SUSTAINABILITY IN PRACTICE

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Asphalt Pavements & LEED v4: Credits & Opportunities

LEED, which stands for Leadership in Energy and Environmental Design, is the most widely recognized sustainability rating system in the U.S. It effectively serves as the *de facto* benchmark for the design, construction, and operation of high-performance green buildings. With over 92,000 projects using LEED and 2.2 million square feet of building space certified under LEED daily, asphalt pavement contractors and material suppliers are almost certain to encounter LEED projects through the course of their business operations.

The decision to obtain a LEED certification is typically driven by building owners in both the public and private sectors, either voluntarily or through government mandates for green construction. While LEED focuses primarily on buildings, rather than infrastructure, there are several opportunities for asphalt paving contractors and suppliers to contribute toward a project's LEED certification. Some of the available credits are material-specific while others are more general in nature. This guide provides an overview of the available credits that asphalt pavements can help a project achieve. Asphalt pavement contractors and suppliers will find this guide useful to understand what customers are looking for when they ask for LEED documentation, and to develop proactive marketing strategies for the green construction sector. Building owners and designers will find this guide useful to understand how an asphalt parking lot or driveway can help contribute to a project's overall score under LEED v4.

Information About LEED

With a pedigree of nearly two decades, LEED is a highly evolved, complex system encompassing more than 20 distinct green rating programs. LEED certifications can be obtained for various categories including Building Design and Construction, Operations and Maintenance, Interior Design and Construction, and Neighborhood Developments. Within these categories, LEED certification programs are tailored to different market sectors, such as commercial, retail, schools, residential, and others. This guide is focused on the LEED for Building Design and Construction: New Construction and Major Renovation program (LEED BD+C: New Construction).

The LEED standard was developed by the U.S. Green Building Council (USGBC), a non-governmental organization, and LEED certifications for projects are administered by Green Building Certification Inc. (GBCI). The standard is reviewed and updated by USGBC periodically as the overall building industry adopts more sustainable design and construction standards. LEED v4 was introduced in 2013 and was formally adopted on October 31, 2016 — all new projects registered after that date are subject to the LEED v4 standard. Projects that registered with GBCI under the LEED 2009 standard have a sunset date for project completion of June 30, 2021. This means that contractors and suppliers will need to keep track of both standards until 2021. This

guide focuses on LEED v4; a separate guide for LEED 2009 is available at *www.AsphaltPavement.org/sustainability*.

To achieve certification, a project must attain a set of minimum prerequisites that apply to all projects, and then earn points or credits across various functional groupings, such as Materials & Resources, and Sustainable Sites. A project requires a minimum of 40 points out of 100 to achieve basic LEED certification. Asphalt pavement contractors and suppliers can contribute to both the prerequisites and the credits.

How LEED Applies to Asphalt Pavements

LEED looks at a building as a system of components, which may include associated parking lots, driveways, and sidewalks. Asphalt pavements are typically evaluated through these functions as part of a LEED project. Asphalt pavements may allow a project to qualify for LEED credits through using recycled materials, porous pavements, environmental product declarations (EPDs), and more. A review of the available credits associated with asphalt pavements from LEED v4 is provided below, and a summary is provided in Table 1.

LEED v4 Credits

Sustainable Sites (SS)

Rainwater Management (2–3 points)

To reduce runoff volume and improve water quality, two to three points are available for projects that manage on site the runoff for the 95th or 98th percentile (respectively) regional or local rainfall events using low impact development (LID) and green infrastructure. Porous asphalt pavements can be an important component of an LID strategy for managing runoff. NAPA has two publications on porous pavements that designers, owners, and contractors might find helpful, both of which are available at *store.AsphaltPavement.org*:

- *Porous Asphalt Pavements for Stormwater Management* (IS 131) covers general site and pavement design, construction, and maintenance; and
- *Structural Design Guidelines for Porous Asphalt Pavements* (IS 140) is geared towards projects that expect higher traffic volumes and vehicle weights than a typical commercial parking lot or residential street.

Materials and Resources (MR)

Construction and Demolition Waste Management Planning (prerequisite)

As a prerequisite, projects are required to develop and implement a construction and demolition waste management plan, and provide a final report detailing all major waste streams generated, including disposal and diversion rates. Since asphalt is a highly recyclable material, project teams can reliably plan on recycling old asphalt pavements that are scheduled for removal or milling. Asphalt pavement contractors can assist their customers in meeting this prerequisite by providing documentation that reclaimed asphalt pavement (RAP) generated from milling or excavation will be recycled or reused.

Building Product Disclosure and Optimization — Environmental Product Declarations (1–2 points)

The EPD credit has two options, each worth 1 point. Option 1 is for projects that use at least 20 different products sourced from at least five different manufacturers that have a product-specific Type III EPD. NAPA's Emerald Eco-label EPD Tool — *www.AsphaltPavement.org/EPDs* — helps asphalt mix producers develop and publish a valid Type III EPD for each asphalt mix.

Option 2 provides 1 point if at least 50% of the total building product value (including purchase and delivery, but not installation) is utilized on products that have environmental impacts below the industry average in at least three out of the five impact categories. This is referred to as Multi-Attribute Optimization. At the time of writing this guide, an industry average EPD has not been compiled for asphalt pavements. Alternatively, the manufacturer can demonstrate reduced impact of the same product, over time, with two product-specific EPDs. A few examples of operational or mix-design changes that would reflect a reduction in the environmental impacts reported in an EPD include the following:

- increasing the recycled material content,
- sourcing raw materials from closer distances,
- reducing burner fuel consumption by reducing aggregate moisture, and
- energy efficiency upgrades such as the installation of variable frequency drives for large motors.

Mix producers who want to demonstrate reduced impacts over time should carefully evaluate their plant operations, mix designs, and supply chains to determine the most suitable optimization strategy to match their operations with the desired outcomes.

USGBC has developed the Building Product Disclosure and Optimization (BPDO) Calculator, a Microsoft Excel-based tool to assist in calculating the value of qualifying materials under this credit. The BPDO Calculator is available at *www.usgbc.org/resources/bpdo-calculator*.

The value of products where all extraction and manufacturing operations are within 100 miles of the project site are valued at 200% of their base contributing cost. In most cases, asphalt pavements do not meet the local sourcing criteria under LEED v4 because the crude oil source for virgin asphalt cement is typically extracted from distances much greater than 100 miles.

Building Product Disclosure and Optimization — Sourcing of Raw Materials (1–2 points)

The Sourcing of Raw Materials credit has two options, each worth one point. Under Option 1, a point is available for projects that use at least 20 different products from at least five different manufacturers that have publicly released a third-party verified corporate sustainability report (CSR) from their raw material suppliers under a framework such as the Global Reporting Initiative. Products sourced from manufacturers with self-declared CSRs are valued as ½ of a product credit. CSRs must contain information specified in the LEED standard to qualify.

Option 1 is a difficult credit to earn, because very few manufacturers and raw material suppliers are currently disclosing the required information. At least 90% of the contents of each product need to be from raw materials covered by a compliant CSR to qualify. The CSR must include the extraction location(s) of the raw materials, a commitment to long-term ecologically responsible land use, a commitment to reducing environmental harms from extraction and/or manufacturing processes, and a commitment to voluntarily meet applicable standards or programs that address responsible sourcing criteria. An asphalt mix supplier would need to submit its own CSR that meets the criteria listed above, plus CSRs from enough of its raw material suppliers to cover at least 90% of the mix components. While this may be feasible for some companies that are vertically integrated or plants that source their aggregates from a single quarry, very few project teams are even attempting to achieve this credit due to the complexity of the reporting requirements.

Option 2, which is much more popular among project teams, provides one point for products that meet at least one of several listed responsible extraction criteria for at least 25%, by cost, of the total product value for the project (i.e., the total value of all the products used on the project). Of the six responsible extraction criteria listed in the standard, asphalt pavements often qualify for the recycled content criterium. Recycled content is the sum of post-consumer content plus half the pre-consumer content. The recycled content is multiplied by the material cost (including delivery, but excluding installation cost) to determine the value of the product that meets the responsible extraction criteria.

In the context of an asphalt pavement, pre-consumer content includes materials such as blast furnace slag, recycled asphalt shingles (RAS) sourced from manufacturing waste, and RAP derived from manufacturing waste such as start-up/shut-down waste, job overruns, and the like. Post-consumer content includes materials such as ground tire rubber, RAS sourced from roofing contractors (tear-offs), and RAP derived from road millings.

For instance, a mix design might incorporate 5% RAS (sourced from a shingle manufacturer's industrial waste) and 15% RAP (derived from road millings). In this case, the mix contains 5% pre-consumer recycled content and 15% post-consumer recycled content. If the cost of the asphalt mix (including delivery, but not including installation) is a hypothetical $100 per ton, then the recycled content value would be calculated as:

$$\begin{aligned}\text{Recycled Content Value} &= \$100 \times [(0.5 \times \text{pre-consumer content}) + (\text{post-consumer content})] \\ &= \$100 \times [(0.5 \times 0.05) + (0.15)] \\ &= \$100 \times 0.175 \\ &= \$17.50 \text{ per ton}\end{aligned}$$

These calculations can be done automatically using the BPDO Calculator. Documentation of pre-consumer and post-consumer recycled content for asphalt mixes can be satisfied via a letter from the asphalt mix supplier. Third-party certification of recycled material content is not required under LEED v4.

In all cases, the recycled content should be based on the total weight of the mix, rather than the weight of the aggregates. Also, invoices and other project documentation for asphalt paving projects do not always include a breakdown of material cost, delivery cost, and construction cost. Project

teams should carefully develop their contract documents to ensure they clearly state the necessary cost information that contractors and suppliers should provide.

Similar to Option 2 of the EPD credit, asphalt pavements do not normally qualify for the 200% multiplier under Option 2 of the Sourcing of Raw Materials credit for products sourced within 100 miles of the project site.

Construction and Demolition Waste Management (1–2 points)

Projects can earn 1 or 2 points if they divert at least 50% or 75% (respectively), by either weight or volume, of the total construction and demolition material for recycling. Projects that involve excavation, milling, or reclamation of existing asphalt pavements can qualify for this credit if the contractor provides documentation that the RAP will be recycled or re-used. Documentation should indicate the following:

- type of waste stream (i.e., source separated, commingled, or donated),
- the recycling or re-use location/facility,
- the total volume or tonnage of material generated, and
- the volume or tonnage of material diverted.

The LEED v4 Construction and Demolition Waste Calculator can be downloaded from *www.usgbc.org/resources/construction-and-demolition-waste-calculator*.

Innovation (IN)

Innovation Credits (1–5 points)

Innovation credits encourage a project to achieve exceptional or innovative performance. There are three categories within the innovation credit, and project teams can use a combination of innovation, pilot, and exemplary performance categories for a maximum of 5 points. Asphalt pavements are potentially eligible for all three categories.

1. *Innovation (1–3 points)*
   Projects that achieve significant, measurable environmental performance using a strategy not addressed in the LEED green building rating system can earn 1 point for each innovation. The proposal should identify the intent of the proposed innovation credit, the requirements for compliance, submittals to demonstrate compliance, and the design approach or strategies used to meet the requirements. The innovation strategy must be comprehensive (more than one product or process), include quantitative performance improvements (comparing a baseline and design case), and be significantly better than standard sustainable design practices. Although there is little guidance as to what constitutes a “significant” improvement over standard sustainable design practices, it can be inferred that innovation credits involving asphalt may be appropriate only for projects with relatively large paved areas, such as race tracks, stadiums, or large suburban shopping centers. Project teams that are interested in pursuing this credit are encouraged to consult with a LEED AP or review the LEED Innovation Catalog (*www.usgbc.org/articles/introducing-leed-innovation-catalog*) for additional information.

2. *Pilot Credit (1–3 points)*
   USGBC has a library — *www.usgbc.org/pilotcredits* — of nearly 50 Pilot Credits a project can earn. Some ways asphalt paving contractors and suppliers can help a project earn pilot credits include:
   - Develop and implement a plan to reduce particulate matter (PM) emissions from diesel fueled vehicles, construction equipment, and temporary power generation during construction.
   - Employ contractors, subcontractors, and building trade workers who are certificate holders under a qualified green building training program prior to the commencement of the trade work. A list of qualified programs is available at *www.usgbc.org/node/4720457?view=resources*.
   - Participate in supplier assessments or scorecards that document social equity within the supply chain. Asphalt pavement manufacturers and upstream suppliers can self-certify assessments that address social responsibility elements outlined in the pilot credit.

3. *Exemplary Performance (1–2 points)*
   An exemplary performance point is typically earned for achieving double the credit requirements or the next incremental percentage threshold for an existing prerequisite or credit. The most likely scenarios in which asphalt pavements can contribute to an exemplary performance credit are the collection of EPDs or the use of high-RAP pavements (i.e., >50% RAP).

Regional Priority (RP)
Regional Priority Credits (1–4 points)

RP credits have been identified by the USGBC regional councils and chapters as having additional importance. Extra points can be earned for projects that achieve credits that are on a region's RP list. In some regions, asphalt pavements can help a project achieve RP credits. For instance, rainwater management is an RP credit for the northeast. A project in the northeast using porous pavements as part of an LID strategy to manage the 98th percentile rainfall event can earn 4 points, instead of the normal 3 points. A database of RP credits and their geographic applicability is available on the USGBC website at *www.usgbc.org*.

Summary

Asphalt pavements are eligible for a variety of credits in the LEED v4 rating systems. Paving contractors and suppliers who understand how their products qualify for LEED credits can provide added value to customers seeking LEED certification for a project. This can be an effective marketing tool for contractors and suppliers who are proactive in their efforts to support the green construction sector, and can bolster a company's brand identity as a leader in sustainability. Project owners who are seeking LEED certification can maximize the number of credits earned by engaging with asphalt pavement contractors and suppliers during the design, procurement, pre-construction, and construction phases of a project.

For more information, contact NAPA Director of Sustainable Pavements Joseph Shacat at jshacat@asphaltpavement.org or 301-731-4748

Table 1. Summary of credits that asphalt pavements can qualify for under LEED v4.

Section	Credit	Points	How Asphalt Can Contribute	Comments on Difficulty/Cost
SS	Rainwater Management	2–3	Project team incorporates porous asphalt pavements to manage storm water.	Feasibility depends on site-specific design considerations.
MR	Construction and Demolition Waste Management Planning	Prerequisite	Project team can incorporate RAP into C&D Waste Management Plan.	Easy — Should be routine.
MR	BPDO — Environmental Product Declarations, Option 1 (EPDs)	1	Mix producer can develop an EPD using NAPA's Emerald Eco-Label tool.	Moderate to Easy — Requires time investment to learn how to use the tool and compile plant data, but easy once configured.
MR	BPDO — Environmental Product Declarations, Option 2 (Optimize Products)	1	Mix producer can optimize mixture design and plant operations to reduce environmental impacts. Develop a second EPD to document the improvement.	Varies — Mix design changes might be easily achieved, but it may take 1-2 years for operational improvements to be reflected in plant data.
MR	BPDO — Sourcing of Raw Materials, Option 1 (Raw Material Disclosure)	1	Mix producer publicly discloses sustainability information regarding raw materials.	Very difficult to implement.
MR	BPDO — Sourcing of Raw Materials, Option 2 (Raw Material Optimization)	1	Mix producer discloses recycled material content of asphalt mixtures utilized in the project.	Easy — Documentation provided via letter from mix supplier.
MR	Construction and Demolition Waste Management	1–2	Contractor can document that RAP removed from a project site is diverted from landfills.	Easy — Should be routine.
IN	Innovation	1–3	Project team can incorporate innovations to improve asphalt pavement sustainability	Difficult — Innovation must be clearly documented and scalable to other projects. May be appropriate for projects with large paved areas.
IN	Pilot Credits	1–3	Depends on project-specific priorities.	Varies — Depending on the pilot credits utilized.
IN	Exemplary Performance	1–2	Achieve double or the next incremental percentage threshold for an existing credit.	Difficult — EPDs and high-RAP pavements (>50%) can contribute toward credit achievement.
RP	Regional Priority	1–4	Extra points for achieving credits in the project location's Regional Priority list.	Varies — Depends on the region.

BPDO — Building Product Disclosure and Optimization
C&D — Construction and Demolition
EPD — Environmental Product Declaration
RAP — Reclaimed Asphalt Pavement