

Energy Efficiency Calculator

EE NOW – 2016

Jimmy Ord

<https://akrebate.ahfc.us/AkAppraisals.aspx>

What is in it for me?



Who is this tool for?

- Appraisers
- Real Estate Agents
- Builders
- Lenders
- Homeowners



Let's start at...

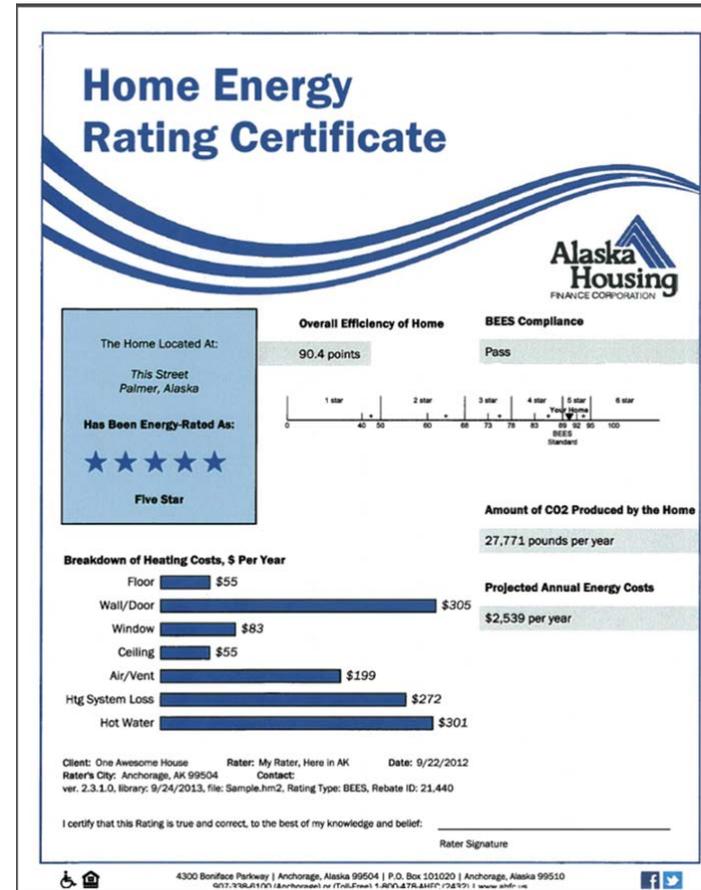


It's really all about **cost.**

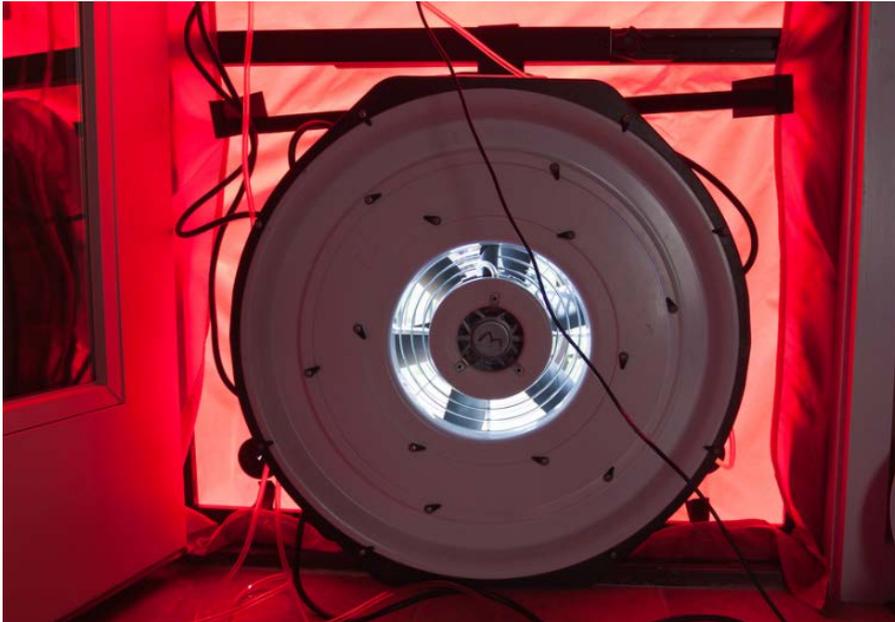
**The Energy Efficiency Calculator
compares the energy costs of a subject
home to the energy costs of comparable
homes.**

Two ways to get the energy costs

- Actual
- **Estimated**



What type of information does an energy rater collect?





House measurements



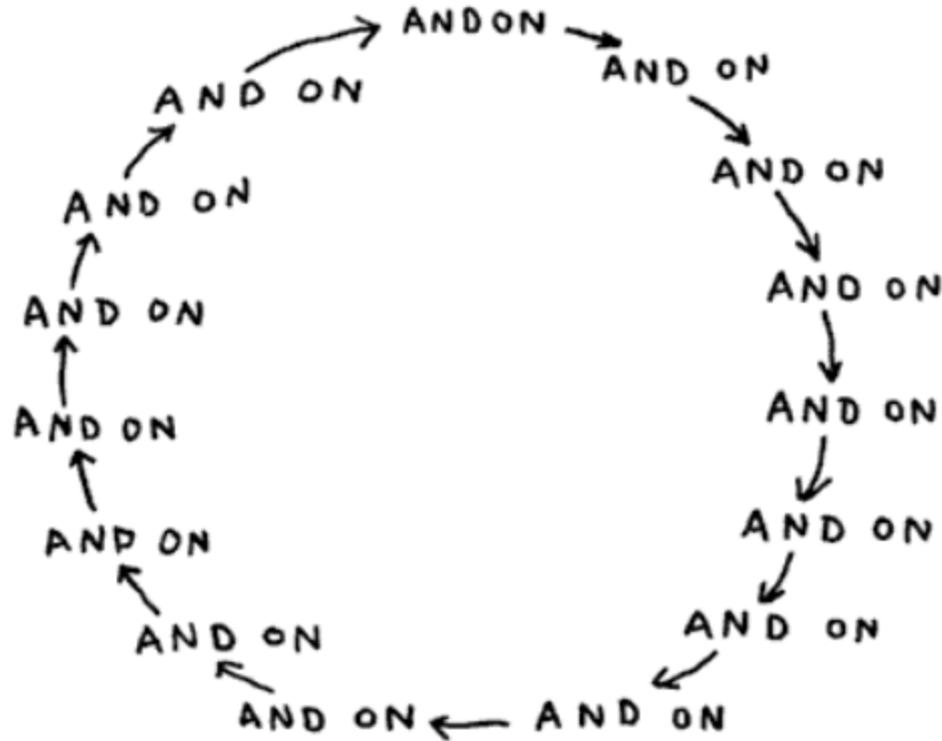
Insulation levels



Heating unit efficiency



Window area



Dozens and Dozens of Housing Characteristics

AKWarm Energy Modeling



Home Energy Rebate Weatherization



Thousands of Energy Ratings in the Database

...remember it is all about cost.



Will buyers pay more for lower costs?

Higher efficiency might influence economics of home ownership

- Price
- Loan
- Operation



How does the tool work?



If using energy costs from the database, then...

the tool searches for homes matching similar characteristics of the subject home.

Matching based on:

Fuel type/cost



House style/size/age



Community/Precinct

Rating Data

Includes:

- single family/mobile homes
- less than 10,000 square feet
- homes less than 12 bedrooms
- homes with ACH_{50} less than 75

Does not include homes:

- with recorded energy cost = \$0
- with annual energy usage greater than 1.9 billion BTUs
- without windows

If no complete matching records

Search Database matches

Matching
Combination 1

Matching
Combination 2

Matching
Combination 3

Calculate Weighted Average
(energy use/utility cost)

Average Utility Cost of Matches

Example:

- Anchorage, E 20th Ave, 3 BR, Rating: 85 +/- 5

<u>Full Energy (MMBTU)</u>	<u>#Records</u>	
245.10	308	Community_SqFt_YearBuilt_Bedrooms
404.10	14	Community_YearBuilt_Bedrooms_RatingPoints
423.00	7	Community_Bedrooms_SqFt_RatingPoints
414.68	6	Community_SqFt_YearBuilt_RatingPoints
216.72	41	Community_SqFt_Bedrooms_Precinct
NULL	0	Community_YearBuilt_Bedrooms_Precinct
NULL	0	Community_SqFt_YearBuilt_Precinct
NULL	0	Community_YearBuilt_RatingPoints_Precinct
NULL	0	Community_Bedrooms_RatingPoints_Precinct
NULL	0	Community_SqFt_RatingPoints_Precinct

- Calculate weighted average of energy consumption of groups returning > 5 records

Weighted Average Example

	Matching Records	Energy (MMBTU)	Product
Comb 1	308	245	75460
Comb 2	14	404	5656
Comb 3	7	423	2961
Total	329		84077

Weighted average is $84,077/329 = 256$

Weighted average is $84,077/329 = 256$

What does the tool do with 256mmbtu average?

It does a calculation based on the most recent energy costs in the AKWarm Energy Modeling Software.

Giving the user an average annual energy cost!

Back from the Future

Bringing it all back to today's dollars



Present Value

$$PV = FV / (1 + r)^n$$

where:

FV = future value (utility costs; 100%)

r = discount rate or energy escalation rate

n = number of years

Let's say energy costs are \$2,000 at the end of this year.

$$PV = FV / (1 + r)^n$$

$$PV = \$2,000 / (1 + .04)^1$$

$$PV = \$1,923.08$$

The Calculator Tool Performs a Net Present Value Calculation

$$\text{NPV} = \text{FV}/(1 + r)^n + \text{FV}/(1 + r)^n + \text{FV}/(1 + r)^n + \dots$$

The Calculator Tool returns the difference between the subject and comparable homes

Difference of NPV of subject home and NPV of comparable homes

OR

NPV (subject home) – NPV (comparable homes)

The Calculator Tool returns the difference between the subject and comps

NPV (subject home) – NPV (Comp home)

Subject Home

\$2,000 energy costs @4% for 7 years = \$12,004.11

Comp Home

\$3,000 energy costs @ 4% for 7 years = \$18,006.16

= \$6,002.05

Utility Cost is the Important Variable!

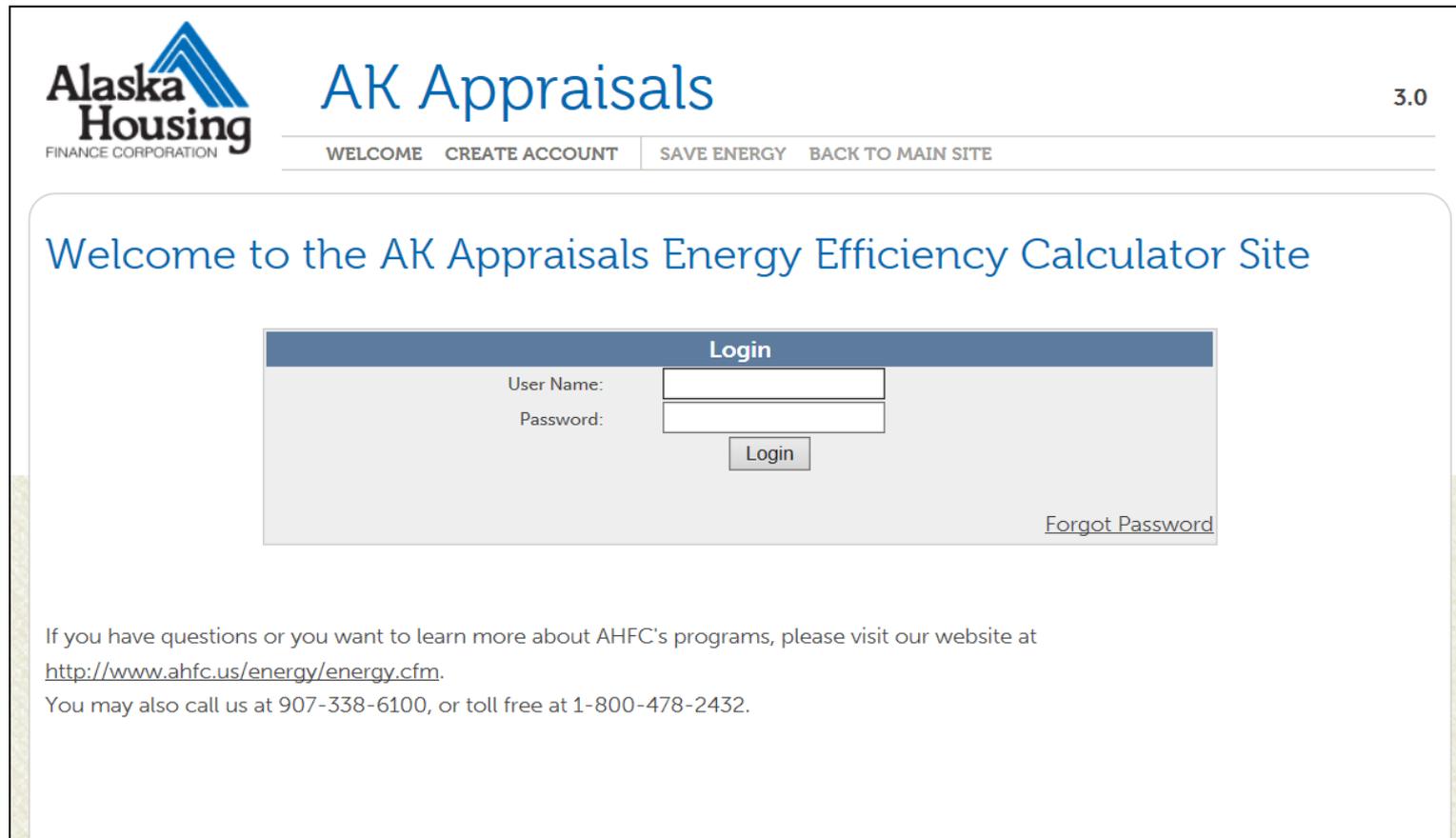
All other input data are used to generate comparison homes

Tool Function Summary

- Tool searches ARIS database for homes that match subject home or uses user-entered comparable homes
- Compares operational costs of subject home to average operational cost of matching/comparable homes
- Generates adjustment (↑↓) of appraised value based on subject home's operational cost

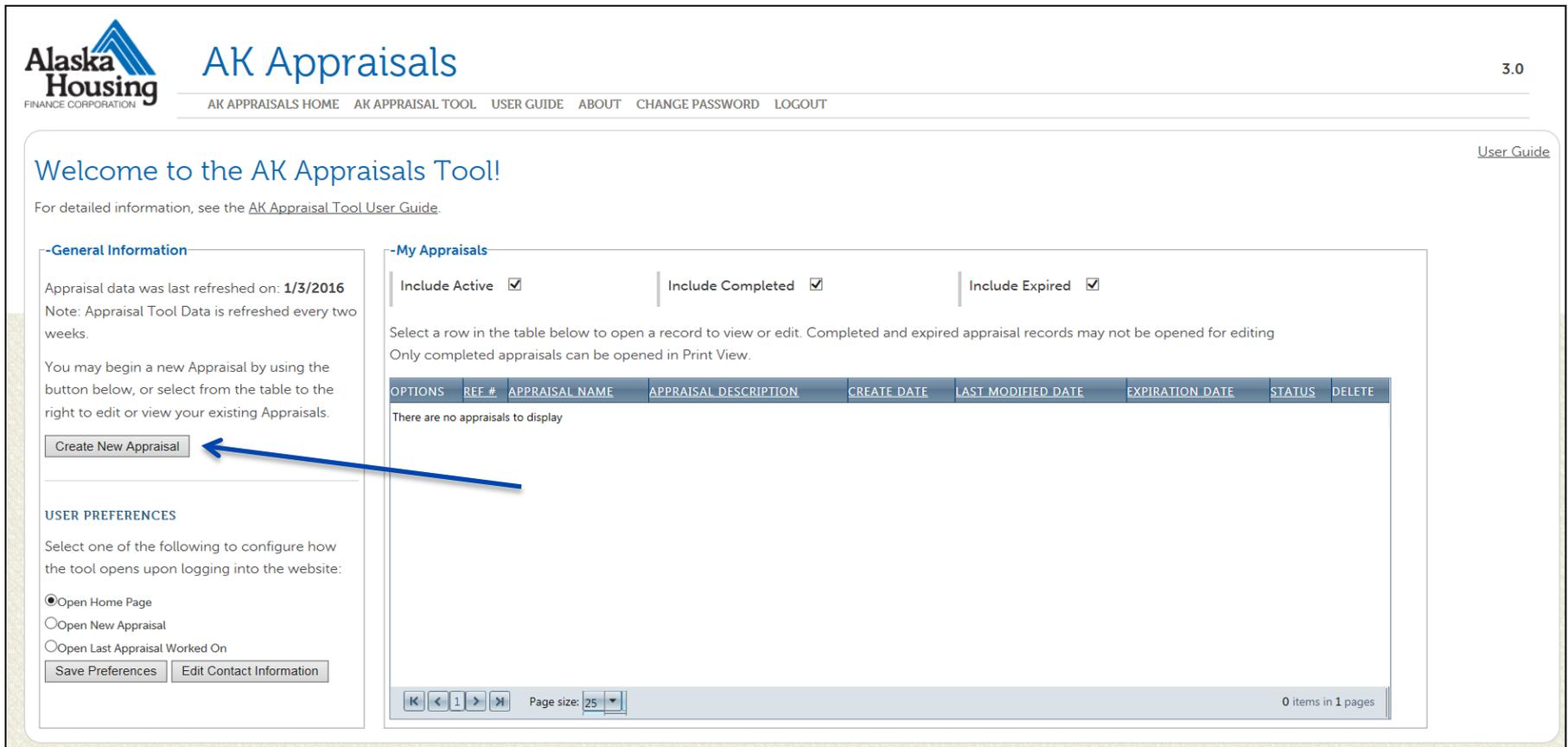
What does the calculator look like?

Page 1 – Log In



The screenshot shows the login page for the AK Appraisals Energy Efficiency Calculator Site. At the top left is the Alaska Housing Finance Corporation logo. To its right is the title "AK Appraisals" and the version number "3.0". Below the title is a navigation bar with links: "WELCOME", "CREATE ACCOUNT", "SAVE ENERGY", and "BACK TO MAIN SITE". The main heading reads "Welcome to the AK Appraisals Energy Efficiency Calculator Site". The login form is titled "Login" and contains fields for "User Name:" and "Password:", each with an input box. A "Login" button is positioned below the password field. A "Forgot Password" link is located at the bottom right of the form. Below the form, there is a paragraph of text: "If you have questions or you want to learn more about AHFC's programs, please visit our website at <http://www.ahfc.us/energy/energy.cfm>. You may also call us at 907-338-6100, or toll free at 1-800-478-2432."

Page 2 – Your Home Page



The screenshot shows the 'AK Appraisals' home page. At the top left is the Alaska Housing Finance Corporation logo. The page title is 'AK Appraisals' with a version number '3.0' in the top right. A navigation menu includes 'AK APPRAISALS HOME', 'AK APPRAISAL TOOL', 'USER GUIDE', 'ABOUT', 'CHANGE PASSWORD', and 'LOGOUT'. A 'User Guide' link is located in the top right corner of the main content area.

The main heading is 'Welcome to the AK Appraisals Tool!'. Below it, a note states: 'For detailed information, see the [AK Appraisal Tool User Guide](#).' The page is divided into two main sections: 'General Information' and 'My Appraisals'.

General Information: This section contains text about data refresh times and instructions on how to create or edit appraisals. A 'Create New Appraisal' button is highlighted with a blue arrow pointing to it from the right.

My Appraisals: This section features three filter checkboxes: 'Include Active' (checked), 'Include Completed' (checked), and 'Include Expired' (checked). Below the filters, a message reads: 'Select a row in the table below to open a record to view or edit. Completed and expired appraisal records may not be opened for editing. Only completed appraisals can be opened in Print View.' A table with the following headers is shown: 'OPTIONS', 'REF #', 'APPRAISAL NAME', 'APPRAISAL DESCRIPTION', 'CREATE DATE', 'LAST MODIFIED DATE', 'EXPIRATION DATE', 'STATUS', and 'DELETE'. The table body contains the text 'There are no appraisals to display'. At the bottom of this section, there are navigation controls (back, first, last, forward) and a 'Page size: 25' dropdown menu. The footer of this section indicates '0 items in 1 pages'.

USER PREFERENCES: This section allows users to configure how the tool opens upon logging in. It includes three radio button options: 'Open Home Page' (selected), 'Open New Appraisal', and 'Open Last Appraisal Worked On'. There are 'Save Preferences' and 'Edit Contact Information' buttons at the bottom.

Page 3 – Appraisal Name/Utility Bills*



AK Appraisals

3.0

[AK APPRAISALS HOME](#) [AK APPRAISAL TOOL](#) [USER GUIDE](#) [ABOUT](#) [CHANGE PASSWORD](#) [LOGOUT](#)

Energy Efficiency Calculator

For detailed information, see the [AK Appraisal Tool User Guide](#).

[Appraisal Description](#) | [ARIS Search Criteria](#) | [ARIS Search Results](#) | [Comparable Details](#) | [Recommended Appraisal Adjustment](#) | [Monthly Mortgage Calculator](#) | [Home Energy Costs by Star Rating](#)

Appraisal Reference Number: New Appraisal

Enter details about the appraisal record and enter the annual utility bills total for the subject home below.

Appraisal Details

Appraisal Name:

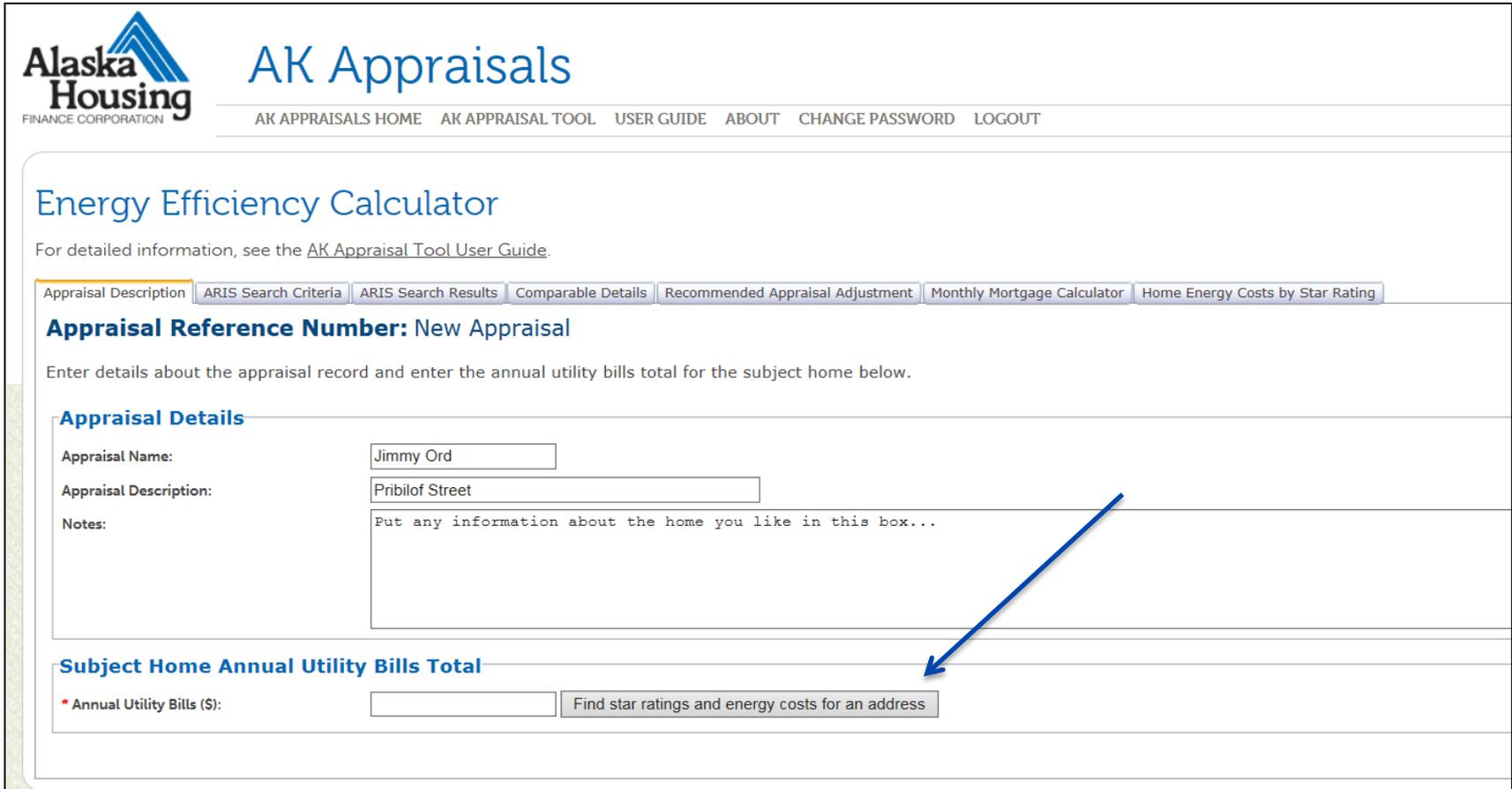
Appraisal Description:

Notes:

Subject Home Annual Utility Bills Total

* Annual Utility Bills (\$):

Page 3 – Appraisal Name/Utility Bills



 **AK Appraisals**

AK APPRAISALS HOME AK APPRAISAL TOOL USER GUIDE ABOUT CHANGE PASSWORD LOGOUT

Energy Efficiency Calculator

For detailed information, see the [AK Appraisal Tool User Guide](#).

Appraisal Description ARIS Search Criteria ARIS Search Results Comparable Details Recommended Appraisal Adjustment Monthly Mortgage Calculator Home Energy Costs by Star Rating

Appraisal Reference Number: New Appraisal

Enter details about the appraisal record and enter the annual utility bills total for the subject home below.

Appraisal Details

Appraisal Name:	<input type="text" value="Jimmy Ord"/>
Appraisal Description:	<input type="text" value="Pribilof Street"/>
Notes:	<input type="text" value="Put any information about the home you like in this box..."/>

Subject Home Annual Utility Bills Total

* Annual Utility Bills (\$):	<input type="text"/>	<input type="button" value="Find star ratings and energy costs for an address"/>
------------------------------	----------------------	--

Page 3 – Appraisal Name/Utility Bills*

Search for star rating and estimated energy costs by address

Note: Data is only available for houses with energy ratings, therefore a search for a valid address may not yield results.

*House Number:

*Street:

City:

Zip: x

Page 3 – Appraisal Name/Utility Bills*

Search for star rating and estimated energy costs by address

Note: Data is only available for houses with energy ratings, therefore a search for a valid address may not yield results.

*House Number:

*Street:

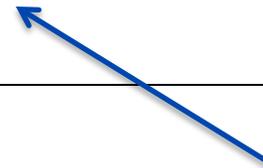
City:

Zip:

Close

Run Search

ADDRESS	CITY	ZIP	STAR RATING	ESTIMATED ENERGY COST
2850 PRIBILOF ST	ANCHORAGE	99517	5 Star	\$1177.25



Page 3 – Appraisal Name/Utility Bills*

Energy Efficiency Calculator

For detailed information, see the [AK Appraisal Tool User Guide](#).

Appraisal Description | ARIS Search Criteria | ARIS Search Results | Comparable Details | Recommended Appraisal Adjustment | Monthly Mortgage Calculator | Home Energy Costs by Star Rating

Appraisal Reference Number: New Appraisal

Enter details about the appraisal record and enter the annual utility bills total for the subject home below.

Appraisal Details

Appraisal Name:

Appraisal Description:

Notes:

Subject Home Annual Utility Bills Total

* Annual Utility Bills (\$): ×

Page 4 – Search Criteria (Optional)

Appraisal Description | **ARIS Search Criteria** | ARIS Search Results | Comparable Details | Recommended Appraisal Adjustment | Monthly Mortgage Calculator | Home Energy Costs by Star Rating

ARIS Search Criteria

Note: The ARIS Search feature is optional. If you already have comparable home utility bill information and do not wish to search the ARIS database, click the Skip button below to proceed to the Comparable Details tab.

Enter search criteria in the form below. Typically search criteria is similar to the subject home being appraised. **At a minimum, please select a community and at least two other home details.** Proceed to select fuel types and utility areas before generating search results.

Home Details

* Community:

Street Number:

Street Name:

Street Suffix:

Matched Precinct:

Number of Bedrooms:

Square Feet: +/- Sq Ft

Year Built: +/- Years

Fuel Types

Utility Costs Cover: (Recommended Fuel Types)

Space Heating Fuel:

DHW Fuel:

Appliances & Lights Fuel:

Utility Areas

Electric Utility:

Natural Gas Utility:

Page 4 – Search Criteria (Optional)

Home Details

* Community: ▼

Street Number:

Street Name:

Street Suffix: ▼

Matched Precinct:

Number of Bedrooms:

Square Feet: +/- Sq Ft

Year Built: +/- Years

Fuel Types

Utility Costs Cover:

Space Heating Fuel:

DHW Fuel:

Appliances & Lights Fuel:

Utility Areas

Electric Utility:

Natural Gas Utility:

▼
 ▼

Page 5 – ARIS Search Results

Energy Efficiency Calculator

For detailed information, see the [AK Appraisal Tool User Guide](#).

Appraisal Description | ARIS Search Criteria | **ARIS Search Results** | Comparable Details | Recommended Appraisal Adjustment | Monthly Mortgage Calculator | Home Energy Costs by Star Rating

ARIS Search Results

Number of Records Averaged:	50
Average Energy Bill of Matching Records:	\$3,575.82

Save Appraisal | Next

Page 6 – User-entered comparable homes (Optional)

Energy Efficiency Calculator

For detailed information, see the [AK Appraisal Tool User Guide](#).

Appraisal Description | ARIS Search Criteria | ARIS Search Results | **Comparable Details** | Recommended Appraisal Adjustment | Monthly Mortgage Calculator | Home Energy Costs by Star Rating

Comparable Homes

Select the number of comparable homes to use:

2 ▼

COMPARABLE #	COMPARABLE DESCRIPTION	USE ARIS SEARCH RESULT?	ANNUAL UTILITY BILL AMOUNT (\$)
1		Yes ▼	\$3,575.82
2		Yes ▼	\$3,575.82



Here are the energy costs from the database search.

Page 6 – User-entered comparable homes (Optional)

Determine how many homes to compare.

	USE ARIS SEARCH RESULT?		ANNUAL UTILITY BILL AMOUNT (\$)
<input type="checkbox"/>	Yes	▼	\$3,575.82
<input type="checkbox"/>	No	▼	3,000

The user can plug in their own energy cost comparable.

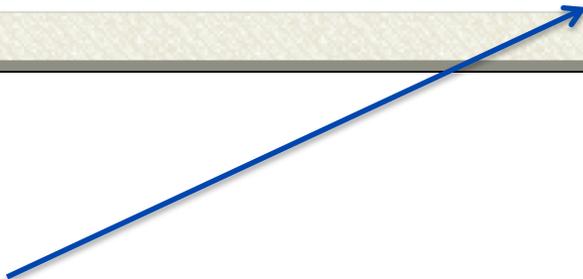
Page 6 – User-entered comparable homes (Optional)

Comparable Details | Recommended Appraisal Adjustment | Monthly Mortgage Calculator | Home Energy Costs by Star Rating

2 ▾

USE ARIS SEARCH RESULT?		ANNUAL UTILITY BILL AMOUNT (\$)
Yes	▾	\$3,575.82
No	▾	3,000

Save Appraisal Calculate



Hit the calculate button!

Page 7 – Recommended Adjustment

Energy Efficiency Calculator

For detailed information, see the [AK Appraisal Tool User Guide](#).

Appraisal Description | ARIS Search Criteria | ARIS Search Results | Comparable Details | **Recommended Appraisal Adjustment** | Monthly Mortgage Calculator | Home Energy Costs by Star Rating

Recommended Appraisal Adjustment: **\$8,890.00**

The Recommended Appraisal Adjustment represents the average of Net Present Values (NPV) calculated from the difference in energy costs between the subject home and each comparable home. For the subject home and the comparable homes, the appraiser needs to have energy bills for the energy combination being appraised. The Net Present Value represents the value, in today's dollars, of a series of payments and income over a set amount of time going forward.

NPV Calculation Variables

* Discount Rate:
 * Period:
 Energy Cost Comparison: \$10,103.65
 Electric Regulatory Charges: 0.000578
 Natural Gas Regulatory Charges: 0.00161

Finalize Appraisal

Mark Appraisal Record as Complete

If checked, calculations are re-run when the Appraisal is saved. All data necessary for the calculations must be entered before the Appraisal can be saved.

Page 7 – Recommended Adjustment

Energy Efficiency Calculator

For detailed information, see the [AK Appraisal Tool User Guide](#).

Appraisal Description | ARIS Search Criteria | ARIS Search Results | Comparable Details | **Recommended Appraisal Adjustment** | Mon

Recommended Appraisal Adjustment: \$12,668.00

The Recommended Appraisal Adjustment represents the average of the Net Present Values (NPV) calculated from the appraisals to have energy bills for the energy combination being appraised. The Net Present Value represents the value, in

NPV Calculation Variables

 * Discount Rate:	<input type="text" value="4"/>
 * Period:	<input type="text" value="7"/>

These can be changed by the user.

Page 7 – Recommended Adjustment

Energy Efficiency Calculator

For detailed information, see the [AK Appraisal Tool User Guide](#).

[Appraisal Description](#) [ARIS Search Criteria](#) [ARIS Search Results](#) [Comparable Details](#) **[Recommended Appraisal Adjustment](#)** [Monthly Mortgage Calculator](#) [Home Energy Costs by Star Rating](#)

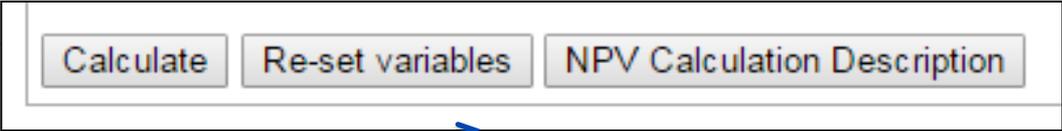
Recommended Appraisal Adjustment: \$8,890.00

The Recommended Appraisal Adjustment represents the average of the Net Present Values (NPV) calculated from the difference in energy costs between the subject home and each comparable home. For the subject home and the comparable homes, the appraiser needs to have energy bills for the energy combination being appraised. The Net Present Value represents the value, in today's dollars, of a series of payments and income over a set amount of time going forward.

NPV Calculation Variables

- * Discount Rate:
- * Period:
- Energy Cost Comparison: \$10,103.65
- Electric Regulatory Charges: 0.000578
- Natural Gas Regulatory Charges: 0.00161

[Calculate](#) [Re-set variables](#) [NPV Calculation Description](#)



[Calculate](#) [Re-set variables](#) [NPV Calculation Description](#)

Finalize Appraisal

Mark Appraisal Record as Complete

If checked, calculations are re-run when the Appraisal is saved. All data necessary for the calculations must be entered before the Appraisal can be saved.

[Save Appraisal](#)

Page 7 – Recommended Adjustment

Energy Efficiency Calcula

For detailed information, see the [AK Appraisal Tool](#)

Appraisal Description ARIS Search Criteria ARIS Search

Recommended Appraisal Adjust

The Recommended Appraisal Adjustment represents the difference between the present value of an investment's future cash flows and the initial investment for each comparable home. For the subject home and the series of payments and income over a set amount of time

NPV Calculation Variables

Discount Rate: 6

Period: 5

Energy Cost Comparison: \$10,103.65

Electric Regulatory Charges: 0.000578

Natural Gas Regulatory Charges: 0.00161

Calculate Re-set variables NPV Calculation

Finalize Appraisal

Mark Appraisal Record as Complete
If checked, calculations are re-run when the

Save Appraisal

Net Present Value (NPV)

The difference between the present value of an investment's future cash flows and the initial investment

$$\text{Present Value}_{\text{savings}} - \text{present value}_{\text{cost}}$$

$$\text{NPV} = \text{FV}/(1 + r)^n$$

FV = future rate

r = discount rate

n = year

The tool assumes

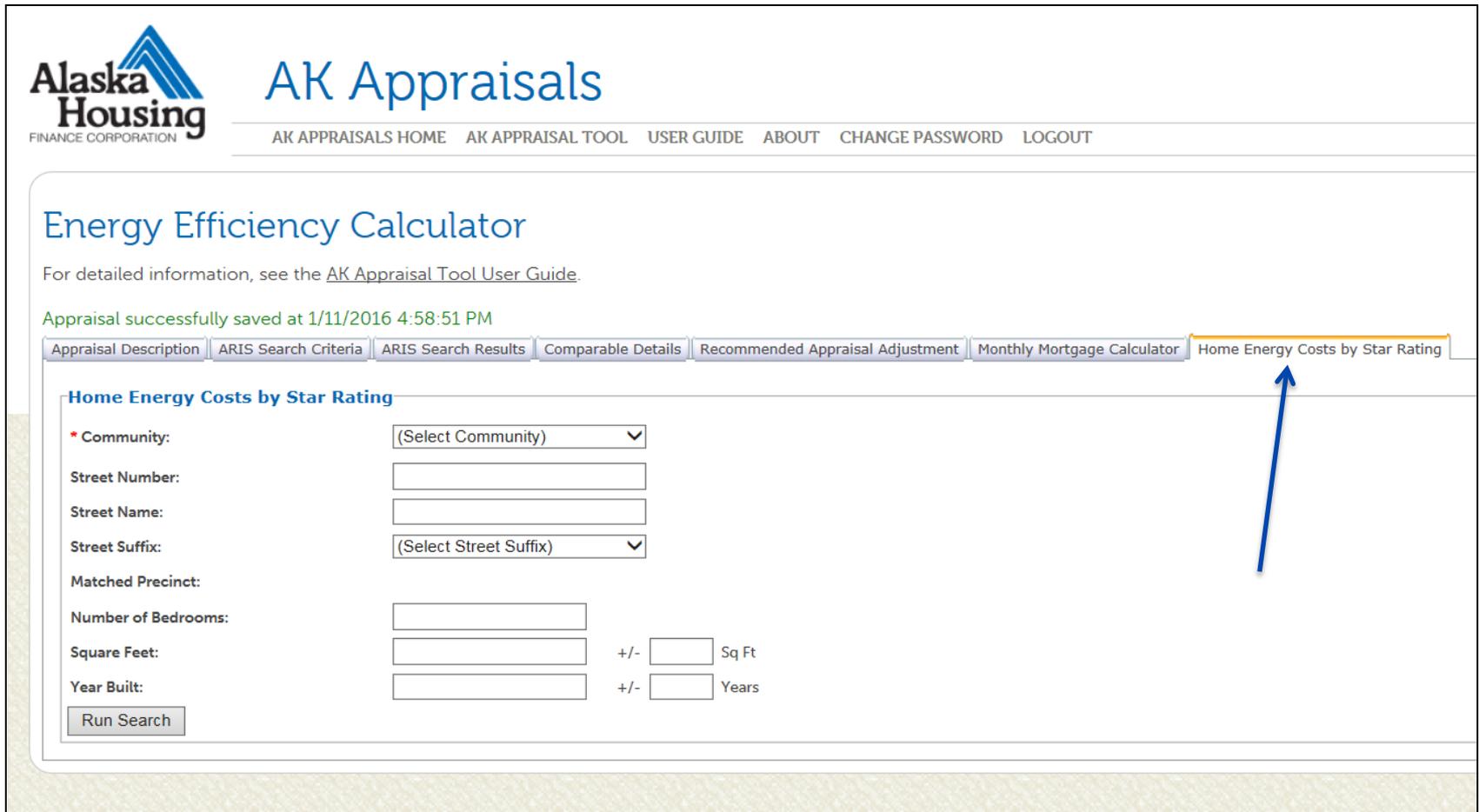
FV = 100% of present value

r = 6% (discount rate default, adjustable by user)

n = 1 - 5; lifetime = 5 years (adjustable by user)

Close

Page 8 – Home Energy Costs by Star Rating



Alaska Housing
FINANCE CORPORATION

AK Appraisals

AK APPRAISALS HOME AK APPRAISAL TOOL USER GUIDE ABOUT CHANGE PASSWORD LOGOUT

Energy Efficiency Calculator

For detailed information, see the [AK Appraisal Tool User Guide](#).

Appraisal successfully saved at 1/11/2016 4:58:51 PM

Appraisal Description ARIS Search Criteria ARIS Search Results Comparable Details Recommended Appraisal Adjustment Monthly Mortgage Calculator **Home Energy Costs by Star Rating**

Home Energy Costs by Star Rating

* Community: (Select Community) ▼

Street Number:

Street Name:

Street Suffix: (Select Street Suffix) ▼

Matched Precinct:

Number of Bedrooms:

Square Feet: +/- Sq Ft

Year Built: +/- Years

Page 8 – Home Energy Costs by Star Rating

Energy Efficiency Calculator

For detailed information, see the [AK Appraisal Tool User Guide](#).

Appraisal successfully saved at 1/11/2016 4:58:51 PM

Appraisal Description | ARIS Search Criteria | ARIS Search Results | Comparable Details | Recommen

Home Energy Costs by Star Rating

* Community:	<input type="text" value="Anchorage"/>		
Street Number:	<input type="text" value="2850"/>		
Street Name:	<input type="text" value="Pribilof"/>		
Street Suffix:	<input type="text" value="ST"/>		
Matched Precinct:			
Number of Bedrooms:	<input type="text" value="3"/>		
Square Feet:	<input type="text" value="2000"/>	+/-	<input type="text" value="300"/> Sq Ft
Year Built:	<input type="text" value="1981"/>	+/-	<input type="text" value="4"/> Years
<input type="button" value="Run Search"/>			

Page 8 – Home Energy Costs by Star Rating

STAR RATING	ESTIMATED ENERGY COSTS
2 Star	\$3,727.97
2 Star +	\$3,107.82
3 Star	\$3,854.45
3 Star +	\$3,435.56
4 Star	\$2,629.35
4 Star +	\$2,322.65
5 Star	\$1,813.82

Close

The Tool:

<https://akrebate.ahfc.us/AkAppraisals.aspx>

Thank you for participating.

Please fill out the conference evaluation form;
it helps us improve the event for you.