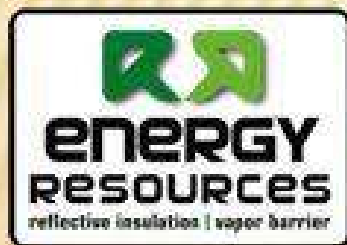


RADIANT BARRIER

Building Envelope Success

Achieving Up To An Equivalent “99” R-Value at Less Cost



Presented by: Carl A. Worthington AIA, ASLA

Examples from Consultant to Energy Resources: Art Carlson, Mechanical Engineer

FORCE CONDUCTIVE INSULATION

- ✦ Once heat is formed, conduction follows
- ✦ ICC demands all buildings control heat gains/losses with conductive materials
- ✦ 93% of conductive heat flow is resisted by R-13, "improvement to R-32", reduces heat flow by 4%

REFLECTIVITY, EMISSIVITY KEY

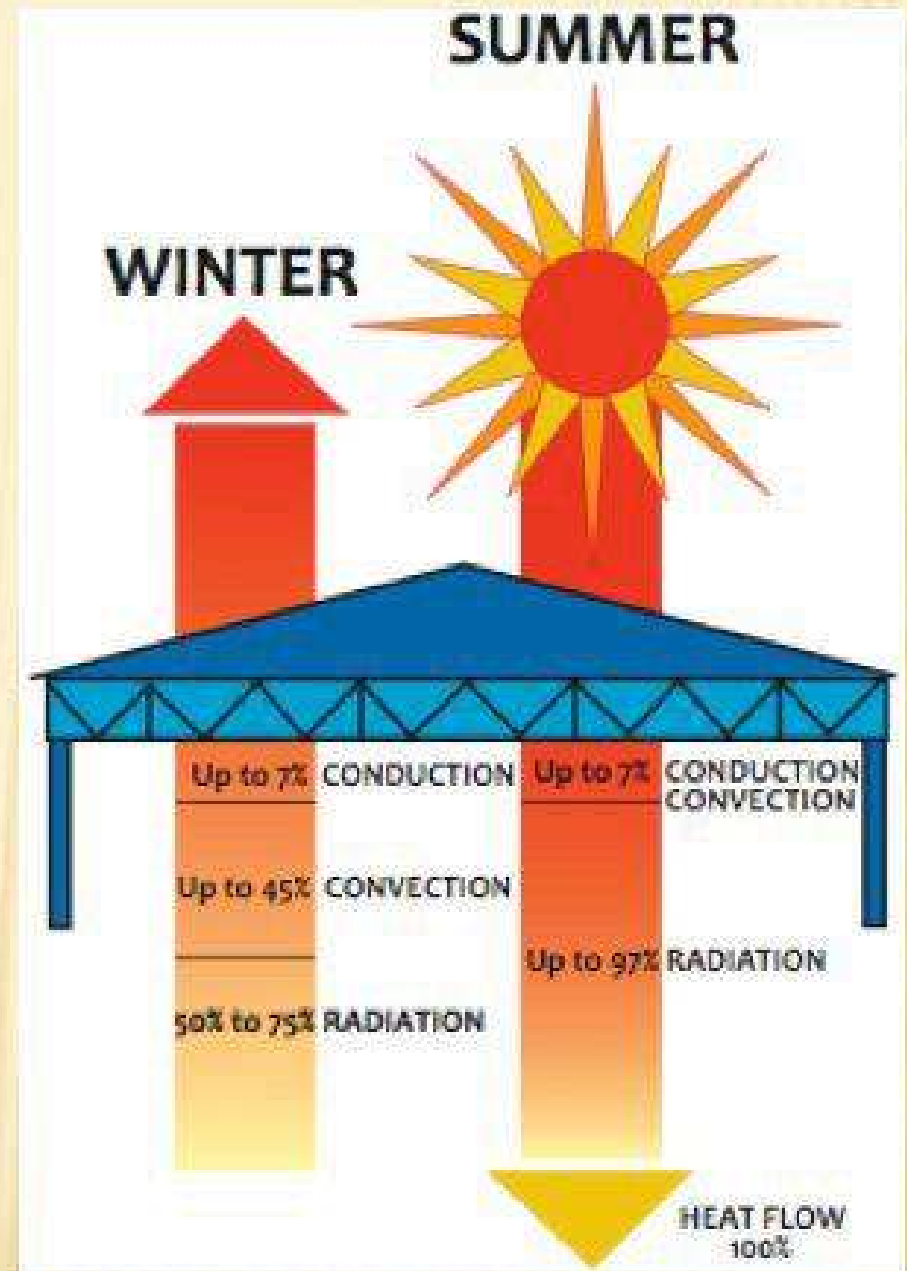
- ✦ No building codes recognize the presence of the IR spectrum
- ✦ Materials with low emissivity are ignored in the code
- ✦ All heat is formed by the emission of the IR spectrum, Period!

BUILDING CODES

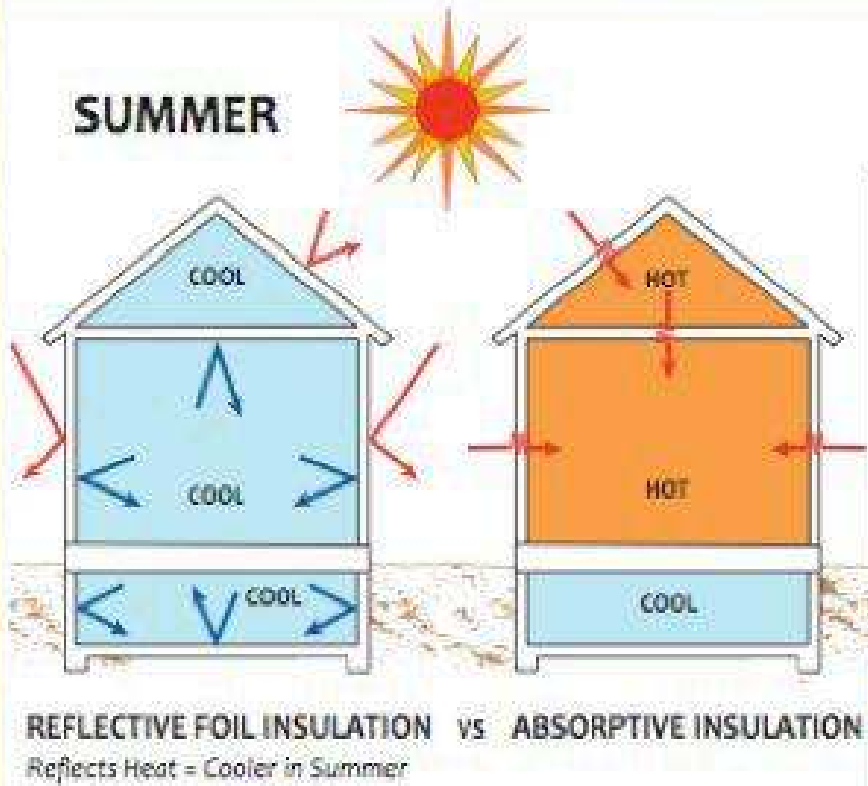
RESIDENTIAL and COMMERCIAL BUILDING

40+% of US Energy Usage

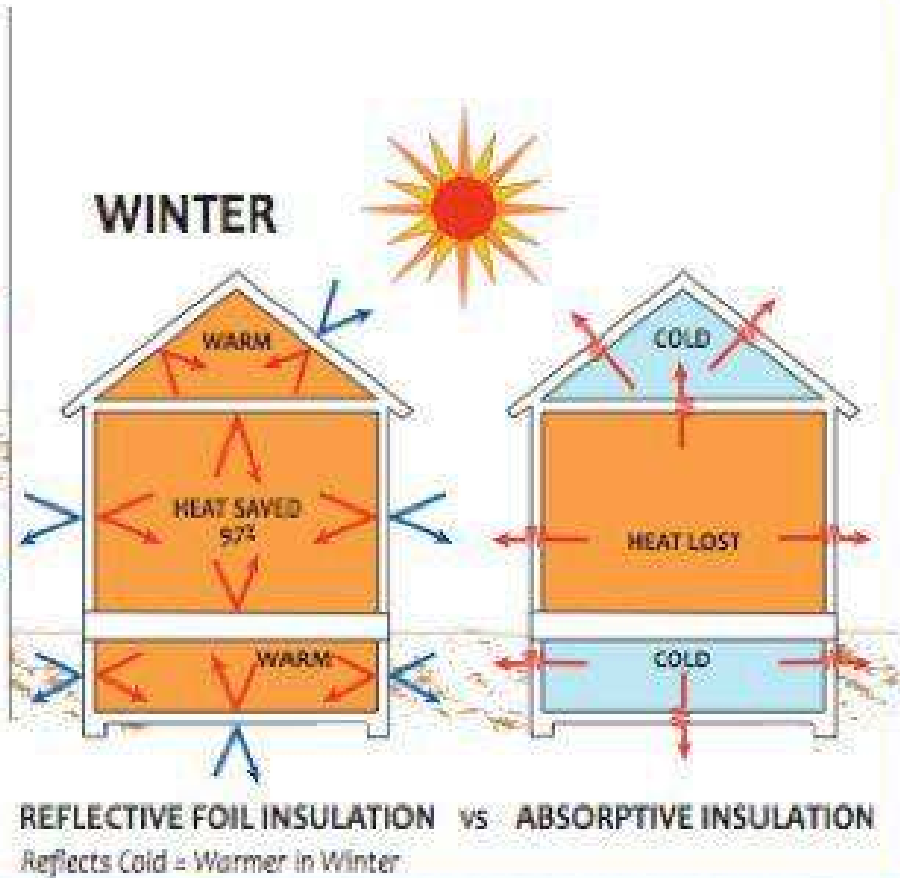
- Radiant Barrier reflects up to 97% of heat gain away from structures in summer
- Reduces up to 75% of heat loss in winter
- Traditional insulation (R-factor) does not address the radiant portion of heat transfer – the largest % of heat flow!



Keeps the HEAT OUT



Keeps the HEAT IN



- The plan called for \$85,000 Heating system and Chemical insulation
- The owner asked for the energy profile using Reflective insulation
 - Result: Use in pre-Retail season for Nursery stock... No freezing!
 - Use through out the summer season - No Air conditioning!
 - Temperature range in the climate zone -20F to 100F
 - Building operates 35F to 75F
- There is no power in the building!
- Installation :
 - 4 days
 - Cost to owner \$6,800
 - 7,000SF covered dirt floor



WEBB NURSERY AND ITS POLE BARN



WEBB NURSERY EXTERIOR



**12,000 SF STARHEAT WAREHOUSE
CDX PANELS COVERING TEMPShield ON FURRING STRIPS**

STARHEAT ROCK, MASONRY SUPPLIES & DECORATIVE TILES



EXTERIOR



STARHEAT MECHANICAL ROOM



20,000 SF ROCKY MOUNTAIN HARDWARE FACTORY BUILDING WRAPPED PRIOR TO STEEL SHEETING, STEEL FURRING

The Mechanical package specified two \$250k air handlers.
Only one is required, and has never operated above 13%...Delta T 62F, Reflective insulation cost for entire building interior and exterior, \$14,500

- North wall, TempShield DBDF
- Covered with CDX, steel firing!
- No measurable heat flow through wall at 55F temperature differential
- CMU structural wall, filled and #4bar
- The owner was willing to spend an additional \$250,000 to achieve the LEEDS certification for the LOBBY Plaque
- And use emissivity to protect the building Thermally
- Advertising vs Function!



FACTORY INTERIOR

A NICE PLACE FOR THE COMPANY PLANE



BUILDINGS DESERVE BETTER!

- ✘ Convention has led the industry down the path of More mass and chemical insulators are Better... Better than what?
- ✘ IT is not possible to warm up a European castle by adding chemical insulation layers on the exterior.. So why do it?
- ✘ Respectfully place Radiant Barriers, and “build in” affordable comfort!

- Contemporary design with emphasis on passive solar!
- The Geo Ground loops are sized for 6-8BTU/SF losses. Conventional insulation would eliminate Geo loops, not enough property!
- The air infiltration was mitigated with a light interior layer of Closed Cell foam
- The interior was “wrapped” with Radiantfoil
- The building operates at +70F with 55F delta T as a passive solar building
The Geo Water Furnace has not come on
- The Heat flux density, measured on the interior of the North wall is 0 BTU's lost. AKA: $U=0$



Rutherford Project

GEOHERMAL AND SOLAR AND RADIANTFOIL...VERY GREEN!

Because you can...
... be green NOW

Geothermal

Radiant Heat

Green Roof

40% CO₂ Reduction

Radiant Cool

A carbon footprint...
...as small as your real one

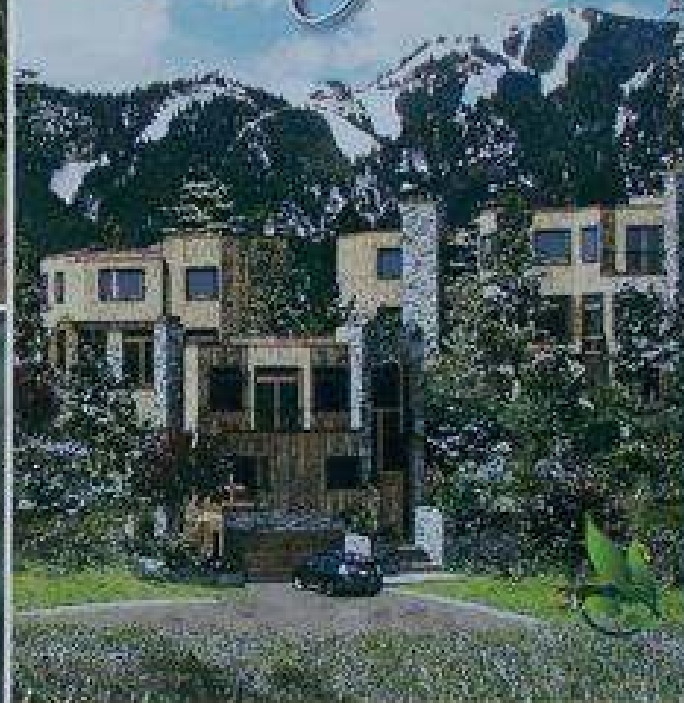
East Avenue Bluff
Townhomes

Stacey Rutherford

208.450.9131 cell
www.AllAroundSunValley.com

Sun Valley Homes LLC
140 West 21st Street
P.O. Box 100000, Phoenix, AZ
85010-0000

Because You Can...



East Avenue Bluff
Townhomes

Stacey Rutherford

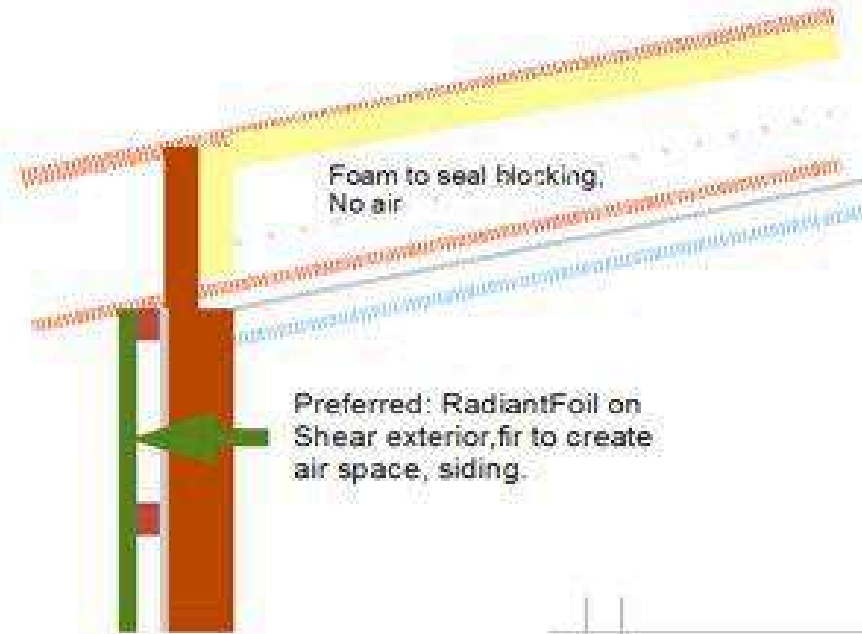
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ASHRAE Computer model allows the inclusion of low emissivity materials...



Roof Assembly



Preferred: RadiantFoil on Shear exterior, fir to create air space, siding.

RadiantFoil Detail
art Carlson, Engineer
208-725-0884
art@radiantFoil.com

IT CAN'T BE THIS SIMPLE!

NO HEAT LOSS IN STRUCTURE! "0"



Buffalo Electric Project

10,000 SF WAREHOUSE



\$6M RESIDENCE



CARLSON RESIDENCE

HEAT FLUX DENSITY AT FRONT SURFACE

Coefficients: Sensitivity 4.77 BTU / W 0.317 Radiant Foil: Captec Heat Flux Surface Density Meter
www.captecenterprise.com

Surface Heat Density measured in (mV x 1000) / sensitivity = WATTS / Sq. Meter x BTU / SF / Hr
U = (BTU / SF / Hr) / Delta T; R-Value = 1 / U

Wall Insulation Profile:	BIBS	DBDF only	F - DBDF	F - FO - DBDF	A - F - FO - DBDF	A - F - FO - F
Type	1	2	3	4	5	6
(5.5" Typical Framed Wall, Measurement in center between Studs)						

Legend: BIBS Blown in Blanket System - Fiberglass
DBDF TempShield taped to seal - Stand alone
F Radiant Foil - Radiant Barrier
FO Closed Cell RT Foam 1.5 - 2"
A Exterior Air Space

PROJECT	MEASUREMENT LOCATION	DATE	TYPE	READING	BTU/SF/Hr	T-In	T-Out	DELTA-T	U FACTOR	R-VALUE ACTUAL	RESCheck CLAIM*
Latrobe	BR North Wall	1/27/2009	1	0.05	3.323	43	10	33	0.101	9.931	21
Timberline	Dining North Wall	1/27/2009	2	0.03	1.994	72	-16	88	0.023	44.139	19
Hamilton	Garage North Wall	1/27/2009	5	0	0.000	66	12	54	0.000	99.000	36
Rutherford	LR - NW Fireplace	1/28/2009	6	0	0.000	66	28	38	0.000	99.000	26
Buffalo Elec.	Office North Wall	1/29/2009	4	0	0.000	71	19	52	0.000	99.000	21

* RESCheck / COMPcheck are DOE spread sheets showing compliance heat losses by component in buildings.

DRAMATIC ENERGY SAVINGS

- **2-3 Year ROI for most Structures**
- **Extremely Cost Effective**
- **Up to 70% Savings on Energy Bill**
- **Superior Performance vs Fiberglass**
- **Fireproof / Water Resistant / Light Weight**
- **Easy Installation for RETROFITS and New Construction**
- **Reduces Construction Cost for New Structures**

TESTIMONIALS

- **Performance VS Prescriptive:**

I am the building Official for the city of Salmon and Lemhi County, Idaho.

Performance codes are clearly superior to prescriptive codes when the proper data is provided.

Gary Goodman, City of Salmon and Lemhi County Planning and Zoning Administrator

(reference to proper data forces actual measurements - aka as FLUX METER!)

- I thought you would be interested in knowing that in Dec '05 **our electric bill was \$500, this last year it was \$128**, or roughly a 70-75% reduction. The house was a pleasant 70-75 degrees as opposed to 60ish in 2005.

In 3 months we paid for the radiant barrier plus...nothing else comes close!

Richard White

POWER Engineers, Inc., Hailey, ID

- **Your product was quite easy to work with.** Radiant foil is a fine product and I am trying to find other uses for its Reflective properties - I'm sure I will!

Our Air Conditioning doesn't come on until temperature is lower than 76 degrees and house stays cool at 76 degrees with outside temperatures at 88-89 degrees.

Dr. David, Saratoga, FL