Retrofit – update

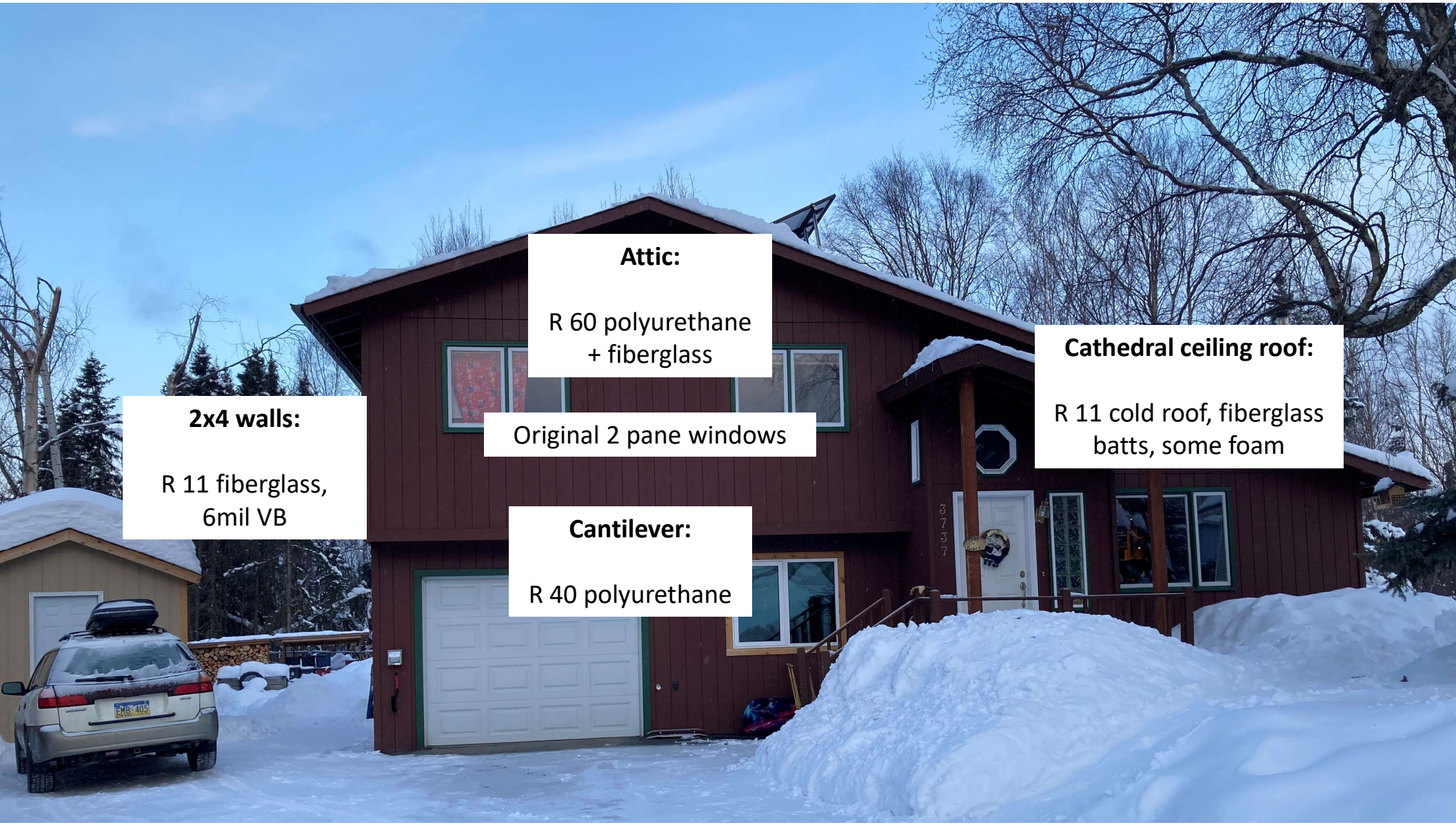
Alaska Center for Appropriate Technology Annual Meeting November 22, 2024

Tobias Schwoerer • Research Assistant Professor

International Arctic Research Center on the UAF Troth Yeddha' Campus

UNIVERSITY OF ALASKA FAIRBANKS

International Arctic Research Center


Attic:
R 60 polyurethane + fiberglass
2x4 walls:
R 11 fiberglass, 6mil VB
Original 2 pane windows
Cantilever:
R 40 polyurethane
Cathedral ceiling roof:
R 11 cold roof, fiberglass batts, some foam

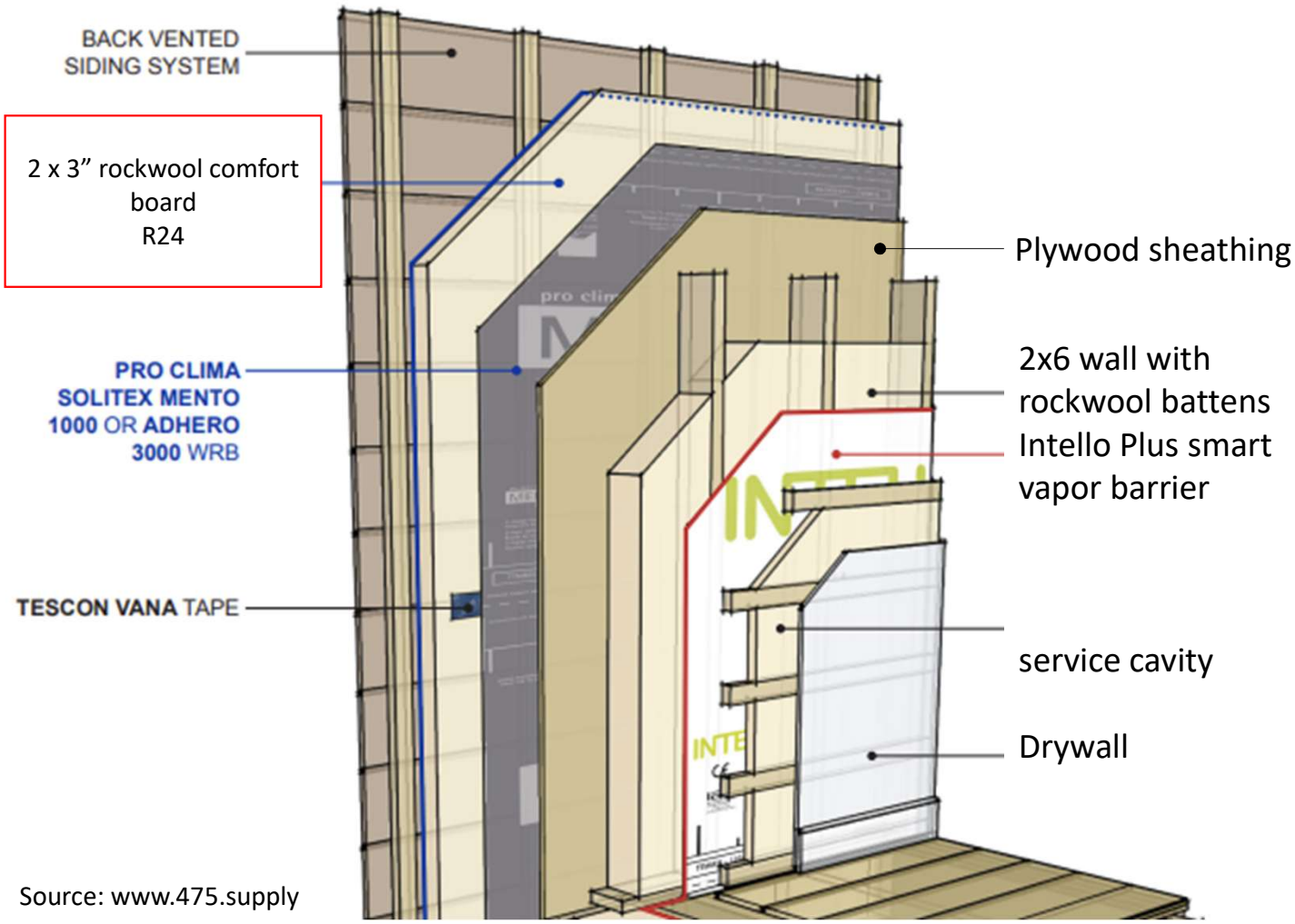

3737

Smart Enclosure System

diffusion / vapor open

minimizing thermal bridging

Addition



Source: www.475.supply

LiteZone® GLASS INC

litezone.ca

LiteZone® Insulating Glass

Rockwool batts for 2x6

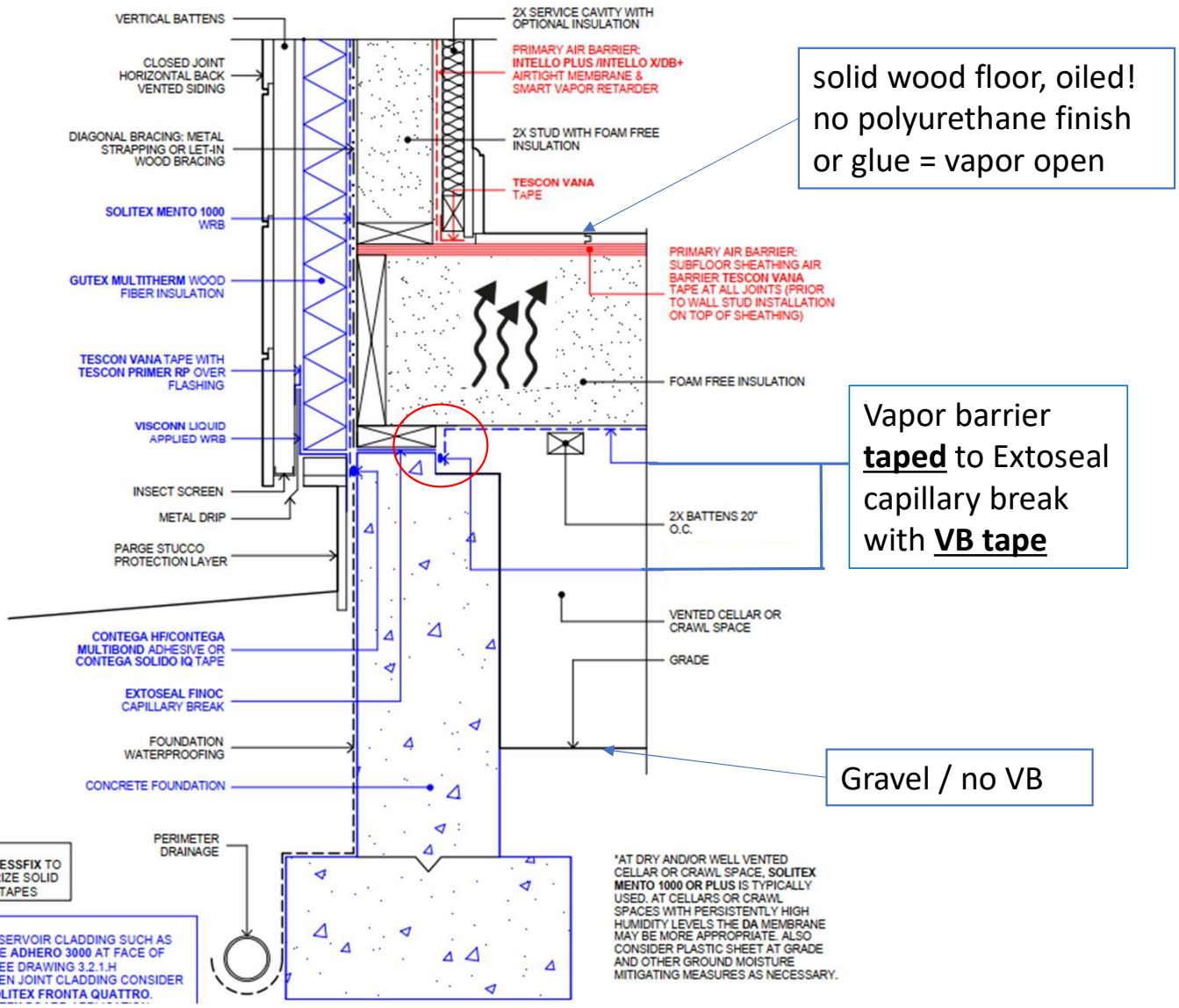
Service cavities

Ceiling and flooring

2 counter layers rockwool - minimize thermal bridging

80 – 90% relative humidity root cellar

Continuous vapor barrier on ceiling / living room floor



solid wood floor, oiled! no polyurethane finish or glue = vapor open

Vapor barrier **taped** to Extoseal capillary break with **VB tape**

Gravel / no VB

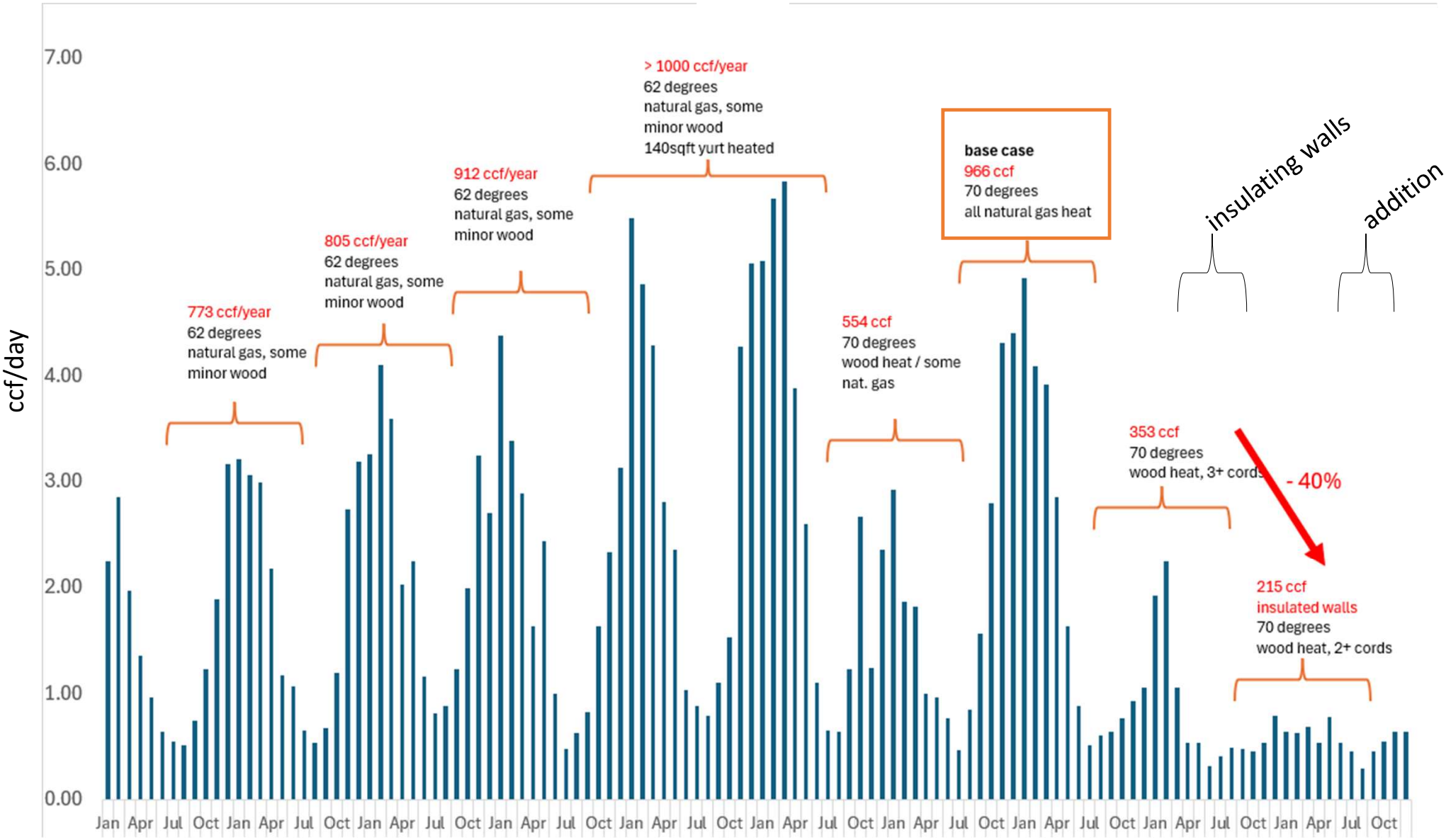
Root cellar

Continuous vapor barrier with service cavity

Envelope Efficiency

- Built: 1978
- Location: near Campbell Tract
- Living space: 1,274 sqft, Garage: 288 sqft, → 1,374 sqft w/ addition
- S-facing windows: 0 → 2
- Window / wall: 10% remains
- Energy Rating: 4 Star + (84.1 points) → 6 Star (98.4 +7 renewables)
- Air exchanges/h @50Pa: 9.04 → 2.5 (0.15 natural)
- Heat: Natural gas boiler, baseboard heat, no ducting → wood
- Electricity: 8.4kW solar array (½ each for home and vehicle)

Floor Insulation	R-27.5 *
Wall/Door Insulation	R-36.0 *
Ceiling Insulation	R-46.6
Window U-Value	U-0.12
Window SHGC	0.41
Window to Wall Ratio, Living Space	10.2%
South Facing Window Area	32 square feet


ccf/day
7.00
6.00
5.00
4.00
3.00
2.00
1.00
0.00
Jan Apr Jul Oct Jan Apr Jul Oct Jan Apr Jul Oct Jan Apr Jul Oct Jan Apr Jul Oct Jan Apr Jul Oct Jan Apr Jul Oct Jan Apr Jul Oct Jan Apr Jul Oct Jan Apr Jul Oct Jan Apr Jul Oct Jan Apr Jul Oct
773 ccf/year
62 degrees
natural gas, some
minor wood
805 ccf/year
62 degrees
natural gas, some
minor wood
912 ccf/year
62 degrees
natural gas, some
minor wood
> 1000 ccf/year
62 degrees
natural gas, some
minor wood
140sqft yurt heated
554 ccf
70 degrees
wood heat / some
nat. gas
base case
966 ccf
70 degrees
all natural gas heat
insulating walls
addition
353 ccf
70 degrees
wood heat, 3+ cords
- 40%
215 ccf
insulated walls
70 degrees
wood heat, 2+ cords

The Home Located At:

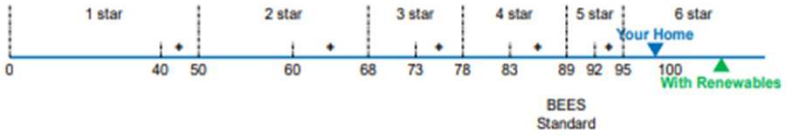
3737 Coventry Dr.
Anchorage, AK 99507

Has Been Energy-Rated As:

★ ★ ★ ★ ★ ★

Six Star

Efficiency Score	Renewables Bonus	Combined Score
98.4 points	7.0 points	105.4 points



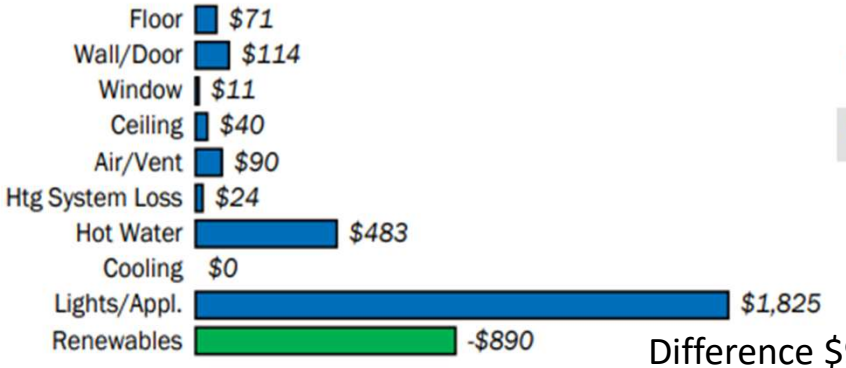
Amount of CO2 Produced by the Home

5,178 pounds per year = 2.3 mt

Projected Annual Energy Costs

$1,768 per year

Breakdown of Costs, $ Per Year



Difference $935
Actual ~ $450

Round-trip flight
Chicago - Paris

Acknowledgments

- Mark Houston, The Comforts of Home
- Floris Keverling, 475 High Perf. Building Supply
- Ilya Benesch, Cold Climate Housing Research Center
- Erik Hjelm and Andy Hoyt, Hjelm Construction
- Andy Buhler, Buhler Construction
- Seth Downs and Trond Flagstad
- Jamie and Isaac Paiken, Alaska Masonry Heat
- Tory Dugan

Thank you

tschwoerer@alaska.edu

International Arctic Research Center