



BASF Spray Polyurethane Foam Sustainability Fact Sheet

Sustainability Fact Sheet

Q Is spray polyurethane foam a “green” product?

A A 2009 Eco-Efficiency Analysis Study* found that spray polyurethane foams are more eco-efficient than conventional insulating alternatives.

The study compared insulation systems in a “base case” home in Newark, NJ (Zone 4), (additional base case information on page 4) and completed energy and cost calculations for homes in Tampa, FL (Zone 2), Phoenix, AZ (Zone 3) and Minneapolis, MN (Zone 6), in order to evaluate the energy efficiency of the systems in different climates and regions of the country. The systems that were compared include:

- 2 lb. closed-cell, spray-applied polyurethane foam (ccSPF)
- 2 lb. closed-cell, spray-applied soy-based polyurethane foam (ccSPF-bio)
- Open-cell spray-applied polyurethane foam (ocSPF)
- Fiberglass batts
- Sprayed cellulose

The following R-values† were assumed:

- ccSPF: 6.62-6.96 /inch (formulation dependent)
- ccSPF bio: 6.74 /inch
- ocSPF: 3.70 /inch
- Fiberglass: 3.45 /inch
- Cellulose: 3.70 /inch

* Please refer to Eco-Efficiency Analysis graph on page 4.

Q What did the study find?

A The study, which looked at both environmental and economic impacts over the life cycle of the home, found that spray polyurethane foams, such as BASF’s COMFORT FOAM® and SPRAYTITE® closed-cell SPF, and ENERTITE® open-cell SPF, are more eco-efficient than the traditional insulation alternatives.

The primary reason is the material’s superior air sealing properties that result in significant energy savings and reductions in greenhouse gas emissions. In fact, ENERGY STAR® reports that air leakage accounts for 25 - 40% of the energy used for heating and cooling in a typical home. They estimate that a homeowner can save up to 20% on heating and cooling costs by proper sealing and insulating.

Source: www.energystar.gov

Furthermore, global warming potential (GWP) caused by the emission of greenhouse gases is primarily a result of energy for heating the home over its lifetime. BASF closed-cell polyurethane spray foam insulation has the lowest GWP of all alternatives considered.

Q Aren’t soy-based spray foams the most sustainable spray foam alternative?

A No overall life cycle advantage was shown for soy-based closed-cell spray foam over standard closed-cell polyurethane foams. In fact, the study found that the soy-based alternative performs similarly to the other closed-cell alternatives in all aspects except for land use, in which it performs worse. This is due to the land requirements for its renewable (soy) content.

Would Soy Foam by Any Other Name Sound as “Green”?

One misunderstanding in the industry is that “soy-based” spray foam insulations are made exclusively from soy, a rapidly renewable resource.

The truth is that these products are simply a type of polyurethane insulation incorporating a small amount of soy oil to produce a component of the final product known as the *formulated resin*. For COMFORT FOAM and SPRAYTITE, BASF uses a different renewable resource to manufacture this resin – sucrose-based oils, which typically come from sugar beets.

However cleverly marketed, all spray foams, including so-called “soy”, are roughly 50% petroleum-based isocyanate. Total content percentages of the small amount of renewable materials vary slightly in these formulations, so one product generally will not offer more “sustainable” performance than the other.

Q What about other environmental impacts like air pollution, hazardous fumes, resource consumption and land use?

A The BASF spray polyurethane foam products use zero-ozone-depleting blowing agents and emit no VOCs (volatile organic compounds.) Moreover, as insulating air barriers, they prevent outdoor allergens and pollutants from entering into homes by sealing off the building envelope and minimizing uncontrolled air leakage.

Because of their high R-value range and air barrier/infiltration characteristics, ccSPFs like COMFORT FOAM and SPRAYTITE have the lowest overall environmental impact in energy use, resource consumption, air emissions and land use.

Q What about occupant indoor air quality?

A According to the U.S. Environmental Protection Agency, dampness in homes is common and promotes conditions in which pathogens, bacteria and infectious diseases can thrive.

When combined with adequate mechanical ventilation, BASF spray polyurethane foam insulation promotes healthy indoor air quality and is not a food source for mold. In fact, in 2009, BASF spray polyurethane products met the rigorous standards of the GREENGUARD® Low-Emitting Listing Program and Microbial Resistance Listing Program.

Q Is R-value enough to consider when looking at real-world performance?

A Not at all and here's why. R-value is what the industry sometimes uses when describing the insulating value of a particular system when installed perfectly. However, it doesn't take into account frequent errors that occur during most installation, as well as the reduction in thermal resistance that occurs in most insulation when air or moisture moves through these products.

For example, the study found that the fiberglass alternative was the least eco-efficient technology due to high air infiltration rates and resulting loss of thermal performance. Cellulose was better than fiberglass in this area but came in way behind all SPF alternatives.

Q What about costs?

A Alternative choices of ccSPF insulation typically have the lowest initial installed cost for insulating value only, however these costs do not include costs for vapor retarders or air barriers.

Specifically, cellulose has the lowest installed cost but when the life cycle costs are calculated, it has a higher overall cost. While the initial cost of installed COMFORT FOAM and SPRAYTITE is higher, the overall life cycle cost is lower.

BASF COMFORT FOAM and SPRAYTITE insulation can help the environment, make your home more comfortable and save you money.

Reduced Greenhouse Gases.

Spray polyurethane foam helps reduce greenhouse gases in the atmosphere.

This study has shown that a home insulated with COMFORT FOAM or SPRAYTITE can prevent approximately 84,000,000 grams of carbon dioxide equivalents from being emitted into the atmosphere. This is the equivalent CO₂ uptake by almost 2 (1.75) acres of 25-year-old forest over the lifetime of the home (60 years) or over 1,200 trees every year for 60 years.

Cost Savings. More money in your pocket at the end of the month.

For a typical home, COMFORT FOAM or SPRAYTITE may add about \$20-\$40 per month in extra mortgage costs. However, they can save the homeowner an average of \$60-80 a month in energy costs, actually paying you back every month despite the higher initial investment.¹

Lower HVAC Costs & Optimized Operation.

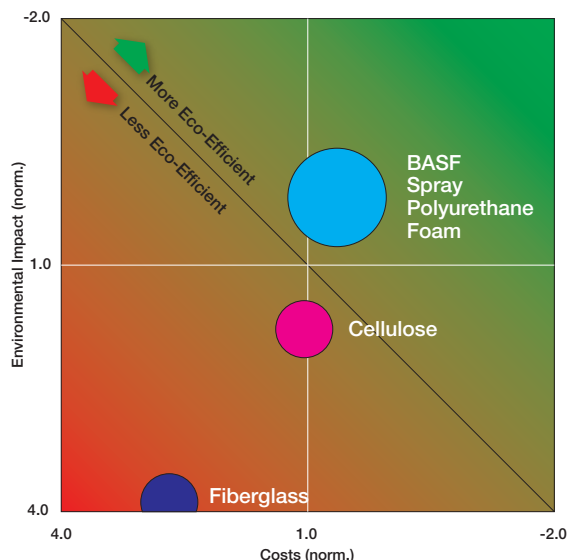
By controlling air leakage, BASF COMFORT FOAM and SPRAYTITE insulation installed homes utilize more appropriately sized HVAC systems, which work more efficiently, and run less often. This adds up to mechanical cost savings up front, less maintenance down the road and a more comfortable indoor environment.

3:1 for More Climate Protection

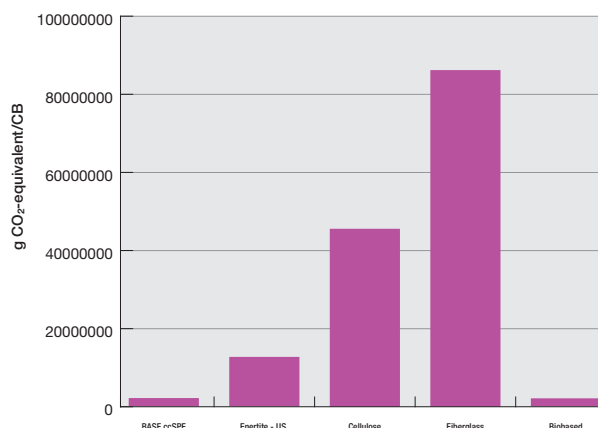
BASF is the world's first company to present a comprehensive carbon balance for its operations. The results show: BASF products can save three times more greenhouse gas emissions than the entire amount caused by the production and disposal of our products.



Eco-Efficiency Analysis



Global Warming Potential (GWP) Analysis



BASF ccSPF has the lowest GWP of all alternatives considered. GWP is primarily a result of energy for heating the home over its lifetime.

About BASF

As the world's largest chemical company, BASF plays a leadership role in shaping a sustainable future. BASF is included in the Dow Jones Sustainability World Index (DJSI World), the most important sustainability index and represents the top 10 percent of the largest 2,500 companies in each industry included in the Dow Jones Global Index.

At BASF we are working to find answers to two of our greatest challenges – climate protection and energy conservation. EPA estimates that the energy used in homes, alone, generates 16 percent of all U.S. greenhouse gas emissions. By making our homes more energy efficient, we can have an immediate and significant impact on the health of the planet.

BASF is an ENERGY STAR® partner and a member of the U.S. Green Building Council.

† The R-value of this insulation. "R" means resistance to heat flow. The higher the R-value, the greater the insulating power. Compare insulation R-values before you buy. There are other factors to consider. The amount of insulation will depend upon the climate, the type and size of your house, and the fuel use patterns and family size. If you buy too much insulation, it will cost you more than what you will save on fuel. To achieve proper R-values, it is essential that this insulation be installed properly.

This fact sheet complies with the Federal Trade Commission labeling and advertising of home insulation rules and regulations, Federal Register, 16 CFR Part 460 Labeling and Advertising of Home Insulation: Trade Regulation Rule; Final Rule, Tuesday, May 31, 2005.

About the Eco-Efficiency Analysis

Used by BASF since 1996, the Eco-Efficiency Analysis guides the company in finding the proper balance between economy and ecology. Applied to more than 350 products and manufacturing processes since its inception, the Eco-Efficiency Analysis helps BASF determine how to produce products using as few materials and energy as possible, and keep manufacturing-related emissions as low as possible.

Base Case

The base case considers a single-story 1,100 square foot home in Newark, NJ with no basement and built on concrete slab with:

- R38 attic insulation
- R13 wall insulation
- All systems have the same interior and exterior coverings.
- Home life of 60 years with HVAC cycle of 15 years.
- HVAC (heating, ventilation and air conditioning) is DX: direct compression with gas furnace
- SEER (Seasonal Energy Efficiency Ratio) rating of 13 and furnace efficiency of 90%

About the GREENGUARD Environmental Institute

The GREENGUARD Environmental Institute (GEI) is an industry-independent, non-profit organization that oversees the GREENGUARD Certification ProgramSM. As an ANSI Authorized Standards Developer, GEI establishes acceptable indoor air standards for indoor products, environments, and buildings.

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Footnote 1: Sources include Honeywell Corporation Homeowner Case Studies and ENERGY STAR HomeCalc software energy savings calculator.
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