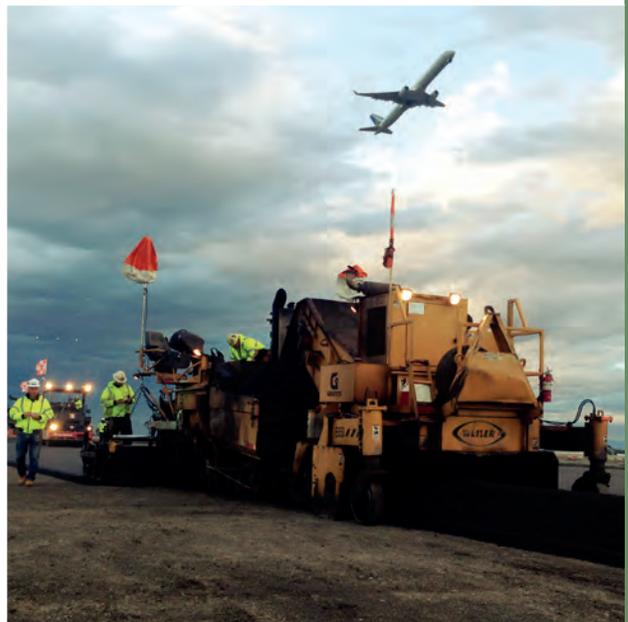
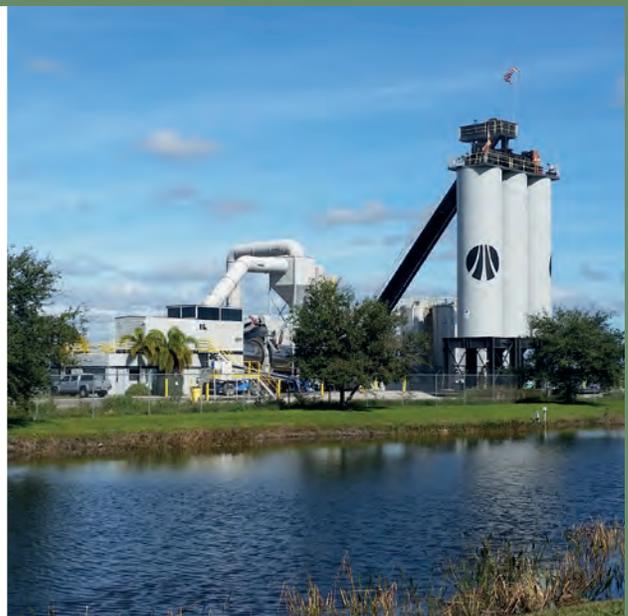


Sustainable Asphalt Pavements: A Practical Guide How to Develop a Sustainability Program



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. NAPA also strongly supports the development and dissemination of research, engineering and educational information that meets America's needs in transportation, recreational, and environmental pavements.



**NATIONAL ASPHALT
PAVEMENT ASSOCIATION**

6406 Ivy Lane, Suite 350 ■ Greenbelt, MD 20770-1441
Tel: 301-731-4748 ■ Fax: 301-731-4621 ■ Toll free 1-888-468-6499
www.AsphaltPavement.org ■ NAPA@AsphaltPavement.org

Audrey Copeland, Ph.D., P.E.
President & CEO

J. Richard Willis, Ph.D.
Vice President for Engineering, Research, & Technology

Joseph Shacat
Director of Sustainable Pavements

This publication is designed to provide information of interest to NAPA Members and is not to be considered a publication of standards or regulations. The views of the authors expressed herein do not necessarily reflect the decision making process of NAPA with regard to advice or opinions on the merits of certain processes, procedures, or equipment.

COPYRIGHT NOTICE

Publications produced and published by the National Asphalt Pavement Association (NAPA) are copyrighted by the Association and may not be republished or copied (including mechanical reproductions) without written consent. To obtain this consent contact the Association at the address above.

© 2019 National Asphalt Pavement Association

Sustainability in Practice Series 104

Printed 11/19

Sustainability in Practice 104

Sustainable Asphalt Pavements: A Practical Guide

How to Develop a Sustainability Program

By

Adam J.T. Hand, Ph.D., P.E.

University of Nevada, Reno

Stephen T. Muench, Ph.D., P.E.

University of Washington



**NATIONAL ASPHALT
PAVEMENT ASSOCIATION**

6406 Ivy Lane, Suite 350 ■ Greenbelt, MD 20770-1441
Tel: 301-731-4748 ■ Fax: 301-731-4621 ■ Toll free 1-888-468-6499
www.AsphaltPavement.org ■ NAPA@AsphaltPavement.org

Sustainable Asphalt Pavements: A Practical Guide

This is the fourth 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.

This material is disseminated under the sponsorship of the U.S. Department of Transportation in the interest of information exchange under FHWA Cooperative Agreement DTFH61-13-H-00027 “Deployment of Innovative Asphalt Technologies.” The U.S. Government assumes no liability for the use of this information.

The U.S. Government does not endorse products or manufacturers. Trademarks or manufacturer’s names appear in this material only because they are considered essential to the objective of the material. They are included for informational purposes only and are not intended to reflect a preference, approval, or endorsement of any one product or entity.

SIP-104: How to Develop a Sustainability Program

To develop an effective sustainability program, a contractor needs an understanding of sustainability specifics relative to the construction industry and of the fundamental change management practices necessary to successfully implement a program.

This document provides details of what a sustainability program should include, based on what is commonly accepted and what makes good sense. It starts with important items to consider when planning the development of a sustainability program and the reporting associated with it. The importance of setting meaningful sustainability goals and measuring them effectively is described next. A summary of existing asphalt industry sustainability documents is also provided to highlight common sustainability plan elements, goals, and reporting practices.

The need to consider and apply change management fundamentals while developing and implementing a sustainability program is then described. Implementing a sustainability program involves change in a company, likely a pretty big change. Managing that change is critical to a program's success. In fact, most implementation failures occur because of poor change management, not poor products or ideas. Ten best practices for sustainability program development, implementation, and reporting, based on interviews with NAPA member-company employees at multiple levels in their organizations, are presented. Finally, many of the resources available for developing, implementing, and reporting on a sustainability program are highlighted with a focus on resources available through NAPA.

Corporate Sustainability Program Planning

Corporate sustainability program planning can be done using the following five basic steps:

- 1) Pre-Planning
 - a) Team
 - b) Understand Sustainability
 - c) Research Industry Competitors' Plans
 - d) Vision or Mission
 - e) Communicate & Engage
- 2) Plan Development
 - a) Plan Elements
 - b) Goals and Metrics
 - c) Action Steps & Resources
 - d) Schedule
- 3) Implementation
 - a) Communicate & Engage

- 4) Reporting
- 5) Continuous Improvement

These five steps are applicable regardless of company size and aspirations. An initial sustainability plan for a small company that wants to be more intentional in following and communicating sustainable practices doesn't have to be extensive. In fact, starting small and continuously improving the plan is logical. It also allows time for the company to understand and embrace sustainability. Regardless of company size and aspiration, when the decision to develop a sustainability program is made, the decision needs to be well communicated to the employees by the company's senior-most manager. It needs to be clearly communicated that the plan is not a marketing tool for the company, but rather a tool to help make the business more sustainable for the long term by delivering benefits to customers, employees, the environment, and society as a whole.

Pre-Planning

Team

To start sustainability planning, a team within the organization must be identified and charged with delivering a plan. As with any other significant business process, one individual needs to have responsibility for leading the team and communicating with senior management. Selection of the team leader is critical, as the stature of that person in the company sends a message to the rest of the company. Depending on the size of the company and its sustainability aspirations, the team leader assignment may well need to be a full-time assignment lasting for as long as a couple of years (through the first reporting cycle). The team needs to have access to senior management, and senior management needs to communicate its support for the team to both the team and all other company employees. The team may benefit from being identified as a Sustainability Planning Committee or by whatever terminology is commonly used in the company, so it is understood to be an important effort.

The team should include a senior manager with intricate knowledge of the company's core values and future business strategic plans. This person will "carry the torch" once the program is developed. At a minimum, the team should also include mid-level manager(s) in each major company division (i.e., plants, construction); functional leader(s) (i.e., safety, environmental, quality, human resources); and at least one very operationally oriented person from each major company division who has direct access to senior craft employees. Depending on the size of the company, one person may fill more than one role. Outside assistance to the team from a consultant should be considered and, if deemed necessary, engaged during this Pre-Planning step.

Understand Sustainability

The team must develop a common understanding of what sustainability means and why addressing it is important to the company. There are many resources available to support this, including the NAPA *Sustainable Asphalt Pavements: A Practical Guide* series of documents. The sustainability plan being developed should place an adequate focus on the

company operating as a sustainable business because the company will generate value over the long term by integrating sustainability (business, environment, and people) into its core values and strategy. The team leader has a responsibility to be sure a foundation of what sustainability is and how sustainable practices support the sustainability of the company are clearly established.

Research Industry Competitors' Plans

Several NAPA member companies have published sustainability plans and reports as have other companies that work in the materials and transportation industries. These companies are proud of their sustainability efforts and post their plans on the Internet for all to see. Go ahead and review them. These plans are not all the same; the plan elements, goals, and metrics vary. Specific project activities are also highlighted in some plans. Some will be more mature than others and some will even dive into ethics, especially those of publicly held companies. Doing this research after having determined a common understanding of sustainability helps the team set the stage for developing a vision or mission for the company sustainability plan.

Vision or Mission

A vision or mission statement needs to be concise, but broad and flexible enough to allow for adjustments in plan elements, goals, and metrics over time. It is imperative that the vision or mission also support the company's business strategy and plan. They all must be integrated or they will compete with each other and sustainability will lose. Hopworks Urban Brewery (HUB) in Portland, Oregon, provides a good example of a mission statement that reflects both the business and sustainability goals of the company: "Using beer as a force for good. We focus on making world-class beer and food with practices that drive quality, protect the environment, and improve the community we live in" (HUB, n.d.). It is concise yet broad enough to encompass many sustainable practices. For example, the parking lot at the brewery is a permeable pavement, and HUB is the first Salmon-Safe certified brewery in the world.

Communicate & Engage

With the team formed and working with a common understanding of sustainability, coupled with a knowledge of other related-industry plans, to develop a mission or vision statement, it is again time to communicate with company employees about the sustainability planning efforts. Transparency throughout the process is important to ensure employee engagement as the plan is developed and implemented. Transparency can also help dispel any rumors about the planning process and what is forthcoming. Without an effective communication plan, misperceptions and hearsay can spread misinformation throughout a company, which has the potential to undermine the overall sustainability effort.



Figure 1. HUB Mission Statement.

Plan Development

Plan Elements

The first step in the plan development process is deciding what elements/areas to include in the company's plan. Examples may include business resilience, protecting the environment, supporting the community, health and safety, ethics and compliance. Including plan elements addressing employees and families have also become more common. Goals associated with this element may focus on personal development, diversity, and gender equality. The pre-planning efforts will have led to ideas that can be further developed by the committee. Review of the company's strategic plan and assuring alignment between it and the sustainability plan is an important step. Consideration of competitors' sustainable practices and where the company wants to be relative to them and the industry as a whole is also worthwhile.

Hitting the whiteboard with a sketch of the company's major departments, responsibilities, products, and outputs can be a useful exercise. Listing all the sustainable practices the company currently does — but may not necessarily be taking credit for — and making sure most of them have a place in the first round of the plan is also important. *Sustainable Asphalt Pavements: A Practical Guide — Sustainability Specifics* (SIP 102) is a useful reference for identifying sustainable practices. In this process, it is okay to put an emphasis on reducing costs while minimizing environmental impacts; however, it is very important that positive impacts on employees and communities are also included. Depending on the company's aspirations, it may be worthwhile to conduct some research, such as conducting waste and energy audits or a survey of employee perception of benefits, to gauge where the company stands and what opportunities may exist based on them.

Goals and Metrics

Once plan elements are selected, goals can be identified within each. This is a point where the mid-level manager and operationally oriented team members' input become very important, as they will recognize opportunities as well as potential challenges. Potential challenges are more likely to be connected to metrics rather than goals. Some companies state aspirational goals, such as Zero Injuries. They then state actual goals that support the aspirational one. This can be confusing if the two types of goals are not clearly distinguished in the plan. Some companies state short- and long-term goals, for example 5% alternative energy use in two years and 20% in five years.

When identifying goals, it is worth looking at the U.N. Sustainable Development Goals (SDGs) (United Nations, 2015) to see if the identified goals are in alignment, if that is an objective. This may be more important for companies that pursue alternative procurement work where a statement of qualifications could include reference to a sustainability plan that supports the SDGs, such as publicly held companies and/or for companies with both domestic and international operations.

When identifying goals, it is important to consider metrics that can be used to indicate performance relative to goals. A health and safety metric might be an operating unit's OSHA or MSHA recordable incident rate or rate reduction. An environmental metric might be a reduction in the number of environmental violations.

Three important things to remember when selecting metrics are:

- It must be possible to obtain the information necessary to accurately report performance. With some metrics, it may seem that obtaining the needed information would be simple when in practice it is not.
- Normalizing metrics may be necessary and/or beneficial to allow for change or cycles. For example, a goal of reducing energy consumption at an asphalt plant by 5% may not be nearly as meaningful as reducing energy consumption by 5% on a tonnage basis.
- If reporting to a standard, the goals and related metrics need to conform with or be translatable to the standard reporting requirements.

The most commonly used reporting standard among publicly held companies is the Global Reporting Initiative (GRI), an independent international standards organization that helps entities understand and communicate their impact on climate change, human rights, and corruption, among other issues. It is worth reviewing GRI standards while setting goals and metrics. Subsequent sections of this publication provide additional information on both U.N. SDGs and GRI standards.

It is important to do some research on the availability of information, the need to normalize it, the ability to compile it across a company if there are multiple divisions/business units, and how it will be reported when selecting metrics.

Action Steps and Resources

For each plan element and goal, it is worthwhile to identify the action steps necessary to accomplish the stated goal. When the action steps are listed, then the resources required to support them can also be identified. Remember that everyone in the company already has a full-time job. It is important to be realistic about what else, in addition to their regular job, people can be tasked with. If the committee does not do a good job of identifying and quantifying the resource requirements, then it has failed the organization. Underestimating or not providing necessary resources can lead to frustration, push back, and ultimately not meeting the stated goals. This is another reason why it is so important to engage mid-level managers and operationally oriented team members. If they participated in the development of the plan, they can help communicate how it will impact operations and get buy-in to support implementation.

This is a good reality check on what it will take to implement the plan being developed. The feedback can then be used to prioritize goals based on available resources, new resources that must be provided, and, if necessary, plan for staged implementation efforts. It is also a good time to look at what goals senior management set when plan development began and to communicate what it will take to achieve them.

Schedule

All sustainability plans need a schedule to communicate the timing of actions that lead to full implementation and ultimately reporting. The materials and construction industry is very familiar with schedules, so they are a no-brainer for internal company communications. The

importance of involving mid-level managers and operationally oriented team members in development of the timeline cannot be over emphasized. These types of people are also good at identifying critical paths and opportunities for work to be done in parallel, and they have a sense for realistic contingency planning that should be built into the schedule. The timeline needs to be realistic, and these staff members can be the reality-checkers.

Implementation

If a plan is thoughtfully developed using steps similar to those listed above, then smooth implementation according to the planned timeline should be possible. Of course, the plan needs to be documented in a form that can be publicly shared, if that is the goal — and it should be. For the first round of the plan development, there should be two levels of detail documented. The first level is for public information and the second level should include additional details needed for those actually implementing the plan. For example, the detail in terms of action steps, resources, and Gantt charts needed for public communication is far less than the level needed for operational implementation. Graphic artists are often engaged and sometimes get quite creative when developing graphics for sustainability plan documentation. If a diagram is included in a sustainability plan, it should be able to be concisely described by anyone in the company tasked with communicating the plan.

At this point, the sustainability team leader's job has really just begun. No matter how easy or difficult the plan development process was, implementation will take a champion committed to that effort. Senior management's job is to communicate to the entire company that:

- The plan has been developed with input from people at all levels of the company;
- It is aligned with the company's business strategy and exists to make the business more sustainable over time; and
- There are benefits of the plan for the company, all the employees, the environment, and society.

A good time for this communication is once the plan is developed and ready to be shared with employees so they can consume and embrace it. The bulk of the sustainability committee work as a team will be completed from a development perspective, but the reality is each team member can and should still play a role in communicating and promoting the plan. The reality is a little work around planning communications during the initial implementation will go a long way toward generating excitement and support for the implementation, especially when everyone knows what is in it for them as individuals.

Reporting

Reporting on performance of a publicly communicated sustainability plan is very important in creating credibility around it. Transparency is very important today and a sustainability report is also an opportunity to demonstrate a company's commitment to transparency in reporting. Reporting is also the opportunity to share the good things the company is doing both internally and externally.

The current trend on reporting frequency is every two years in the materials/construction industry. Most companies report on the performance over that period and update or state new goals and metrics for the coming period. For the current period, each goal is stated along with the actual performance and commonly some summary graphics indicating extreme success, success, more work needed, or a need for change. This is high level and if someone wants more detail, the goals and metrics are there for closer review.

Sustainability reports are commonly posted on company websites and start with a statement from the company President. She or he usually describes the company's commitment to sustainability and thanks the employees for accomplishing all that they did in implementing sustainable practices which has benefited the company, its customers, the environment, and society. There are several NAPA member companies that post sustainability reports on a regular basis. Their websites are listed in the reference section of this document and portions of most are summarized in a subsequent section of this document.

Continuous Improvement

For any effective plan to remain effective, it must be reviewed on a regular basis to see what is and is not working well. Opportunities for improvement are identified and changes made to make the plan more effective moving forward. For a sustainability plan, the mission, elements, goals, metrics, resources, communication, and value are all items that should be reviewed regularly. This is normally done with each reporting cycle and is an opportunity to communicate with and engage company employees along the way.

Many tools and templates are available on the Internet that can be reviewed and potentially used at every step of the sustainability program process — from development of a sustainability program all the way through the continuous improvement cycle. A quick search of “Sustainability Planning Tools” will reveal many of these tools, as well as help identify consultants that offer support of plan development.

Corporate Sustainability Reporting

Corporate sustainability reporting can take different forms and may occur at different frequencies. Regardless of form and frequency, a corporate sustainability report is a culmination of prior planning, implementation, and measurement efforts. It's the opportunity to document positive outcomes of sustainable practices, comparing stated goals with actual performance, and identifying future goals. The reality is sustainability goals are what drive behavior and are thus the foundation of sustainability reports. A description of high-level sustainability goals and reporting standards follows to illustrate future direction. This is followed by a review of asphalt industry sustainability reports looking closely at what elements, goals, and metrics are commonly included in their sustainability plans and reports.

Sustainability Goals

The U.N. Development Programme (UNDP) is the United Nations' global development network advocating for change and connecting countries to knowledge, experience, and resources to help people build a better life (United Nations, 2015). Through the UNDP, leaders from 193 governments came together to develop the Sustainable Development Goals (SDGs), otherwise known as the “Global Goals.” The SDGs are a universal call to action to end poverty, protect the planet, and ensure that all people enjoy peace and prosperity. The 17 SDGs build on the previously established U.N. Millennium Development Goals to include new areas, such as climate change, economic inequality, innovation, sustainable consumption, peace, and justice, among other priorities. Many of these goals are interconnected, so sometimes a key to success for one goal may involve achieving success with one or more associated goals. Figure 2 illustrates the SDGs; some of these are more pertinent to asphalt producers than others, such as Nos. 3, 4, 8, 9, 10, 11, and 12.



Figure 2. United Nations Development Programme Sustainable Development Goals (United Nations, 2015).

The SDGs are global, and many are applicable across many businesses and entities. In addition to being referenced in construction company sustainability reports, the SDGs are referenced in the Bill & Melinda Gates Foundation Goalkeepers Data Report, which is published annually to chart progress toward the SDGs (Gates Foundation, 2019). Figure 3 is an excerpt from a Salini Impregilo sustainability report illustrating the role of infrastructure in support of the SDGs from that company’s perspective and its operations (Salini Impregilo, 2016). It is worth noting that Salini Impregilo companies perform significant heavy civil

construction work. Until late 2018, Salini Impregilo's U.S. subsidiary Lane Construction Inc. owned a substantial portfolio of asphalt plants and was a major paving contractor.

The point is, from a global perspective, sustainable and common goals are applicable to all entities. A summary of several asphalt industry companies' reported sustainability goals is presented in the following section after more background on reporting standards and goal setting examples are provided.



Figure 3. The role of infrastructure in support of the U.N. SDGs per Salini Impregilo (2016).

Sustainability Reporting Standards

The most popular standards for sustainability reporting are from the Global Reporting Initiative (GRI), the Sustainability Accounting Standards Board (SASB), and the International Integrated Reporting Council (IIRC) (GRI, n.d.a; SASB, n.d.; IIRC, 2013). GRI, at about 80% of the market, is the dominant sustainability standards resource across all industries and continents. *Sustainable Asphalt Pavements: A Practical Guide — Sustainability Specifics (SIP-102)*, describes specific sustainable practices at the corporate/organizational, project delivery, and project levels that can be achieved using today's technology and know-how along with reference to GRI reporting (Muench & Hand, 2019). A brief overview of GRI and SASB reporting standards and their use in the construction and materials sector is provided below.

GRI is an independent international organization that has taken the lead in sustainability reporting since the late 1990s (GRI, n.d.a). GRI indicates that 93% of the world’s largest 250 corporations report on their sustainability performance using GRI Sustainability Reporting Standards. GRI defines a Corporate Social Responsibility (CSR or sustainability report) as “... a report published by a company or organization about the economic, environmental, and social impacts caused by its everyday activities. A sustainability report also presents the organization’s values and governance model, and demonstrates the link between its strategy and its commitment to a sustainable global economy” (GRI, n.d.b). A sustainability report serves as a focal point in the management of sustainability efforts and a tool for communicating sustainability performance and impacts.

Category	Economic	Environmental			
Aspects ^{III}	<ul style="list-style-type: none"> Economic Performance Market Presence Indirect Economic Impacts Procurement Practices 	<ul style="list-style-type: none"> Materials Energy Water Biodiversity Emissions Effluents and Waste Products and Services Compliance Transport Overall Supplier Environmental Assessment Environmental Grievance Mechanisms 			
Category	Social				
Sub-Categories	Labor Practices and Decent Work	Human Rights	Society	Product Responsibility	
Aspects ^{III}	<ul style="list-style-type: none"> Employment Labor/Management Relations Occupational Health and Safety Training and Education Diversity and Equal Opportunity Equal Remuneration for Women and Men Supplier Assessment for Labor Practices Labor Practices Grievance Mechanisms 	<ul style="list-style-type: none"> Investment Non-discrimination Freedom of Association and Collective Bargaining Child Labor Forced or Compulsory Labor Security Practices Indigenous Rights Assessment Supplier Human Rights Assessment Human Rights Grievance Mechanisms 	<ul style="list-style-type: none"> Local Communities Anti-corruption Public Policy Anti-competitive Behavior Compliance Supplier Assessment for Impacts on Society Grievance Mechanisms for Impacts on Society 	<ul style="list-style-type: none"> Customer Health and Safety Product and Service Labeling Marketing Communications Customer Privacy Compliance 	

Figure 4. GRI standard reporting Categories, Sub-Categories and Aspects within them (GRI, 2015).

The Governance & Accountability Institute reports that in 2017 85% of S&P 500 companies did sustainability reporting (Coppola, 2018); however, GRI states that sustainability reporting is not as well-established in the construction sector (Lamprinidi & Ringland, 2008). Only one

NAPA member company, CRH Americas Materials, indicates it reports to any of the GRI elements. Figure 4 is an excerpt from the GRI reporting principles and standards, showing the three primary reporting categories: economics, environment, and social. It also illustrates four subcategories under the social category. Under each category and subcategory, specific reporting aspects are listed.

SASB is similar to the well-recognized Financial Accounting Standards Board (FASB). FASB is a private, non-profit standard-setting body with the primary purpose of establishing and improving U.S. generally accepted accounting principles (GAAP) in the public interest (FASB, n.d.). SASB connects business and investors to the financial impacts of sustainability (SASB, n.d.). It was founded in 2011 to develop and disseminate sustainability accounting standards, which is important because “other social and environmental measures” are understood to be relevant to financial reporting today. A SASB goal is to have its standards integrated into the U.S. Securities and Exchange Commission (SEC) annual 10-K reporting requirements which are a comprehensive summary of a public company’s financial performance.

SASB has developed industry-specific reporting standards, enabling relevant company comparisons. The SASB website states that “Investors increasingly recognize that environmental, social and governance (ESG) factors can impact a company’s ability to manage risk and deliver financial performance over the long-term.” SASB has created an Investor Advisory Group (IAG) comprised of leading asset owners and asset managers committed to improving the quality and comparability of sustainability-related disclosure to investors. Collectively, the IAG represents more than \$21 trillion in assets under management.

The U.N. SDGs, use of GRI reporting standards, and SASB IAG membership are not the norm among relatively small companies working to improve their sustainable practices. However, they are becoming common in larger companies, especially publicly traded companies. They are certain to become more common in the future.

Obtaining Meaningful Data for Sustainability Goal Reporting

When establishing sustainability goals, it is very important to consider what action steps will be required to achieve stated goals and how the information necessary to report on goals will be obtained. In some cases, this could be quite simple. At a very basic level, a goal of reducing energy consumption at an administrative building could be set. Utility company bills could be used to see if the steps taken were effective in reducing energy consumption. Examples of action steps might include conducting an energy audit; replacing incandescent and CFL lightbulbs with LED bulbs when they burn out; turning all office equipment (computers, monitors, printers) off at night; using motion detectors and automatic dimmers for lighting control in hallways and meeting spaces; and using programmable thermostats wisely. The investment in the action steps could be easily quantified while the energy consumption and related cost savings could be obtained from the utility company bills to measure performance. That is pretty straightforward and could easily be reported to the

office occupants, showing the return on investment and reduction in energy use. Details of this and other examples can be found in SIP-102 (Muench & Hand, 2019).

A more challenging example might be a goal to reduce GHGs at an asphalt pavement mixture production facility with action steps of increasing RAP use by 10%, increasing the ratio of warm-mix to hot-mix production by 10%, insulating hot oil lines, and installing variable frequency drives on the slat conveyor and baghouse motors. All of these action steps make sense financially and should also make sense from a GHG reduction perspective. To make the example more interesting, the production site might also have an aggregate plant, equipment shop, quality control lab, regional business office, and a series of 15 temporary offices set up to support a large project nearby that will be removed when the project ends in nine months. Interestingly, there is only one gas meter and one electric meter on the entire site. Quantifying the actual energy consumption and GHG impacts of the logical action steps above could be very challenging, nearly impossible, under these conditions. It could be further complicated if significant swings in annual aggregate and plant production occur, although this could be normalized by reporting relative to production. The point of this example is to ensure goals are well thought out and measurement and reporting are considered when establishing them. This requires involvement in the goal setting process of those who would be charged with doing the measurement.

Examples of Industry Sustainability Programs

To illustrate how these principles are put to use, several asphalt industry company sustainability plans and/or reports were reviewed and are highlighted below. Sustainability program elements, goals, metrics, and reporting frequency were reviewed along with ties to business strategy. Reports from Colas, CRH Americas Materials, Granite Construction Inc., Salini Impregilo S.p.A., Martin Marietta Inc., and Vulcan Materials Co. were reviewed.

CRH Americas Materials' Vision from its 2017 annual sustainability report is shown in Figure 5 (CRH, 2017). It illustrates a tie between business strategy and sustainability.

The report also includes summary financial reporting. The CRH Americas Materials annual



Figure 5. CRH Vision (CRH, 2017)

report was one of two NAPA member reports with reference to any of the U.N. SDGs with specific references to SDGs Nos. 9, 11, 12, and 13.

The CRH report lists 15 goals with one or more of the following elements in its plan: safety, employee engagement, business conduct, community engagement, supply chain, environment, climate, air, waste, water, and biodiversity. The report includes extensive graphics illustrating plan elements and practices associated with the elements. Figure 6 is an example of this from the report.



Figure 6. CRH Americas Materials plan elements and associated practices. (CRH, 2017).

The 2017 Martin Marietta sustainability report included limited financial reporting and focused on performance, although specific goals were not stated (Martin Marietta, 2017). Plan elements were not clearly stated either. Figure 7 is an example from the report illustrating improvement in safety performance.

The 2016 Granite Construction sustainability report included limited financial reporting (Granite, 2016). It included seven elements with clearly stated goals and reported performance. Space was also dedicated to ethics like some of the other plans. Figure 8 is a graphic illustrating the plan elements with safety at the center. Interestingly, it was the only plan reviewed that included infrastructure investment as an element. Additional research revealed that the company is headquartered in California and has significant construction materials and construction resources in that state. The Infrastructure Investment element was likely partially driven by California Senate Bill 1, the Road Repair and Accountability Act of 2017, which provided for significant long-term transportation funding in the state.



Figure 7. Martin Marietta Safety Performance Example (Martin Marietta, 2017).



Figure 8. Granite's Seven Pillars of Sustainability (Granite, 2016)

Like the CRH Americas Materials report, the 2016 Salini Impregilo sustainability report was extensive and included financial reporting and ethics elements (Salini Impregilo, 2016). It also included reference to the U.N. SDGs (see Figure 3) with direct contribution to SDG Nos. 6, 7, 9, 11 and 13, as well as indirect contribution to the other 12 goals. Figure 9 excerpted from the report shows what is referred to as the “Shared Value Approach,” including economic value, social and environmental value that addresses infrastructure needs while addressing sustainable development goals. This clearly illustrates the tie between business strategy and sustainability strategy.

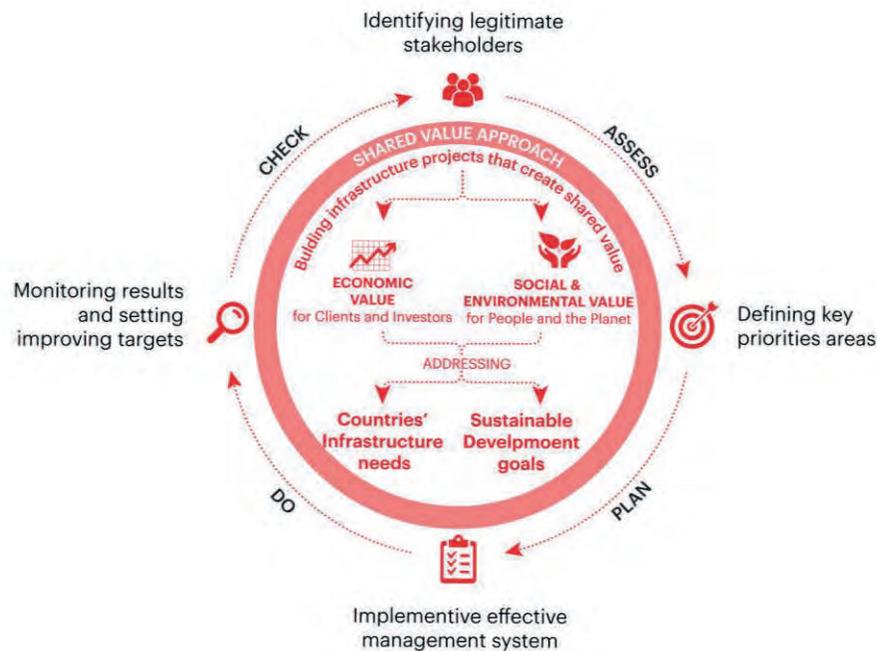


Figure 9. Salini Impregilo’s Shared Value Approach (Salini Impregilo, 2016).

It is worth mentioning that graphics can be very useful for communicating information and relationships. However, if they are not well done or communicated, graphics can also create confusion; unfortunately, this is not uncommon when it comes to the graphics sometimes found in sustainability plans and reports.

The elements of the six reviewed corporate sustainability program plans are summarized in Table 1. All six included the following elements: Business and Sustainability Strategies Integration, Safety, Employee, Community Engagement, and Environment. Three included Customers/Quality, and four included Compliance/Risk Management/Ethics. All six included public reporting with metrics.

While there was some consistency in plan elements, the reporting metrics used were not nearly as consistent among the companies reviewed. A few selected examples of the metrics used are summarized by company and sustainability plan element in Table 2. Appendix A contains more detailed lists of metrics they used. The appendix has a table for each company with more detailed lists of the metrics used within each sustainability plan element. The appendix also contains a set of tables organized by sustainability plan

element, showing the companies' metrics together within each sustainability plan element. The Colas, CRH Americas Materials, and Salini Impregilo reports contained the most extensive levels of metrics reporting and complexity. The CRH report was the only one to reference reporting to GRI standards. Colas also included metrics more fundamental or directly related to environment impact, such as CO₂/GHG, energy consumption, water use, and waste generation to name a few examples.

Table 3 illustrates how many asphalt industry corporate sustainability reporting metrics can be directly related to GRI reporting standards. The example shown in the table is for sustainability plan metrics associated with the sustainability plan element Integration of Business and Sustainability Strategies. This example also clearly shows that NAPA member companies could join the more than 80 percent of S&P 500 company reporting to the GRI standard. The same could be done for other sustainability plan element metrics using the summary of all GRI reporting standards categories, subcategories, aspects, indicators, and descriptions presented in Appendix B.

Observations on Industry Company Reports

There is a range of effort and documentation from the companies when it comes to sustainability reporting. Of the sustainability programs reviewed, those with a significant portion of the company business outside the U.S. have the most mature programs. The programs rely on ISO management standards, incorporate U.N. SDGs, and one even reports to the GRI standard with third-party certification of its reporting. Examples are CRH Americas Materials, Colas, and Salini Impregilo.

The U.S.-based companies reporting publicly are obviously not as influenced by European standards and the sustainability climate of Europe. Interestingly, both the U.S.- and Europe-based company plans contain essentially the same plan elements. The sustainability plans of the U.S.-based companies are less mature, simpler, but still include metrics. It is important to note that all the plans reviewed were for publicly traded companies.

For privately held companies working on or considering developing sustainability plans, it would be best to use the reviewed U.S. company plans as a starting point and as an indicator of what will be important over the next five years in the U.S. Then look at the factors the Europe-based company plans contain when considering the direction sustainability planning could take in the U.S. over the longer term. It cannot be emphasized enough that sustainability plan development and reporting can begin with simply taking credit for what a company is currently doing and then building on that over time.

Table 1. Elements of Asphalt Industry Company Corporate Sustainability Programs.

Company	Business & Sustainability Strategies Integrated	Safety	Employees	Community Engagement	Environment	Customers, Quality	Compliance, Risk Management, Ethics	Public Reporting with Metrics
CRH Americas Materials	Building a Resilient and Sustainable Business	Embedding a Culture of Safety	Developing and Empowering Our People	Collaborating and Engaging for Sustainability	Protecting the Environment	Creating Solutions for Our Customers	Yes	Yes (2017)
Martin Marietta	Sustainability Excellence Drives Shareholder Value	Safe Operations	Employee Well-Being	Community Well-Being	Environmental Stewardship			Yes (2017)
Granite Construction	...align our sustainability goals with our five-year Strategic Plan	At Granite our ultimate goal is zero incidents	Our most powerful partnership is the one we have with our employees	...each local community is at the heart of those we serve	We believe that we must be a leader in environmentally responsible operations in our industry	We deliver high-quality projects and materials to meet or exceed our customers' standards...	Named by Ethisphere Institute as one of the "World's Most Ethical Companies" seven years in a row	Yes (2016)
Colas	our commitment to sustainability is an essential part of this strategy	Health, Safety and Wellbeing	Our People	Community	Environmental Sustainability	Customers Suppliers and Partners	Ensuring we comply with regulation and have strong governance and ethics	Yes (2017)
Vulcan Materials	... guide our business conduct as well as our social, environmental and economic activities	Safety Drives and Reinforces Every Action We Take	Committed to Our People	We're in This Together	Responsible Stewards		Upholding ethical business practices	Yes (2016)

Table 2. Examples of Asphalt Industry Company Corporate Sustainability Reporting Metrics.

Company	Business	Safety	Employees	Community Engagement	Environment	Customers, Quality	Compliance, Risk Management, Ethics
CRH Americas Materials	<ul style="list-style-type: none"> Financials GRI Index Four U.N. Global Sustainability Goals 	<ul style="list-style-type: none"> Fatalities Accidents by Injuries and Cause Contractor site induction Safety training 	<ul style="list-style-type: none"> Employee training Employees by age, gender, and country 	<ul style="list-style-type: none"> Community engagement plans 	<ul style="list-style-type: none"> Expenditures on licensing, waste management, restoration & biodiversity, alternative material & fuel use, emissions reduction CO₂ emissions Energy use Waste type & recycling 		<ul style="list-style-type: none"> Supply chain procurement ethics Code of Business Conduct training Compliance training Board member make up
Martin Marietta	<ul style="list-style-type: none"> Awards 	<ul style="list-style-type: none"> Awards Injury rate Lost time rate Audits 	<ul style="list-style-type: none"> Female & minority employees Continuous learning courses 401(k) participation 	<ul style="list-style-type: none"> Volunteer hours Donated materials Education visits Meals 	<ul style="list-style-type: none"> Investment in mobile equipment with reduced GHG Alternative fuel use in plants Alternative shipping (rail) 		<ul style="list-style-type: none"> Ethics training
Granite Construction	<ul style="list-style-type: none"> Sustainable infrastructure investment Senior management engagement in industry Rating system engagement 	<ul style="list-style-type: none"> OSHA recordable incident rate OSHA & MSHA citations OHSAS 18001 certification 	<ul style="list-style-type: none"> Wellness program participation Women in construction support Retention & turnover rates 	<ul style="list-style-type: none"> Community outreach engagements Financial support of non-profits All business unit disaster relief drive 	<ul style="list-style-type: none"> ISO 14001 certification Environmental citations Green construction materials use Telematics for reduced fuel consumption Carbon footprint 	<ul style="list-style-type: none"> ISO 9001 conformance-Quality staff certifications & licensure Quality awards 	<ul style="list-style-type: none"> Ethisphere Most Ethical Company designation Compliance training ISO 19600 Corporate Compliance & Ethics conformance

Table 2 (continued). Examples of Asphalt Industry Company Corporate Sustainability Reporting Metrics.

Company	Business	Safety	Employees	Community Engagement	Environment	Customers, Quality	Compliance, Risk Management, Ethics
Colas	<ul style="list-style-type: none"> • Financials • Growth 	<ul style="list-style-type: none"> • Lost time frequency • Vehicle incidents • Accident frequency • OHSAS 18001 non-conformances 	<ul style="list-style-type: none"> • Workforce • Employee training days • Female management • Turnover • Employee satisfaction 	<ul style="list-style-type: none"> • Community investment • Volunteer time • Educational events 	<ul style="list-style-type: none"> • ISO 14001 certification • Incident frequency • Prosecution rate • Non-conformances • Recycling rate • CO₂ turnover • GHG • Energy efficiency • Waste • ISO 50001 certification 	<ul style="list-style-type: none"> • Remedial spend • Customer satisfaction • Quality non-conformance rate • Customer quality issues 	<ul style="list-style-type: none"> • Number of suppliers • Supplier performance reviews
Salini Impregilo	<ul style="list-style-type: none"> • Financials • Total projects • Global presence (total employees, countries, nationalities) • Local procurement 	<ul style="list-style-type: none"> • Injury rate • Lost days rate 	<ul style="list-style-type: none"> • Training hours provided • Master's in International Construction Management program 	<ul style="list-style-type: none"> • Local community meetings • Project visits • Free health interventions 	<ul style="list-style-type: none"> • Climate change mitigation backlog • GHG • Energy, Water and Reuse intensity • Reutilized materials • Supplier evaluations • Goods shipped by sea • Pollution controls • Reforestation 		<ul style="list-style-type: none"> • Code of ethics training • Organizational control and corruption training

Table 2 (continued). Examples of Asphalt Industry Company Corporate Sustainability Reporting Metrics.

<p>Vulcan Materials</p>	<ul style="list-style-type: none"> • Financials 	<ul style="list-style-type: none"> • MSHA & OSHA recordable injury rate • MSHA citation rate • Health testing rate • Dust, silica and noise exposure sampling 	<ul style="list-style-type: none"> • Employees • Tenure • New Hires 	<ul style="list-style-type: none"> • Scholarships awards/funds • School partnerships • Visitors • Plant tours • Dollars donated • Foundation and matching gifts • Matching employee contributions 	<ul style="list-style-type: none"> • Acreage in portfolio • Water stores at former quarry • Wildlife Habitat Council certified sites • Used oil recycled • Products produced from recycled materials 		
-----------------------------	--	---	--	--	---	--	--

Table 3. Asphalt Industry Company Corporate Sustainability Reporting Metric Examples for Integration of Business and Sustainability Strategies related to GRI Reporting Standards.

Company	Business & Sustainability Strategies Integrated	Related GRI Reporting Category > Sub-Category > Aspect
CRH Americas Materials	Financials	Economic > Economic Performance
	GRI Index	
	Four U.N. Sustainable Development Goals (SDGs)	
Martin Marietta	Awards	
Granite Construction	Sustainable infrastructure investment	Economic > Market Presence
	Senior management engagement in industry organizations	
	Promoting sustainable infrastructure funding	Society > Public Policy
	Envision and Greenroads participation	Society > Local Communities
Colas	Financials	Economic > Economic Performance
	Growth	
Salini Impregilo	Financials	Economic > Economic Performance
	Total projects	Economic > Market Presence
	Global presence (total employees, countries, nationalities)	Social > Labor Practices and Decent Work > Employment
	Local procurement	Economic > Procurement Practices
Vulcan Materials	Financials	Economic > Economic Performance

Implementation Best Practices

Industry sustainability program best practices were identified by interviewing key personnel at NAPA member companies with responsibility for developing, implementing, or maintaining sustainability programs. People at different organization levels, ranging from president and CEO to operational managers and craft workers, were interviewed.

Collectively the following 10 best practices were identified through a review of the literature, personal experience, and, most importantly, interviews of industry personnel:

1. How sustainability supports the business strategy must be clear to the company.
2. Senior leadership commitment and communication are essential to implementation.
3. Stakeholders at all levels must be engaged in development to support implementation.
4. Resources necessary for implementation and maintenance must be provided.
5. Management systems should complement and support sustainability programs.
6. External assistance can help with development and continuous improvement.
7. Careful consideration of sustainability plan elements and goal setting.
8. Ability to measure performance is essential.
9. Documentation, measurement, and reporting drive performance.
10. Patience is required and program evolution will occur.

How Sustainability Supports the Business Strategy Must be Clear

It must be very clear how development and implementation of a sustainability program supports the company's business strategy and will provide return on investment in order for buy-in to occur at all levels of the company. Direction from the board of directors or senior management, including the president, without clear communication as to why sustainability is good for employees, shareholders, the environment, and society may not lead to support from those who must make the changes and do the work necessary to accomplish the goals of the program. Once the economic value is clear, it is easy to also illustrate the environmental and social benefits.

Use of simple examples like the use of RAP and even in some cases just meeting owner requirements are an excellent way to do this. Once the conversation begins with the positive financial aspects, which also include positive environmental impacts, then less tangible examples can be communicated, such as program benefits to employees and local communities. Regardless of the path taken to communicate or gain support for a sustainability program, communication must start with the positive financial impact it can have on the company. A copy of the book *Green to Gold: How Smart Companies Use Environmental Strategy to Innovate, Create Value, and Build Competitive Advantage* (Esty & Wilson, 2009) dropped on a few desks afterwards can be helpful also.

Senior Leadership Commitment and Communication Are Essential to Implementation

If senior leadership in a company is not committed to a sustainability program, the effort should not be pursued until they are convinced of its merit. What is important to an employee's boss is normally important to the employee. If senior leadership is committed, it is much easier to obtain commitment from the rest of the company's employees. If the president of a company has the vision to see how sustainable practices can improve business performance and company perception, then he or she clearly has the ingredients necessary to be committed and to communicate that commitment.

Once committed, senior leadership must be unwavering in its commitment. It must lead by example, clearly communicating the company's path and the value the sustainability program will create for the company and its employees. Every company employee is a stakeholder in the program and needs to be engaged for it to be successfully implemented to provide the expected returns. If senior leadership does not make the sustainability program a high priority, communicate that, and "walk the talk" by providing the resources necessary to accomplish it, the likelihood of success will be low. When senior leadership does walk the talk, then commitment will trickle down through the company.

One of the best things senior leadership can do is publicly acknowledge and reward those that show the same level of commitment and at the same time appropriately hold those who are not committed accountable for their actions. This is particularly important at mid-level management and senior craft levels. When a superintendent who has helped make the company successful in the past is openly negative about the sustainability program, they

need to be appropriately addressed so that the crews working for them do not turn negative too. This usually occurs either due to a lack of understanding of the benefits of the program or when appropriate resources have not been provided.

Stakeholders at All Levels Must Be Engaged in Development to Support Implementation

A sustainability program cannot successfully be developed and implemented without involving stakeholders at all levels of a company. Senior management can have a desired or even publicly stated goal, but without input on how to achieve the goal from mid-level managers and, even more importantly, craft-level workers that actually produce products, the desired outcome will not be attainable in the most efficient and effective manner. In fact, management dictation of goals along with how they will be accomplished can result in pushback and disengagement of employees. Conversely, when employees at all levels of a company are involved in identifying goals and setting targets, then they will be more engaged in helping the company achieve them, especially if they can see a tie between the goals and the return on investment for the company and its employees. Using this process also assures different stakeholders will understand how their asks will impact others and vice versa, ultimately eliminating future roadblocks.

Resources Necessary for Implementation and Maintenance Must Be Provided

Whenever a new initiative is begun, it requires resources for development and implementation, as well as maintenance and improvement once established. It is important that those tasked with each of these activities have the resources necessary to accomplish what they are being asked to do. There are always costs and time associated with a commitment of resources, and management needs to walk the talk on resource commitment.

For example, when setting a goal to increase RAP use in asphalt mixtures from 10% to 30%, capital investments may be needed for plant improvements. New mix designs, training of staff, and inventory-tracking process changes will be needed, too. All of this will take time to acquire, shakedown, and effectively implement before the goal can be accomplished. Management needs to recognize this and provide the support needed to reach the goal.

Management Systems Should Complement and Support Sustainability Programs

Many companies successfully leverage ISO management systems to support sustainability program objectives, goals, reporting, and continuous improvement. ISO 9001, ISO 14001, and ISO 45001 are Quality Management, Environmental Management and Occupational Health and Safety Management standards, respectively (ISO, n.d.). All are similar in philosophy and rely on the same basic principles to engage senior management while leading to expected outcomes and continuous improvement.



Many GRI reporting requirements are well aligned with the ISO management standards. A good example with direct comparison between ISO 14001 requirements and GRI reporting requirements can be found in Mileva (2013). Some of the company sustainability reports reviewed, including CRH Americas Materials, Colas, Granite Construction and Salini Impregilo, reference ISO-based, -compliant, or -certified management systems. Taking the time to closely review these companies' sustainability plans and reports can provide insight into the ties between the ISO management standards, goals, and reporting. Some of these companies also rely on Lean and Six Sigma methodologies for continuous improvement. Lean focuses on eliminating waste in processes and production, while Six Sigma focuses on reducing variability in processes and production (George, 2002). The reality is Lean and Six Sigma complement each other and that is why many companies combine the two into what is called Lean Six Sigma for continuous improvement. All these resources can be used to support sustainable operations.

External Assistance Can Help with Development and Continuous Improvement

Several forms of external assistance can be used to help a company develop or improve an existing sustainability program. Examples include hiring someone with experience in this field if no one in the company has it (not necessarily a consultant); benchmarking against peer companies; forming a council of advisors that may or may not be formal; and being intentional in adding a company board of director who worked for a company with an effective sustainability program. Although external assistance can be very helpful, it is essential that someone in the company have "ownership" of the sustainability program as it will ultimately be managed by the company, not a consultant.

Careful Consideration of Sustainability Plan Elements and Goal Setting

A process for considering and selecting sustainability plan elements and key goal selection considerations was described previously in the "Corporate Sustainability Program Planning" section. Confusion around selecting plan elements can occur after the goals, action steps, and metrics associated with them are developed, as they may fall under more than one plan element. This is a common occurrence that forces proposed plan elements to be revisited and revised, which is acceptable. What is not acceptable is getting bogged down and complicating the plan by combining elements to the point so aggressively that only a few elements that are difficult to communicate clearly remain.

Ability to Measure Performance is Essential

The most meaningful and powerful outcomes of a sustainability program are the measurement and reporting of performance. Reporting performance data clearly demonstrates a company's commitment to sustainability. Therefore, performance measurement data need to be readily obtainable and as accurate as possible. Transparency is confirmed through performance reporting, and no company wants its credibility questioned due to the accuracy of its performance reporting data.

When selecting metrics, it is important to give consideration to what may happen over time to influence the metrics and reporting. For example, a company could acquire additional plants or merge companies. There could be significant swings in plant production tonnage from year to year due to local market conditions, etc. When selecting metrics, it may be best to normalize them, so relative comparisons can be made over time. For example, tracking energy consumption per ton versus total annual energy consumption.

Documentation, Measurement, and Reporting Drive Performance

There are several adages, often incorrectly attributed to management and quality gurus Peter Drucker and/or W. Edwards Deming, that state some variation of “If you don’t measure it, you can’t manage it or improve it.” Regardless of the source, the message is a valuable one for sustainability programs. For a sustainability program and related reports to be of significant value to a company and its customers, the program must be built on facts, not marketing propaganda. Documentation, measurement, and reporting are the keys to credibility. There are several references to this in the works of Andrew Winston (Esty & Winston, 2009; Winston, 2014). In *The Big Pivot: Radically Practical Strategies for a Hotter, Scarcer, and More Open World* (Winston, 2014), in particular, Winston focuses on the importance of companies being truthful and transparent in sustainability reporting.

Winston uses several examples to illustrate how dramatically social media can rapidly damage company reputation and credibility, as well as force a company to take actions. One example is the 2015 Volkswagen emissions scandal, commonly referred to as “dieseltgate,” which is estimated to have cost the company \$18 billion (Boston, 2016). As the scandal erupted, Volkswagen AG stock price rapidly dropped from about \$25/share to \$11/share. Four year later, it is still trading for about \$17/share. Another recent example is students petitioning Starbucks to reduce paper cup waste using the Change.org petition site, leading the company to commit to investing \$10 million for development of more sustainable cups (Ko, 2018; Smith, 2018).



Several good examples of sustainability reports from the asphalt industry are referenced in this document. Central to all of them is reliance on the measurement of performance relative to a set of stated goals. The reports reviewed are primarily from larger producers and are based on mature programs developed over many years. If one reviews these company sustainability reports over time, the importance of measuring and reporting performance is very clear. Once reporting starts, no company desires to show a decline in performance. Therefore, documenting goals, measuring performance, and reporting it on a regular basis leads to continuous improvement and commitment of resources needed to accomplish stated goals that evolve with time.

Patience is Required and Program Evolution Will Occur

Development, implementation of, and ultimately reporting on the effectiveness of a sustainability program takes time. It typically takes several years and is an evolutionary process.

Recognizing this is important in planning so that a realistic initial scope and expectations over time are set. It is not unusual for a program to start relatively small by simply identifying the sustainable practices the company already does and laying out a program to recognize and take credit for them. This is useful for illustrating to a company's employees how it is already committed to sustainability and how that commitment positively impacts the company, environment, and society. After this initial development, the program can continually improve and grow in scope and at a pace that best suits the company. Introduction and evolution also involves change management, which should be considered, especially when considering the pace of development, implementation, and evolution. The review of publicly available sustainability plans and reports illustrates this.



Resources to Support Contractor Sustainability Programs

There are many resources available to support development of sustainability programs for asphalt mixture producers, construction companies, and related businesses. Tools and templates are available on the Internet that can be reviewed and potentially used when beginning development of a sustainability program. There are many active sustainability consultants, although few are focused on the materials/construction industry. Importantly, NAPA has a significant number of asphalt-focused sustainability resources available that compliment other sustainability resources. Most of these resources can be accessed via the NAPA website, www.AsphaltPavement.org/PracticalGuide, including:

- Annual survey reports on the use of recycled materials and warm-mix asphalt technologies in the United States.
- The Emerald Eco-Label, a web-based tool that allows asphalt mix producers to easily and cost effectively develop plant- and mixture-specific environmental product declarations (EPDs).
- Guidance on the design, production, construction, and maintenance of porous asphalt pavements.
- Information on pavement reflectivity and the urban heat island effect.
- A greenhouse gas calculator tool for asphalt mix production facilities.
- Guidance on how asphalt pavements can help projects earn credits under various green rating systems, such as LEED and Greenroads.
- Numerous reports and fact sheets on the sustainable aspects of asphalt pavements.

The NAPA Online Store includes a complete suite of technical publications that cover everything from managing energy consumption at asphalt plants to designing high RAP mixtures. In addition, links to sustainability webinars, including the 10-part “Specialization in Asphalt Sustainability Implementation” series, that can be viewed on demand are available. The NAPA Sustainability Committee meets twice a year at NAPA’s Annual Meeting and Midyear Meeting, and sustainability topics are regularly included among these meeting’s workshops and sessions. Past conferences have even been dedicated only to sustainability. Finally, multiple NAPA staff members are industry leaders in specific areas of sustainability and are easily accessible and eager to respond to requests.

References

- Boston, W. (2016). Bad News? What Bad News? Volkswagen Bullish Despite Emissions Costs. *The Wall Street Journal*, April 18, 2016. <https://www.wsj.com/articles/volkswagen-says-diesel-car-buy-backs-to-cost-almost-9-billion-1461831943>
- Colas (2017). Corporate and Sustainability Report 2017. Colas United Kingdom, Crawley, England. www.colas.co.uk/media/1643/colas-uk-corporate-and-sustainability-report-2017.pdf
- Coppola, L. (2018). Flash Report: 85% of S&P 500 Index® Companies Publish Sustainability Reports in 2017. Governance & Accountability Institute Inc., New York City, New York.
- CRH (2017). 2017 Annual Report and Form 20-F. CRH PLC, Dublin, Ireland. www.crh.com/media/2870/2017-annual-report-and-form-20-f-interactive.pdf
- Esty, D.C., & A.S. Winston (2009). *Green to Gold: How Smart Companies Use Environmental Strategy to Innovate, Create Value, and Build Competitive Advantage*. John Wiley & Sons Inc., Hoboken, New Jersey.
- FASB (n.d.). Homepage [website]. Financial Accounting Standards Board (FASB), Norwalk, Connecticut. www.fasb.org
- Gates Foundation (2019). Examining Inequality: The Goalkeepers Report 2019. Bill and Melinda Gates Foundation, Seattle, Washington. www.gatesfoundation.org/goalkeepers/
- George, M.L. (2002). *Lean Six Sigma: Combining Six Sigma Quality with Lean Production Speed*. McGraw-Hill Professional Publishing, New York City, New York.
- Granite (2016). Granite 2016 Sustainability Update. Granite Construction Inc., Watsonville, California. www.graniteconstruction.com/sites/default/files/inline-files/Granite_2016_Sustainability_Report_4.pdf
- GRI (n.d.a). Homepage [website]. Global Reporting Initiative (GRI), Amsterdam, Netherlands. www.globalreporting.org
- GRI (n.d.b). About Sustainability Reporting [website]. Global Reporting Initiative (GRI), Amsterdam, Netherlands. www.globalreporting.org/information/sustainability-reporting/

- GRI (2015). *G4 Sustainability Reporting Guidelines: Reporting Principles and Standard Disclosures*. Global Reporting Initiative (GRI), Amsterdam, Netherlands.
- Harvey, S. (2013). Sustainability Plans. *Green Plus*. Institute for Sustainable Development, Durham, North Carolina. gogreenplus.org/nuts-and-bolts-guide/performance-nuts-and-bolts-guide/sustainability-management/sustainability-plans/
- HUB (n.d.). Homepage [website]. Hopworks Urban Brewery, Portland, Oregon. hopworksbeer.com
- IIRC (2013). *The International <IR> Framework*. International Integrated Reporting Council (IIRC), London, England. integratedreporting.org/resource/international-ir-framework/
- ISO (n.d.). Homepage [website]. International Organization for Standards (ISO), Geneva, Switzerland. www.iso.org
- Ko, G. (2018). Starbucks, we know you can make a #BetterCup. Change.org. <https://www.change.org/p/starbucks-we-know-you-can-break-free-from-plastic-and-make-a-bettercup>
- Lamprinidi, S., & L. Ringland (2008). *A Snapshot of Sustainability Reporting in the Construction and Real Estate Sector*. Global Reporting Initiative (GRI), Amsterdam, Netherlands.
- Martin Marietta (2017). 2017 Sustainability Report. Martin Marietta, Raleigh, North Carolina. cdn.martinmarietta.com/media/1413/2017-sustainabilityreport.pdf
- Mileva, E.I. (2013). *Sustainability Reporting and SMEs — From ISO 14001 to Global Reporting Initiative* (Master's thesis). Aalborg Universitet, Aalborg, Denmark.
- Muench, S.T., & A.J.T. Hand (2019). *Sustainable Asphalt Pavements: A Practical Guide — Sustainability Specifics* (Publication No. SIP-102). National Asphalt Pavement Association, Lanham, Maryland.
- Salini Impregilo (2016). *Sustainability Report 2016*. Salini Impregilo S.p.A., Milan, Italy. www.salini-impregilo.com/static/upload/sus/sustainability-report-2016.pdf
- SASB (n.d.). Homepage [website]. Sustainable Accounting Standards Board (SASB), San Francisco, California. www.sasb.org
- Smith, A. (2018). Starbucks offers \$10 million for ideas on a better cup. CNN Business. <https://money.cnn.com/2018/03/21/news/companies/starbucks-cups/index.html>
- United Nations (2015). *Sustainable Development Goals*. United Nations Development Programme, New York City, New York. <https://www.undp.org/content/undp/en/home/librarypage/corporate/sustainable-development-goals-booklet.html>
- Vulcan Materials (n.d.). Reaching Higher: Vulcan's Social Responsibility Commitment to You [website]. Vulcan Materials Co., Birmingham, Alabama. csr.vulcanmaterials.com/
- Winston, A.S. (2014). *The Big Pivot: Radically Practical Strategies for a Hotter, Scarcer, and More Open World*. Harvard Business Review Press, Boston, Massachusetts.

Appendix A

Summary of Asphalt Industry Examples of Sustainability Reporting Metrics

Table A1. CRH Americas Materials Example Corporate Sustainability Reporting Metrics (CRH, 2017)

Metrics by Plan Element						
Business	Safety	Employees	Community Engagement	Environment	Customers, Quality	Compliance, Risk Management, Ethics
<ul style="list-style-type: none"> • Financials • GRI Index • Four UN Global Sustainability Goals 	<ul style="list-style-type: none"> • Fatalities by cause • Accidents by Injuries • Accidents by Cause • Contractor site induction • Safety training 	<ul style="list-style-type: none"> • Employee training • Employees by age, gender, & country 	<ul style="list-style-type: none"> • Community engagement plans 	<ul style="list-style-type: none"> • Expenditures on emission reductions, licensing, waste management, restoration & biodiversity, water use, energy reduction, alternative materials (RAP, RAS, C&D), & fuel use • CO₂ emissions • Energy use • Waste type & recycling 		<ul style="list-style-type: none"> • Supply chain procurement ethics • Code of Business Conduct training • Compliance training • Board member independence, gender, geographic spread, & tenure

Table A2. Martin Marietta Example Corporate Sustainability Reporting Metrics (Martin Marietta, 2017)

Metrics by Plan Element						
Business	Safety	Employees	Community Engagement	Environment	Customers, Quality	Compliance, Risk Management, Ethics
<ul style="list-style-type: none"> • Awards 	<ul style="list-style-type: none"> • Awards • Injury rate • Lost time rate • Audits 	<ul style="list-style-type: none"> • Female & minority employees • Continuous learning courses • 401(k) participation 	<ul style="list-style-type: none"> • Volunteer hours • Donated materials • Education visits • Meals 	<ul style="list-style-type: none"> • Investment in mobile equipment with reduced GHG • Alternative fuel use in plants • Alternative shipping (rail) 		<ul style="list-style-type: none"> • Ethics training

Table A3. Granite Construction Example Corporate Sustainability Reporting Metrics (Granite, 2016)

Metrics by Plan Element						
Business	Safety	Employees	Community Engagement	Environment	Customers, Quality	Compliance, Risk Management, Ethics
<ul style="list-style-type: none"> • Sustainable infrastructure investment • Senior management engagement in industry organizations • Promoting sustainable infrastructure funding • Envision & Greenroads participation 	<ul style="list-style-type: none"> • OSHA recordable incident rate • OSHA & MSHA citations • OHSAS 18001 certification 	<ul style="list-style-type: none"> • Wellness program participation • Women in construction support • Retention & turnover rates 	<ul style="list-style-type: none"> • Community outreach engagements • Financial support of non-profits • All business unit disaster relief drive 	<ul style="list-style-type: none"> • ISO 14001 certification • Environmental citations • Green construction materials use • Telematics for reduced fuel consumption • Carbon footprint 	<ul style="list-style-type: none"> • ISO 9001 conformance-Quality staff certifications & licensure • Quality awards 	<ul style="list-style-type: none"> • Ethisphere Most Ethical Company designation • Compliance training • ISO 19600 Corporate Compliance & Ethics conformance

Table A4. Colas Example Corporate Sustainability Reporting Metrics (Colas, 2017)

Metrics by Plan Element						
Business	Safety	Employees	Community Engagement	Environment	Customers, Quality	Compliance, Risk Management, Ethics
<ul style="list-style-type: none"> • Financials • Growth 	<ul style="list-style-type: none"> • Lost time frequency • Vehicle incidents • Accident frequency & incident rate • OHSAS 18001 non-conformance • CEO/director safety audits • DIY health MOTs 	<ul style="list-style-type: none"> • Workforce • Manager participation in development training • Employee formal training days • Female senior management positions • Turnover rate • Employee satisfaction • Workforce under 25-years-old 	<ul style="list-style-type: none"> • Community investment • Volunteer time • Educational events 	<ul style="list-style-type: none"> • ISO 14001 certification • Incident frequency • Prosecution rate • Non-conformance frequency • Recycling rate • CO₂ turnover • GHG • Energy efficiency • Waste • ISO 5001 certification 	<ul style="list-style-type: none"> • Remedial spend • Customer satisfaction survey score • Public satisfaction score • Quality non-conformance rate • Customer quality issues • Resident quality issues 	<ul style="list-style-type: none"> • Number of suppliers • Supplier performance reviews

Table A5. Salini Impregilo Example Corporate Sustainability Reporting Metrics (Salini Impregilo, 2016)

Metrics by Plan Element						
Business	Safety	Employees	Community Engagement	Environment	Customers, Quality	Compliance, Risk Management, Ethics
<ul style="list-style-type: none"> • Financials • Total projects • Global presence (total employees, countries, nationalities) • Local procurement 	<ul style="list-style-type: none"> • Injury rate • Lost days rate 	<ul style="list-style-type: none"> • Training hours provided • Master's in International Construction Management program 	<ul style="list-style-type: none"> • Local community meetings • Project visits • Free health interventions 	<ul style="list-style-type: none"> • Climate Change Mitigation backlog • GHG • Energy intensity • Water intensity • Reuse intensity • HSE expenses • Reutilized materials • Monitoring activities • Audits • Supplier evaluations • WMA use • Goods shipped by sea • Erosion protection • Pollution controls • Noise & vibration • Reforestation 		<ul style="list-style-type: none"> • Code of ethics training • Organizational control & corruption training

Table A6. Vulcan Materials Example Corporate Sustainability Reporting Metrics (Vulcan Materials, n.d.)

Metrics by Plan Element						
Business	Safety	Employees	Community Engagement	Environment	Customers, Quality	Compliance, Risk Management, Ethics
<ul style="list-style-type: none"> Financials 	<ul style="list-style-type: none"> MSHA & OSHA recordable injury rate MSHA citation rate Health testing participation rate Dust, silica, & noise exposure sampling 	<ul style="list-style-type: none"> Employees Tenure New Hires 	<ul style="list-style-type: none"> Scholarships awarded Scholarship funds awarded School partnerships Visitors Plant tours Dollars donated Foundation & matching gifts Matching employee contributions 	<ul style="list-style-type: none"> Acreage in portfolio Water stores at former quarry Wildlife Habitat Council certified sites Used oil recycled Products produced from recycled materials 		

Table A7. Example Corporate Sustainability Reporting Metrics for Integration of Business and Sustainability Strategies.

Company	Business & Sustainability Strategies Integrated Metrics
CRH Americas Materials	Financials
	GRI Index
	Four U.N. Global Sustainability Goals
Martin Marietta	Awards
Granite Construction	Sustainable infrastructure investment
	Senior management engagement in industry organizations
	Promoting sustainable infrastructure funding
	Envision & Greenroads participation
Colas	Financials
	Growth
Salini Impregilo	Financials
	Total projects
	Global presence (total employees, countries, nationalities)
	Local procurement
Vulcan Materials	Financials

Table A8. Example Corporate Sustainability Reporting Metrics for Safety.

Company	Safety Metrics
CRH Americas Materials	Fatalities by cause
	Accidents by injuries
	Accidents by cause
	Contractor site induction
	Safety training
Martin Marietta	Awards
	Injury rate
	Lost time rate
	Audits
Granite Construction	OSHA recordable incident rate
	OSHA & MSHA citations
	OHSAS 18001 certification
Colas	Lost time frequency
	Vehicle incidents
	Accident frequency & incident rate
	OHSAS 18001 non-conformances
	CEO/director safety audits
	DIY health MOTs
Salini Impregilo	Injury rate
	Lost days rate
Vulcan Materials	MSHA & OSHA recordable injury rate
	MSHA citation rate
	Health testing participation rate
	Dust, silica, & noise exposure sampling

Table A9. Example Corporate Sustainability Reporting Metrics for Employees.

Company	Employees Metrics
CRH Americas Materials	Employee training
	Employees by age, gender, & country
Martin Marietta	Female & minority employees
	Continuous learning courses
	401(k) participation
Granite Construction	Wellness program participation
	Women in construction support
	Retention & turnover rates
Colas	Workforce
	Manager participation in development training
	Employee formal training days
	Female senior management positions
	Turnover rate
	Employee satisfaction
	Workforce under 25-years-old
Salini Impregilo	Training hours provided
	Master's in international construction management program
Vulcan Materials	Employees
	Tenure
	New Hires

Table A10. Example Corporate Sustainability Reporting Metrics for Community Engagement.

Company	Community Engagement Metrics
CRH Americas Materials	Community engagement plans
Martin Marietta	Volunteer hours
	Donated materials
	Education visits
	Meals
Granite Construction	Community outreach engagements
	Financial support of non-profits
	All business unit disaster relief drive
Colas	Community investment volunteer time
	Educational events
Salini Impregilo	Local community meetings
	Project visits
	Free health interventions
Vulcan Materials	Scholarships awarded
	Scholarship funds awarded
	School partnerships
	Visitors
	Dollars donated
	Foundation & matching gifts
	Matching employee contributions

Table A11. Example Corporate Sustainability Reporting Metrics for Environment.

Company	Environment Metrics
CRH Americas Materials	Expenditures on emission reductions, licensing, waste management, restoration & biodiversity, water use, energy reduction, alternative material (RAP, RAS, C&D), & fuel use
	CO ₂ emissions
	Energy use
	Waste type & recycling
Martin Marietta	Investment in mobile equipment with reduced GHG
	Alternative fuel use in plants
	Alternative shipping (rail)
Granite Construction	ISO 14001 certification
	Environmental citations
	Green construction materials use
	Telematics for reduced fuel consumption
	Carbon footprint
Colas	ISO 14001 certification
	Incident frequency
	Prosecution rate
	Non-conformance frequency
	Recycling rate
	CO ₂ turnover
	GHG
	Energy efficiency
	Waste
	ISO 5001 certification
Salini Impregilo	Climate Change Mitigation backlog
	GHG
	Energy intensity
	Water intensity
	Reuse intensity
	HSE expenses
	Reutilized materials
	Monitoring activities
	Audits
	Supplier evaluations
	WMA use
	Goods shipped by sea
	Erosion protection
	Pollution controls
	Noise & vibration measurements
Reforestation, tree planting	

Table A11 (continued). Example NAPA Member Company Corporate Sustainability Reporting Metrics for *Environment*.

Company	Environment Metrics
Vulcan Materials	Acreage in portfolio
	Water stores at former quarry
	Wildlife Habitat Council certified sites
	Used oil recycled
	Products produced from recycled materials

Table A12. Example Corporate Sustainability Reporting Metrics for *Customers, Quality*.

Company	Customers, Quality Metrics
CRH Americas Materials	
Martin Marietta	
Granite Construction	ISO 9001 conformance
	Quality staff certifications & licensure
	Quality awards
Colas	Remedial spend
	Customer satisfaction survey score
	Public satisfaction score
	Quality non-conformance rate
	Customer quality issues
	Resident quality issues
Salini Impregilo	
Vulcan Materials	

Table A13. Example NAPA Member Company Corporate Sustainability Reporting Metrics for Compliance, Risk Management, and Ethics.

Company	Compliance, Risk Management, Ethics Metrics
CRH Americas Materials	Supply chain procurement ethics
	Code of Business Conduct training
	Compliance training
	Board member independence, gender, geographic spread, & tenure
Martin Marietta	Ethics training
Granite Construction	Ethisphere Most Ethical Company designation
	Compliance training
	ISO 19600 Corporate Compliance & Ethics conformance
Colas	Number of suppliers
	Supplier performance reviews
Salini Impregilo	Code of ethics training
	Organizational control & corruption training
Vulcan Materials	

Appendix B

Summary of GRI Sustainability Reporting Standard Categories, Sub-Categories, Aspects, Indicators, and Descriptions

Table B1. GRI Sustainability Rating Details.

Category	Sub-Category	Aspect	Indicator	Description
Economic	N/A	Economic Performance	G4-EC1	Direct Economic Value Generated and Distributed
			G4-EC2	Financial Implications and Other Risks and Opportunities For the Organization's Activities Due to Climate Change
			G4-EC3	Coverage of the Organization's Defined Benefit Plan Obligations
			G4-EC4	Financial Assistance Received from Government
		Market Presence	G4-EC5	Ratio of Standard Entry Level Wage by Gender Compared to Local Minimum Wage at Significant Locations of Operation
			G4-EC6	Proportion of Senior Management Hired from the Local Community at Significant Locations of Operation
			G4-EC7	Development and Impact of Infrastructure Investments and Services Supported
			G4-EC8	Significant Indirect Economic Impacts, Including the Extent of Impacts
		Procurement Practices	G4-EC9	Proportion of Spending on Local Suppliers at Significant Locations of Operation

Table B1 (continued). GRI Sustainability Rating Details.

Category	Sub-Category	Aspect	Indicator	Description
Environmental	N/A	Materials	G4-EN1	Materials Used by Weight or Volume
			G4-EN2	Percentage of Materials Used That Are Recycled Input Materials
		Energy	G4-EN3	Energy Consumption Within the Organization
			G4-EN4	Energy Consumption Outside of the Organization
			G4-EN5	Energy Intensity
			G4-EN6	Reduction of Energy Consumption
			G4-EN7	Reductions in Energy Requirements of Products and Services
		Water	G4-EN8	Total Water Withdrawal by Source
			G4-EN9	Water Sources Significantly Affected by Withdrawal of Water
			G4-EN10	Percentage and Total Volume of Water Recycled and Reused
		Biodiversity	G4-EN11	Operational Sites Owned, Leased, Managed In, or Adjacent To, Protected Areas and Areas of High Biodiversity Value Outside Protected Areas
			G4-EN12	Description of Significant Impacts of Activities, Products, and Services on Biodiversity in Protected Areas and Areas of High Biodiversity Value Outside Protected Areas
			G4-EN13	Habitats Protected or Restored
			G4-EN14	Total Number of IUCN Red List Species and National Conservation List Species with Habitats in Areas Affected by Operations, by Level of Extinction Risk
		Emissions	G4-EN15	Direct Greenhouse Gas (GHG) Emissions (Scope 1)
			G4-EN16	Energy Indirect Greenhouse Gas (GHG) Emissions (Scope 2)
			G4-EN17	Other Indirect Greenhouse Gas (GHG) Emissions (Scope 3)
			G4-EN18	Greenhouse Gas (GHG) Emissions Intensity
			G4-EN19	Reduction of Greenhouse Gas (GHG) Emissions
			G4-EN20	Emissions of Ozone Depleting Substances (ODS)
			G4-EN21	NO _x , SO _x , and Other Significant Air Emissions

Table B1 (continued). GRI Sustainability Rating Details.

Category	Sub-Category	Aspect	Indicator	Description
Environmental	N/A	Effluents and Waste	G4-EN22	Total Waste Discharge by Quality and Destination
			G4-EN23	Total Weight of Waste by Type and Disposal Method
			G4-EN24	Total Number and Volume of Significant Spills
			G4-EN25	Weight of Transported, Imported, Exported, or Treated Waste Deemed Hazardous Under the Basel Convention, Annex I, II, III, and VIII, and Percentage of Transported Waste Shipped Internationally
			G4-EN26	Identity, Size, Protected Status, and Biodiversity Value of Water Bodies and Related Habitats Significantly Affected by the Organization's Discharges of Water and Runoff
		Products and Services	G4-EN27	Extent of Impact Mitigation of Environmental Impacts of Products and Services
			G4-EN28	Percentage of Products Sold and Their Packaging Materials That Are Reclaimed by Category
		Compliance	G4-EN29	Monetary Value of Significant Fines and Total Number of Non-Monetary Sanctions for Non-Compliance With Environmental Laws and Regulations
		Transport	G4-EN30	Significant Environmental Impacts of Transporting Products and Other Goods and Materials for the Organization's Operations, and Transporting Members of the Workforce
		Overall	G4-EN31	Total Environmental Protection Expenditures and Investments by Type
		Supplier Environmental Assessment	G4-EN32	Percentage of New Suppliers That Were Screened Using Environmental Criteria
			G4-EN33	Significant Actual and Potential Negative Environmental Impacts in the Supply Chain and Actions Taken
		Environmental Grievance Mechanisms	G4-EN34	Number of Grievances About Environmental Impacts Filed, Addressed, and Resolved Through Formal Grievance Mechanisms
Social	Labor Practices and Decent Work	Employment	G4-LA1	Total Number and Rates of New Employee Hires and Employee Turnover by Age Group, Gender, and Region
			G4-LA2	Benefits Provided to Full-Time Employees That Are Not Provided to Temporary or Part-Time Employees, by Significant Locations of Operation
			G4-LA3	Return to Work and Retention Rates After Parental Leave, by Gender

Table B1 (continued). GRI Sustainability Rating Details.

Category	Sub-Category	Aspect	Indicator	Description
Social	Labor Practices and Decent Work	Labor/Management Relations	G4-LA4	Minimum Notice Periods Regarding Operational Changes, Including Whether These are Specified in Collective Agreements
		Occupational Health and Safety	G4-LA5	Percentage of Total Workforce Represented in Formal Joint Management-Worker Health and Safety Committees That Help Monitor and Advise on Occupational Health and Safety Programs
			G4-LA6	Type of Injury and Rates of Injury, Occupational Diseases, Lost Days, and Absenteeism, and Total Number of Work-Related Fatalities, by Region and Gender
			G4-LA7	Workers with High Incidence or High Risk of Disease Related to Their Occupation
			G4-LA8	Health and Safety Topics Covered in Formal Agreements With Trade Unions
		Training and Education	G4-LA9	Average Hours of Training Per Year Per Employee By Gender, and By Employee Category
			G4-LA10	Programs and Skills Management and Lifelong Learning That Support the Continued Employability of Employees and Assist Them in Managing Careers
			G4-LA11	Percentage of Employees Receiving Regular Performance and Career Development Reviews, By Gender and By Employee Category
		Diversity and Equal Opportunity	G4-LA12	Composition of Governance Bodies and Breakdown of Employees Per Employee Category According to Gender, Age Group, Minority Group Membership, and Other Indicators of Diversity
		Equal Remuneration for Women and Men	G4-LA13	Ratio of Basic Salary and Remuneration of Women to Men by Employee Category, by Significant Locations of Operation
		Supplier Assessment for Labor Practices	G4-LA14	Percentage of New Suppliers That Were Screened Using Labor Practices Criteria
			G4-LA15	Significant Actual and Potential Negative Impacts for Labor Practices in the Supply Chain and Actions Taken
		Labor Practice Grievance Mechanisms	G4-LA16	Number of Grievances About Labor Practices Filed, Addressed, and Resolved Through Formal Grievance Mechanisms

Table B1 (continued). GRI Sustainability Rating Details.

Category	Sub-Category	Aspect	Indicator	Description
Social	Human Rights	Investment	G4-HR1	Total Number and Percentage of Significant Investment Agreements and Contracts That Include Human Rights Clauses Or That Underwent Human Rights Screening
			G4-HR2	Total Hours of Employee Training on Human Rights Policies or Procedures Concerning Aspects of Human Rights That Are Relevant to Operations, Including the Percentage of Employees Trained
		Non-Discrimination	G4-HR3	Total Number of Incidents of Discrimination and Corrective Actions Taken
		Freedom of Association and Collective Bargaining	G4-HR4	Operations and Suppliers Identified In Which The Right To Exercise Freedom of Association and Collective Bargaining May Be Violated Or At Significant Risk, and Measures Taken to Support These Rights
		Child Labor	G4-HR5	Operations and Suppliers Identified as Having Significant Risk For Incidents of Child Labor, and Measures Taken to Contribute to the Effective Abolition of Child Labor
		Forced or Compulsory Labor	G4-HR6	Operations and Suppliers Identified as Having Significant Risk for Incidents of Forced or Compulsory Labor, and Measures to Contribute to the Elimination of All Forms of Forced or Compulsory Labor
		Security Practices	G4-HR7	Percentage of Security Personnel Trained in the Organization's Human Rights Policies or Procedures That Are Relevant to Operations
		Indigenous Rights	G4-HR8	Total Number of Incidents of Violations Involving Rights of Indigenous Peoples and Actions Taken
		Assessment	G4-HR9	Total Number and Percentage of Operations That Have Been Subject to Human Rights Reviews or Impact Assessments
		Supplier Human Rights Assessment	G4-HR10	Percentage of New Suppliers That Were Screened Using Human Rights Criteria
			G4-HR11	Significant Actual and Potential Negative Human Rights Impacts in the Supply Chain
		Human Rights Grievance Mechanisms	G4-HR12	Number of Grievances About Human Rights Impacts Filed, Addressed, and Resolved Through Formal Grievance Mechanisms

Table B1 (continued). GRI Sustainability Rating Details.

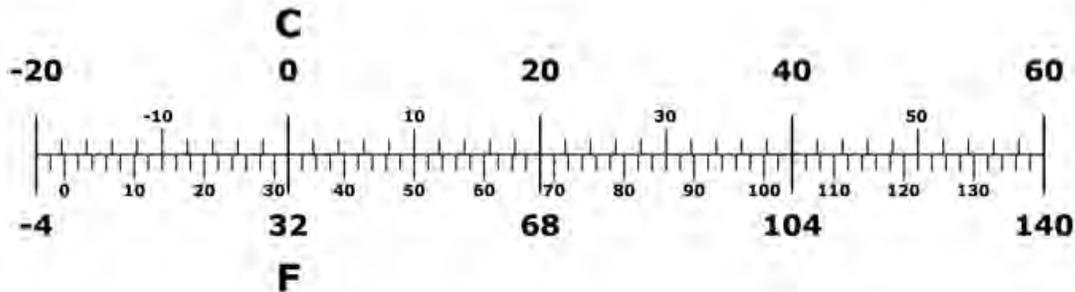
Category	Sub-Category	Aspect	Indicator	Description
Social	Society	Local Communities	G4-SO1	Percentage of Operations With Implemented Local Community Engagement, Impact Assessments, and Development Programs
			G4-SO2	Operations With Significant Actual and Potential Negative Impacts on Local Communities
		Anti-Corruption	G4-SO3	Total Number and Percentage of Operations Assessed for Risks Related to Corruption and the Significant Risks Identified
			G4-SO4	Communication and Training on Anti-Corruption Policies and Procedures
			G4-SO5	Confirmed Incidents of Corruption and Actions Taken
		Public Policy	G4-SO6	Total Value of Political Contributions by Country and Recipient/Beneficiary
		Anti-Competitive Behavior	G4-SO7	Total Number of Legal Actions for Anti-Competitive Behavior, Anti-Trust, and Monopoly Practices and Their Outcomes
		Compliance	G4-SO8	Monetary Value of Significant Fines and Total Number of Non-Monetary Sanctions for Non-Compliance with Laws and Regulations
		Supplier Assessment for Impacts on Society	G4-SO9	Percentage of New Suppliers That Were Screened Using Criteria for Impacts on Society
			G4-SO10	Significant Actual and Potential Negative Impacts on Society in the Supply Chain and Actions Taken
		Grievance Mechanisms for Impacts on Society	G4-SO11	Number of Grievances About Impacts on Society Filed, Addressed, and Resolved Through Formal Grievance Mechanisms

Table B1 (continued). GRI Sustainability Rating Details.

Category	Sub-Category	Aspect	Indicator	Description
Social	Product Responsibility	Customer Health and Safety	G4-PR1	Percentage of Significant Product and Service Categories for Which Health and Safety Impacts are Assessed for Improvement
			G4-PR2	Total Number of Incidents of Non-Compliance with Regulations and Voluntary Codes Concerning the Health and Safety Impacts of Products and Services During Their Life Cycle, By Type of Outcomes
		Product and Service Labeling	G4-PR3	Type of Product and Service Information Required by the Organization's Procedures for Product and Service Information and Labeling, and Percentage of Significant Product and Service Categories Subject to Such Information Requirements
			G4-PR4	Total Number of Incidents of Non-Compliance with Regulations and Voluntary Codes Concerning Product Service Information and Labeling, by Type of Outcomes
			G4-PR5	Results of Surveys Measuring Customer Satisfaction
		Marketing Communications	G4-PR6	Sale of Banned or Disputed Products
			G4-PR7	Total Number of Incidents of Non-Compliance With Regulations and Voluntary Codes Concerning Marketing Communications, Including Advertising, Promotion, and Sponsorship, by Type of Outcomes
		Customer Privacy	G4-PR8	Total Number of Substantiated Complaints Regarding Breaches of Customer Privacy and Losses of Customer Data
		Compliance	G4-PR9	Monetary Value of Significant Fines for Non-Compliance With Laws and Regulations Concerning the Provision and Use of Products and Services

SI* (MODERN METRIC) CONVERSION FACTORS

APPROXIMATE CONVERSION TO SI UNITS					APPROXIMATE CONVERSION FROM SI UNITS				
Symbol	When You Know	Multiply by	To Find	Symbol	Symbol	When You Know	Multiply by	To Find	Symbol
LENGTH					LENGTH				
in	inches	25.4	millimeters	mm	mm	millimeters	0.039	inches	in
ft	feet	0.305	meters	m	m	meters	3.28	feet	ft
yd	yards	0.914	meters	m	m	meters	1.09	yards	yd
mi	miles	1.61	kilometers	km	km	kilometers	0.621	miles	mi
AREA					AREA				
in ²	square inches	645.2	square millimeters	mm ²	mm ²	square millimeters	0.0016	square inches	in ²
ft ²	square feet	0.093	square meters	m ²	m ²	square meters	10.764	square feet	ft ²
yd ²	square yards	0.836	square meters	m ²	m ²	square meters	1.196	square yards	yd ²
ac	acres	0.405	hectares	ha	ha	hectares	2.47	acres	ac
mi ²	square miles	2.59	square kilometers	km ²	km ²	square kilometers	0.386	square miles	mi ²
VOLUME					VOLUME				
fl oz	fluid ounces	645.2	milliliters	mL	mL	milliliters	0.034	fluid ounces	fl oz
gal	gallons	3.785	liters	L	L	liters	0.264	gallons	gal
ft ³	cubic feet	0.028	cubic meters	m ³	m ³	cubic meters	35.315	cubic feet	ft ³
yd ³	cubic yards	0.765	cubic meters	m ³	m ³	cubic meters	1.308	cubic yards	yd ³
NOTE: Volumes greater than 1000 L should be shown in m ³									
MASS					MASS				
oz	ounces	28.35	grams	g	g	grams	0.035	ounces	oz
lbs	pounds	0.454	kilograms	kg	kg	kilograms	2.205	pounds	lbs
T	short tons	0.907	megagrams	Mg	Mg	megagrams	1.102	short tons	T
T	short tons	0.907	metric tonnes	t	t	metric tonnes	1.102	short tons	T
NOTE: A short ton is equal to 2,000 lbs					NOTE: A short ton is equal to 2,000 lbs				
TEMPERATURE (exact)					TEMPERATURE (exact)				
°F	Fahrenheit	$\frac{5(F-32)}{9}$	Celsius	°C	°C	Celsius	$(1.8 \times C) + 32$	Fahrenheit	°F



*SI is the symbol for the International System of Units

NAPA: THE SOURCE

This publication is one of the many technical, informational, and promotional resources available from the National Asphalt Pavement Association (NAPA). NAPA also produces training aids, webinars, and other educational materials. For a full list of NAPA publications, training aids, archived webinars, and promotional items, visit <http://store.asphaltpavement.org/>.

National Asphalt Pavement Association
6406 Ivy Lane, Suite 350
Greenbelt, Maryland 20770-1441
www.AsphaltPavement.org
NAPA@AsphaltPavement.org
Tel: 301-731-4748
Fax: 301-731-4621
Toll Free: 1-888-468-6499

SIP 104

