



# Comprehensive Energy Audit For Venetie IGAP/ICWA Building



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Prepared For  
**Venetie Village Council**

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## **PREFACE**

The purpose of this report is to provide guidance in reducing facility operating costs and enhance the sustainability of this community. The report assesses the current energy usage of the facility, provide options for reducing the amount of energy used, and evaluate the cost vs. benefit of each option.

Discussions of site-specific concerns, financing options, general facility information, and an energy efficiency action plan are also included in this report.

## **ACKNOWLEDGMENTS**

The Alaska Native Tribal Health Consortium (ANTHC) Rural Energy Initiative gratefully acknowledges the assistance of Patrick (PJ) Hanson, First Chief, the members of the Venetie Village Council, and Donna Erick, the former Council administrator.

## **LIMITATIONS OF THIS STUDY**

The building modeling software AkWarm© was used to create a virtual representation of the Venetie IGAP/ICWA Building. The model is then used to test the cost effectiveness of different energy efficiency measures (EEMs) like LED lighting and pump improvements. The AkWarm© software calculates the annual cost savings and payback period for the investment, and then ranks all EEMs based on their payback period.

There are limitations using this software, which may affect the accuracy of the EEMs cost savings. This report should serve as a guide when deciding which EEMS to pursue further. All EEMs and installation costs should be verified with a certified professional in that field before construction begins.

# OVERVIEW

This report was prepared for the Venetie Village Council. The scope of the audit focused on the Venetie IGAP/ICWA Building, and includes an analysis of building occupancy schedules, building shell, heating systems, lighting, and other electrical loads. The Venetie IGAP/ICWA Building was built in the 1970s and is approximately 889 square feet. It has a main meeting room, two offices, and an unheated storage area that is used by the Venetie Village Store. Data was gathered on a site survey and an interview with the IGAP coordinator.

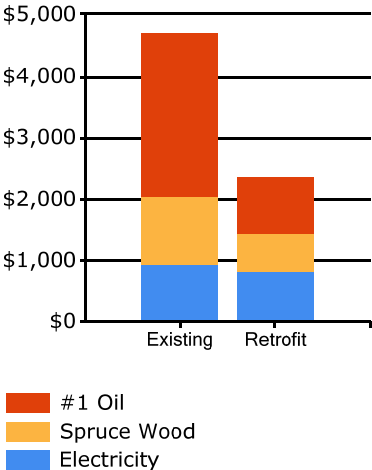
## ENERGY BASELINE

Based on unsubsidized electricity and fuel oil prices in effect at the time of the audit, the total predicted energy costs are about \$4,645 per year. This includes \$939 for unsubsidized electricity, \$2,639 #1 fuel oil (diesel), and an estimated annual cost of \$1,067 for cord wood.

The State of Alaska Power Cost Equalization (PCE) program provides a subsidy to rural communities across the state to lower electricity costs and make energy affordable in rural Alaska. The Venetie IGAP/ICWA Building does not receive a PCE subsidy.

Table 1 lists the predicted annual energy usage before and after the proposed retrofits for the Venetie IGAP/ICWA Building.

**Annual Energy Costs by Fuel Type**



**Table 1: Predicted Annual Energy Use for the Venetie IGAP/ICWA Building**

Predicted Annual Fuel Use		
Fuel Use	Existing Building	With Proposed Retrofits
Electricity	1,044 kWh	918 kWh
Spruce Wood	7.11 cords	4.08 cords
#1 Oil	293 gallons	100 gallons

## PROPOSED ENERGY EFFICIENCY MEASURES (EEM)

Table 2 below summarizes the energy efficiency measures analyzed for the Venetie IGAP/ICWA Building. Listed are the estimates of the annual savings, installed costs, and two different financial measures of investment return: the Savings Investment Ratio (SIR) and the retrofits’ Simple Payback. Green highlighted cells are high priority measures, yellow are medium priority, and orange highlighted cells are the lowest priority recommendations.

**Table 2: Priority List – Energy Efficiency Measures**

Rank	Feature	Improvement Description	Annual Energy Savings <sup>1</sup>	Installed Cost	Savings to Investment Ratio, SIR <sup>2</sup>	Simple Payback (Years) <sup>3</sup>
1	Toyotomi Stove	Program the Toyostove to maintain the building temperature at 60.0° F when the building was unoccupied.	\$536	\$25	285.91	0.0
2	Wood Stove	Replace existing stove with a higher efficiency model. The total includes estimated costs for the stove, freight, miscellaneous materials, and installation.	\$1,237	\$2,800	7.45	2.3
3	Lighting: Two Bulb Overhead Fixtures	Replace with lighting with direct wire, energy efficient LED bulbs.	\$48 + \$3 Maint. Savings	\$455	1.73	9.0
4	Building Walls	Furr out the building interior wall. Fill the framing cavity with R-13 fiberglass batts. Cost estimate includes construction materials , shipping, and installation costs.	\$296	\$11,138	0.60	37.6
5	Building Floor	Remove the existing floorboards and insulation. Replace insulation with R-30 fiberglass batts. Cost estimate includes construction materials, shipping, and installation costs, but does not include new interior flooring.	\$109	\$6,048	0.40	55.5
6	Window: ICWA Office	Replace existing window with triple pane, low-E, argon window.	\$23	\$1,022	0.37	44.6
7	Lighting: Four Bulb Overhead Fixtures	Replace with lighting with direct wire, energy efficient LED bulbs.	\$39 + \$14 Maint.	\$2,275	0.36	43.1
8	Air Tightening	Fill any gaps in the wood wall chinking, and around windows and doors. Install weather-stripping around door and window frames as needed. Energy savings reflect a 5% reduction in draft.	\$18	\$600	0.27	33.2
<b>TOTAL, all measures</b>			<b>\$2,305 + \$17 Maint. Savings</b>	<b>\$24,363</b>	<b>1.61</b>	<b>10.5</b>
<b>TOTAL, cost-effective measures</b>			<b>\$1,820 + \$3 Maint. Savings</b>	<b>\$3,280</b>	<b>8.78</b>	<b>1.8</b>

## **Table Notes:**

<sup>1</sup> Maintenance savings were calculated by determining the approximate number and cost of fluorescent bulbs that would need to be replaced over the lifetime of an equivalent LED bulb, and then adding that subtotal to the cost of labor for changing each bulb. The total was divided over the lifespan of the LED equivalent bulb. Note: the LED lifespan is capped at 30 years.

A value of \$25 per hour was estimated for local labor. The length of time for changing each bulb was estimated at 10 minutes.

<sup>2</sup> Savings to Investment Ratio (SIR) is the total savings over the life of a project (for example: changing a light bulb) divided by its investment costs (materials, labor, shipping, etc.). The SIR shows how profitable a project will be; the higher the SIR, the more profitable the project. An SIR greater than 1.0 indicates a cost-effective project (i.e. more savings than cost). Note: the project's SIR is related to the rest of the Energy Efficiency Measures (EEM) above and the calculation assumes that projects are completed in the same order as in the table.

<sup>3</sup> Simple Payback (SP) is the estimated length of time needed to recoup the initial investment cost of the project. Note: this does not account for accrued interest from loans or any future changes in energy prices.

The wood stove upgrade recommended above is one solution to balance residents' needs, fuel efficiency, and improved air quality. There are numerous models available that will serve this purpose, and still meet or exceed the building's current heating requirements.

*Note: Wood stoves may contribute to poor indoor air quality. Long-term exposure to poor indoor air quality may increase the risk of developing respiratory conditions, particularly in young children and elders. Steps should be taken to properly monitor and ventilate buildings with woodstoves, regardless of any potential improvements to the building shell. Burning dry, cured wood whenever possible will reduce particulate emissions at its source.*

## **Additional Recommendations (not included in Table 2)**

Appliances: Combine the contents of the refrigerators and freezers, and unplug appliances when not needed.

Window film: Applying shrink-wrap film may reduce air/heat loss through the windows.

Thermal curtains: Installing thermally insulating or heavy curtains may reduce air/heat loss through the windows.

# FACILITY DESCRIPTION

## Building Occupancy Schedules

The building is used as an office and meeting space. It is open Monday through Friday 9:00 AM to 4:00 PM, with a one-hour lunch break taken at noon. There are usually two people in the building during operating hours.

## Building Shell

The exterior walls are log construction. Each log is approximately 8 inches in diameter. The sidewall near the Toyostove has significant structural issues: the logs near the bottom of the wall are bowing into the building and are not aligned with the upper logs. This should be inspected by a professional structural engineer to determine the extent of damage and for recommended fixes before the problem becomes too severe.

The building has a cathedral ceiling similar to other buildings in Venetie: whole log beams are covered with about one inch of spray foam insulation. Fiberglass batt (about 5.5 inches of R-21 fiberglass batt) fills the cavity between the log beams and exterior roofing. However, a false ceiling has been installed in the interior, adding an additional 3.6 inches of R-13 fiberglass batt to the roof structure. The cathedral roof cavity is not well sealed, and the exterior fiberglass batt is likely damaged from exposure to moisture.

The floor of the building is constructed on short pilings covered by a very leaky crawlspace. There is an estimated 5.5 inches of R-21 fiberglass batt between the exterior and interior subfloors. The subfloor cavity is not well sealed.

Typical windows throughout the building are triple paned, air-filled windows with wooden framing. One window in the ICWA office has two broken panes.

The Venetie IGAP/ICWA Building has a main entrance door and a rear exit. Both doors are fiberglass with a polyurethane core. Neither door has a window.



**FLIR thermal imaging of the Venetie IGAP/ICWA Building's broken window. The colors on the higher end of the color gradient scale indicate areas that have greater heat loss.**

## Heating Systems

The primary heating systems used in the building are:

### **Wood Stove**

Nameplate Information:	Barrel wood stove (55-gallon drum)
Fuel Type:	Cord wood (spruce)
Input Rating:	32,292 BTU/hr. (approximate)
Steady State Efficiency:	40 - 60 % (depending on the cord wood moisture)
Idle Loss:	10 %
Heat Distribution Type:	Air

### **Toyotomi Oil-Fired Stove - Laser 730**

Nameplate Information:	Toyostove Vented Kerosene Heater - Laser 730
Fuel Type:	#1 Oil (diesel)
Input Rating:	42,140 BTU/hr.
Steady State Efficiency:	87 %
Idle Loss:	0 %
Heat Distribution Type:	Air

There was a 1500 W electric space heater (Howard Beger Co., LLC Comfort Zone Heater) in an office, but this is likely to be used infrequently. The space heater was not included in the model.

## Lighting

There are a total of 7 light fixtures in the building. The lights use an estimated 327 kWh annually.

**Table 3: Lighting in the Venetie IGAP/ICWA Building**

Lighting	Number of Bulbs	Fixture Type	Location(s)
4' 4-bulb Fluorescent Fixtures	20	Overhead lighting	Throughout building
4' 2-bulb Fluorescent Fixtures	4	Overhead lighting	Office area



## **Major Equipment**

Below is a list of the major equipment in the Venetie IGAP/ICWA Building. The appliances and equipment use an estimated 671 kWh annually.

**Table 4: Major Appliances and Equipment in the Venetie IGAP/ICWA Building**

<b>Equipment</b>	<b>Rating (Watts)</b>	<b>Annual Usage (kWh)</b>
GE Microwave	950	62
JVC Portable CD Radio	19	14.9
HP All-in-one Computer	90	140.9
HP Desktop Computer and Monitor	53	83
Ceiling Fan	46.1	21.4
Dell Desktop Printer	705	9.2
Village Store Refrigerator	382 (est. annual consumption)	221.4
Village Store Freezer	306 (est. annual consumption)	118.1

## **PROJECT FINANCING**

The total estimated cost of the recommended EEM's is \$24,363. The payback for the implemented EEM's is approximately 10.5 years. ANTHC is willing to assist the community with acquiring funds to complete the scope of work recommended in this energy audit.

There are several options for financing energy efficiency projects within the State of Alaska. These include the use of grants, loans, and other funding opportunities. Below is some information on potential funding opportunities.

**Energy Efficiency Revolving Loan Program** – This is a loan administered by the Alaska Housing Finance Corporation (AHFC) for use by any applicant who is also the owner of the building where the work will take place. It provides a loan for permanent energy-efficiency projects with a completion window of one year.

**Sustainable Energy Transmission and Supply Program** – This is a loan administered by the Alaska Energy Authority (AEA) for a government, business, or other organized body of people. It provides a loan for energy-efficiency or power transmission or distribution projects.

**USDA-RD Communities Facilities Direct Loan & Grant Program** - This is a loan or grant provided by the US Department of Agriculture – Rural Development (USDA-RD) for any essential community facility in a rural area. It provides a loan or grant to develop essential community facilities with upgrades or equipment for improvement.

## **MEASUREMENT AND VERIFICATION**

The actual results of these recommendations can be measured by collecting and monitoring energy use. This information is available on the monthly bills provided by the local electric utility and the local fuel oil supplier. Collecting data and performing a historical comparison is the simplest method of validating the energy and cost savings seen by the measures. Additionally, active remote monitoring systems are available that can collect and store data regarding energy and fuel usage. These systems allow the user to track the usage in real time and can be shared more easily with partners across the state.

# APPENDICES

## *Appendix A – Energy Billing Data*

### 1. Electricity Billing Data

Electric Utility: Venetie Village Electric

Date	Reading	Usage (kWh)	Charge
January 2017	10619	6	\$5.10
February 2017	10638	19	\$16.15
March 2017	10783	145	\$123.25
April 2017	10865	82	\$69.70
May 2017	10985	120	\$102.00
June 2017	11143	158	\$142.20
July 2017	11260	117	\$105.30
August 2017	11343	83	\$74.70
September 2017	11411	68	\$61.20
October 2017	11464	53	\$47.70
November 2017	11699	235	\$211.50
December 2017	No reading	-	-

### 2. #1 Fuel Oil (Diesel) Billing Data

Fuel Company: Venetie Village Council

Year	Gallons	Price per Gallon	Total
2017	310	\$9.00	\$2,790

### 3. Spruce Cord Wood Usage (estimated)

Date	Usage (cord)	Charge
January 2017	1	\$150.00
February 2017	1	\$150.00
March 2017	1	\$150.00
April 2017	1	\$150.00
May 2017	0	-
June 2017	0	-
July 2017	0	-
August 2017	0.25	\$38.00
September 2017	0.75	\$113.00
October 2017	1	\$150.00
November 2017	1	\$150.00
December 2017	1	\$150.00

## Appendix B – Energy Audit Report – Project Summary

ENERGY AUDIT REPORT – PROJECT SUMMARY	
General Project Information	
PROJECT INFORMATION	AUDITOR INFORMATION
<b>Building:</b> Venetie IGAP/ICWA Building	<b>Auditor Company:</b> Alaska Native Tribal Health Consortium
<b>Address:</b> Venetie	<b>Auditor Name:</b> Kevin Ulrich
<b>City:</b> Venetie	<b>Auditor Address:</b> 4500 Diplomacy Drive
<b>Client Name:</b> Patrick (PJ) Hanson	Anchorage, AK 99508
<b>Client Address:</b> P.O. Box 8119 Venetie, AK 99781	<b>Auditor Phone:</b> (907) 729-3237
<b>Client Phone:</b> (907) 849-8212	<b>Auditor FAX:</b> (907) 729-3509
<b>Client FAX:</b> (907) 849-8097	<b>Auditor Comment:</b> Assistant auditor: Kelli Whelan, MS Environmental Eng. (907) 729-3723; kmwhelan@anthc.org.
Design Data	
<b>Building Area:</b> 889 square feet	<b>Design Space Heating Load:</b> Design Loss at Space: 25,189 Btu/hour with Distribution Losses: 25,189 Btu/hour Plant Input Rating assuming 82.0% Plant Efficiency and 25% Safety Margin: 38,398 Btu/hour Note: Additional Capacity should be added for DHW and other plant loads, if served.
<b>Typical Occupancy:</b> 2 people	<b>Design Indoor Temperature:</b> 72° F (building average)
<b>Actual City:</b> Venetie	<b>Design Outdoor Temperature:</b> -49.4° F
<b>Weather/Fuel City:</b> Venetie	<b>Heating Degree Days:</b> 15,409° F-days
Utility Information	
<b>Electric Utility:</b> Venetie Village Electric	<b>#1 Fuel Oil (Diesel) Provider:</b> Venetie Village Council
<b>Average Annual Cost/kWh:</b> \$0.900/kWh	<b>Average Annual Cost/gal.:</b> \$9.00/gallon

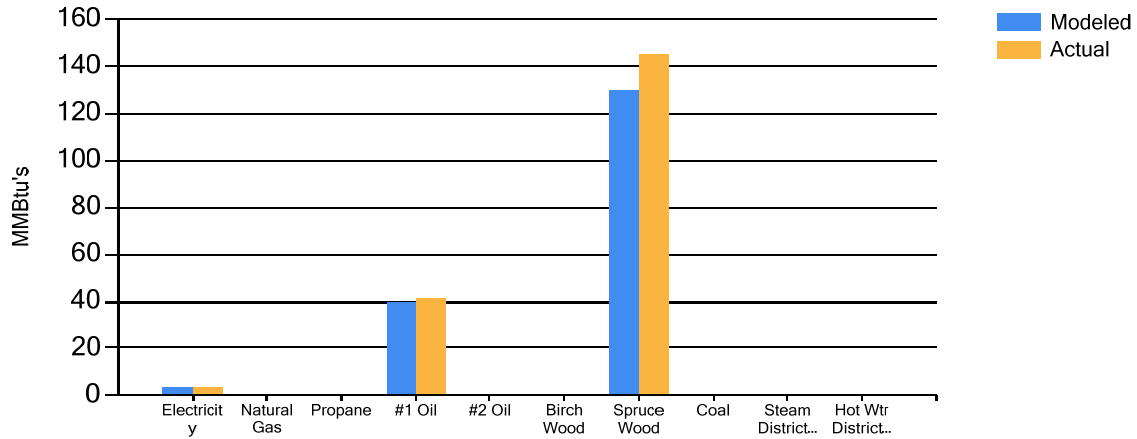
Annual Energy Cost Estimate				
Description	Space Heating	Lighting	Other Electrical	Total Cost
<b>Existing Building</b>	\$3,747	\$294	\$604	<b>\$4,645</b>
<b>With Proposed Retrofits</b>	\$1,529	\$208	\$604	<b>\$2,340</b>
<b>Savings</b>	\$2,218	\$86	\$0	<b>\$2,305</b>

Building Benchmarks			
Description	EUI (kBTU/sq. ft.)	EUI/HDD (BTU/sq. ft./HDD)	ECI (\$/sq. ft.)
<b>Existing Building</b>	192.3	12.48	\$5.22
<b>With Proposed Retrofits</b>	101.3	6.58	\$2.63
EUI: Energy Use Intensity - The annual site energy consumption divided by the structure's conditioned area. EUI/HDD: Energy Use Intensity per Heating Degree Day. ECI: Energy Cost Index - The total annual cost of energy divided by the square footage of the conditioned space in the building.			

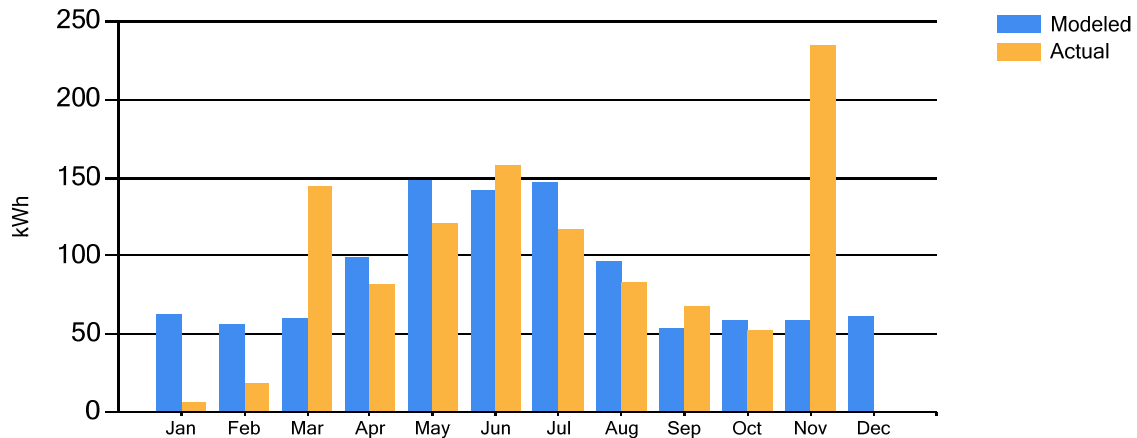
## Appendix C- Actual Fuel Use versus Modeled Fuel Use

The graphs below show the modeled energy usage results of the energy audit process compared to the actual energy usage report data. The model was completed using AkWarm modeling software. The orange bars show actual fuel use, and the blue bars are AkWarm's prediction of fuel use.

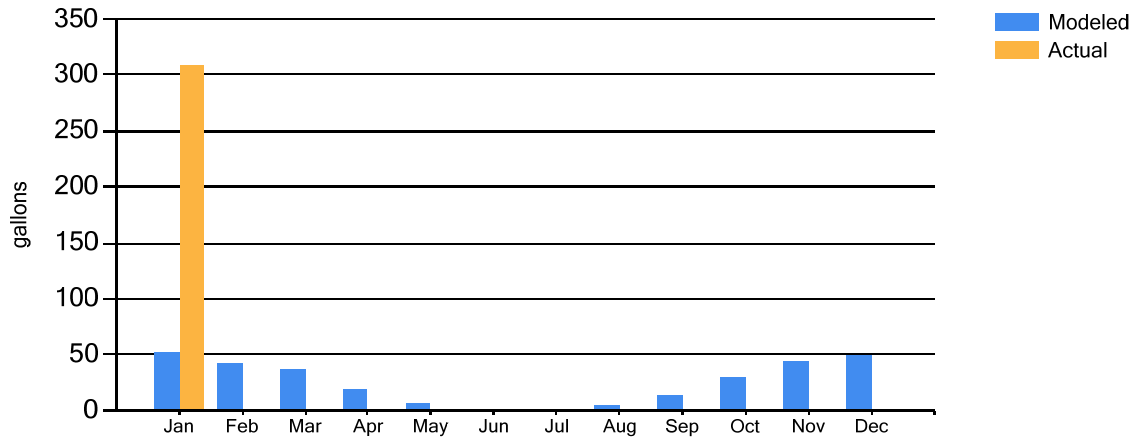
### Annual Fuel Use



### Electricity Fuel Use

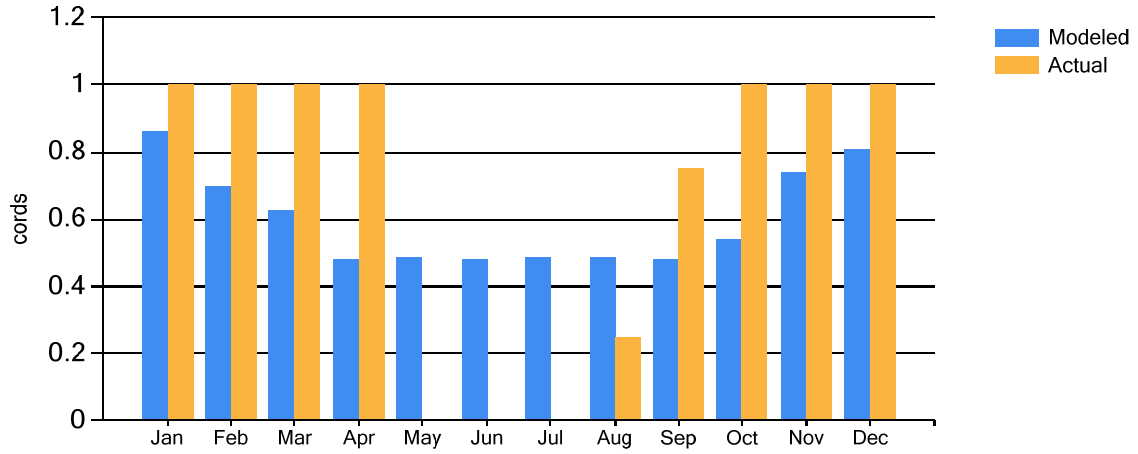


### #1 Fuel Oil Fuel Use



Note: The yellow bar represents the total amount of fuel purchased in 2017.

### Spruce Wood Fuel Use



Note: The cord wood usage was estimated based on an interview with the IGAP coordinator input.

## Appendix D - EUI Calculation Details

Venetie Village Electric currently provides electricity to the residents of Venetie as well as to all commercial and public facilities. The Venetie Village Council is the local fuel distributor.

The average cost for each type of fuel used in this building is shown in Table D-1 below. This figure includes all surcharges, subsidies, and utility customer charges:

**Table D-1: Energy Cost Rates for each Fuel Type**

Average Energy Cost (as of March 2018)	
Description	Average Energy Cost
Electricity	\$ 0.90/kWh
#1 Oil	\$ 9.00/gallons
Cord Wood (Spruce)	\$150/cord

Table D-2 shows the calculated results for the building Energy Use Index (EUI), which determines the total energy usage for a type of building for comparison with other buildings of the same type. This allows the user to determine the relative energy use of a building in relation to others of the same type or use.

**Table D-2: EUI Building Calculations for the Venetie IGAP/ICWA Building**

Energy Type	Building Fuel Use per Year	Site Energy Use per Year, kBTU	Source/Site Ratio	Source Energy Use per Year, kBTU
Electricity	1,044 kWh	3,562	3.340	11,899
Spruce Wood	7.11 cords	128,757	1.000	128,757
#1 Oil	293 gallons	38,702	1.010	39,089
<b>Total</b>		<b>171,021</b>		<b>179,744</b>
BUILDING AREA		889	Square Feet	
BUILDING SITE EUI		192	kBTU/Ft <sup>2</sup> /Yr.	
<b>BUILDING SOURCE EUI</b>		<b>202</b>	<b>kBTU/Ft<sup>2</sup>/Yr.</b>	
* Site - Source Ratio data is provided by the Energy Star Performance Rating Methodology for Incorporating Source Energy Use document issued March 2011.				

Table D-3 shows information on common energy use benchmarks used to characterize the efficiency of a building.

**Table D-3: Building Benchmarks for the Venetie IGAP/ICWA Building**

Building Benchmarks			
Description	EUI (kBTU/sq. ft.)	EUI/HDD (BTU/sq. ft./HDD)	ECI (\$/sq. ft.)
Existing Building	192.3	12.48	\$5.22
With Proposed Retrofits	101.3	6.58	\$2.63
EUI: Energy Use Intensity - The annual site energy consumption divided by the structure's conditioned area. EUI/HDD: Energy Use Intensity per Heating Degree Day. ECI: Energy Cost Index - The total annual cost of energy divided by the square footage of the conditioned space in the building.			

## Appendix B – Materials List and Labor Estimation

Tables E-1 and E-2: ANTHC Materials List and Cost Estimation for the Venetie IGAP/ICWA Building EEM's

Energy Retrofit	Required Materials	Quantity <sup>a</sup>	Cost per Item	Total Materials Cost	Total Project Cost <sup>b</sup>
Shell Improvement: Walls	R-13 faced fiberglass insulation (pallet)	9	\$658.56	\$5,927.00	\$11,130
	Vapor barrier	5	\$63.72	\$318.60	
	2x4 Lumber	44	\$14.77	\$747.40	
	¼" Plywood	116	\$12.75	\$1,479.00	
	Additional construction materials (sheathing tape, screws, interior paint)	-	-	\$433.50	
Shell Improvement: Floors	R-30 faced fiberglass insulation (pallet)	3	\$564.83	\$1,694.50	\$6,015
	Vapor barrier	4	\$63.72	\$254.90	
	23/32" Subflooring	30	\$43.78	\$1,313.40	
	Additional construction materials (sheathing tape, screws)	-	-	\$227.10	
Shell Improvement: Window	Triple pane, insulated framing window	1	\$800.00	\$800.00	\$1,020
Air sealing	Weather stripping, caulking	-	-	\$200.00	\$430
	Insulating foam sealant	12	\$4.48	\$53.80	\$165
Heating	New wood stove	1	\$1,249.00	\$1,249.00	\$2,800
	Additional flue pipe, flooring materials for stove replacement	-	-	\$750.00	
	Program Toyostove temperature set back	-	-	-	\$25
Lighting	LED T-8 equivalent light bulbs with one tombstone per bulb	27	\$16.74	\$451.90	\$1,120

<sup>a</sup> 10% surplus included.

<sup>b</sup> Project costs include materials, freight (15% of materials cost, and labor).



	<b>Contractor (lighting)</b>	<b>Local Labor</b>
<b>Category</b>	<b>Cost (\$)</b>	<b>Cost (\$)</b>
Labor	1,000	3,925
Materials	452	15,351
Freight	68	2,303
Travel <sup>c</sup>	580	-
Indirect <sup>d</sup>	630	-
<b>Subtotal</b>	<b>\$2,730</b>	<b>\$21,580</b>
<b>Grand Total</b>		<b>\$24,310</b>

<sup>c</sup> Travel costs for a certified electrician: airfare from Fairbanks and per diem (\$80 per day).

<sup>d</sup> Indirect rate is 30% (of the total estimated labor, travel, materials, and freight costs). This represents an estimate of contractor profit, insurance, and bonding costs.

## ***Appendix C – Example Materials***

### **Insulation**

#### **1. [Owens Corning R-13 Kraft Faced Fiberglass Insulation Batts 15" x 93" \(10 bags\)](#)**

Owens Corning EcoTouch Insulation is soft to the touch, easy to cut and install. It delivers comfort – helping homes stay cooler in the summer and warmer in the winter to reduce energy costs. The R13 Kraft Faced Batt Insulation has pre-cut widths to fit between the studs and joists in your home. It offers exceptional thermal and sound control performance.

- Dimensions: 3-1/2 in. x 15 in. x 93 in. 11 pieces (106.56 sq. ft. / bag)
- 10 bags/pallet is equal to 110-pieces/1065.60 sq. ft.
- Application: 2x4 walls (exterior/interior/basement), floors
- Thermal insulation performance helps lower monthly heating/cooling costs
- EcoTouch insulation helps control sound; add to bedrooms, home office, family room, utility room, kitchen and bathroom
- Can be combined with FOAMULAR insulating sheathing to achieve greater R-value in exterior wall applications

#### **2. [Owens Corning R-30 Kraft Faced Fiberglass Insulation Batt 24" x 48" \(8 bags\)](#)**

Owens Corning EcoTouch Insulation is soft to the touch, easy to cut and install. It delivers comfort – helping homes stay cooler in the summer and warmer in the winter to reduce energy costs. The R30 Kraft Faced Batt Insulation has pre-cut widths to fit between the studs and joists in your home. It offers exceptional thermal and sound control performance.

- Dimensions: 9-1/2 in. x 24 in. x 48 in., 11 pieces (88 sq. ft./bag)
- 8 Bags/pallet = 88 pieces/704 sq. ft.
- Application: attics
- Provides thermal performance and helps lower monthly heating/cooling costs
- Check with your local building department or building official on the need for a vapor retarder facing on ceiling insulation
- If your joist cavities are completely filled, lay unfaced insulation in long runs perpendicular to the joists
- Department of Energy recommends an R-30 to R-60 for attics
- You need 20 in. of insulation to reach an R-60 in your attic

### **Vapor Barrier**

#### **3. [Vapor Barrier: CertainTeed MemBrain 100" x 50' Air Barrier with Smart Vapor Retarder](#)**

### **Lumber**

4. [2 x 4 Lumber](#)
5. [¼" Plywood](#)
6. [15/23" Plywood](#)
7. [23/32" Subflooring](#)

## Window

### 8. Example: [Great Land Window](#)

## Lighting

### 9. [EarthLED T-8 or T-12 Equivalent Bulbs](#)

EarthLED Total Product Insight	
Performance Specifications	
REPLACEMENT FOR:	T8 OR T12 4 FOOT FLUORESCENT TUBE
BRIGHTNESS (LUMENS):	2000
COLOR TEMPERATURE:	4000K   5000K
COLOR ACCURACY (CRI):	80
DIMENSIONS	1.02" X 47.2"
POWER CONSUMPTION:	18 WATTS
VOLTAGE:	120-277 VOLTS
DIMMABLE:	NO
Dimensions / Additional Data	
CERTIFICATIONS:	UL, DESIGNLIGHTS (DLC)
PRODUCT/ORDER CODE:	4000K - 18WT8P-4F-40K-BYP 5000K - 18WT8P-4F-50K-BYP
Lifespan / Cost To Run	
PROJECTED LIFE: @3 HRS/DAY	50,000 HRS
YEARLY ENERGY COST: 3 HRS/DAY @ .11 KWH	\$2.17
WARRANTY	5 YEAR THINKLUX LIGHTING LIMITED WARRANTY <a href="#">EARTHLED PRODUCT PROTECTION PLAN IS AVAILABLE</a>

## Heating

### 10. [Wood Stove: Osburn Freestanding 1600 Wood Stove](#)

Maximum log length:	17"
Log positioning:	Over width
Chimney diameter:	6"
Flue outlet diameter:	6"
Minimum chimney height (feet):	12'
Baffle type:	C-Cast
Approved for a mobile home installation:	Yes
Shipping Weight:	360 lb (163 kg)
Door type:	Single, glass with cast iron frame
Glass type:	Ceramic glass
Glass surface – dimensions (Width X Height):	15" X 8 3/8"
Glass air-wash system:	Yes
Overall dimension (Height):	32 3/8"
Overall dimension (Width):	25"
Overall dimension (Depth):	26 1/2"
Door opening – dimension (Height):	8 3/8"
Door opening - dimension (Width):	15 5/8"
Firebox – dimension (Height):	12 7/8"
Firebox – dimension (Width):	18 1/8"
Firebox – dimension (Depth):	14 3/4"
Firebox lined with refractory bricks for better heat distribution:	Yes
Stainless-steel secondary-air system improving gas combustion:	Yes
Model:	Pedestal
Steel thickness – body:	3/16"
Steel thickness – top:	5/16"
Centre line of flue outlet to the side:	12 1/2"
Centre line of flue outlet to the back:	7 7/8"
Easy-to-access ash drawer:	Yes
USA standard (emissions):	EPA

Canadian Standard (emissions):	CSA B415.1-10
USA standard (safety):	UL 1482
Canadian standard (safety)	ULC S627
Tested and listed as per applicable standards:	By an accredited laboratory (CAN/USA)
Warranty:	Limited lifetime

***Appendix G – Additional Photos of the Venetie IGAP/ICWA Building***



**Venetie IGAP/ICWA Building exterior.**



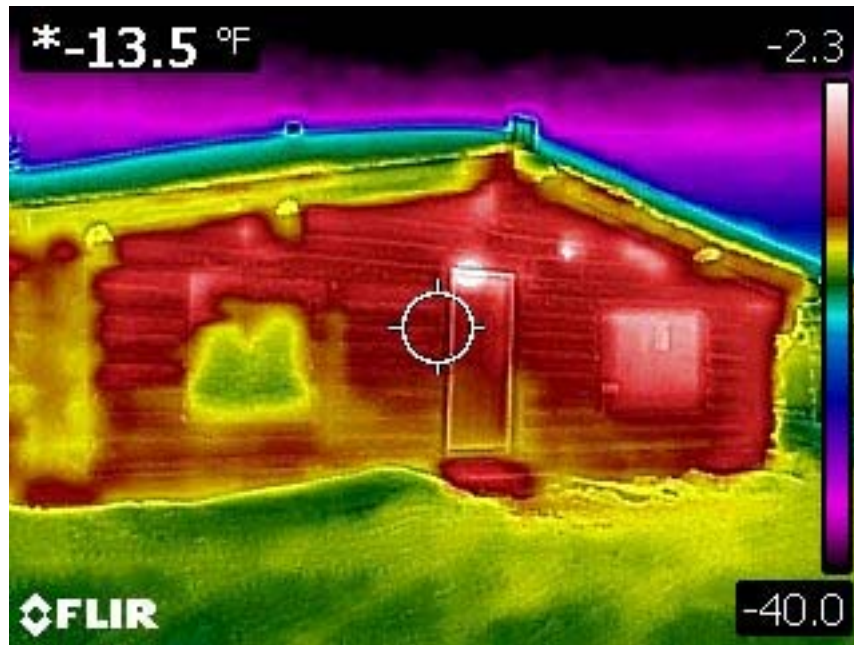
**Building interior. The main entrance door on the left has gaps between the door and the header. Weather stripping should be applied to the door frame and spray foam added around the frame to reduce heat loss. The wall on the right is bowing toward the interior of the building.**



Venetie IGAP/ICWA Building wood stove.



The exterior roof and subflooring are not well sealed. The fiberglass batt is likely to be damaged from exposure to the elements and moisture.



FLIR thermal imaging of the building main entrance. The color gradient on the right depicts the temperature range of the photo (-40° F to -2.3° F). Colors in the higher end of the gradient indicate where heat is being lost. Note the white area above the entrance door. There was a gap between the doorframes at that location.