# Certified Vinyl Siding: Verifiably Green

Presented by Tad Radzinski P.E, LEED AP, SFP

VINYL SIDING INSTITUTE
America Sides with Vinyl℠

This webinar will use Voice over Internet Protocol (VoIP)
Please make sure your speakers are turned on

# USGBC Education Provider

EDUCATION PROVIDER

- Sustainable Solutions Corporation is a USGBC Education Provider committed to enhancing the professional development of the building industry and LEED Professionals through high-quality continuing education programs.
- As a USGBC Education Provider, we have agreed to abide by USGBC-established operational and educational criteria, and are subject to course reviews and audits for quality assurance.

GBCI CMP

Approved for 1 GBCI CE Hours for LEED Professionals.

# Copyright



SustainableSolutions
CORPORATION

# About the Vinyl Siding Institute (VSI)

- VSI is the trade association for manufacturers of vinyl and other polymeric siding and suppliers to the industry
- Located in Washington, DC
- VSI priority programs
  - Product and color retention certification
  - Installation, including the Certified Installer Program
  - Technical work
  - *America Sides with Vinyl (ASwV)* marketing initiative
  - Code and regulatory projects

# AIA Continuing Education Provider

- The Vinyl Siding Institute is an American Institute of Architects (AIA) Continuing Education System (CES) provider committed to helping design and building industry professionals fulfill their AIA continuing education requirements.
- As an approved provider VSI agrees to uphold all AIA CES standards and guidelines and is subject to course reviews and audits for quality assurance.
- This course has been approved for one learning unit hour.

# Learning Objectives

At the end of this presentation, you will be able to:

- Understand the basics and value of Life Cycle Assessment (LCA)
- Discuss the life cycle tools used to compare building products
- Understand the environmental impacts of vinyl siding, fiber cement and other siding products
- Understand how LCA contributes to green building codes and standards
- Understand the future use of LCA for building products and whole building LCA

# Poll #1

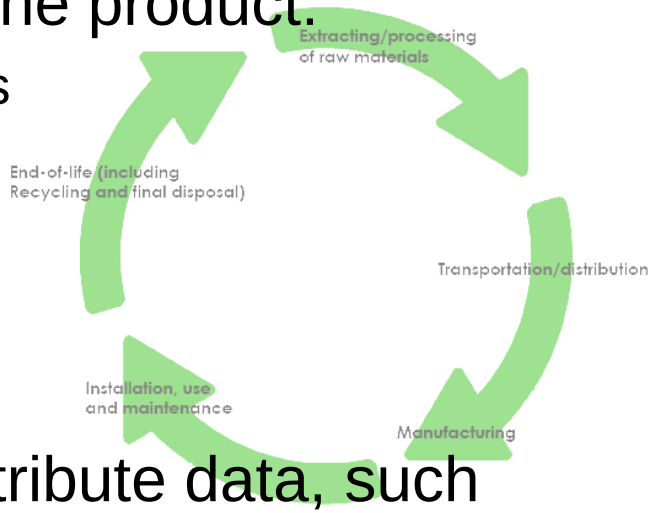
# What is Life Cycle Assessment (LCA)?

# Life Cycle Thinking

- True sustainability of buildings requires a thorough understanding of the impacts of products and materials
- It is important to use life cycle thinking as we design and renovate buildings

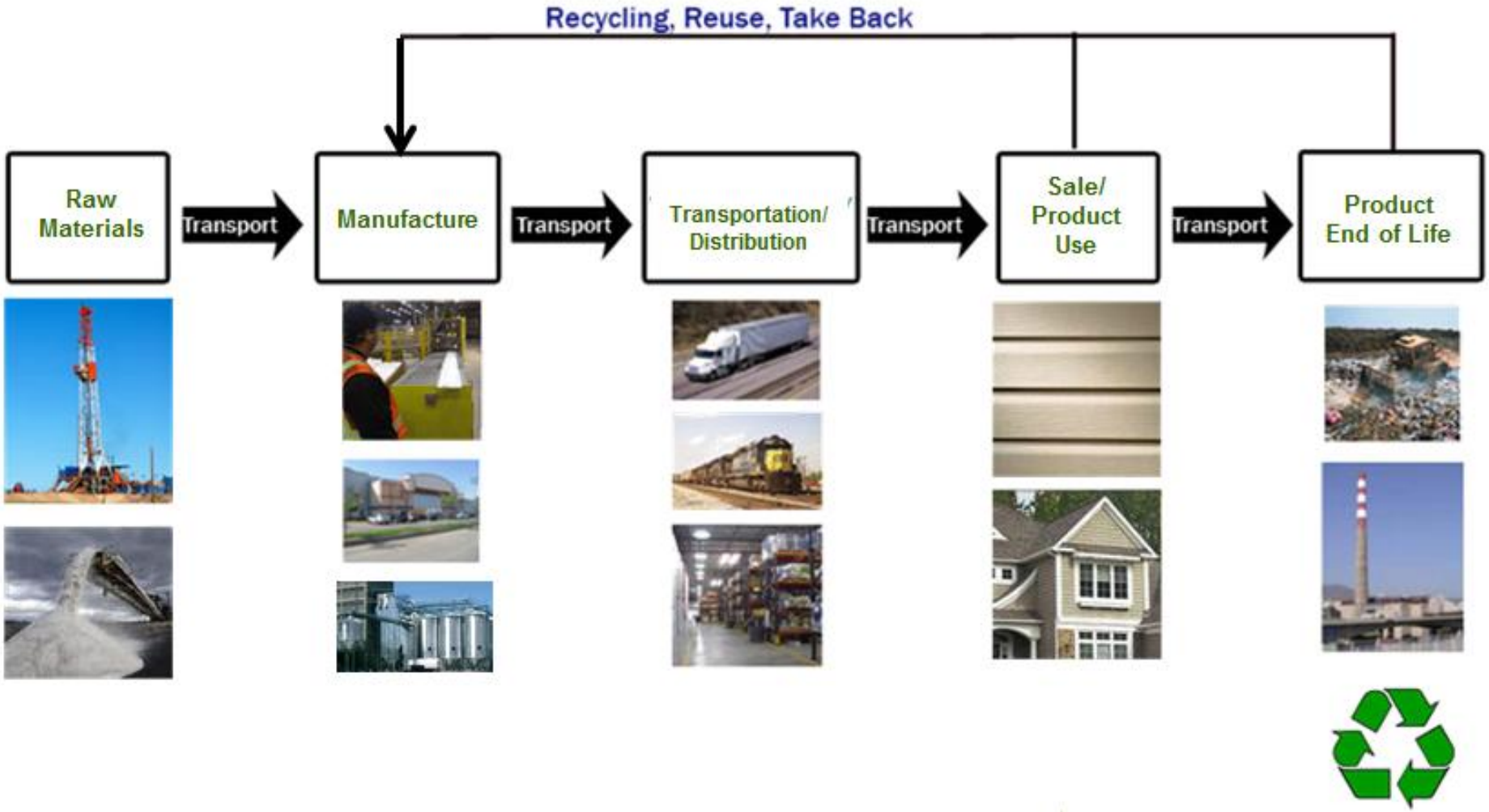
# Life Cycle Assessment

- Life Cycle Assessment (LCA) is a method for identifying the environmental impacts of a product, process or activity over its entire lifespan
- LCA considers the entire life cycle of the product:
  - extraction and processing of raw materials
  - manufacturing
  - transportation and distribution
  - use, reuse, and maintenance
  - recycling and final disposal



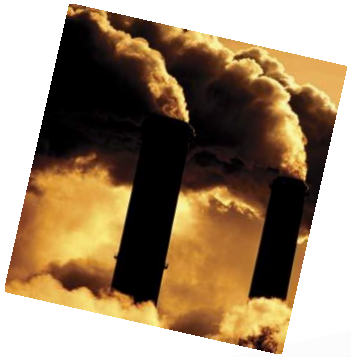

- LCA can be used to develop single attribute data, such as carbon footprinting or embodied energy as well as comprehensive environmental impacts

# Vinyl Siding Product Life Cycle



# Life Cycle Impacts

- Most products create many environmental impacts before they come in to our hands
- Drilling for natural gas, mining metals, fertilizing fields, and other methods for obtaining raw materials all have significant environmental impacts that are hard to see in the final product
- LCA allows us to identify the most environmentally sound products rather than relying on recycled content, renewable materials and other single issue measures




# BEES Vinyl Siding Life Cycle Boundaries

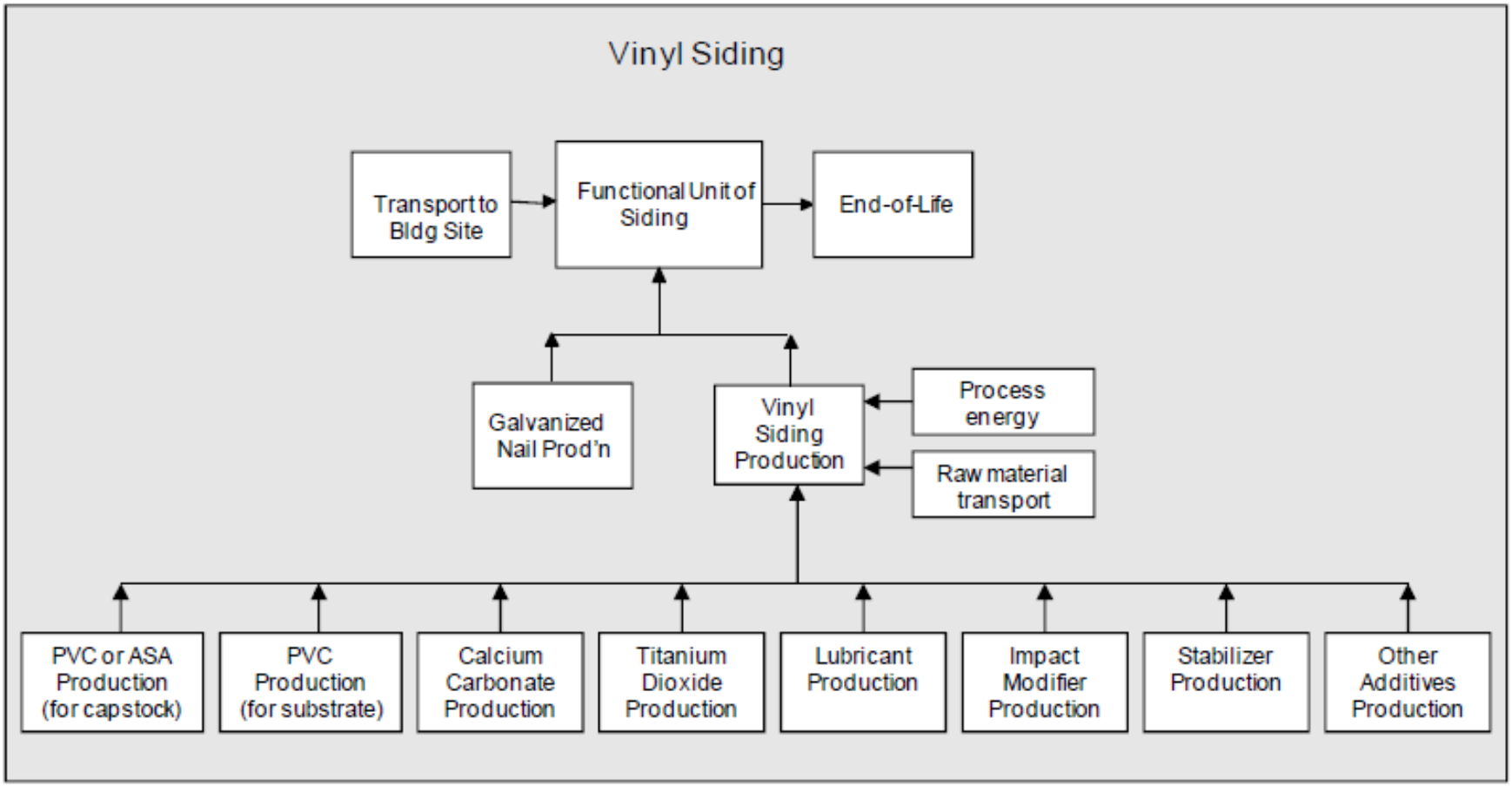



*Figure 1: Vinyl Siding System Boundaries*

Source: BEES

# Typical Impact Categories

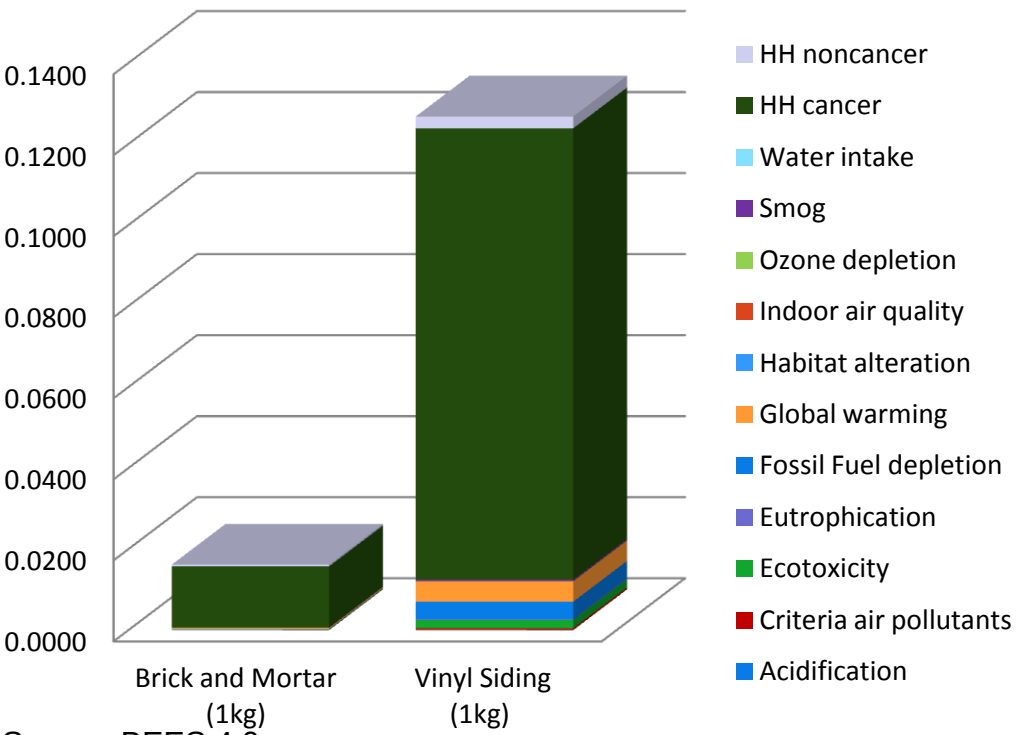
- Air: Smog, Ozone Depletion, Criteria Air Pollutants
- Water: Use, Eutrophication, Acidification
- Human Health: Cancer and Non-Cancer
- Global Warming Potential
- Fossil Fuel Depletion
- Indoor Air Quality
- Habitat Alteration
- Ecotoxicity

# Poll #2

# Functional Unit Example

- Some marketing pieces will try to use the wrong units for comparison or will not explain which units they are using

Comparison by weight, not functional unit

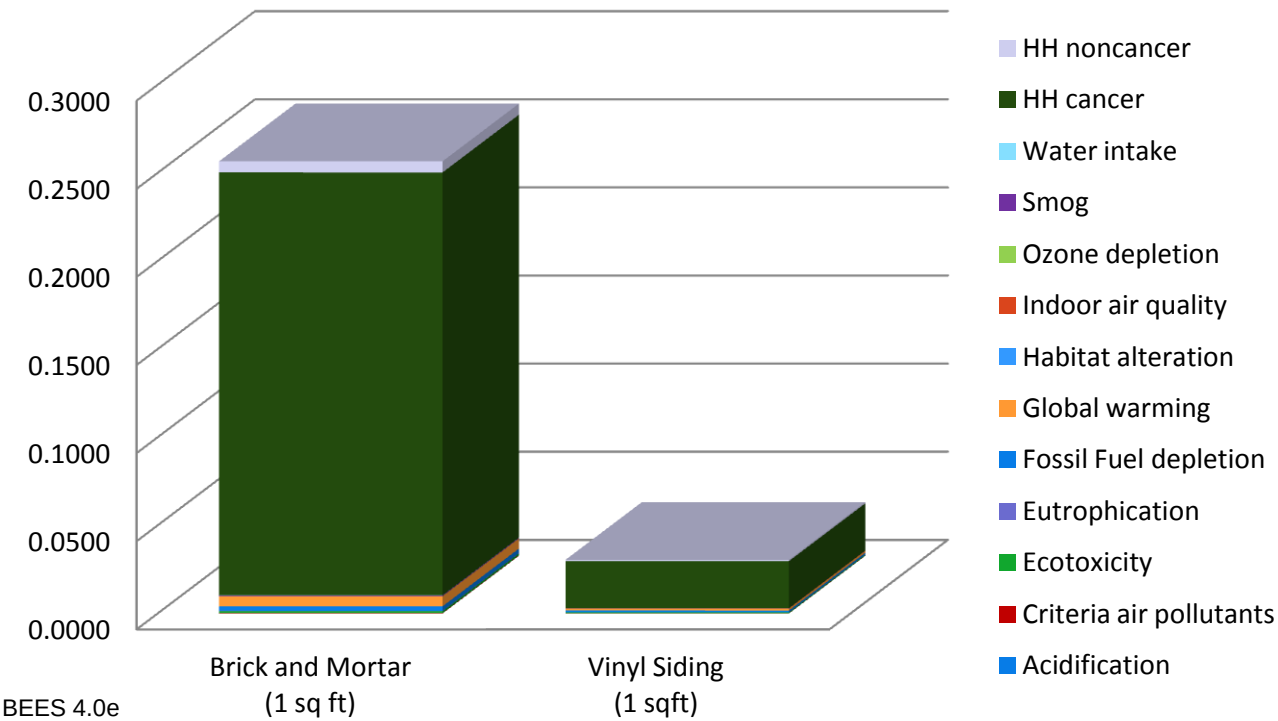



Source: BEES 4.0e

*Brick siding weighs almost 35 lbs per square foot of wall coverage, while vinyl siding only weighs half a pound per square foot*

# Functional Units

- Comparisons of LCA results should always be made using *functional* units
- Functional units are based on how the product is used
- For Siding the functional unit is area of wall covered




Source: BEES 4.0e

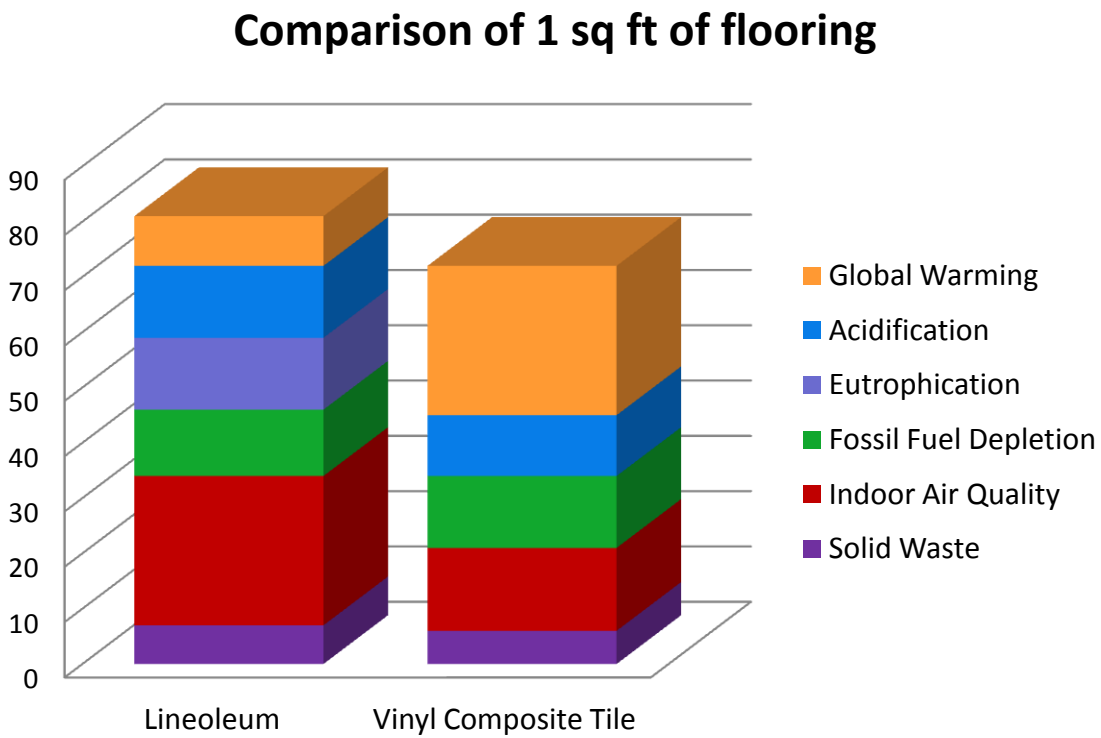
# Choosing the "Greenest" Product

- The results of LCA can be counter-intuitive because we are not always aware of the impacts involved in manufacturing a product
- Linoleum is made primarily from linseed oil and jute, both rapidly renewable products, but the raw materials and the final product must be shipped long distances to reach consumers in the United States
- Vinyl Composite Tile (VCT) is manufactured from petroleum products and limestone but is usually made in the United States, close to consumers

Source: Lippiatt, Barbara. "Selecting Cost-Effective Green Building Products: BEES Approach." Journal of Construction and Engineering Management Nov/Dec (1999): 448-455.

# Choosing the "Greenest" Product

- Choosing the most environmentally sound product is not always as simple as choosing the natural material, or the one with high recycled content




*Despite being made from rapidly renewable materials, linoleum from Europe is slightly worse than VCT in terms of life cycle impact*

Source: Lippiatt, Barbara. "Selecting Cost-Effective Green Building Products: BEES Approach." Journal of Construction and Engineering Management Nov/Dec (1999): 448-455.

# What is being done with LCA?

- Many companies and industry associations are completing LCA for various products. This data is being published in BEES, the NREL LCI database, and as EPDs
- LEED has developed a Pilot LCA credit, and future LEED Standards are expected to integrate credits for product selections based on LCA
- The National Green Building Standard, International Green Construction Code (IgCC) and the California Green Building Code (CALGreen) provide credit for selecting materials using LCA
- Retail companies are using LCA to analyze consumer products and provide information to consumers

# LCA Comparison Tools

# BEES®

- **BEES** (Building for Environmental and Economic Sustainability) is a life cycle analysis tool developed by the National Institute of Standards and Technology (NIST) that makes use of the environmental LCA approach in ISO 14040 series standards.
- BEES provides the ability to compare many building products based on LCA and cost data, allowing the user to choose the best product according to their preferences
- BEES is free and available at the website:

  http://www.nist.gov/el/economics/BEESSoftware.cfm

# ATHENA

- The ATHENA® tools allow the comparison of whole building assemblies, rather than specific products and can be used to create a whole building LCA
- EcoCalculator, the free version, is a spreadsheet based tool useful for comparing assemblies
- Impact Estimator, the advanced tool, is useful for creating whole building LCA's
- More information on Athena is available at:

  http://www.athenasmi.org/our-software-data/overview/

# Environmental Product Declaration

- An Environmental Product Declaration (EPD) is a simplified presentation of the results of an LCA
- They present quantified environmental data for products or systems
- EPDs are well established in Europe, but the necessary standards are still being developed in the United States
- EPDs are generally produced by the product manufacturer

ENVIRONMENTAL PRODUCT DECLARATION

CASHMERE®

CERTAINTEED
CASHMERE® AND FINE FISSURED HIGH NRC MINERAL FIBER CEILING PANELS

*Two families of ceiling products with a range of aesthetic, acoustical, and other performance properties to meet your needs in education, office, and healthcare buildings.*

CertainTeed
SAINT-GOBAIN
Ceilings

CertainTeed Corporation, a subsidiary of Saint-Gobain, is a leading North American manufacturer of interior building materials including gypsum, ceilings, and insulation as well as exterior building materials which include roofing, vinyl and fiber cement siding, trim, fence, railing, decking, foundations, and pipe products. CertainTeed respects the environment through the responsible development of sustainable building products and systems.

Architects, contractors and manufacturers continue to look for ways to reduce our industry's impact on the environment while meeting customer demand for products that deliver beauty, comfort, and performance. CertainTeed Ceilings' respect for the environment is reflected in our ongoing emphasis on sustainable building products and systems. Open sharing of the data we gather on these effects - as embodied in Environmental Product Declarations - is central to the process, and sets CertainTeed Ceilings apart.

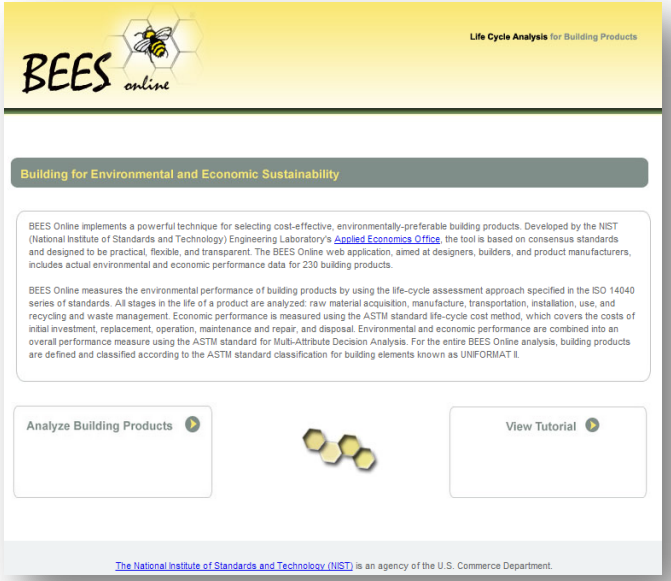
For more information visit
http://www.certainteed.com

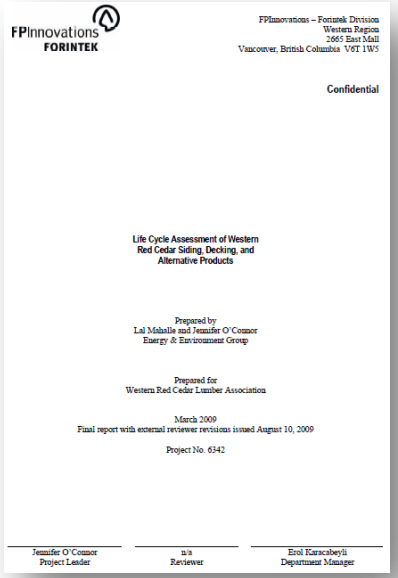
UL
CERTIFIED
ENVIRONMENTAL PRODUCT DECLARATION

# LCA Comparison of Exterior Cladding

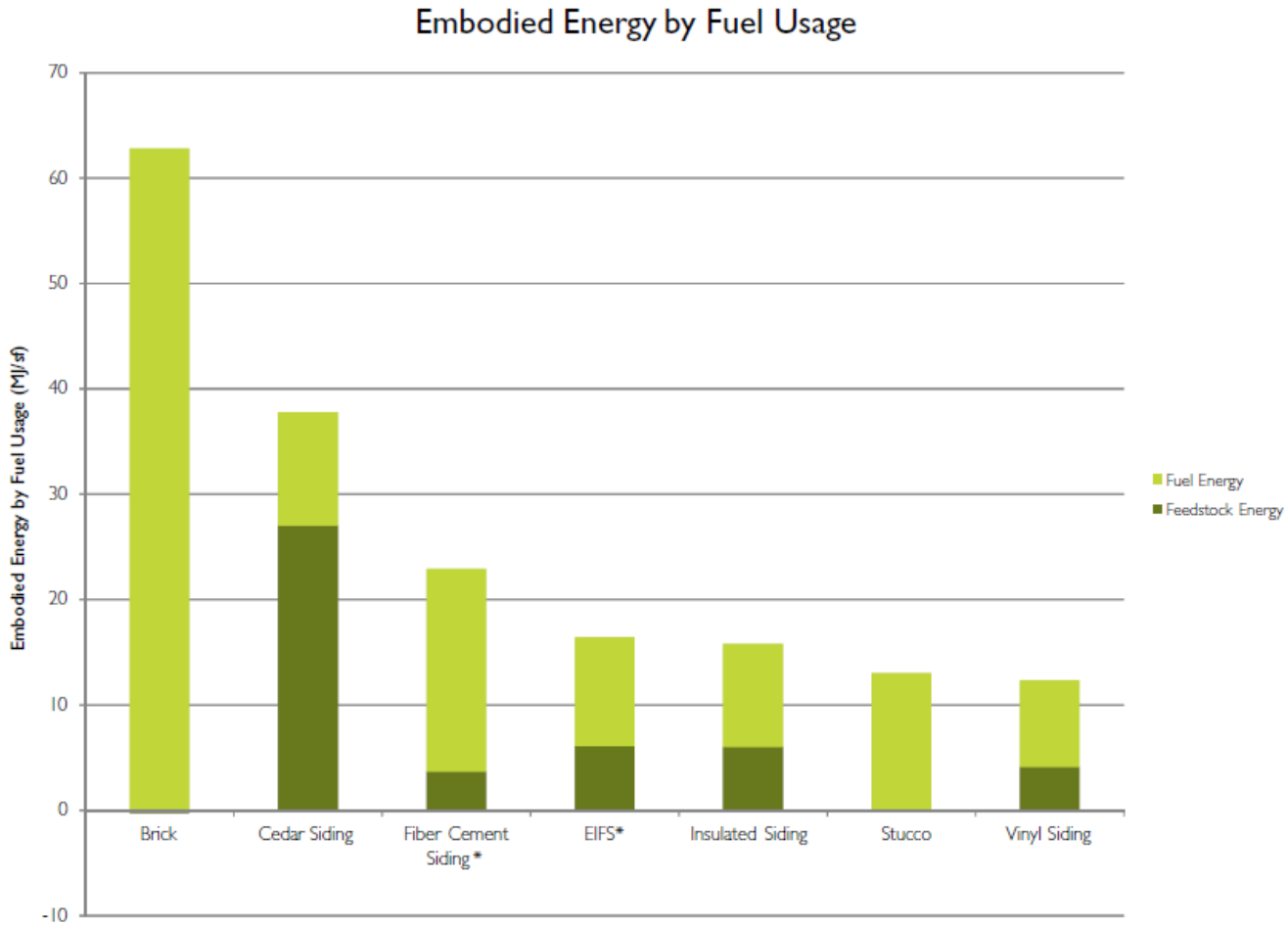
# Comparisons of Exterior Cladding

- A main source of LCA data for comparing various exterior cladding options is BEES
- The Western Red Cedar Lumber Association published a report comparing four cladding options: Western Red Cedar, Brick, Vinyl Siding, and Fiber Cement which shows comparable results to BEES



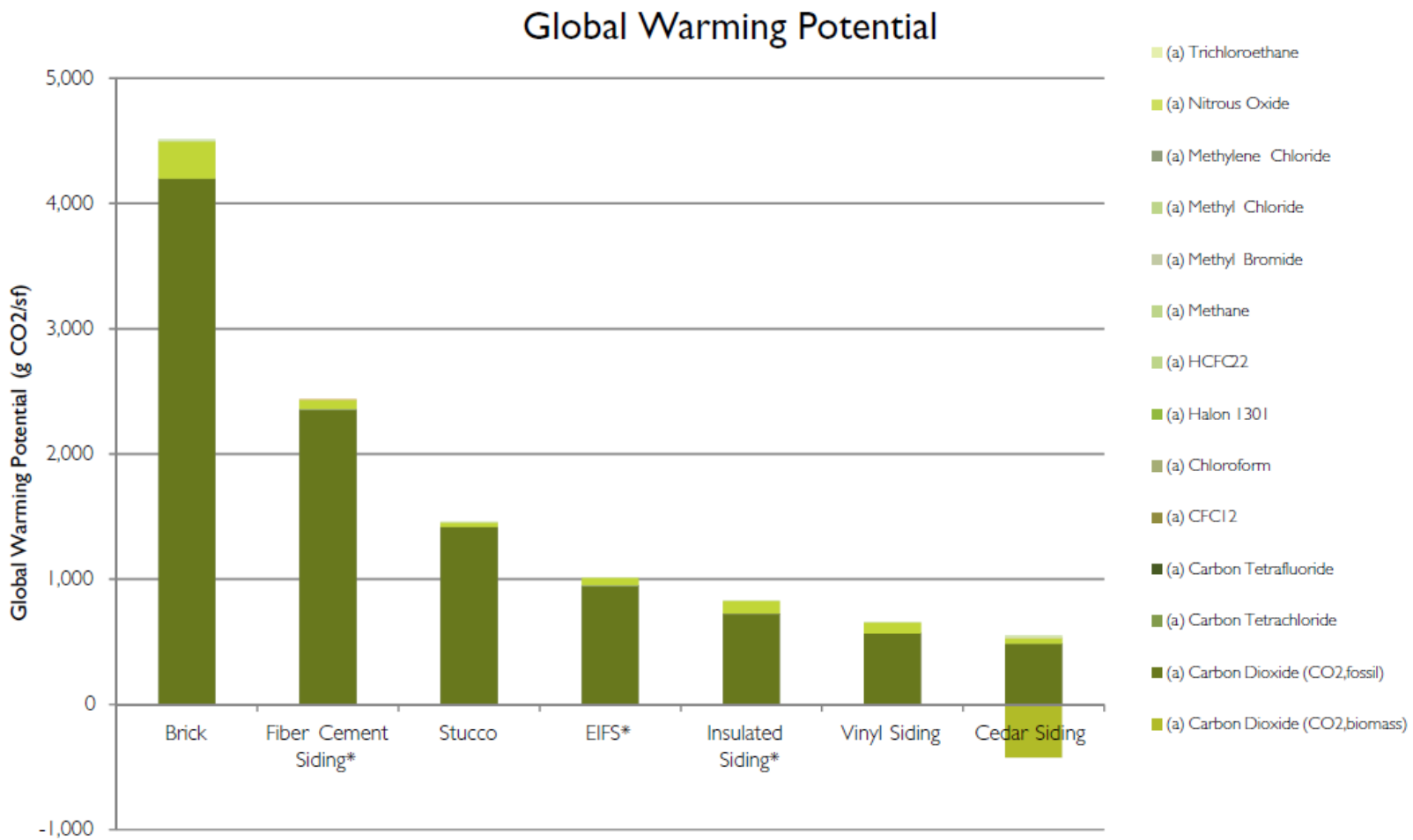
# Embodied Energy by Fuel Usage Comparison




Source: BEES Online, National Institute of Standards and Technology; http://ws680.nist.gov/Bees; October 2012.
*Insulated siding, EIFS and fiber cement siding without recycled content data submitted to BEES by individual companies.
Note: Lower values are better

Figure 1.4 Embodied Energy Comparison

# Global Warming Comparison

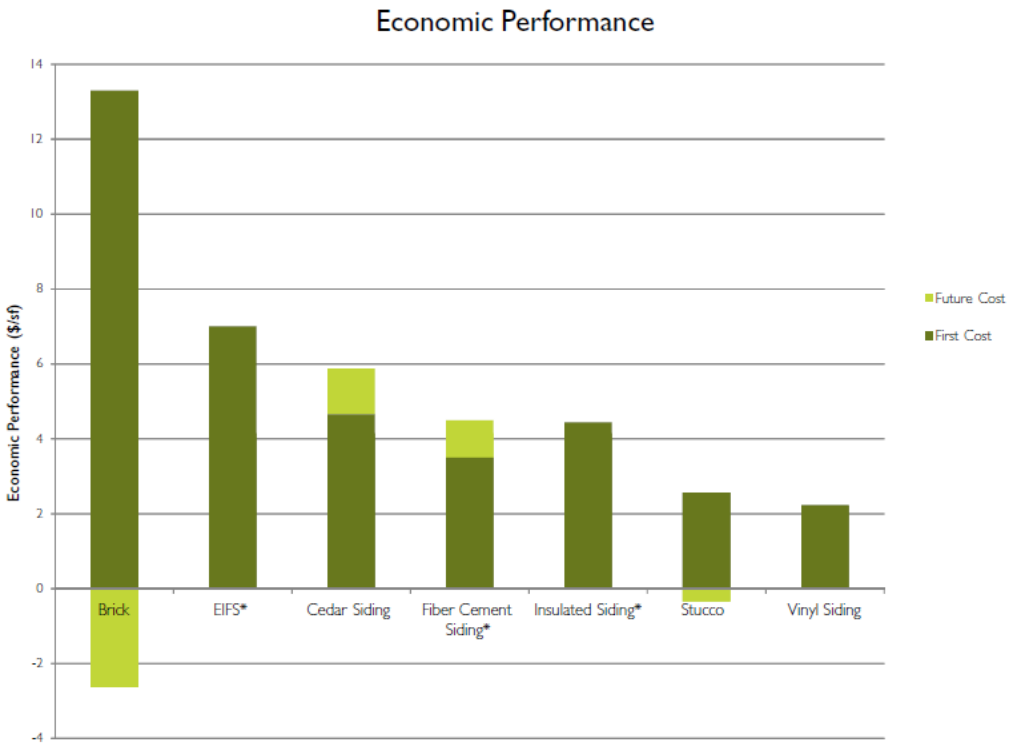



Source: BEES Online, National Institute of Standards and Technology; http://ws680.nist.gov/Bees; October 2012.
*Insulated siding, EIFS and fiber cement siding without recycled content data submitted to BEES by individual companies.
Note: Lower values are better

**Figure 1.5 Global Warming Potential Comparison**

# Economic Performance

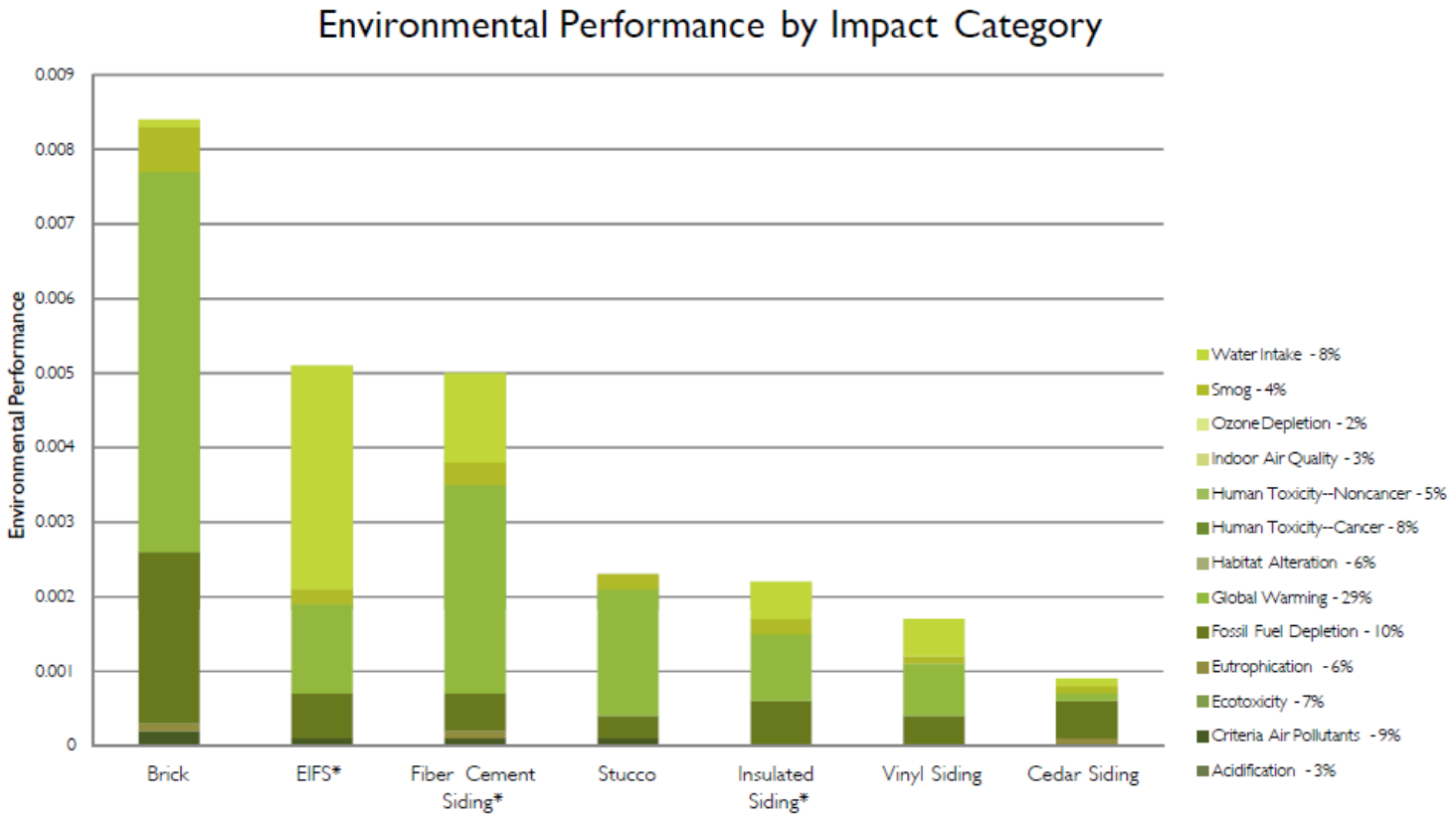
- A key component of selecting sustainable materials that needs to consider installed costs and future costs such as maintenance.
- Maintenance not only adds cost but increases life cycle impacts.
- Consider low maintenance products.




Source: BEES Online, National Institute of Standards and Technology; http://ws680.nist.gov/Bees; October 2012.
*Insulated siding, EIFS and fiber cement siding without recycled content data submitted to BEES by individual companies.
Note: Lower values are better

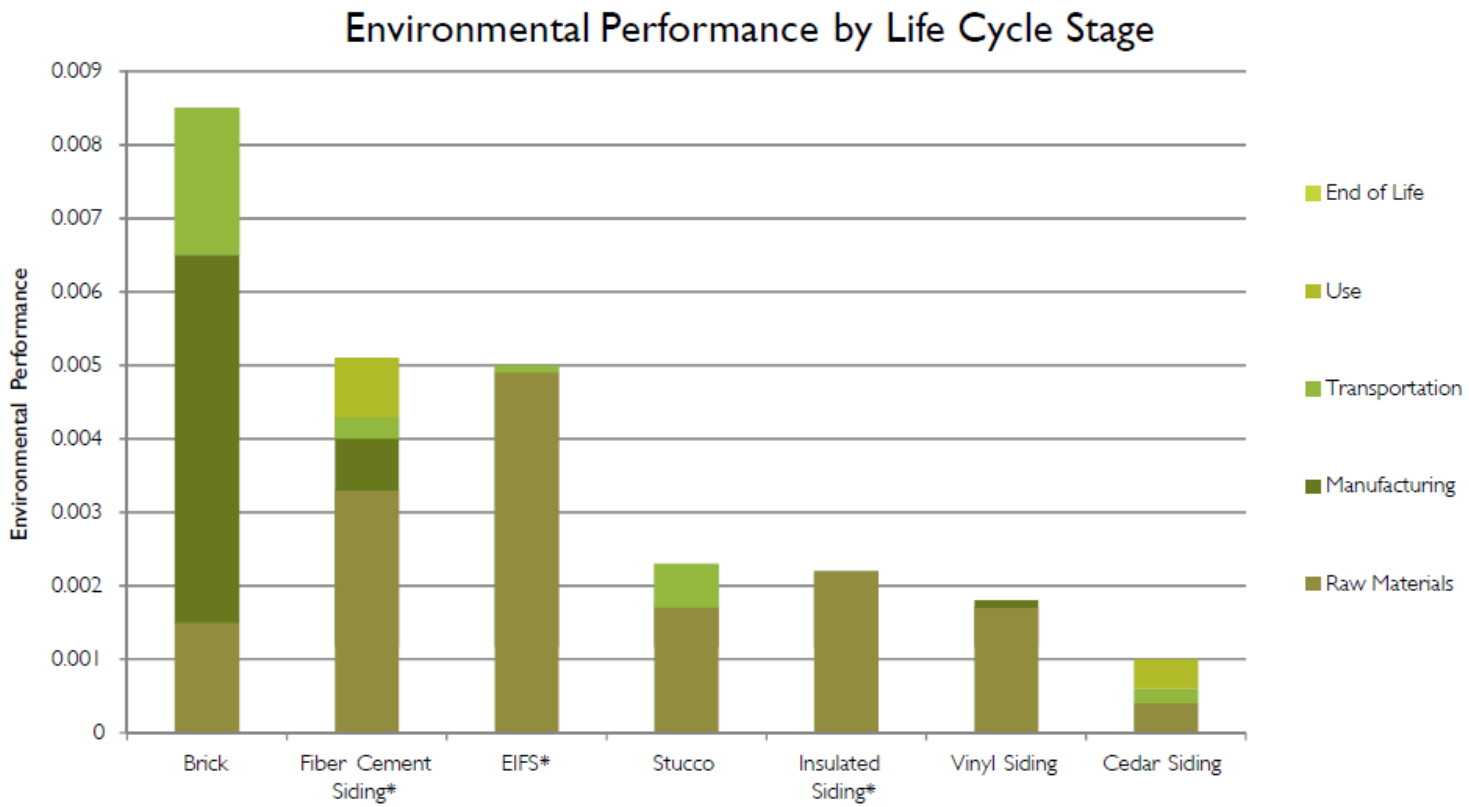
Figure 1.3 Cladding Economic Performance Comparison

# Life Cycle Impact
# Exterior Cladding Comparison




Source: BEES Online, National Institute of Standards and Technology; http://ws680.nist.gov/Bees; October 2012.
*Insulated siding, EIFS and fiber cement siding without recycled content data submitted to BEES by individual companies.
Note: Lower values are better

# BEES Environmental Performance by Life Cycle Stage




Source: BEES Online, National Institute of Standards and Technology; http://ws680.nist.gov/Bees; October 2012.
*Insulated siding, EIFS and fiber cement siding without recycled content data submitted to BEES by individual companies.
Note: Lower values are better

**Figure 1.1 Overall Environmental Performance by Life Cycle Stage**

# Cladding Comparison: Vinyl Siding vs. Fiber Cement

- A summary the life cycle impacts — compared to vinyl siding, fiber cement contributes
  - Almost 2x the embodied energy
  - Almost 4x the global warming potential
  - More than 2x the acidification
  - More than 3.5x the air pollution
  - Approximately 10x the ecotoxicity
  - 2x the eutrophication
  - More than 2x the smog impact
  - Requires more than double the water
  - Almost 150x the human health impact

# Cladding Comparison: Vinyl Siding vs. Brick

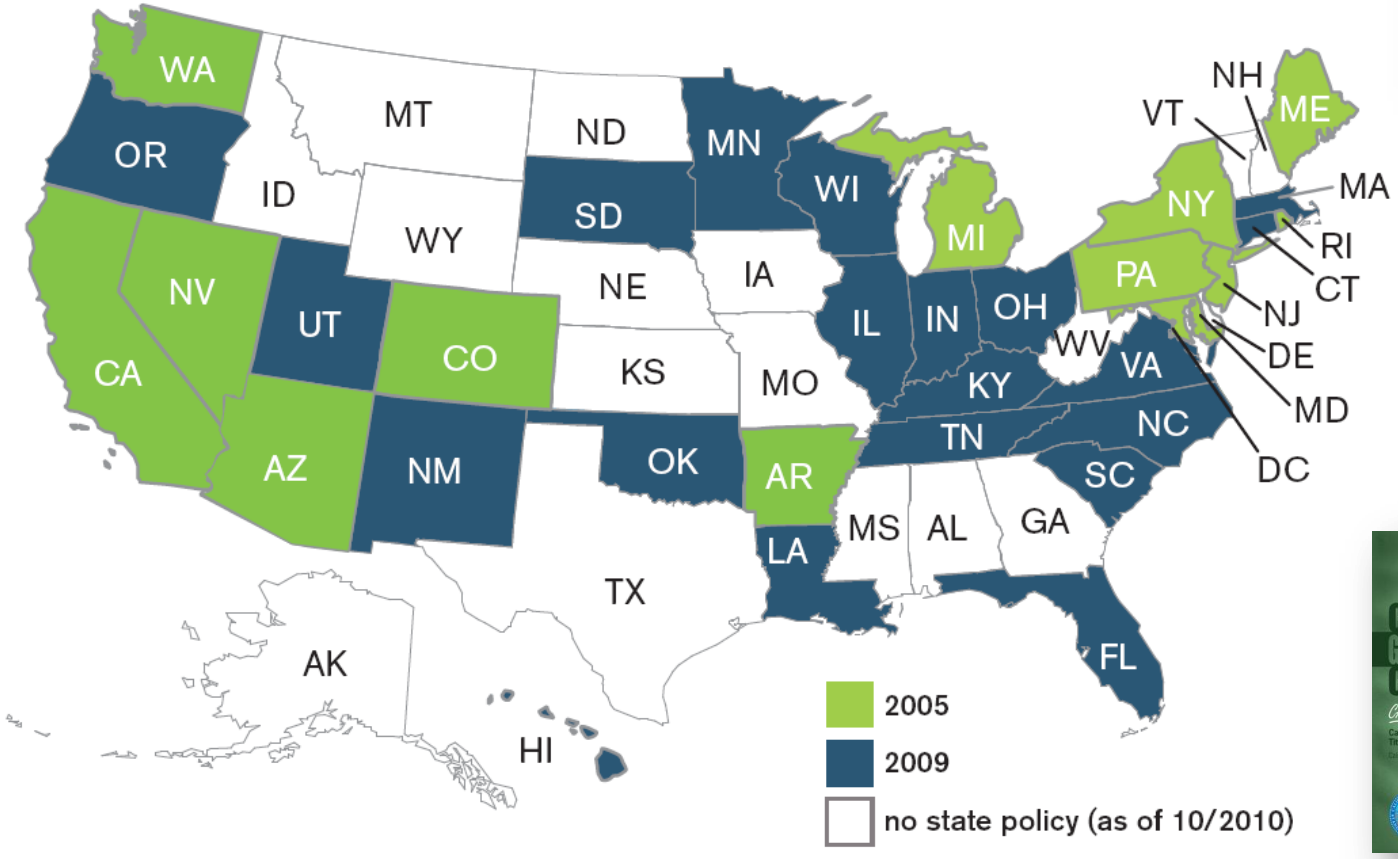
- A summary the life cycle impacts — compared to vinyl siding brick contributes
  - Approximately 5x the embodied energy
  - Nearly 7x the global warming potential
  - More than 5x the acidification
  - More than 6x the criteria air pollutants emissions
  - More than 5x the ecotoxicity
  - 4x the eutrophication
  - More than 5x the smog impact
  - Almost 300x the human health impact

# LCA in Green Building Codes and Standards

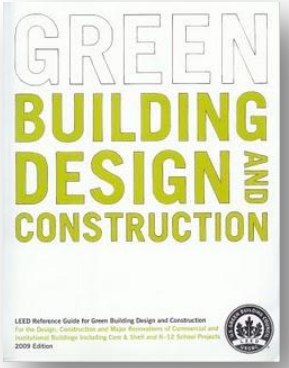
# Legislation

**Location of State-Level Green Building Policies or Legislation**

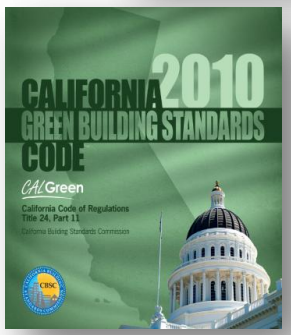
January 2005–October 2010




Source: McGraw-Hill Construction Research and Analytics, January 2005–October 2010.

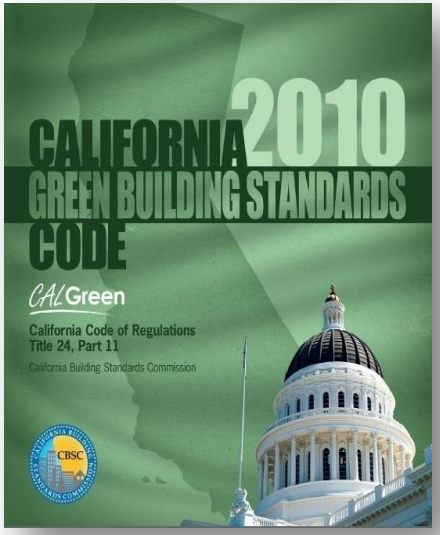


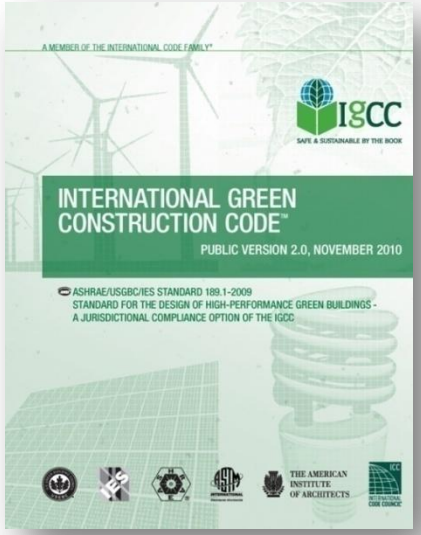




# Green Building Codes: IgCC and CALGreen

- Green building is voluntary in most areas of the U.S.; however, the International Green Construction Code (IgCC) and California Green Building Standards (CALGreen) now make green building a code requirement.



# LEED Building Design and Construction: Pilot Credit

## LEED Pilot Credit Library

Pilot Credit 61: Material Disclosure and Assessment

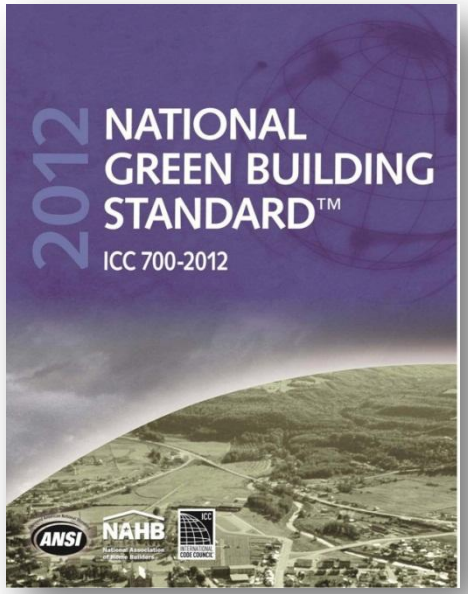
- **Intent:** To increase the use of products and materials with life cycles, ingredients, and attributes understood and optimized to improve overall environmental, economic, and social performance.
- Option 1: Assessment and Optimization of Non-Structural Products
  - Use a minimum of 20%, by cost, permanently installed nonstructural products and elements meeting at least one of the criteria below.
    - Industry Wide (Generic) EPD
    - Product Specific Declaration
- Option 2: Assessment and Optimization of Structure and Enclosure
  - Use a minimum of 20%, by cost, structure and enclosure meeting one of the criteria below.
    - Industry Wide (Generic) EPD
    - Product Specific Declaration

# Siding and LEED v4 Certification (Proposed)

- LEED NC, CS, Schools, Retails, Data Centers, Warehouses & Distribution Centers, Hospitality, and Healthcare
  - MR Credit: Building Product Disclosure and Optimization – Environmental Product Declarations
    - **Intent:** To encourage the use of products and materials for which life-cycle information is available and that have environmentally, economically and socially preferable life-cycle impacts. To reward project teams for selecting products from manufacturers who have verified improved environmental life-cycle impacts.

# National Green Building Standard Credits

- 610.1 Life Cycle Analysis
  - Select the more environmentally preferable product or assembly for an application based upon the use of a Life Cycle Assessment (LCA) tool compliant with ISO 14044 or other recognized standards that compare the environmental impact of building materials, assemblies, or the whole building.
    - (1) pre product/ system comparison
    - (2) whole building LCA
    - (3) two or more products with the same intended use are compared based on LCA and the product with at least a 15% average improvement is selected. The environmental impact measures to be considered are chosen from the following:
      - Fossil fuel consumption
      - Global warming potential
      - Acidification potential
      - Eutrophication potential
      - Ozone depletion potential

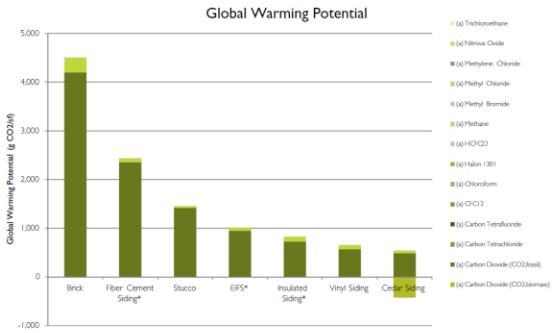


# Vinyl Siding Contributions to Green Building Standards

- Use of vinyl siding on a building can support certification through both LEED® for Homes (H), New Construction (NC), Core and Shell (CS), Schools, Healthcare, Retail, and Canada
  - Construction waste management
  - Sustainably sourced
  - May contain recycled content
  - Regional materials
  - For insulated siding, helps optimize energy use
  - Thermal comfort
  - Material disclosure and assessment
- By using vinyl siding, points can be obtained for resource and energy efficiency in the ANSI approved ICC-700-2012 National Green Building Standard™ (NGBS)
  - No additional finish on site
  - Termite-resistant materials
  - May contain recycled content
  - Recycled construction materials
  - Indigenous materials
  - Life cycle analysis
  - Innovative practices
  - Building energy efficiency
- Most green programs will qualify vinyl siding for points based on it's durability and low maintenance

# The Future of LCA

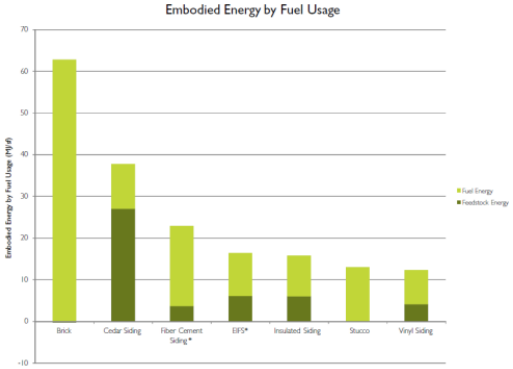
Product LCAs can be used to create building LCA's:




Source: BEES Online, National Institute of Standards and Technology; http://ws680.nist.gov/Bees; October 2012.
*Insulated siding, EIFS and fiber cement siding without recycled content data submitted to BEES by individual companies.
Note: Lower values are better

Figure 1.5 Global Warming Potential Comparison

**Product LCA's**




Source: BEES Online, National Institute of Standards and Technology; http://ws680.nist.gov/Bees; October 2012.
*Insulated siding, EIFS and fiber cement siding without recycled content data submitted to BEES by individual companies.
Note: Lower values are better

Figure 1.4 Embodied Energy Comparison

**Whole Building LCA**

# What to do:

- Educate yourself on the life cycle of products and how to use LCA in order to compare products
- Use life cycle thinking in your selection of products and materials – BEES is a good tool to begin this process
- Ask the manufacturer if they have an LCA, EPD or any information on life cycle impacts of their products
- Look for whole building LCA in the future

# Poll #3

# Learning Objectives

You are now able to:

- Understand the basics and value of Life Cycle Assessment (LCA)
- Discuss the life cycle tools used to compare building products
- Understand the environmental impacts of vinyl siding, fiber cement and other siding products
- Understand how LCA contributes to green building codes and standards
- Understand the future use of LCA for building products and whole building LCA

# Questions?

To complete this course, please click on the link below to take a quick survey:
https://www.surveymonkey.com/s/KJGYK53

For more information on the life cycle of vinyl siding plus other benefits of vinyl siding, visit:
www.vinylsiding.org

VINYL SIDING INSTITUTE
America Sides with Vinyl℠