LEED v4.1 vs LEED v5
Implications for Reinforcing Steel (Rebar) by Stakeholder

Leadership in Energy and Environmental Design (LEED) is a globally recognized green building certification program developed by the U.S. Green Building Council (USGBC) to guide and evaluate sustainable design and construction practices. It provides a framework for creating high-performance buildings that reduce environmental impact, conserve resources, and improve occupant well-being. While the USGBC has many products within its suite of rating systems, this resource focuses only on requirements for Building Design and Construction.

Within LEED, materials such as reinforcing steel play an important role in achieving sustainability goals by contributing to credits under the Materials and Resources (MR) category. Projects can earn credits through specifying reinforcing steel with verified EPDs and lower embodied carbon.

Reinforcing steel supplied to ASTM standards A615 (Standard Specification for Deformed and Plain Carbon-Steel Bars for Concrete Reinforcement) and A706 (Standard Specification for Deformed and Plain Low-Alloy Steel Bars for Concrete Reinforcement) support recycled-content goals because, in the U.S., A615/A706 rebar is typically produced in electric arc furnace (EAF) mills using very high recycled content (often over 97%) and is infinitely recyclable at the end of a structure's life. Buildings earn certification levels of Certified, Silver, Gold, or Platinum based on overall points, and the latest LEED v5 version strengthens the focus on embodied carbon reduction, making documentation and sourcing of low-carbon reinforcing steel a critical component of sustainable structural design.

This document outlines the key differences between LEED v4.1 and LEED v5 as they relate to reinforcing steel and describes what each stakeholder—Architect, Engineer, Mill, Fabricator, and General Contractor—needs to know and do to remain compliant and competitive under LEED v5.

1. Architect

Primary Role: Sets the project's LEED strategy and specifies material compliance in Division 03 (Concrete/Reinforcing Steel).
Under LEED v4.1, MR credits applicable for reinforcing steel focused on increased recycled content and supplying EPDs to ensure transparency. Under LEED v5, the emphasis of MR credits shifts to embodied carbon assessment and use of reduced embodied-carbon materials. Architects are responsible for ensuring that the specifications explicitly require reinforcing steel that has a product-specific EPD and meets reduced embodied carbon goals. They must coordinate with engineers and LEED consultants to define measurable targets for embodied carbon reduction.
Key Actions:
- Update specifications to require reinforcing steel with product-specific EPDs.
- Coordinate with engineers to confirm equivalent structural performance for alternate

products.
- Collect EPDs and supporting documentation for LEED submission.

2. Structural Engineer

Primary Role: Ensures that reinforcing steel meets design, code, and sustainability requirements.

The engineer evaluates alternative low-carbon materials and confirms compliance with structural codes (ACI, ASTM, IBC). Under LEED v5, engineers are responsible for validating embodied carbon data and confirming that material substitutions do not compromise safety or performance.

Key Actions:

- Approve mills and fabricators with product-specific EPDs.

- Confirm structural equivalency of reduced embodied carbon or alternate materials.

- Support embodied carbon reporting for LEED MR credits.

3. Reinforcing steel Mill

Primary Role: Produces reinforcing steel and supplies verified, product-specific EPDs. Mills have the largest direct impact on embodied carbon outcomes. LEED v5 elevates the importance of plant-specific, third party-verified EPDs. Reinforcing steel mills must track energy mix, recycled content, and embodied carbon intensity (kg CO_2e per ton).

Key Actions:

- Maintain current, Type III, product-specific EPDs (A1–A3 cradle-to-gate data).

- Document recycled content and EAF/BOF production routes.

- Provide verified embodied carbon-intensity data to fabricators and design teams.

4. Fabricator

Primary Role: Cuts, bends, and assembles reinforcing steel while maintaining traceability and documentation. Fabricators act as the link between mills and general contractors, responsible for consolidating mill certificates and EPDs into LEED-compliant documentation packages. Under LEED v5, documentation rigor increases significantly.

Key Actions:

- Maintain traceability from mill to project.

- Include current product-specific EPDs and mill certifications with each shipment.

- Coordinate with the GC or LEED consultant for project documentation upload.

5. General Contractor

Primary Role: Implements procurement and manages LEED documentation compliance.

The GC ensures all project materials meet LEED documentation requirements and coordinates between design, procurement, and construction teams. Under LEED v5, the GC becomes more active in tracking embodied carbon data and verifying submittals.

Key Actions:

- Collect and upload EPDs, mill certs, and recycled content reports.

- Verify embodied carbon compliance with project specifications.

- Manage supplier communication to ensure documentation completeness.

LEED v4.1

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Requirements in relation to structural materials (including reinforcing steel)

For projects in New Construction, Core & Shell, Schools, Retail, Data Centers, Warehouses & Distribution Centers, Hospitality and Healthcare, the LEED v4.1 Building Design and Construction Materials and Resources Credit: Environmental Product Declarations (EPDs) provides multiple compliance pathways that serve distinct purposes and apply different evaluation criteria.

Option 1 EPD is a disclosure-based pathway.
Under this option, products are recognized based on the availability and type of verified Type III EPDs, either industry average or product-specific, developed in accordance with ISO 14025 and EN 15804 or ISO 21930. Option 1 does not require demonstration of environmental performance improvement relative to a baseline; rather, it rewards transparency and standardized reporting of life-cycle impacts. Product valuation is assigned based on EPD type and verification status, without reference to percentage reductions in environmental impact indicators.

Option 2 (Embodied Carbon/LCA Optimization) is a performance-based pathway.
Under this option, products are evaluated based on demonstrated reductions in environmental impacts relative to a defined baseline, using comparative life-cycle assessment or product-specific Type III EPDs. Option 2 explicitly requires quantification of improvements in global warming potential and, at higher performance tiers, reductions across additional environmental impact categories. Product contribution values increase with the magnitude and breadth of demonstrated impact reductions, subject to third-party verification requirements.

The criteria summarized in Table 1 below corresponds to LEED v4.1 Option 2 (Embodied Carbon/LCA Optimization). The table reflects tiered valuation thresholds based on percentage reductions in global warming potential relative to a baseline scenario, as well as additional reductions in selected environmental impact categories. These characteristics are unique to Option 2 and are not applicable to Option 1 compliance.

Table 1: Option 2 (Embodied Carbon/LCA Optimization)

Report Type	Reference Document(s) for the Optimization Report	Report Verification	Valuation
Embodied Carbon/LCA Action Plan	Product-specific LCA or product-specific Type III EPD	Prepared by the manufacturer and signed by company executive	½ product
Reductions in Embodied Carbon: less than 10% reduction in GWP relative to baseline	Baseline: Product-specific LCA, Product-specific Type III EPD, or Industry-wide Type III EPD Optimized: Product-specific LCA or product-specific Type III EPD	Comparative analysis is verified by an independent party	1 product
Reductions in Embodied Carbon: 10%+ reduction in GWP relative to baseline	Baseline: Product-specific LCA, Product-specific Type III EPD, or Industry-wide Type III EPD Optimized: Product-specific LCA or product-specific Type III EPD	Comparative analysis is verified by an independent party	1.5 products
Reductions in Embodied Carbon: 20%+ reduction in GWP and 5%+ reduction in two additional impact categories, relative to baseline	Baseline: Product-specific LCA or Product-specific Type III EPD Optimized: Product-specific LCA or product-specific Type III EPD	Comparative analysis is verified by an independent party	2 products

Note-1: Reference documents for the optimization reports must be compliant with EPD Credit Option 1.
Note-2: In LEED tables, the term "industry-wide" is used interchangeably with "industry-average". This document treats the terms as equivalent.
Note-3: Definitions:
Product-specific Type III EPD: A third-party verified Type III EPD (ISO 14025) that covers a single product, or a small group of sufficiently equivalent products, such that product-to-product variability is minimized and the reported environmental impacts represent that defined product.
Facility-specific EPD: A third-party verified Type III EPD (ISO 14025) that reports environmental impacts based on data from a single manufacturer and a single facility (plant) at which the final product is manufactured.

Life-Cycle Impact Categories

For Option 2 evaluations, comparative assessments shall address, at a minimum, GWP (in units of kg CO_2 equivalent) and may show reductions in two of the following impact categories, depending on the report type chosen by the project team:

- *Depletion of the stratospheric ozone layer, expressed as kilograms of CFC-11-equivalent.*
- *Acidification of terrestrial and aquatic systems, expressed as moles of H^+-equivalent or kilograms of SO_2-equivalent.*
- *Eutrophication potential, expressed as kilograms of nitrogen-equivalent or phosphate-equivalent.*
- *Formation of tropospheric ozone, expressed as kilograms of NO_x-equivalent, O_3-equivalent, or ethene-equivalent; and*
- *Depletion of nonrenewable energy resources, expressed in megajoules using CML or depletion of fossil fuels using TRACI.*

Regional Sourcing Valuation Adjustment

Consistent with LEED v4.1 credit calculation rules, products that are extracted, manufactured, and purchased within 100 miles of the project site may be valued at twice their base contributing product value, up to a maximum contribution of two products.

LEED v5
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Requirements in relation to structural materials (including reinforcing steel)

LEED is a green building program that helps reduce environmental impact while keeping projects competitive and cost-effective. Buildings that earn LEED certification are designed to save money, use less energy and water, and create healthier spaces for people. They also send less waste to landfills, protect natural habitats, and lower greenhouse gas emissions. In addition, LEED projects promote the use of transparent, high-quality green materials and may qualify for financial, or zoning incentives offered by many cities.

LEED v5 introduces a stronger focus on measurable performance outcomes rather than disclosure alone. The rating system is organized around three impact priorities: decarbonization, quality of life, and ecological conservation and restoration. Embodied carbon reduction is a core requirement, not an optional strategy.

Applicable Rating Systems

This guidance applies to LEED BD+C: New Construction and LEED BD+C: Core and Shell projects. Core and Shell projects are especially relevant to the reinforcing steel industry because they include foundations, structural frames, and floor systems that include reinforcing steel and structural materials tend to dominate embodied carbon calculations.

Structural Materials and Reinforcing Steel

Reinforcing steel is classified as a major structural material under LEED v5. When structural concrete is part of the project scope, reinforcing steel is always included in embodied carbon calculations and cannot be excluded through specification choices.

MR Prerequisite 2: Quantify and Assess Embodied Carbon

All LEED BD+C projects must complete MR Prerequisite 2. Project teams are required to quantify embodied carbon for major materials, including reinforcing steel, using product-specific, third-party verified Type III EPDs. Industry-average EPDs may be used only to establish baselines and cannot be used for credit compliance.

MR Credit 2: Reduce Embodied Carbon

Projects may earn additional points by reducing embodied carbon relative to industry baselines. Reductions are measured in kilograms of CO_2-equivalent (kg CO_2e). Reinforcing steel with lower cradle-to-gate emissions can meaningfully contribute to credit achievement.

Compliance Pathways and Use of Tables

MR Credit 2 provides three compliance options, but only two are discussed in depth here.
Option 1 uses a whole-building life cycle assessment.
Option 2 uses EPD-based analysis and includes both a project-average path and a materials-type path.
Option 3 tracks carbon emissions from construction activities.
The two tables shown below summarize Options 1 and 2 and the associated point thresholds for New Construction and Core and Shell projects.

Table 1. Points for embodied carbon reductions in Options 1 and 2 for New Construction Projects

	Option 1. Whole-building life cycle assessment	AND/OR	Option 2. EPD Analysis Path 1. Project-average approach	OR	Path 2. Materials-type approach
Meet baseline or industry average	2		1		Three material categories for one point OR Five or more material categories for two points
10% reduction in GWP	3		–		–
20% reduction in GWP	4		2		–
30% reduction in GWP	5		–		–
40%+ reduction in GWP	6		3		–

NOTE: Meeting the baseline or industry average in Table 2 can achieve no more than two points.

Table 2. Points for embodied carbon reductions in Options 1 and 2 for Core and Shell projects

	Option 1. Whole-building life cycle assessment	AND/OR	Option 2. EPD analysis Path 1. Project-average approach	OR	Path 2. Materials-type approach
Meet baseline or	2		1		Two material categories for one point

industry average					OR Four material categories for two points OR Six or more material categories for three points
10% reduction in GWP	3		–		–
20% reduction in GWP	4		2		–
30% reduction in GWP	5		–		–
40%+ reduction in GWP	6		3		–
50%+ reduction in GWP	7		4		–

NOTE: Meeting the baseline or industry average in Table 2 can achieve no more than two points.

The point thresholds shown in the tables apply at the project level, not at the individual product level. Reinforcing steel is evaluated as one of several major materials contributing to total project embodied carbon.

Baselines and Performance.

All reductions are measured relative to an industry baseline. While industry-average data may be used to define the baseline, product-specific or facility-level EPDs are required to demonstrate performance improvements. Facilities with efficient electric arc furnace operations, high 97% recycled content, and optimized fabrication practices are better positioned to show reductions.

The tables do not require reinforcing steel alone to achieve the full percentage reductions listed, nor do they mandate specific steelmaking routes or recycled content thresholds. Instead, they provide a framework for comparing overall project performance using transparent and verified data.

Practical Implications for the Reinforcing Steel Industry

LEED v5 increases the importance of high-quality, facility-specific EPDs for reinforcing steel. Manufacturers without such EPDs may face reduced market access, while producers of lower-

carbon reinforcing steel gain a competitive advantage. Early coordination among manufacturers, fabricators, contractors, and project teams can improve compliance outcomes.

Practical Questions for Your Reinforcing Steel-Fabricator Supply Chain

1. Does the reinforcing steel mill/fabricator have an EPD for the product?
   Under v4.1 this was "nice to have"; under v5 this may be required or strongly preferred. Under LEED v5, product-specific, third-party verified Type III EPDs are often required or strongly preferred for major structural materials. For reinforcing steel, these EPDs are typically produced and maintained by the steel mill, as they represent facility-specific cradle-to-gate (A1–A3) impacts. Fabricators are responsible for providing traceability and documentation linking the supplied reinforcing steel to the applicable mill EPD.

2. What is the embodied carbon (kg CO_2e) per metric ton of reinforcing steel?
   Under LEED v5, embodied carbon is treated as a quantitative value metric, typically expressed as kilograms of CO_2-equivalent per metric ton of reinforcing steel. This value is used to compare products against industry baselines. This value is reported in the EPD and is used by the design team to evaluate performance relative to industry baselines.

3. What life-cycle stages are covered by the EPD?
   LEED v5 primarily evaluates cradle-to-gate impacts (A1–A3). Any additional stages should be reported separately and clearly identified.

4. What is the recycled content and steel scrap sourcing route?
   Reinforcing steel manufacturers in the United States typically achieve over 97% recycled content using EAF technology, making reinforcing steel a highly sustainable product.

5. What factors most influence the embodied carbon of reinforcing steel?
   In the United States, reinforcing steel is predominantly manufactured using electric arc furnace (EAF) technology, which relies on recycled steel scrap. As a result, the embodied carbon of reinforcing steel is largely influenced by the electricity grid mix at the mill location, rather than by raw material inputs. Due to the strict chemical and mechanical requirements of ASTM A615 and ASTM A706, material composition variations have limited influence on embodied carbon compared to energy sourcing and process efficiency.

6. Can the supply chain be traced from mill to fabrication to project?
   Clear documentation linking the EPD to the actual supplied material is required to support LEED review and verification.

7. How much does reinforcing steel contribute to the building's total embodied carbon footprint?

For major projects such as large infrastructure, foundation, shell, slabs, choosing lower embodied-carbon reinforcing steel may offer high incremental benefit via LEED credit-point savings.

8. Documentation burden and cost:
   Under LEED v5, EPD verification, data transparency, and supply chain documentation may require additional time and cost compared to LEED v4.1.

9. Timing/Version Risk: Projects registered under v4.1 may avoid some burdens as the stronger requirements must be met for projects registered under v5.

Practical Questions for the A/E Industry

Under LEED v4.1, a product-specific EPD was often optional. Under LEED v5, product-specific, third-party verified Type III EPDs may be required or strongly preferred, particularly for projects pursuing MR Credit 2: Reduce Embodied Carbon. For major structural materials such as reinforcing steel, EPD availability is becoming a baseline expectation.

1. Where can I find the industry-average EPD for reinforcing steel?
   CRSI updated its industry-average EPD for ASTM A615 and ASTM A706 reinforcing steel in 2022 and is located via . The current industry-average EPD is valid until 2027.
   CRSI is currently developing the next industry average EPD, with a targeted validity period of 2027–2032.

2. Where can I find if the reinforcing steel mill/fabricator has an EPD for their products?
   Databases such as Building Transparency host searchable EPD libraries. Program operators such as ASTM, NSF, UL, and SmartEPD publish verified EPDs. Reinforcing steel suppliers can also provide EPDs directly.

3. What is the embodied carbon value (kg CO_2e per metric ton of reinforcing steel)?
   Under LEED v5, embodied carbon is treated as a quantitative value metric, typically expressed as kilograms of CO_2-equivalent per metric ton of reinforcing steel. This value is used to compare products against industry baselines.

4. Where do I find the embodied carbon (kg CO_2e) per metric ton of reinforcing steel?
   This information is listed in an EPD and is typically under the heading of “global warming potential” or “climate change.” In either case, this value metric will be listed as “X kg CO_2e/tonne” In some cases, the value is provided as "tonne CO2e/tonne", which can be converted to kg by multiplying by 1000.

5. What life-cycle stages are included in the reported value?
   LEED v5 primarily evaluates cradle-to-gate impacts (Modules A1–A3). Fabrication and transport to site (A4–A5) may be reported separately but should not be combined with A1–A3 values when comparing products.

6. What industry baseline is being used for comparison?
   Embodied carbon reductions are measured relative to an industry baseline. Industry-average EPDs may be used to establish the baseline, but product-specific EPDs are required to demonstrate reductions.

7. What is the typical recycled content of reinforcing steel?
   The United States manufactures reinforcing steel from over 97% recycled content via electric arc furnace (EAF) technology.

8. What influences the embodied carbon of reinforcing steel?
   Because reinforcing steel is manufactured via electric arc furnace (EAF) technology in the United States, its embodied carbon is largely influenced by the mix of fuels used in the electricity grid in the area where the steel mill is located. Due to strict manufacturing tolerances for ASTM A615 and ASTM A706 reinforcing steel, very little influence is due to slight changes in material composition.

9. How does reinforcing steel contribute to MRc5, Construction and Demolition Waste Diversion?
   Reinforcing steel is infinitely recyclable, thus contributes to jobsite waste that can be diverted from landfill. Because of the high value of steel, there is also a financial incentive for source separation.

10. What documentation and verification should be expected?
    LEED v5 requires third-party verification, consistent LCA methodology, and clear documentation across the mill–fabricator–project supply chain. This may increase cost and lead time.

References

1. U.S. Green Building Council (USGBC).
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2. U.S. Green Building Council (USGBC).
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