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# Understanding Energy Code Acceptance within the Alaska Building Community

T. Mapes

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Pacific Northwest National Laboratory  
Richland, Washington 99352



# **Understanding Energy Code Acceptance within the Alaska Building Community**

## **Technical Assistance to the Alaska Home Financing Corporation (AHFC)**

By Terry Mapes

### **Background**

The state of Alaska has not adopted a statewide energy code as of January, 2012. In an effort to incentivize builders to build more energy efficient buildings by use of the 2009 International Energy Conservation Code (IECC) and the ASHRAE Standard 62.2-2010, the state required that prospective homes be built according to an amended version of those documents called the 2011 Building Energy Efficiency Standard (BEES) before they could be considered for financing from the Alaska Housing Finance Corporation (AHFC). This additional financing option, which offers lending opportunities to many Alaska home buyers who could not otherwise qualify for conventional loans, was expected to attract many builders to willingly implement the energy codes. Results have been mixed, however, and AHFC is attempting to better understand builders' sentiments toward energy codes in an effort to maximize the potential of the program. They are especially interested in builders in an Alaskan borough one hour to the north of Anchorage called Mat-Su (Matanuska-Susitna) which is currently the fastest growing borough in the state and would represent a sizeable portion of the new homes being built. Pacific Northwest National Laboratory (PNNL) was asked to assist AHFC in collecting information about the attitudes of builders toward existing and proposed energy codes.

### **Survey**

PNNL and AHFC collaborated to create a builder questionnaire based on the 2009 IECC residential checklist, and input sought by AHFC. Each component of the checklist pertains to a requirement within the IECC (e.g. exterior door U-factor  $\geq 0.35$ ), and builders were asked to indicate the percentage of homes that they build to this code and to rate the importance of the element on a scale of 0–5. Fourteen of the most important components were chosen to make up the first section of the survey, followed by ten questions composed by AHFC. A copy of this survey, titled "Homebuilder Questionnaire," can be found in the appendix.

A group of 37 members of the Mat-Su Home Builders Association (MSHBA) <http://www.matsuhomebuilders.org/find-a-member.php> were chosen to be surveyed as the initial survey population. From this list, 11 could not be reached or were not capable of completing a survey for various reasons, and the remaining 26 were contacted by phone twice each in an attempt to disseminate the survey and encourage builders to respond. As of January, 2012, four of the 26 builders had returned a completed the survey. Results of the calls can be found in the Excel file titled "Register of Homebuilder Phone Calls" found in the appendix.

A copy of the survey was e-mailed to the MSHBA by Dave Owens, President of the Alaska State Homebuilding Association, on October 20, 2011, and an administrator at MSHBA was asked to have builders complete the survey. One builder, Clai Porter, completed the survey, and his response was added to the four collected in the previous effort.

**Survey Results**

Results of the five completed surveys can be seen in the Excel file titled “Survey Results” in the appendix (please see the “Instructions” page on the first tab of the file). Any conclusions drawn from the results can be allowed only a low level of confidence given the small number of responses, and even unanimous agreements should only be taken to indicate possible trends that have modest amounts of corresponding evidence. This section will reveal the results that were within 10% of the lowest or highest score possible.

<u>Percentage of homes built to a given code</u>	<u>Average (0-100)</u>
Slab edge insulation R-value	96
Crawl space insulation R-value	100
Door U-factor	100
Glazing U-factor	100
Air sealing complies	100

<u>Importance of homes built to a given code</u>	<u>Average (0-5)</u>
Slab edge insulation R-value	4.6
Crawl space insulation R-value	4.8
Wall insulation R-value	4.8
Basement wall interior insulation R-value	4.8
Air sealing complies	4.6

<u>Individual questions</u>	<u>Average</u>
Do you market your buildings as energy efficient structures?	0.90 (0-1)
How many of your homes are built to a minimum energy efficiency standard?	1.00 (0-1)
If your homes are built to an energy efficiency standard, do you believe you lose sales to homes that are not built to an energy efficient standard?	0.80 (0-1)*
Given two homes of the same design in the same neighborhood, is it sale price or energy efficiency that determines the sale?	0.30 (0-1)**

\*An answer of “sometimes” was given a value of 0.5, causing the average to move away from the maximum. However, none of the five respondents answered “no”.

\*\* An answer of “both” was given a value of 0.5, causing the average to move away from the minimum. However, none of the five respondents answered “energy efficiency”.

**Interviews**

**Michael Medford – First Bank of Alaska**

During a call with Michael Medford, Vice President and Community Reinvestment Officer for First Bank in Ketchikan, AK, in November, 2011, he described the impact of inspection forms PUR-101 and PUR-102 on lending practices. Form PUR-101 pertains to thermal requirements as described by the BEES and allows for compliance by either prescriptive (checklist) methods or performance (overall) methods. PUR-102 pertains to structural and hazard codes such as footing and foundation, framing, electrical, plumbing/mechanical, fire safety, etc. As of July 1, 1992, Alaska Statute (AS) 18.56.300 required that all residential housing constructed in Alaska include both of these forms to be eligible for financing from AHFC.

Mr. Medford explained the ensuing confusion among the building community in the first several years after 1992 regarding the existence of these new requirements. Lenders, as well as builders, were not aware of the statute and continued to allow new homes to be built without submitting the PUR forms. This went relatively unnoticed for the first few years as the original homeowners continued to occupy these new homes, but as some of the owners began attempting to sell their homes it was discovered that prospective buyers were not eligible for financing from AHFC and thus the homes became less marketable because of the limited financing options.

Attempts to retroactively inspect the homes and have them comply met with limited success. Meeting the terms of the PUR-101 is somewhat simple, especially given the performance option for compliance, but meeting the terms of the PUR-102 normally requires complicated and expensive deconstruction of the homes to inspect elements of its construction, to the point that it's considered by many to be an unrealistic option.

Mr. Medford believes that in the southeastern area of Alaska, where he is located, almost all builders and lenders today are educated about the statute and are submitting the PUR forms with all new home construction. However, he believes there are many other areas in Alaska where the building community needs to be more educated about the existing situation, particularly in areas where many homes are built by the owners themselves rather than by professional builders. He also believes that most builders and citizens are in favor of energy codes, but that a lack of education about the applications and impacts of these codes is a persistent problem with their adoption and compliance. He suggested amending AS 18.56.300 to remove the need to comply with PUR-101 and -102. He also suggested that appraisers be involved to encourage them to recognize the value of energy efficiency in their appraisals as a means to bring awareness of the topic to the building community.

David Owens – Alaska State Homebuilding Association

David Owens is an Alaska state building inspector and was President of the Alaska State Homebuilding Association as of December, 2011. He was consulted several times during the technical assistance process and was instrumental in the understanding of how builders perceive the existing energy codes in Alaska.

Mr. Owens was particularly interested in describing the way in which most builders would use the performance option of the PUR-101 to circumvent particular codes which were challenging to meet. Under the prescriptive method, builders were obligated to meet each individual code in the BEES, but by using the performance method they were only obligated to make sure that the overall home met a given energy performance minimum. If a builder is able to exceed code in some areas, it may allow them to ignore code in others as long as the final product meets the energy performance minimum. Some individual requirements are mandatory, such as the air changes created by ventilation equipment, but the majority of the requirements are not mandatory.

Mr. Owens explained that one of the key reasons the builders chose the performance path option was based on a lack of understanding which code officials have for the typical stock supplies available in Alaska. One example he cited was the code requirement for insulated blueboard around the perimeter of a slab-on-grade foundation, which is required to be a minimum of 4" thick by the BEES. However, the typical blueboard stocked in Alaska is 1.5" or 2" thick, which would require the builder to use two boards around the entire perimeter of the foundation. Using just one board is considerably less expensive and drops the energy performance of the entire home to such a small degree that it's easy to compensate for this deficit in other areas.

Another area of concern mentioned by Mr. Owens was in the lack of demand from homeowners for energy efficiency measures which exceed code. On many occasions builders will offer homeowners an option for higher measures of energy efficiency, such as increased furnace insulation or highly insulating windows, but indicate that these increased measures will result in increased costs. Rarely do the homeowners choose to accept these options and this lack of demand from the homeowners results in the lack of supply created by builders.

*Kathryn Dodge – Cold Climate Housing Research Center (CCHRC)*

Dr. Kathryn Dodge is the Policy Director for the Cold Climate Housing Research Center in Fairbanks, AK. During a phone call with her in January, 2012 she intimated the importance of recognizing the difference in energy cost between Anchorage, where 40% of the population of Alaska resides, and the rest of the state, particularly in the northern tiers (shown in the table below).

**ACCRA Cost-of-Living Index, select cities, 2010**

Region City	Items index costs	Groceries	Housing	Utilities	Transportation	Health care	Misc. goods and services
Anchorage	128.3	134.4	142.5	94.3	122.0	135.4	124.7
Fairbanks	137.3	127.8	148.2	193.6	118.8	144.6	118.7
Juneau	136.4	133.1	165.3	135.4	121.1	144.1	116.1
Kodiak	128.6	149.4	127.5	132.2	143.4	130.4	115.4

(ACCRA = American Chamber of Commerce Research Association)

This discrepancy is often overlooked during the consideration of energy codes, which leads to lost opportunities to reduce consumption for the majority of Alaskans, particularly those who are most likely to embrace changes in the code structure. Dr. Dodge strongly favors statewide adoption of an energy code and cited a study from CCHRC which showed a significant drop in heating costs per capita when the BEES was first introduced.

Dr. Dodge believes that the adoption of a statewide code would be supported by most members of the building community. Lenders in Fairbanks are currently attempting to implement energy requirements in their lending practices, and a uniform code would save them the considerable effort of researching and drafting such requirements. Appraisers would be provided a tool for evaluating energy efficiency in their assessment of home prices. Realtors would be at less risk of being involved in the sale of homes which have limited financing options. Municipal governments would be relieved of the burden of answering a growing popular demand to address modern energy issues. Many homes are still being built in areas that do not fall under the jurisdiction of any municipality.

Dr. Dodge also believes that incentives for energy efficiency measures need to be upstreamed, such as AHFC’s Five Star Plus New Home Energy Rebate, which offers \$7500 to new home buyers for purchasing a home that rates five stars or higher in an energy modeling software program called AKWarm. The aim of the rebate is to incent home buyers to raise the demand for energy efficient homes, which will in turn induce builders to build them. However, it does not take into account that builders must pay the upfront cost of these more efficient measures and will not be able to raise the price of the home beyond the appraisal value, which will not be increased by those measures. It may be more logical to give the incentive to the builders to cover their cost increase knowing that they will still need to sell the house at the appraised price. Buyers will be attracted to homes which have lower heating costs and sell at the same price as homes that do not, and the cost obstacle which normally prevents builders from exceeding code will be removed.

This also eliminates the problem for existing homes regarding the timing of the incentive during the buying process. Buyers will normally shop for homes until they find one they like and then seek a realtor and lender to help them through the process. By this time they will be far less likely to change their minds about the home they want. If builders are given the incentive to build more efficient homes, the buyers will choose them before going to a realtor and lender.

## **Recommendations**

### *Survey*

The survey is the most immediate means of assessing builders' attitudes toward existing and prospective energy codes, and can be modified to fit changing needs. A copy, titled "Homebuilders Questionnaire," can be found in the appendix. As mentioned previously, more questionnaires will need to be collected to increase the confidence level of any results. Previously, 26 people were contacted by phone and asked to complete the survey, but despite enthusiastic conversations, only four people ultimately responded. Live contact with builders will be necessary to collect any substantial number of surveys and it is recommended that builders' organizations be contacted to gain information about events where their members can be approached. One example is the MSHBA which keeps an online event calendar for upcoming meetings at <http://www.matsuhomebuilders.org/calendar.php>. Given that a survey should take about five minutes to complete, it is highly recommended that the builders are approached at such meetings and asked to complete the survey on location.

### *PUR-101 and -102*

Mr. Medford suggested that the state consider abolishing AS 18.56.300 and the requirements for thermal and structural housing inspections by AHFC, which ultimately would result in requiring homes to be built only to local municipal codes or to limit themselves to conventional financing. However, Mr. Medford also remarked that almost all builders in southeastern Alaska now meet the requirements of this statute, which indicates that with proper education it is possible to bring a given building community into accordance with the statute.

The challenge is in determining the stage of the homebuilding process that would educate the involved parties most quickly and most prominently. Homeowners are not legally obligated to meet the requirements and therefore building officials may be hesitant to accept the responsibility of announcing them. Builders and realtors may have the greatest incentive because of their desire to raise the marketable value of the homes without raising their cost. A possible approach would be to create literature which clearly explains the simplicity of submitting the PUR-101 and -102 forms as well as the advantages that homes gain in having greater lending options in the future. Distribution of this literature to builder associations, realtor associations and banks, particularly in rural areas, could help educate the Alaska building community about these advantages.

Retroactively qualifying homes built after July, 1992, creates another challenge. It is possible that many of these homes actually meet the requirements but were simply never inspected (or that the remodeling required is minimal). As mentioned earlier, it's much simpler to inspect for the thermal requirements than for the structural requirements, and perhaps the two issues should be approached separately rather than uniformly. Every municipal government will have structural and safety codes which they enforce, and in many cases these codes will meet or exceed those of the PUR-102. Through research of these municipal codes it could be determined which ones are similar enough to accept in lieu of the PUR-102 without the need for an inspection. In these areas, homes would only need to be inspected for the requirements of the PUR-101 to become eligible for AHFC financing.

*Lenders and Appraisers*

Perhaps the most common obstacle to implementing energy efficient features in homes is that these features will almost invariably come with increased costs that will not raise the appraisal price of the home. Builders will not incur costs which they cannot include in the price, and therefore will rarely build any home to exceed code. While granite countertops, which enhance the appearance of a kitchen, will raise the price of the building, highly efficient windows, which significantly lower heating costs, will not. As described in the interview with Dr. Kathryn Dodge, one solution is to upstream the incentives for these costs from the buyer to the builder. Another approach is to have an effect on the appraisal value itself. Some appraisers have incorporated the Home Energy Rating Score (HERS) in their appraisals, and some lending institutions require them to do so, but these augmentations normally fall well short of the cost being paid by the builder. Also, there are very few lenders who factor lower energy costs into the equations that they use to qualify applicants, and this issue could have considerable impact on their practice.

**Appendix A**

**Homebuilder Questionnaire**

## Homebuilder Questionnaire

The following questions are based on the 2009 International Energy Conservation Code for climate zones 7 and 8. Please indicate the approximate percentage of houses which you build to this code level or higher, the importance you give to this code in your area from 0 to 5 (0=not important, 5=extremely important), and any reasons which you believe make the code important or unimportant.

<b>Area Of Building</b>	<b>Code Level</b>	<b>%</b>	<b>Im p 0-5</b>	<b>Reasons</b>
Slab edge insulation R-value	Heated Area=R15			
Slab edge insulation depth/length.	4 ft.			
Basement wall exterior insulation R-value.	Continuous: R-15			
Basement wall exterior insulation depth.	10 ft. or to basement floor			
Crawl space wall insulation R-value.	Continuous Cavity R-10 R- 13			
Door U-factor.	U-0.35			
Glazing U-factor (area-weighted average).	U-0.35 (0.4 max)			
Floor insulation R-value.	Wood: R-38			
Wall insulation R-value.	R-21			
Basement wall interior insulation R-value.	Continuous Cavity R-10 R- 19			
Basement wall interior insulation depth.	10 ft or to basement floor			
Air sealing complies with sealing requirements via blower door test. If applicable, verification via visual inspection should be marked N/A.	ACH $50 \leq 7$			
Ceiling insulation R-value.	Wood: R-49 Steel Truss: R-38+R-5 Steel Joist: R-49			
Attic access hatch and door insulation.	R-49			

Additionally, please help with any information which you think might be helpful in answering the following questions:

Do you market your buildings as energy efficient structures?

Are any of the energy efficient features able to raise the appraisal value of the building? If so, which ones?

Is building to a minimum energy efficient standard an advantage or disadvantage when competing in the housing market?

If you build homes to a minimum energy efficiency standard, is the average sale price of your home higher or the same as a home not built to a minimum energy efficiency standard?

When building to an energy efficient standard which of the following groups best describes your biggest competition?

- A. Builders who build to an energy efficient standard.
- B. Builders who do not build to an energy efficient standard.
- C. All builders.

How many of your homes are built to a minimum energy efficiency standard?

- A. None
- B. Some/most
- C. All

If your homes are built to an energy efficient standard, do you believe you lose sales to homes that are not built to an energy efficient standard?

If your homes are not built to an energy efficient standard, do you believe you lose sales to homes that are built to an energy efficient standard?

In your market, if two homes of the same design are built in the same neighborhood with two different levels of energy efficiency, which of the two homes would sell first?

- A. home with lower energy efficiency.
- B. home with higher energy efficiency.

Based on your answer to the above question, is it the sale price or the energy efficiency that determines the sale?

**Appendix B**

**Register of Homebuilder Phone Calls**

	Name	1st call	Result	2nd call	Result
1	Alaska Quality Builders	17-Oct	vm - sent survey	3-Nov	spoke - resent
2	American Dream Construction	17-Oct	vm - sent survey	3-Nov	spoke - resent
3	Bear Alaska, LLC	17-Oct	vm - sent survey	3-Nov	spoke - no resend
4	Bema Construction Co	17-Oct	spoke - sent survey	3-Nov	spoke - no resend
5	Drobesko Investments, Inc.	17-Oct	spoke - sent survey	3-Nov	vm - resent
6	Epperson Construction, Inc.	17-Oct	spoke - sent survey	3-Nov	vm - resent
7	Flawless Construction Co	17-Oct	spoke - sent survey	3-Nov	spoke - resent
8	Gillespie Custom Homes	17-Oct	vm - sent survey	3-Nov	spoke - resent
9	H & H Construction	17-Oct	vm - sent survey	3-Nov	vm- resent
10	Hall Quality Homes	17-Oct	spoke - sent survey	3-Nov	spoke - no resend. Also received it from D.O.
11	Hammer Man Construction Inc.	17-Oct	sent survey - email returned		
12	Hamming Floor Covering & Construction	17-Oct	no email given with info		
13	Horseshoe Properties, LLC	17-Oct	developers, not builders		
14	Jenson & Sons Construction, Inc.	17-Oct	spoke - sent survey	14-Nov	spoke - resent
15	JMD Construction, Inc.	17-Oct	number not in service		
16	Johns Building Company	17-Oct	spoke - sent survey	14-Nov	spoke - remodeler, doesn't see most codes
17	Klein Construction & Maintenance	17-Oct	spoke - sent survey	14-Nov	spoke - no resend
18	Milby Construction, Inc.	17-Oct	vm - sent survey	14-Nov	vm - resent
19	Monaghan Construction	18-Oct	vm - sent survey	14-Nov	vm - resent
20	North Country Builders of Alaska, Inc.	18-Oct	spoke - sent survey	14-Nov	spoke - resent
21	Olson Homes & Developing, Inc.	18-Oct	spoke - sent survey	14-Nov	spoke - resent
22	Owens Inspection Services, Inc.	18-Oct	partner		
23	Pacific North Construction, Inc.	18-Oct	vm - sent survey	14-Nov	spoke - resent
24	Preferred Custom Homes of Alaska, Inc.	18-Oct	vm - sent survey	14-Nov	no answer
25	Rosemont Inc./DG Smith Builders LLC	18-Oct	voicemail full - sent survey	14-Nov	voicemail full - sent survey
26	Skyhill	18-Oct	spoke - sent survey	14-Nov	spoke - no builders (forwarded survey to one)
27	Spinell Homes, Inc.	18-Oct	spoke - sent survey	14-Nov	spoke - resent to Andre@spinellhomes.com
28	Steve Orr Construction	18-Oct	no email given with info		
29	Sumner Co	18-Oct	vm - sent survey	14-Nov	vm - resent
30	Taylor Restoration	18-Oct	spoke - sent survey	14-Nov	spoke - resent
31	Teeple Cabinets & Construction	18-Oct	spoke - sent survey	14-Nov	spoke - resent
32	The Thomas Co., Inc.	18-Oct	number not in service		
33	Troy Davis Homes	18-Oct	spoke - sent survey	14-Nov	spoke - resent
34	Tru Built Construction	18-Oct	vm - sent survey	14-Nov	vm - resent
35	Turner Construction	18-Oct	not currently building		
36	Wirtanen, Inc.	18-Oct	spoke - sent survey	14-Nov	spoke - resent
37	WM Construction LLC	18-Oct	vm - sent survey	14-Nov	vm - resent
	Indicates completed survey was received from builder		13		
	Indicates no completed survey was possible				

**Appendix C**

**Survey Results**







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