# Energy Policy Recommendations

## Alaska Housing Finance Corporation

State of Alaska

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# EXECUTIVE SUMMARY

## Introduction

The purpose of this report is to provide energy policy recommendations for the Alaska Housing Finance Corporation (AHFC). The recommendations provide comprehensive goals that will improve the energy performance of AHFC buildings.

The recommendations include goals for strategic planning and optimizing the construction, operation, and maintenance of AHFC buildings. The energy policy consists of integrated goals where each goal supports and is supported by the others to produce a comprehensive path toward improving AHFC's position as an Alaska leader in energy efficiency.

## Energy Policy

The following energy policy goals are recommended for the Alaska Housing Finance Corporation:

Policy A: Energy Plan. Develop an energy plan for each facility that meshes with and enhances community energy goals as part of AHFC strategic planning to ensure that AHFC facilities remain viable and affordable in a changing energy world.

Policy B: Energy Monitoring. Develop an energy monitoring program that gathers data on building and system energy use. Compile the data into useful formats to facilitate the design, operation, and maintenance of an efficient building.

Policy C: Purchasing Standards. Establish purchasing standards for energy related products to ensure that the products provide the lowest life cycle cost over the life of the product.

Policy D: Building Standards. Establish facility standards for the design and construction of AHFC facilities. Derive the standards from previous experience and validate them using life cycle cost analysis to provide buildings that are designed for optimal energy efficiency and be within AHFC capabilities to operate and maintain.

Policy E: Risk Management. AHFC will work closely with designers and challenge designers to set aside conventional methods and design optimal systems for the buildings. AHFC will accept some liability by directing the designers to use better criteria for their designs.

Policy F: New Technologies. Utilize the resources and expertise of AHFC to evaluate and implement new technologies into AHFC buildings.

Policy G: Disseminate Information. Develop a formal process of educating designers on the optimal systems for AHFC buildings.

Policy H: Commissioning. Establish guidelines for commissioning buildings as part of the design and construction process. Utilize an independent Commissioning Authority and in-house personnel to represent AHFC interests and oversee relevant steps in the design, construction, testing, and training steps of a project.

Policy I: Training. Establish a training program that provides operating personnel the knowledge and qualifications they need to fully understand the design and operation of the systems in their buildings.

Policy J: Operations and Maintenance. Institute a policy for operating and maintaining the facilities that places an emphasis on energy efficiency as an integral component of the operating and maintenance functions.

Policy K: Participation. Develop a campaign to increase occupant participation in improving building energy efficiency.

## INTRODUCTION

The purpose of this report is to provide energy policy recommendations for the Alaska Housing Finance Corporation (AHFC). The recommendations provide comprehensive goals that will improve the energy performance of AHFC buildings and enhance AHFC's role as an energy efficiency leader in Alaska.

The recommendations include goals to optimize the construction, operation, and maintenance of AHFC buildings. Many of the recommendations will lead to cost reductions in each of these areas.

A crucial area in which AHFC can lead is the development of energy plans for its facilities. Each Alaska community has unique energy opportunities and challenges. AHFC—with perpetual facilities—has a vested interest in developing energy plans for its facilities that incorporate the community's energy future. AHFC can be a community leader in transitioning with changes in local and global energy sources.

In the area of building design, we propose policies for building standards, energy monitoring, sharing risk, and disseminating information to design consultants. These will provide greater assurance that AHFC buildings are designed for optimal energy efficiency.

Building operations and maintenance will be improved through recommended policies for commissioning, training, purchasing standards, and maintenance standards. These recommendations will provide a long-term path toward operating optimized high performance buildings.

Building residents and occupants play an important role in energy efficiency. A policy to promote their participation in energy conservation is integral toward the goal of energy use reduction.

To remain a leader in energy efficiency, AHFC must have a goal to evaluate and embrace new technologies, especially renewable energy technologies that improve building performance and reduce reliance on non-renewable energy sources.

The proposed energy policy consists of highly integrated goals. Each goal can support and be supported by the other goals to produce a comprehensive path toward improving AHFC's position as a leader in energy efficiency.

## POLICY A: ENERGY PLAN

### Objective

Throughout Alaska there are considerable variations in the availability and cost of energy. Each community has its unique energy opportunities and challenges that must be identified and incorporated into long-term energy plans.

It is incumbent upon AHFC to develop energy plans for its facilities that mesh with the community's energy picture. AHFC is also well positioned to initiate discussions about future energy opportunities and lead transitions to other energy sources, such as renewable energy.

Examples

The energy world is quickly changing as communities adapt to a world of higher energy costs and limited energy resources. AHFC must incorporate the long-term energy picture into their facility plans to be a proactive participant in the future of energy.

The policy can include goals to transition with changes in local and global energy sources and lead the transition to renewable energy sources.

### Policy Recommendation

Develop an energy plan for each facility that meshes with and enhances community energy goals as part of AHFC strategic planning to ensure that AHFC facilities remain viable and affordable in a changing energy world.

Related Policies

- Policy 3 – Purchasing: Incorporate the energy plan into purchasing standards.
- Policy 4 – Building Standards: Incorporate the energy plan into the building standards.
- Policy 6 – New Technologies: The energy plan can be the catalyst to evaluating new technologies.
- Policy 7 – Disseminate Information: The energy plans will be valuable information to other building owners and the design community.

## POLICY B: ENERGY MONITORING

### Objective

How buildings use energy is important information for optimally designing buildings. Unfortunately there is little data available to incorporate into the design process. The lack of data causes designs to be based on calculated peak loads rather than actual loads and load profiles. The result is often oversized systems that have higher construction, maintenance, and energy costs than optimally sized systems. Energy monitoring will be educational and useful towards the optimal design of building systems.

Example

Residential domestic hot water systems are typically oversized due to calculation methods that over-predict hot water usage. Energy monitoring will provide information on the dynamic nature and magnitude of the DHW load, providing designers better information for sizing the systems.

### Policy Recommendation

Develop an energy monitoring program that gathers data on building and system energy use. Compile the data into useful formats to facilitate the design, operation, and maintenance of an efficient building.

Related Policies

- Policy 3 – Purchasing: Energy monitoring data will be valuable toward establishing standards.
- Policy 4 – Building Standards: Energy monitoring data will be invaluable toward establishing building standards.
- Policy 5 – Risk Management: Energy Monitoring data will provide AHFC the energy use knowledge that is essential to directing the designers to provide an optimal system design.
- Policy 6 – New Technologies: Energy Monitoring data can be used to evaluate new technologies.
- Policy 7 – Disseminate Information: Energy Monitoring data is highly educational to designers.
- Policy 8 – Commissioning: Energy Monitoring data can validate the commissioning process.
- Policy 10 – Operations and Maintenance: Energy Monitoring data will identify any drop in system performance.

## POLICY C: PURCHASING STANDARDS

### Objective

AHFC purchases large quantities of products for buildings that are located throughout the state. Products include appliances, lighting lamps, vehicles, and other energy consuming items. Energy costs vary greatly for the buildings. Establishing standards based on lowest life cycle cost can be highly beneficial at reducing energy consumption and/or maintenance.

Examples

The energy consumption of appliances can vary greatly. For example, annual clothes washer energy use ratings can vary from 177 to 1,296 kWh/year. A purchasing standard would result in a preferred products list for each community based on lowest life cycle cost over the life of the appliance.

### Policy Recommendation

Establish purchasing standards for energy related products to ensure that the products provide the lowest life cycle cost over the life of the product.

Related Policies

- Establish Facility Standards: The purchasing standards and facility standards are integral to energy efficient design of AHFC buildings.
- Monitor Building Energy Use: Monitoring energy use before and after applying the standard will validate the energy savings.
- Educate Design Consultants: The economic basis for the preferred products will be valuable to design consultants when selecting products for other projects.
- Policy 2 – Energy Monitoring: Purchasing standards can utilize energy monitoring data to determine actual appliance use.
- Policy 4 – Building Standards: Purchasing standards should be integrated into building standards for products that are provided in construction contracts.
- Policy 6 – New Technologies: Purchasing standards can be established for new technologies so AHFC can identify and try new technologies.
- Policy 7 – Disseminate Information: Purchasing standards can be disseminated to the design community for their use in incorporating energy efficiency standards into their product specifications.
- Policy 10 – Operations and Maintenance: The purchasing of energy efficient products will integrate well with goals to incorporate energy efficiency into O&M standards.
- Policy 11 – Participation: Purchasing energy efficient products will demonstrate to occupants a culture of energy efficiency that is based on using products that provide the lowest life cycle cost.

## POLICY D: BUILDING STANDARDS

### Objective

AHFC is one of the largest building owners in Alaska with approximately 1,800,000 square feet of residential and office spaces. This offers AHFC considerable experience gained in the design, constructing, operation, and maintenance of buildings.

To construct and renovate these buildings, AHFC hires design consultants throughout the state. These consultants have developed a wide variety of designs using many variations in systems and equipment. Some have been highly successful while others have not.

There is considerable opportunity for AHFC to bring together their past experience and establish facility standards that produce energy efficient buildings that are not a burden to operate and maintain.

Examples

- Heating Systems: Develop optimal plant configurations for heating systems that use condensing gas boilers, non-condensing gas boilers or fuel oil boilers, including standards for their control systems and control sequences.
- Ventilation Systems: Optimize the ventilation strategies for residential and office buildings by setting standards for ventilation rates and strategies.
- The standards can include performance standards such as complying with energy codes or design and construct the envelope to an overall heat loss of 10 Btuh/sqft.

### Policy Recommendation

Establish facility standards for the design and construction of AHFC facilities. Derive the standards from previous experience and validate them using life cycle cost analysis to design new and renovated buildings for optimal energy efficiency and be within AHFC capabilities to operate and maintain.

Establish a procedure for continuously reviewing and updating the standards as new technologies arise and better ideas come forward.

Related Policies

- Policy 1 – Energy Plan: Building standards must be integrated with an AHFC energy plan.
- Policy 2 – Energy Monitoring: Building standards must be based on actual energy use data.
- Policy 3 – Purchasing: Building standards must incorporate purchasing standards.
- Policy 6 – New Technologies: Building standards provide a firm foundation for assessing new technologies.
- Policy 7 – Disseminate Information: Building standards are educational to design consultants.
- Policy 8 – Commissioning: Building standards will standardize the commissioning process.
- Policy 9 – Training: Building standards can lead to standardized training procedures.
- Policy 10 – Operations and Maintenance: Building standards will lead to developing O&M standards that seek to improve energy efficiency.

## POLICY E: RISK MANAGEMENT

### Objective

Designers are often hesitant to increase their risk by apply new concepts or technologies to projects. In addition, designs are often based on tried and true methodologies that tend to apply unnecessary levels of redundancy to the building or may not be optimal for the building.

Rather than overrule their resistance to change, AHFC can work with designers to share the risk in trying new technologies, changing design methodology, or incorporating optimal operating strategies by directing the design and sharing the associated risk. AHFC can provide the designer feedback on how the system operates over time, educating them on the benefits of properly sizing systems.

Examples

- The transition toward using remote insulation on wall assemblies was resisted by the design community for many years. AHFC can direct the use of remote insulation systems and share the liability for the use of the system.
- Most buildings have installed boiler capacity much greater than what is needed for reasonable redundancy. To reduce the size of the plant—saving in construction, maintenance, and energy costs—AHFC can direct the designers to use multiple boilers to provide redundancy, yet limit the total plant capacity to improve efficiency.
- Ventilation system sizing is often based on density factors that are much higher than actual occupancy. AHFC can predict and direct the designer to use the actual occupancy of the spaces so that systems are optimally sized.

### Policy Recommendation

AHFC will work closely with designers and challenge designers to optimally size systems for actual operating conditions. AHFC will provide actual design criteria on loads and building use and request that designers use reasonable assumptions in their load calculations and redundancy factors.

Where AHFC feels they have superior criteria for building design and/or designers are too conservative, they can direct the designer to use their criteria, with the caveat that AHFC will share some of the liability for their specific input into the design.

Related Policies

- Policy 2 – Energy Monitoring: The risk can be minimized by using energy monitoring data to validate actual operating conditions.
- Policy 4 – Building Standards: The risk can be reduced by developing building standards.
- Policy 6 – New Technologies: Sharing the risk of new technologies will give designers incentive to optimize their inclusion in a project.
- Policy 7 – Disseminate Information: Sharing the risk by disseminating information will provide design consultants knowledge to optimize their designs.

## POLICY F: NEW TECHNOLOGIES

### Objective

The application of new technologies has the best opportunity for success if its assessment and application is based on actual energy data, is conceptualized and designed by knowledgeable consultants, and the operations personnel are well trained to optimize its potential. By embracing many of the energy policy recommendations, AHFC will be uniquely capable of taking the lead in applying new technologies, especially renewable energy technologies, to their buildings.

Examples

Air source heat pumps are gaining market share due to their relatively low first cost and higher efficiency. However, there is still insufficient data on actual performance and service life of the equipment in the Alaska climate. AHFC has sufficient opportunity and incentive to install a few systems and assess their performance.

### Policy Recommendation

Utilize the resources and expertise of AHFC to evaluate and implement new technologies into AHFC buildings.

Related Policies

- Policy 1 – Energy Plan: New technologies will be crucial toward efforts to bring the buildings into agreement with facility energy plans.
- Policy 2 – Energy Monitoring: the performance of new technologies can be best assessed by energy monitoring.
- Policy 4 – Building Standards: Proven new technologies should be incorporated into the building standards.
- Policy 5 – Risk Management: AHFC can assume the risk of applying new technologies and minimize the risk by providing a thorough assessment of the technology.
- Policy 7 – Disseminate Information: The lessons learned will be extremely valuable to building owners and the design community.
- Policy 8 – Commissioning: New technologies must be properly commissioned to ensure they are optimally applied to the buildings.
- Policy 9 – Training: New technology training will be essential to the success of the systems.
- Policy 10 – Operations and Maintenance: New technologies can contribute to an increased O&M focus on energy efficiency.
- Policy 11 – Participation: By incorporating new technologies, AHFC can promote a culture of energy efficiency in their buildings.

## POLICY G: DISSEMINATE INFORMATION

### Objective

The Alaska Housing Finance Corporation is an Alaska leader in promoting and educating on the benefits of energy efficiency. There is in-house expertise in the design, operation and maintenance of buildings. Unfortunately, it is apparent that designers are not tapping the AHFC knowledgebase as many designs are not optimal for the buildings.

AHFC should develop a process for disseminating their expertise to building owners and the design community as part of a concerted effort to improve buildings throughout the State.

Example

Through the development of building standards, AHFC will establish a firm basis for their preferences. Sharing this information with the building owners and the design community will foster a better understanding of building energy systems and likely promote valuable discussion on what is optimal for building systems. All building Owners will benefit from this process.

### Policy Recommendation

AHFC should have a formal process of educating designers on the optimal systems for their buildings. The following steps can be used to achieve this goal:

- Provide building standards to designers at the start of the project, allow them to review them and comment, and then agree on the concepts for the project.
- Provide energy monitoring data to designers so they can optimally size the systems to be most efficient during average loads, instead of peak loads.
- Include designers in commissioning activities so they can observe the system operation, the nuances of controlling them and the challenges of maintaining them.
- Disseminate this information to the wider building ownership and design communities.

Related Policies

- Policy 2 – Energy Monitoring: Disseminating information on building energy use will promote optimal design.
- Policy 4 – Building Standards: Disseminating information on building standards will foster a better understanding of building energy system operation.
- Policy 5 – Risk Management: Disseminating information will reduce risk by vetting the information across the design community.
- Policy 6 – New Technologies: Disseminating information on forays into new technology will promote successful applications.
- Policy 8 – Commissioning: Disseminating information by including designers in the commissioning process will allow them to spend time in the building observing system operation.
- Policy 9 – Training: Disseminating information to designers by AHFC's highly trained personnel can offer designers valuable hands-on experience with the building and systems.
- Policy 10 – Operations and Maintenance: Disseminating information will show the benefits of applying energy efficiency criteria to O&M procedures.
- Policy 11 – Participation: Disseminating information on the benefits of occupant participation will promote incorporating building occupants into the goal of increasing building energy efficiency.

## POLICY H: COMMISSIONING

### Objective

The success of a project can only be certain when the building is optimally design, properly constructed, and fully tested at the end of the project. Commissioning provides a mechanism for achieving these goals. An independent Commissioning Authority (CxA), working with AHFC personnel, can offer expertise while representing the Owners interests during development, design, construction, and verification testing of the systems.

Examples

The Commissioning Authority can perform the following roles:

- Work closely with the designers during conceptual design of the building systems
- Review the design at appropriate stages
- Verifying building documentation
- Verify system operation and demonstrating the systems to the operating personnel
- Verify personnel training

### Policy Recommendation

Establish guidelines for commissioning buildings as part of the design and construction process. Utilize an independent Commissioning Authority and in-house personnel to represent AHFC interests and oversee relevant steps in the design, construction, testing, and training steps of a project.

Related Policies

- Policy 2 – Energy Monitoring: Commissioning should include energy monitoring systems.
- Policy 4 – Building Standards: Commissioning standards can be developed for projects that incorporate building standards.
- Policy 6 – New Technologies: Commissioning can verify the proper implementation of new technologies.
- Policy 7 – Disseminate Information: Commissioning provides valuable feedback to design consultants on system operation.
- Policy 9 – Training: Commissioning provides operating personnel an opportunity to become familiar with the systems and observe them operating properly.
- Policy 10 – Operations and Maintenance: Commissioning should be focused on setting up the buildings for optimal energy efficiency.

## POLICY I: TRAINING

### Objective

Properly trained and knowledgeable operating personnel are essential to improving building energy efficiency. Training will empower these individuals to be energy aware and motivate them to reduce energy consumption.

Example

Energy audits have consistently shown that personnel that are knowledgeable on how the systems are designed to operate are an essential component to highly energy efficient buildings.

### Policy Recommendation

Establish a training program that provides operating personnel the knowledge they need to fully understand the design and operation of the systems in their buildings. Recommended training methods include:

- Courses on building operation and maintenance, HVAC systems and lighting systems
- Attendance during commissioning activities so operators can become familiar with the systems and observe them operating properly.
- On-site instruction by the designer on the operation of the system, design criteria, and normal operating modes
- A systems manual that describes proper operation of the systems and acceptable operating parameters for the systems.

Related Policies

- Policy 2 – Energy Monitoring: Training will enable operators to understand monitoring data, note changes in system operation that indicate maintenance or repair is needed, and assess the data to offer recommendations to improve performance.
- Policy 4 – Building Standards: Training will enable knowledgeable operating personnel to offer valuable insight into the process of developing building standards.
- Policy 6 – New Technologies: Training will be essential to the success of incorporating new technologies into buildings.
- Policy 7 – Disseminate Information: Training will enable knowledgeable operating personnel to offer design consultants key information on building and system operation that should be incorporated into their designs.
- Policy 8 – Commissioning: Including operators in the design process will provide the designers valuable AHFC knowledge and increase operator knowledge of the building systems. Training will enable operators to play an active commissioning role.
- Policy 10 – Operations and Maintenance: Training will be essential to incorporate energy efficiency into O&M procedures.

## POLICY J: OPERATIONS AND MAINTENANCE

### Objective

Operations and maintenance have been historically focused on reliability. Current energy prices make this an insufficient metric. Building managers can achieve 5-20% energy savings through optimal operation and maintenance of the systems.

Examples

Development of standard operating procedures based on energy efficiency will promote consistency and empower operators to optimize system operation.

Building management systems are useful tools for monitoring and optimizing the operation of a building. They can also be configured as a valuable component of an energy monitoring system.

Retrocommissioning can be used to periodically perform functional tests to ensure systems are operating properly and at optimal efficiency.

Incentives can be used to motivate operating personnel to incorporate energy efficiency as an integral component of their duties. A portion of the energy savings can be returned to the operators for their use to purchase niceties that improve the quality of their work environment or improve the facilities and ease their effort.

### Policy Recommendation

Institute a policy for operating and maintaining the facilities that places an emphasis on energy efficiency as an integral component of the operating and maintenance functions.

Related Policies

- Policy 2 – Energy Monitoring: Operating personnel can utilize energy data as an essential tool in monitoring system performance.
- Policy 3 – Purchasing: Operating personnel will have incentive to purchase energy efficient products to improve building energy efficiency.
- Policy 6 – New Technologies: Operating personnel that prioritize energy efficiency will take a necessary interest in the operation of new technology.
- Policy 7 – Disseminate Information: Operating personnel that focus on energy efficiency will have valuable knowledge to share with design consultants.
- Policy 8 – Commissioning: Operating personnel can use the commissioning process to be fully trained on building systems and how to operate them optimally.
- Policy 9 – Training: Operating personnel must be properly trained to incorporate energy efficiency into their job description.
- Policy 11 – Participation: Operating personnel must engage and work with occupants in order to minimize building energy use.

## POLICY K: PARTICIPATION

### Objective

The building occupants can have a considerable effect on the energy consumption of a building. Engaging the occupants in energy efficiency is a necessary step toward increasing energy efficiency. Promoting awareness, providing incentives, and empowering occupants are recommended steps toward improving energy efficiency.

Examples

Occupants who are knowledgeable about energy efficiency will likely be more energy efficient. They will be conscientious about common conservation measures such as turning off unneeded lights, closing curtains at night, and turning down thermostats when they are not home or at night.

Conservation is vital to the fiscal health of AHFC and the long-term maintenance of the housing stock. Since most occupants of AHFC buildings are not billed directly for their utilities, positive incentives for practicing energy conservation can provide motivation to conserve. Incentives could include common space improvements, an event sponsored by AHFC, or financial rebates.

Empowering occupants will maximize their involvement. Getting them involved in the planning and implementation will legitimize the campaign. Displaying data that shows their actions are making a difference will motivate them and allow them to "compete" with neighboring buildings. This will motivate the occupants to become an important resource in building operations as they are intimately aware of the building and its occupants and their involvement strengthens the perception of social norms surrounding energy conservation.

### Policy Recommendation

Develop a campaign to increase occupant participation in improving building energy efficiency.

Related Policies

- Policy 2 – Energy Monitoring: The energy savings from resident participation can be documented using the energy monitoring system.
- Policy 3 – Purchasing: Proving residents guidance on energy efficient appliances will give them incentive to purchase energy efficient appliances.
- Policy 6 – New Technologies: Residents will gain interest in renewable energy technologies if they are given data showing its benefits.
- Policy 10 – Operations and Maintenance: Residents can assist the O&M process by calling attention to systems that may not be operating correctly.