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Energy Efficiency Policy Recommendations for Alaska

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List of Acronyms

AEA	Alaska Energy Authority
AEEU	Alaska Energy Efficiency Utility
AHFC	Alaska Housing Finance Corporation
ASHRAE	American Society of Heating, Refrigeration, and Air-Conditioning Engineers
CCHRC	Cold Climate Housing Research Center
Commission	Alaska Energy Commission (proposed)
DCCED	Alaska Department of Commerce, Community, and Economic Development
EERS	Energy Efficiency Resource Strategy
HB 306	Alaska House Bill 306-2010
ISER	University of Alaska, Anchorage Institute of Social and Economic Research
Partnership	Alaska Energy Efficiency Partnership
SB 220	Alaska Senate Bill 220-2010
Working Group	Alaska Energy Efficiency Partnership Working Group

Executive Summary
Energy Efficiency Policy Recommendations for Alaska

Background and Scope

In 2010, House Bill 306 (HB 306) and Senate Bill 220 (SB 220) declared an energy efficiency policy for Alaska and established several new energy efficiency programs. This report expands on the scope of HB 306 and SB220 and makes recommendations to further define the energy efficiency goals of the State of Alaska, recommends a consolidated oversight commission and establishment of an energy efficiency utility, and provides a roadmap to create a comprehensive approach to meeting our overall goal of increasing energy efficiency by 15% per capita by 2020 (15% Goal).

The compelling economics of energy efficiency

Investing in energy efficiency is the most immediate and effective way to lower energy costs and save money for Alaska's households and businesses.[1] Studies show that not only can Alaskans slow the increase in energy demand, but they can reduce future demand by investing in energy efficiency now.[2] This investment, and attendant reduction in energy consumption, will help stabilize energy costs and strengthen Alaska's economy.[3] In California, similar efforts have resulted in flat levels of electrical energy consumption for over thirty years. This compares with an over 40% growth nationally.[4]

Alaska has also invested in energy efficiency through many programs, including, for example, the Alaska Housing Finance Corporation (AHFC) Home Energy Rebate Program. This program is saving participating Alaska homeowners $1,297 per year in energy costs and demonstrating an impressive five-year payback on the state's investment.[5] For homeowners, lower energy bills are equivalent to a permanent boost in take-home pay, which can fuel further spending, investment, and growth.

Individual Alaskans, companies, and industries[6] spend about $5.7 billion a year on energy, or $8,027 per capita.[7] Were Alaskans to accomplish the 15% Goal, they would save up to an estimated $1,216 per capita per year.

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[1] Laitner, J., February 5, 2009.

[2] American Council for an Energy Efficient Economy, September 2009.

[3] Ibid.

[4] Rosenfeld, A., Poskanzer, D., Fall 2009.

[5] Alaska Housing Finance Corporation, March 2012.

[6] Excludes North Slope oil production and jet fuel.

State energy efficiency goal

In 2010 the Alaska State Legislature enacted HB 306, *"An Act Declaring a State Energy Policy"* and recognized that investing in energy efficiency was an investment in economic development and sustainability. This Act provided that it was the intent of the Legislature to "increase energy efficiency per capita by 15% between 2010 and 2020." That same year the legislature enacted SB 220, "*The Alaska Sustainable Energy Act*," which created an energy efficiency revolving loan fund, an alternative energy conservation revolving loan fund, and other programs.

These legislative actions were bold first steps toward harvesting a vast energy efficiency resource to create a vigorous and sustainable future. However, the State still needs to implement a comprehensive and coordinated approach to energy efficiency, including a detailed plan to achieve its 15% Goal. This report proposes a roadmap comprised of four overarching structural recommendations, six priority recommendations, and 19 other recommendations to complete the plan.

What Other States Have Done

Nationally, 26 states have adopted energy efficiency plans,[8] often called an Energy Efficiency Resource Standard. This standard is a set of one or more energy reduction targets that are intended to be met through the implementation of energy efficiency programs.[9] Nationally, these states are realizing annual savings of about 1% per year,[10] and many are returning between $2 and $4 for every dollar invested in energy efficiency.[11] Three examples of these programs are:

California Energy Commission – This commission is California's primary energy policy and planning agency and was created by the California legislature in 1974. It is estimated that energy efficiency savings resulting from policies implemented by the California Energy Commission amount to about $1,000 per family per year.[12]

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[7] Calculations based upon information from *Alaska Energy Statistics 1960-2008 (*May 2011), includes industrial and commercial consumption, and does not reflect solely personal consumption.

[8] American Council for an Energy Efficient Economy, June 2011.

[9] Ibid.

[10] Ibid.

[11] For example California Energy Commission, Energy Trust of Oregon, Efficiency Vermont, Illinois Now.

[12] Rosenfeld, A., April 2005.

Energy Trust of Oregon – The Trust has helped participating customers save nearly $800 million on their energy bills. They report that every dollar spent on energy efficiency brings $4 in benefits to the utility customers.[13]

Efficiency Vermont – In 2009, Efficiency Vermont delivered energy efficiency at 3.8 cents per kWh, approximately one-quarter of the cost of comparable electric supply. They report that every dollar spent on efficiency returns $2.4 in benefits to the ratepayers.[14]

Applying These Examples to Alaska

The common characteristics of these different approaches are the legislative establishment of (1) a methodology and goal, (2) an agency or nonprofit responsible for implementing energy efficiency programs to meet the goal, (3) funding mechanisms to administer and pay for the services and incentives provided by the efficiency programs, and (4) an agreement on the baseline data and approach needed to measure progress toward meeting the goal.

Methodology: Establish an Energy Efficiency Resource Strategy

The principal recommendation of this report is to establish and implement an Energy Efficiency Resource Strategy (EERS) for Alaska. The proposed strategy would contain a set of specific targets with associated metrics that would be used to measure progress in meeting the state's 15% Goal. The Alaska EERS would be adopted by a state commission and comprised of specific targets for the various energy efficiency programs in the state. The commission would have broad oversight responsibilities to set the targets and monitor progress toward meeting the targets, but fundamentally it would be an advisory body to the legislature, executive agencies, and the energy efficiency utility. The implementation of the various energy efficiency programs would, for the most part, remain with the existing state agencies.

The authors propose Alaska's EERS be divided into the four commonly recognized energy sectors: (1) residential buildings, (2) commercial (i.e., non-residential) buildings, (3) industrial, and (4) transportation.[15]

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[13] Accessed March 30, 2012: http://energytrust.org/.

[14] Accessed March 30, 2012: http://efficiencyvermont.com.

[15] As electrical end-uses occur primarily within buildings, industrial plants, and to some extent transportation systems, we chose not to define a distinct category for electrical end-use targets, rather they are included within the sector in which the end-use occurs; for example, energy efficiency targets for residential lighting are included in the residential building sector.

Scope of Goal - The State of Alaska will focus on meeting its energy efficiency goal in the following four energy use sectors:

Residential Buildings & Commercial Buildings – including energy used for space heating, cooling and ventilation, water heating; and electricity for lighting, appliances, electronics, vehicle plug-ins, other plug loads, and parking lot lighting.

Transportation – including energy used for vehicle power and street lighting.

Industrial – including energy used for processing and plant use, water supply and sewage treatment, and electrical production.

Establish Organization – Who is responsible for energy efficiency in Alaska?

There are a number of organizations that could be responsible for developing and overseeing the implementation of the Alaska Energy Efficiency Resource Strategy (EERS). The authors recommend establishing an oversight commission for coordination, but suggest leaving delivery of services with the various state agencies presently offering them. The one exception is that we recommend establishment of an energy-efficiency utility to deliver some programs not presently available. The Alaska Energy Efficiency Commission (Commission) would be composed of energy efficiency experts from certain state agencies, University of Alaska, and the public.

Purpose, Powers and Composition of the Commission

The Commission would be responsible for developing the EERS, recommending programs to meet the strategic targets, and evaluating progress in achieving the EERS. It would be an advisory body charged with making recommendations to both the legislature and the executive branch agencies. For administrative purposes, the Commission would be overseen by the Legislative Council. It would have a separate budget, powers to hire staff, make contracts, and receive and expend funds.

Funding: Provide sustainable funding for energy efficiency programs

For Alaska to achieve its 15% goal, it is critical to provide consistent and sustainable funding for its energy efficiency programs. The State presently relies on specific capital appropriations for year-to-year operations for the most part; except that AHFC, for example, has developed a major revolving loan fund and has used corporate receipts to fund some long-standing programs. Following are a number of other options for funding programs that have not been used to-date.

Property tax assessment/on-bill financing types of programs – There are a variety of funding mechanisms that allow utilities and municipalities to provide zero to low cost financing with long term paybacks through funding attached to the property and not the owner.

System benefits charge - A common funding stream for energy utilities is a "system benefits charge." Mature energy efficiency programs around the nation are being delivered at a cost to consumers of roughly 3 cents per kWh saved.[16]

Fuel transfer taxes – A fuel transfer tax could be collected at the wholesale level and fund the Commission and outreach for non-electric programs. A 1% tax on natural gas, diesel, gasoline, and propane could generate about $50 million per year or $500 million in 10 years. A 15% increase in efficiency at the end of 10 years would represent an annual savings of about $700 million, so the tax-funded efficiency program could more than pay for itself in reduced energy expenditures.

Endowment funds – A large capital appropriation can be set aside with the interest dedicated to support efficiency programs. A $5 billion fund could generate $125 million per year with a 2.5% payout. This would be sufficient to fund the AHFC Home Energy Rebate Program at more than 16,000 homes per year, enough to meet the 15% Goal for the residential sector.

Mandatory energy efficiency designed into the construction of large buildings - If the integrated design process were required for large new commercial buildings, the cost of this energy efficiency work would be borne by the construction budget and paid back quickly.

Continue to gather baseline and updated end-use energy efficiency data

In 2011, the Alaska Energy Authority (AEA) published a report containing 2008 energy data that can be used to set initial energy efficiency targets for all energy sectors.[17] This highly aggregated data will allow Alaska to set its overall residential, commercial, transportation or industrial consumption of a fuel type (i.e., electricity, coal, natural gas, or transportation fuel). Between 2011 and 2012, AEA commissioned a significant and unprecedented data collection effort for the residential and non-residential sectors that will serve as a baseline for those sectors. End-use data for the industrial and transportation sectors, however, are incomplete and need to be addressed. Once the comprehensive baseline is established, a plan to update the data every two years will need to be developed, funded, and implemented.

Discussion of implementation strategy

The first principle related to implementation of the recommendations in this report is: "Do no harm." Alaska has many programs that are helping increase energy efficiency in the state. Whether or not any of the other recommendations in this report are implemented, the existing programs should be maintained with adequate levels of funding.

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[16] Shirley, W., 2007.

[17] Alaska Energy Authority, May 2011.

However, the existing programs are insufficient to achieve Alaska's 15% Goal. Most of the present effort is directed at the residential and public building sectors, and there are very few programs focused on the industrial or transportation sectors; yet these sectors consume about one half of the modified net energy consumption in the state.[18]

The foundation for the proposed Commission lies in the AEA-led Alaska Energy Efficiency Partnership (Partnership). An ad-hoc working group (Working Group) of Partnership members could be the interim body responsible for considering these recommendations and setting out a plan to work with the legislature to establish the Commission, obtain adequate funding, begin identifying and implementing steps in the EERS, and developing a plan for continuing to gather comprehensive baseline and updated end-use energy efficiency data.

Developing the targets

Methodology - The State of Alaska will meet its 15% Goal by implementing a variety of cost-effective programs that encourage and incentivize the adoption of energy efficiency measures within each energy end-use subsector. These programs will include outreach, education and training; and will provide rebates, loans, and other forms of assistance to help private and public entities reduce the use and cost of energy in their buildings, transportation systems, and industrial plants and processes.

Determination of the goal

The first requirement for each program area is to determine a metric for calculating the rate of energy use within the appropriate subsector.

Measurement

Progress toward the 15% Goal will be measured through the general approach of top down and bottom up comparisons. In the top down approach, one would find the total energy used for a subsector through data such as total fuel sales. In the bottom up approach one would measure a representative sample for a particular end-use and extrapolate that result to the whole subsector.

Specific recommendations for implementing the strategy

The State is already in year two of the 10-year implementation period for achieving its 15% Goal; clearly it cannot afford to wait until the 2013 legislative session to begin creating the Commission, establishing funding mechanisms, and finalizing an ongoing data collection plan. Therefore actions must be taken immediately to begin implementing this plan. Six recommendations for immediate actions can and should be undertaken by existing

[18] Net domestic total energy consumption includes the four energy end-use sectors, including electrical source, and unclassified. Modified net domestic total energy consumption reported here begins with the net domestic, removes all jet fuel, and prorates total electric consumption and unclassified energy use into the four end-use energy sectors (see Appendix I).

organizations, coordinated by the Working Group, and either completed or handed off to the Commission once it is established.

The six most important recommendations for immediate action include:

(1) Continue to fund, support, and strengthen existing energy efficiency programs.

(2) Establish a statewide building code that includes an energy efficiency standard for all building retrofits and new construction.

(3) Establish a comprehensive and coordinated approach to educate state residents on the benefits of energy efficiency and conservation, and provide technical assistance as needed.

(4) Instruct the Regulatory Commission of Alaska to require utilities to identify and complete all feasible, cost effective forms of demand-side management prior to approval of supply side projects.

(5) Create an independent energy efficiency utility[19] that provides efficiency and conservation programs to increase energy efficiency through coordinated outreach, education, and technical assistance. The utility would be charged with meeting specific energy-use reduction goals through these demand-side programs.

(6) Establish policies that mandate energy efficiency measures in all departments of state government including building operations, workforce scheduling, and life-cycle cost analysis in procurement decisions.

Conclusion

In Alaska, energy efficiency is a largely untapped resource that offers an impressive potential return on investment. Based upon AEA's 2011 report, Alaska residents, businesses, and industries will spend more than $57 billion on energy in the next 10 years, most of which will leave our economy. Investing in energy efficiency over the next decade could keep up to 15% of this money in Alaska,[20] circulating through our economy. Results from AHFC's Home Energy Rebate Program demonstrate a four to five year payback on the state's investment, highlighting the cost-effectiveness of energy efficiency improvements.[21] For these compelling economic reasons, the State Legislature established a *State Energy Policy* that included a goal of

[19] An energy efficiency utility is an independent agency funded by the ratepayers to provide energy efficiency services that reduce demand.

[20] The $57 billion estimate includes industry and transportation and excludes jet fuel. The Energy Efficiency Resource Strategy adopted by the Commission will determine what is ultimately in the 15% Goal.

[21] Alaska Housing Finance Corporation, March 2012.

increasing energy efficiency by 15% by 2020. This paper proposes a roadmap to start Alaska on the road to achieving its 15% Goal, thus keeping up to 15% of that estimated $57 billion, as much as $8.6 billion, circulating in Alaska.

Chapter 1
Introducing an Energy Efficiency Resource Strategy for Alaska

Section 1.1 Background and Scope

In 2010 the Legislature passed and the Governor signed House Bill 306 (HB 306) and Senate Bill 220 (SB 220), two important energy bills that established an energy efficiency policy and programs for Alaska. These bills established several programs in multiple agencies and built upon progress already set into motion by the legislature in 2008 when they provided assistance and incentives for Alaskans to use energy more efficiently. This report makes recommendations to further define the energy efficiency goals of the State of Alaska, recommends a consolidated oversight commission, establishment of an energy efficiency utility, and provides a roadmap for combining existing and new programs to create a comprehensive approach to meeting our overall goal of increasing energy efficiency by 15% per capita by 2020 (15% Goal).

In January of 2011, the Alaska Energy Authority (AEA) contracted with the Cold Climate Housing Research Center (CCHRC) to develop and propose a comprehensive and coordinated roadmap that the State could follow to achieve its 15% Goal. This contract was funded by a U.S. Department of Energy grant to the AEA and augmented with other federal funds through the Alaska Housing Finance Corporation (AHFC). This work builds on programmatic recommendations presented in an earlier CCHRC report,[22] results from a workshop of experts held in Anchorage in March 2011,[23] and reports from consultants contracted to review energy efficiency issues in the industrial,[24] transportation,[25] and electrical[26] sectors.

Section 1.1.1 The compelling economics of energy efficiency

Investing in energy efficiency is the most immediate and effective way to lower energy costs and save money for Alaska's households and businesses.[27] Studies show that not only can Alaskans slow the increase in energy demand, but they can reduce future demand by investing in energy efficiency now.[28] This investment, and attendant reduction in energy consumption,

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[22] Cold Climate Housing Research Center, June 2008.

[23] Cold Climate Housing Research Center, June 2011.

[24] Cold Climate Housing Research Center, October 2011, Winters & Associates.

[25] Cold Climate Housing Research Center, September 2011, Information Insights.

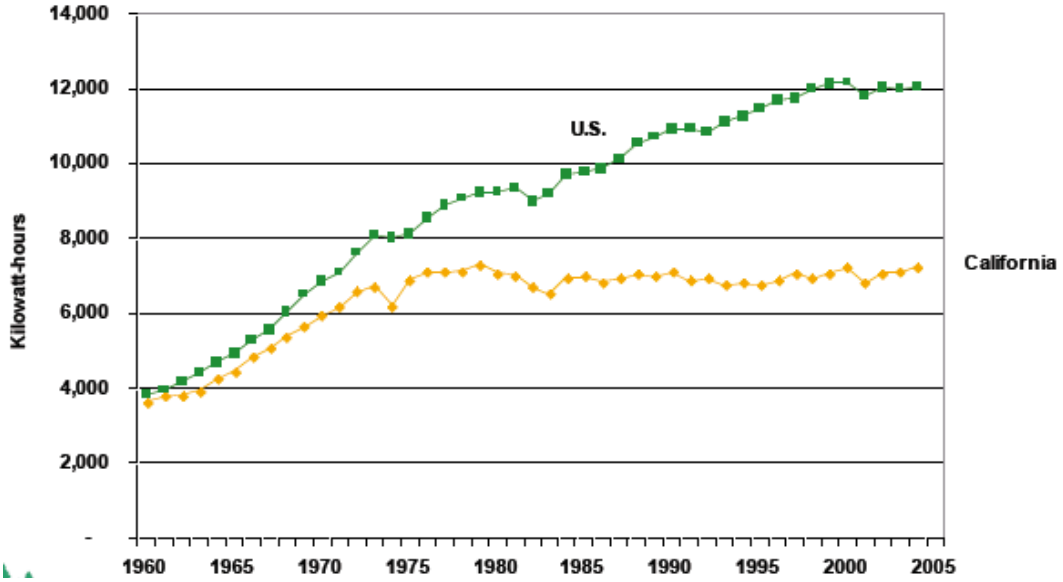
[26] Cold Climate Housing Research Center, October 2011, Information Insights.

[27] Laitner, J., February 5, 2009.

[28] American Council for an Energy Efficient Economy, 2009.

will help stabilize energy costs and strengthen Alaska's economy.[29] In California, during a period of significant expansion, similar efforts have resulted in flat levels of electric energy consumption for over 30 years (see Figure 1). This compares with an over 40% growth in national consumption during the same period.[30] California's investment allowed energy utilities to avoid building 16 new power plants.[31] By 2005, these investments were saving Californian families' an average of $1,000 per year.[32]

Figure 1: Comparison of per capita electricity consumption in U.S. and California



Source: Carter et al, 2004.

Alaska has also invested in energy efficiency through many energy efficiency audit, financing, and retrofit programs, including AHFC's Home Energy Rebate Program. This program is saving participating Alaska homeowners $1,297 per year in energy costs and demonstrating an impressive 5 year payback on the state's investment.[33] Alaska has also begun auditing public and commercial buildings and retrofitting State owned facilities. This should result in sustained reductions in state and municipal energy bills, which will reduce the cost of government in Alaska. For homeowners, lower property taxes and energy bills are equivalent to a permanent boost in take-home pay, which will also stimulate further spending, investment, and growth.[34]

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[29] Ibid.

[30] Rosenfeld, A., Poskanzer, D., Fall 2009.

[31] Carter, S., et al, 2004.

[32] Rosenfeld, A., April 2005.

[33] Alaska Housing Finance Corporation, March 2012.

[34] Email communication, Steve Colt, Institute of Social and Economic Research, February 17, 2012.

This report documents that individual Alaskans, companies, and industries[35] spend about $5.7 billion dollars a year on energy, or $8,027 per capita.[36] The $5.7 billion spent on energy costs are almost all exported, representing a huge drain and opportunity cost for Alaska and its economy. In 2010, the Alaska State Legislature declared its 15% Goal. Were Alaska to accomplish this goal, Alaskans would save an estimated $1,216 per capita per year. Because this includes money spent by all Alaska commercial and industrial operations (except oil and gas and jet fuel), these are not dollars that would necessarily be saved directly by individual Alaskans; rather they are dollars that would not be spent on energy generally and will therefore benefit Alaskans by reducing the cost of living and doing business in Alaska.

Section 1.1.2 State energy efficiency goal

In 2010, the Alaska State Legislature recognized that investing in energy efficiency was an investment in economic development and sustainability and passed HB 306, a *"State Energy Policy*." House Bill 306 declared that it was "the intent of the Legislature that…the state achieve a 15 percent increase in energy efficiency on a per capita basis between 2010 and 2020." The *State Energy Policy* included a call to

> (1) institute a comprehensive and coordinated approach to supporting energy efficiency and conservation by (A) encouraging statewide energy efficiency codes for new and renovated residential, commercial, and public buildings; (B) decreasing public building energy consumption through conservation measures and energy-efficient technologies; and (C) initiating and supporting a program to educate state residents on the benefits of energy efficiency and conservation … (2) (E) promoting the efficiency of energy used for transportation; … (4)(B) by using one office or agency, as may be specified by law, to serve as a clearinghouse in managing the state's energy related functions to avoid fragmentation and duplication and to increase effectiveness …

That same year the legislature enacted SB 220, *The Alaska Sustainable Energy Act*, which, among other programs, created an energy efficiency revolving loan fund and an alternative energy conservation revolving loan fund. SB 220 also directed the Department of Transportation and Public Facilities (DOT/PF) to perform energy retrofits on at least 25% of its buildings by 2020, and to consider purchasing energy efficient vehicles. The Office of Management and Budget (OMB) was tasked with collecting and storing energy use and cost information for all state buildings and AEA was tasked with providing energy efficiency outreach programs. In the capital budget, AHFC received an additional $101 million to continue retrofitting residential housing through its Home Energy Rebate and Weatherization Assistance programs.

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[35] Excludes North Slope oil production and jet fuel.

[36] Calculations based upon information from *Alaska Energy Statistics 1960-2008 (*May 2011). Includes industrial and commercial consumption, and does not reflect solely personal consumption.

These legislative actions were bold first steps toward harvesting a vast energy efficiency resource to create a vital and sustainable future. However, the State still needs to implement a comprehensive and coordinated approach to energy efficiency, including a detailed plan to achieve its 15% Goal. This report proposes four overarching recommendations that must be implemented to create a comprehensive framework, six priority recommendations and 19 additional recommendations to complete the plan. The recommendations in this report, if adopted, would take Alaska a long way down the path toward a more sustainable and dynamic economy and future.

Section 1.1.3 What other states have done

Nationally, 26 states have adopted energy efficiency plans.[37] Most of these plans focus on end-use electrical reductions and are delivered through the state's electric utilities; however, some also involve gas utilities. There are a variety of management models, often including state agencies, nonprofits, or a combination of both. These state energy efficiency plans are usually funded by a small, dedicated fee called a "system benefits charge" on the bill of each utility customer.

These energy efficiency plans are often called an Energy Efficiency Resource Standard,[38] which consists of a set of one or more energy reduction targets intended to be met through the implementation of energy efficiency programs. Nationally, the states that have adopted energy efficiency resource standards are realizing savings of about 1% per year.[39]

Section 1.2 Examples from other states

California Energy Commission – This commission is California's primary energy policy and planning agency.[40] It was created by the California legislature in 1974 and its energy efficiency responsibilities include:

- Forecasting future energy needs and maintaining historical energy data.
- Licensing thermal power plants 50 megawatts or larger (requires all cost effective energy efficiency measures prior to licensing).
- Promoting energy efficiency by setting the state's appliance and building efficiency standards and working with local government to enforce those standards.

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[37] American Council for an Energy Efficient Economy, June 2011.

[38] Nationally these programs are commonly known as Energy Efficiency Resource Standards (EERS); however, this term caused a great deal of confusion among Alaskans, so the authors opted to call the Alaskan plan an Energy Efficiency Resource Strategy.

[39] American Council for an Energy Efficient Economy, June 2011.

[40] Accessed March 30, 2012: www.energy.ca.gov.

- Supporting public interest energy research that advances energy science and technology through research, development, and demonstration programs.
- Administering more than $300 million in American Reinvestment and Recovery Act funding through the state energy program, the energy efficiency conservation and block grant program; the energy efficiency appliance rebate program and the energy assurance and emergency program.

It is estimated that energy efficiency savings resulting from policies implemented by the California Energy Commission amount to about $1,000 per family per year.[41]

Energy Trust of Oregon – The Trust is an independent, nonprofit organization funded by the ratepayers of four major utilities and dedicated to helping those utility customers benefit from energy efficiency and renewable energy programs. These services, cash incentives, and solutions have helped participating customers of Portland General Electric, Pacific Power, NW Natural Gas, and Cascade Natural Gas save nearly $800 million on their energy bills. They report that every dollar spent on energy efficiency brings $4 in benefits to the utility customers.[42]

Efficiency Vermont - In 1999, the Vermont legislature passed a law creating an energy efficiency utility. Efficiency services are provided by a private nonprofit organization, the Vermont Energy Investment Corporation, under an appointment issued by the Vermont Public Service Board. Efficiency Vermont delivers services designed to help Vermonters save energy, reduce energy costs, and protect their environment. An energy efficiency charge on ratepayers' electric bills provides the funds for these services. Efficiency Vermont delivered energy efficiency in 2009 at 3.8 cents per kWh, approximately one-quarter of the cost of comparable electric supply. They report that every dollar spent on efficiency returns $2.4 in benefits to the ratepayers.[43]

Section 1.3 Applying these examples to Alaska

The common characteristics of these different approaches are the legislative establishment of (1) a methodology and goal, (2) an agency or nonprofit responsible for implementing energy efficiency programs to meet the goal, (3) funding mechanisms to administer and pay for the services and incentives provided by the efficiency programs, and (4) an agreement on the baseline data needed to measure progress toward meeting the goal.

In Alaska the Legislature and Governor have established a general goal for the State of Alaska as well as a number of programs in several state agencies to improve the energy efficiency of our buildings. In the next sections we will interpret and expand the goal to each energy sector in

[41] Rosenfeld, A., 2005.

[42] Accessed March 30, 2012: http://energytrust.org/

[43] Accessed March 30, 2012: http://efficiencyvermont.com

Alaska and provide a roadmap for meeting the goals within each sector. We will lay out the methodology, suggest the implementation agencies, recommend funding mechanisms, and discuss the need for additional end-use energy efficiency data to support an ongoing assessment of progress.

Chapter 2
An Energy Efficiency Roadmap for Alaska

Section 2.1 Methodology: Establish an energy efficiency resource strategy

The principal recommendation of this report is to establish and implement an Energy Efficiency Resource Strategy (EERS) for Alaska. The proposed strategy will contain a set of specific targets with associated metrics that will be used to measure progress in meeting the State's 15% Goal.

The Alaska EERS would be adopted by a state commission and comprised of specific targets for the various energy efficiency programs in the state. The Commission (described in greater detail below) would have broad oversight responsibilities to set the targets and monitor progress toward meeting the targets, but fundamentally it would be an advisory body to the legislature, the executive agencies, and the energy efficiency utility. The implementation of the various energy efficiency programs would, for the most part, remain with the existing state agencies.

An EERS is typically broken down into major end-use energy categories or sectors. The authors propose Alaska's EERS be divided into the four commonly recognized energy sectors (as identified in the baseline data section below): (1) residential buildings, (2) commercial (i.e., non-residential) buildings, (3) industrial, and (4) transportation.[44]

House Bill 306 established the official intent that Alaska achieve a "15 percent increase in energy efficiency on a per capita basis between 2010 and 2020." We interpret and further define this intent as follows: The goal of the State of Alaska is to reduce the 2010 rate of energy use 15% by 2020, primarily through encouraging the implementation of energy efficiency measures. The rate of energy use will be defined as per capita, per square foot of building area, per amount of product produced, or per vehicle mile driven as appropriate to the respective sector. The scope of sectors included for evaluation in meeting this goal is defined below.

Scope of Goal - The State of Alaska will focus on meeting its energy efficiency goal in the following four energy-use sectors:

> **Residential Buildings** & **Commercial Buildings** – including energy used for space heating, cooling and ventilation, water heating; and electricity for lighting, appliances, electronics, vehicle plug-ins, other plug loads, and parking lot lighting.

[44] As electrical end-uses occur primarily within buildings, industrial plants and to some extent transportation systems, we chose not to define a distinct category for electrical end-use targets, rather they are included within the sector in which the end-use occurs; for example, energy efficiency targets for residential lighting are included in the residential building sector.

Targeted building types include - residential, nonprofit, public (federal, state, municipal, university, and school), and commercial (office, retail sales, restaurants, clinics, hospitals, etc.).

Excluded types are – military, and those that directly support the extraction and processing of oil and gas for export.

Transportation – including energy used for vehicle power and street lighting.

Targeted transportation modes include – personal automotive, public transit, trucking and fleets (public and commercial), off-road vehicles (snow machines, four-wheelers, etc.), railroads, and marine highways.

Excluded modes are – all aviation using jet fuel.

Industrial – including energy used for processing and plant use, water supply and sewage treatment, and electrical production.

Targeted industries include – seafood processing, tourism, mining, electrical production, and construction.

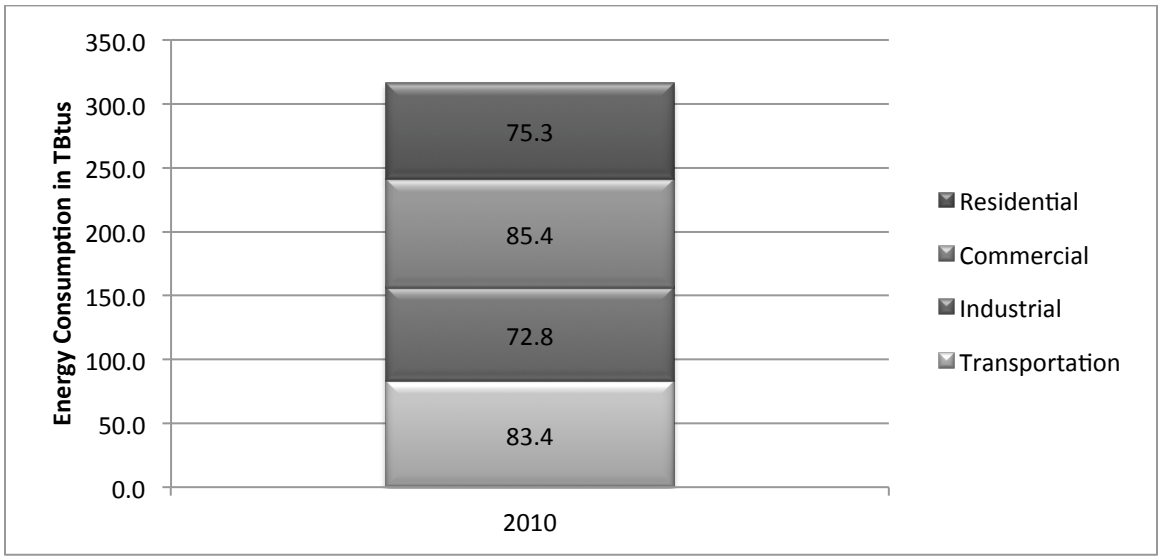
Excluded industries are - those that directly support the extraction and processing of oil and gas for export and aviation.

This scope, in particular with the exclusion of all jet fuel, is reflected in our assessment of the 2008 modified net domestic energy consumption[45] for Alaska based on work by the Institute of Social and Economic Research (ISER)[46] and presented in Appendix 1. It results in an estimated total of 310 trillion Btu spread over the four sectors as shown in Figure 2.

[45] Alaska Energy Authority's *2011 Alaska Energy Statistics* report documenting 441 TBtu of net domestic total energy consumption. This includes the four energy end-use sectors, electrical, including source, and unclassified. The 310 TBtu of modified net domestic total energy consumption reported here begins with the net domestic, removes all jet fuel, and prorates total electric consumption and unclassified energy use into the four end-use energy sectors (see Appendix I).

[46] Alaska Energy Authority, May 2011.

Figure 2: Modified Net Domestic End-Use Energy Consumption by Sector (TBtu). When all end-use consumption is rolled into these four sectors and jet fuel is removed from transportation, the total is 310 TBtu, allocated as shown in the figure.



Section 2.2 Organization: Alaska Energy Efficiency Commission

There are several organizations that could develop and oversee the implementation of the Alaska Energy Efficiency Resource Strategy. Around the nation, successful energy efficiency programs are managed in many ways, including (1) wholly by an agency of the state (California), (2) by a nonprofit (Oregon and Vermont), and (3) by utilities or an umbrella organization of utilities operating in the state (Washington).[47] The authors recommend establishing an oversight commission for coordination, but leaving delivery of services with the various state agencies presently offering them. The one exception is that we recommend establishing an energy-efficiency utility to deliver some programs not presently available. The Alaska Energy Efficiency Commission (Commission) would be composed of energy efficiency experts from certain state agencies, the University of Alaska, and the public.

In the past, recommendations have been made to establish oversight of the State's energy efficiency programs within an existing state agency, a new department of energy, or a governor's cabinet-level task force. All of these recommendations recognize the need to have a central focus and some coordination and oversight of the various state energy efficiency programs. House Bill 306 specifically addresses this need for oversight and coordination by stating that

> it is the [energy] policy of the state to … institute a comprehensive and coordinated approach to supporting energy efficiency and conservation by… coordinating governmental functions … by using one office or agency, as may be

[47] American Council for an Energy Efficient Economy, June 2011.

> specified by law, to serve as a clearinghouse in managing the state's energy-related functions to avoid fragmentation and duplication and to increase effectiveness …

However, for various reasons, none of these recommendations have been implemented to date. In suggesting a Commission, we have been mindful of two characteristics that we believe are necessary for successful oversight of energy efficiency programs: (1) the coordinating body should not be housed in any individual state agency, and (2) it should not be part of a larger entity mainly responsible for the supply of energy.

Section 2.2.1 Purpose and powers of the Commission

The Commission will be responsible for fully developing the EERS, recommending programs to meet the strategic targets, and evaluating progress in achieving the EERS. It will be an advisory body charged with making recommendations to the Legislature, the executive branch agencies, and the energy efficiency utility. The purview of the Commission will be broad, across all energy sectors, so as to have a comprehensive view of the state's progress in meeting the 15% Goal. The Commission will utilize the best data available to make a quantitative report to the Legislature within the first month of the first session of each new Legislature.

For administrative purposes, it is recommended that the Commission be overseen by the Legislative Council. The Commission shall have a separate budget, powers to hire staff, make contracts, and receive and expend funds. The affairs of the Commission shall be carried out by an executive director hired by the Commission and assisted by such staff as approved by the Commission. The members of the Commission shall serve without salary or wages or other employment benefits, except that the public members may receive per diem payments to cover the cost of their participation in official meetings of the Commission. The Commission should undergo sunset review in 2021.

Section 2.2.2 Composition of the Commission

It is recommended that the Commission consist of nine members and that actions of the Commission require an affirmative vote of a least five members. It would be comprised of one representative each from Alaska Energy Authority, Alaska Housing Finance Corporation, Department of Transportation & Public Facilities, Alaska Native Tribal Health Consortium, Alaska Association of Housing Authorities, Alaska Energy Efficiency Utility,[48] and the University of Alaska. These representatives would be the chief executive officer of each of the respective organizations or their designee. These organizations were selected because they offer the majority of the energy efficiency programs in the state. In addition, two public members would be appointed by the Legislature, one by the Senate President and one by the Speaker of the House and would be selected for their energy efficiency expertise and knowledge of different regions of the state.

[48] The Alaska Energy Efficiency Utility is discussed later in the paper.

Many energy efficiency experts from these and other organizations are currently working together as the Alaska Energy Efficiency Partnership (Partnership), and members of the Partnership could be the source of an interim ad-hoc organization (Working Group) until the Commission is formed. For more on the relationship of the proposed Commission to the current Partnership, please see the section on "Discussion of implementation strategy" below.

Section 2.3 Funding: Provide sustainable funding for energy efficiency programs

As with all programs, consistent, sustainable funding of energy efficiency programs is critical to Alaska achieving its 15% Goal. This funding will need to come from many different sources: specific appropriations, endowments, and statutorily dedicated funds. Assistance will be provided in many different forms: information, technical assistance, grants, rebates, tax benefits, or loans. Priority should be placed on maintaining existing successful programs. The state presently relies on specific capital appropriations for year-to-year operations for the most part; but AHFC has developed a major revolving loan fund and has used corporate receipts to fund some long-standing programs. Following are a number of other options for funding programs that have not been used to date.

Property tax assessment/on-bill financing types of programs – There are a variety of funding mechanisms that allow utilities and municipalities to provide zero to low cost financing with long-term paybacks through funding attached to the property and not the owner. These programs allow property owners to fund energy efficiency improvements over periods of time that may extend past their expected period of ownership.

System benefits charge - A common funding stream for energy utilities is a "system benefits charge." The charges typically are based on usage or a simple flat rate. Mature energy efficiency programs around the nation are being delivered at a cost to consumers of roughly 3 cents per kWh saved (cheaper than supply-side-solutions), with program costs that tend to be stable over time.[49] These efficiency programs provide the ability to serve additional electricity consumers at a lower cost than providing new generation facilities. Efficiency programs reduce consumer bills and can return more than they cost; typically $2 - $4 for each dollar invested.[50]

A system benefits charge can provide stable funding for energy efficiency and conservation programs. A tenth of one cent charge per kWh on the 6.5 billion kWh sold in Alaska each year would generate about $6.5 million and could be used to fund the Alaska Energy Efficiency Utility (AEEU). At a three-to-one rate of return, this charge could return $19.5 million in the aggregate to consumers. This type of stable funding dramatically increases the likelihood that those programs will be able to effect change and diminish consumers' exposure to fuel price increases and volatility.

[49] Shirley, W., 2007.

[50] Oregon Trust, Efficiency Vermont, and Illinois Energy Now.

Fuel transfer taxes – A fuel transfer tax could be collected at the wholesale level and fund the Commission and outreach for non-electric programs. A 1% tax on natural gas, diesel, gasoline, and propane could generate about $50 million per year or $500 million in 10 years. A 15% increase in efficiency at the end of 10 years would represent a per year savings of $750 million. Therefore, by 2020 this investment will have more than repaid itself; in the tenth year alone it will pay 1.5 times the estimated program costs to date…and will continue to do so year after year.

Endowment funds – A large capital appropriation can be set aside with the interest dedicated to support efficiency programs. A $5 billion fund could generate $125 million per year with a 2.5% payout. This would be sufficient to fund the AHFC Home Energy Rebate Program at more than 16,000 homes per year, enough to meet the 15% Goal for that program.

Another source of endowment funding might be from interest on the capital appropriated for large construction projects. Setting aside some or all of the money that will be used to construct the project and using the interest earnings from the set-aside to provide funding for efficiency improvements would provide significant funding for existing or new programs.

Mandatory energy efficiency designed into the construction of large buildings - If the integrated design process were required for large new commercial buildings, the cost of this energy efficiency work would be borne by the construction budget and paid back quickly.

Section 2.4 Continue to gather baseline and updated end-use energy efficiency data

Alaska Energy Authority published a report containing 2008 energy data that can be used to set initial energy efficiency targets for all energy sectors.[51] This report details electric generation as well as summary data on end-use consumption within the four energy sectors in Alaska. This highly aggregated data will allow Alaska to track whether or not it has reduced its overall residential, commercial, transportation or industrial consumption of a fuel type (i.e., electricity, coal, natural gas, or transportation fuel).

However, to track consumption by region, types of building, modes of transportation, or specific industrial uses, the Commission will need end-use data that is far more detailed. In a companion project to this study, AEA has contracted with WHPacific to perform a major end-use data study that will provide all of the baseline information needed within the residential and commercial building sectors. The end-use study did not significantly address the industrial or transportation sectors. These still need to be addressed and may require that new programs be established to gather additional data.

[51] Alaska Energy Authority, May 2011.

Once all of these data are gathered, they must be maintained and updated so that progress can be tracked and reported to each new legislature, appropriate project adjustments can be made, and a defensible final report can be delivered to the legislature and governor in 2021.

Section 2.5 Discussion of implementation strategy

The strategic framework just laid out is critical to Alaska's future as a competitive player in a global economy. We cannot wait for all of the pieces to be in place to take action; indeed the state is already offering many efficiency programs and it is important to keep these going while we work to develop the proposed framework and implement the specific recommendations in this report. Below we present some thoughts on what the energy efficiency program landscape looks like now, what it could look like in the future, and how we can make the transition.

Section 2.5.1 What does Alaska's EERS look like?

The first principle related to implementation of the recommendations in this report is: "Do no harm." Alaska has many programs that are helping increase energy efficiency in the state. These include AHFC's retrofit, loan and audit programs, AEA's outreach, loan and retrofit programs, and DOT/PF public building retrofit programs, among many others. Whether or not any of the other recommendations in this report are implemented, the existing programs should be maintained with adequate levels of funding.

However, the existing programs are insufficient to achieve Alaska's 15% Goal by 2020. As seen in the Current System Map (Figure 3), most of the present effort is directed at the residential and public building sectors, and there are very few programs focused on the private commercial, industrial or transportation sectors; yet these sectors consume over half of the modified net energy consumption in the state.

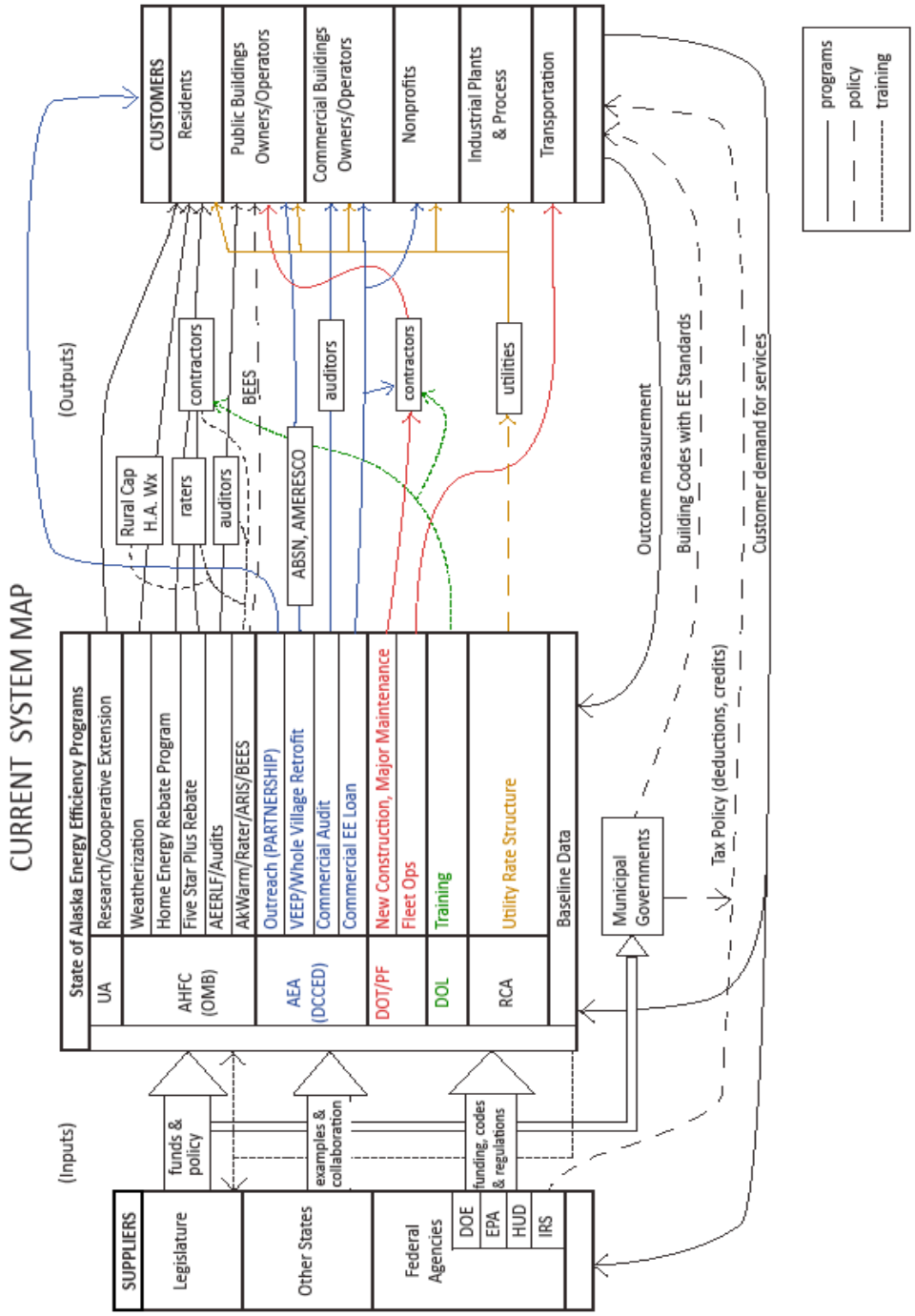
Alaska has the resources and ability to move beyond just these current programs and indeed must to meet its 15% Goal. As recommended above, establishing the Commission is one of the important first steps. The role of the Commission is illustrated in the *Proposed System Map* (Figure 4). As a body created by the Legislature, it can help to obtain funds for existing and new programs from many sources and can provide a mechanism for the state to coordinate programs so that all sectors are addressed and efforts are not duplicated. One of the most important roles of the proposed Commission is to make sure updated end-use data are collected from all of the sectors and analyzed to measure progress in meeting the targets set in the EERS.

The foundation for the proposed Commission lies in the Partnership. The Partnership, made up of statewide energy efficiency experts, has been working to develop coordinated outreach and education programs, and gather baseline data. An ad-hoc working group comprised of Partnership members could be the interim body (Working Group) responsible for considering these recommendations. This will entail designing a plan to work with the Legislature to

establish the Commission, obtaining adequate funding, implementing some of the initial steps in the EERS, and developing a plan to continue gathering comprehensive end-use energy data.

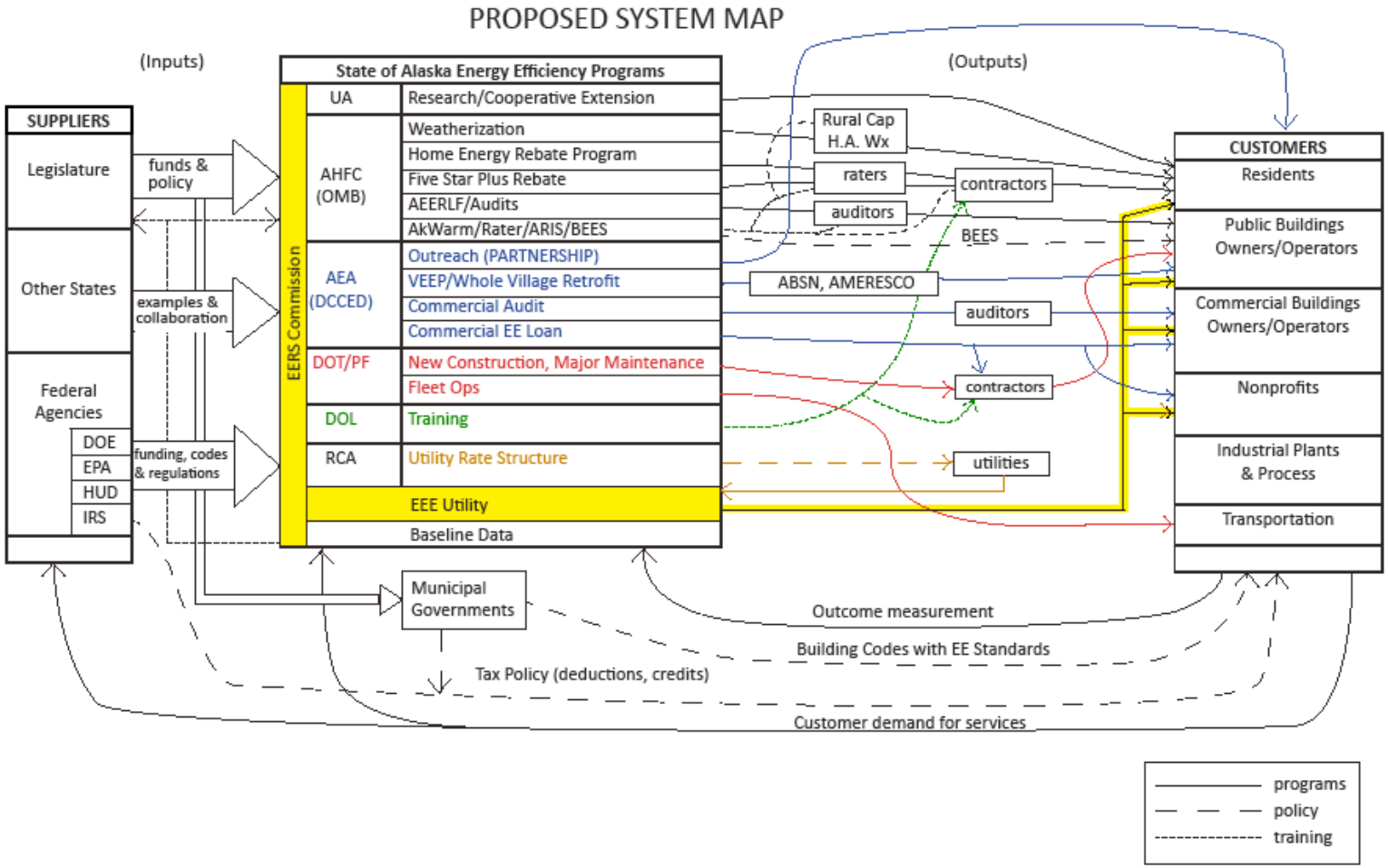
This Working Group and other entities in the state can continue to implement, on an ad hoc basis, some of the programs and policies recommended in this report. But in order for Alaska to accomplish its 15% Goal by 2020, the authors strongly recommend the legislature establish and fund the oversight mechanisms outlined above and adopt and/or fund the six priority recommendations in this report. Absent these actions, the current pace of energy efficiency improvements will not reach the 15% Goal and large scale efforts to do so may be hampered by ineffective coordination.

Figure 3: Current Energy Efficiency System Map



[52] Note that in the System Maps, the agencies in parentheses have energy efficiency program responsibilities that are implemented by the agencies they are grouped with.

Figure 4: Proposed Energy Efficiency System Map



Section 2.5.2 Developing the targets

Methodology - The State of Alaska will meet its 15% Goal by implementing a variety of cost-effective programs that encourage and incentivize the adoption of energy efficiency measures within each energy end-use subsector. These programs will include outreach, education, and training; and will provide rebates, loans, and other forms of assistance to help private and public entities reduce the use and cost of energy in their buildings, transportation systems, and industrial plants and processes.

Determination of the goal

The first requirement for each program area is to determine a metric for calculating the rate of energy use within the appropriate subsector. For example, for residential housing the rate could be the total energy used in a housing unit divided by the total number of square feet of that unit. This metric is often called the Energy Use Intensity (EUI) and expressed in thousands of Btu per square foot (KBtu/SF) per year. It is paramount that the goal not be set as simply a percentage reduction in energy use per sector because this type of goal would be very difficult to meet if there were a housing boom or too easy to meet if there were an economic retrenchment.

Measurement

Since one cannot manage what is not measured, it is crucial that a comprehensive baseline data acquisition program that covers all sectors be implemented and maintained so that the process of meeting the goal can be monitored and adjusted if necessary. The AEA funded End-Use Study is a major piece of the requisite program. Progress toward the 15% Goal will be measured using the following methods:

General approaches

Top down and bottom up comparisons: In the top down approach, one would find the total energy used for a subsector through data such as total fuel sales. In the bottom up approach one would measure a representative sample for a particular end-use and extrapolate that result to the whole subsector.

Sum of known savings**:** Log and add up all known savings due to energy efficiency programs. As we won't know energy savings from non-programmatic efficiency measures, this will be an incomplete picture of total energy savings, but a very accurate measurement for known savings. This will be accomplished via the Alaska Energy Efficiency Map.[53]

Regional comparisons: If energy use data are tagged by census block (or zip code) it will be possible to make comparisons for various measures of program efficacy in different regions such as by election district, climate zone, urban vs. rural, etc.

[53] See www.akenergyefficiencymap.org.

Buildings Sectors

Top down per capita: Total energy in each building subsector divided by total appropriate population. As examples, for single family residential buildings, one might use just the population that resides in single family housing as the divisor; or for big-box stores in Anchorage, one might use the total population in the catchment area for those stores.

Top down per square foot**:** Total energy in a certain building type divided by the total square feet of floor area for that subsector. Square footage is another way to triangulate the energy savings in the event that there are more buildings or more people per building across time.

Bottom up per capita**:** Sample buildings for energy end-uses by subsector and by region, extrapolate to whole state, and divide by the appropriate population.

Bottom up per square foot**:** Sample buildings for energy end-uses by subsector and region, extrapolate to whole state, and divide by total square footage for that subsector.

Average energy intensity measurement**:** Measure longitudinal changes in energy intensity in selected buildings by subsector (Btu/sf/year), normalized by heating degree days, extrapolate to whole subsector.

Transportation Sector

For each mode of transportation, track total fuel used and vehicle miles traveled, so a fleet average of miles per gallon may be calculated.
Also, use the bottom-up approach of sampling the fuel use and miles traveled for certain subsectors (such as large passenger cars) and extrapolating to the whole subsector.

Industrial Sector

As energy efficiency programs are the least well developed in this sector, it may not be reasonable to set a 15% Goal for the sector as a whole. Therefore different approaches should be taken depending on the availability of data and potential savings identified through evaluations of energy efficiency savings potential. Where data are limited or not available, every effort should be made to develop methodologies to obtain those data.

In general, different measures of energy efficiency will be needed for each industrial subsector. In seafood processing, for example, the measure may be the average energy used to process a ton of product; in gold mining it might be the average energy used to produce a 1000-ounce ingot of gold.

Chapter 3
Recommendations for Advancing Toward the 15% Goal

The Alaska EERS outlined in Chapter 2 is comprised of four overarching recommendations that are fundamental to organizing and implementing the energy efficiency programs required to achieve Alaska's 15% Goal. Additionally, six priority recommendations have been identified which are central to achieving the 15% Goal and can be acted upon independently from other recommendations in this report. Finally, 19 additional recommendations are made for the Commission, Working Group, or other policy-making entity to consider when developing the EERS.

Section 3.1 The top six recommendations

Each of the top six recommendations has the potential to create large and lasting energy efficiency improvements in Alaska and is seen as fundamental to any effort to achieve the 15% Goal. This standing distinguishes these recommendations from others in the report because it will be extremely difficult to achieve the 15% Goal without acting on these recommendations in some manner. These six recommendations can be acted on independently or in concert with the other recommendations contained in this report.

Priority Recommendation 1:

Continue to fund, support, and strengthen existing energy efficiency programs including the:

- AHFC Home Energy Rebate and Weatherization programs sustainably funded at $125 million per year to meet the energy efficiency target.
- AHFC New Home Rebate (Five Star Plus) program with an added sixth star that includes greater incentives.
- AEA Village Energy Efficiency Program (VEEP) & Whole Village Retrofit programs.
- AHFC Alaska Energy Efficiency Revolving Loan Fund and Audit program.
- AEA Alaska Commercial Energy Audit program.
- Department of Commerce, Community, and Economic Development /AEA Alternative Energy and Energy Efficiency Commercial Loan program.
- AEA Industrial Energy Audit program for seafood processing facilities.

Justification:

Each of these programs are already in place and helping Alaska move toward the 15% Goal. In the case of the AHFC Home Energy Rebate program, the average participant is saving 33% in energy consumption per year. Likewise, the AHFC Weatherization program yields energy efficiency improvements of approximately 27%. The New Home Rebate program (for 5 Star Plus homes) incentivizes new residential construction to be 30% more efficient than 2010 levels. Adding a 6th Star could incentivize new residential construction to be 45% more efficient than 2010 levels.

The VEEP and Whole Village Retrofit programs address areas with low income and high energy costs and have shown typical energy savings of 50%.

The AEA Alaska Commercial Energy Audit program provides the commercial sector with access to actionable information about the energy efficiency condition of buildings, while the Energy Efficiency Commercial Loan Program is helping to provide upfront capital to support energy efficiency retrofits. The commercial audit program has identified cost effective measures that would save the buildings on average 31% of their energy bill, and payback in 6.25 years.[54]

Priority Recommendation 2:

Establish a statewide building code that includes an energy efficiency standard for all building retrofits and new construction.

Justification:

Building codes and standards have proven to be some of the "most successful and profitable ways for society to save energy and money."[55] However, Alaska does not have statewide building codes or energy standards. In HB 306, the Legislature encouraged "statewide energy efficiency codes for new and renovated residential, commercial, and public buildings" and mandated that all new state buildings be built to American Society of Heating Refrigeration and Air-Conditioning Engineers (ASHRAE) energy standards. For Alaska to meet its 15% Goal, all existing building retrofits and new residential and commercial structures must meet an improved, climate-zone specific, energy efficiency standard.

Priority Recommendation 3:

Establish a comprehensive and coordinated set of programs to educate state residents and businesses on the benefits of energy efficiency and conservation and provide technical assistance as needed.

Justification:

In the State's Energy Policy declared in HB 306, the Legislature stated it was their policy to "institute a comprehensive and coordinated approach to supporting energy efficiency and conservation by…initiating and supporting a program to educate state residents on the benefits of energy efficiency and conservation, including dissemination of information on state and federal programs that reward energy efficiency…"

Integrated energy efficiency outreach and technical assistance are critical to Alaska achieving its 15% Goal for many reasons. Most Alaskans haven't received training on energy efficiency concepts, technology, or investments. When Alaskans' energy bills get overwhelmingly high they may want to take action, but may have no idea what to do.

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[54] Personal communications, Sean Scaling, Alaska Energy Authority, April 30, 2012.

[55] Rosenfeld, A., 1999, p. 40.

Energy efficiency campaigns often fail because they do not provide a clear and understandable path for consumers to evaluate and implement energy efficiency measures. This often results in a disconnect between the message and the desired outcome. People need clearly defined steps to follow, and sometimes they need help. Creating a system that marries outreach with delivery of technical assistance is one way of overcoming this barrier.

Several agencies and programs currently provide energy efficiency outreach and technical assistance activities across Alaska. However they are underfunded and not well coordinated, therefore they provide intermittent and inconsistent messaging, with some regions and communities receiving no outreach at all. Alaska Energy Authority and the Partnership have begun working to fill this gap, and can continue to do so during the initial implementation stage, but needs additional funding and staffing to fully meet this need.

Priority Recommendation 4:

Instruct the Regulatory Commission of Alaska to require utilities to identify and complete all feasible, cost-effective forms of demand-side management prior to approval of supply-side projects.

Justification:

Nationally, communities and utilities are finding ways to increase energy efficiency on the demand-side, thus reducing the need to construct expensive new substations or power plants. Communities around the nation find that energy efficiency investments of $0.025 per kWh offset the need for investments of $0.06 - $0.15 per kWh in constructing new generation facilities.[56] Therefore, requiring utilities to evaluate and invest in demand-side improvements before approving supply-side construction can reduce the cost of energy to Alaska consumers.

Priority Recommendation 5:

Create the AEEU, an independent, statewide, energy efficiency utility, that would provide efficiency and conservation programs to increase energy efficiency through coordinated outreach, education, and technical assistance. The utility would be charged with meeting specific levels of service through these demand-side programs.

Justification**:**

Nationally, states have found that traditional energy utilities are focused on and expert at providing energy, not necessarily energy efficiency. States are finding that creating an energy efficiency utility, whose sole focus is on providing energy efficiency services, is a good method for delivering energy efficiency outreach, education, and technical assistance (e.g. Efficiency Vermont, Oregon Trust, California Energy Commission). The AEEU's focus would be on increasing energy efficiency statewide; it would set periodic targets with the Commission and be responsible for achieving those goals.

[56] American Council for an Energy Efficient Economy, E122, January 2012.

Priority Recommendation 6:
Establish policies that mandate energy efficiency measures in all departments of state government including: building operations, workforce scheduling, and life-cycle cost analysis in procurement decisions.

Justification:
Many states have found that leading by example is an effective way to accelerate the adoption of new technology. In SB 220, the Legislature directed the DOT/PF to explore purchasing energy efficient vehicles. This should be amended to require the DOT/PF purchase energy efficient vehicles, educate employees on how to conduct life-cycle costs that include the cost of energy, and purchase energy efficient technology where practicable. Not only will this save the state money on operating costs, but as state employees become educated about energy efficient products and processes and citizens see energy efficiency successes, the adoption of the technology will be accelerated.

Section 3.2 Additional energy efficiency policy recommendations

These recommendations are intended to serve as starting points for a coordinating entity like the Commission or Working Group to use in developing the EERS.

Section 3.2.1 Recommendations that apply to more than one sector (Cross-Sector)

Cross-Sector Recommendation 1:
Create tax incentives for energy efficiency improvements, including corporate tax breaks for companies that invest in energy efficiency and conservation measures, and municipal tax incentives through property tax credits or other financing programs.

Justification:
Alaska has no tax incentives designed to promote energy efficiency and conservation. SB 220 called for evaluation of municipal energy improvement financing programs by the Department of Revenue.[57] The State can take a direct role in offering a corporate tax credit for implementing energy efficiency measures. The State could also permit local governments to create tax incentives or other financing programs for energy efficiency measures. Municipalities and other local governments could then offer property tax credits or other financing for both residential and commercial building energy efficiency measures. These actions would encourage additional investment in energy efficiency.

Cross-Sector Recommendation 2:
Evaluate establishing additional requirements in all sectors for tracking and reporting energy end-use data.

[57] SB 220-2010, Section 43.

Justification:
End-use energy data are essential to managing and evaluating progress in meeting the EERS targets. The data presently available are uneven and incomplete. For example, the state could require industries of certain size to report their energy consumption, which would help establish the baseline and allow for accurate tracking of progress made in achieving the 15% Goal. An additional benefit from tracking and reporting may be an increased awareness of energy consumption by individual businesses.

Section 3.2.2 Residential building sector priorities

The residential building sector is probably the best understood and served end-use energy sector in Alaska. AHFC has been providing the Weatherization Assistance, Home Energy Rebate, and New Home Rebate programs for many years. The Home Energy Rebate program has been delivering an average of 33% energy savings per retrofit.[58] However, this does not typically address retrofits related to electrical end-uses.

Residential Recommendation 1:
Establish a program to encourage residential users to do electric energy efficiency retrofits including lighting, appliances and electronics. Examples of programs that could be adopted include: (1) broaden the existing AHFC rebate program to include appliances, (2) a new statewide electrical retrofit program could be established and delivered through the utilities, (3) electrical audits, (4) wholesale buy-down for energy efficient appliances, (5) rural outreach and technical assistance to Power Cost Equalization communities (see Appendix II, Alaska Electrical Energy End-Use Sector Executive Summary for more information).

Justification:
Existing Weatherization Assistance and Home Energy Rebate programs do not emphasize energy efficiency improvements for lighting, appliances, and electronics. Alaska Energy Authority's VEEP is achieving approximately 50% savings in electrical consumption through investments in lighting, pumps, and other electrical devices; so clearly savings are achievable. This should be addressed in the EERS and implemented by the AEEU.

Residential Recommendation 2:
Change AHFC's financing regulations to require homes meet a five star energy rating (up from four star plus) or above to be able to participate in their financing program.

Justification:
For Alaska to achieve its 15% Goal it needs to ensure that all new construction be built at least 15% more energy efficient than the 2010 standard. Each half step in energy star ratings equals approximately 15% in additional energy efficiency. Therefore, to ensure that all new homes

[58] Alaska Housing Finance Corporation, March 2012.

financed by AHFC are at least 15% more energy efficient than they were in 2010, AHFC should change its financing standard to a five star minimum.

Residential Recommendation 3:
Develop and implement an energy efficiency labeling program for homes that documents a structure's energy efficiency characteristics.

Justification:
Most homeowners lack information about their home's energy efficiency characteristics. This makes it difficult for them to make informed decisions about improving their home, and makes it difficult for new buyers to make decisions that are informed by actual energy efficiency data. An energy efficiency label will educate the current homeowner, give them information about what improvements make the most sense, and provide information for future homebuyers.

Section 3.2.3 Commercial building sector priorities

Commercial buildings include almost all non-residential buildings that are not used directly for industrial purposes. Major ownership categories include public and municipal buildings, buildings owned by businesses, and those owned by nonprofits. Within these categories are functional classifications such as schools, laboratories, hospitals, libraries, apartment and office buildings, clinics, churches, washeterias, malls, grocery and big-box stores, restaurants, fast-food restaurants, theaters, warehouses, and many others. This discussion is broken down into new construction and existing buildings.

Section 3.2.3.1 New commercial construction

Building energy efficient new construction now lessens the need to retrofit later, thereby over time reducing the pool of structures in need of retrofit.

New Commercial Recommendation 1:
Establish and fund a program to incentivize use of the integrated design process, including energy modeling and commissioning.

Justification:
Nationally, leading engineering and design firms are beginning to incorporate the integrated design process along with energy efficiency modeling into the building design process, achieving greater energy efficiency and some construction cost savings. Also, as a result of the integrated design process it is easier to carry out meaningful commissioning (start-up, testing and balancing) of a building's HVAC systems that can result in significant initial and on-going savings.[59]

[59] Green Buildings BC et al, June 2011.

Section 3.2.3.2 Existing commercial structures

Most existing buildings present many energy efficiency investment opportunities and Alaska has begun putting in place tools for affordable energy efficiency audits and financing. During AHFC audits conducted in the winter of 2011/12, AHFC contractors discovered many situations where re-commissioning was indicated. Alaska Energy Authority's commercial audit program has identified cost-effective measures that would save the buildings on average 31% of their energy bill and payback in 6.25 years.[60] American Society of Heating Refrigeration and Air-Conditioning Engineers report savings of up to 50% by re-commissioning heating, ventilation and air conditioning systems in existing buildings.[61]

Existing Commercial Recommendation 1:
Develop and sustainably fund a coherent financing package for existing private and public commercial buildings. Continue investing in retrofitting 25% of the State of Alaska's structures by 2020. Provide grants for commercial building audits, no/low cost technical assistance, and low-to-no-interest loans for retrofitting commercial (public, non-profit, private) structures.

Justification:
The commercial sector consumes 27% of Alaska's energy and is challenged with improving their energy efficiency while balancing the capital needs of the business against that needed for energy efficiency upgrades. Therefore, businesses will be slow to invest without incentives and assistance. In SB 220 the Legislature put in place financing programs for some commercial structures. For the state to meet its 15% Goal, the Legislature needs to sustainably fund the existing programs, as well as add additional programs that result in a coherent package of funding tools for the entire commercial sector.

Existing Commercial Recommendation 2:
In power-cost-equalization communities, target outreach education and technical assistance on lighting and appliances/electronics to owner/operators of private commercial buildings.

Justification:
The VEEP program has been very successful at improving the energy efficiency of public buildings. A similar effort should be focused on privately owned rural commercial buildings, presently excluded from this effort. Helping small rural businesses become more energy efficient should improve the economy and sustainability of rural Alaska.

Existing Commercial Recommendation 3:
Public building managers should lead by example in performing energy efficiency retrofits and publicizing their energy efficiency approach and savings.

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[60] Personal communications, Sean Scaling, Alaska Energy Authority, April 30, 2012.

[61] McFarlane, D., 2011.

Justification:
If local, state, and federal agencies invest in energy efficiency in their own buildings, they can demonstrate the energy efficiency potential and publicize ongoing savings realized through reduced operating costs. Moreover, citizens can see the impact of the investment when they visit government buildings and government employees can experience the impact and share their lessons learned with the community.[62]

Existing Commercial Recommendation 4:
Expand existing programs to provide financial assistance for energy efficiency retrofits of nonprofit buildings.

Justification:
Nonprofit buildings are generally not eligible to participate in current energy efficiency programs, yet they represent a class of commercial buildings that significantly need upgrading. The VEEP program should be expanded to support audits of rural non-profit structures and this audit should be considered sufficient for Alaska's various commercial revolving loan funds. This should improve Alaska's rural economy and its economic sustainability.

Section 3.2.4 Industrial sector priorities

As of 2008, Alaska's modified net domestic total energy consumption amounted to 310 trillion Btu. Of this 310 trillion Btu, Alaskan industries (other than oil and gas extraction or processing) used 73 trillion Btu for a variety of industrial uses, including heat, generating power and processing material. More detailed information on energy use by sectors within the industrial sector is not currently available.[63] Due to lack of specific information about industrial energy consumption, the authors have recommended not including industrial consumption, as a whole, in the 2020 target.

Industrial Recommendation 1:
Create an Alaska Industry Challenge and Recognition Program, including exemplar development and early adopter recognition.

Justification:
There is little specific knowledge about the end-use energy consumption of industries operating in Alaska.[64] Further, it is expected that the energy efficiency policy recommendations are going to be unique to each industry. Therefore it is recommended that work with industry should begin by developing an Alaska Industry Challenge and Recognition program that will help to develop and communicate what is possible across the various industries. Therefore, the AEEU, in partnership with Department of Commerce, Community, and Economic Development

[62] U.S. EPA, 2009.

[63] Alaska Energy Authority, May 2011.

[64] Alaska Energy Authority has a pilot energy audit program for seafood processing facilities.

(DCCED) and in consultation with industry, should create a voluntary Industry Challenge and Recognition Program[65] with the following components:

- Challenge industrial firms or sectors to voluntarily establish energy intensity reduction targets and commit to implementing cost-effective energy efficiency projects. The Challenge and Recognition Program could establish energy intensity reduction targets, and include an audit of facilities that do not have a current energy audit. Progress should be tracked and written up as exemplars for other industry members. The Challenge and Recognition Program could maintain a database on energy savings, benefit-cost ratios and simple payback periods.

- Ensure the Challenge and Recognition Program includes helping industry evaluate process improvements, including processing layout, evaluation of equipment used, re-commissioning of equipment and buildings for efficiencies found through proper operations. The findings should be written up and shared broadly with other industry participants. The programs could be modeled on successful programs for industrial users in other states such as Washington and New York.

- Implement an annual awards program to recognize and honor industrial firms that are participating in the Challenge and Recognition Program and have made progress in reducing their energy intensity. The governor could give the awards at an annual event.

- Through the AEEU, provide expanded industrial energy efficiency training and technical assistance activities such as those provided by regional programs or the Washington State University Extension Energy Program Industrial Services or the Industrial Assessment Centers funded by the U.S. Department of Energy.

Industrial Recommendation 2:

Research in greater depth the energy consumption of existing industries in Alaska.

Justification:

Prior to creating a comprehensive industrial energy efficiency program, research should be conducted to better evaluate the energy intensity of various Alaska industries. *Alaska Energy Statistics, 1960-2008* contains limited data on industrial energy use. Industrial and military producers of electricity with installed capacity greater than one megawatt are required by law to report their operations to the federal government; however, ISER found that the reporting was not complete.[66] There are also limited data on installed capacity for the petroleum and seafood industries.

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[65] See *Recommendations for Industrial End-Use Energy Efficiency* (http://www.cchrc.org/docs/reports/industrial_ee_final.pdf) for additional information.

[66] Ibid.

Industrial Recommendation 3:
The Legislature should task DCCED to work with the Working Group, Commission and/or AEEU to evaluate energy end-use data, identify target industries, and partner with energy efficiency consultants to develop energy efficiency solutions that will result in a more competitive industry and decreased energy consumption. These should be documented and shared as exemplars with other industry partners.

Justification:
As noted, little information is available about specific industry consumption; so recommendations about which industries to partner with, or how many industries to partner with, would be difficult. The first step is to gather additional information about industries and their energy use. Then DCCED could partner with the AEEU to expand their current work with industry to include assisting them with energy efficiency audits and recommendations from expert consultants.

Industrial Recommendation 4:
As the Commission gathers data and works with DCCED, they should set a target of a number of exemplars per year by industry type or simply a number of industry exemplars per year.

Justification:
Working with industry and developing exemplars is an excellent method for identifying energy efficiencies in industry processes and marketing the results. Setting targets increases the likelihood that DCCED will seek out additional industry participants in the exemplar program.

Section 3.2.5 Transportation sector priorities

In the transportation sector it is especially easy to get confused about what should be measured. A change in vehicle miles traveled (VMT) can be the caused by many things: people using alternative modes of transport (car-pooling, buses, light-rail, bicycles, etc.), population changes, or economic and demographic shifts that lead to changes in commute distances. A reduction in VMT will reduce fuel used in that sector, but, for example, it may be due to job losses or shorter commutes due to development of a new business center. Care needs to be taken to ensure the measurements take into account changes in the economy and demographics as well as increases in energy efficiency.

Transportation Recommendation 1:
Accelerate purchase of vehicles that meet new Corporate Average Fuel Efficiency (CAFE) standards through incentives including waiver of fees or direct rebate.

Justification:
If we exclude aviation, net domestic consumption in the transportation sector will be dominated by on-road fuel use in automobiles and trucks. The main driver for improvements in the efficency of these vehicles will be the CAFE standards set by the National Highway Traffic Safety Administration (NHSTA). For most of the past two decades, the CAFE standard has been

27.5 mpg for passenger cars and 21 mpg for light trucks. In April 2010, NHTSA and EPA announced new standards, agreed to by the auto industry and the State of California, which will increase to 35.5 mpg by 2016 for the light-duty fleet with an intention to move the standards even higher by 2025.

Assume that in 2010 light-duty fleet average for Alaska was 20 mpg; if half the vehicles in Alaska improved to 26 mpg by 2020 (and the other half remained at 20), the fleet average would 23 mpg, a 15% improvement. This improvement is based on half the fleet improving by 6 mpg while the CAFE standard is expected to rise by more than 8 mpg. These hypothetical calculations show that if a sufficient number of high efficiency vehicles are purchased, it is quite possible for Alaska to meet its efficiency goal in the transportation sector.

Transportation Recommendation 2:

Clarify and implement State fleet requirements that energy efficient vehicles be used wherever cost effective, based on life-cycle cost analysis.

Justification:
Senate Bill 220-2010 required the State to purchase efficient vehicles "wherever cost effective." The new law did not provide a definition for "cost effective" or instruction about how to perform this analysis. As a result, the current requirement is vague and regulations should be developed to clarify this, including clear instructions on using life-cycle cost analysis in all cost evaluations. This cost analysis should take into account fuel efficiency and reliability so that the lowest overall cost can be computed, not just the lowest initial cost.

Transportation Recommendation 3:

Provide state incentives to municipalities to use full life-cycle cost analysis when purchasing vehicles.

Justification:
Many municipalities have fleets of vehicles, but may have limited ability to perform life-cycle costs analysis. A state-funded program to assist with life-cycle cost analysis could help municipalities evaluate the impact of purchasing energy efficient vehicles for their fleets.

Transportation Recommendation 4:

Require that energy efficiency be integrated into transportation and community comprehensive land use plans.

Justification:
Comprehensive plans are required to include land use, community facilities, and transportation plans.[67] The role of energy efficiency in each of these sections is typically undeveloped. Considerations of potential energy efficiency savings should be added to transportation and community comprehensive land use plan requirements.

[67] Alaska Statute 29.40.030.

Transportation Recommendation 5:

State and municipal road planners and designers should consider bike traffic in both the planning and review phases of new construction and transit projects, and all new public buildings should include safe and adequate bike storage facilities.

Justification:

Bicycles are a highly efficient mode of transportation and by integrating them into plans for roads and buildings their use will be increased.

Conclusions

Energy efficiency is a largely untapped resource that offers an impressive potential return on investment to Alaskans. Based upon AEA's 2008 report, Alaska residents, businesses and industries will spend more than $57 billion on energy in the next 10 years, most of which will leave our economy. Investing in energy efficiency may keep up to 15% of that money in Alaska, circulating through our economy. Results from AHFC's Home Energy Rebate Program demonstrate a four to five year payback on the state's investment, highlighting the cost effectiveness of energy efficiency improvements.[68] For these compelling economic reasons, the State Legislature established a state energy policy that included a goal of increasing energy efficiency 15% by 2020. This paper proposes a roadmap to start Alaska down the road to achieving its 15% Goal, thus keeping 15% of the estimated $57 billion, as much as $8.6 billion, circulating in Alaska.

Key actions that must be taken to realize this 15% Goal are (1) create an Energy Efficiency Resource Strategy (EERS) with accurate and attainable targets for achieving the 15% Goal; (2) create an Alaska Energy Efficiency Commission (Commission) to develop the EERS and track progress in meeting its targets; (3) the Commission and other existing and proposed programs need to be adequately funded through 2021; (4) deepening the baseline information on industry and transportation and keeping the end-use energy data current will be necessary.

There are six priority recommendations that need to be implemented immediately. Top among these is to maintain funding for existing energy efficiency programs.

The second priority is to adopt statewide building codes that include energy efficiency standards. As long as Alaska continues to have no statewide building codes or energy efficiency standards, homes and commercial structures will continue to be built that are not energy efficient, that consume more energy than is necessary, and will ultimately have to be retrofitted, probably through a state program. This is bad business and implementing statewide building codes that include energy efficiency standards can change this.

The third priority recommendation is to continue and strengthen outreach, education, and technical assistance delivery. High energy costs coupled with inefficient homes leaves many Alaskans in economic peril and desperate to know what to do to reduce their energy bills. Outreach, education, and technical assistance will help address this need.

The fourth priority recommendation is to instruct the Regulatory Commission of Alaska to require utilities to identify and complete all feasible, cost-effective forms of demand-side energy efficiency improvements prior to approval of supply-side projects.

[68] Alaska Housing Finance Corporation, March 2012.

The fifth priority recommendation is to create an energy efficiency utility that will implement energy efficiency programs and provide coordinated outreach, education and technical assistance over the long term. Its success will be measured against achieving agreed energy efficiency goals. This utility may take some time to be established, but is crucial to Alaska achieving its 15% Goal.

The sixth priority recommendation is to establish policies that mandate energy efficiency measures in all departments of state government, including life-cycle cost analysis in procurement decisions. This encourages the state to lead by example.

One of the most cost-effective resources Alaska has is energy efficiency and conservation. Sustained reductions in energy bills will help businesses be more competitive and free up resources for reinvestment and business growth. For homeowners, lower energy bills are equivalent to a permanent boost in take-home pay, which will also create further spending, investment, and growth. Implementing the Roadmap and the Priority Recommendations in this report would take Alaska a long way down the path to a sustainable, competitive, and dynamic economy.

Appendix 1
Net Energy Consumption Calculations

Following are the calculations documenting the energy components that make up *net domestic total energy consumption* (Figure 5) and *modified net domestic total energy consumption* (Figure 6). The underlying data are from Alaska Energy Authority's *2008 Alaska Energy Statistics* (May 2011) and include the four energy end-use sectors, as well as electrical and unclassified categories. *Modified net domestic total energy consumption* (Figure 6) reported here begins with the net domestic total energy consumption, removes all jet fuel, and pro-rates total electric consumption and unclassified energy use into the four end-use energy sectors.

Figure 5: Net Domestic Total Energy Consumption Calculations

ISER NET DOMESTIC CONSUMPTION - Rationalized

	Coal	Nat Gas	Diesel	Jet Fuel	Gasoline	Other	Wood	Hydro	Total	Electricity	Source	Tot Elec
Net Domestic Consumption	21	133	81	135	35	34	2	4	445	22	45	67
Residential		22.98	7			2	1.45		33.43	7	14.318182	21.318182
Commercial	11	17.76	7		1	1	0.23		37.99	10	20.454545	30.454545
Industrial	0.003	6.27	16		0.385	28	0.05		50.708	5	10.227273	15.227273
Transportation		2	41	135	34	3			215	0		
Electric	9	44	10					4	67			
Unclassified	1	40							41			
ChekSum	21.003	133.01	81	135	35.385	34	1.73	4	445.128			
Commodity Totals	1,021	129	14	24	7	6	84	1,130				
Units	K Sh Tons	BCF	Mbbl	Mbbl	Mbbl	Mbbl	Kcords	KMWhr				
Price	$30	$8.60	$168	$126	$168	$126	$300	$200				
Units	Sh Ton	KCF	bbl	bbl	bbl	bbl	cord	MWhr	**TOTAL**	**15%**	**$ per cap.**	
Expenditure ($ million)	$30.63	$1,109.40	$2,352	$3,024	$1,176	$756	$25.20	$226.00	**$8,699**	**$1,305**	**$1,864**	

ISER NET DOMESTIC CONSUMPTION - With Unclassified Distributed

	Coal	Nat Gas	Diesel	Jet Fuel	Gasoline	Other	Wood	Hydro	Total	Electricity	Source	Tot Elec
Net Domestic Consumption	21	133	81	135	35	34	2	4	445	22	45	67
Residential		41.735	7.000			2.000	1.450		52.185	7.000	14.318	21.318
Commercial	11.500	32.255	7.000		1.000	1.000	0.230		52.985	10.000	20.455	30.455
Industrial	0.003	11.387	16.000		0.385	28.000	0.050		55.825	5.000	10.227	15.227
Transportation		3.632	41.000	135.000	34.000	3.000			216.632	0.000		
Electric	9.5	44	10					4	67.5			
Unclassified	0	0							0			
ChekSum	21.003	133.010	81.000	135.000	35.385	34.000	1.730	4.000	445.128			

ISER NET DOMESTIC CONSUMPTION - With Unclassified and Electric Distributed ----->

	Coal	Nat Gas	Diesel	Jet Fuel	Gasoline	Other	Wood	Hydro	Total	Electricity	Source	Tot Elec
Net Domestic Consumption	21	133	81	135	35	34	2	4	445	22.167	45.3333	67.5
Residential	0.000	41.735	7.000			2.000	1.450		52.185	7.056	14.429	21.485
Commercial	11.500	32.255	7.000		1.000	1.000	0.230		52.985	10.056	20.565	30.620
Industrial	0.003	11.387	16.000		0.385	28.000	0.050		55.825	5.056	10.339	15.395
Transportation		3.632	41.000	135.000	34.000	3.000			216.632	0.000		
Electric	9.5	44	10					4	67.5			
Unclassified	0	0							0			
ChekSum	21.003	133.010	81.000	135.000	35.385	34.000	1.730	4.000	445.128			

Alaska Modified Net Domestic Energy Consumption (TBtu) by Sector									
	2008	2010	2020	15%	2008-2020	2008-2010	2010-2020		
Residential	73.7	75.3	82.0	12.3	1.1130725	1.021656	1.0894787	75.2960467	82.03344
Commercial	83.6	85.4	93.1	14.0	1.1130725	1.021656	1.0894787	85.410441	93.052857
Industrial	71.2	72.7	79.3	11.9	1.1130725	1.021656	1.0894787	72.7419067	79.250759
Transportation	216.6	221.3	241.1	36.2	1.1130725	1.021656	1.0894787	221.290688	241.09149

	Rate =	1.077%	Alaska Population Projections 2010 to 2034
	1999	**622,000**	
	2000	628,699	Alaska Dept of Labor and Workforce Development
	2001	635,470	
	2002	642,314	February 2011
	2003	649,232	
	2004	656,224	(Numbers in **bold)**
	2005	663,292	
	2006	670,435	
	2007	677,656	
	2008	684,954	2010/2008 1.021656
692,314	2009	692,331	
	2010	699,787	2020/2010 1.1130725 (believe this is 2008-2020)
	2011	707,324	
	2012	714,942	
	2013	722,642	
	2014	730,425	
	2015	738,292	
	2016	746,243	
	2017	754,280	
	2018	762,404	
	2019	770,615	
	2020	778,914	

Sector Consumption (TBtu) for 2008	
Mod Tot	
445	Net Domestic Consumption
73.7	Residential
83.6	Commercial
71.2	Industrial
216.6	Transportation
0	Electric
0	Unclassified
445.1	ChekSum

Figure 6: Modified Net Domestic Total Energy Consumption (Minus Jet Fuel)

ISER NET DOMESTIC CONSUMPTION - Rationalized

	Coal	Nat Gas	Diesel	Gasoline	Other	Wood	Hydro	Total	Electricity	Source	Tot Elec
Net Domestic Consumption	21	133	81	35	34	2	4	310	22	45	67
Residential		22.98	7		2	1.45		33.43	7	14.318182	21.3181818
Commercial	11	17.76	7	1	1	0.23		37.99	10	20.454545	30.4545455
Industrial	0.003	6.27	16	0.385	28	0.05		50.708	5	10.227273	15.2272727
Transportation		2	41	34	3			80	0		
Electric	9	44	10				4	67			
Unclassified	1	40						41			
ChekSum	21.003	133.01	81	35.385	34	1.73	4	310.128			
Commodity Totals	1,021	129	14	7	6	84	1,130				
Units	K Sh Tons	BCF	Mbbl	Mbbl	Mbbl	Kcords	KMWhr				
Price	$30	$8.60	$168	$168	$126	$300	$200				
Units	Sh Ton	KCF	bbl	bbl	bbl	cord	MWhr				
Expenditure ($ million)	$30.63	$1,109.40	$2,352	$1,176	$756	$25.20	$226.00				
								$8,027.20			

TOTAL	15%	$ per cap.
$5,675	$851	$1,216

ISER NET DOMESTIC CONSUMPTION - With Unclassified Distributed

	Coal	Nat Gas	Diesel	Gasoline	Other	Wood	Hydro	Total	Electricity	Source	Tot Elec
Net Domestic Consumption	21	133	81	35	34	2	4	310	22	45	67
Residential		41.735	7.000		2.000	1.450		52.185	7.000	14.318	21.318
Commercial	11.500	32.255	7.000	1.000	1.000	0.230		52.985	10.000	20.455	30.455
Industrial	0.003	11.387	16.000	0.385	28.000	0.050		55.825	5.000	10.227	15.227
Transportation		3.632	41.000	34.000	3.000			81.632	0.000		
Electric	9.5	44	10				4	67.5			
Unclassified	0	0						0			
ChekSum	21.003	133.010	81.000	35.385	34.000	1.730	4.000	310.128			

ISER NET DOMESTIC CONSUMPTION - With Unclassified and Electric Distributed ----->

	Coal	Nat Gas	Diesel	Gasoline	Other	Wood	Hydro	Total	Electricity	Source	Tot Elec
Residential	0.000	41.735	7.000		2.000	1.450		52.185	7.056	14.429	21.485
Commercial	11.500	32.255	7.000	1.000	1.000	0.230		52.985	10.056	20.565	30.620
Industrial	0.003	11.387	16.000	0.385	28.000	0.050		55.825	5.056	10.339	15.395
Transportation		3.632	41.000	34.000	3.000			81.632	0.000		
Electric	9.5	44	10				4	67.5			
Unclassified	0	0						0			
ChekSum	21.003	133.010	81.000	35.385	34.000	1.730	4.000	310.128			

Alaska Modified Net Domestic Energy Consumption (TBtu) by Sector (minus jet fuel)

	2008	2010	2020	15% of 201	15% of 202	2008-2020	2008-2010	2010-2020		
Transportation	81.6	83.4	90.9	12.5	13.6	1.1130725	1.021656	1.08947871	83.40014888	90.862687
Industrial	71.2	72.8	79.3	10.9	11.9	1.1130725	1.021656	1.08947871	72.76241186	79.273099
Commercial	83.6	85.4	93.1	12.8	14.0	1.1130725	1.021656	1.08947871	85.41584512	93.058745
Residential	73.7	75.3	82.0	11.3	12.3	1.1130725	1.021656	1.08947871	75.26572391	82.000404
Net Domestic Consumption	310.1	316.8	345.2	47.5	51.8	1.1130725				

	Rate =	1.077%	Alaska Population Projections 2010 to 2034
	1999	**622,000**	
	2000	628,699	Alaska Dept of Labor and Workforce Development
	2001	635,470	
	2002	642,314	February 2011
	2003	649,232	
	2004	656,224	(Numbers in **bold)**
	2005	663,292	
	2006	670,435	
	2007	677,656	
	2008	684,954	2010/2008 1.021656
692,314	2009	692,331	
	2010	699,787	2020/2010 1.1130725 (believe this is 2008-2020)
	2011	707,324	
	2012	714,942	
	2013	722,642	
	2014	730,425	
	2015	738,292	
	2016	746,243	
	2017	754,280	
	2018	762,404	
	2019	770,615	
	2020	778,914	

Appendix 2
Reports from Consultants

Industrial Sector Executive Summary[69]

By Nadine Winters
Winters & Associates
October 2011

Alaska's Industrial Sector

Alaska's industrial sector is important in terms of energy use and economic impact to the state. As of 2008, Alaska's net domestic consumption amounted to 444 trillion Btu. Net domestic consumption is comprised of five components: residential, commercial, industrial, transportation and electric sector consumption. Alaska's net domestic consumption of 444 trillion Btu does not include energy used by utilities for electric power generation or energy used during petroleum product processing. Industrial consumption (including military bases) totaled 51 trillion Btu or 12% of overall consumption. Transportation consumption was the largest component of Alaska's net domestic consumption accounting for 215 trillion Btu followed by the electric sector which used 67 trillion Btu as inputs to produce electricity. Residential sector consumption was 33 trillion Btu and finally, commercial consumption was about 38 trillion Btu. Alaska industries (other than oil and gas extraction or processing) used the 51 trillion Btu for a variety of industrial uses, including heat, generating power and processing material. More detailed information on energy use by sectors within the industrial is not currently available.[70]

There is significant potential to increase energy efficiencies in the industrial sector. Reducing energy usage in industries in the state will lead to increased productivity and enhanced competitiveness, leading to a strengthened economy in the state. The Western Governor's Association, *Industrial Energy Efficiency Programs and Supporting Policies*[71] suggests realistic goals for reducing baseline energy consumption are from 2.0 – 3.0% annually. EPA's Energy Star for Industry and DOE's Save Energy Now Leaders programs have developed standard goals of 2.0-2.5% annually.[72]

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[69] See http://www.cchrc.org/docs/reports/industrial_ee_final.pdf for a full version of the report.

[70] Fay, Ginny, et al, May 2011.

[71] March 2011.

[72] See www.energystar.gob and www.eere.energy.gov.

Transportation Sector Executive Summary[73]

By Indra Arriaga
Information Insights, LLC
September 2011

Alaska's Transportation Sector

Alaska's transportation sector is indispensible to the growth and continuing evolution of the state's economy, the development of its natural resources, the sustainability of its communities, and the quality of life of Alaska residents. The transportation sector includes all the managed modes of transportation used to move goods and people in, out and throughout the state. It is defined by the Bureau of Economic Analysis (BEA) to include: air, rail, water, truck, transit and ground passenger transportation, as well as pipeline transportation, warehousing and storage, and other transportation and support activities.
As an industry, the transportation sector makes up 8.8% of the state's Gross Domestic Product (2010 estimate, see Appendix 1). Given its significant contribution to the state's vitality, the sector's energy consumption also carries significant impacts for Alaska residents, businesses and infrastructure. According to 2005 Energy Information Administration figures, Alaska consumes 40% more fuel per capita than any other state, and more than three times the national per capita average. This is due to a number of factors: the state's remoteness; isolated communities and population; limited road system and resulting dependence on air travel; status as a major world air cargo hub; and oil production, transportation and refining. As a result, Alaskans have a higher dependence on energy resources and are more vulnerable to energy price volatilities and shocks.[74]

[73] See www.cchrc.org/docs/reports/Energy_EE_Transportation.pdf for a full version of the report.

[74] Abstract: Model of Alaska Transportation Sector to Assess Energy Use and Impacts of Price Shocks and Climate Change Legislation, http://ine.uaf.edu/autc/projects/model-of-alaska-transportation-sector-to-assess-energy-use-and-impacts-of-price-shocks-and-climate-change-legislation.

Electrical Sector Executive Summary[75]

By Cady Lister, with assistance from Mark Foster
Information Insights, LLC, Foster & Associates
October 2011

Alaska's Electrical End-Use Energy Sector

Alaska is an energy resource state with some of the highest energy prices in the nation. Alaskan energy consumers have a greater understanding of energy generation than in many places, yet we lag far behind in developing and exploiting our cheapest and cleanest resource—efficiency and conservation—particularly in relation to electric energy.

The State of Alaska maintains several successful programs to address thermal efficiency in the residential market through home weatherization efforts, most notably the low-income Weatherization (Wx) and Home Energy Rebate (HER) programs. More recently, RurAL CAP's *Energy Wise* program has begun to address residential electric energy as well as thermal consumption in households in rural Alaska communities, primarily by encouraging the use of compact florescent lamps (CFL) and maintenance and cleaning of refrigerators and freezers.

Several energy efficiency programs targeted to the commercial building sector are outlined below. All of these programs address energy savings in public building including, but not limited to, electric savings:

- Department of Transportation and Public Facilities runs a program to reduce energy consumption—both thermal and electric—for state-owned buildings
- Alaska Housing Finance Corporation (AHFC) offers a newly created public building revolving loan program which will facilitate energy efficiency upgrades to public buildings including schools, health facilities, tribal and local government buildings, etc.
- Alaska Energy Authority (AEA) provides a commercial energy audit program
- Alaska Building Science Network operates the Village Energy Efficiency Program

Two Approaches to Increasing Energy Efficiency

There are two general schools of thought as to how to decide what energy efficiency measures to target in both the commercial and residential sectors.

- Do the cheapest things with the biggest return on investment (ROI) first, leaving the more expensive stuff for later
- Do all energy efficiency and conservation measures up to the margin together, measuring ROI on the whole package of improvements

[75] See www.cchrc.org/docs/reports/Electric_EE_Environmental_Scan_Lit_Review.pdf for a full version of the report.

There are benefits and costs associated with both of these methodologies, but there is no doubt that greater total energy savings are found using the latter. The increased up-front costs associated with many efficiency technology upgrades are one of the primary barriers to efficiency for consumers whether they are individuals or large commercial enterprises. Most states have moved beyond the initial sticker shock and now recognize that investment in energy efficiency and conservation programs is a good use of public dollars. In New York, utility customers and energy service companies (ESCOS) invest an additional $3 for every $1 the state government spends on energy efficiency (EE) measures, leveraging public funds for an even greater impact.

Overview of Recommendations for Alaska

Energy efficiency programs have been successfully implemented around the country and the world and many of them are absolutely applicable in Alaska. In places with high energy prices and extreme climate, the improved return on investment should create fertile soil for efficiency efforts. For the purposes of this report we have narrowed the list of energy efficiency policy recommendations to 12 that will have significant impact and are within the purview of the State's ability to influence. That is not to say that any of the multitude of other options available are not good ideas.

Recommendations fall into four general categories: 1) addressing existing barriers; 2) providing incentives; 3) targeting existing opportunities in underserved market segments; and 4) establishing policy that leads to lasting change.

REMOVE BARRIERS

1. **Empower the RCA**: Through legislative action empower the Regulatory Commission of Alaska (RCA) to regulate effectively
2. **Establish a single point of contact**: Create an umbrella organization to act as a single point of contact for independent power producers to bring renewable energy generation to the Railbelt system
3. **Remove utility disincentives to efficiency**: Draft nuanced regulations on rate increases that specify allowable rate increases associated with decreases in demand resulting from energy efficiency and conservation

PROVIDE INCENTIVES

4. **Lead by example**: Write and enforce policies that mandate energy efficiency measures in all departments of state government, focusing on procurement and public buildings, including schools
5. **Establish revolving loan funds**: Provide low-interest revolving loan funds for private commercial and residential users to do electric energy efficiency retrofits on specific list of measures. Tie loan for commercial users to an electric energy audit.

6. **Use tax incentives to promote efficiency**: Create tax incentives for efficiency including corporate tax breaks for companies that invest in energy efficiency and conservation measures. Allow municipalities to provide tax incentives through property tax credits.

TARGET UNDERSERVED MARKETS

7. **Power Cost Equalization (PCE) Communities**: Target outreach education and technical assistance focused on lighting and appliances/electronics to households using more than 500 kWh/month and private commercial facilities in rural Alaska

8. **Low-Income Urban Population**: Target outreach education and technical assistance focused on lighting and appliances/electronics to low-income households and private commercial facilities in urban Alaska communities

CREATE A FRAMEWORK FOR LASTING CHANGE

9. **Establish an Energy Efficiency Resource Standard (EERS)** for the state of Alaska

10. **Create an efficiency utility:** Create an independent entity that can act as an efficiency utility, providing services to meet demand, working with but not for existing utility companies

11. **Ensure sustainable funding:** Provide consistent and sustainable funding for electric energy efficiency programs. State legislature should direct RCA to include an efficiency charge in utility rate structure.

12. **Connect outreach, education with technical assistance**: Create a system in which outreach, education and technical assistance are connected, complimentary and attached to sustainable funding

The four recommendations under the category of creating a framework for lasting change interconnected and are most effective if taken together. Establishing an EERS (Rec. 9) creates the need for ramped up efficiency efforts. This need can be met in several ways including through the creation of an efficiency utility (Rec. 10). Connecting outreach and education with technical assistance (Rec. 12) is an industry best practice that also fits well within the structure of an efficiency utility model (Rec. 10). Providing sustainable funding (Rec. 11) is clearly necessary for any effort to be successful in the long term. Each of these recommendations can stand alone, however the highest value will be found in taking them as a package.

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