

# A Dozen Things You Might Not Know That Make Vinyl Siding Green



By Tad Radzinski,  
P.E., LEED AP

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By definition, the U.S. Environmental Protection Agency (EPA) says green building – also known as sustainable or high performance building – is the practice of creating structures and using processes that are environmentally responsible and resource-efficient throughout a building’s life-cycle from siting to design, construction, operation, maintenance, renovation and deconstruction. This practice expands and complements the typical building design concerns of economy, utility, durability and comfort.

The green building movement is well underway and many builders, remodelers, developers and homeowners are evaluating a variety of green building standards to determine how to build a green home. The current standards provide opportunities to utilize materials and products that can contribute to earning points toward green building certification. For example, the standards classify materials as “green” or environmentally preferable products if they contain recycled content, are Forest Stewardship Council (FSC) certified or are manufactured within 500 miles of a project site.

As green building consultants, Sustainable Solutions Corporation routinely evaluates many materials and products to understand how they can contribute points toward green building certification. There is a great deal of information available on these products, some of which is based on fact and science and some based on hearsay and misinformation. In order to better understand the facts, we conducted a review of available data related to vinyl siding, including life-cycle data. Life-cycle analysis is a technique to evaluate the environmental impact of a material or a service throughout all stages of its life, from extraction or harvesting of raw materials through processing, manufacture, installation, use and ultimate disposal or recycling.

From its start with two simple and natural building blocks, to its efficient manufacturing process and modest transportation energy use, evidence shows that vinyl siding is sustainable throughout its life-cycle, especially when compared to other exterior cladding. What follows is an examination of 12 facts that illustrate why vinyl siding is a green cladding.

## **I Can Contribute To Points In Leading Green Building Certification Programs**

While residential green building certification programs have been implemented at the local level for years, establishment at the national level is being led by two organizations: the United States Green Building Council (USGBC) with its LEED® for New Construction and LEED® for Homes Rating Systems, and the National Association of Home Builders (NAHB) through its ANSI approved ICC 700-2008 National Green Building Standard.™ Additionally, several locally-implemented programs have grown into regional programs, such as Earthcraft Home (in the Southeast) and Built Green (in the Northwest).

Green building certification programs require third party verification that a home has been built to the stated performance level and are based on point systems. Online scoring tools are available to help calculate points and performance levels. Points are awarded to establish either a minimum threshold for compliance or a threshold to reach a specific level of performance.

Based on its durability and low maintenance, most green building programs will qualify vinyl siding for points. Most significantly, vinyl siding contributes points for certification in the LEED for New Construction and LEED for Homes Rating Systems, as well as the National Green Building Standard (see Tables 1–3 below).

**Table 1: LEED For New Construction 2009**

<b>Materials &amp; Resources</b> <b>Recycled-Content</b> (1 or 2 points)	Use materials with recycled content such that the sum of the post-consumer recycled content plus one-half of the pre-consumer content constitutes at least 10% or 20% based on cost, of the total value of the materials in the project.
<b>Materials &amp; Resources</b> <b>Regional Materials</b> (1 or 2 points)	Use materials or products that have been extracted, harvested or recovered, as well as manufactured, within 500 miles of the project site for a minimum of 10% or 20% based on cost, of the total value of materials in the project.
<b>Energy &amp; Atmosphere</b> <b>1 – Optimize Energy Performance</b> (1–19 points)	Demonstrate a percentage improvement in the proposed building performance rating compared to the baseline building performance rating per ASHRAE/IESNA Standard 90.1 – 2007 by a whole building project simulation. Insulated siding may contribute to this credit.

**Table 2: LEED For Homes January 2008**

<p><b>Materials &amp; Resources</b>  <b>MR 2.2 –</b>  <b>Environmentally</b>  <b>Preferable Materials</b>  <b>(0.5 points EPP,</b>  <b>0.5 points local)</b></p>	<p>Use environmentally preferable products (EPP) and/or materials that have been extracted, processed and manufactured within 500 miles of the home (“local”). For siding to qualify as an EPP the siding must contain 25% post-consumer or 50% pre-consumer recycled content.</p>
<p><b>Energy &amp; Atmosphere</b>  <b>EA 1.2 –</b>  <b>ENERGY STAR</b>  <b>Labeled Home</b>  <b>(1–34 points)</b></p>	<p>Improve the overall energy performance of the home. 1–34 points are earned by exceeding a base HERS Index (85 for Southern States, 80 for Northern States). Insulated siding may contribute to this credit.</p>

**Table 3: ANSI Approved ICC 700-2008 National Green Building Standard**

<p><b>601: Quality of Construction Materials and Waste</b>           601.7: Site-applied finishing materials          (2–5 points)</p>	<p>Building materials or assemblies are utilized that do not require additional site-applied material for finishing.</p> <p>90% or more of the installed building material or assembly listed in the Standard (5 points each)</p> <p>50% to less than 90% of the installed building material or assembly listed in the Standard (2 points each)</p>
<p><b>602: Enhanced Durability and Reduced Maintenance</b>           602.8: Termite-resistant Materials          (2–6 points)</p>	<p>Use termite-resistant materials for the foundation, all structural walls, floors, concealed roof spaces not accessible for inspection, exterior decks and exterior claddings in geographic areas of slight to moderate, moderate to heavy or very heavy termite infestation probability. Higher points are awarded in areas of very heavy termite infestation probability.</p>
<p><b>604: Recycled-Content Building Materials</b>           604.1: Recycled-Content          (1–6 points)</p>	<p>Building materials with recycled content are used for two minor and/or two major components of the building. Points are awarded based on the percentage of recycled content (25% to more than 75%) and whether used on major or minor component.</p>

<p><b>606: Renewable Materials</b></p> <p>606.3: Manufacturing Energy (2–6 points)</p>	<p>Materials are used for major components of the building that are manufactured using a minimum of 33% of the primary manufacturing process energy derived from renewable sources, combustible waste sources, or renewable energy credits (RECs). (2 points per material)</p>
<p><b>608: Indigenous Materials</b></p> <p>608.1: Indigenous Materials (2–10 points)</p>	<p>Indigenous materials are used for major elements of the building. (2 points per type of material – maximum of 10 points)</p>
<p><b>609: Life Cycle Analysis</b></p> <p>609.1: Life Cycle Analysis (3–15 points)</p>	<p>A more environmentally preferable product or assembly is selected for an application based upon the use of a Life Cycle Assessment (LCA) tool compliant with ISO 14044 or other recognized standards that compares the environmental impact of building materials, assemblies, or a whole building.</p> <p>Per product/system comparison (3 points – maximum of 15 points) Whole building LCA Analysis (15 points)</p>
<p><b>610: Innovative Practices</b></p> <p>610.1: Manufacturer’s environmental management system concepts (1–10 points)</p>	<p>Product manufacturer’s operation and business practices include environmental management system concepts and the production facility is ISO 14001 certified or equivalent. The aggregate value of building products from ISO 14001 certified or equivalent production facilities is 1% or more of the estimated total building materials cost. (1 point per percent)</p>
<p><b>702: Performance Path</b></p> <p>702.2: Energy cost performance levels (30 –120 points)</p>	<p>Energy efficiency features are implemented to achieve energy cost performance that exceeds the ICC IECC by 15–60%. (A documented analysis using software in accordance with ICC IECC, Section 404, or ICC IEC Section 506.2 through 506.5, applied as defined in the ICC IECC, is required.)</p> <p>Insulated vinyl siding may contribute to points in this area.</p>
<p><b>703 Prescriptive Path</b></p> <p>703.1: Building Envelope (10–36 points)</p>	<p>Total building thermal envelope UA improved by 10–20% over that required by IECC.</p> <p>Insulated vinyl siding may contribute to this practice.</p>

National green building certification programs aside, the Vinyl Siding Institute, Inc. has taken steps to ensure a sustainable future for vinyl siding. In fact, vinyl siding is the only exterior cladding with both third-party product certification and certified installer programs, both of which are administered by an accredited, independent quality control agency to ensure that products and colors meet or exceed ASTM standards and that installers demonstrate knowledge of ASTM-accepted application techniques. Regular updates to the Official List of Certified Products and Colors and the Official Registry of Certified Installers can be viewed by visiting [www.vinylsiding.org/vsicert](http://www.vinylsiding.org/vsicert).

## **2 Boosts A Home's R-Value**

Buildings and homes use significant amounts of energy over their lifespan, and durable homes need to be extremely energy efficient in order to be sustainable. To that end, innovations in vinyl siding continue to strengthen a home's sustainable performance. One of the industry's most popular product innovations is insulated vinyl siding, which helps increase the exterior wall's R-value and contributes to a home's energy efficiency. In fact, according to the ASHRAE Handbook: Fundamentals, published in 2005, insulated vinyl siding can increase the effective R-value of a wall by 10–16 percent compared to traditional vinyl siding. This added R-value reduces energy consumption over the lifetime of the building or home and reduces its overall carbon footprint.

## **3 Generates Less Waste During Manufacturing**

Vinyl siding manufacturing is an extremely efficient process. The ability to immediately return scrap and off-specification materials (regrind) directly into the manufacturing process results in virtually no manufacturing waste. Some manufacturers integrate recycled vinyl into their siding products. Vinyl, also known as polyvinyl chloride (PVC), starts with two simple building blocks: 57 percent from common salt, one of Earth's most common compounds, from which chlorine is extracted, and 43 percent from natural gas, from which ethylene is made. According to the U.S. Energy Information Agency's 2008 Short-term Energy Outlook, most natural gas utilized to manufacture ethylene is domestically produced, which reduces consumption of imported oil products.

#### **4 Produces Little Waste When Installed**

The installation of vinyl siding generates very little waste compared to other exterior cladding. According to the NAHB Construction Waste Estimate of a Typical 2,000-Square-Foot House, released by the NAHB Research Center in 2001, assuming three sides of exterior clad in vinyl siding and a brick veneer of the front façade, studies have shown average scrap rates from vinyl siding installation are less than 1.9 percent of total construction waste. Masonry waste, primarily composed of scrap generated from the installation of brick veneer on the façade, yields 1,000 pounds of waste, or 12.5 percent of the total construction waste.

Additionally, the U.S. EPA benchmark report, Characterization of Building-Related Construction and Demolition Debris in the U.S. lists 36 typical constituents in the construction and demolition debris stream, and vinyl siding is not listed among them.

Furthermore, installers who complete the VSI Vinyl Siding Certified Installer Program learn how to minimize vinyl siding waste through proper estimating and source reduction techniques. The program ensures that individuals are properly trained and companies are properly staffed and managed to install vinyl siding (as well as soffit and accessories) consistent with ASTM D4756, the industry recognized installation standard.

#### **5 Requires Fewer Resources To Maintain**

Vinyl siding has the advantage of simple maintenance. Unlike other exterior cladding, vinyl siding does not require painting, staining or caulking and only needs periodic cleaning with mild soap and water. This lowers the cost of maintaining vinyl siding and ensures that it is not responsible for releasing harmful solvents into the environment, as can happen with painting and staining.

While vinyl siding is virtually maintenance free, brick requires re-pointing of mortar, fiber cement siding requires periodic painting and caulking, wood siding requires frequent painting and staining, and stucco requires maintenance including painting and sealing.

Also, the fact that painting is not needed with vinyl siding this helps to contribute points in green building certification programs. (See **1** – Can Contribute to Points in Leading Green Building Certification Programs)

Cladding	Vinyl Siding	Fiber Cement	Brick	Stucco	Hardboard	Cedar
<b>Long Term Maintenance</b>	Good weather resistance, virtually maintenance free	Can absorb water if joints not caulked, needs painting	Repointing may be required	Stains easily, shows dirt, subject to cracking	Can absorb water, can swell, rot and chip, needs painting	Can split, warp, rot, chip, insect damage, absorbs water, needs painting

Vinyl siding now offers a broad and ever-increasing spectrum of colors – more than any pre-finished cladding on the market today. The vinyl siding industry has achieved this versatility through advanced color formulation methods and constant testing in the most challenging climates. Nearly 350 colors of vinyl siding have been certified for color retention.

## 6 Engineered To Last

Sustainability is not possible without durability, and vinyl siding industry initiatives have focused on improved durability. As the only exterior cladding with both third-party product certification and certified installer programs, vinyl siding offers the following characteristics that make it durable:

- Low Maintenance
- Service Life
- Wind Resistance
- Color Retention
- Water Resistance
- Resistance to Insect Damage
- Chemical Resistance
- Energy Efficiency

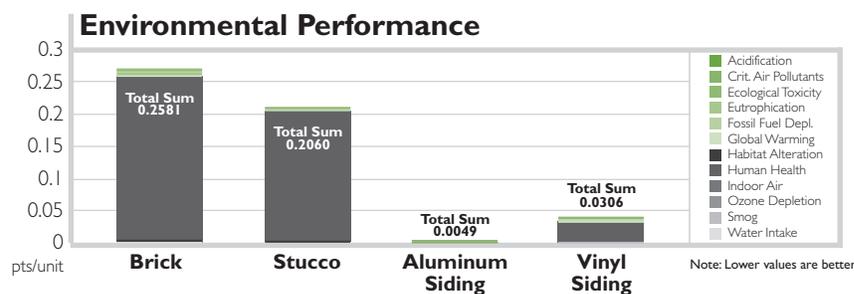
Products certified through the VSI Vinyl Siding Product Certification Program are verified to meet or exceed ASTM D3679, the standard for vinyl siding quality.

As an engineered product, vinyl siding is undergoing constant improvement. Its expected service life continues to increase as improvements are made to color retention and other key areas of durability. Because vinyl siding has been in mainstream use for approximately 30

years, its actual lifetime is still being determined. However, the NAHB has cited “Lifetime” as the estimated life expectancy of vinyl siding on a home in its Study of Life Expectancy of Home Components, published in February of 2007. Also, according to the Chemical Resistance Database, published by Cole-Palmer in 2008, vinyl siding is resistant to many chemicals, including corrosive chemicals. In fact, it has a very high resistance to nitric and sulfuric acids, the main components of acid precipitation.

## 7 Offers Better Environmental Performance

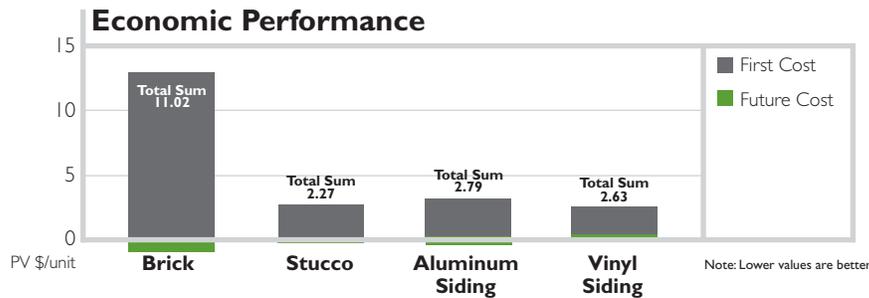
Vinyl siding has excellent environmental performance when compared with other exterior cladding. The graph below was produced using Building for Environmental and Economic Sustainability (BEES®) software and includes effects of all life-cycle stages, including raw material acquisition, manufacture, transportation, installation, use and waste management. Note: Fiber cement data is not currently available for comparison in BEES analysis.



## 8 Balances Economic With Environmental Performance

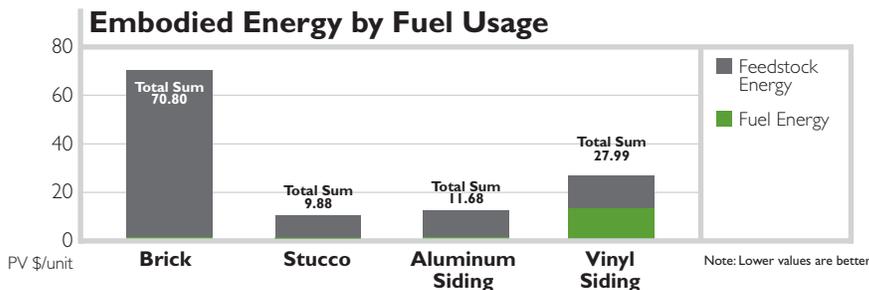
Environmental and economic performance must be balanced. A 2006 poll by the American Institute of Architects (AIA) showed that while 90 percent of U.S. consumers would be willing to pay more to reduce their home’s environmental impact, they would be willing to pay only \$4,000 to \$5,000, or about two percent. (This AIA study was published in 2007 in Energy Prices, Environmental Awareness Motivating Homeowners to Go Green.) Thus, vinyl siding is a cladding that provides a balance between environmental and economic performance.

In addition to its exemplary environmental performance, vinyl siding is an economically sensible option, with an installed cost that's typically lower than that of wood, fiber cement, stucco, brick or stone. The graph below illustrates the costs associated with some common exterior cladding. This graph was produced using BEES and includes the effects of all life-cycle stages, including raw material acquisition, manufacture, transportation, installation, use and waste management.



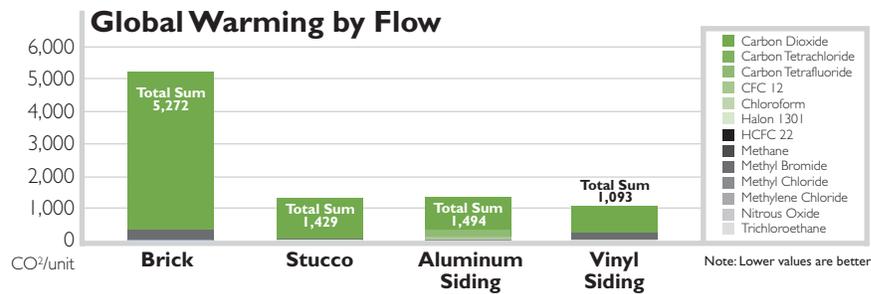
## 9 Contributes Less To Global Warming Than Brick

The manufacture of vinyl siding consumes less than half of the energy and fuel consumed in the process of manufacturing brick and mortar. The graph below was produced using BEES and includes only the effects of manufacturing.



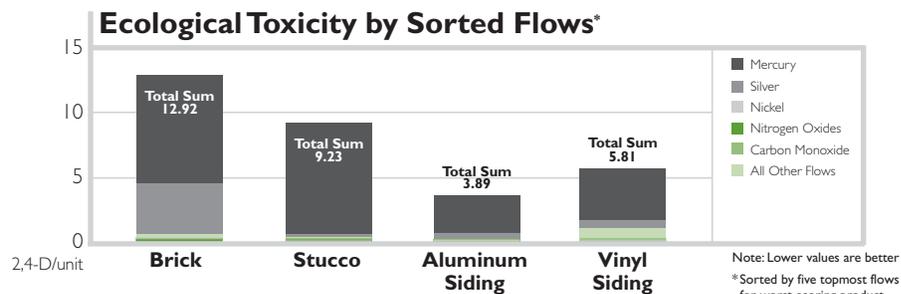
Another factor to consider is the amount of energy used during transportation. Vinyl siding's lighter weight compared to other exterior cladding provides a reduced transportation energy impact.

When you look at the total picture, combining the amount of energy saved with manufacturing and transportation, it is clear that vinyl siding contributes significantly less to global warming than other exterior cladding. The graph below was produced using BEES and includes the effects of all life-cycle stages, including raw material acquisition, manufacture, transportation, installation, use and waste management.



## 10 Releases Fewer Toxic Chemicals Than Other Exterior Cladding Through Life-Cycle

Compared to other exterior cladding, vinyl siding is responsible for the emission of significantly lower levels of toxic chemicals, including mercury and silver, into the environment. The graph below was produced using BEES and includes the effects of all life-cycle stages, including raw material acquisition, manufacture, transportation, installation, use and waste management.



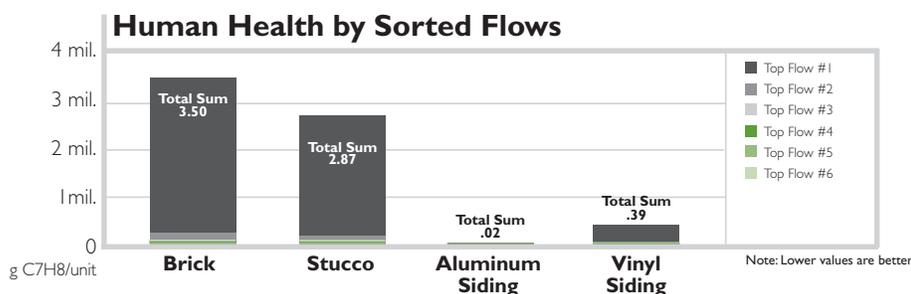
Furthermore, vinyl siding certified through the VSI Vinyl Siding Product Certification Program specifically requires that the product be free of lead, which reduces the chances of this toxic material entering the waste stream. The vinyl siding industry led efforts to have ASTM add a prohibition on lead to the ASTM D3679 standard, referenced by the International Residential Code and the International Building Code.

## 11 Emits Less Dioxin

According to the EPA, in the year 2000, vinyl, also known as polyvinyl chloride (PVC), production was responsible for less than two percent of the (total) dioxin released into the environment in the U.S. By comparison diesel trucks (approximately five percent), heavy equipment (approximately two percent) and industrial wood burning (approximately three percent) are each responsible for the production of more dioxin on an annual basis than is PVC production.

The production of cement creates more dioxin (from combustion of hazardous and non-hazardous waste in cement kilns) than does the production of PVC. Because of this, cement-based products, including stucco, brick and mortar, are generally responsible for the creation of more dioxin than is vinyl siding. And in fact, despite considerable growth in the production of vinyl siding and other vinyl products over the past 20 years, the level of dioxin released into the environment each year has decreased by nearly 90 percent over the same time period.

In the graph below, it can be seen that brick and mortar is responsible for almost 10 times the dioxin production of vinyl siding. The graph was created in BEES and considers all stages of the product life-cycle.



## 12 Poses No Serious Health Risks

Vinyl siding does not utilize any materials that can cause adverse health effects to installers – or to anyone. Advocates or manufacturers of silica-based fiber cement, like James Hardie’s siding products, cannot make this claim. Silica-based fiber cement siding products require special tools for installation, along with a dust mask or respirator. As stated on the James Hardie Building Products Material Safety Data Sheet, silica-based fiber cement may potentially cause adverse health effects such as silicosis (an incurable lung disease) to installers who do not use respirators.

In fact, the NAHB recently issued a new Safety Card titled Silica Hazards in Home Building warning about the dangers of silicosis and specifically mentions brick, mortar and silica-based fiber cement board.

## **Conclusion: Vinyl Siding Is A Sustainable Cladding**

As green building continues to play a vital and growing role in the long-term health of our planet, today's vinyl siding delivers many recognized benefits. Beauty, durability, value, low maintenance and sustainability are among them.

By using vinyl siding, builders, remodelers, architects, designers, contractors, planners and homeowners can help make and keep their homes green, doing their part to make communities – and our planet – sustainable.

## **About The Author And Sustainable Solutions Corporation (SSC)**

Tad Radzinski, P.E., LEED AP, Founder and President of SSC, served as the U.S. Environmental Protection Agency (EPA) Waste Minimization Program National Expert. He was responsible for the waste minimization program which focuses on reducing persistent, bioaccumulative and toxic chemicals from the hazardous waste stream. He received numerous awards from EPA including a Superior Service Medal for “outstanding collaboration with industry which reduced 100 million pounds of waste, saved 1.6 billion gallons of water, and saved industry \$42 million.”

Mr. Radzinski is a practicing professional engineer and teaches graduate level courses on The Principles of Sustainable Development, Industrial Pollution Prevention and Sustainable Community Design and Development. His deep understanding of earth systems and natural cycles form the basis for developing solutions in each project.

Sustainable Solutions has assisted its clients with saving over \$65 million and provides comprehensive sustainable development and green building services for corporations, municipalities, developers and homeowners. SSC has extensive experience with Leadership in Energy and Environmental Design (LEED) green building projects and has managed multiple LEED projects.

Founded in 2001, Sustainable Solutions Corporation applies ecological thinking to the evaluation and design of operations, systems, processes and places for people to live, learn and work with the goal of balancing environmental, economic and social health.

In 2007, Sustainable Solutions Corporation was retained by the Vinyl Siding Institute, Inc. to help identify and verify the facts about vinyl siding and sustainability.

For more information on Sustainable Solutions visit [www.sustainablesolutionscorporation.com](http://www.sustainablesolutionscorporation.com).

## **About The Vinyl Siding Institute**

The Vinyl Siding Institute, Inc., located in Washington, DC, represents manufacturers of vinyl and other polymeric siding and suppliers to the industry. VSI is the sponsor of the VSI Vinyl Siding Product Certification Program and the VSI Certified Installer Program. For more information on vinyl siding visit [www.vinylsiding.org](http://www.vinylsiding.org).