydroelectric and wind projects in all districts.	Y	Y	Y	Y	Y	Y	6
4	T13	RE1-A	Work with AEL&P and the State to implement net metering or energy buy back systems that will allow owners of small renewable systems to receive a credit for energy they produce.	Y	Y	Y	Y	Y	Y	6
4	T14	RE1-A	Develop a competitive grant process to assist businesses in installing renewable energy systems.	Y	Y	Y	Y	Y	Y	6
2, 4	T15	RE1-A	Consider property tax exemption for buildings with renewable energy pilot projects. (Note: Changes to taxes may require changes to state statute.)	Y	Y	Y	Y	Y	Y	6

APPENDIX B: RANKED JCAIP ACTIONS THAT FORMED ENERY PLAN PRIORITY STRATEGIES

Energy Plan Strategy	JCAIP Goal	JCAIP Strategy	Renewable Energy Strategy KEY 1= CBJ, 2= Buildings, 3 = Transportation, 4= Renewable Energy JCAIP ACTION	Direct Energy/GHG Savings	Return on investment	Resilience	Significant energy savings	Implemented by/with CBJ	Within reasonable timeframe	Score
4	T16	RE1-A	Explore commercial use of energy produced by solid waste treatment.	Y	Y	Y	Y	Y	Y	6
4	T17	RE2-A	Evaluate subdivision and other permitting and development codes to ensure that there are no barriers to the use of district heating.	Y	Y	Y	Y	Y	Y	6
4	T18	RE2-A	Evaluate options for implementing a district heating system (possibly using a seawater heat pump) in the Willoughby District. This area would be good for a pilot project as there is a high density of publically owned properties and several properties that are ready for redevelopment.	Y	Y	Y	Y	Y	Y	6
4	T19	RE2-A	Perform a city-wide study investigating district heating options for such complexes as UAS, Vintage Park, the prison complex, the Hospital area, etc.	Y	Y	Y	Y	Y	Y	6
4	T20	RE2-A	If feasible, implement a district heating system in the Willoughby District.	Y	Y	Y	Y	Y	Y	6
4	T21	RE2-A	Pursue funding to implement other feasible district heating projects in Juneau.	Y	Y	Y	Y	Y	Y	6
1,3,4	T1	T1-A	Modify transportation contracts to incentivize alternative/renewable fuel use (school buses, construction contracts, etc.).	Y	Y	Y	Y	Y	Y	6
1,3	T1	T1-A	Purchase low or zero-emission vehicles or renewable fuel vehicles to test for fleet use.	Y	Y	Y	Y	Y	Y	6
1,3	T1	T1-A	Consider using vehicles from a car sharing organization to reduce the Borough fleet size.	Y	Y	Y	Y	Y	Y	6
2	T22	B2-A	Encourage the State to continue to update energy efficiency standards for new State buildings.	Y	Y	Y	Y	N	Y	5
2	T23	B4-A	Update the building code to increase energy efficiency requirements for new residential buildings. Code should include specific standards, such as those laid out by the American Society of Heating, Refrigeration and Air-Conditioning Engineers (ASHRAE 90.1). New buildings should show 50% reduction in energy requirements per square foot as compared to existing buildings.	Y	Y	Y	N	Y	Y	5
3	T24	T2-A	Update and work to secure funding needed to implement the “optimum scenario” in the Transit Development Plan. Focus on the actions that will have the biggest impact on reducing GHG emissions and energy use.	Y	Y	Y	Y	Y	N	5
3	T25	T8-B	Evaluate the fee structure for public on-street and off-street parking in Downtown Juneau and support efforts to account for and capture the true and market rate for	Y	Y	Y	N	Y	Y	5

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			parking.							
3	T26	T8-B	Update zoning regulations to set parking maximums instead of parking minimums only.	Y	Y	Y	N	Y	Y	5
1,2,3	T27	T8-D	Incorporate an analysis and evaluation of the potential GHG emissions from proposed projects undergoing a development review process. Applicants wishing to develop a building or operation over a certain size threshold could be required to include potential GHG emissions for Planning Commission consideration. Update the land use code appropriately.	Y	Y	Y	Y	Y	N	5
1,2	T28	U4-A	Work with AEL&P to maximize the number of energy efficient lights in Juneau. Research what lighting technology is the best for this climate, is economical from a lifecycle perspective, and provides good lighting (Sitka has recently completed a similar study).	Y	Y	N	Y	Y	Y	5
4	MC 1	MC1-A	Work with Coeur Alaska to bring a source of renewable energy to the Kensington mine site.	Y	Y	Y	Y	N	Y	5
4	RE3	RE3-A	Consider the feasibility of other potential hydroelectric sources to meet future needs such as Phase 2 Lake Dorothy (capacity of 94 GWh) and Sweetheart Lake (136 GWh).	Y	Y	Y	Y	N	Y	5
3	T2	T2-B	Encourage employers to offer incentives for employees to use transit (e.g., discount on bus pass, etc.).	Y	Y	N	Y	N	Y	5
1	B1	B1-A	Establish a policy that requires equipment purchased or leased by local government to meet specified energy efficiency standards, such as Energy Star.	Y	Y	N	N	Y	Y	4
1,2	B2	B1-A	When new construction or upgrades are completed, commission the systems to ensure they are working at maximum efficiency.	Y	Y	N	N	Y	Y	4
1,2,3	B3	B3-B	Identify largest local energy/heating fuel consumers and work with them to establish and meet energy efficiency targets.	Y	Y	N	Y	Y	N	4
1	B4	B4-A	Promote energy savings technologies by incorporating them into CBJ projects and disseminating information to the public.	Y	N	Y	N	Y	Y	4
1,3	B5	T1-A	Add minimum fuel efficiency standards to criteria for purchasing bids for new vehicles so that lowest bid alone does not win the contract. Standards could include mileage, emissions, and noise.	Y	N	Y	N	Y	Y	4
1,3	B6	T1-B	Improve and increase training for fleet mechanics, especially in newer energy efficient vehicles and technologies, such as hybrids and electric vehicles, and ensure required vehicle tune-ups and maintenance occur in a timely manner.	Y	Y	Y	N	Y	N	4

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1,3	T2	T2-A	Implement all recommendations for the "optimum scenario" in the Transit Development Plan.	Y	Y	Y	N	Y	N	4
1,3	T3	T3-A	Implement city-sponsored driver training program to improve driving habits in order to reduce fuel consumption and emissions.	Y	N	N	Y	Y	Y	4
3	T3	T3-B	Develop local incentives for the purchase of fuel efficient vehicles. Examples include free parking for hybrid electric vehicles (Los Angeles), a rebate for purchase of new hybrid electric vehicles (City of Riverside, CA, and an exemption from local sales tax for purchase of new fuel efficient vehicle (many communities).	Y	Y	Y	N	Y	N	4
1,3	T3	T3-B	Reduce parking fees in government-owned garages for vehicles that reach a certain high threshold of fuel-efficiency.	Y	Y	Y	N	Y	N	4
3	T4	T4-A	Continue to implement recommendations in Non-Motorized Transportation Plan. CBJ government Long-Term Actions.	Y	Y	Y	N	Y	N	4
3	T4	T4-A	Begin with implementing high priority infrastructure recommendations from the Non-Motorized Transportation Plan. Once completed, work to implement medium and low priority recommendations from the Plan.	Y	Y	Y	N	Y	N	4
3	T6	T6-A	Select energy efficient designs when choosing new vessels for the Alaska Marine Highway System	Y	Y	N	Y	N	Y	4
3	T7	T7-A	Work with local aviation companies to reduce fuel consumption in aviation.	Y	Y	N	Y	N	Y	4
3	T7	T7-A	Bring local aviation companies, and possibly airplane manufacturers, together to share ideas to reduce fuel use in jets and small aircraft.	Y	Y	N	Y	N	Y	4
3	T8	T8-B	Continue to reduce parking requirements, consider car-lite or car-free development in certain transit served areas; set parking maximums.	Y	Y	Y	N	Y	N	4
1	U1	U1-B	Install Supervisory Control Data Acquisition System in lift stations, to eliminate the need for a staff person to visit on a daily basis.	Y	Y	N	N	Y	Y	4
1	U1	U1-B	Complete the high priority Energy Conservation Opportunities outlined in the 2009 Juneau-Douglas and Mendenhall Treatment Plant Energy Audits	Y	Y	N	N	Y	Y	4
1	U1	U1-B	Complete the medium priority Energy Conservation Opportunities outlined in the 2009 Juneau-Douglas and Mendenhall Treatment Plant Energy Audits.	Y	Y	N	N	Y	Y	4
1	U2	U2-A	Implement the High Priority actions listed in the 2008 Water System Energy Audit.	Y	Y	N	N	Y	Y	4

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1	U4	U4-A	For new CBJ fixtures, install only energy efficient fixtures and bulbs.	Y	Y	N	N	Y	Y	4
4	MC 1	MC1-A	Support/provide incentives to encourage the use of renewable energy sources for local industrial operations.	Y	Y	N	Y	N	Y	4
4	MC 1	MC1-A	Encourage local operations to implement best energy management practices to reduce energy use (e.g. turning off equipment when not in use, keeping motors in good repair, etc.).	Y	Y	N	Y	N	Y	4
1,2	B1	B1-A	Set energy efficiency standards for all new local government buildings. Use specific standards that exceed the minimum baselines of such standards as the American Society of Heating, Refrigeration and Air-Conditioning Engineers Energy Efficiency Standard (ASHRAE 90.1 or 90.2), for example, the 10 BTUs per square foot of heated floor area standard. New buildings should aim to achieve a 50% reduction in energy use per square foot compared to existing buildings. GHG emissions abatement and energy efficiency need to be incorporated into the early stages of building design.	Y	Y	N	N	Y	N	3
1,2	B1	B1-A	Establish a policy that sets minimum energy efficiency standards for space leased by local government. The base standard could be set at 10 BTUs per square foot of heated floor area.	Y	N	N	N	Y	Y	3
1,2	B1	B1-A	Adopt a policy requiring that all new CBJ government buildings undergo a life cycle analysis and that this information be used to make decisions about energy efficiency and alternative systems.	Y	Y	N	N	Y	N	3
1,2	B1	B1-B	Over the next two years, conduct energy audits on 75% of CBJ buildings (including schools and the hospital). AHFC is currently offering a program that will fund the audits in exchange for providing building data as part of their benchmarking efforts. Audits should be completed on "worst energy offenders" first, and lighting and appliances should be included. Based on the recommended energy conservation opportunities identified in the energy audits, create a schedule for increasing each building's energy efficiency. Implement identified efficiency measures, starting with high priority recommendations.	Y	Y	N	N	Y	N	3
1,2	B1	B1-B	Commit to an annual maintenance program and ongoing monitoring for local government building heating systems to ensure systems are running at optimum efficiency.	Y	Y	N	N	Y	N	3
1,2	B1	B1-B	Set up a system to monitor heating oil, water, and electricity use. Determine if tracking should be done by building, division, or department, and select a system that is easy to	Y	Y	N	N	Y	N	3

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			install, wireless, and web-based (for example, www.esightenergy.com).							
1,2	**B1**	**B1-B**	As staffing and space needs change, ensure space is not wasted in offices, workshops, garages, and storage areas. Consider setting guidelines for the amount of space in square feet required for each office.	Y	Y	N	N	Y	N	**3**
1,2	**B1**	**B1-B**	Continue to implement high, medium, and low-priority measures recommended by the energy audits for local government buildings.	Y	Y	N	N	Y	N	**3**
1,2	**B1**	**B1-B**	Continue to seek funding from state, federal, and other sources for energy efficiency upgrades. Currently, loans are available for this purpose from the Alaska Energy Efficiency Revolving Loan Fund Program. Consider using Energy Savings Performance Contracts—a method of financing capital projects whereby a private contractor will guarantee a minimum level of energy cost savings resulting from capital upgrades. Make grant writing for energy efficiency-related projects a priority.	Y	Y	N	N	Y	N	**3**
2	**B2**		Encourage the State to continue to update energy efficiency standards for new State buildings. New buildings should show a 50% reduction in energy requirements per square foot compared to existing buildings.	Y	Y	N	Y	N	N	**3**
2	**B3**	**B3-B**	Launch a community awareness campaign to promote energy efficiency. Actions could include the installation and use of programmable thermostats, weatherization strategies, and new and/or alternative heating systems. Connect businesses and nonprofits with information on state, federal, or other resources that provide financing for energy efficiency improvements.	Y	N	Y	N	Y	N	**3**
2,3,4	**B3**	**B3-B**	Set up an award program for business/building owners that have implemented innovative measures to reduce energy consumption. Organize annual tour of award winners to showcase changes local businesses are making.	Y	N	Y	N	Y	N	**3**
2	**B3**	**B3-B**	Implement ongoing financial incentives for energy efficiency measures taken by commercial and industrial building owners.	Y	N	Y	N	Y	N	**3**
2,4	**B4**	**B4-B**	Evaluate ways to provide incentives to home owners to carry out innovative energy projects (including solar hot water, micro-hydro, etc). Consider an annual competitive granting process.	Y	N	Y	N	Y	N	**3**
2	**B4**	**B4-B**	Implement energy efficiency incentive packages for homeowners.	Y	N	Y	N	Y	N	**3**

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1,3	T1	T1-B	Implement and enforce an anti-idling campaign to restrict idling of CBJ municipal vehicles, allowing flexibility for cold conditions or other situations where increasing the number of starts would be counterproductive.	Y	Y	N	N	Y	N	3
1,3	T2	T2-A	Purchase only alternative/renewable fuel or hybrid transit vehicles in the future.	Y	N	Y	N	Y	N	3
1,3	T2	T2-B	Increase public education about the benefits of public transit.	Y	Y	N	N	Y	N	3
3	T3	T3-A	Pass an ordinance to restrict idling of all vehicles, mount public education campaign, and enforce the ordinance. Students at JDHS launched an anti-idling campaign, and there are now anti-idling signs posted in school pick-up areas; work with students to place signs at all schools.	Y	Y	N	N	N	Y	3
1,3	T3	T3-B	Create free or designated parking spaces and metered charging stations for electric and plug-in hybrid vehicles.	Y	N	Y	N	Y	N	3
1,3	T3	T3-B	Require every public building to have a minimum number of vehicle plug-ins in each parking lot and parking garage.	Y	N	Y	N	Y	N	3
3	T4	T4-A	Work to secure funding for high priority non-motorized transportation projects outlined in the Non-Motorized Transportation Plan.	Y	Y	Y	N	N	N	3
1,3	T4	T4-B	Work with employers to establish incentives for employees to commute via non-motorized transportation.	Y	Y	Y	N	N	N	3
1,3	T4	T4-B	Install bicycle racks, showers, and other amenities at City facilities to promote bicycle use by agency employees and visitors.	Y	N	Y	N	Y	N	3
3	T8	T8-C	Update road and street standards to include wider sidewalks, traffic calming measures in high-pedestrian areas, and shortened pedestrian crossing distances.	Y	N	Y	N	Y	N	3
3	T8	T8-C	Implement recommendations from the Juneau Non-Motorized Transportation Plan to improve the pedestrian environment, including crosswalk and streetscape improvements at specific locations.	Y	N	Y	N	Y	N	3
1	U2	U2-A	Implement the Low priority actions listed in the 2008 Water System Energy Audit.	Y	N	N	N	Y	Y	3
1,2,3,4	MC 1	MC1-A	Incentivize and reward companies that reduce energy use, GHG emissions, and waste.	Y	N	N	Y	N	Y	3
4	MC 2	MC2-A	Support/provide incentives to encourage the use of renewable energy sources for local construction and related operations.	Y	N	Y	N	N	Y	3

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1,2,3,4	MC 2	MC2-A	Incentivize and reward companies that reduce energy use, GHG emissions, and waste.	Y	N	N	N	Y	Y	3
2,3	MC 2	MC2-A	Encourage local operations to implement best energy management practices to reduce energy use (e.g. turning off equipment when not in use, keeping motors in good repair, etc.).	Y	Y	N	N	N	Y	3
2	T6	T6-A	Require all cruise ships and other large commercial ships to have the capacity to plug in to Juneau's electric energy supply when in port.	Y	N	Y	Y	N	N	2
3	T6	T6-A	Mandate new commercial docks to provide electric plug-ins for cruise ships and other commercial vessels, and require that ships use electric power whenever it is available.	Y	N	Y	Y	N	N	2
1	B1	B1-B	Establish a local government-wide energy efficiency policy that provides employees with guidelines and requirements for efficient use of the facility, such as by turning off unneeded lights and computers, setting thermostats appropriately, and other energy saving behaviors.	Y	N	N	N	Y	N	2
1	B1	B1-B	Mount a campaign to educate employees on the importance of saving energy. Give rewards to employees or departments that make quantifiable contributions toward meeting the government's energy conservation goals.	Y	N	N	N	Y	N	2
1	B1	B1-B	Support CBJ staff in becoming Association of Energy Engineers Energy Managers LEED-accredited professionals. Ensure personnel responsible for maintaining systems receive the required training.	Y	N	N	N	Y	N	2
1,2,3	B1	B1-B	Require departments or divisions to pay for fuel/energy out of their own budgets. Designate a staff person to be responsible for overall energy use in each department, division, or building.	Y	N	N	N	Y	N	2
2	B2	B2-A	Encourage the State to continue to make energy upgrades to existing buildings by securing funding and considering the use of Energy Savings Performance Contracts.	Y	Y	N	N	N	N	2
2	B2	B2-A	Consider ways to reduce energy used by the State's computer network. (Examples include purchasing Energystar machines and using virtualization to reduce the number of physical servers, thus reducing the energy required to power and cool them.)	Y	Y	N	N	N	N	2
2	B3	B3-B	Research financing options to support an incentive program to encourage building owners to undertake energy retrofits. Incentives could include low interest/no interest loans, property tax breaks, or one-time grants. Consider adding new tax on fuel/electricity and using revenue to fund energy efficiency incentives. (Note: Changes to taxes may need to be supported by state statute.)	Y	N	N	N	Y	N	2

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2	**B4**	**B4-A**	Work with the State to update the Alaska Building Energy Efficiency Standard (BEES) to require more energy efficient buildings. The BEES is the standard that must be met for a new home to qualify for financing through the Alaska Housing and Finance Corporation. (Current standard is the 2006 International Energy Conservation Code (IECC) with Alaska Specific Amendments).	Y	N	Y	N	N	N	**2**
2,4	**B4**	**B4-B**	Educate the community on measures with the most potential to reduce energy consumption and save on heating costs including weatherization, thermostat management, renewable sources, micro-energy production systems, efficient electrical heating, and other new technology. Increase citizens' awareness of Energy Star products. Work with community partners, such as hardware stores, Alaska Energy Authority, and community groups on energy education. Hold annual workshop on how to get homes ready for winter. Sponsor a "button up your home" weekend around the second weekend in September. Include information on how to reduce electrical energy and water use. Participate in Energy Awareness Month (designated as October by the State of Alaska). Participate in the home show or create a new energy home show. Develop a forum for home owners to exchange information.	Y	N	Y	N	N	N	**2**
2	**B4**	**B4-B**	Evaluate possible incentives local government could offer for home energy and heating efficiency improvements. (Incentives could include no/low interest loans, property tax reduction, waiving permit fees for innovative projects, using a Property Assessed Clean Energy program where the City offers a loan that is paid back through property taxes over 15 to 20 years.) Include incentives aimed at low-income residents and landlords.	Y	N	N	N	Y	N	**2**
2	**B4**	**B4-B**	Lobby the State to continue the Alaska Housing Finance Corporation's Home Energy Rebate program. Investigate and come up with plan to get through the long waiting list and inertia that occurs with current program, where actions taken by owners prior to acceptance into the program have no rebate value.	Y	Y	N	N	N	N	**2**
2	**B4**	**B4-B**	Develop an annual award for homeowners who complete innovative energy projects involving both retrofits and new construction and organize a tour of worthy projects.	Y	N	N	N	Y	N	**2**
2	**B4**	**B4-C**	Set up award program from local companies that excel at completing energy efficiency upgrades and building very energy efficient houses.	Y	N	Y	N	N	N	**2**
1,3	**B4**	**B4-C**	Consider local government incentives to encourage local energy-related training courses.	Y	N	N	N	Y	N	**2**

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1,3	T1	T1-A	Revise the surplus system within city government so that older less fuel efficient vehicles are no longer shifted from one department to another but removed from the fleet.	Y	N	N	N	Y	N	2
1,3	T1	T1-A	Ensure fleet is expanded only for essential purposes.	Y	N	N	N	Y	N	2
1,3	T2	T2-A	Build a new maintenance facility to house expanding hybrid/electrical fleet.	Y	N	N	N	Y	N	2
1,3	T2	T2-B	Offer incentives for CBJ employees to use Capital Transit. Could include discounted bus passes, prizes for individuals or departments with highest rate of transit use, etc.	Y	N	N	N	Y	N	2
3	T2	T+C104:K1052-B	Work with large employers to set flexible and/or staggered work hours to coordinate with transit schedule and/or reduce crowding on buses.	Y	Y	N	N	N	N	2
3	T3	T3-B	Make some convenient parking areas only usable by small cars, forcing large vehicles to find parking further away.	Y	N	N	N	Y	N	2
3	T3	T3-B	Work with tour companies to replace tour buses with more energy efficient models. Consider the feasibility and economic viability of replacing existing fleet with electric buses.	Y	Y	N	N	N	N	2
1,3	T4	T4-A	Implement the recommendations from the Safe Routes to Schools Plan.	Y	N	Y	N	N	N	2
3	T4	T4-B	Host or support bike rodeos, bike to work, and other events to promote nonmotorized transportation.	Y	N	Y	N	N	N	2
3	T4	T4-B	Implement community enforcement, education, and encouragement programs to promote bicycling and walking.	Y	N	Y	N	N	N	2
3	T5	T5-A	Designate free on-street parking and convenient spaces in commercial and workplace parking lots for van pool and car pool vehicles.	Y	Y	N	N	N	N	2
3	T5	T5-B	Educate the public to plan ahead and consolidate vehicle trips in order to reduce vehicle miles driven.	Y	Y	N	N	N	N	2
3	T6	T6-A	Work with community partners to hold annual workshops to teach boaters to maintain engines and boats properly for enhanced energy efficiency.	Y	Y	N	N	N	N	2
3	T6	T6-A	Work with community partners to hold workshops to inform boaters of enhanced energy efficiency engine maintenance and new technologies.	Y	Y	N	N	N	N	2
3	T6	T6-A	Develop a program to encourage the replacement of 2-stroke engines with 4-stroke engines.	Y	Y	N	N	N	N	2

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3	T6	T6-A	Discourage use of 2-stroke engines within the Borough. (Alaska Department of Natural Resources has prohibited 2-stroke engines on the Kenai River.)	Y	Y	N	N	N	N	2
1,2,3,4	MC 1	MC1-A	When evaluating proposals for new mines or other large industrial projects, consider the potential impact on the community's GHG emissions.	Y	N	N	N	Y	N	2
2	B2	B2-A	Encourage the State to update policies regarding leased buildings to set minimum enclosure energy efficiency standards for leased space.	Y	N	N	N	N	N	1
2	B2	B2-B	Set up regular meetings with representatives from local, state, and federal government to share ideas, resources, strategies, and innovations for decreasing energy use in public buildings.	Y	N	N	N	N	N	1
2	B3	B3-B	Encourage real estate agents to include information about energy usage and energy efficiency upgrades when selling commercial buildings.	Y	N	N	N	N	N	1
2	B4	B4-B	Provide homeowners with information about State and Federal funding opportunities. Actively support continued funding of energy efficiency incentive programs.	Y	N			N		1
3	T3	T3-A	Hold free public workshops on climate friendly driving and vehicle maintenance techniques (e.g., correcting tire pressure).	Y	N	N	N	N	N	1
3	T3	T3-A	Work with local tour companies to ensure that tour buses are properly equipped and maintained to run as efficiently and cleanly as possible.	Y	N	N	N	N	N	1
3	T3	T3-B	Add low-speed vehicle corridor from Downtown to the Valley by filling in the gaps at Salmon Creek and McNugget intersections	Y	N	N	N	N	N	1
3	U4	U4-A	Encourage the state DOT&PF to adopt a policy requiring all new bulbs and fixtures to be energy efficient.	Y				N		1
1,4	U5	U5-E	Consider the economic feasibility of developing a waste-to-energy facility in Juneau.	Y				N		1
3	MC 2	MC2-A	When evaluating proposals for road building or other large industrial projects, consider the potential impact on the community's GHG emissions of both construction and ongoing operation of a project.	Y	N	N	N	N	N	1
1,2,3,4	RE3	RE3-A	Develop an Energy Plan for the community to identify and evaluate the economics of renewable energy sources (including hydroelectric, biomass, solar, tidal, and wind) that will be able to meet the community's needs in the future. The Energy Plan will need to be flexible enough to respond to changing conditions and will need to examine the full range of renewable energy potential and relative costs.	Y				N		1

APPENDIX B: RANKED JCAIP ACTIONS THAT FORMED ENERY PLAN PRIORITY STRATEGIES

Energy Plan Strategy	JCAIP Goal	JCAIP Strategy	Renewable Energy Strategy KEY 1= CBJ, 2= Buildings, 3 = Transportation, 4= Renewable Energy JCAIP ACTION	Direct Energy/GHG Savings	Return on investment	Resilience	Significant energy savings	Implemented by/with CBJ	Within reasonable timeframe	Score
4	RE3	RE3-A	Implement the recommendations of the Energy Plan to identify and develop local renewable energy sources.	Y				N		1
3	T1	T1-B	Work with the ADEC, Juneau School Board, and school bus service providers to retrofit school bus fleet with equipment (such as oxidate catalysts) that reduces emissions.	N	N	N	N	Y	N	0
3	T3	T3-A	Set vehicle emissions standards similar to those in California.	N	Y	N	N	N	N	0
3	T5	T5-A	Work with community partners to set up a website for car pool networking.	N	Y	N	N	N	N	0
3	T5	T5-A	Work with community partners to bring a car sharing program to Juneau.	N	Y	N	N	N	N	0
3	T5	T5-A	Work with the community's largest employers to develop van pooling and car pooling programs.	N	Y	N	N	Y	N	0
3	T8	T8-C	Update the land use code to require better streetscaping and pedestrian amenities with new development. Changes could include requiring landscaping within parking lots, street trees, crosswalks, and pedestrian routes within parking lots, and requiring parking to be located behind, beside, in, or under new buildings so that buildings front the sidewalk.	N	Y	Y	N	Y	N	0
1	U1	U1-A	Evaluate the feasibility of composting all sewage sludge. Consider adding other compostables, such as fish or brewery waste.	N	Y	Y	N	Y	N	0
1	U1	U1-A	If feasible, develop a system for composting sewage sludge.	N	Y	Y	N	Y	N	0
1	U3	U3-A	Expand public awareness of the importance of conserving water, including detecting and repairing leaks.	N	Y	Y	N	Y	N	0
2	U3	U3-A	Adopt incentive program to encourage installation of water conservation measures in existing businesses and homes.	N	Y	Y	N	Y	N	0
1	U3	U3-B	Carry out ongoing maintenance and repairs to minimize leaks in the water system.					N		0
1	U3	U3-B	Expand leak detection and ongoing maintenance and repairs to the water distribution system.	N	Y	Y	N	Y	N	0
1	U3	U3-B	Upgrade and retrofit CBJ plumbing systems with water conserving technology.	N	Y	Y	N	Y	N	0

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1,2	**U3**	**U3-B**	Assess, maintain, and repair existing plumbing fixtures and pipes in all government buildings and facilities, including building and parking lot landscaping, public restrooms, and parks and other recreational facilities, to reduce borough-wide water consumption.	N	Y	Y	N	Y	N	**0**
1	**U3**	**U3-C**	Consider introducing a residential water metering program.	N	Y	Y	N	Y	N	**0**
NA	**U5**	**U5-A**	Mount a campaign to educate residents about the importance of waste reduction. Campaign could encourage use of reusable bags, coffee cups, and plastic water bottles.	N				N		**0**
NA	**U5**	**U5-A**	Promote the utilization of reuse and repair businesses in outreach to businesses and residents.	N				Y		**0**
NA	**U5**	**U5-A**	Work with businesses to reduce/eliminate use of disposable containers or increase use of compostable containers if composting facilities are provided.	N				Y		**0**
NA	**U5**	**U5-A**	Discourage use of single-use plastic bags.	N				N		**0**
NA	**U5**	**U5-B**	Work with CBJ departments to identify strategies for increasing recycling at Borough facilities.	N				N		**0**
NA	**U5**	**U5-B**	Complete an audit of waste from various departments and use results to make changes that will reduce waste.	N				Y		**0**
NA	**U5**	**U5-B**	Increase reuse of surplus items. Use freecycle or other giveaway processes for non-salable surplus items.	N				Y		**0**
NA	**U5**	**U5-B**	Consider updating procurement policies to promote purchasing of fewer disposable and more durable items	N				Y		**0**
NA	**U5**	**U5-B**	Adopt a sustainable procurement policy that seeks to procure all supplies, services, maintenance, construction, and architect-engineer services in a manner that promotes increased energy efficiency and reduced GHG emissions.	N				Y		**0**
NA	**U5**	**U5-C**	Educate the public about opportunities for waste reduction and recycling.	N				N		**0**
NA	**U5**	**U5-C**	Make recycling a condition of permits issued by local government for special use and festivals and other events. Increase awareness around best practices and resources for waste reduction at events.	N				N		**0**

APPENDIX B: RANKED JCAIP ACTIONS THAT FORMED ENERY PLAN PRIORITY STRATEGIES

Energy Plan Strategy	JCAIP Goal	JCAIP Strategy	Renewable Energy Strategy KEY 1= CBJ, 2= Buildings, 3 = Transportation, 4= Renewable Energy JCAIP ACTION	Direct Energy/GHG Savings	Return on investment	Resilience	Significant energy savings	Implemented by/with CBJ	Within reasonable timeframe	Score
NA	**U5**	**U5-C**	Support efforts to increase recycling in public spaces such as the airport and Centennial Hall.	N				Y		**0**
NA	**U5**	**U5-C**	Target commercial operations and institutions to increase participation in waste reduction and recycling efforts.	N				N		**0**
NA	**U5**	**U5-C**	Keep clothing and fabric out of the landfill by encouraging residents to recycle clothes. Consider innovative options for cloth recycling.	N				N		**0**
NA	**U5**	**U5-C**	Place recycling collection bins in neighborhoods throughout the community, e.g., at schools, shopping centers, or publicly-owned buildings.	N				N		**0**
NA	**U5**	**U5-C**	Add a free store or take-it-or-leave-it location at the landfill where reusable items can be dropped off and picked up.	N				N		**0**
NA	**U5**	**U5-C**	Extend recycling contract from 3 years to 10 years to allow bidder to invest in new infrastructure, increase space, etc.	N				Y		**0**
NA	**U5**	**U5-C**	Implement a curb-side recycling service in Juneau.	N				N		**0**
NA	**U5**	**U5-C**	Encourage businesses to use “deconstruction” services when undertaking demolition and renovation projects, including selective dismantlement of building components for reuse and recycling.	N				Y		**0**
NA	**U5**	**U5-C**	Increase capacity of the recycling center and expand the types of items that are recycled, especially plastics.	N				N		**0**
NA	**U5**	**U5-C**	Support local efforts to recycle paper or glass. Update the recycling contract to require contractor to use recyclables locally where possible.	N				N		**0**
NA	**U5**	**U5-C**	Support a Re-Build facility where construction materials can be salvaged and recycled. Could include construction materials, glass jars, etc. CBJ could donate land or provide an old warehouse or provide land for a building or use a portion of an existing warehouse.	N				N		**0**
NA	**U5**	**U5-D**	Research and develop a municipal composting facility in a central location. Consider composting sewage sludge, fish waste, brewery waste, wood scraps, yard waste, and household compostables, drawing on the composting experiences of other communities in the region, e.g., Gustavus, Haines, and Whitehorse.	N				Y		**0**
NA	**U5**	**U5-D**	Consider the feasibility of developing a commercial biomass recovery facility that could accept various biomass waste streams such as sewage sludge, landscape/tree residue, waste/recycled paper and cardboard, and cooking grease, for energy	N				Y		**0**

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			recovery.							
NA	**F1**	**F1-A**	Promote and continue to expand the Juneau farmers market. Consider developing an outdoor covered space that could be used as a market and for other uses.	N				N		**0**
NA	**F1**	**F1-A**	Support/promote commercial agriculture at a scale that the available land in Juneau can support. Focus on agriculture that does not require large land areas.	N				N		**0**
NA	**F1**	**F1-A**	Update land use codes to allow for increased personal use animal husbandry, agriculture, and community gardens.	N				Y		**0**
NA	**F1**	**F1-A**	Encourage and support existing community gardens as well as neighborhood initiatives to launch additional community gardens. Consider avalanche chutes as possible locations.	N				N		**0**
NA	**F1**	**F1-A**	Support local efforts to provide training to residents in farming and gardening techniques.	N				N		**0**
NA	**F1**	**F1-A**	Support local seafood sales on or near the downtown waterfront.	N				N		**0**
NA	**F1**	**F1-A**	Provide gardening information to residents. This could include information on techniques, seeds, local tips and other resources. Work with local partners such as 4H, UAS agriculture, and the Jensen-Olson Arboretum.	N				N		**0**
NA	**F1**	**F1-A**	Partner with other Southeast Alaska communities to develop a regional food production plan.	N				Y		**0**
NA	**F1**	**F1-A**	Increase the amount of local food (including local or regional fish) served in school lunches. (Examples of school greenhouses found in Barrow and Sitka school lunch programs.)	N				N		**0**
NA	**F1**	**F1-A**	Consider planting edible plants instead of ornamentals on CBJ lands.	N				Y		**0**
NA	**F1**	**F1-A**	Consider innovative techniques, such as using waste heat for greenhouses or growing vegetables in old mine shafts	N				N		**0**

APPENDIX C: COMPREHENSIVE PLAN OF THE CITY AND BOROUGH OF JUNEAU

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APPENDIX C: COMPREHENSIVE PLAN OF THE CITY AND BOROUGH OF JUNEAU, ADOPTED 2013 (ORDINANCE 2013-26)

Juneau's Comprehensive Plan directly addresses the community's future energy needs, vulnerabilities, and strategic priorities in Chapter 6, which is fully devoted to Energy. The plan presents a nuanced, community-based approach for addressing energy issues based on extensive public dialogue. The JRES will treat this document as a community mandate, and incorporate its framework as a clear vision for Juneau's energy future.

Key sections of the chapter's narrative and its twelve policies are inserted below for reference:

Introduction and Narrative (excerpts, page 67, 68, and 71)
The increased use of renewable energy needs to be encouraged to offset energy consumption of non-renewable sources. This should be accomplished in two manners: conservation of energy consumption with more efficient application and reduced need; and increased development of renewable resources. Programs to reduce energy consumption including building envelope heat loss reduction; application of heat pump technology, biomass and other technologies; and LED lighting application, all of which should be supported. Renewable energy producers should be encouraged to continue planning for development, and ultimately the implementation of renewable energy sources, including hydropower, to offset the consumption of non-renewable energy sources.

There is ultimately limited, although substantial, hydroelectric generation potential in the Juneau area, and associated costs of extending transmission lines to remote sites well suited for hydropower development are high. Users should consider taking steps to conserve available energy or private industry will need to speed up the pace of developing and constructing new hydropower facilities based on market forces.

It would be beneficial to the community for the CBJ government to work with utility providers and energy developers to examine these emerging sources, technologies, and funding sources for potential use in the community and as a revenue source when sold to ratepayers such as cruise ships, Greens Creek Mine, the Couer Kensington Gold Mine, and other future large load users.

Energy Planning. Understanding where energy is used in the community (internal and external uses), its sources, and the financial and social implications of energy use is fundamental to establishing a sound policy for energy development and use. In order to implement the policies outlined in this chapter it is necessary to establish a plan for the future use of energy resources in the borough. The Juneau Climate Action and Implementation Plan of 2011 (CAP) contains much more detailed analysis of energy use than is included in this Plan.

Juneau's fossil fuel supply is subject to disruption due to a variety of reasons: embargoes, price hikes, shipping disputes, or disasters, among others. Use of local energy resources reduces these risks. As the Snettisham avalanches of 2008 and 2009 showed, however, dependence on exposed, remote transmission lines for delivering electricity to users exposes the electrical system to unforeseen disruption. Most of the money used to purchase fossil fuels leaves the community. Juneau can have a much healthier local economy if we develop and encourage the use of our

own energy resources that are adequately protected from disruption by relatively predictable natural disasters such as avalanches.

Support State Capital Functions Through Energy Efficiency. As the availability of fossil fuels decreases throughout the world, it will be increasingly important to identify energy-efficient means of assuring cost-effective electronic and physical access to the capital city.

Energy Efficient CBJ Buildings and Projects. In addition to keeping costs to Juneau taxpayers as low as possible and conserving energy in general, it is the role of the CBJ government to set an example for businesses and individuals in adopting cost-effective energy saving technologies and operating procedures.

Maximize Efficient Use of Renewable Energy Resources. In 1995, about 85% of the energy used in Juneau was provided by fossil fuels. By 2010, fossil fuels accounted for only 77% of the total energy consumed in the borough. Conservation and renewable resources could displace much of this fossil fuel and greatly reduce both the dependence on these fuels and the export of capital from Juneau and Alaska.

Full-Cost Analysis. The very real environmental and social costs, now and in future generations, of relying completely on fossil fuels are not included in the prices paid for fossil fuel-based energy. Wise local and global energy production and use requires that external costs be internalized into energy prices, in order to conserve energy and to encourage its production from renewable, low-impact sources. Additionally, federal, state, and municipal budgets are strained with fewer funds trickling down to the city. Working capital or funds available for investment are therefore a scarce resource not unlike energy. Therefore, careful consideration of impact on the local citizenry must include how redirecting scarce dollars to renewable energy or conservation may have a very real impact. Because national and state policies have not been implemented to do this, the CBJ government should take the initiative to protect the long-term interests of its residents. The exact dollar value of these costs is hard to determine, yet they must not be ignored since they ultimately have a major economic impact on the quality of life.

Minimize Utility Investment. The peak rate of energy use (peak load) determines the size of generators, transformers, wires, backup generators, and other equipment needed. The cost of these capital investments has a major impact on rates and can be reduced by leveling out energy use on a daily and seasonal basis. Although these improvements are the responsibility of the utility provider and are in response to market forces, the costs of the improvements are paid by rate payers, including the CBJ government. Accordingly, it is the CBJ government's responsibility to support efforts that encourage non-utility private energy investments which reduce the community's financial investment in the electrical system.

Energy Efficient Buildings. Juneau's maritime climate and comparatively cold winters mean that keeping living spaces warm excessively consume energy if efficient heating, insulating and ventilating practices, materials, equipment and design are not used in the construction of new buildings and in remodeling existing buildings.

Industrial Energy Use. The design and operation of industrial developments can be managed to reduce, transfer, or minimize energy waste and to maximize use of renewable energy. Mining projects tend to be energy intensive and short-lived (tens of years). Within Juneau mining projects could have a great effect on the community's energy economy and be greatly affected by the CBJ energy policy. For industries with large amounts of fuel material by-products (e.g., wood waste), or with high temperature energy by-products (e.g., steam), the generation of electrical energy for sale to the utility grid can be useful and increase overall community

energy efficiency. Similarly, there are industries that produce large amounts of heat as a by-product, e.g., over one megawatt thermal, and that could use this energy resource to displace fossil fuel energy in nearby structures for space heating or other low temperature processes. The CBJ government could play a role in making such projects viable, saving considerable energy dollars for use in the community, rather than for export to pay fossil fuel energy costs.

Public Education on Energy. Individual consumer decisions and behavior are significant in governing the extent of required energy development. Nationally, there is a trend toward using rate incentives to further community energy goals. The effect of these incentives is maximized by advising consumers on how to take advantage of them. Only a well-educated citizenry is able to make well-informed decisions.

Policy 6.1 (page 29)

To work with utility and energy providers to analyze the local energy system, potential renewable energy sources, and emerging technologies; to establish a long-term energy plan; and to implement that plan for the affordable and sustainable use of energy in the community.

#	Action
6.1 - IA1	Analyze Juneau's internal and external energy economies and systems throughout system life-cycles.
6.1 - IA2	Develop and implement a long range energy plan for Juneau that addresses both private-sector, public-sector, and CBJ government energy conservation and management goals, objectives, and an action plan. The plan should consider renewable energy sources, emerging technologies, and other plans being developed within the region and the state.
6.1 - IA3	Host research projects that identify energy sources that use renewable resources such as hydro, tidal, solar, wind, and energy from organic waste (e.g., cellulosic ethanol) that can be used by households, businesses, and the public sector.
6.1 - IA4	(i) Develop and examine scenarios for alternative long-term energy plans, including a risk management plan.
6.1 - IA4	(ii) Based on alternative scenarios, identify courses of action for each scenario.
6.1 - IA4	(iii) Implement actions that maintain flexible energy strategies that best meet Juneau's future energy needs.
6.1 – IA5	Conduct public meetings to explain and develop the community's long-range energy plan.
6.1 – IA6	Once an energy plan is developed, undertake an immediate reconsideration and rewrite of the policies and actions in this chapter for approval by the CBJ Assembly.
6.1 – IA7	Assign a CBJ staff member to work with the Commission on Sustainability and provide them resources as necessary to ensure that Implementing Actions 6.1 – IA1, 2, and 4 are implemented in the near-term.

Policy 6.2 (page 70)

To support the development of renewable energy resources in Juneau and in the Southeast Alaska region.

#	Action
6.2 - IA1	Work with the State of Alaska, Southeast Conference, Tlingit Haida Central Council, Douglas Indian Association, AEL&P, independent energy producers, and other interested entities toward the planning, funding, and development of renewable resources in Juneau and within the region.
6.2 – IA2	Promote conversion from fossil fuel heating systems to geothermal, thermal, heat pump, biomass, or biofuel systems.
6.2 – IA3	Promote the development and use of renewable energy sources to help meet the

	goals, strategies, and objectives of the Juneau Climate Action and Implementation Plan of 2011.

Policy 6.3 (page 70)

To support the development of a Southeast Alaska intertie.

#	Action
6.3 – IA1	Work with the State of Alaska, Southeast Conference, Tlingit Haida Central Council, Douglas Indian Association, AEL&P, independent energy producers, and other interested entities toward the planning, funding, and development of a regional electrical intertie.
6.3 – IA2	Support State of Alaska projects to extend electrical power along Glacier Highway to Cascade Point to improve highway safety, provide emergency services, reduce electrical costs and carbon emissions, and facilitate economic development.

Policy 6.4 (page 70)

To provide cost-effective and energy-efficient facilities, systems and infrastructure that strengthens Juneau's role as the state capital.

#	Standard Operating Procedure
6.4 - SOP1	Invest in energy-efficient technologies and equipment that provide affordable electronic and physical access to state legislative, courts and other governmental agencies for Alaskan residents.
6.4 - SOP2	The CBJ government must weigh the additional costs of public investment up front with long-term savings over the life of the improvement, and the improvement must at least generate a positive return over its life to be implemented.

Policy 6.5 (page 71)

To incorporate technologies and operating practices that will promote efficient and cost effective energy use into all of its new and existing buildings and energy-using projects.

#	Standard Operating Procedure
6.5 - SOP1	Replace inefficient street lighting and lighting in CBJ-owned buildings and facilities with efficient fixtures upon replacement cycle.
#	Implementing Actions
6.5 - IA1	Establish and fund a revolving energy conservation investment fund to invest in energy-saving public projects that meet CBJ government return-on-investment criteria.
6.5 - IA2	Invest in necessary metering equipment to produce monthly project energy reports.
6.5 - IA3	Conduct energy audits and establish energy management goals for CBJ-owned buildings.
6.5 - IA4	Develop and implement a system for rewarding CBJ employee initiative and responsibility in good energy management.
6.5 - IA5	Continue to incorporate LEED-Juneau principles and standards when designing public structures and facilities, with appropriate fuel cost sensitivity analyses over the long term life of the Project.
6.5 - IA6	When designing new facilities or major renovation of CBJ-owned facilities, analyze life-cycle costs of energy applications, and use that analysis to guide future development. [see also 6.7 - IA2]
6.5 - IA7	Analyze the workings of CBJ water and wastewater facilities and incorporate energy-saving methods and technologies where appropriate.
6.5 – IA8	CBJ government is to set an example for businesses and individuals in adopting cost-effective energy-saving technologies and operating procedures. Conduct post-improvement analysis of the energy savings. These results should be published as a

	learning and development tool for the building community.

POLICY 6.6 (page 71 - 72)

To maximize the ratio of local, renewable-source energy to imported fossil-source energy in Juneau's internal energy economy.

#	Standard Operating Procedure
6.6 - SOP1	Encourage energy conservation to reduce the amount of money leaving the community to pay for fuels.
#	Implementing Actions
6.6 - IA1	Seek federal and state funding to convert the CBJ fleet and, particularly, public transit vehicles, to dual-fuel, hybrid, or other fuel technologies with reduced carbon footprints and enhanced sustainability over fossil-fuel burning vehicles.
6.6 - IA2	Where practicable in large industrial operations, encourage co-generation processes to transform by-product heat to electrical energy for use by the operation and adjacent uses or for transmission to a nearby electrical grid.
6.6 - IA3	Where practicable and where there are no significant adverse impacts to marine or other ecosystems, encourage the use of tidal, geothermal, wind, heat pump technologies and other renewable energy sources to generate energy for adjacent uses or for transmission to the electrical grid.
6.6 - IA4	Encourage dual-fuel systems that are cost effective for buildings.
6.6 - IA5	Coordinate with the University of Alaska, other research organizations, and companies to identify potential renewable energy sources to power vehicles, vessels, aircraft, and structures. Analyze both the short- and long-term costs and environmental impacts of energy production and distribution systems giving preference to dependable, cost-competitive, and renewable sources that do not adversely affect natural resources and wildlife habitat when choosing a source of energy.

POLICY 6.7 (page 72-73)

To maximize the efficient use of renewable energy resources.

#	Implementing Actions
6.7 - IA1	Coordinate efforts with the University of Alaska and other research organizations and entities to identify potential renewable energy sources to fuel vehicles, vessels, aircraft, structures, and utilities and to heat structures. Analyze both the short- and long-term costs and environmental impacts of energy production and distribution systems and give preference to dependable, cost-competitive, renewable sources that do not adversely impact natural resources and ecosystems when choosing a source of energy.
6.7 - IA2	When designing new facilities or major renovation of CBJ-owned facilities, analyze life-cycle costs of energy applications with consideration of renewable sources given priority. [see also 6.5 IA6]

POLICY 6.8 (page 73)

To include the full costs (direct and indirect) of energy use in its economic analyses.

#	Standard Operating Procedure
6.8 - SOP1	Use quantifiable external and indirect costs in establishing the cost of energy when conducting life-cycle cost analyses of CBJ-owned facilities, projects, and operations.
#	Implementing Actions

6.8 - IA1	Incorporate energy costs, fuel cost volatility, and inflation into scenario analyses conducted as part of long-term energy planning.

POLICY 6.9 (page 73)

To encourage electrical energy use patterns that minimize utility investment.

#	Implementing Actions
6.9 - IA1	Work with electrical utility providers and energy developers to develop programs and educational materials promoting energy conservation.

POLICY 6.10 (page 73)

To encourage cost effective energy efficient building and remodeling practices.

#	Implementing Actions
6.10 – IA1	Encourage the installation of energy-efficient heating systems in new construction.
6.10 – IA2	Encourage participation in current residential energy efficient mortgage programs and other energy efficiency programs for both new and existing homes and businesses. Encourage favorable lending rate programs for energy efficient multifamily housing and commercial construction or renovation.
6.10 – IA3	Establish energy efficient standards for new and existing buildings and adopt into local building Code, CBJ 19.
6.10 - IA4	Encourage the conversion of existing heating systems from fossil fuel to renewable sources of energy.
6.10 – IA5	Consider enacting water conservation ordinances that lead to significant energy savings for the CBJ government, and in turn to utility customers, in pumping water and in treating wastewater.
6.10 – IA6	Encourage consideration of “life cycle” costs, the use of energy efficient construction techniques, materials, and equipment that are consistent with acceptable health and safety standards and that are appropriate for local climatic conditions, while keeping project costs low.
6.10 – IA7	Consider providing incentives supporting 6.10 – IA6.

POLICY 6.11 (page 74)

To encourage industrial and commercial users to be as efficient as possible in their use of energy, to use renewable energy sources, and to make energy by-products available for use elsewhere in the community.

#	Implementing Actions
6.11 – IA1	Encourage energy intensive projects to follow adopted CBJ energy policy.
6.11 – IA2	Assist those proposing energy intensive projects in understanding, at the earliest point in their projects, the adopted CBJ energy policy.
6.11 – IA3	Require the use of renewable and environmentally-sensitive energy sources for energy intensive projects, where cost effective.
6.11 – IA4	Encourage the development of co-generated electrical energy at avoided cost.
6.11 – IA5	Encourage appropriate land use patterns of development close to potential sources of surplus by-product heat.

POLICY 6.12 (page 75)

To increase public understanding of how individual and CBJ government energy decisions affect individual consumer costs, as well as the livability and sustainability of the community.

#	Implementing Actions
6.12 – IA1	The CBJ Commission on Sustainability and the Juneau School District should work together to improve energy education in K-12 public school educational curriculum within the Juneau Douglas School District, including: energy as a fundamental human need; historical perspective of energy; understanding our local energy system, and how it fits within the regional, state, federal, and world systems; helping students become smart consumers; informing future voters on the need to establish and maintain an energy system that is high quality, secure, equitable, and sustainable; and a multi-disciplinary approach to energy.
6.12 – IA2	Encourage the private sector, with financial assistance from the CBJ government and support from the Commission on Sustainability, to conduct a public education program to explain the benefits of conservation of energy.
6.12 – IA3	Conduct public meetings to explain and discuss the Energy Chapter of this Plan.
6.12 – IA4	Suggest that the Regulatory Commission of Alaska consider allowing utility providers to charge rate payers for the company's investment in conservation efforts and education on a cost benefit basis.

APPENDIX D: PUBLIC CONSULTATION SUMMARY

APPENDIX D: PUBLIC CONSULTATION SUMMARY

JCOS MEETINGS TO DEVELOP THE RENEWABLE ENERGY STRATEGY

The development of this strategy document occurred through a series of JCOS meetings and work sessions held between April 2015 and June 2017. All JCOS meetings and worksessions are open to the public and publically noticed in the Juneau Empire and the CBJ website. Where specific input was needed from certain organizations the consultant Stantec or JCOS invited their participation and input into the Draft Energy Plan (now called Juneau Renewable Energy Strategy) development. Minutes from all JCOS regular meetings can be found on the JCOS website (juneau.org/sustainability).

PUBLIC PRESENTATIONS RELATED TO RENEWABLE ENERGY STRATEGY

The draft Juneau Energy Plan was presented to the Juneau Assembly Committee of the Whole (COW) on July 25th, 2016. A Sustainability Session on the Energy Plan took place on July 27th, 2016. Additional discussions occurred with the Juneau Chamber of Commerce, the Cruise Lines of Alaska (CLIA), and Alaska Electric Light & Power (AEL&P).

Various topics related to the Renewable Energy Strategy were presented at 7 public 'Sustainability Sessions'. These were hosted by JCOS and a variety of other affected groups, and facilitated by the city manager. These were held in the Assembly Chambers or the KTOO Building, were well attended, and gave a chance to discuss issues relating to community energy use and supply. Presenters included AEL&P, Juneau Hydropower, and Alaska Energy Authority.

The sessions were as follows:

- *Explaining Juneau's Electricity System* by representatives from AEL&P
- *Sweetheart Lake Hydroelectric Facility* by Juneau Hydropower Inc.
- *The Case for Electric Vehicles in Juneau - panel discussion*
- *District Heating and Downtown Juneau* by Juneau District Heating
- *Capital Planning: Maintaining and Developing Juneau's Electricity System* by representatives from AEL&P
- *Renewable Heating Alternatives - panel discussion*
- *Emerging Energy Technologies for Alaska* by *AEA*

PUBLIC COMMENT ON DRAFT ENERGY PLAN

The Draft Juneau Community Energy Plan was released for public comment in August 2016. The Draft was posted on the CBJ and JCOS websites where comments could be provided via an online comment box or directly to a dedicated CBJ email address.

The comments were summarized by JCOS according to the key themes they contained. The draft plan received 123 written comments from groups and individuals in 2016. While not necessarily completely representative of the whole of Juneau, most of these (96%) supported the goals and approach of the plan, while 5 expressed opposition or concerns with all or part of the draft. Some comments offered additional information and suggestions for improvements. A response to written comments is provided below, and a summary of comments as **Appendix F**. The full public comments are included as Annex 1 to this document.

By the time the written public comments were received, Stantec had completed it's contract, so the volunteer members of JCOS undertook the job of reviewing them and revising the plan. Representatives of JCOS also met with organizations that expressed concern about the plan. As a result of these discussions JCOS made a number of changes to the plan between December 2016 and July 2017.

The following topics summarize responses to the critical public comments and significant changes made to the plan:

A strategic plan, not an action plan

Some comments criticized lack of details and specificity in the draft, and argued that it is not a complete plan. The description of the purpose and the title have been revised to clarify that this is a strategic plan, not an action and implementation plan. The Juneau Renewable Energy Strategy recommends additional implementation steps and recognizes that much more work is needed to implement the high priority actions. This is the same as when the actions were first suggested in JCAIP; a stronger commitment and follow through than seen for the JCAIP is necessary for development and implementation of the JRES.

The relationship between the energy plan and the Juneau Climate Action and Implementation Plan

Some comments were based on confusion about the relationship between this effort and the JCAIP. The JCAIP, which was adopted by resolution in 2011, focuses on reduction of GHG emissions. While the JRES was developed to implement a recommendation in the JCAIP, it focuses on a broader set of public benefits from shifting away from fossil fuels toward renewable energy with significant discussion on the local energy context. This context was missing from the JCAIP. These include increasing community resilience, reducing energy costs, and creating new jobs and business opportunities, as well as reducing GHG emissions. The goal of the JRES is framed in terms of transformation and increasing the renewable energy used in Juneau, rather than reducing GHG emissions.

Public Process

One comment expressed concern about whether the JCOS followed CBJ procedures and a transparent public process, and whether proper records were kept. At that time some JCOS meeting minutes had not been published online. JCOS meeting minutes are now up to date, to provide a full record of actions related to the energy plan. Worksessions are publicly notice, but by their very nature have traditionally not been documented since no formal actions can be taken at worksessions. Concern was also expressed about potential conflicts of interests among JCOS members. The JCOS chair, Steve Behnke, reviewed the CBJ conflict of interest policies (CBJ

01.45.360) with the Commission and concluded that none of the recommendations in the plan were matters involving personal or financial interests of the two members of the commission that work for energy-related companies, AEL&P and Juneau Hydropower, and that there was no need for them to recuse themselves from work on the plan.

Financial analysis and impacts

Concerns were expressed about the lack of detailed economic analysis of priority strategies. This concern was beyond the scope or budget of this effort. As specific action plans are developed to implement the strategies, economic viability, financial analysis and updated analysis of alternatives will be explored as strategies become actions.

Concerns were also raised about Impacts on utility operations and rates. Throughout preparation of the document, AEL&P provided information, comments, and suggestions related to the local utility operations, to the consultant Stantec, to CBJ staff, and to JCOS directly.

It is acknowledged in a number of places in the Strategy that expansion of the existing renewable electricity supply to Juneau will have economic implications. These are documented in the JRES. The concerns raised by AEL&P that too fast a development of additional renewable energy supply and associated transmission infrastructure should be a consideration as the community works toward an 80% renewable energy target.

In addition, AEL&P employee Darryl Wetherall, who is a member of JCOS, answered questions and explained issues. These valuable inputs have been incorporated throughout the plan.

Dock electrification

One of the high priority strategies that Stantec identified for the Strategy was continuing electrification of additional cruise ship docks, to expand on the success of the Princess dock. This was drawn from recommendations in the Juneau Climate Action and Implementation plan. Comments pointed out that in the six years since the JCAIP was adopted major changes have occurred in the cruise lines approaches to air quality and other environmental concerns. We appreciate the discussions and input from Mike Tibbles and CLIA. The new floating cruise docks are also expected to be much more expensive to connect to Juneau's electric system. The JCOS therefore placed this as a lower priority.

Specific comments noted by AEL&P

A number of helpful suggestions were made by AEL&P to provide greater clarity on parts of the community energy context. It is hoped these have been addressed with revised wording based on the AEL&P feedback. JCOS feels the broader AEL&P comments have also been addressed as described above. As illustrated with the AEA funded SEIRP providing complete community consensus among different parties regarding energy planning is a near impossibility.

APPENDIX E: DRAFT PROPOSAL FOR A CBJ ENERGY MANAGEMENT PROGRAM

APPENDIX E: DRAFT PROPOSAL FOR A CBJ ENERGY MANAGEMENT PROGRAM

1.1 INTRODUCTION

The Juneau Renewable Energy Strategy recommends that the CBJ implement a systematic energy management program. This will ensure that public funds are used effectively to meet community goals of cost savings, energy efficiency, support for renewable energy, and GHG emission reductions.

The ISO 50001 energy management standard is a voluntary framework to manage and improve energy performance. The following sections provide information on the ISO 50001 framework, and on CBJ energy use, as background for developing a CBJ energy management program.

1.2 RATIONALE

The CBJ spends at least $8 million annually on energy for public buildings, facilities, and transportation, as well as for services such as transit, water treatment and street lights.

Dozens of recent studies conducted across the United Stated and compiled the US Department of Energy (DOE) show it is feasible and achievable for organizations to save 1 to 2.5% per year through systematic energy efficiency programs[1]. If the CBJ were to make savings in the middle of this range, at 1.75% per year, it could save more than $500,000 over the first 3 years. This is fiscal responsibility.

Other examples of the potential for savings include an analysis of energy efficiency programs showing an average 12% reduction in energy costs within 15 months2. Participants in the DOE's Better Buildings Challenge averaged a 2.5% improvement in energy usage intensity (EUI) annually[3].

Locally, the Juneau School District has demonstrated the benefits of a systematic energy efficiency and savings program. In 2007 it began an energy management project with assistance from the firm Energy Education that saved $500,000 per year over the next four years[4].

The CBJ does not have a systematic energy management program. CBJ does not appear to regularly track, monitor or report energy use or costs in a centralized manner. Individual fuel tank data is collected through the payment of fuel accounts, and AEL&P can provide CBJ with billing

[1] US DOE Office of Energy Efficiency & Renewable Energy https://energy.gov/eere/slsc/energy-efficiency-potential-studies-catalog
[2] US DOE Office of Energy Efficiency & Renewable Energy https://energy.gov/eere/amo/business-case-iso-50001-and-sep#case-studies
[3] US DOE Office of Energy Efficiency & Renewable Energy https://energy.gov/articles/better-buildings-challenge-reports-first-year-s-savings-partners-track-meet-2020-goal
[4] KTOO Public Radio- Juneau Schools Save Big Bucks with Conservation Program http://www.ktoo.org/2011/10/30/juneau-schools-save-big-bucks-with-conservation-program/

and usage reports on a per meter basis. However, this is not compiled into a single report with which CBJ energy use can be tracked over time. While CBJ departments frequently incorporate energy savings into projects when one-time funds become available there is no system in place to evaluate their effectiveness, learn from successes or failures, or share this information with the public.

Focus on single-technology, one time solutions, such a replacing lighting or heating with more efficient technologies may limit whole-building performance improvement and keep managers focused on short-term savings rather than on energy holistic continuous improvement. An organization-wide energy management approach that sets long-term energy savings goals and uses systematic tracking and reporting systems can drive greater savings, reach across entire program portfolios, and institutionalize such practices to sustain long-term savings.

The experience of other communities shows that—for little or no initial cost and with simple paybacks for specific projects typically less than 3 years—organization-wide strategic energy management programs can deliver cost-effective energy savings5.Education and training can sustain and increase energy savings over time.

1.3 AN ENERGY MANAGEMENT SYSTEM: THE ISO 50001

An energy management system is a series of processes that enables people of varied responsibilities across an organization to use data and information to maintain and improve energy performance, while improving operational efficiencies, decreasing energy intensity, and reducing environmental impacts.

ISO 50001 is a voluntary International Standard developed by the International Organization for Standardization (ISO) to give organizations a framework to manage and improve their energy performance[6]. The Energy Management System standard addresses:

- Energy use and consumption
- Measurement, documentation, and reporting of energy use and consumption
- Design and procurement practices for energy-using equipment, systems, and processes
- Development of an energy management plan and other factors affecting energy performance that can be monitored and influenced by the organization.

[5] State and Local Energy Efficiency Action Network (SEE Action), facilitated by the U.S. Department of Energy/U.S. Environmental Protection Agency https://www4.eere.energy.gov/seeaction/system/files/documents/commercialbuildings_factsheet_strategicenergymanagement_stateandlocal.pdf

[6] US DOE https://energy.gov/ISO50001

ISO 50001 requires continual energy performance improvement but it does not include prescriptive energy performance improvement goals. Rather, it provides a framework through which each organization can set and pursue its own goals for improving energy performance.

1.4 DEVELOPING AN ENERGY MANAGEMENT SYSTEM

The initial steps recommended to prepare for adopting ISO 50001[7] include:

1. Purchasing ISO 50001, which includes detailed guidance.
2. Taking preparatory steps toward establishing an energy management system (EnMS):

- Develop an energy policy that includes commitment to the EnMS from top management
- Identify a management representative to lead implementation of the EnMS
- Establish a team of representatives from major functional areas of the organization
- Decide on the boundaries of the EnMS

3. Once prepared, get started with implementing an EnMS:

- Undertake an energy review to identify significant energy uses, their energy consumption, and opportunities for improvement
- Establish an energy baseline
- Identify energy performance indicators for tracking energy performance improvement against the baseline

For additional guidance, DOE and other organizations offer technical resources to assist with implementation with energy management.

Consider Superior Energy Performance (SEP) certification early on in the process of implementing an EnMS. SEP provides guidance, tools, and protocols to drive deeper, more sustained savings from ISO 50001.

The U.S. Department of Energy has compiled technical resources and opportunities to help get started implementing an energy management system.

1.5 CBJ OPPORTUNITIES FOR ENERGY AND DOLLAR SAVINGS

Existing CBJ policies provide a starting point and background for developing an energy management program for the CBJ. Chapter 6 (Energy) of the CBJ Comprehensive Plan (2013) provides general policies and guidance. Administrative Policy 05-04, CBJ Energy Conservation and Efficiency Policy, directs departments to consider energy efficiency. Copies of these documents are included in the last section.

[7] https://energy.gov/eere/amo/iso-50001-frequently-asked-questions

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The 2011 Juneau Climate Action and Implementation Plan (JCAIP) identifies specific short and long term actions relating to energy use and efficiency in CBJ buildings, transportation, and utilities that can provide a basis for a systematic energy manage-ment plan. The following sections summarizes these recommendations, which could provide the basis for implementing an ISO 50001 program.

1.5.1 Buildings

More than one-third of energy use typically goes to space heating/cooling and equipment operation in buildings. Estimates of the amount of energy that can be saved in the average building vary from 20 to over 50 percent, depending on what kinds of improvements are included8.

A portfolio-wide, systematic approach is the best way to improve energy efficiency and reduce costs in owned and leased buildings and to incorporate energy efficiency into the design of new of and renovated buildings. It results not only in greater total reductions in local government energy costs, but will allow the CBJ to offset the costs of more substantial energy efficiency projects in buildings with higher upfront costs with the savings from projects in other buildings. It can also help generate more momentum for energy efficiency action generally, leading to more sustained implementation and continued savings.

The JCAIP identifies two strategies and a number of short and long term implementation actions that can provide a starting point for evaluating the potential energy and cost savings for CBJ buildings.

JCAIP STRATEGY B1-B: REDUCE ENERGY CONSUMED IN AND GHG EMISSIONS PRODUCED BY LOCAL GOVERNMENT BUILDINGS.

Short-Term Actions

- Over the next two years, conduct energy audits on 75% of CBJ buildings (including schools and the hospital). Audits should be completed on "worst energy offenders" first, and lighting and appliances should be included. Based on the recommended energy conservation opportunities identified in the energy audits, create a schedule for increasing each building's energy efficiency. Implement identified efficiency measures, starting with high priority recommendations.
- Establish a local government-wide energy efficiency policy that provides employees with guidelines and requirements for efficient use of the facility, such as by turning off unneeded lights and computers, setting thermostats appropriately, and other energy saving behaviors.
- Mount a campaign to educate employees on the importance of saving energy. Give rewards to employees or departments that make quantifiable contributions toward meeting the government's energy conservation goals.

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[8] Osborn, J., Goldman, C., Hopper, N., & Singer, T. (2002). Assessing U.S. ESCO Industry Performance and Market Trends: Results from the NAESCO Database Project. Berkeley: Ernest Orlando Lawrence Berkeley National Laboratory

- Commit to an annual maintenance program and ongoing monitoring for local government building heating systems to ensure systems are running at optimum efficiency.
- Support CBJ staff in becoming Association of Energy Engineers Energy Managers LEED-accredited professionals. Ensure personnel responsible for maintaining systems receive the required training.
- Set up a system to monitor heating oil, water, and electricity use. Determine if tracking should be done by building, division, or department, and select a system that is easy to install, wireless, and web-based (for example, www.esightenergy.com).

Long-Term Actions

- As staffing and space needs change, ensure space is not wasted in offices, workshops, garages, and storage areas. Consider setting guidelines for the amount of space in square feet required for each office.
- Require departments or divisions to pay for fuel/energy out of their own budgets.
- Designate a staff person to be responsible for overall energy use in each department, division, or building.
- Continue to implement high, medium, and low-priority measures recommended by the energy audits for local government buildings.
- Continue to seek funding from state, federal, and other sources for energy efficiency upgrades. Currently, loans are available for this purpose from the Alaska Energy Efficiency Revolving Loan Fund Program. Consider using Energy Savings
- Performance Contracts—a method of financing capital projects whereby a private contractor will guarantee a minimum level of energy cost savings resulting from capital upgrades. Make grant writing for energy efficiency-related projects a priority.

JCAIP STRATEGY B2-B: INCREASE COLLABORATION AMONG THE CBJ, STATE, AND FEDERAL GOVERNMENTS

Short-Term Actions

- Set up regular meetings with representatives from local, state, and federal government to share ideas, resources, strategies, and innovations for decreasing energy use in public buildings.

1.5.2 Transportation

Municipal vehicles account for significant costs, both for fuel and maintenance.

"In 2010... The CBJ fleet of 314 vehicles includes 132 heavy duty trucks, 125 light duty trucks and 19 passenger cars. Unlike most transportation sectors, because the fleet is under the direct control of one entity, the Borough, by changing vehicles through reorganizing operations and altering employee behavior, local government can significantly reduce government costs and

area-wide GHG emissions." (JCAIP). Today, CBJ is assumed to have a similar fleet mix although there is no single source that lists all CBJ vehicles as many are owned by individual departments[9].

Public transit services also have significant energy and maintenance costs. Currently, Capital Transit operates 18 buses, 11 para-transit vans, and 6 utility vans. In FY 2017, the vehicles provided 1,045,651 rides and drove approximately 952,721 miles[10].

The JCAIP identifies 4 strategies which provide a starting point for reducing CBJ energy costs for transportation. Recommended short and long term actions include increasing the energy efficiency of the municipal fleet, and the transit system, and developing car sharing and ride sharing programs.

STRATEGY T1-A. EXPAND LOCAL GOVERNMENT FLEET WITH THE MOST ENERGY EFFICIENT VEHICLES PRACTICABLE.

Short-Term Actions

- Add minimum fuel efficiency standards to criteria for purchasing bids for new vehicles so that lowest bid alone does not win the contract. Standards could include mileage, emissions, and noise.
- Purchase low or zero-emission vehicles or renewable fuel vehicles to test for fleetuse.
- Revise the surplus system within city government so that older less fuel efficient
- vehicles are no longer shifted from one department to another but removed from the fleet.
- Ensure fleet is expanded only for essential purposes.

Long-Term Actions

- Consider using vehicles from a car sharing organization to reduce the Borough fleet size.
- Modify transportation contracts to incentivize alternative/renewable fuel use (school buses, construction contracts, etc.)
- Improve and increase training for fleet mechanics, especially in newer energy efficient vehicles and technologies, such as hybrids and electric vehicles, and ensure required vehicle tune-ups and maintenance occur in a timely manner.

To ensure implementation of green fleets, it is helpful if the legislative body passes a resolution, or the Mayor issues an executive order. Information on options for reducing transportation costs, including examples of resolutions and executive orders is available at (http://www.dec.ny.gov/energy/57108.html#Reduce).

[9] Personal communication with CBJ Fleets
[10] Figures provided by CBJ Capital Transit

STRATEGY T2-A: EXPAND TRANSIT SERVICE USING MOST ENERGY EFFICIENT VEHICLES PRACTICAL

Short-Term Actions

- Update and work to secure funding needed to implement the "optimum scenario" in the Transit Development Plan. Focus on the actions that will have the biggest impact on reducing GHG emissions and energy use.

Long-Term Actions

- Purchase only alternative/renewable fuel or hybrid transit vehicles in the future.
- Implement all recommendations for the "optimum scenario" in the Transit Development Plan.
- Build a new maintenance facility to house expanding hybrid/electrical fleet.

STRATEGY T2-B: INCREASE PUBLIC EDUCATION AND PROVIDE INCENTIVES TO INCREASE TRANSIT RIDERSHIP

Short-Term Actions

- Increase public education about the benefits of public transit.
- Offer incentives for CBJ employees to use Capital Transit. Could include discounted bus passes, prizes for individuals or departments with highest rate of transit use, etc.
- Encourage employers to offer incentives for employees to use transit (e.g., discount on bus pass, etc.).
- Work with large employers to set flexible and/or staggered work hours to coordinate with transit schedule and/or reduce crowding on buses.

STRATEGY T5-A. DEVELOP A CAR SHARING AND RIDE SHARING PROGRAMS

Short-Term Actions

- Designate free on-street parking and convenient spaces in commercial and workplace parking lots for van pool and car pool vehicles.
- Work with community partners to set up a website for car pool networking.
- Work with community partners to bring a car sharing program to Juneau.
- Work with the community's largest employers to develop van pooling and car pooling programs.
- Launch a public awareness campaign to encourage ride sharing. Focus on the convenience and potential for saving money.
- Provide incentives to encourage city employees to participate in ride sharing.

1.5.3 Utilities

Energy is consumed in all stages of the water use and treatment cycle, and the rate of use is increasing as new water treatment issues require energy-intensive solutions.

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According to recent estimates by the US Environmental Protection Agency and the State of New York, treating wastewater and providing drinking water cost more than one-third of a typical American municipality's total energy bill. Although it is difficult to discern, treating Juneau's waste water is energy intensive and expensive. The US EPA and New York studies indicate that energy consumption at most facilities could be reduced by 10 to 20 percent, while some facilities could save as much as 50 percent[11].

Juneau's water and wastewater systems together consume almost 5% of the electricity used in Juneau, providing significant opportunities for conservation and efficiency improvements.

The 2009 audits of the Juneau-Douglas Wastewater Treatment Plant and the Mendenhall Wastewater Treatment Plant set out high and medium priority energy conservation opportunities. In 2016, 1.069 billion gallons of waste water were treated at the three CBJ wastewater treatment plants[12]. Energy use at the plants has fallen since the 2009 audits due to an incinerator being decommissioned but the addition of the new drier facility at the Mendenhall Treatment Plant the energy use will increase again. Some recommendations of the energy audit have been completed but there seems to be little publically available data on the savings.

In 2016, the water system produced ~1.2 billion gallons of water[13]. The associated facilities are all primarily powered by electricity. In 2008, 1,500 M Gallons were produced and consumed approximately 2,500 MWh in 2008 at a cost of $206,000. A 2008 energy audit of the water system estimated that by investing in energy efficiency across the system Juneau could reduce its water system-related energy costs by 25%. This study recommended high, medium, and low priority actions. Some have been completed but information on the resultant energy savings was not immediately available.

Energy efficiency and cost saving opportunities exist for most, if not all, municipal utilities, including wastewater and sewage disposal, drinking water treatment and distribution, and street lighting. Areas identified by the JCAIP include:

STRATEGY U1-A. REDUCE GHG EMISSIONS AND ENERGY USE ASSOCIATED WITH DISPOSAL OF SEWAGE SLUDGE

Short-Term Actions

- Evaluate the feasibility of composting all sewage sludge. Consider adding other compostables, such as fish or brewery waste.

Long-Term Actions

- If feasible, develop a system for composting sewage sludge.

[11] Improve Wastewater and Drinking Water Treatment Efficiency. http://www.dec.ny.gov/energy/64089.html#Wastewater
[12] Figures provided by CBJ Public Works Staff
[13] Figures provided by CBJ Public Works Staff

STRATEGY U1-B. REDUCE GHG EMISSIONS AND ENERGY USE ASSOCIATED WITH EXISTING WASTEWATER SYSTEM

Short-Term Actions

- Install Supervisory Control Data Acquisition System in lift stations, to eliminate the need for a staff person to visit on a daily basis.
- Complete the high priority Energy Conservation Opportunities outlined in the 2009 Juneau-Douglas and Mendenhall Treatment Plant Energy Audits.

Long-Term Actions

- Complete the medium priority Energy Conservation Opportunities outlined in the 2009 Juneau-Douglas and Mendenhall Treatment Plant Energy Audits.

STRATEGY U2-A. IMPLEMENT THE RECOMMENDATIONS OF THE 2008 ENERGY AUDIT TO REDUCE ENERGY USE AND EMISSIONS RELATED TO THE EXISTING WATER SYSTEM

Short-Term Actions

- Implement the High Priority actions listed in the 2008 Water System Energy Audit.

Long-Term Actions

- Implement the low priority actions listed in the 2008 Water System Energy Audit.

STRATEGY U3-A. IMPLEMENT EDUCATION PROGRAMS AND INCENTIVES TO ENCOURAGE RESIDENTS TO CONSERVE WATER.

Short-Term Actions

- Expand public awareness of the importance of conserving water, including detecting and repairing leaks.

Long-Term Actions

- Adopt incentive program to encourage installation of water conservation measures in existing businesses and homes.

STRATEGY U3-B. CARRY OUT ONGOING MAINTENANCE AND REPAIRS TO MINIMIZE LEAKS IN THE WATER SYSTEM.

Short-Term Actions

- • Expand leak detection and ongoing maintenance and repairs to the water distribution system.

Long-Term Actions

- • Upgrade and retrofit CBJ plumbing systems with water conserving technology.
- • Assess, maintain, and repair existing plumbing fixtures and pipes in all government

- buildings and facilities, including building and parking lot landscaping, public rest
- rooms, and parks and other recreational facilities, to reduce borough-wide water
- consumption.

STRATEGY U3-C. CONSIDER WATER METERING AND INCREASING CHARGES TO ENCOURAGE WATER CONSERVATION

Long-Term Actions

- Consider introducing a residential water metering program.

In Juneau, the State owns the street lights along State roads, local government owns street lights along most city roads, and AEL&P owns lights along some streets, parking lots, stairways, and other areas; each of these entities owns and controls approximately one-third of the community's street lights. CBJ is continuing on a program that is replacing high pressure sodium lamps with more energy efficient LED lamps. Use of LED street lights will save municipalities money in the long term with Los Angles being a good example of this[14]. Care should be taken not to provide additional street lighting with the cost savings. Powering the street lights owned by the borough accounted for 8% of the electricity purchased by local government in 2008. Since that time of the approximately 1,300 street lights operated by CBJ, 106 have been converted to LED lamps[15].

STRATEGY U4-A. INSTALL ENERGY EFFICIENT STREET LAMPS.

Short-Term Actions

- Work with AEL&P to maximize the number of energy efficient lights in Juneau.
- For new CBJ fixtures, install only energy efficient fixtures and bulbs.
- Encourage the state DOT&PF to adopt a policy requiring all new bulbs and fixtures to be energy efficient.

1.6 ENERGY-EFFICIENT PROCUREMENT POLICY

Purchasing energy-efficient products can reduce facility energy costs by 5-10%, and also lower maintenance costs. Municipal governments typically implement these policies at no added cost by using replacement schedules already in place[16].

[14] http://bsl.lacity.org/led.html
[15] Figures provided by CBJ Streets Staff
[16] US DOE Best Practices Guide, Oct. 2016
https://energy.gov/sites/prod/files/2016/10/f33/femp_best_practices_guide_for_procurement.pdf

1.7 INCORPORATE ENERGY USAGE AND COSTS INTO THE CIP PROCESS.

CBJ Administrative Policy directs that energy usage and costs should be considered in the CIP process. The Juneau Commission on Sustainability has recommended that these costs be included routinely in CIP requests, to allow for specific consideration of the energy use and cost implications of proposed projects (see below).

1.8 FINANCING MUNICIPAL ENERGY EFFICIENCY

A barrier common to energy efficiency work is the lack of upfront capital. However, it is possible to structure energy efficiency efforts so they pay for themselves by reducing utility costs over time. Because the energy — and thus financial — savings associated with various energy efficiency improvements can be estimated with some accuracy, it is possible to "capture" their value in a properly structured financial arrangement, where the initial cost of the improvements is secured by the improvements themselves, and the utility cost savings are used to pay back this obligation over time[17].

Capturing this value and directing it to energy efficiency improvements is not a new concept — in fact, it is the basis of the ESCO (Energy Service Company) business model — and is not the only key to unlocking the energy efficiency market. It does, however, provide an important financial basis for this work, which coupled with other policy and program elements we discuss below, offers a way to increase the scale of energy efficiency work to match its potential.

Some energy efficiency upgrades to municipal buildings pay for themselves in only a few years, then continue to generate energy and cost savings for many years longer; even upgrades with longer payback times yield significant long-term savings. Innovative financing mechanisms can provide upfront capital, which is paid back over time from the savings on energy bills.

For example, energy performance contracts allow municipalities to finance facility energy projects without issuing bonds or notes. A performance contract provides a streamlined energy upgrade process and long-term energy cost savings with little or no upfront expenditure of capital.

If Juneau had an energy manager or an assigned performance requirement to have the capacity to manage an energy project end-to-end (including audit, contracting, monitoring, verification, and of course, financing) in a long-term, integrated fashion to prevent savings erosion (where due to poor building management and occupant behavior, systems cease to operate at full efficiency) over time, it would save the CBJ money. This will allow deeper retrofits, more significant savings, and more job creation. If this admittedly complicated function can't be achieved internally, an ESCO is a logical alternative.

[17] Rogers, J. (2007). Seizing The Opportunity (For Climate, Jobs, And Equity) In Building Energy Efficiency. Madison WI: Center on Wisconsin Strategy, UW-Madison.

1.8.1 Dedicated Energy Savings Reinvestment Plans

Establishing an Energy Savings Reinvestment Plan allows future projects to be internally self-funded. These plans are set up so that up to 80% of a project's savings goes to the energy fund to pay for future energy efficiency projects, while the remaining amount is returned to the city's general fund.

The City of Phoenix's Energy Management program for its municipal facilities is one of the best kept efficiency secrets in the United States. Years ago, Phoenix officials became aware of the fact that if the City's energy bills were treated as a single expense, energy would be the City's largest budget item after payroll. This provided the initial impetus for efficiency in Phoenix. Now its success story -- 16 years in the making -- has proceeded with little fanfare or accolades, but has provided $18 million in net repayments to the City's General Fund[18].

1.8.2 CBJ Sustainability Fund

The CBJ Sustainability Fund (57.05.027) could provide a useful tool for assisting in funding energy savings. However, there does not appear to be any ongoing implementation of the program at this time.

[18] http://ecomotion.us/city-of-phoenix-energy-managementcapital-reinvestment-plan-2/

1.9 BACKGROUND DOCUMENTS RELATING TO CBJ ENERGY MANAGEMENT

A wide range of recommendations have been made over the past 20+ years to assist CBJ in using energy more efficiently, and reducing energy costs. Five key documents are included below, including Chapter 6 of the CBJ Comprehensive Plan (2013), Administrative Policy 05-04, CBJ Energy Conservation and Efficiency Policy, and the Juneau Climate Action and Implementation Plan (2011), and JCOS recommendations to the CBJ on incorporating energy usage and costs into the CIP process, and on sustainability indicators.

1.9.1 CBJ Comprehensive Plan (2013)

POLICY 6.5. TO INCORPORATE TECHNOLOGIES AND OPERATING PRACTICES THAT WILL PROMOTE EFFICIENT AND COST EFFECTIVE ENERGY USE INTO ALL OF ITS NEW AND EXISTING BUILDINGS AND ENERGY-USING PROJECTS.

Standard Operating Procedure

6.5 - SOP1 Replace inefficient street lighting and lighting in CBJ-owned buildings and facilities with efficient fixtures upon replacement cycle.

Implementing Actions

6.5 - IA1 Establish and fund a revolving energy conservation investment fund to invest in energy-saving public projects that meet CBJ government return-on-investment criteria.

6.5 - IA2 Invest in necessary metering equipment to produce monthly project energy reports.

6.5 - IA3 Conduct energy audits and establish energy management goals for CBJ-owned buildings.

6.5 - IA4 Develop and implement a system for rewarding CBJ employee initiative and responsibility in good energy management.

6.5 - IA5 Continue to incorporate LEED-Juneau principles and standards when designing public structures and facilities, with appropriate fuel cost sensitivity analyses over the long term life of the Project.

6.5 - IA6 When designing new facilities or major renovation of CBJ-owned facilities, analyze life-cycle costs of energy applications, and use that analysis to guide future development. [see also 6.7 -IA2]

6.5 - IA7 Analyze the workings of CBJ water and wastewater facilities and incorporate energy-saving methods and technologies where appropriate.

6.5 – IA8 CBJ government is to set an example for businesses and individuals in adopting cost-effective energy-saving technologies and operating procedures. Conduct post-improvement analysis of the energy savings. These results should be published as a learning and development tool for the building community.

POLICY 6.8. TO INCLUDE THE FULL COSTS (DIRECT AND INDIRECT) OF ENERGY USE IN ITS ECONOMIC ANALYSES.

Standard Operating Procedure

6.8 - SOP1 Use quantifiable external and indirect costs in establishing the cost of energy when conducting life-cycle cost analyses of CBJ-owned facilities, projects, and operations.

Implementing Action

6.8 - IA1 Incorporate energy costs, fuel cost volatility,

1.9.2 CBJ Energy Conservation and Efficiency Policy

In 2005 the CBJ adopted Administrative Policy 05-04, which directs each Department to review and implement energy efficiency measures, and to discuss these quarterly. The policy also establishes procedures for considering energy costs and conducting life cycle analyses for large projects. It is unclear to what extent these policies are currently followed by CBJ departments.

ADMINISTRATIVE POLICY NO. 05-04

CBJ ENERGY CONSERVATION AND EFFICIENCY POLICY

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1. **PURPOSE AND POLICY**

Energy conservation and efficiency is an important concept that all departments and enterprise functions should embrace and practice on a regular basis. Simple practices such as turning off lights, controlling building temperatures, car pooling, as well as minimizing the use of vehicles, can result in measurable efficiencies and cost savings. With the increasing high costs of fuel, it is every employee's responsibility to do their part in conserving energy.

2. **GENERAL PRACTICE**

Each Department Director will review the operations of their department as an on-going practice and take appropriate steps to ensure that all functions are being performed in the most energy efficient way possible. Efforts being taken to contain energy costs will be discussed quarterly with each department director during staff meetings.

3. **CAPITAL PROJECTS**

It is important that energy efficiency and life cycle costs be considered in our large capital construction projects. Some projects lend themselves to this consideration and others clearly (i.e., street construction & paving, sewer/water) do not.

A. An Energy Life Cycle Cost Analysis (ELCCA) or other equivalent analysis of energy design considerations shall be performed on all new facility construction or major remodel or rehabilitation projects with a funding level of $3 million or more and/or projects that exceed 15,000 square feet.

B. A sensitivity analysis shall be done that incorporates a charge for external costs on energy consumption. The energy use analysis shall be done at the earliest time of project design when a sufficient level of detail is available to conduct such an analysis. Recommended design features for the purpose of energy conservation should be reconfirmed during the middle stages of design and incorporated into the final bid document. The Energy Advisory Committee should be consulted throughout this process. Funding to perform an appropriate energy analysis shall be anticipated and included in the original project cost estimate and bid document.

C. A checklist of energy conservation measures that is to be completed for all capital projects that qualify for an ELCCA is attached.

4. **GENERAL PROVISIONS**

A. Scope: This policy applies to all agencies and employees of the City and Borough of Juneau, Alaska under the general direction of the City Manager.

B. Authority to promulgate policy: The City Manager of the City and Borough of Juneau, Alaska, maintains the authority granted by the CBJ Charter to order policy and the guidelines for implementation.

C. Effective Date: This policy will take effect on: December 1, 2005.

Dated at Juneau, Alaska, this 5th day of November ,2005

Rod Swope
City and Borough Manager

1.9.3 Juneau Climate Action and Implementation Plan (2011)

The Juneau Climate Action and Implementation Plan includes a wide range of recommendations for how the CBJ organization can improve energy efficiency and save money. These are spread throughout the document in the sections dealing with buildings, transportation, and utilities.

1.9.4 JCOS Recommendations Concerning Energy Costs in CIP

CITY AND BOROUGH OF JUNEAU
COMMUNITY DEVELOPMENT

Juneau Commission on Sustainability

(907) 586-0715
CDD_Admin@juneau.org
www.juneau.org/cdd
155 S. Seward Street • Juneau, AK 99801

DATE: October 25, 2016

TO: Planning Commission, Manager's Office

FROM: Juneau Commission on Sustainability

RE: Recommendations on FY17/18 Capital Improvement Program

As noted by the Juneau Commission on Sustainability (JCOS) in past years, the Capital Improvement Program (CIP) process does not adequately address energy costs or opportunities for savings from energy efficiency. It also often fails to address opportunities to implement the recommended actions in the 2010 Juneau Climate Action and Implementation Plan (a prioritized list of these actions is presented in the draft Juneau Community Energy Plan (JCEP)).

As far as we can determine, the CBJ does not have a system to comprehensively audit energy expenditure. Without such an overview, the task of reducing organizational energy use and reducing costs is far more challenging than it needs to be. Knowing how much CBJ spends on energy, including where, when, and how much is being spent, will help identify potential energy savings. Also, the process of collecting this data will allow us to track the success of our efforts as we implement the above plans. The Juneau School District has demonstrated that significant cost savings ($500,000+ annually) are possible by systematically addressing energy use and efficiency in their facilities.

While we understand that energy costs and savings are often considered as Departments prepare their CIP requests, there is no transparency in this process. The public and the Assembly have no way to know what options for energy savings have been considered and then either incorporated or discarded into the CIP requests.

As recommended in previous years, each initial CIP request should include a description of the energy and greenhouse gas (GHG) implications of the project. A request should consider whether it would increase or decrease energy demand and costs or be consistent with energy policies of the Comprehensive Plan and the Juneau Climate Action and Implementation Plan. This analysis should be considered as part of the screening process prior to the 'short list' of projects being presented to the Assembly and be included in the project descriptions presented to the Assembly.

The following list is based on based on the 2017-2022 six year departmental project list and identifies the following:

i. Which proposals should be fully funded and some new projects that should be added and funded
ii. Which proposed projects should incorporate sustainable design including energy efficiency and water conservation measures in both the project description and later design

Comments have also been made on how the current 2017 funded project list could/should be designed to realize opportunities to reduce energy use and water conservation.

It is noted that at this early stage of the 2018-2023 CIP process, JCOS has not seen new projects submitted by other CBJ departments/bodies. Additional comments may be made as more details of this list become available. JCOS would appreciate being alerted to the availability of this list.

JCOS would also appreciate comment from the Manager's Office or CBJ Engineering and Public Works department on how our recommendations could be best taken forward and what barriers they perceive to their full implementation.

Yours faithfully,

Steve Behnke, Chair
Juneau Commission on Sustainability

1.9.5 JCOS Recommendation Concerning Sustainability Indicators

Extract from Juneau Commission on Sustainability Annual Report - June 2011 to May 2012, *p.3*

Sustainability Indicators

Policy 2.3 of the 2008 City and Borough of Juneau Comprehensive Plan (Plan) states that "It is the policy of the CBJ to develop and use sustainability indicators to measure Juneau's progress toward becoming a more sustainable community". Chapter 2 further directs the JCOS to develop these Sustainability Indicators. It notes that their development begins by "selecting important, diverse, measurable categories and topics that the community will commit to measure at regular intervals", and that they will be developed "from ongoing issues that emerge in the community".

APPENDIX E: DRAFT PROPOSAL FOR A CBJ ENERGY MANAGEMENT PROGRAM

The JCOS began this work in 2011 by reviewing a broad range of approaches and possible sustainability indicators. Over the following months the JCOS focused our efforts on finding measurable and relevant indicators in support of the "Implementing Actions" identified in Chapter 2 of the Plan. These include a range of social, economic, and environmental areas (Sections 2.1.IA3 through 2.1.IA12, and 2.2IA1 through 2.2.IA6); about two-thirds of them deal with energy use and energy conservation.

Given the significance of energy in the Plan, and to the community, the JCOS decided to further focus their initial efforts on identifying appropriate indicators related to energy use. The JCOS was greatly aided in this by the development of the Juneau Climate Action and Implementation Plan (JCAP) during 2011.The JCAP compiles data on internal energy use and greenhouse gas emissions in Juneau for 2010 and compares it with baseline data from 2007. It also recommends a goal of reducing GHG emissions by 25% by 2032, and sets out a series of implementation actions for achieving this goal. To measure progress toward the JCAP goals, the Commission decided to forward the following three sustainability indicators relating to internal energy use to the CBJ Assembly for adoption. A letter to the Assembly is in development.

1) Fossil fuel use.

This indicator is measured as MMBtu's (millions of British thermal units) of fossil fuel used annually. The JCAP provides a methodology for measuring petroleum energy use. It also breaks out data by CBJ government activities, as well as the community as a whole. The burning of petroleum fuels generates about 75% of local energy used in Juneau, mostly for transportation and heating. Juneau is highly dependent on oil for heating, and the economies of households, businesses and agencies are affected by fuel oil costs.

2) Renewable energy use

This indicator is measured as MMBtu's of renewable energy used annually. The JCAP provides a methodology for measuring this. Hydropower provides most of Juneau's electricity. Electricity is about 25% of the total energy consumed in the borough.

3) Greenhouse gas emissions

This indicator is measured as metric tons of carbon dioxide equivalent (MTCO2e). The JCAP provides a methodology for measuring GHG emissions, and sets a specific goal for reduction of GHG (25% reduction by 2032).

APPENDIX F: SUMMARY OF WRITTEN PUBLIC COMMENTS

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JCOS Draft Energy Plan Comment Tabulation												
Comments include those submitted with no name or submitted anonymously												
Name of Juneau Resident or Organization						For Do a lot	For		Against		Summary of Key Comments	
Kathrin McCarthy,						For					Not supportive of LNG, Heat pumps are prevalent at NOAA facility, Juneau Airport and schools as they are cost effective and reduce GHG. When School District hired an Energy coordinator that schools have saved a half million dollars. Simple air source heat pumps are same price as a Toyo heater and is three times as efficient.	
Paul McCarthy						For					Not supportive of LNG, Heat pumps are prevalent at NOAA facility, Juneau Airport and schools as they are cost effective and reduce GHG. When School District hired an Energy coordinator that schools have saved a half million dollars. Simple air source heat pumps are same price as a Toyo heater and is three times as efficient.	
Elaine Schroeder						For					We have local renewable resources. We have climate change evidence already in Juneau. Net zero carbon should be our goal	
Dick Harnell							For				Support District Heating, Electrification of Transportation and encourage ownership of EV's	
John Neary						For					Expand renewable energy capacity and support innovative electric energy projects. We have dependable hydropower resources and we need to expand capacity while efficiently uses these resources. Juneau energy future is on dependable and renewable hydropower, not fossil fuels. Our atmosphere requires it. Lets be ambitious.	
George Partlow						For					Climate is warming. There are economic benefitst to reduce our dependence on fossil fuels. Supports hiring a full time energy manager to reduce energy costs and the position will pay for itself.	
Karen and Jeff Wilson						For					Simple-our survival requires it	
Alicia Norton						For					We should do a lot	
John Sonin						For					Support policies to maximize energy conservation. Business as usual is delusional. Need to future proof our economy.	
Sally Willson						For					Other communities have 100% clean energy goal (like Salt Lake City). Supports do a lot plan	
Mark Miller							For				Sustainable Hydropower for transportaiton and transform fossil fuel use to sustainable hydropower	
Christine Niemi							For				Support the Draft Energy Pan and strongly support electric transformation of Juneau's transportation sector.	
Martin Niemi							For				Support the Draft Energy Pan and strongly support electric transformation of Juneau's transportation sector.	
Robert Barker							For				Support the Draft Energy Pan and strongly support electric transformation of Juneau's transportation sector.	
Amy Lujan							For				Support the Draft Energy Pan and strongly support electric transformation of Juneau's transportation sector.	
Jacque Farnsworth							For				Support the Draft Energy Pan and strongly support electric transformation of Juneau's transportation sector.	
Laura Dameron							For				Support the Draft Energy Pan and strongly support electric transformation of Juneau's transportation sector.	
Mark Everett							For				Support the Draft Energy Pan and strongly support electric transformation of Juneau's transportation sector.	
Monica Todden							For				Support the Draft Energy Pan and strongly support electric transformation of Juneau's transportation sector.	
William Spear							For				Support the Draft Energy Pan and strongly support electric transformation of Juneau's transportation sector.	
Robert Germain							For				Support the Draft Energy Pan and strongly support electric transformation of Juneau's transportation sector.	
Jeremiah Germain							For				Support the Draft Energy Pan and strongly support electric transformation of Juneau's transportation sector.	

APPENDIX F: SUMMARY OF WRITTEN PUBLIC COMMENTS

Scott Marmon							For				Support the Draft Energy Pan and strongly support electric transformation of Juneau's transportation sector.	
Rick Haida							For				Support the Draft Energy Pan and strongly support electric transformation of Juneau's transportation sector.	
Willie Anderson							For				Support the Draft Energy Pan and strongly support electric transformation of Juneau's transportation sector.	
Ed Mayer							For				Support the Draft Energy Pan and strongly support electric transformation of Juneau's transportation sector.	
Judith Morley							For				Support the Draft Energy Pan and strongly support electric transformation of Juneau's transportation sector.	
Ken Leghorn							For				Support the Draft Energy Pan and strongly support electric transformation of Juneau's transportation sector.	
Amy Skilbred							For				Support the Draft Energy Pan and strongly support electric transformation of Juneau's transportation sector.	
Mitchell Sharman							For				Support the Draft Energy Pan and strongly support electric transformation of Juneau's transportation sector.	
Chuck Brown							For				Support the Draft Energy Pan and strongly support electric transformation of Juneau's transportation sector.	
Joyanne Bloom							For				Support the Draft Energy Pan and strongly support electric transformation of Juneau's transportation sector.	
Joy Lyon							For				Support the Draft Energy Pan and strongly support electric transformation of Juneau's transportation sector.	
Margaret Cowan							For				Support the Draft Energy Pan and strongly support electric transformation of Juneau's transportation sector.	
Angela Mueller							For				Support the Draft Energy Pan and strongly support electric transformation of Juneau's transportation sector.	
Sean Eagan							For				Support the Draft Energy Pan and strongly support electric transformation of Juneau's transportation sector.	
Barbara Learmonth							For				Support the Draft Energy Pan and strongly support electric transformation of Juneau's transportation sector.	
Gail Roust							For				Support the Draft Energy Pan and strongly support electric transformation of Juneau's transportation sector.	
Logan and Fran Dameron						For					Support the Draft Energy Pan and strongly support electric transformation of Juneau's transportation sector. Support Air Source Heat Pumps and need more local information	
Chris Roust							For				Support the Draft Energy Pan and strongly support electric transformation of Juneau's transportation sector.	
Sue Ann Randall							For				Support the Draft Energy Pan and strongly support electric transformation of Juneau's transportation sector.	
Gene Randall							For				Support the Draft Energy Pan and strongly support electric transformation of Juneau's transportation sector.	
Maria Jordison							For				Support the Draft Energy Pan and strongly support electric transformation of Juneau's transportation sector.	
Michael Lundberg							For				Support the Draft Energy Pan and strongly support electric transformation of Juneau's transportation sector.	
Andrew Comstock							For				Support the Draft Energy Pan and strongly support electric transformation of Juneau's transportation sector.	
Cecilia Lati							For				Support the Draft Energy Pan and strongly support electric transformation of Juneau's transportation sector.	
Pauline Jaing							For				Support the Draft Energy Pan and strongly support electric transformation of Juneau's transportation sector.	
Jeannie Monk							For				Support the Draft Energy Pan and strongly support electric transformation of Juneau's transportation sector.	

APPENDIX F: SUMMARY OF WRITTEN PUBLIC COMMENTS

Richard Farnell							For				Support the Draft Energy Pan and strongly support electric transformation of Juneau's transportation sector. Support for District Heating. Support to convert fossil fuel transportation to electric. Also park and ride woul help reduce energy use. The CBJ should encourage ownership of electric vehicles with tax incentives and rebates, Increase the number of charging stations, and assist in training of EV technicians in our community.	
Estela Bourque							For				Support the Draft Energy Pan and strongly support electric transformation of Juneau's transportation sector.	
Chris Courrau							For				Support the Draft Energy Pan and strongly support electric transformation of Juneau's transportation sector.	
Bev Agler							For				Support the Draft Energy Pan and strongly support electric transformation of Juneau's transportation sector.	
Michelle Ridgway							For				Support the Draft Energy Pan and strongly support electric transformation of Juneau's transportation sector.	
Ervin Lott							For				Support the Draft Energy Pan and strongly support electric transformation of Juneau's transportation sector.	
John Sisk							For				Support the Draft Energy Pan and strongly support electric transformation of Juneau's transportation sector.	
Mary Pat Schilly							For				Support the Draft Energy Pan and strongly support electric transformation of Juneau's transportation sector.	
Kyle Cuzzort							For				Support the Draft Energy Pan and strongly support electric transformation of Juneau's transportation sector.	
Erica Cuzzort							For				Support the Draft Energy Pan and strongly support electric transformation of Juneau's transportation sector.	
Doug Edgar							For				Support the Draft Energy Pan and strongly support electric transformation of Juneau's transportation sector.	
Odette Edgar							For				Support the Draft Energy Pan and strongly support electric transformation of Juneau's transportation sector.	
Kathryn K. Bousler							For				Support the Draft Energy Pan and strongly support electric transformation of Juneau's transportation sector.	
Peggy Chaplin							For				Support the Draft Energy Pan and strongly support electric transformation of Juneau's transportation sector.	
Cameron Mitchell							For				Support the Draft Energy Pan and strongly support electric transformation of Juneau's transportation sector.	
Patricia Walker							For				Support the Draft Energy Pan and strongly support electric transformation of Juneau's transportation sector.	
Selina Everson							For				Support the Draft Energy Pan and strongly support electric transformation of Juneau's transportation sector.	
Raymond Jordison							For				Support the Draft Energy Pan and strongly support electric transformation of Juneau's transportation sector.	
Patricia Everson							For				Support the Draft Energy Pan and strongly support electric transformation of Juneau's transportation sector.	
JoAnn Everson							For				Support the Draft Energy Pan and strongly support electric transformation of Juneau's transportation sector.	
Michael Everson							For				Support the Draft Energy Pan and strongly support electric transformation of Juneau's transportation sector.	
Kace Satran							For				Support the Draft Energy Pan and strongly support electric transformation of Juneau's transportation sector.	
Catrina Mitchell							For				Support the Draft Energy Pan and strongly support electric transformation of Juneau's transportation sector.	
Serena Drazkowski							For				Support the Draft Energy Pan and strongly support electric transformation of Juneau's transportation sector.	
Kenneth Lander							For				Support the Draft Energy Pan and strongly support electric transformation of Juneau's transportation sector.	
Sam Jahn							For				Support the Draft Energy Pan and strongly support electric transformation of Juneau's transportation sector.	
Logan and Fran Dameron						For					We support the do a lot plan and would like more community information on air source heat pumps to replace toyo heaters	

APPENDIX F: SUMMARY OF WRITTEN PUBLIC COMMENTS

Mary Desmet						For					Great Job on Juneau Vision. We area heat pump success story and would like to see a list of heat pump success stories for Juneau	
Greg Burger						For					Great Job on Juneau Vision. We area heat pump success story and would like to see a list of heat pump success stories for Juneau	
Nancy Waterman						For					Encourage the next steps such as update building codes, prioritize heat tax money to reduce GHG, review energy audits to save energy, Evaluate a centralized CBJ fleet, Utilize Urban service boundaries to focus on development that is more affordable and energy efficient.	
Michele Elfers											Diverting waste stream and encouraging recycling reduces GHG	
Karla Hart						For					Energy Plan wisely identifies strategies to preserve Juneau for future generations by transforming our economy now.	
Jon Dunker											The Draft Energy Plan represents many hours of thoughtful work. Encourage public or cooperative ownership of infrastructure, seek to have CBJ advise and assist CBJ recommnedations to the Regulatory Commission of Alaska	
Britta Tonnessen						For					Support Electrification of Juneau's Transportation, Transistion to heat pumps and district heating instead of oil or natural gas. Please follow the priorities listed in plan and include priorities in ordinances and coses so that they will have a timeline and teeth. We cannot afford business as usual.	
Chilton Bowman						For					Support Electrification of Juneau's Transportation, Transistion to heat pumps and district heating instead of oil or natural gas. Please follow the priorities listed in plan and include priorities in ordinances and coses so that they will have a timeline and teeth. We cannot afford business as usual.	
Doug Woodby						For					This letter is to support the Do a Lot futur path to reduce our community's use of fossil fuels. This is the responsible choice for future generations and will make Juneau one of the most desirable communities in the Nation.	
Elisabeth Genaux						For					Support Electrification of Juneau's Transportation, Transistion to heat pumps and district heating instead of oil or natural gas. Please follow the priorities listed in plan and include priorities in ordinances and coses so that they will have a timeline and teeth. We cannot afford business as usual.	
Gretchen Keiser						For					Support Electrification of Juneau's Transportation, Transistion to heat pumps and district heating instead of oil or natural gas. Please follow the priorities listed in plan and include priorities in ordinances and coses so that they will have a timeline and teeth. We cannot afford business as usual. Supports District Heating, reduced fossil fuel use, and land use regulations that support mixed use development and utilize economies of scale with mining and others to support renewable energy development.	
Helena Fagan						For					Support Electrification of Juneau's Transportation, Transistion to heat pumps and district heating instead of oil or natural gas. Please follow the priorities listed in plan and include priorities in ordinances and coses so that they will have a timeline and teeth. We cannot afford business as usual.	
Jamie Bursell						For					Support Electrification of Juneau's Transportation, Transistion to heat pumps and district heating instead of oil or natural gas. Please follow the priorities listed in plan and include priorities in ordinances and coses so that they will have a timeline and teeth. We cannot afford business as usual.	
Jeff Redmond						For					Support Electrification of Juneau's Transportation, Transistion to heat pumps and district heating instead of oil or natural gas. Please follow the priorities listed in plan and include priorities in ordinances and coses so that they will have a timeline and teeth. We cannot afford business as usual.	
Katy Nalven						For					Support Electrification of Juneau's Transportation, Transistion to heat pumps and district heating instead of oil or natural gas. Please follow the priorities listed in plan and include priorities in ordinances and coses so that they will have a timeline and teeth. We cannot afford business as usual.	
Linda Buckley						For					Support Electrification of Juneau's Transportation, Transistion to heat pumps and district heating instead of oil or natural gas. Please follow the priorities listed in plan and include priorities in ordinances and coses so that they will have a timeline and teeth. We cannot afford business as usual.	

APPENDIX F: SUMMARY OF WRITTEN PUBLIC COMMENTS

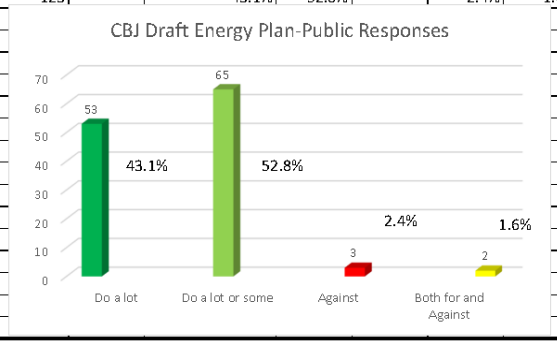
Mary Ann Dlugosch						For					Support Electrification of Juneau's Transportation, Transistion to heat pumps and district heating instead of oil or natural gas. Please follow the priorities listed in plan and include priorities in ordinances and coses so that they will have a timeline and teeth. We cannot afford business as usual.	
Margo Waring						For					Support Electrification of Juneau's Transportation, Transistion to heat pumps and district heating instead of oil or natural gas. Please follow the priorities listed in plan and include priorities in ordinances and coses so that they will have a timeline and teeth. We cannot afford business as usual.	
Maryann Ray						For					Support Electrification of Juneau's Transportation, Transistion to heat pumps and district heating instead of oil or natural gas. Please follow the priorities listed in plan and include priorities in ordinances and coses so that they will have a timeline and teeth. We cannot afford business as usual.	
Marsha Buck						For					Support Electrification of Juneau's Transportation, Transistion to heat pumps and district heating instead of oil or natural gas. Please follow the priorities listed in plan and include priorities in ordinances and coses so that they will have a timeline and teeth. We cannot afford business as usual.	
Mollie Dwyer						For					Support Electrification of Juneau's Transportation, Transistion to heat pumps and district heating instead of oil or natural gas. Please follow the priorities listed in plan and include priorities in ordinances and coses so that they will have a timeline and teeth. We cannot afford business as usual.	
Mary Wilson						For					Support Electrification of Juneau's Transportation, Transistion to heat pumps and district heating instead of oil or natural gas. Please follow the priorities listed in plan and include priorities in ordinances and coses so that they will have a timeline and teeth. We cannot afford business as usual.	
Gretchen O'Donnell						For					Support Electrification of Juneau's Transportation, Transistion to heat pumps and district heating instead of oil or natural gas. Please follow the priorities listed in plan and include priorities in ordinances and coses so that they will have a timeline and teeth. We cannot afford business as usual.	
Patricia O'Brien						For					Support Electrification of Juneau's Transportation, Transistion to heat pumps and district heating instead of oil or natural gas. Please follow the priorities listed in plan and include priorities in ordinances and coses so that they will have a timeline and teeth. We cannot afford business as usual. Supports all prioirities identified	
Kristen Lyda Rees						For					Support Electrification of Juneau's Transportation, Transistion to heat pumps and district heating instead of oil or natural gas. Please follow the priorities listed in plan and include priorities in ordinances and coses so that they will have a timeline and teeth. We cannot afford business as usual.	
Lucy Squibb						For					Support Electrification of Juneau's Transportation, Transistion to heat pumps and district heating instead of oil or natural gas. Please follow the priorities listed in plan and include priorities in ordinances and coses so that they will have a timeline and teeth. We cannot afford business as usual.	
John Nagel						For					Tansition to renwable by 2030, especially ground transportation. We have hydro so heat pumps are the way to go. We really do not need (except for possible back up) anything petroleum.	
Gary Miller						For					Juneau is being hit by climate change. Spruce trees have mites and cold weather is no longer killing them. We have Alaskan communities facing rising oceans impacting wildlife. Every community should be doing its part and renewable energy will help. This includes Juneau.	
Jeannette Cook						For					Support doing a lot to reduce fossil fuels. Natural gas is not a adequate substitute and will cause problems. WE should be pursuing a non-fossil fuels and gearing toward the lowest carbon footprint options. Electrification of Juneau's Transportation, Transistion to heat pumps and district heating instead of oil or natural gas. Please follow the priorities listed in plan and include priorities in ordinances and coses so that they will have a timeline	

APPENDIX F: SUMMARY OF WRITTEN PUBLIC COMMENTS

Morgan Michels						For					The Draft Energy Plan priorities have immendse implications. Specifically electric forms of transportation make sense for Juneau. Hydroelectric resources make this simple for us to limit our emissions. Thank you for listening to the community and taking action. Your dedication and service are important in facing these challenges.	
Susan Clark						For					Help us move off oil dependence. Thank you.	
Sara Wilson						For					Lets Do the work to implement this. No more studies, drafts , committees!	
Eric Schaal			Comments supporing some stratetgies and not one of them								Agree that building code updates are warranted for energy improvements. Not for electrification of cruise ships. Supports some priorities and questions others. Supports Biomass and wood chip heating.,	
Lin Davis						For					Especially Support Strategy #5 electrification of transportation. With downtown district heating, cruise ship and mining operations transition to electricity, energy efficiency measures for all buildings, Juneau can show the rest of the country how quickly and effectively we can be renewable. We need to transition quickly to hydro, electric and non-fossil fuel applications.	
Maureen Longworth						For						
Uyanga Mendbayer						For						
Jon Pond and Gladi Kulp						For					Do all you can to reduce our dependence on fossil fuels	
Susan Cox						For					CBJ should be a leader in reducing fossil fuel use. We must do more than what we have identified in the 2010 JCAP for ourselves and future generations. Thanks to the JCOS on this draft plan.	
Malia McInerney						For					I drive an electric car and heat my home with electricity and save money over fossil fuel use. I would like to see more use of electric power and more efficient use of electric power in public and private buildings. We should consider mixed use housing designed for sustainability.	
Suzanne Cohen						For					Make Juneau a Carbon Free Leader. Use our plentiful hydro energy . Let Juneau be a beacon for other communities in Alaska and around the world	
Danielle Redmond						For					Do a lot. Govt has a duty to administer responsibly and wisely. Climate change poses an existential threat. Juneau has abundant natural resources and has options to meet our needs through energy efficiency and renewable energy. Cost. Once implemented, the energy plan results in significant lower costs to Juneau...and there is a cost to not implementing the plan. From this plan, begin implementing the priorities. Hire a ne energy coordinator. Udpate building codes, support air source heat pumps and create a revolving loan fund. Share ideas with other cities tackling the same issues.	
Anonymous									Against		Not a plan, but a wish list. No costs but wants subsidies. What about LNG.	
Anonymous						For					We should start with efficiency. City budgets are unlikely for LNG or land for wind turbines.	
Organizations												
AEL&P									Against		Priority Actions listed in report were chosen without analysis of economic viability. The Draft Energy Plan is not a plan. AELP lists 7 Executive Summary comments on poor wording and differences of opinion of how the summary is drafted. AELP lists 10 comments on the plan which inclues the most glaring ommission from the document is the discussion of the Draft SEIRP	
Note AEL&P has a represenative on the JCOS that attended and contributed to the JCEP. AEL&P was on the selection board that interviewed, rated and ultimately hired the Consultant that worked on the Energy plan. Energy Plan contractor, Stantec heavily consulted and engaged input from AELP throughout the Energy Plan process											Red	

APPENDIX F: SUMMARY OF WRITTEN PUBLIC COMMENTS

Alaska State Chapter Interfaith Power and Light						For					JCEP is pragmatic approach and IPL is willing to assist CBJ and JCOS goals. Alaska IPL is currently working with 10 congregational faiths in Juneau to improve energy efficiency of church and monastery buidlings, encourage more sustainable practices in churches and monasteries and to educate congregants in sustainable living. Juneau is a perfect model city to lead as a sustainable community. Juneau should shift towards a future with economic and sustainable technlogies to decrease our dependence on volatile and destructive fossil fuels. Please do the moral thing to push our community to reduce GHG.
Alaska Native Brotherhood Camp #70 Glacier Valley						For					Support the Energy Plan as the priority objective represent Native Alaskan values
Juneau Chamber of Commerce									Against		Not a plan, no recognition of Implications, not for electrification of cruise ships, not for uninterruptible power for mining industry, not for hiring an energy manager, and complaints that the public process has questions. Raises issues on transparency. Note that the President of the Chamber is Erik Eriksen, VP of AELP.
Juneau Hydropower, Inc						For					Juneau is a community that "can" achieve 100% renewable due to its availability of renewable resources. ..for which much is given, much is requested. The transformation to renewable energy not only makes our community reslient and self sufficient, it is responsible. This plan is a strategic plan with well thought out overarching strategies and represents Juneau community values. Tactical execution and implementation will take continual public and community involvement.
Cruise Line Industry of Alaska							For and Against depending on priority				Agianst forced cruise ship dock electrification. The plan fails to analyze the environmental impact of its recommendations. For more energy efficient use of energy with LED Lights, solar panels on ships, Reuse of waste engine heat.
											Industry is for more use of hydropower where it makes sense. The cruise industry does and is reducing carbon emissions including a 30% reduction of carbon emissions by 2025 on all new constructed ships
CBJ Port of Juneau									Against		Against Strategy 2 Increase use of electricity by cruise ships. Is not acheivable as the board does not believe there is enough electrical capacity. Against cruise ship head tax fees being used.
				CBJ Draft Energy Plan Public Response							
Total				Do a lot		53					
				Do a lot or some			65				
				Against					3		
				Both for and Against						2	
				123		43.1%	52.8%		2.4%	1.6%	



APPENDIX G: ERRATA - TECHNICAL CORRECTIONS TO BACKGROUND INFORMATION ADOPTED BY JCOS

APPENDIX G: Errata - Technical corrections to background information adopted by JCOS

Following adoption of the Juneau Renewable Energy Strategy (JRES) by the Assembly (Resolution 2808, February 12, 2018), the Juneau Commission on Sustainability has continued to work with AEL&P on some technical corrections to the background information regarding Juneau's existing electricity system. AEL&P were consulted during the writing of the JRES and numerous comments and suggestions were incorporated into the final draft approved by the Assembly. However, AEL&P provided further suggested edits. JCOS approved the addition of these edits to the JRES at their March 14, 2018 meeting.

Throughout Section 2.0 of the JRES, text to be replaced by these edits is shown as strikethrough font and the replacement text is provided in this section. A version of JRES is also available with the replacement text incorporated directly into the document.

These technical changes do not alter the recommended actions of JRES nor its recommended target of 80% renewable energy by 2045.

Page 19-20 Existing:

There are currently some industrial businesses that burn fossil fuels for their own electricity generation (as opposed to those that burn fossil fuel for heating purposes) because they are not connected to the Juneau electricity grid. Converting these operators to renewable energy would work towards Juneau's climate and energy goals. However, to provide them with electricity may require significant upgrades to the existing electricity distribution network. New large industries such as mining and seafood processing, as called for in the Juneau Economic Development Plan, could be used as 'anchor' users that result in additional generation capacity and infrastructure to unserved areas of the borough such as West Douglas and north of Lena Point. It is important when considering 'anchor tenants' that they will have steady, financially sound operation for the duration required or they could represent a risk to the financial success of the new generation facility.

For example, the Coeur Alaska Kensington Mine (KM) is located north of Juneau near the northern side of Berners Bay. This is outside the service boundary of the local electric utility. KM is not connected to the Juneau electric grid. KM currently generates all of its electricity using diesel generators. A connection to the mine has been proposed but requires permitting approval for construction. The cost to construct the connection is estimated between $22M – $30M. Additional local electricity generation capacity would be needed unless there was a significant reduction in the demand in Juneau. If a private power producer provided this electricity then the local electricity utility would receive revenues from 'wheeling' this power over their electricity grid and this additional revenue could be passed on to the utility's firm customers. Some additional infrastructure may be required to provide the same level of resilience in the distribution network but this would have to be addressed on a case by case basis.

Replace with:

Some businesses operating inside the borough boundaries are not connected to Juneau's electric system and therefore provide their own electricity with diesel generators. Converting these operators to renewable energy would help to reduce the total emissions associated with

Juneau's energy sector. However, to provide these businesses with a renewable source of electricity may require investment in new renewable sources of electricity, new standby sources of electricity if the businesses did not choose to maintain their on-site supply, and/or transmission and distribution infrastructure.

Any company operating within AEL&P's service territory not currently connected to Juneau's electric system may elect to become a firm customer of AEL&P, subject to the line-extension policy within AEL&P's tariff. A recent example of this is the Eaglecrest Ski Area, which relied on generation from a small hydropower generator fed from Cropley Lake and, primarily, on-site diesel generators until choosing to connect to Juneau's electric system in 2008. The cost of the extension of facilities – including engineering, permitting, surveying, environmental study, infrastructure upgrades – was around $1.55 million, which was borne by the ski area. This replaced much of the diesel generation at Eaglecrest, decreasing the annual cost of electricity and reducing emissions associated with its operation. The Black Bear chairlift at the ski area remains powered by a diesel generator – it is estimated it would require $500,000 of additional infrastructure to connect it to Juneau's grid.

Another example is the Coeur Alaska Kensington Mine (KM), located outside AEL&P's service territory on the northern side of Berners Bay. KM is not connected to the Juneau electric grid and supplies its own electricity with diesel generators. A locally-formed transmission corporation recently proposed constructing a transmission line from AEL&P's Lena substation to KM to link the mine with Juneau's electric system. This effort is coordinated with Juneau Hydropower's plan to construct a hydroelectric generation plant at Sweetheart Lake, which intends to connect to the Snettisham transmission line at the southern end of Juneau's electric system. Once these facilities are constructed, the energy must "wheel" through the existing Snettisham and AEL&P transmission systems, which requires an interconnection agreement between the parties. This example differs from the Eaglecrest example because KM does not intend to become a firm customer of AEL&P, which would require KM to pay for all necessary infrastructure upgrades upfront. Instead, KM would purchase power through a power sales agreement with Juneau Hydropower, and Juneau Hydropower and other entities will own the bulk of new equipment required to enable this offset of diesel generation at the mine.

Page 20 Existing:

Spotlight: Electric Vehicles existing:

Juneau has a growing number of electric vehicles. In 2015 it was estimated there were 60-75 vehicles. Additionally, a recent collaboration between the Juneau Community Foundation, CBJ, Juneau Hydropower, AEL&P, IBEW, and other donors funded and installed 17 electric vehicle charging ports at 11 locations throughout Juneau. The limited length of the Juneau road system is particularly well suited to electric vehicles because the vehicle battery is unlikely to drain before reaching a charging point.

An experimental Electric Vehicle Rate has been provided to a limited number of electric vehicle owners in order to better understand the impacts on the electricity distribution network. In principle, electric vehicles are attractive since they are a relatively steady, predictable year round load on the electricity network.

Replace with:

Juneau has a growing number of electric vehicles (EVs). In 2017, an estimated 200 EVs could be found on Juneau's roads. The growth in EVs was aided by a grant awarded to the CBJ and Juneau Community Foundation to enable the installation of public charging infrastructure. Funds from that grant enabled the installation of 14 charge ports at 11 locations, with the initial objective to allow a battery-only EV to make a round trip from any starting point on Juneau's limited road system.

In 2017, AEL&P converted its experimental EV rate schedule into a permanent EV rate schedule and added an option to rent a charging station for a monthly fee. Providing for an off-peak incentive rate encourages EV owners to charge their vehicles when electricity consumption is low, allowing for more efficient use of existing electric infrastructure, and the equipment rental option makes it easier for some customers to participate in the off-peak rate.

Page 27 Existing:

The current electricity supply model has some customers who can be interrupted should electricity demand outstrip supply. These customers are referred to as 'non-firm' or 'interruptible' customers. The largest non-firm customers are Green's Creek Mine and the Franklin Cruise Ship Dock.

The future demand for electricity is unclear. The local electric utility has typically used a 1% annual increase in demand based upon historical trends although this trend is particularly sensitive to both electricity and fossil fuel prices. It also does not account for significant demand increases due to new mines, implementation of electric based district heating, connection of cruise ships, and growth in numbers of electric vehicles.

Replace with:

The current electricity supply model has some customers who can be interrupted should there be a shortage of energy (eg: low water in reservoirs) or capacity (eg: loads are high). These customers are referred to as 'non-firm' or 'interruptible' customers. The largest non-firm customers are the Greens Creek Mine and Princess Cruises at the Franklin Cruise Ship Dock.

The future demand for electricity is difficult to predict because it is sensitive to weather, fossil fuel prices, and is affected by economic and technological changes. The addition or subtraction of an industrial load, such as a local mine opening or closing, development of an electric based district heating, new construction, or shore power for cruise ships could have *large* impacts on demand, as could growth in numbers of electric vehicles and shifts in thermal loads. Short-term

shifts can be considerable. Energy efficiency measures reduced electricity demand by about 8% after the 2008 and 2009 avalanches, while in 2017 electricity use increased by 5% over 2016 due to weather (footnote).

AEL&P does not include speculative loads in its forecasting because, as previously discussed, large industrial loads seeking to connect to AEL&P's system would be subject to the line extension policy in the tariff, which requires the entity seeking to connect to pay for the infrastructure necessary to connect them. Because AEL&P's investment in the system becomes incorporated into rates, making speculative investments in infrastructure that ultimately may not be required to meet the needs of firm customers would create an undue rate burden to electric customers in Juneau.

(footnote: 2016 was the warmest year since at least 1960, according to AELP records, and 2016 was the third consecutive year of declining firm sales. HDD in 2017 were at or near the 30-year average for Juneau and significantly higher than 2016. The increase in firm sales in 2017 relative to 2016 is associated with with the colder temperatures. AEL&P TA 464-1 November 2017 Distribution Report Sales Report)

Page 28 existing:

Supplying non-firm customers and potential demand such as the Kensington Mine (currently outside the AEL&P service area) could be considered as an unserved demand since they have to use diesel generated electricity some or all of the time. If additional capacity were created that allowed current non-firm customers to be given guaranteed electricity supply then additional infrastructure would be necessary to connect them. This would have to be paid for by newly connected customers while upgrades to existing infrastructure to carry additional loads would need to be borne by the existing firm customers. However, if this additional capacity is provided by a private company this could be covered by a 'wheeling charge' for access to the transmission lines. Wheeling is the transmission of electricity by an entity that does not own or directly use the power it is transmitting. Alternatively, a private company may apply to build the new transmission line although this may require Regulatory Commission of Alaska (RCA) approval.

Replace with:

While AEL&P is the only entity authorized to make retail sales of electricity within its service territory, there are two other types of entities that may play a role in the production of electricity. Independent Power Producers (IPPs) are entities that operate electricity generation facilities to sell electricity to one or more customers, often to utilities or large industrial customers, through a power-sales agreement, or to a wholesale market. Net-metering customers are utility customers who generate on-site and may occasionally have excess generation that flows back into the utility grid. IPPs and net-metering customers operate under different sets of federal and state laws and regulations.

Rather than own shared transmission assets, IPPs typically build only the lines required to connect to a larger grid and, from there, utilize existing transmission networks by working with the affected owner(s) of the transmission pathway from its generation plant to a utility, other customer(s), or wholesale market. Federal and state laws and regulations govern the conditions under which the owners of transmission assets provide access to their lines, as well as the conditions under which a utility makes purchases from an IPP. In general, an IPP may request and receive access to transmission lines and sell power to its customer by ensuring safe and reliable interconnection with the larger electric grid, and by fairly compensating the affected owner(s) for use of the grid. If the IPP's customer is an electric utility, the utility may be required to provide the IPP with compensation equal to its avoided cost, which can be described as the amount of money the utility would save if the IPP's energy were delivered for free.

Net-metering customers rely on a separate set of enabling laws and regulations than IPPs. Net-metering customers operate a small generator on their property and connect through their existing electric service. The on-site generators reduce the total amount of energy required from the serving utility and, if generation output exceeds on-site loads at any moment, some energy is exported to the grid. In many cases, the customer exporting energy receives one-for-one credit for each kilowatt-hour sent back into the utility grid, but net-metering rules vary by state. In Alaska, utilities below a certain size and utilities generating with renewable energy are exempt from net-metering rules. Alaska's largest utilities in the Railbelt, who generate much of their electricity with natural gas or coal, must provide compensation to customers who send excess renewable electricity onto the electric grid. AEL&P operates under an exemption from state net-metering rules because its generation is nearly 100% renewable.

Page 30 existing:

Hydroelectricity projects require a 5-10 year license preparation period prior to approval by relevant Government agencies so early recognition of deficiencies of energy supply is necessary. Some plans for additional hydroelectric capacity in Juneau are already being explored and are in various stages of the design and permitting process. Lake Dorothy Phase II project (80 GWh) will use the same transmission infrastructure as Lake Dorothy Phase I. However, the Lake Dorothy Phase I water supply would be hindered by Lake Dorothy Phase II so the net increase in hydroelectric capacity will be less than 80 GWh – AEL&P states the combine output would be 169 GWh. Additionally, a private company, Juneau Hydropower, received a Federal Regulatory Commission license on September 9, 2016 for the Sweetheart Lake Hydroelectric Facility which proposes to add 116 GWh. The Sweetheart Lake Hydroelectric Facility is a lake tap hydroelectric project. A second 'run-of the river' project has also been explored by AEL&P at Sheep Creek but the project is not currently being pursued.

Replace with:

Hydroelectricity projects commonly require a development period of five to ten years, so early recognition of deficiencies of energy supply for firm customers is necessary. Some plans for

additional hydroelectric capacity in Juneau are being explored and are in various stages of design and permitting. Juneau Hydropower received a FERC license in 2016 to construct a storage project at Sweetheart Lake, which would produce 116 GWh per year, and Juneau Hydropower is actively pursuing development of that project. AEL&P's Lake Dorothy Project could, with an amendment to its FERC license, add a second phase that would increase its annual output from about 80 GHh per year to 169 GWh per year. AEL&P has also explored a smaller "run-of-river" project at Sheep Creek, which would not require a FERC license, but AEL&P has no immediate plans to construct any new hydro generation facilities.

Page 30, Footnote 47, existing:

Sweetheart Lake Hydroelectric Project, Environmental Impact Statement P-13563, October 29, 2015. Federal Energy Regulatory Commission. The company have stated that their project business strategy is to provide industrial hydropower to the Kensington Mine, cruise ships, and provide other industrial users of power when AEL&P are unable to provide this power. The Sweetheart Lake Hydroelectric Project would also provide back-up power to the Juneau community.

Replace with:

Sweetheart Lake Hydroelectric Project, Environmental Impact Statement P-13563, October 29, 2015. Federal Energy Regulatory Commission.

Page 31- 32 existing:

The role of private energy suppliers - *In addition to local electric utilities, private energy companies are also working to supply electricity to Juneau. Private suppliers are known as Qualifying Facilities (QFs) and have to be approved by Federal Energy Regulatory Commission (FERC). Juneau Hydropower recently received approval as a QF. In Alaska, local electric utilities are obligated to provide access to their transmission lines to allow transfer of electricity generated by independent power producers. Transmission rates have to be approved by the RCA. The utility who owns the distribution infrastructure, with approval from RCA, can levy a 'wheeling charge' for use of their infrastructure.*

A recent ruling by the RCA has added greater incentives for QFs; their electricity now has to be purchased by the local utility if it is cheaper than the utility's most expensive current or future supply. The rate that could be charged by these QFs would have to match the current or future 'avoided' costs. Avoided costs can be described as the costs that the local utility would not incur from generating their own electricity if they had to use electricity that was given to them for free. Previously the utility could use an average cost of all their current generating sources but now must use the federal standard of incremental avoided cost. In the case of the existing supply situation in Juneau, a QF would have to sell its electricity at a cost that was equal or less

than using existing diesel generators or to provide a new electricity supply (e.g. a new hydroelectric installation). It is important to note the RCA would review the use of this alternative electricity source to ensure it would not cause overall rates to increase more than if the local utility had to provide the electricity. This would include costs that may result from additional transmission capacity that the utility would have to provide to deliver the QF's electricity.

Replace with:

The role of private energy suppliers - As noted above, Juneau Hydropower is developing a hydroelectric project at Sweetheart Lake, 35 miles south of Juneau. Juneau Hydropower and AEL&P are currently studying the technical requirements for connecting the Sweetheart Lake facility with Juneau's electric system and wheeling energy through the Snettisham and AEL&P transmission system.