RRCI-The Reflective Roof Coatings Institute
35 Reflective Coatings Manufacturers
Roof Consultants
Roofing Contractors

MISSION: Educate stakeholders and promote benefits of Reflective Roof Coatings
Benefits of Reflective Coatings

• Extend the life of Roof Systems.
• Reduce Energy consumption and electrical demand in buildings.
• Create a positive impact on the environment.
WHY do SPF and highly reflective coatings produce the MOST SUSTAINABLE roof system available today?
SUSTAINABILITY:

• The ability to meet the “needs” of today without compromising the ability of future generations to also meet their “needs”.

• “Care for”, manage and use wisely all of our capital/resources—the
  – natural (environmental)
  – human
  – Social
  – “built”
Five “E” factors Model of Roof Sustainability

- Energy
- Environment
- Endurance or Durability
- Economics
- Engineering

All play a role in determining whether a roofing system meets high performance criteria and results in minimal or positive impact on the environment.
Function of a high performance REFLECTIVE roof coating:

• Protect and preserve the substrate over which it is applied—SPF
  – Protect from the sun- the UV- chemical breakdown
  – Protect from the sun- the IR- the HEAT
  – Protect from moisture-water-weather
  – Protect from human damage
How reflective coatings work - how roofs get HOT

Energy Balance on Roof Surface

- Incoming Radiation
- Reflected Radiation
- Re-emitted Energy
- Convection

Absorbed Energy

Heat Flux Into Building
Webber Elementary

EPDM Restoration
Lower surface T, less heat conducted thru the insulation. Same with SPF!
Temperatures at Center of Insulation

- Center of Insulation Coated
- Center of Insulation Uncoated
ISO similar to SPF. Insulation 33% more effective at 75 F vs. 110 F.
• White reflective roof coatings protect and cool the surface of the substrate to which they are applied.
• White reflective roof coatings cool the entire roof system to which they are applied.
• PI insulation board and SPF may be in excess of 25% more effective in a roof assembly with a cool white reflective roof coating on the surface vs. a dark heat absorbing material.
• Energy Savings with SPF and white reflective roof coatings compared to other roof systems is based on real data from real tests.
• Energy Performance of SPF Roofs, by Bomberg, et al., 2006
• White coated SPF, aged with SR=0.60 vs. traditional roof with SR=0.20
  Energy Savings of 9% @ R-value of 12
  6% @ R-value of 18
  5% @ R-value of 24
• Effect of fasteners of 6-8%
• Effect of air gaps of 11-15%
• Power Demand difference of 15% on white vs. traditional roof.
CONCLUSION: 15-20% SPF Energy Savings is real!
Sustainable E-Factor  ENDURANCE

- Life-cycle Cost Analysis is best description of direct economic impact of roofing alternatives.
- Generally accepted that LCCA is directly related to a system’s service life, its durability or its Endurance. Longer life produces lower LCC.
- Life-cycle Environmental Assessment is also directly related to service life. “Cradle-to-Grave” impact reduced by long life.
- Of the 5 E’s, ENDURANCE (service life) may have the greatest impact on Sustainability!
Endurance-Rohm and Haas, Philadelphia-Building # 36, 1981

SPF and very early acrylic coating, over BUR in an industrial setting.

No maintenance in 27 years, no leaks
Endurance---Brad Houlden
YMCA, McCook, NE- 1990

37,910 sf, 1 ¾” of SPF with acrylic coating. 3 to 4 leaks due to service personnel. Recoat sometime in the next couple of years
Endurance---Hosler Roofing
Illinois-1982

24,000 sf 1 ½” SPF direct to metal with 3 gal/SQ of acrylic coating.

Recoat, 1982 due to minor hail damage; nothing since.
Endurance---CAW (Coatings Application & Waterproofing) Roofing-Florida, 1977

- BUR roofs-1975
- Reroofed, 1977, SPF & Silicone Coating ---- --
- 335,000 sf 37 Bldgs.
- Warranty until 2014
Endurance--Dennis Vandewater
Iowa-1987

1 ½” SPF with acrylic coating and granules over smooth BUR. Recoated in 1992 due hail damage.
Endurance---Dennis Vandewater
Iowa-1987

1 ½” of SPF over BUR, acrylic coating with granules. No maintenance, No recoat.
Endurance--Dennis Vandewater
Iowa-1985

1 ½” SPF with acrylic coating, base coat being applied. Recoated in 2005, never had a leak.
Sustainable E-Factor  ENDURANCE

• Document 30 years of performance.
• Typical recoat at 20 years.
• Projected service life, 50-60 years if properly maintained?
• Very confident of 40 years, then a second recoat, and another 15-20 year cycle?
• If any surface erosion, scarify ½” off, refoam and coat again.
• ENDURANCE—a Positive E-factor for SPF and reflective coatings.

Reflective Roof Coatings Institute
Sustainable E-Factor

Excellent flashing material

Great wind resistance
• Great effective R-value per inch
• Air barrier, waterproofing, and insulation all in one package.
• May be used in new construction or reroofing; often times eliminating the need for tear-off.
• May be applied to a variety of substrates.
E-Factor ENGINEERING/ENVIRONMENT

Direct to Metal

Direct to BUR
E-Factor ECONOMICS

• Energy and Endurance factors are the most easy and most direct factors to quantify.
• Energy, Environment, Engineering, and Endurance factors may be combined in making Economic comparisons of competitive systems.

• Compare two similar (R-value=18) 50,000sf roofs-Dallas, TX
  • 3” Iso, 60mil fully-adhered EPDM, aged SR=10%
  • 3” SPF, 3 gal acrylic coating, aged SR=60%
• Assume 10% Energy Saving, $25,000 annual E cost, per Energy Star calculator.
• Assume $5/sf original EPDM installation cost, $6/sf original SPF cost, and no inflation.
# E-Factor ECONOMICS

<table>
<thead>
<tr>
<th>Year</th>
<th>50,000 sf</th>
<th>60 mil EPDM</th>
<th>SPF + Coating</th>
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<tr>
<td>1</td>
<td>Original Cost</td>
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<td>1-20</td>
<td>Repair &amp; Maintain</td>
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<td>1-20</td>
<td>Energy Savings</td>
<td>Zero</td>
<td>($50,000)</td>
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<tr>
<td>20</td>
<td>Replace vs. Recoat</td>
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<td>$75,000</td>
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<td>21-40</td>
<td>Repair &amp; Maintain</td>
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<td>60</td>
<td>Assume End of Life-60 YEARS</td>
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<tr>
<td>TOTAL COSTS</td>
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E-Factor  ECONOMICS

Life Cycle Cost

- New EPDM 60 mil
- New Foam and Coatings

Dollars

1  15  20  35  40  55
CONCLUSIONS

- SPF and reflective coatings typically have a slightly higher initial cost of installation.
- Energy Savings, in this example, nearly pay for all ongoing maintenance and recoat costs.
- Once installed, the SPF and reflective coating costs the owner less than $.01/sf net per year over a 60 year period!
- After just 16 years the SPF and Coating roof begins to provide a return to the owner vs. the competitive roof.
CONCLUSIONS-Environmental

• Same 50,000sf roof from an environmental perspective:
  - Each KWH of electricity produced from fossil fuel generates 1.35# of CO2 (GHG).
  - $150,000 of electricity savings over 60 years @ $.07/KWH
  - Represents 2,140,000 KWH saved
  - Accounting for nearly 3,000,000 # of GHG NOT going into the environment!! 1,500 Tons of CO2 From just one 50,000sf roof!
Five “E” factors Model of Roof Sustainability Favor SPF and reflective coatings.

- Environment – production costs, transportation, landfill costs, E efficiency, GHG—favors SPF.
- Engineering – R-value/in, wind uplift, new or recover, broad application—favors SPF.
- Energy – more effective insulation, air barrier, significant E savings—favors SPF.
- Endurance – excellent longevity—favors SPF.
- Economics – Life-cycle cost Assessment considers all cost factors—dramatically favors SPF and Coatings.
SPF and Highly Reflective Roof Coatings - THE Most Sustainable Roof System!