

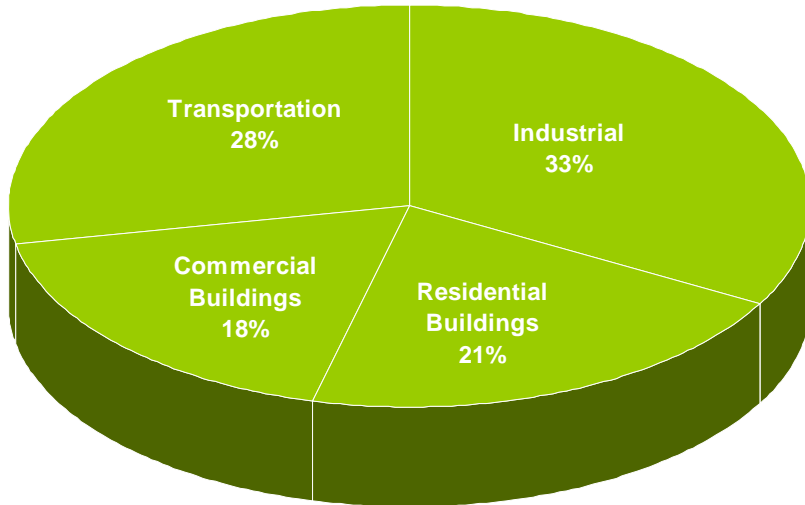
Saving Energy And Money With Spray Polyurethane Foam (SPF) Insulation



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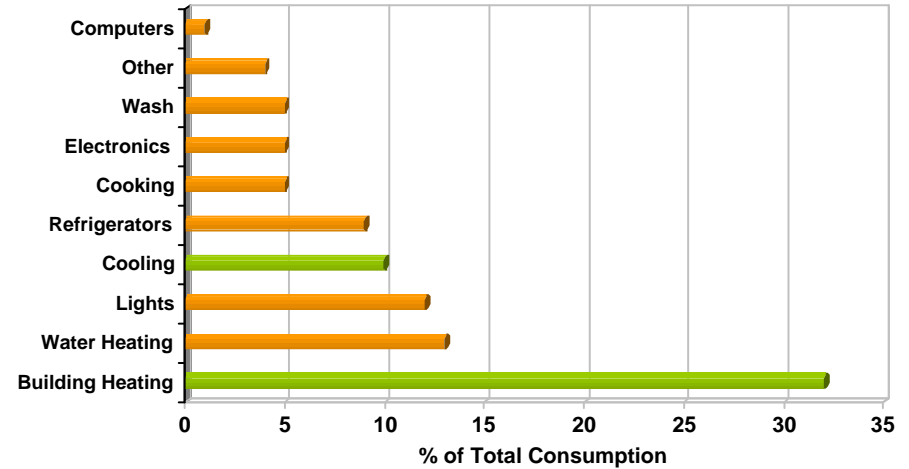
SPF Saves Energy

Where Does Our Energy Go?

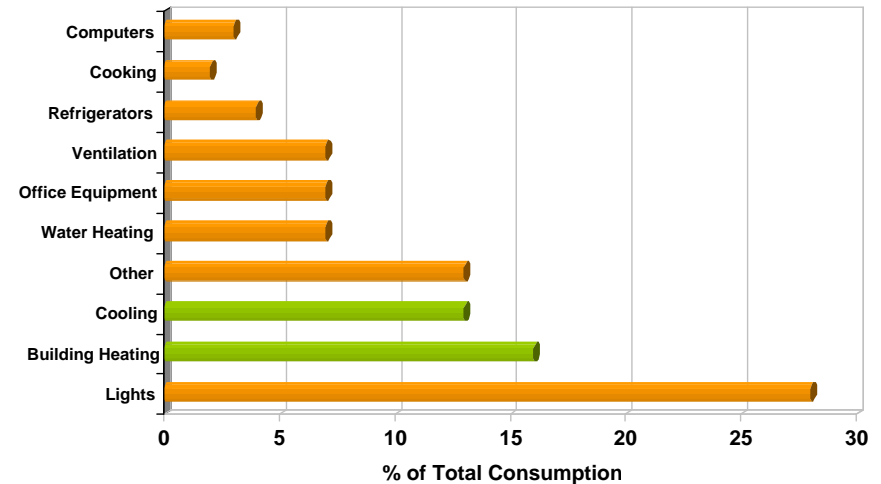


- ~40% of the overall US energy demand goes into the building sector
- ~40% of the energy used in buildings goes into heating and cooling
- SPF in the building envelope can reduce heating and cooling energy load by 30-50%

Residential Building Energy Consumption



Commercial Building Energy Consumption



How it Works

SPF Systems are 2 liquid components:

- Isocyanate (A-side)
- Polyol system (B-side)



Mixing the Components

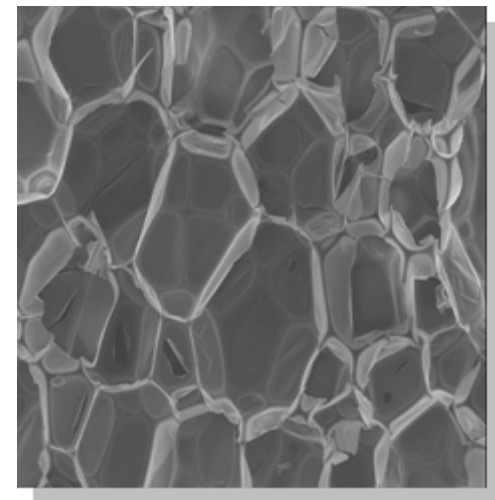
“A” + “B” = SPF



These components are pumped through positive displacement proportioning pumps, through heated hoses to a mixing spray gun.

How It Works

- The liquids are mixed and applied by professionals using pressurized spray equipment
- The two components react while being sprayed to form a urethane foam
- The foam expands 30-120X to completely fill the void space, and solidifies into a light weight yet highly durable polymer matrix

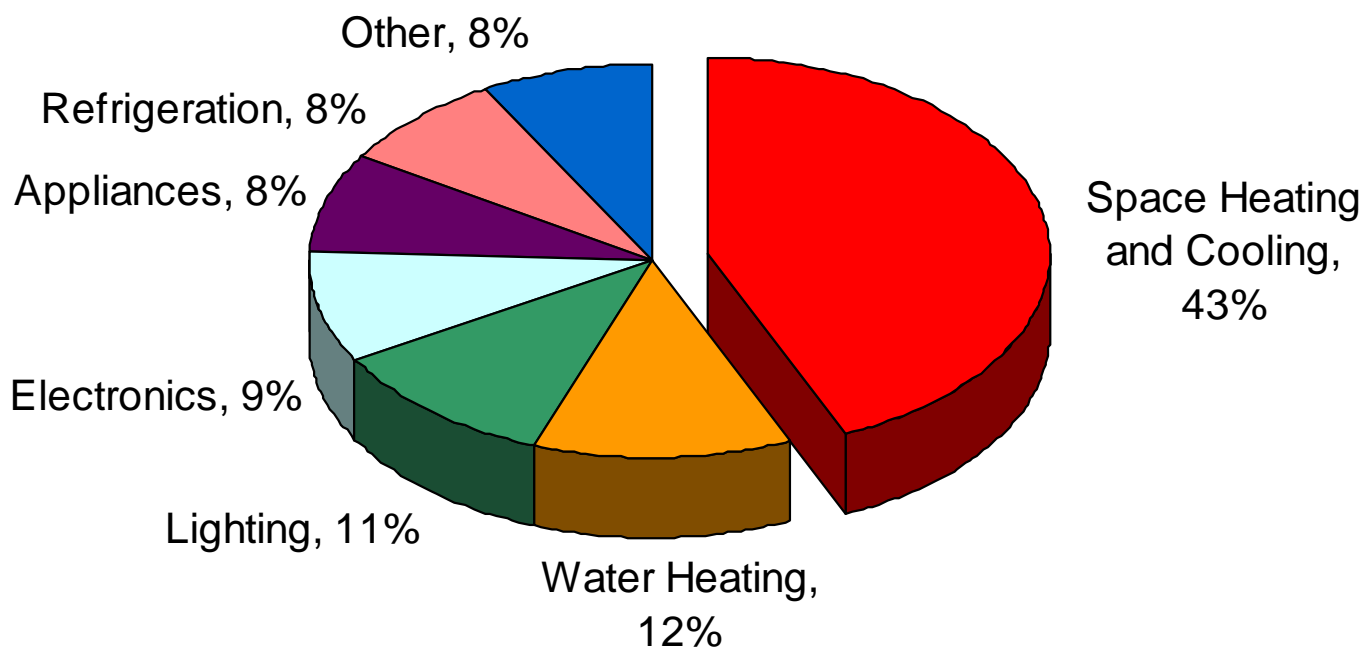


The Majority Energy Costs Are Lost From Poor Insulation

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Typical Homeowner Energy Costs



According to the U.S. Dept. of Energy (DOE), the average home spends \$1,300 annually on heating/cooling utility costs. Studies show that **40% of that energy is lost** due to air infiltration!

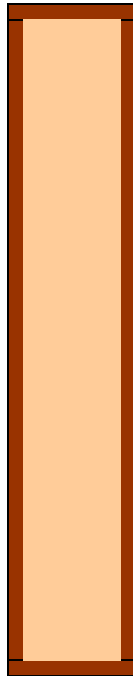


Residential And Commercial Building Envelopes

- Energy loss in a building is caused by both heat loss and air leaks
- Moist air that penetrates the wall system can result in mold, wood rot and pre-mature wall failure
- SPF provides greater thermal insulation than any other material
- SPF is the only insulating material that provides an air and moisture barrier, and it greatly reduces outside noise

SPF Insulation

Outside



Inside

Keeps winter Heating in, saving on heating bills

Keeps summer heat out, saving on A/C cost

No gaps
Seals air leaks
Keeps moisture out
Reduces noise

Other Insulations

Outside



Inside

Leaves gaps
Air leaks in

Does not provide a moisture barrier

More noise gets through

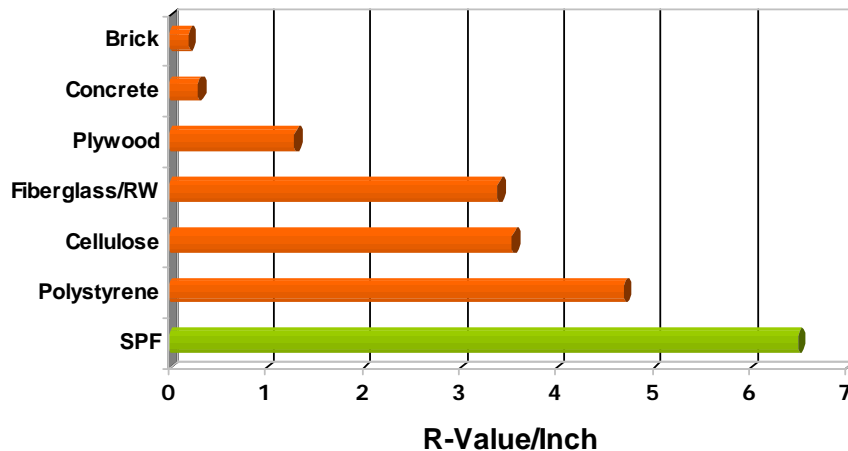
Less insulating value, higher winter heating costs and summer cooling costs

SPF Yields A Higher R-Value Per Inch

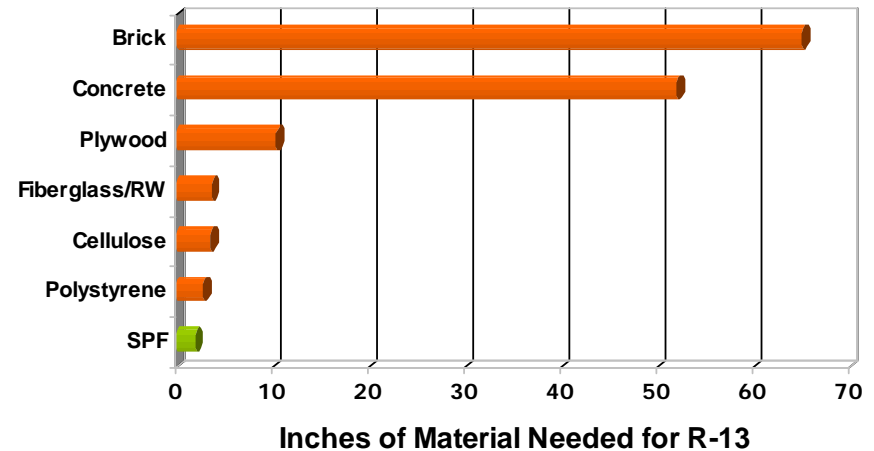
“R-Value” is a measure of insulating value. closed cell SPF has the highest insulating value.

SPF needs fewer inches of insulation to meet an R-13 wall insulation code. With SPF you can either use less than other materials to meet codes, or completely fill the wall to save even more energy and money.

R-Value per inch of Wall Materials



Thickness Needed to Meet R-13 Code



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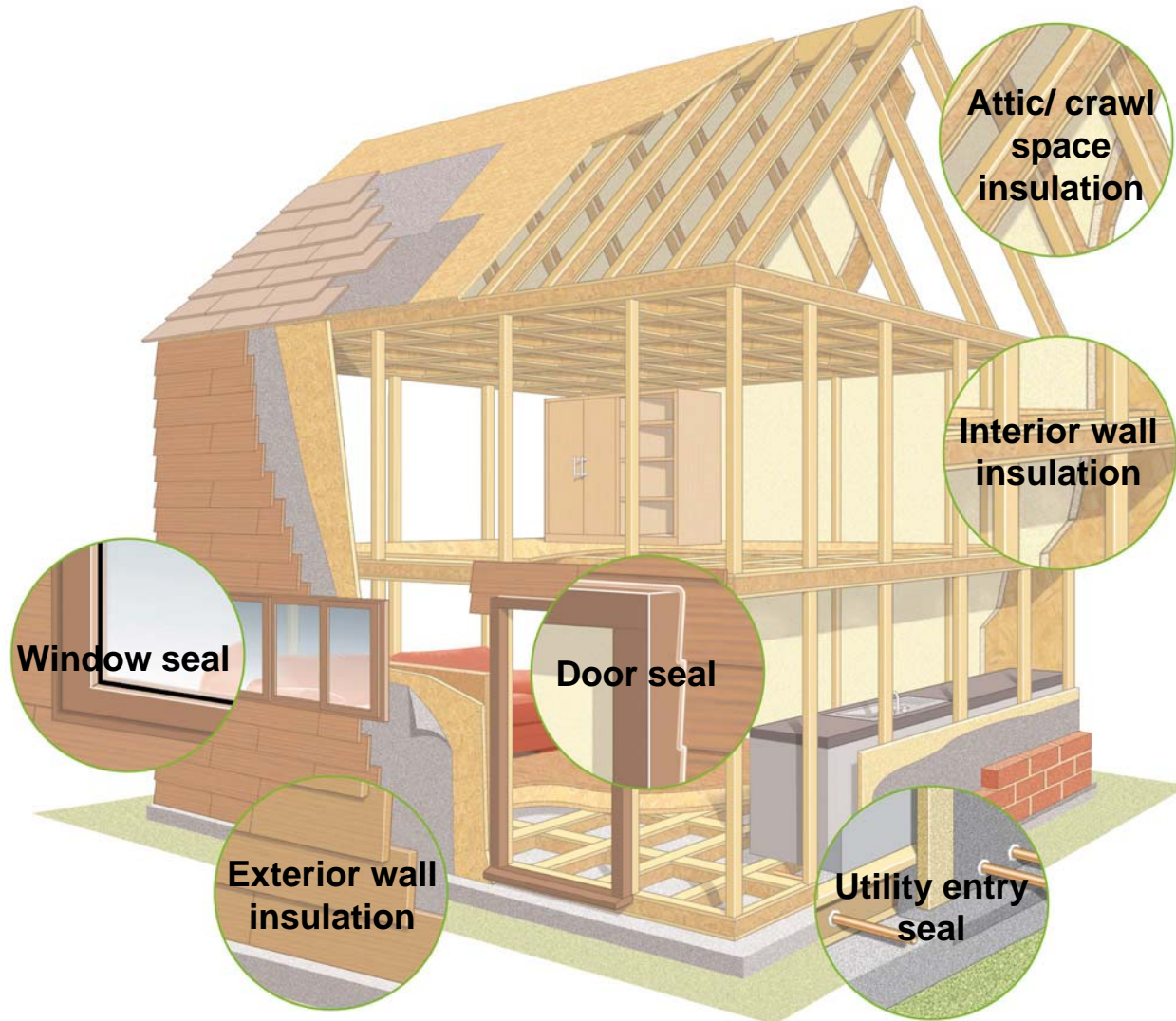
Residential SPF Applications



SPF Has Applications Throughout a Residential Building

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SPF Forms A Monolithic Barrier In Residential Walls



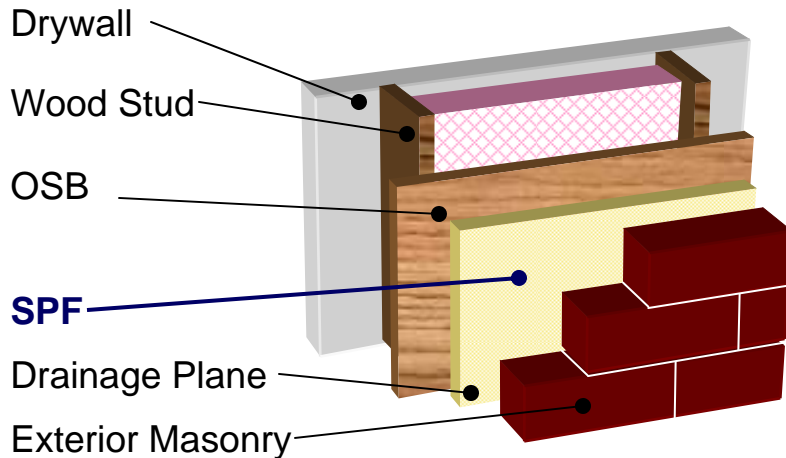
SPF insulation is professionally installed for an even and consistent thermal barrier

Insulated wall cavities with SPF provide not only thermal protection, but moisture and air barriers as well

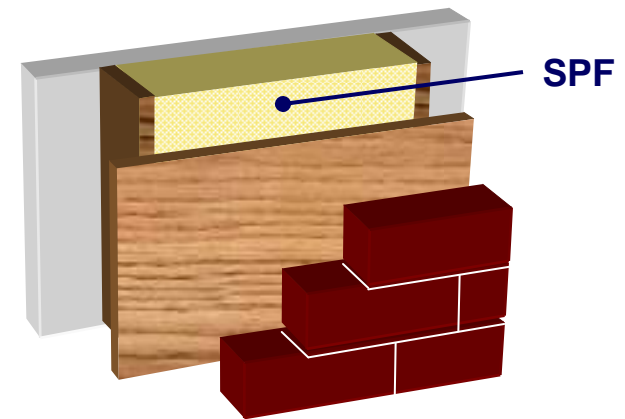
SPF On Residential Walls: Saves Money By Saving Energy

- SPF applied to interior or exterior walls saves on energy costs by providing thermal insulation and sealing gaps and spaces in walls, lowering utility bills
- SPF acts as an air and vapor barrier, blocking moisture infiltration and condensation inside wall cavities
- SPF avoids thermal bridging between the outside environment and inside air, providing year-round air leakage and moisture/vapor protection

Exterior Wall SPF Insulation Schematic



Interior Wall SPF Insulation Schematic

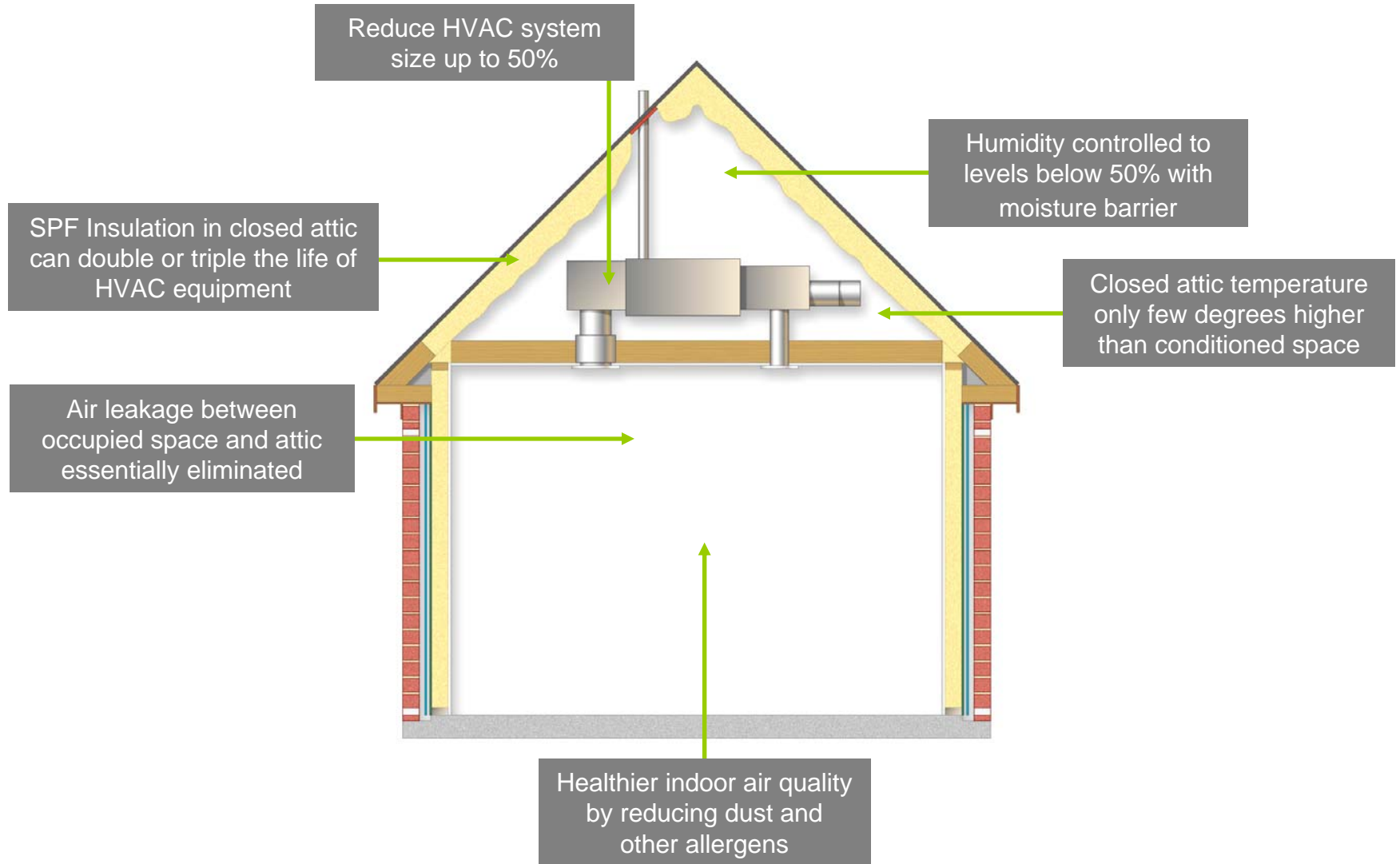


SPF In Unvented Attics Saves Significant Energy

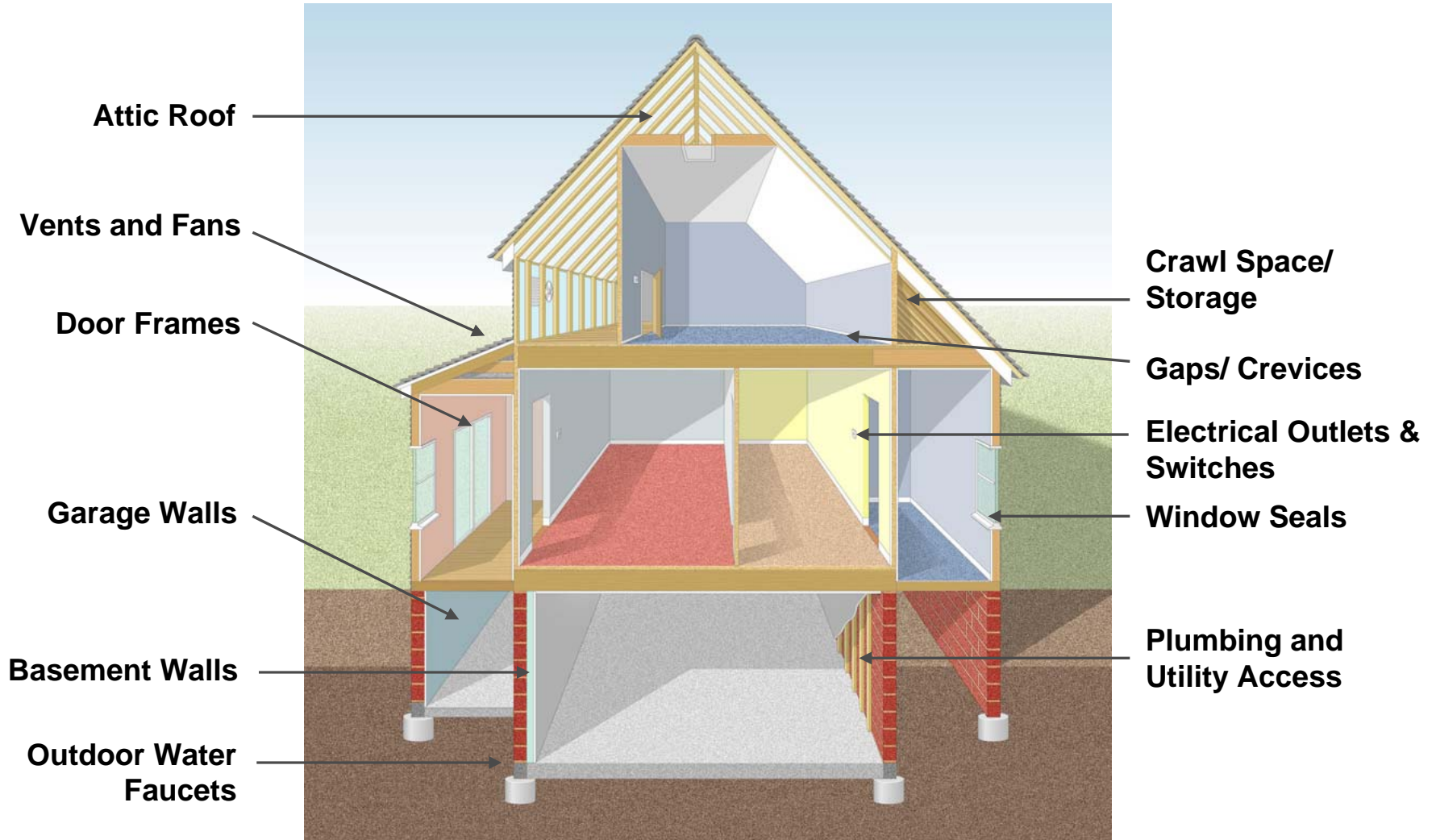


SPF insulation of the attic creates a total building seal for energy savings

SPF Provides A Complete Air Seal When Applied to the Roof Deck



Typical Insulation Weatherization Applications



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Commercial SPF Applications



SPF Provides Value In Many Different Commercial Building Applications



SPF on built-up roofing



SPF on metal roofing



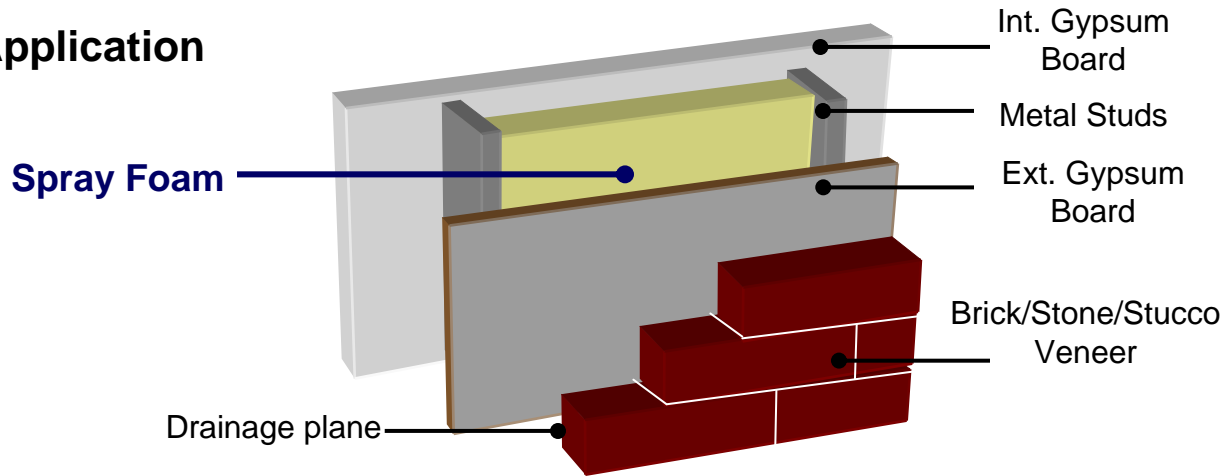
SPF in wood frame walls



SPF in metal frame walls

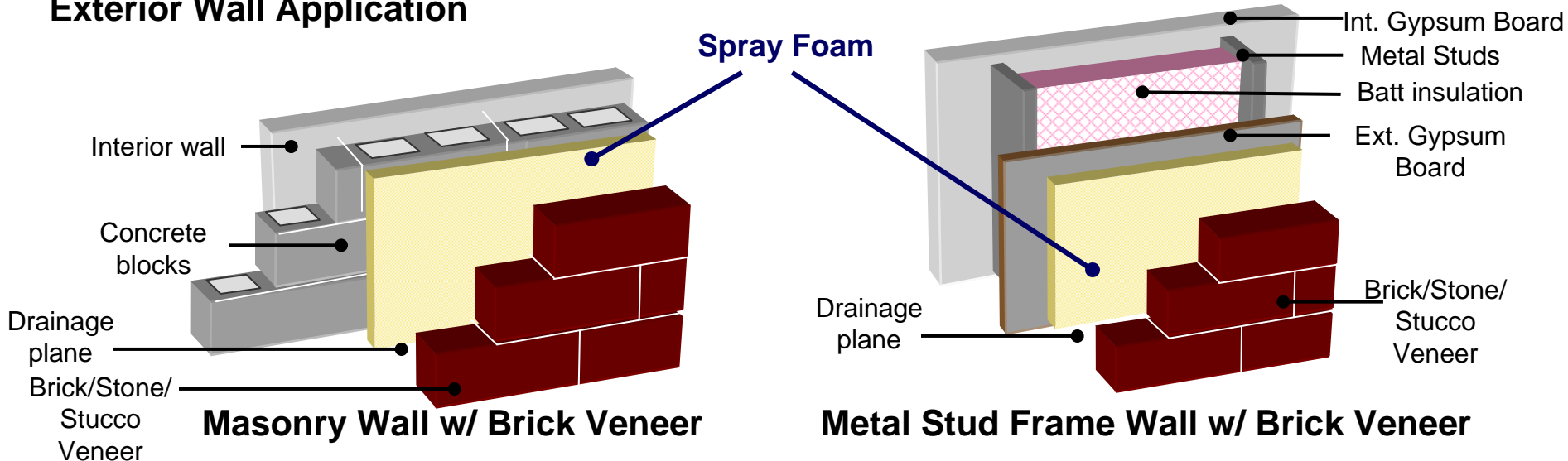
SPF Can Be Applied To Either The Interior Or Exterior Walls

Interior Wall Application



Metal Stud Frame Wall w/ Brick Veneer

Exterior Wall Application



Energy Efficiency, Building Comfort, And Structure Durability

SPF: Thermal Insulant

- Higher R-value than competitive insulants
- SPF completely fills the cavities and will conform to irregular shapes, slopes, and penetrations such as pipes, windows, doors and sheathing fasteners
- Elimination of thermal bridging through studs and gaps with exterior application

SPF: Air Barrier

- NIST estimates that effective air barrier systems could save up to 83% leakage in nonresidential buildings, which would save more than 40% on gas bills and more than 25% on electricity
- SPF meets / exceeds ABAA standards
- Advantages vs. other air barriers
 - Ease & speed of application (lower installation, labor costs)
 - Dual role as a thermal insulation material

SPF: Moisture Barrier

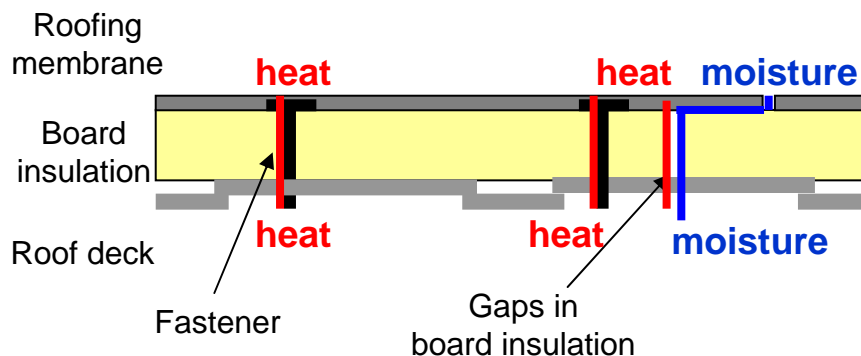
- “Moisture poses the biggest threat to structural integrity and durability, accounting for up to 89% of damage in building envelopes”*
- Exterior application of SPF creates a seamless, monolithic vapor barrier

SPF: Structural Enhancement

- SPF improves racking strength in frame wall constructions up to 300% (NAHB)

Retrofitting With A SPF Roof Can Reduce Air, Heat And Moisture Infiltration

Traditional Dark-colored Roof



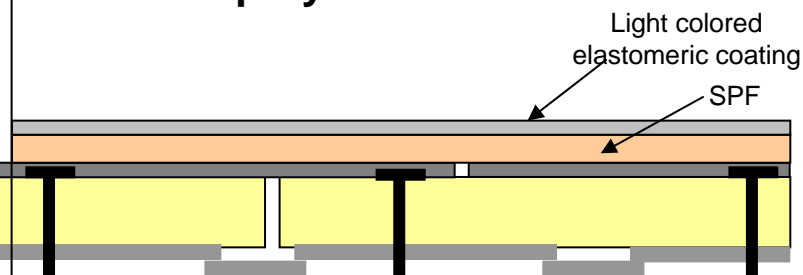
No additional R-value

Gaps in insulation at seams and joints allow air infiltration

Thermal bridging across fasteners can reduce effective insulation value by 1.5% to 31.5% depending on spacing

Moisture ingress occurs at seams and joints. Moisture can cause structural degradation and mold

Light-colored Spray Foam Retrofit



2" of 3pcf SPF can add additional thermal insulation of R-value 15

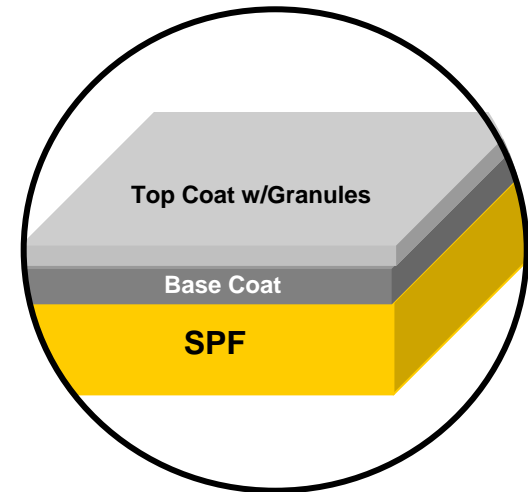
Seamless, closed cell SPF roofs minimize energy lost from air infiltration improving energy performance

Thermal bridging across fasteners is eliminated

SPF roofs provide a seamless moisture barrier reducing the potential for moisture induced structural damage

SPF Roofs Increased Versatility And Durability, Lowering Maintenance Costs

- **SPF roofs can be installed in a number of situations**
 - New roofs
 - Re-roofing (tear-off previous roof)
 - Re-cover (apply directly over existing roof)
- **Versatility**
 - Complex shapes and roof penetrations are easily managed
- **Speed of installation lowers up-front cost**
 - Minimal disruption to occupants during retrofit installations
- **Durability**
 - Service life of closed cell SPF roof >30 years*
 - 10, 15, 20-year recoating intervals are typical
- **Low maintenance costs**
 - Essentially leak-free performance
- **Enhanced wind uplift resistance**



SPF Contributes to Sustainable Building



SPF Helps Meet Building Codes and Contributes to Green Building Certifications

- LEED®-H for homes and LEED® for commercial buildings
- ASHRAE Standard 90.1
- ENERGY STAR®
- IECC
- US Army Corps Building Air Tightness Requirements (ECB 2009-29)
- National Association of Home Builders Green Building Standard™ for homes

