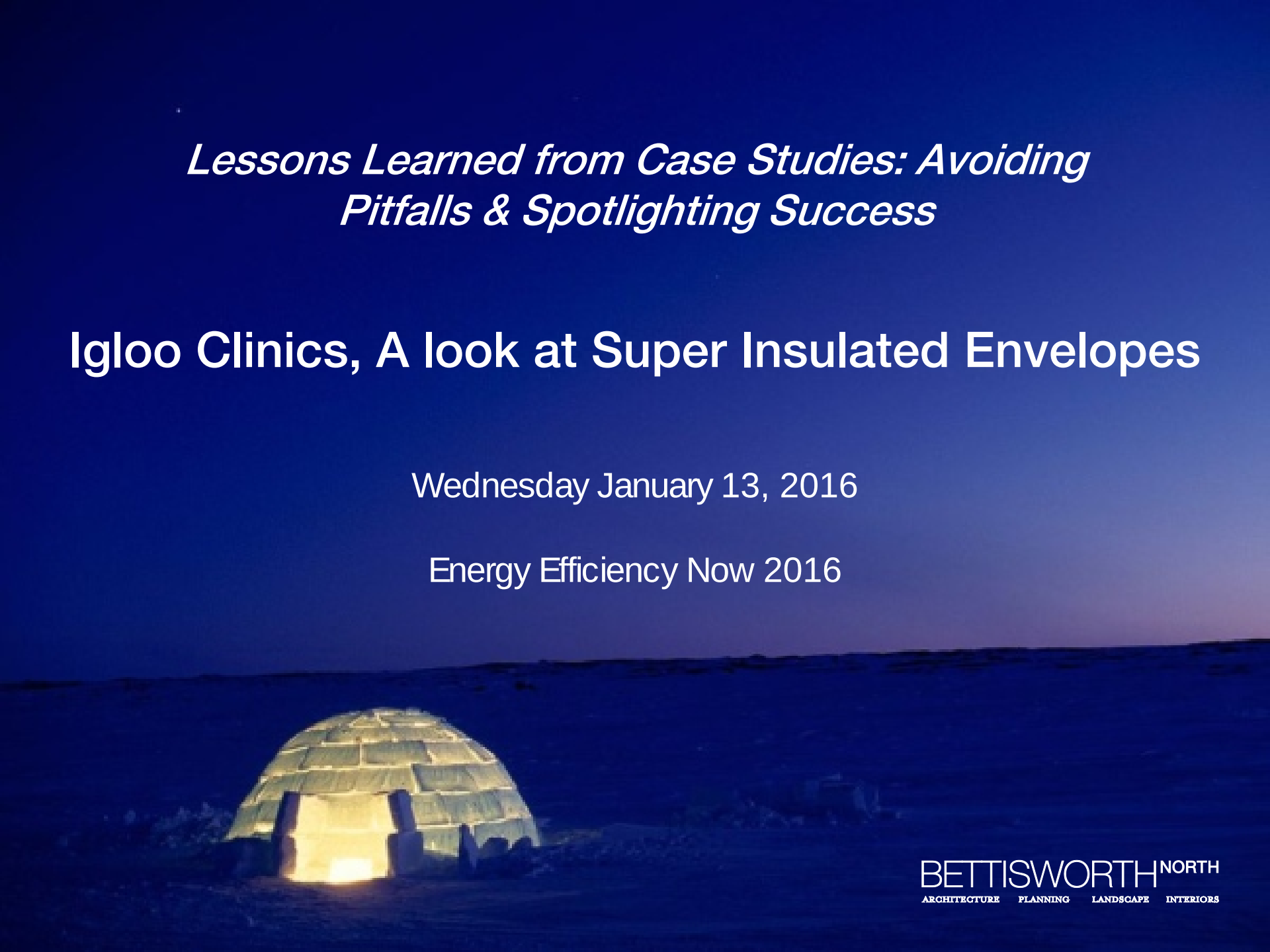
Lessons Learned from Case Studies: Avoiding Pitfalls & Spotlighting Success

Igloo Clinics, A look at Super Insulated Envelopes

Wednesday January 13, 2016

Energy Efficiency Now 2016



BETTISWORTH NORTH
ARCHITECTURE PLANNING LANDSCAPE INTERIORS

Firm Introduction

BETTISWORTH NORTH

ARCHITECTURE PLANNING LANDSCAPE INTERIORS

Project Introduction

Client:
Tanana Chiefs Conference

Owner:
Ruby Tribal Council

Other Team Members:
Arcadis, Watterson Construction Company

Altona M. Brown Medical Clinic

Ruby, Alaska

Square footage: 1,904

Procurement approach: Design Build

Total Design/Construction amount including dental equipment: $1,757,945

Project cost: $2,046,203

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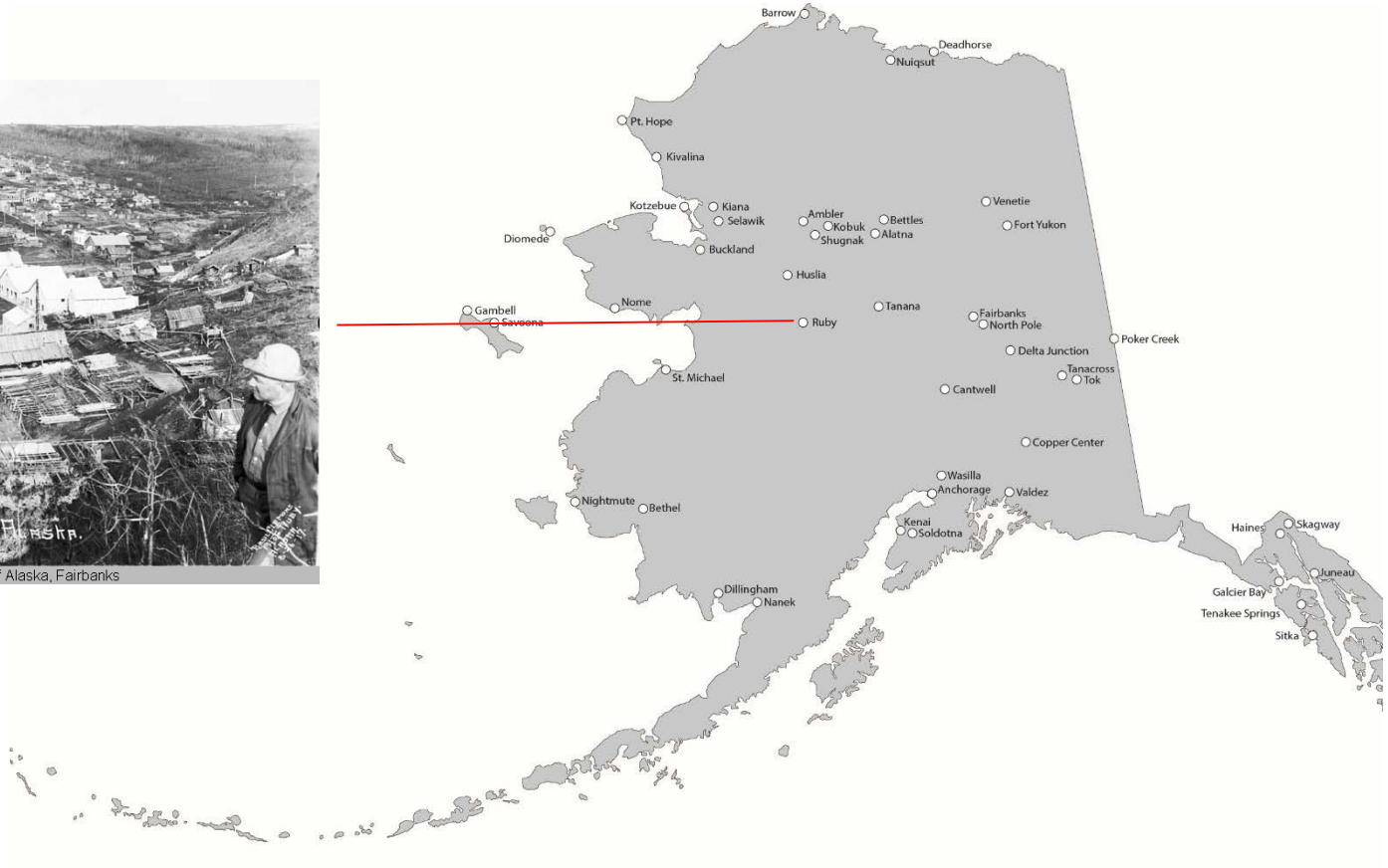
Project Introduction

Archives, University of Alaska, Fairbanks



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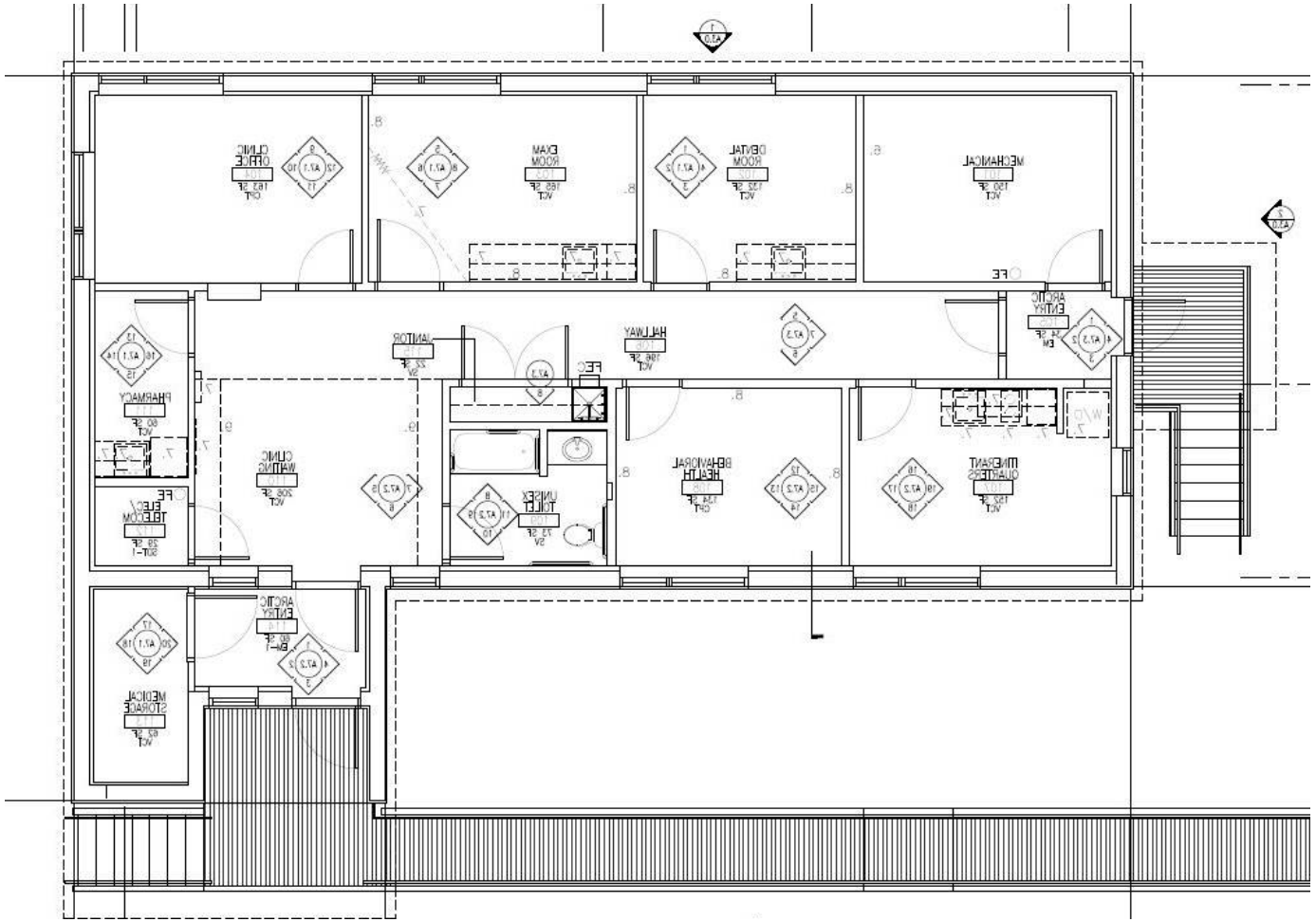
Floor Plan



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Clinic Construction

R-Value Specifics

	2009 BEES	DB Proposal December 2012	Built 2013	TCC Resolution 2013
Roof R-Value	R-49	R-56	R-72	R-110
Wall R-Value	R-25.1	12” SIP + Rigid R=54	R-55	R-80
Underfloor Soffit	R-43	R-37	R-50	R-60 slab
Utilidor		R-33	R-24	

Modeled Performance

Modeling performed by Nortech, Inc using AHFC's AkWarm-C. showed a 21% savings over baseline. Baseline was BEES 2009.

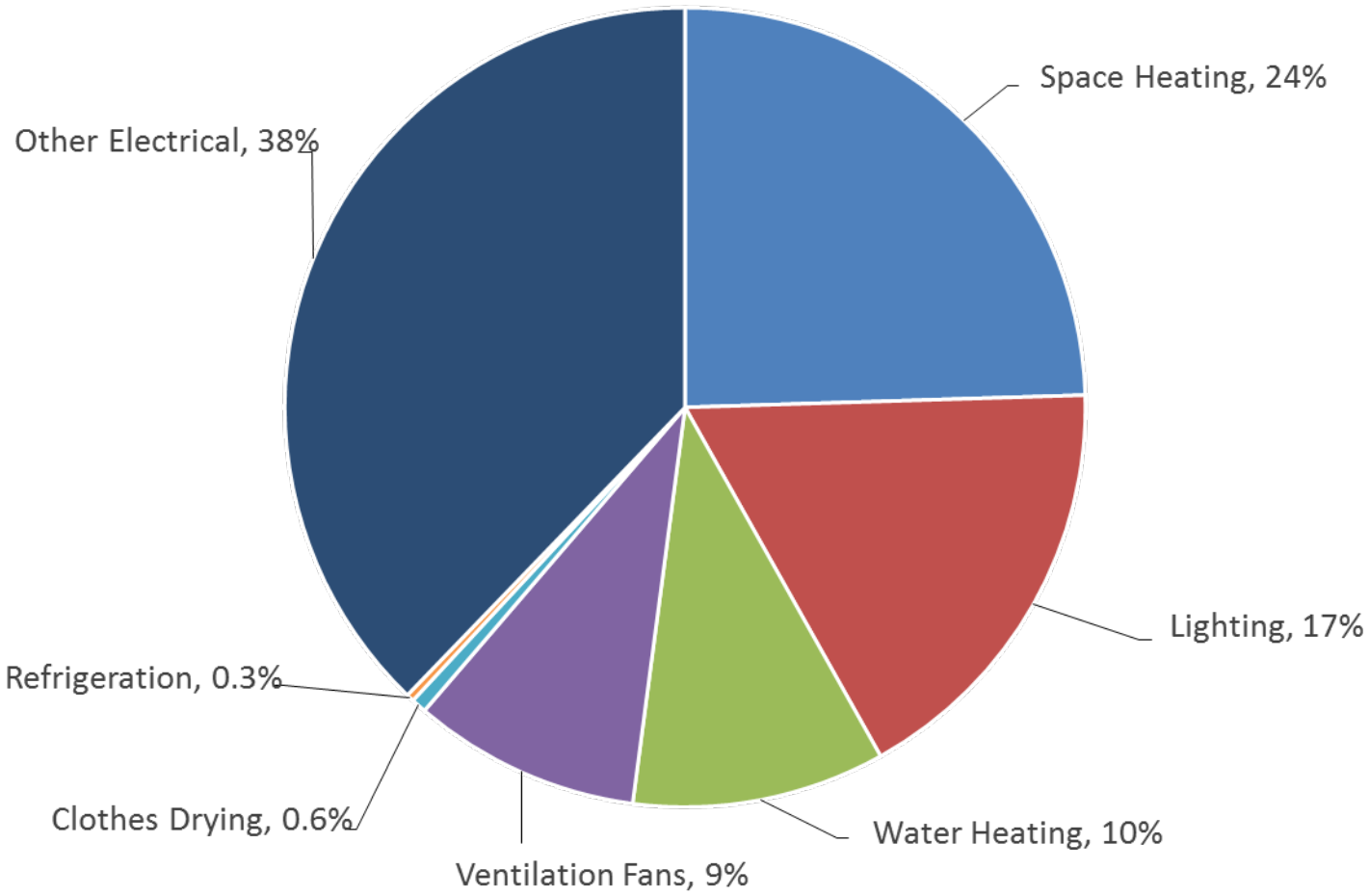
	Description	Baseline R-Value	Built R-Value
Walls	2 ½" metal stud with batt insulation, 6 ½" SIP panels	R25.1	R11+R44ci
Roof	Wood truss system 24" blown in insulation	R49	R72
Floor	24" TJI with batt insulation	R43	R50
Windows	Triple pane, low-e, argon filled, PVC	U0.45	U0.27
Doors	Opaque, swinging	U0.5	U0.25

Utility Costs

Fuel tank outside of the Ruby Clinic

- 2014 $/ kWh rate w/ PCE= $0.45
- 2013 $/ kWh rate w/OUT PCE= $0.84
- 2013 to 2014 $5.92/gallon to $6.00/gallon

Modeled Percentage of Costs



Modeled Results vs. Actual

	Modeled Use of Proposed Design	Actual, (Sept. 2013 to Sept. 2014)	Actual (Once Waste Heat Used)
Site Energy use Index	92	116	TBD
Electrical Usage (kWh)	17,750	24,815	TBD
#1 Oil usage (gallons)	872	1,036	0

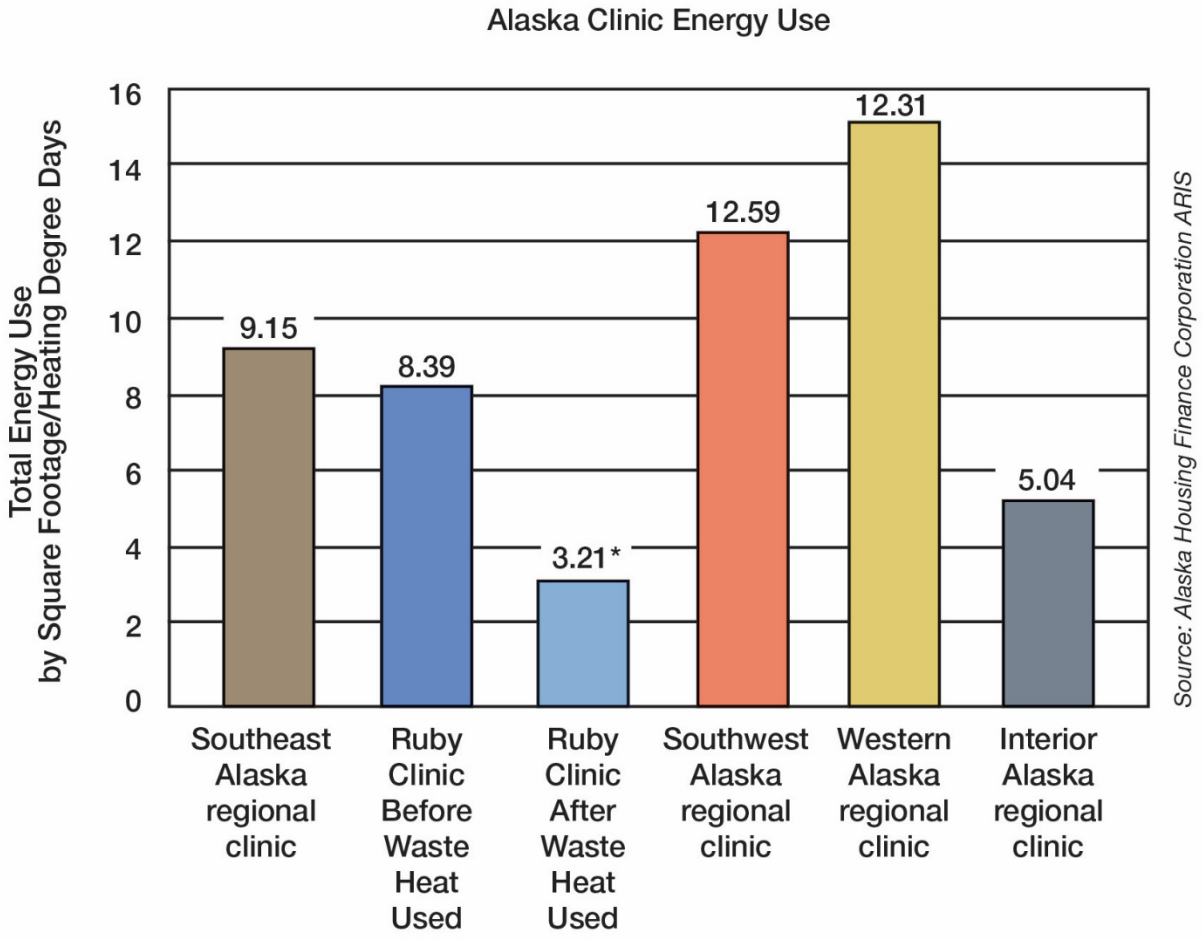
Waste Heat Impact

- In place system serving the Public Safety building and adjacent Washeteria
- Clinic was attached to WH system at end of construction, but not functioning properly until TCC Rural Maintenance Work, ANTHC and AEA force account technician repaired it.
- Up and running late summer 2014 and have not had a fuel delivery since.
- Estimate annual savings are $6,181.83 which is what was spent during the year it wasn't working.

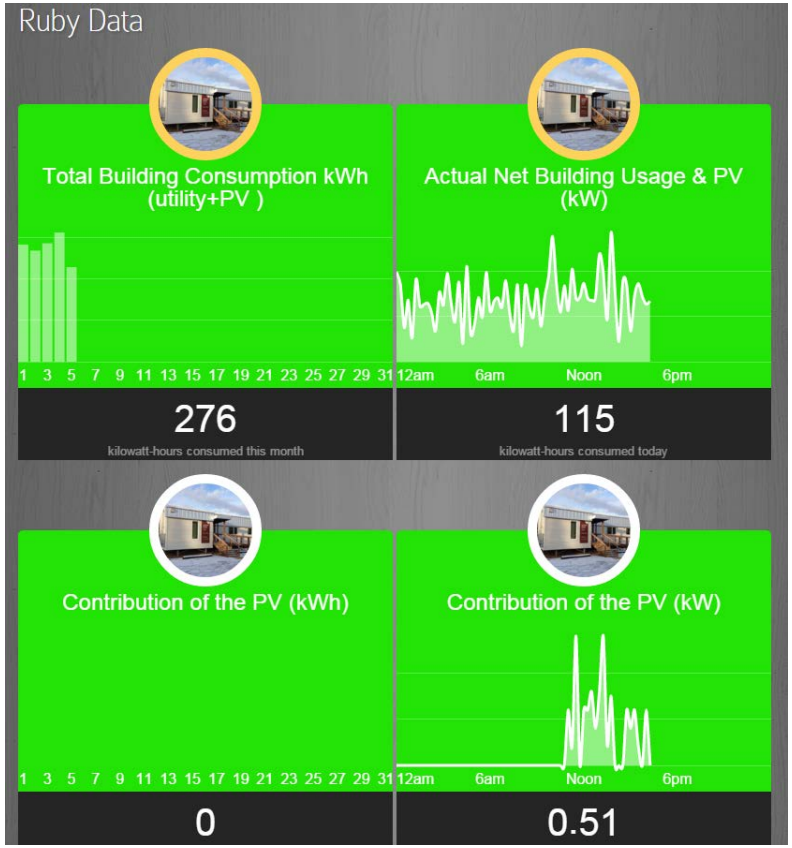
Actual EUI Comparisons

The bar chart to the right compares the energy use of the TCC Ruby clinic to clinics from around Alaska. Names of the comparable clinics have been changed for privacy.

*EUI/HDD is for electrical only using kWh numbers from previous year as no fuel is being burnt because the facility is 100% heated by waste heat.



PV Array and Performance



2014 solar PV production was 3,935.58 kWh. Saved roughly 15% of electrical costs.

The image to the left shows January 5, 2016 production per online production monitoring

Successful Integration of Efficiencies

- Lessons Learned:
  - Emerging technologies is the NORM
  - Analysis and monitoring informs future decisions
  - Waste heat is #1 priority for rural clinics
  - Don’t forget the Human Energy component

Nome Public Safety Building

- R-50 walls and Roof, 12” SIPS
- Redundant boilers, using only two of four in series
- Natural daylighting to interior corridor & Daylight harvesting
- Small zones for Air Handling Units
- LED exterior fixtures
- High Speed bay doors and radiant heat throughout

Ketchikan Library

- Meets LEED Gold Standards
- Biomass boiler
- Daylight harvesting

- Energy use modeling, Life Cycle Cost Analysis and alternative energy analysis performed

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Questions?

Thank you!

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