Sustainable Asphalt Pavements: A Practical Guide
Procuring & Evaluating Sustainability
This publication is provided by the Members of the National Asphalt Pavement Association (NAPA), who are the nation’s leading asphalt producer/contractor firms and those furnishing equipment and services for the construction of quality asphalt pavements.

NAPA Members are dedicated to providing the highest quality asphalt paving materials and pavements, and to increasing the knowledge of quality asphalt pavement design, construction, maintenance, and rehabilitation.

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Sustainability in Practice 103

Sustainable Asphalt Pavements: A Practical Guide
Procuring & Evaluating Sustainability

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Sustainable Asphalt Pavements: A Practical Guide

This is the third of four publications in the NAPA Sustainable Asphalt Pavements: A Practical Guide series meant to provide a practical guide to sustainability. That means a focus on what a NAPA member business or asphalt project can do now to address sustainability within the confines of good business practice. The four publications in this series are meant to work together and are organized as follows:

1. **SIP 101: Sustainability Overview.** A practical definition of sustainability and the elements of and reasons for a business approach to sustainability.
2. **SIP 102: Sustainability Specifics.** Specific sustainability actions that can be taken in corporate/organizational strategy, project delivery, mix design, materials production, construction activities, and pavement design.
3. **SIP 103: Procuring & Evaluating Sustainability.** How sustainability is included in public project procurement, and how sustainability efforts are evaluated within the industry.
4. **SIP 104: How to Develop a Sustainability Program.** Important components of a company sustainability program including goals, best practices, implementation, and reporting.

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SIP 103: Procuring & Evaluating Sustainability

If, as a society, sustainability really matters to us (we have made the argument that it does) then we ought to ask for it specifically in infrastructure project procurement, and we should evaluate how effectively it is being integrated into our infrastructure.

Sustainability does not fit well with normal procurement practices. Remember that, by our simple definition, “sustainability” describes efforts above and beyond the minimum. But, for generations we have procured projects by describing the minimum required standards and asked contractors to meet those minimums at the lowest price possible. This system is not ideally set up to ask for more than the minimum and, if necessary, pay for it. However, there are ways to go beyond the minimum.

Evaluating how well sustainability is included in infrastructure projects is important if we wish to manage and improve the process. What gets measured gets managed, as the saying goes. Sustainability rating systems are an increasingly popular way of doing this evaluation. This is because rating systems are flexible metrics; they describe many sustainable practices (more than you would need even to achieve the highest certification standard) and a project is free to pick those that make the most sense within the context of that project. Third-party rating systems also provide credibility; it’s not just you evaluating your own work and declaring it “sustainable” but rather a recognized accomplishment administered by an unbiased third party.

Procuring Sustainability in Public Contracts

If sustainability is valued by an owner, they may ask for sustainability in the procurement process. However, there is little national or international guidance on how to do this best. This section discusses how sustainability is typically procured in public contracts including:

- Specifying sustainability items directly in the contract documents.
- Using change orders to include more sustainable alternatives after contract award.
- Using alternative sustainability bids.
- Alternative technical concepts (ATCs) that favor more sustainable approaches.
- Requiring sustainability qualifications in a qualifications-based selection process.
- Requiring tracking and reporting of certain sustainability metrics.
- Requiring project certification from an independent third-party rating system.

An individual project may use one or more of these approaches. For instance, specifying some sustainability items, including others in an alternative bid, and requiring the tracking and reporting of key sustainability metrics.

Specifying Sustainability Items in the Contract Documents

This method uses specifications to require, allow, or incentivize sustainability items. In some instances it can be difficult to write good sustainability specifications because (1) they are
only infrequently done so there is little available experience, or (2) the standard is often a
non-specific “better than usual,” which is difficult to measure. Sustainable practices can be
required (you must do it), allowed (do it if you want to), or incentivized (do it for a reward
such as compensation). For instance, an owner might require a polymer modifier in the
asphalt binder to improve durability of the surface course. Or, an owner might allow up to
40% RAP in the base course. Or, an incentive may be offered for contractor personnel
accredited in a certain rating system. If the owner is asking the contractor to do something
that costs the contractor money, but benefits the owner, the only sensible way to get it done
is to require it and pay the contractor for it. However, if a contractor can do something and
benefit from it directly, the owner can just allow it in the specifications and the contractor will
do it if, and only if, it makes good business sense. Of course, the owner often benefits
indirectly from things it allows but does not require. A good example of this is in the case of
RAP: The bid prices for asphalt pavement may decrease over time as contractors pass on
their savings from RAP use to the owner by reducing their price in the low-bid process.

**Change Order to More Sustainable Alternatives after Contract Award**

After a contract is awarded, the owner or contractor may propose, by change order, a more
sustainable alternative. This is similar to a value engineering change proposal (VECP)
where a contractor proposes changes to reduce either construction or life-cycle costs while
maintaining equal functionality. While this may work if the owner communicates its desire for
sustainable practices, it is ultimately a passive approach to sustainability since the
contractor doesn't have to propose anything. Of course, all of this really depends on there
being incentive for the contractor to propose more sustainable alternatives. In the cases
where a more sustainable alternative is also less expensive, there is incentive. However,
many times this is not the case so unless some sort of incentive structure is put in place it
will probably not result in more sustainable approaches that are of equal or greater cost.

**Alternative Sustainability Bids**

This requires the contractor to bid the project in two ways: one bid for the baseline project,
and another for the same project that includes sustainability improvements. An owner can
use this to see how much their sustainable alternatives might cost should they choose to
pursue them. We have seen this used on at least one Greenroads project.

**Alternative Technical Concepts (ATCs)**

Typically used in design-build project delivery, this approach allows the proposing design-
builder to propose ideas to the owner that are not requested but offer some sort of
advantage to the owner (for example: reduced cost, improved design, better schedule,
longer pavement life). Including sustainability as a stated priority for the owner in the request
for proposal (RFP) could open up ATCs to include sustainable alternatives as well. Doing
this can allow proposers to better differentiate their proposal based on sustainability rather
than just respond to minimum RFP requirements.
Sustainability Qualifications
The owner can solicit sustainability qualifications and approaches in a qualifications-based selection process. An RFP is used to ask for qualifications, and ideas and proposals are evaluated and awarded points based on their merit. This approach is great for engaging a contractor’s innovation and unique attributes to get the best possible sustainable solution, but its use so far has been limited. Too often, the RFP asks for (1) environmental regulation compliance only (not above-and-beyond anything), or (2) a rather undefined “sustainability” approach that leaves contractors confused about what to propose and owners unsure of how to evaluate what is proposed.

Sustainability Metric Reporting
This requires the tracking and reporting of specific sustainability metrics throughout the project. It is an indirect way of asking the contractor for more sustainable processes without specifying actions. Metrics can include fuel use, water and electricity use, waste diversion rates, air quality, community programs, recycling, and more. Sometimes these metrics are associated with a specific goal (for example, at least 95% of construction material must be diverted from landfill), and sometimes they are just for accounting purposes. Environmental Product Declarations (EPDs) are a relatively new way of reporting the environmental impact of products (such as asphalt mixtures) in a consistent and verifiable way. NAPA’s Emerald Eco-Label program is a verified EPD program for asphalt mixtures.

Sustainability Rating Systems
Owners can require a project to achieve certification in a specific rating system like LEED, Greenroads, Envision, Green Globes, or INVEST. The general idea is that using a rating system rather than specific requirements allows the project more latitude because there are many ways to achieve a certain score and the project team can choose the most sensible one. Rating system certification will likely include items beyond a contractor’s control (for example, design features, owner requirements for public involvement, designer/owner qualifications) so achieving a rating system certification is a coordinated effort by the entire project team (owner, designer, contractor as a minimum).

Influence of Project Delivery Method
Alternative project delivery methods are better than design–bid–build. Sustainability can be done using any form of project delivery. However, the best project delivery forms for sustainability are the ones that better allow contractors to have input earlier in the process, which allows them to use their innovation and unique attributes productively and in a more efficient manner for the project. The nature of design–bid–build (hard bid) delivery limits contractor input since the design is done before contractor selection, and the low-bid selection method limits what contractors can or may be willing to do beyond minimum requirements.

In contrast, many alternative project delivery methods allow contractor input at earlier project stages (for example: design–build and Construction Manager/General Contractor (CM/GC))
and allow better communications between designer and contractor. CM/GC project delivery method allows an owner to engage a construction manager during the design process to provide constructability input. This can help integrate sustainable features at the most cost-effective point in project development.

**Public private partnerships (P3s).** These aren’t really delivery methods, but rather ways of financing projects that involve some private money. Usually the payback for the private investors is over a long period of time (often 20–50 years or more), so P3s do encourage long-term thinking, which generally means going beyond bare minimum requirements (our definition of sustainability) to meet long-term goals. Also, some private investors use sustainability as a criterion in their investment decisions. Be careful, though: pavements in P3 contracts can be very small portions of the overall effort and, therefore, be a low priority even though they may be the major maintenance component that drives expenses over the long term. The struggle is often to convince P3 investors and builders of a long-life pavement structure and realistic rehabilitation and maintenance timing.

**Evaluating Sustainability Using A Rating System**

Rating systems can be used to quantify sustainability for a variety of infrastructure projects. Currently, most emphasis (and publicity) is on buildings; many states, cities, counties, school districts and colleges have standards in place that require sustainable practices in building design and construction. Some public owners have begun to address roads and pavements also, seeing them as important to include in their sustainability goals and values.

If you look hard enough you can find over 20 different sustainability rating systems that have something to do with asphalt pavements. However, in the U.S. there are five that you should focus on: LEED, Greenroads, Envision, Green Globes, and INVEST. Before we get to how these systems stack up, let’s cover the rating system basics.

**What is a Sustainability Rating System?**

A sustainability rating system is a list of sustainability best practices with an associated point system. Points are used to quantify each best practice so that all sustainability best practices (like pollutant loading in stormwater runoff, pavement design life, tons of recycled materials, energy consumed/saved, pedestrian accessibility, ecosystem connectivity and even the value of art) can all be compared by point value. Rating systems weigh best practices (usually in relation to their impact on sustainability or their priority), which can assist in choosing the most impactful best practices to use given a limited scope or budget. All rating systems can be used as self-evaluation tools, but some are administered by external organizations and can be used as an independent third-party check on a project’s sustainability.

**Topics Addressed (and Not) by Roadway Sustainability Rating Systems**

No matter what the rating system, there are some common topics that show up in almost all of them (only the pavement-related ones are listed here):
• Construction waste management
• Materials reuse and recycling
• Minimize materials
• Local materials
• Reduce non-renewable energy use
• Reduce greenhouse gas emissions

There are also multiple topics that you might think ought to be addressed in a sustainability rating system, but are actually only addressed in a few, if any. Again, only the pavement-related ones are listed here:

• Work site safety
• Job training
• Prevailing wages
• Materials production emissions
• Durable structures (i.e., long-life pavements)
• Construction quality
• Life cycle assessment (LCA)
• Local employment
• Cost-benefit analysis (including life-cycle cost analysis)

This is concerning since the asphalt pavement industry certainly, and for good reason, values safety (Safety Innovation Award), training (Diamond Paving Commendation), fair wages, long-life pavements (APA’s Perpetual Pavement Award), construction quality (e.g., Sheldon G. Hayes, Ray Brown, Larry H. Lemon, and Quality in Construction Awards), and cost.

**How LEED, Greenroads, Envision, Green Globes, and INVEST Stack Up**

It is helpful to look at the five prominent rating systems in detail to see how they specifically address asphalt pavements. The U.S. Green Building Council’s LEED® version 4 BD+C NC (Building Design and Construction for New Construction), Greenroads® version 2, the Institute for Sustainable Infrastructure’s Envision® version 2.0, the Green Building Initiative’s Green Globes® version 1.5, and FHWA’s INVEST version 1.3 are examined in more detail. Each rating system was reviewed for credits that are considered “pavement-related credits.” This means credits that:

• **Can be satisfied or partially satisfied by a paving contractor.** These involve actions either specific to paving contractors, or generally applicable to any contractor. Sometimes the paving contractor is only one of several entities that need to meet credit requirements to achieve points.

• **Address asphalt pavements in partial or in whole.** These generally involve a materials choice (for example, porous asphalt); materials composition (for example, recycled content), source (for example, locally sourced), and manufacturing methods (for example, warm mix asphalt); and design (for example, long life).
The general results are summarized in Table 1.

Table 1. Pavement-Related Points Available in Some Sustainability Rating Systems

<table>
<thead>
<tr>
<th>Type of Rating System</th>
<th>LEED v4 BD+C NC</th>
<th>Greenroads v2</th>
<th>Envision v2</th>
<th>Green Globes v1.5 for NC</th>
<th>INVEST v1.3 PD only</th>
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<tr>
<td>Third-Party Certification Available</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
<td>No</td>
</tr>
<tr>
<td>Total Points Available</td>
<td>110</td>
<td>130</td>
<td>809</td>
<td>1,000</td>
<td>171</td>
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<tr>
<td>Total Pavement-Related Points</td>
<td>19</td>
<td>63</td>
<td>247</td>
<td>31</td>
<td>61</td>
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<tr>
<td>Fraction of Points for Pavements</td>
<td>17%</td>
<td>48%</td>
<td>31%</td>
<td>3%</td>
<td>36%</td>
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</table>

What do Certified Projects Actually Earn with Pavements?

While Table 1 shows what is available for pavements, what pavements actually earn through a certification process may be different. Access to detailed data from the first 22 Greenroads certified projects allows a quick look at this at least for Greenroads. While all 22 of these projects were certified with the earlier Greenroads version 1.5, in terms of pavement-related points this version is quite similar to the current version 2 (version 1.5 has 53 of 108 points available for pavements, or 49%). For these 22 projects, the following ranges were observed:

- Total points earned for the project: 32–46 (average of 38)
- Points earned from pavement-related items: 8–23 (average of 16)
- Fraction of earned points from pavement-related items: 20–53% (average of 41%).

This means that pavement-related credits are achieved at about the same fraction as they are included in the system although achievement rates can vary significantly between projects.

Working with Sustainability Rating Systems

Given that you may run into rating systems while doing business, here are four fundamental recommendations for working with rating systems which can benefit your business:

1. **Be familiar with the five big rating systems.** LEED, Greenroads, Envision, Green Globes, and INVEST. Not all of these systems treat asphalt pavement the same. LEED and Green Globes gives it almost no credit (they are building rating systems after all). There are differences in the other three as well. You can get a general feel for a rating system by reading through it and noting which topics are addressed (and not) and for how many points. Also, rating systems are based on project data, so pay attention to the data collection requirements you might have if using a rating system. Some of this data (like how much RAP, in tons, is actually in the mix) may not
normally be collected by the owner and evidence (records) from the contractor may be required.

2. **Endorse and use rating systems that best represent asphalt pavements.** There are differences between rating systems. Those that best represent asphalt pavements can be useful marketing tools by (1) advertising the sustainable attributes of the asphalt pavement industry, (2) independently verifying the value of these attributes (if the system allows for certification), and (3) understanding what projects pursuing certification are going to want from their asphalt pavement.

3. **Use your knowledge of sustainability rating systems for competitive advantage.** It can be advantageous to align your company with a recognized sustainability brand, especially one that is wholly independent of the industry. In general, a membership fee (these can vary greatly) gets you in the door. Ultimately, there are few recognized sustainability credentials in the industry. A record of working on certified projects, an active membership, and accredited professionals (pass a test on the rating system, become accredited) in your company are the best credentials.

4. **Use rating systems to expand specifications.** Often specifications will not allow you to do what you know is possible and more sustainable. Sometimes, pursuing certification on a project can provide leverage for changing a specification.

**Summary**

Procurement and evaluation are important elements in including sustainability in our infrastructure and, of course, asphalt pavements. There are different ways one can use to include sustainability in procurement, but, so far, there is not much guidance on when or how best to use them. In general, including sustainability in procurement is largely about getting (or allowing) contractor input into the design and construction process. Most commonly, sustainability can be included in these ways:

- **Specification.** Sustainability features can be specified, allowed or incentivized.
- **Change order.** It is, unfortunately, also possible that a sustainable feature is removed via change order.
- **Alternative sustainability bids.** A project that is bid as (1) a typical design, and (2) a similar design in function but with sustainability features. This is a good way for an owner to gauge how much sustainability features are costing or saving (yes, this can and does happen).
- **Alternative technical concepts (ATCs).** Design-build ideas proposed that were not requested but offer a sustainability advantage.
- **Sustainability qualifications.** A qualifications-based contract RFP that asks for contractor sustainability work experience or ideas.
- **Sustainability metric reporting.** Requiring certain project metrics (for example, fuel use) to be reported.
- **Sustainability rating systems.** Using a rating system to judge sustainability.
### APPROXIMATE CONVERSION TO SI UNITS

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**NOTE:** Volumes greater than 1000 L should be shown in m³

### APPROXIMATE CONVERSION FROM SI UNITS

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**NOTE:** A short ton is equal to 2,000 lbs

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