

The Steel Framing Industry Association

SFIA 103:
Sustainability of
Cold-Formed Steel —
LEED v4



- Welcome & housekeeping
- A word about SFIA
- Speaker introduction
- Presentation
- Q&A

Agenda

Welcome & Housekeeping

- Thank you for attending our webinar today!
- Mics are muted. Please ask any questions in the chat or Questions windows.
- A PDF of the presentation and a Certificate of Attendance will be available in your Steel Framing Learning Portal account after the webinar.
- Please submit your AIA number to Meredith Perez in the chat or email it to Meredith@CFSteel.org if you wish to have your learning units recorded.
- If you are a group viewing the presentation from a single computer, please email Meredith for the **Group AIA attendance form** so we can report LUs for everyone who attended. Meredith@CFSteel.org

Major Programs and Services: Tools, Information and Support

Technical Tools / Services

Marketing / Promotion

Business Planning

	Structural Tons Reported				Total
	Q1'19	Q2'19	Q3'19	Q4'19	
East	51,100	52,368	-	-	103,468
North Central	18,368	20,529	-	-	38,897
South Central	27,605	28,445	-	-	56,050
West	34,441	35,854	-	-	70,295
Total					

	NonStructural Tons Reported				Total
	Q1'19	Q2'19	Q3'19	Q4'19	
East	64,593	65,000	-	-	130,593
North Central	21,539	23,172	-	-	44,711
South Central	22,240	24,899	-	-	47,139
West	24,017	27,806	-	-	51,823
Total	132,389	141,877	0	0	274,266

SFIA Staff

Architectural Services

Educational Programs

Sustainability

Research and Innovation

Advocacy

Certification

Introducing our Speaker!



**Casey F. Robb, FCSI, CCPR™,
CDT®, CSC, LEED® AP**

Has over 35 years of construction experience in architectural promotion, commercial market strategy and specification development for a multitude of top building product manufacturers and industry associations.



SFIA 103: Sustainability of Cold-Formed Steel — LEED v.4
Presenter: Casey F. Robb
Date: March 29, 2023



**Approved
Continuing
Education**

Credit(s) earned on completion of this course will be reported to **AIA CES** for AIA members. Certificates of Completion for both AIA members and non-AIA members are available upon request.

This course is registered with **AIA CES** for continuing professional education. As such, it does not include content that may be deemed or construed to be an approval or endorsement by the AIA of any material of construction or any method or manner of handling, using, distributing, or dealing in any material or product.

Questions related to specific materials, methods, and services will be addressed at the conclusion of this presentation.



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Education**

Course Description

This course will introduce participants to the sustainable benefits of cold-formed steel (CFS), including material recyclability, energy savings, and greenhouse gas reductions by the industry. Specific opportunities to increase building sustainability with cold-formed steel under the U.S Green Building Council's LEED® rating and certification system will be covered.



Approved
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Education

Learning Objectives

1. Be able to identify recycling benefits associated with the use of cold-formed steel framing
2. Be able to identify progress made by steel producers in reducing energy use and greenhouse gas emissions
3. Have a basic understanding of the latest version of LEED®
4. Be knowledgeable of the specific LEED® requirements that are associated with cold-formed steel and resources available to assist in meeting those requirements



Main Goal

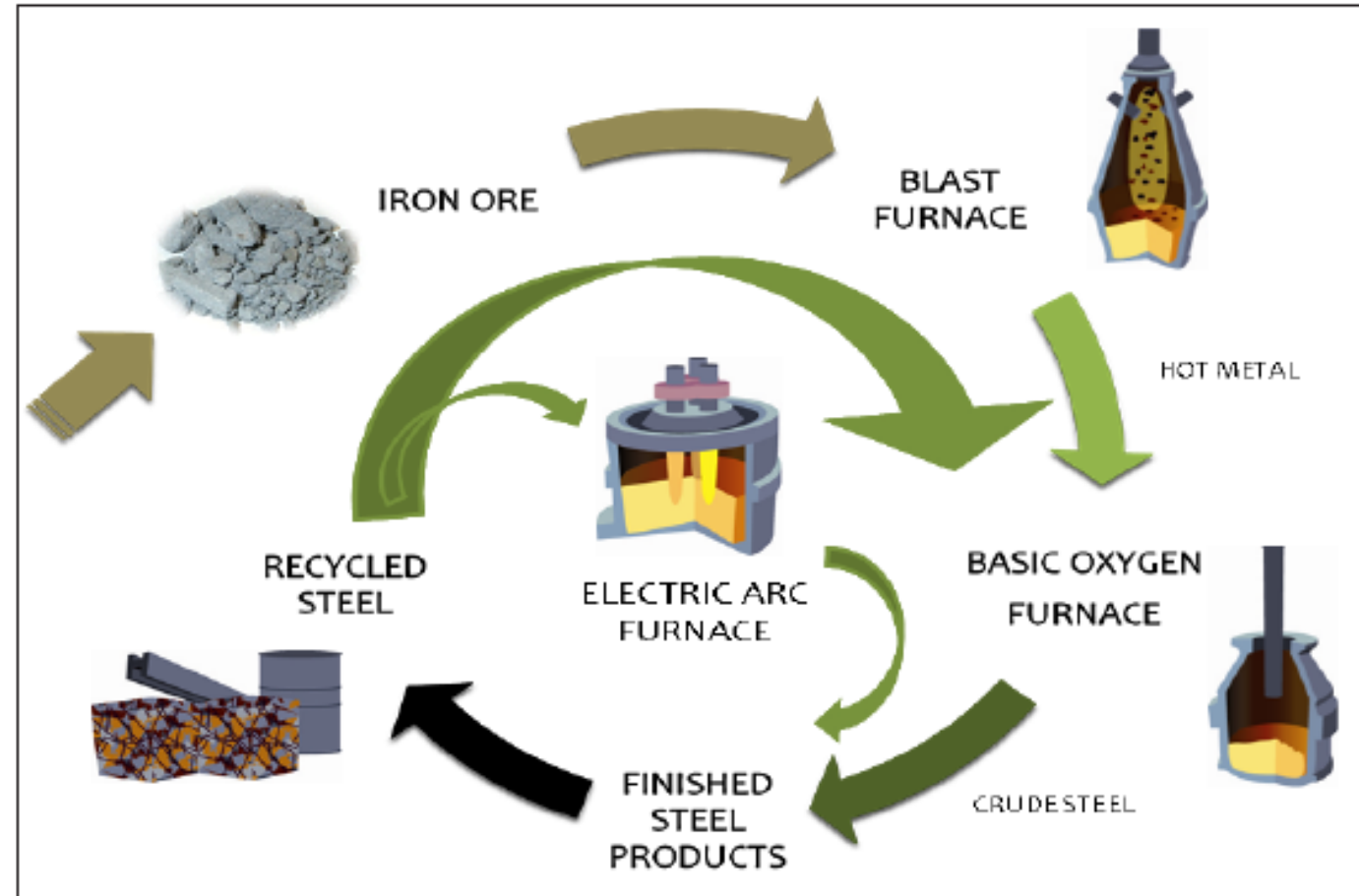
Participants will have a better understanding of cold-formed steel framing, and how this information relates to the latest LEED® requirements for new commercial building construction.

- Recycled content of CFS
- Energy use reductions with steel production
- Greenhouse gas reductions with steel production
- Introduction and background on LEED®
- Specific LEED® requirements that relate to CFS
- Available tools/methods for meeting requirements

Presentation Outline

Recycled Steel

- 80% of post-consumer steel is recycled
- Steel recovery rate for construction is 85%
- EAF's can be charged with 90 to 100% recycled steel
- Basic Oxygen Furnace can be charged with 30% recycled steel



Steel & Recycling

- Steel scrap removed from the waste stream and recycled exceeds the combined totals of paper, plastic, glass, copper, lead and aluminum
- The 2050 Recycling rate goals for construction steel is set at 90%
- Over 1,400 kg of iron ore, 400 kg of coal, and 55 kg of limestone are saved for a tonne of steel scrap used
- 450 million tonnes of hot rolled steel produced from 100% scrap would save approximate 634 million tonnes of CO2 in one year

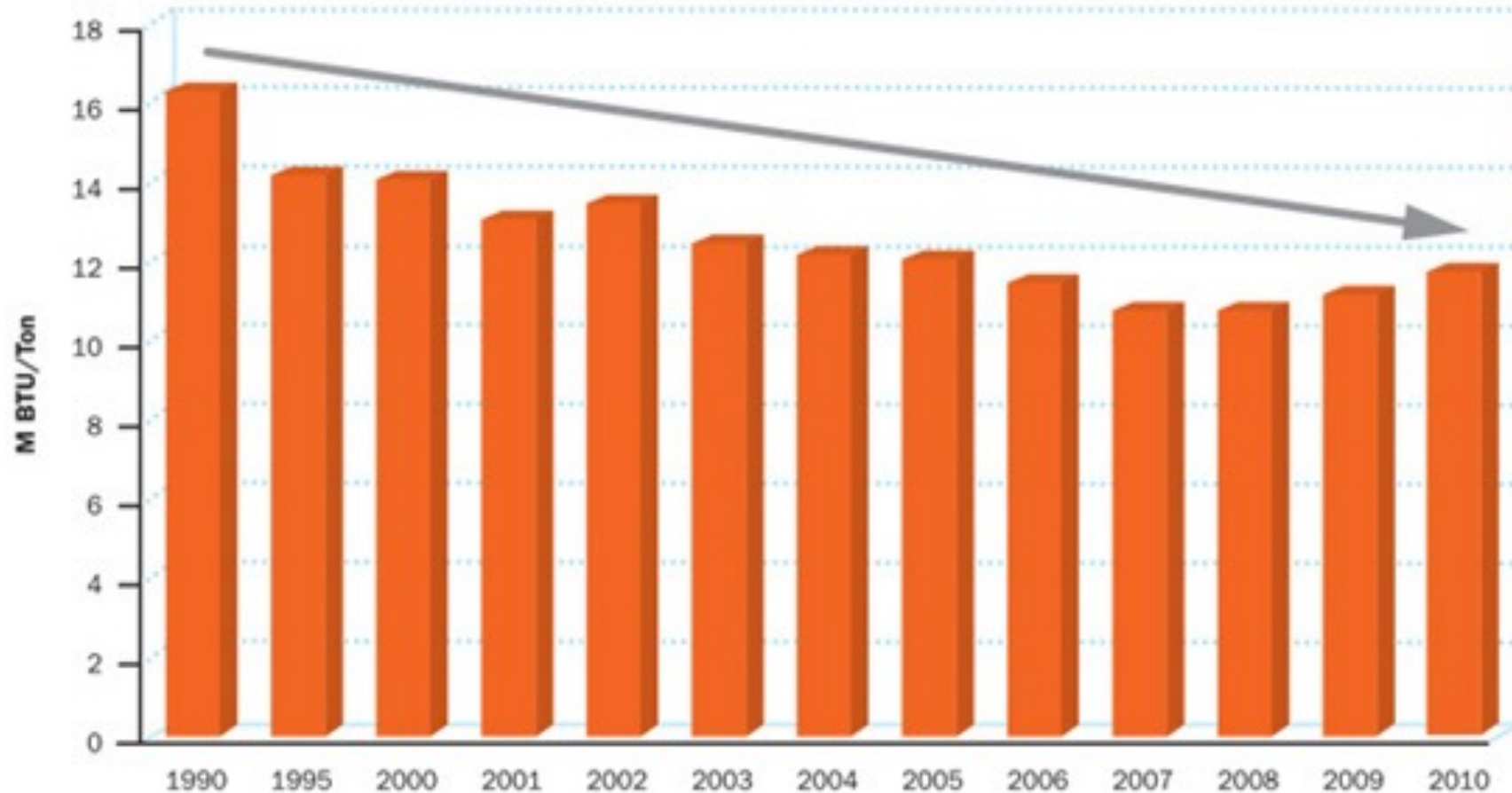
Steel & Recycling

In 2007, approximately 1.4 million tonnes of steel rail were shipped to customers across the US. Based on railroad industry reports, an estimated 1.46 million tonnes of straight rail were put into service, thus over 340,000 tonnes of straight rail were reused during this period. Eliminating the need to produce 340,000 tonnes of new rail products equates to saving of 811,600 tonnes of CO₂.



Energy Reduction

The Steel Industry Improved its Energy Efficiency by 27% Since 1990



Source: American Iron and Steel Institute

Life Cycle Assessment

- Energy cost are 20% of total manufacturing
- Technology change
 - EAF vs. BOF (12.5 vs 31.2 GJ/t energy intensity)
- Process change
 - Scrap preheating
 - Strip casting
 - Oxygen injection
- Cold-formed steel contains less than 13.2 MBtu embodied energy per ton

Low Embodied Energy

Wall Type	Embodied Energy (MMBtu/SF)	CO2 Equivalent (lbs/SF)
2x4 wood studs (16" oc) + Gypsum Board	0.03	2.84
2x4 wood studs (24" oc) + Gypsum Board	0.03	2.78
Steel Studs (16" oc) + Gypsum Board	0.04	3.99
Steel Studs (24" oc) + Gypsum Board	0.04	3.64
6" Concrete Block + Gypsum Board	0.21	34.02
6" Concrete Block	0.19	32.34

Reference: Athena Institute

Greenhouse Gas Emissions (GHG)

- According to EPA:
 - US Steel industry has reduced GHG by almost 47%



Recycling & LCA's

- Case study in Portugal
 - “Life Cycle Comparison of a Light-Weight Steel House VS. a Concrete House”
 - “the reuse of steel allows saving approximately 50% of embodied energy which would otherwise be wasted.”



Recycling & LCA's

- Key Conclusions of Study
 - “Life Cycle Analysis highlights the advantages of steel construction in the pursuit of the aims of sustainable construction.”
 - “The recycling potential of steel and the ability to be reused are two of the most important features of steel structures.”



LEED® Green Building Rating & Certification System

- Leadership in Energy & Environmental Design (LEED)
- Developed by U.S. Green Building Council
 - Non-profit organization
 - Formed 1993
- Initially published: 2000
- Latest versions*:
 - LEED v4.1 still in Beta
 - LEED v4 opened Nov. 2013
 - LEED 2009 registration closed June 2015

ABOUT USGBC

OUR MISSION

To transform the way buildings and communities are designed, built and operated, enabling an environmentally and socially responsible, healthy and prosperous environment that improves the quality of life.

OUR VISION

Buildings and communities will regenerate and sustain the health and vitality of all life within a generation.



Steel & LEED®

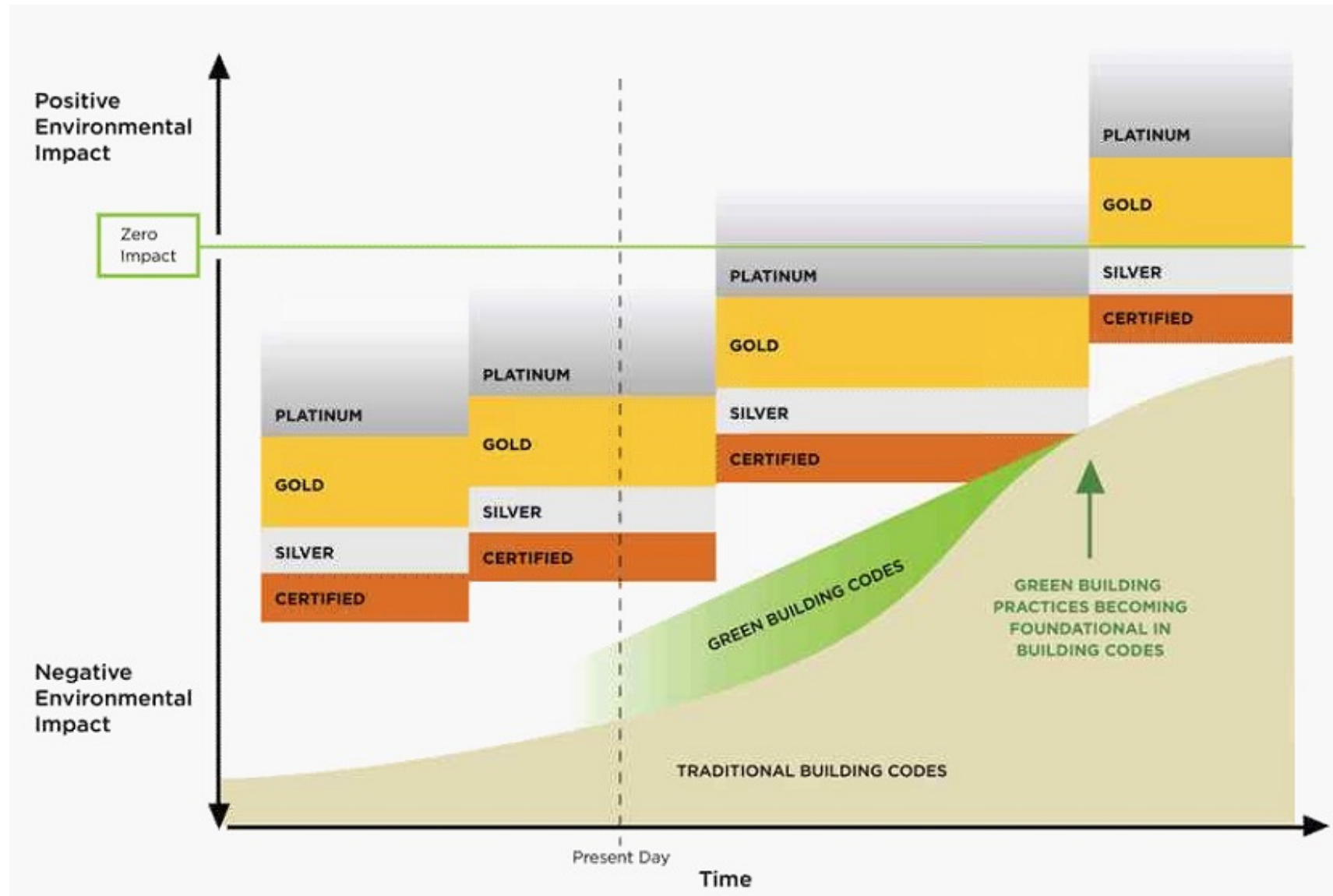
- Poly Canyon Student Housing (Calif. PolyTechnic State U.)
 - Recycled content
 - Panelization & regional material
 - LEED® Gold



LEED® is Continually Evolving

- Current version is LEED v4
- LEED v4.1 has been released as a beta version
- No sunset date for v4 has been established
- No firm indication yet when v4.1 will move out of beta status, although one can register and use the beta version now
- LEED v4 will likely be the current version for the foreseeable future with an overlap period between v4 and v4.1

LEED® Intent to “Improve Environmental Outcomes”



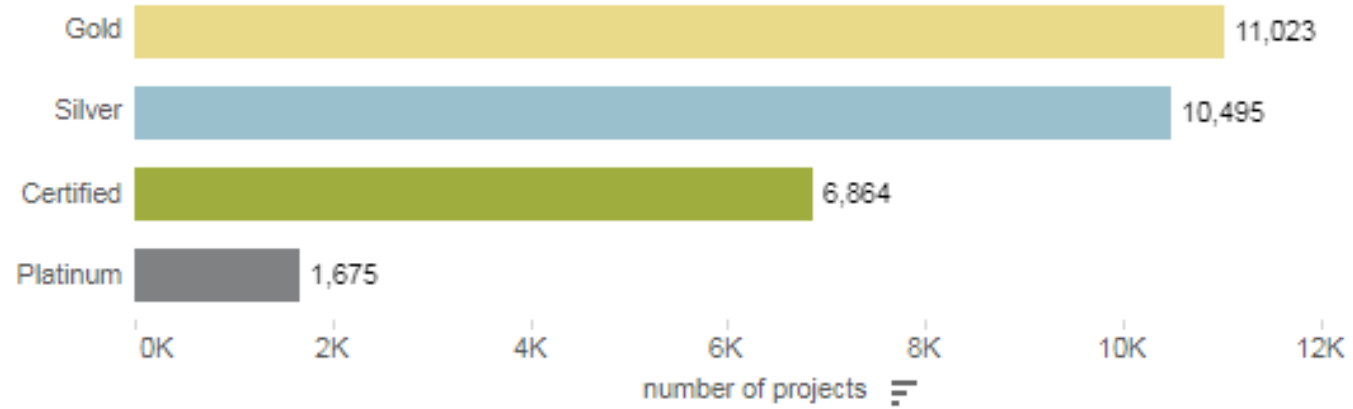
Source: LEED

LEED® Market Uptake (Global)

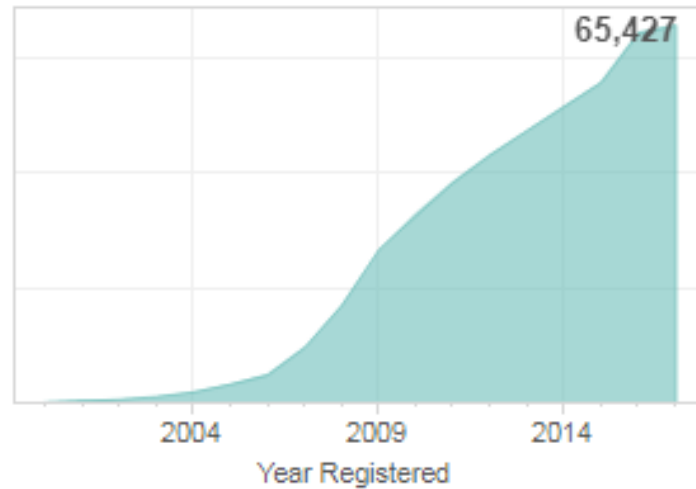
- As of 2019:
 - 165 countries and territories with LEED projects
 - More than 100,000 total commercial projects using LEED
 - More than 39,000 projects certified
 - Over 1,000 LEED v4 projects in 60 countries registered

LEED® in the US

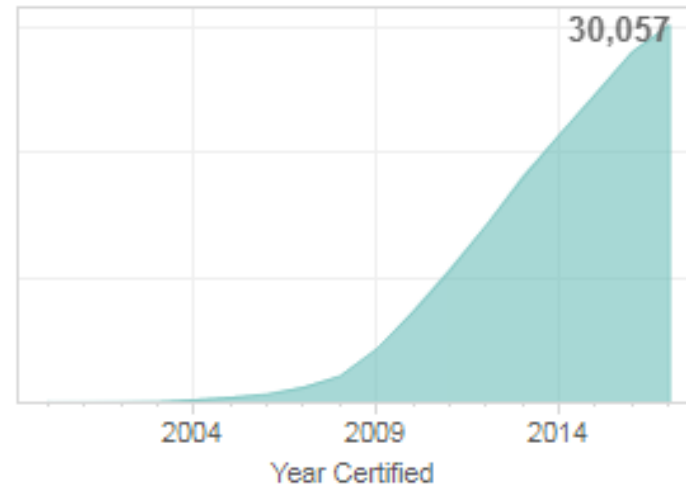
LEED® Achievement



Cumulative LEED® Registrations



Cumulative LEED® Certifications



Source: <https://www.usgbc.org/advocacy/country-market-brief>

LEED® v4 BD+C

What has changed with LEED v4?

- Clear focus on transparency and performance
- New Integrative Process credit incentivizes LEED considerations at project start
- New credit category to address project location and transportation considerations
- Incorporates international requirements
 - LEED is used in over 160 countries
- Complete rewrite of Materials & Resources section
 - Whole building LCA
 - EPDs
 - Disclosure of Chemical Ingredients
 - Responsible Extraction of Raw Materials



LEED® v4 Rating Systems

- Building Design and Construction
- Operations and Maintenance
- Interior Design and Construction
- Homes and Multifamily Mid-Rise
- Neighborhood Development
- Cities and Communities



Highest level



Minimum Level

LEED® v4 BD+C



Certified

40-49 points earned



Silver

50-59 points earned



Gold

60-79 points earned



Platinum

80+ points earned



Source: USGBC website

Materials & Resources Credits in LEED v4

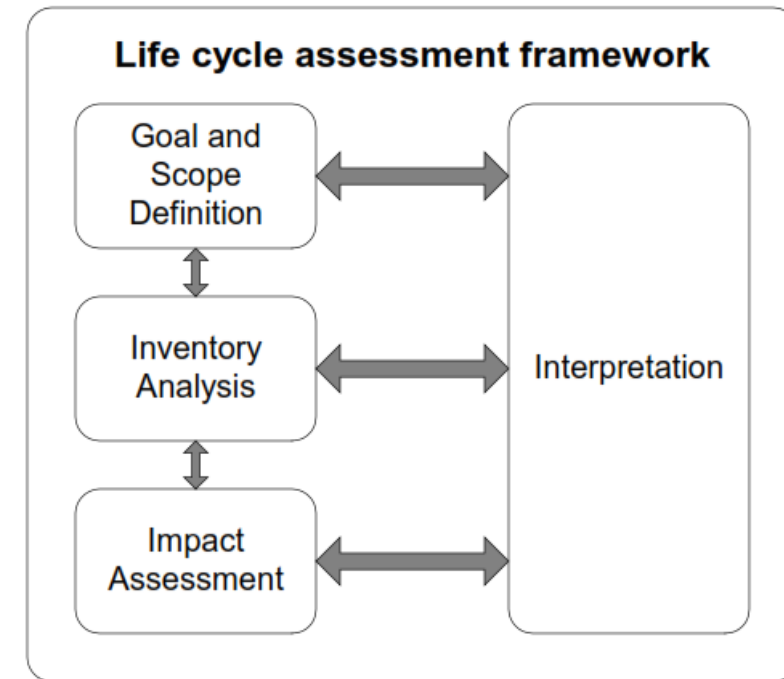
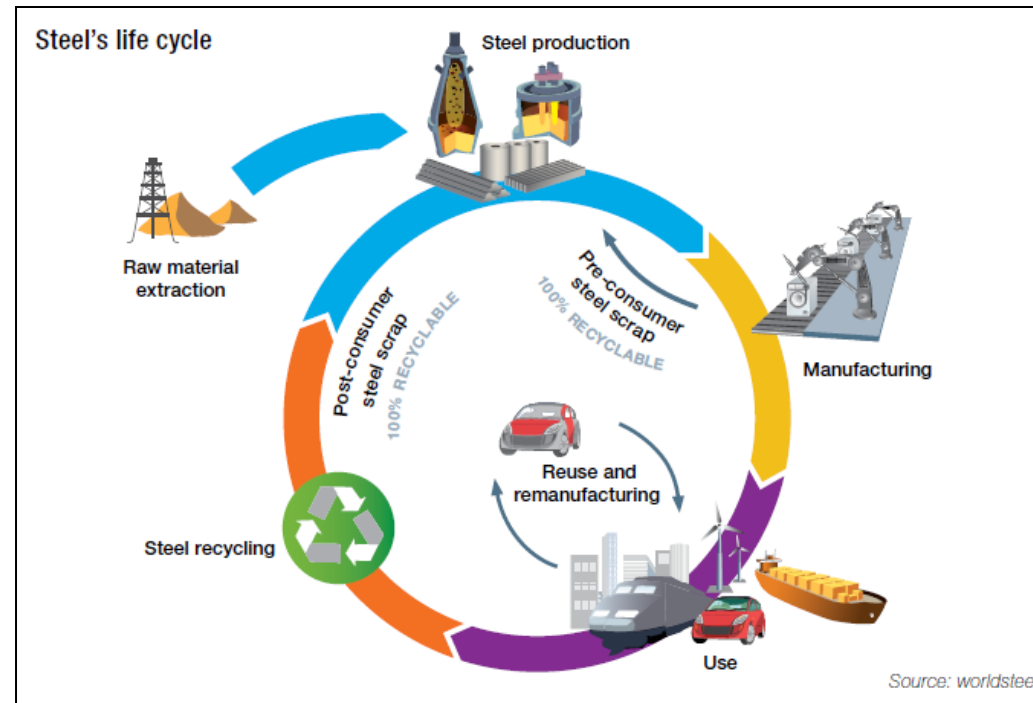


			Materials and Resources	Possible Points:	13
Y			Prereq 1 Storage and Collection of Recyclables		Required
Y			Prereq 2 Construction and Demolition Waste Management Planning		Required
			Credit 1 Building Life-Cycle Impact Reduction		5
			Credit 2 Building Product Disclosure and Optimization - Environmental Product Declarations		2
			Credit 3 Building Product Disclosure and Optimization - Sourcing of Raw Materials		2
			Credit 4 Building Product Disclosure and Optimization - Material Ingredients		2
			Credit 5 Construction and Demolition Waste Management		2
			Total	Possible Points:	110

Certified 40 to 49 points Silver 50 to 59 points Gold 60 to 79 points Platinum 80 to 110

Life Cycle Assessment (LCA)

Standardized, comprehensive method to evaluate potential environmental and human health impacts of a product, material, process, or service throughout its life cycle.


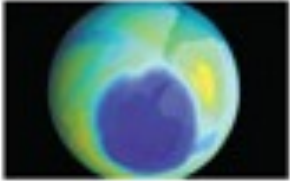





Life Cycle Impact Assessment (LCA)

Most commonly reported →

Additional impacts:

- Human health toxicity
- Eco-toxicity
- Resource depletion (fossil fuel and mineral)
- Land use change
- Biodiversity impacts / habitat disruption

Impact Category Indicators	
Global Warming Potential	
Ozone Depletion Potential	
Acidification Potential	
Smog Potential	
Eutrophication Potential	

LEED® v4 BD+C Reuse & Whole Building LCA



Building Life Cycle Impact Reduction (5 points)

- Intent: encourage adaptive reuse and optimize environmental performance of products and materials
- Four options, including full or partial building reuse
 - Option 1: Historic building reuse (5 points)
 - Option 2: Renovation of abandoned or blighted building (5 points)
 - Option 3: Building and material reuse (2-4 points)
 - Steel products are durable and have a long useful lifetime
 - Bolted or screwed connections well-suited for disassembly; welded connections can be cut without compromising members
 - Steel framing allows for long spans and large column-free spaces that are adaptable and flexible; steel partitions easily relocated.
 - Option 4: Whole-building Life Cycle Assessment (3 points)
 - Life cycle inventory (LCI) data is available for nearly all steel construction products, allowing designers to complete the LCA process

LEED® v4 BD+C Whole Building LCA



Option 4 – Whole-building LCA

- Design must show 10% reduction in at least 3 of the following vs. “reference building” (one must be GWP):
 - Global warming potential (kg CO₂e);
 - Depletion of the stratospheric ozone layer (kg CFC-11);
 - Acidification of land and water sources (moles H⁺ or kg SO₂);
 - Eutrophication (kg nitrogen or kg phosphate);
 - Formation of tropospheric ozone (kg NO_x or kg ethene); and
 - Depletion of nonrenewable energy resources (MJ).
- No impact category may increase by more than 5%.

LEED® v4 BD+C EPDs



Building Product Disclosure and Optimization – Environmental Product Declarations (EPDs)

- 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.

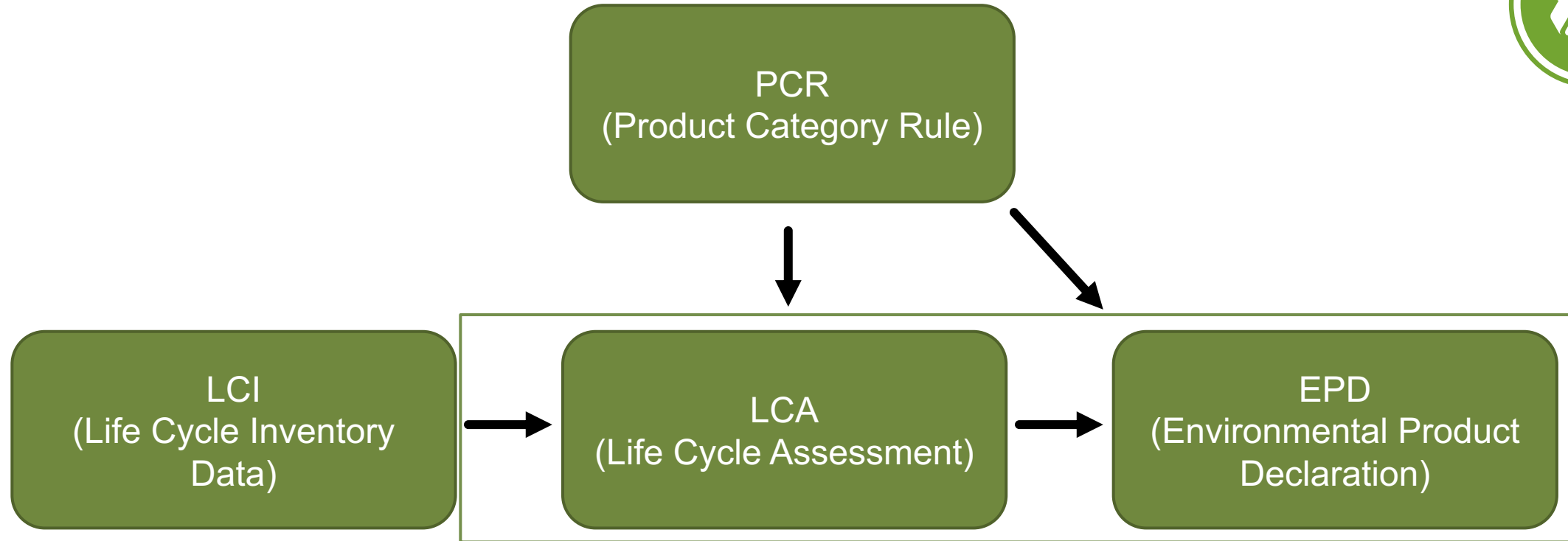
LEED® v4 BD+C EPDs



Building Product Disclosure and Optimization – EPDs (2 points)

- Option 1 (1 point) – EPDs for 20 different products from at least 5 manufacturers
 - Product Specific Type III EPD = 1 product
 - Industry-wide (generic) EPDs = ½ product
 - Product Specific Declarations (LCA) = ¼ product
- Option 2 (1 point)– Multi-attribute Optimization : must meet one of the following (50% of total cost)
 - Third party certified products – demonstrate impact reduction below industry average in at least three of six impact categories
 - Location Valuation Factor applies

EPD Development Process



- Standardized process through ISO
- Guided by a Program Operator
- Various stages of review and verification!

SFIA EPD for CFS Studs & Track

<https://www.cfsteel.org/environmental-product-declaration>

Environmental Product Declaration

SFIA |
Cold-Formed Steel Framing



Declaration Owner

Steel Framing Industry Association
513 W. Broad Street, Suite 210,
Falls Church, VA 22046
Phone: 703.538.1720
www.cfsteel.org

Product:

Cold-formed Steel Framing

Declared Unit

The declared unit is one ton of industry-averaged cold-formed steel framing product

EPD Number and Period of Validity

SCS-EPD-07103
EPD Valid May 28, 2021 through May 27, 2026
Version: January 25, 2022

Product Category Rule

PCR Guidance for Version 3.2. Part A. UL Environment. Sept. 2018

PCR Guidance for Building-Related Products and Services. Part B:
Designated Steel Construction Product EPD Requirements. UL
Environment. v2. August 2020.

Program Operator

SCS Global Services
2000 Powell Street, Ste. 600, Emeryville, CA 94608
+1.510.452.8000 | www.SCSglobalServices.com



Steel Construction Product Industry-wide EPDs

Available at: <http://www.buildusingsteel.org/why-choose-steel/product-transparency.aspx>

The following EPDs are the most current. They are available for free download:

- Cold-Formed Steel Framing – from the Steel Framing Industry Association
- Open Web Steel Joists and Joist Girders – from the Steel Joist Institute
- Steel Roof Deck and Steel Floor Deck – from the Steel Deck Institute
- Fabricated Steel Plate – from the American Institute of Steel Construction
- Fabricated Hot-Rolled Structural Sections – from the American Institute of Steel Construction
- Fabricated Hollow Structural Sections – from the American Institute of Steel Construction and Steel Tube Institute
- Roll-Formed Cladding: Wall and Roof Cladding Systems – from the Metal Construction Association
- Insulated Metal Panels – from the Metal Construction Association
- Primary Structural Steel Frame Components – from the Metal Building Manufacturers Association
- Secondary Structural Steel Frame Components – from the Metal Building Manufacturers Association
- Roll-Formed Metal Wall and Roof Panels – from the Metal Building Manufacturers Association
- Hot-Dip Galvanized Steel After Fabrication: Galvanized Hot-Rolled Sections, Plate and Hollow Structural Sections – from the American Galvanizers Association
- Hollow Structural Sections – from the Steel Tube Institute



American Galvanizers Association



Location Valuation Factor



- Applies to several credits in MR section, including EPD optimization
- “Adds value to locally produced products and materials”
- Products and materials extracted, manufactured, and purchased within 100 miles of the project are valued at 200% of their cost (i.e., the valuation factor is 2).
- Distance measured as the crow flies

Location Valuation Factor



Figure 1. Example material radius

Source: LEED V4 reference Guide

CFS Framing in LEED v4 — Materials & Resources



- Prerequisite: Construction & Demolition Waste Management Planning (required)
- Credit: Construction and Demolition Waste Management (1-2 points)
 - Steel products can be manufactured to precise specifications, resulting in minimal job site scrap, all of which can be easily and economically recycled

CFS Framing in LEED v4 — Materials & Resources



- Credit: BPDO – Sourcing of Raw Materials (1-2 points)
 - Option 1: Raw Material Source and Extraction Reporting (1 point)
 - Requires reporting of the environmental impacts of extraction operations and activities associated with the product and its supply chain. Several North American steel producers publish CSR reports annually that address this.
 - Option 2: Leadership Extraction Practices (1 point)
 - Use of products containing recycled content qualifies here. LEED allows a 25% minimum post-consumer content for steel.
- Credit: BPDO – Material Ingredients (1-2 points)
 - Can be achieved by developing a “... publicly available inventory of all ingredients identified by name and Chemical Abstract Service Registration Number (CASRN).”
 - HPDs, Cradle-to-Cradle certifications, and Declare Labels are beginning to emerge for steel products.

More LEED Resources



Steel
Market Development
Institute



**LEED V4 FACT SHEET
FOR STEEL PRODUCTS USED IN
CONSTRUCTION APPLICATIONS**

<https://www.buildusingsteel.org/why-choose-steel/sustainability/>

More LEED Resources



STEEL FRAMING INDUSTRY ASSOCIATION

LEED® with COLD-FORMED STEEL

SUSTAINABLE STEEL

Steel is one of the world's most sustainable construction materials. Its strength and durability coupled with its ability to be endlessly recycled without ever losing quality make it truly compatible with long-term sustainable development. The steel industry is one of the few industries that can claim to have truly embraced the benefits of reducing energy to manufacture its products. Since 1990 the steel industry in North America has reduced the energy use per ton of steel produced by 31%.

An authentic solution for sustainable building construction

Each year, more steel by weight is recycled in North America than paper, plastic, aluminum and glass, combined. In 2012 alone, 88 million tons of steel were recycled in North America.

- Recycling steel saves the energy equivalent to power 20 million homes for one year.
- All North American steel products have a significant amount of recycled content, including some products with more than 90 percent.
- While other building materials can only be recycled into a lower quality product, steel can be recycled repeatedly and remade into new products without any loss of quality. It's the only true cradle-to-cradle building material.
- Steel is durable. It doesn't rot or serve as food for termites. Coated cold-formed steel used in construction has built-in corrosion resistance that will last hundreds of years beyond the life of a building. Cold-formed steel framing doesn't need maintenance or replacement like other materials.
- Steel used in buildings produces little to no construction waste, unlike other structural materials. Cold-formed steel is typically delivered to building sites in pre-manufactured or cut-to-length products to minimize costs and waste.



<https://www.cfsteel.org/leed-and-sustainability>



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**This concludes The American Institute of
Architects Continuing Education Systems Course**



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