

APICS INSIGHTS AND INNOVATIONS

SUPPLY CHAIN SUSTAINABILITY

UNCOVERING THE TRIPLE BOTTOM LINE



APICS
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ABOUT THIS REPORT

Sustainability practices are evolving and becoming more integrated with other traditional supply chain and operations processes. APICS wanted to learn more about sustainability practices at organizations and in August and September 2011, invited more than 9,000 supply chain professionals to share their perspectives and insights. APICS conducted a survey to investigate the differing levels of experience and maturity that go into sustainability practices, and what those practices bring to organizations. The survey results reflect an approximate four percent margin of error at a 95 percent confidence level.

This report was developed by APICS Supply Chain Council, an organization that advances supply chain and operations management and innovation through research, education and publications. APICS SCC maintains the Supply Chain Operations Reference (SCOR) model, the supply chain management community's most widely accepted framework for evaluating and comparing supply chain activities and performance. For more information, visit apicsscc.org.

APICS SCC research reports are based on practitioner surveys that explore trending topics in supply chain and operations management. They include survey results, analysis, tips and best practices to keep you and your organization informed of insights and innovations in supply chain and operations management.

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SUPPLY CHAIN SUSTAINABILITY

UNCOVERING THE TRIPLE BOTTOM LINE

Sustainability:

The *APICS Dictionary*, 14th Edition, defines sustainability as “activities that provide present benefit without compromising the needs of future generations.”

EXECUTIVE SUMMARY

In 2011, APICS conducted a survey of supply chain and operations management professionals around the world to investigate the differing levels of experience and maturity that go into sustainability practices, and what those practices bring to organizations.

The survey revealed the following sustainability trends:

- The concept of sustainability is not consistent from senior management to the shop floor. A senior manager views sustainability in a strategic way, considering issues such as organizational planning, alignment, goals, options and priorities. On the shop floor, it is more difficult to distinguish sustainability from the day-to-day tactics and key performance indicators that define ongoing tasks.
- Successful supply chain sustainability requires good supply chain strategy and the capability to implement it.
- Triple bottom line supply chain sustainability, or TBL, is a measure of sustainability that includes social, environmental and financial performance measures—people, planet and profit—and helps ensure that there is a long-term supply of people, natural resources and profit.
- Triple bottom line sustainability tends to see differences in priority, but most often people and profitability are placed ahead of planet.
- The most essential ingredient for success is senior management leadership. Senior managers have a powerful influence on the adoption rate of supply chain sustainability practices, the method of practice, and how effectively the practice is integrated in the supply chain and across the organization.

Sustainability is Evolving

Sustainability is becoming better defined vertically within an organization, and better defined horizontally in terms of metrics, measurements and standards globally across industries. Sustainability is becoming more integrated with other traditional supply chain operations processes due to related innovation, new technologies, new processes and stakeholder preferences. Lean management and sustainability are a natural combination, but there will be further innovation in the way service standards or supplier performance integrates with sustainability.

Advancing Sustainability at Your Organization

To advance sustainability at your organization, take the following steps:

- Clarify, define and execute a consistent definition of sustainability that spans all employee levels, from senior management to the shop floor.
- Align supply chain strategy and tactics to support the business unit or organizational strategy in terms of sustainability, including long-term decisions, measurements, investments and process improvements.
- Advance supply chain maturity practice through continuous improvement. Prioritize the most impactful changes, investments, metrics and standards when making decisions, and make sure sustainability remains as visible as it needs to be across the supply chain.

Uncovering the Triple Bottom Line

More and more, business people are talking about something called triple bottom line sustainability, or TBL, a framework comprised of three pillars: social, environmental and financial, or the three Ps: people, profit and planet. Corporate social responsibility is colliding with government regulation and customer desire and pressing decision makers to consider how their supply chain actions influence these three areas. As the United Nations Secretary-General Ban Ki-moon said, “We can and must shape a future where robust markets, sustainable development and a healthy planet become the new status quo.”

The practice of supply chain sustainability—incorporating triple bottom line results into supply chain decisions—ultimately relies on the values of supply chain practitioners, their organizations, and their supply chains to define and develop specific sustainable activities. Increasingly, well-defined standards, industry best practices and published guidance are combining to advance supply chain sustainability around the world.

“We can and must shape a future where robust markets, sustainable development and a healthy planet become the new status quo.”

*U.N. Secretary-General
Ban Ki-moon*

Sustaining and Maximizing Your Supply Chain

The *APICS Dictionary*, 14th Edition, defines sustainability as “activities that provide present benefit without compromising the needs of future generations.” Sometimes the idea of sustainability is expressed as, “Take care of yourself, take care of others, and take care of the planet.”

In practice, supply chain sustainability interacts with almost every supply chain component, whether in simple or complex supply chains. Supply chain sustainability practice should be a consideration in decisions involving strategy, tactics, goals, processes, trade-offs and outcomes in all levels of supply chain management. In fact, senior management is by far the best single influence to supply chain sustainability practice. The customer is the second largest influence, and employees are the third largest influence. Triple bottom line sustainability may intersect with risk or strategy practice in addressing long-term uncertainty in the availability of people, markets and resources necessary for lasting business success.

Supply chain sustainability is still a relatively new idea. Variation in levels of adoption, maturity, metrics and management differ by nation, industry and company. Within supply chains, partner relationships are often insufficiently integrated for optimal interaction. Nonetheless, supply chains designed to combine rising profit and falling customer costs, while resulting in higher living standards and lower environmental costs, are creating new best practices.

In the past, the desirable outcomes of more profit and higher living standards for people (based on falling costs or more availability of goods and services) sometimes came at the expense of rising costs to the planet or in rising costs to people in other ways (inadequate employee standards or customer service, for example). That is not an ideal bargain. To achieve rising profit and higher living standards, and at the same time reduce environmental and customer costs, requires excellence in supply chain and operations management practice. In other words, it takes the very best of supply chain practice to advance people, planet and profit.

The Sustainability Push

Survey respondents revealed that the motivations for incorporating supply chain sustainability practices into an organization's overall strategy are increasing. These motivating factors include:

- Brand management and reputation
- Cost reduction
- Revenue growth
- Customer demand
- Employee recruitment
- Government regulation
- Investor or shareholder expectations

Respondent organizations were compared by sustainable business practices implemented for different lengths of time. The study uncovered one essential ingredient for success: senior management leadership. Senior managers influence the adoption rate of supply chain sustainability practice, the method of practice, and organizational and related supply chain strategy integration. Senior managers also provide vital leadership through such means as business values, mission statements and organizational strategy. Organizations that have practiced sustainability longer tend to identify these areas as most critical when compared to other organizations with less sustainability experience.

However, gaps may develop between senior managers and supply chain professionals, and these disparities may inhibit supply chain sustainability maturity. The reason is that individual business units sometimes are most responsible for adherence to sustainability policy compared to individuals, teams or departments.

Consider the following table, which summarizes the responses from supply chain practitioners regarding the most and least critical elements to achieve maturity in supply chain sustainability.

Senior management leadership	Early adopter My organization has had a policy for 15 years or more	Middle adopter My organization established its policy between five and 15 years ago	Recent adopter My organization has had a policy for less than five years
Most critical	85.5%	73.6%	65.9%
Somewhat critical	13%	20.9%	28.9%
Least critical	0%	2.7%	2.2%

Business values and mission statement	Early adopter My organization has had a policy for 15 years or more	Middle adopter My organization established its policy between five and 15 years ago	Recent adopter My organization has had a policy for less than five years
Most critical	72.9%	65.2%	46.3%
Somewhat critical	22.9%	31.3%	42.6%
Least critical	4.3%	1.8%	8.8%

Organizational sustainability strategies	Early adopter My organization has had a policy for 15 years or more	Middle adopter My organization established its policy between five and 15 years ago	Recent adopter My organization has had a policy for less than five years
Most critical	71.2%	57.5%	48.9%
Somewhat critical	24.7%	38.7%	44.4%
Least critical	4.1%	1.9%	5.38%

Creating Links

Triple bottom line sustainability suggests that people, planet and profit are the ultimate supply chain considerations. Of course, people and the planet are both the sources and consumers of produced goods and services. In supply chain terms, production and consumption result in goods and services that provide short- and long-term profitability and prosperity. Therefore, the supply chain and its operations management intersect with triple bottom line standards.

Consider the following definitions from the APICS Dictionary, 14th edition:

Value stream: the processes of creating, producing and delivering a good or service to the market. For a good, the value stream encompasses the raw material supplier, the manufacture and assembly of the good, and the distribution network. For a service, the value stream consists of suppliers, support personnel and technology, the service “producer” and the distribution channel. The value stream may be controlled by a single business or a network of several businesses.

Value stream mapping: Drawing the current production process/flow and then attempting to draw the most effective production process or flow.

Consider the following: If supply chain sustainability adds new considerations, does the map of the supply chain consider the value of sustainability in determining the effective production process or flow?

Value chain: The functions within a company that add value to the goods or services that the organization sells to customers and for which it receives payment.

Consider the following: Are the people and planet resources included in the definition of value chain? Does the operation of the organization and its supply chain add value to people and planet resources in terms of sustainable activity? Can this integration lead to sustainable profit performance?

Value perspective: A quality perspective that holds that quality must be judged, in part, by how well the characteristics of a particular product or service align with the needs of a specific user.

Consider the following: If society itself was defined as a user, do the characteristics of the product or service align to the sustainable needs of society?

Value engineering or analysis: A disciplined approach to the elimination of waste from products or processes through an investigative process that focuses on the functions to be performed and whether such functions add value to the good or service.

Consider the following: Does a current value stream's transformation of raw materials, human skills, distribution to market and consumption miss opportunities to eliminate waste or add value? Can suitable alternatives produce better results?

How people, planet and profit integrate as active considerations in the supply chain depends on the values demonstrated by an organization and its supply chain. These values stem from the organization's mission statement, strategy, management, owners, partners and customers. An organization's values create expectations, goals, tactics, roles and functions that demonstrate strategy and tactics on an ongoing basis.

Defining Roles

Sustainability strategy calls for the identification of an upper limit of investment (where efforts become unprofitable) and a lower limit (where efforts are ultimately unprofitable and harmful). However, perspectives on these ranges may vary across an organization or supply chain.

An organization or business unit strategy identifies a successful compromise between upper and lower limits that balances a number of things, including customer, partner and stakeholder expectations and values. In addition, the organization's mission statement and its subordinate strategies—including supply chain, marketing and new product development tactics—should be taken into consideration.

Functional supply chain and operations managers who have been at the forefront of lean management also see themselves as practicing sustainability. Where lean and sustainability are viewed as synonymous, supply chain operations managers are more likely to report longer involvement in sustainability than senior manager management counterparts. Therefore, sustainability is not always a top-down initiative. It can be driven by practice as opposed to strategy.

Different levels of management create inherent differences in perspective. Senior managers tend to rank the people part of the triple bottom line highest because senior managers must accomplish their tasks primarily through strategic engagement of people. In contrast, a functional manager accomplishes his or her tasks through more tactical engagement of people, as well as through processes -sustainability practice among all stakeholders.

Supply Chain Strategy and Risk Management

Supply chain sustainability depends on the strength of an organization's overall strategy and supply chain strategy. How well does supply chain strategy assist organizational strategy? Do tactics, plans, goals and priorities align to supply chain and organizational strategy?

Sustainability and risk management are topics of growing maturity. Supply chain sustainability and risk management bond when viewed from a long-range perspective. Triple bottom line sustainability is seen as a form of long-term risk reduction, helping to ensure that an organization and its supply chain have a long-term supply of people, profit and resources (planet) with which to operate many years into the future.

Supply chain risk is growing in maturity and strategic importance because of the increasing view that a risk-optimized supply chain will capture market share from less optimized competitors when experiencing the same risk event. A risk-optimized supply chain balances risk and reward. Supply chain sustainability becomes a risk-reward consideration. In addition, as sustainability practices seek more lean and less resource-intensive operations, risk reduction gained by reduced use of resources is a shared goal of supply chain risk and sustainability.

Practical Policies and Procedures

The three aspects of the triple bottom line can be measured concretely. People, profit and planet tend to be the order of importance and policy in triple bottom line measurements:

- Sustainability with respect to people can be measured by the reduction in lost workdays due to injury or illness; safety improvements made or reduction and safety fines or warnings issued; education options and opportunities; “upskilling” and mentoring offered.
- Profit sustainability can be measured using level of efficiency; utilization of assets and lean tactics; tangible codestiny investment and relationship development in supply chain partnership; charitable or in-kind contributions for joint benefit of an organization; and people or planet per unit, quarter, fixed amount or profit.
- Planet sustainability can be measured by the energy source and amount of energy used; water use and amount; recycling, treating and reprocessing of natural resources; and standards attained.

While there continues to be differences of opinion regarding how to measure the impact of sustainable business practices, in addition to the above there should be:

- A defined level of transparency in the measurement and reporting of sustainable practices
- Improvements in supply chain relationship in order to enhance shared sustainable values
- A level of integration among people, planet and profit development in organizational strategic goals and priorities
- An early-middle-late adopter business culture in terms of sustainable practices

It may seem like a challenge to define and collect hard and soft triple bottom line sustainability measurements. Measurements are difficult because wide variation exists in what to measure and how measurement is expressed as a baseline over time. Care is necessary to evaluate all consequences, as improvements in one area may bring undesirable outcomes in other areas. One way to simplify this is measurement convergence.

If your organization practices Lean Six Sigma operation, sales and operations planning (S&OP), supply chain risk, supply chain strategy, and data collection and reporting for regulatory compliance, it may already be collecting useful sustainability measurements in reports or as part of key performance indicators. It is important to determine the opportunity to converge or align measurement collection and reporting with triple bottom line sustainability. Where there are missing sustainability measurements or data, you may find that an existing person or process would capture and report missing data as an improvement in its own practice.

In addition, traditional business reports such as financial reporting may be able to create a report category or database that covers spending on anticorruption efforts, safety, education, energy and charitable donations as sustainability-related expenses. Human resources departments also may be able to create or add reports in terms of people measurements. Other groups or departments with useful sustainability-related data may include logistics, distribution, customer service, maintenance, repair and overhaul (maintenance, repair and operating), and research. Codestiny works across the supply chain. The triple bottom line becomes a shared value and strategy among all supply chain partners.

Sustainability Best Practices

As with other supply chain practices (such as lean), triple bottom line supply chain sustainability is a journey. The journey advances toward increasing core competencies, innovation, continuous improvement and shared best practices. People, planet and profit stand as the key considerations for success, an ideology that aligns with APICS' formal definition of sustainability.

Despite challenges and complexities, triple bottom line supply chain practice leads to progress. Creating rising profit and higher quality standards along with falling customer and environmental costs requires the combined efforts of all stakeholders, starting with senior management and continuing through every level of the supply chain.

Evaluate sustainability at your organization by considering the following best practices:

Examine strategy and execution capability: Sustainability is a component of many business unit strategies, but like all strategy, it is challenging to execute. Supply chain strategy must execute business-unit strategy. Ensure that the execution of supply chain strategy is improving.

See sustainability horizontally: Examine end-to-end mapping and management of the supply chain. Ensure mapping and partner relationships involve effective shared standards, measurements, goals and priorities. These really matter to sustainability. Sustainability has many nonstandard elements involving each supply chain partner and involving people, planet and profit.

See sustainability vertically: Consider “top to shop”—senior management and the shop floor do not implement sustainability in the same way. The closer one moves to the shop floor, the less clear sustainability becomes. The reason is that the shop floor is the domain of the tactical. Processes, functions, KPIs, repeated actions and orders tend to be well defined and optimized. At the senior management level, sustainability is strategic. It involves planning, alignment, goals, options and prioritizing. This is a very different environment than the tactical floor. Connect shop floor tactics to sustainable strategy. Make the connection clear and as shop tactics evolve and improve, they will incorporate the strategies of sustainability.

Improve customer service: People, planet and profit are indeed consumers of professional supply chain and operations management expertise and focus. Serve them with the same strategic best practices required of good customer service. Consider proactive support, communication and focus as a priority with stakeholders who represent people, profit and planet, such as employees, customers, communities, finance staff, shareholders, public officials and more. This strategy means more than simply performing a sustainability-friendly task in isolation, such as reducing energy used by one percent. It suggests the tasks be communicated and integrated as value-added support for stakeholders and their goals.

Innovate: Sustainability demands innovation. While big innovations make news, don't overlook the small innovations. At this stage of supply chain sustainability practice, even a small idea can grow into an entire family of innovations. Even a small idea can become part of a broader package that combines to deliver sustainable goals. Even the smallest innovation or idea is part of our chain of practice and improvement. Manufacturing has long relied on small continuous innovation implemented over the years to add up to stunning advances.

Global Sustainability Resources

A variety of resources support the practice of supply chain sustainability, with guidance available across all levels of senior management and supply chain management. Three examples are:

- United Nations (UN) Global Compact
- International Organization for Standardization (ISO) 26000 and ISO 14000, which belong to the ISO's family of management and leadership standards
- Global Reporting Initiative (GRI)

UN Global Compact

The UN's 10 principles, established in 2001, define a commonly adopted set of core values among global enterprise organizations. The UN Global Compact asks companies to embrace, support and enact, within their sphere of influence, a set of core values in the areas of human rights, labor standards, the environment and anticorruption. These include the following categories and principles:

■ Human Rights

- Principle 1: Businesses should support and respect the protection of internationally proclaimed human rights, and
- Principle 2: Make sure that they are not complicit in human rights abuses.

■ Labor

- Principle 3: Businesses should uphold the freedom of association and the effective recognition of the right to collective bargaining;
- Principle 4: The elimination of all forms of forced and compulsory labor;
- Principle 5: The effective abolition of child labor; and
- Principle 6: The elimination of discrimination in respect of employment and occupation.

■ Environment

- Principle 7: Businesses should support a precautionary approach to environmental challenges;

- Principle 8: Undertake initiatives to promote greater environmental responsibility; and
- Principle 9: Encourage the development and diffusion of environmentally friendly technologies.

■ **Anticorruption**

- Principle 10: Businesses should work against corruption in all its forms, including extortion and bribery.

Corporate sustainability is defined by the UN Global Compact as “a company’s delivery of long-term value in financial, social, environmental and ethical terms.” In conjunction with the UN Global Compact, the UN proposes its “Blueprint for Corporate Sustainable Leadership,” which target senior management and consists of the following broad steps:

- Implement the 10 principles into strategies and operations
- Take action in support of broader UN goals and issues
- Engage with the UN Global Compact

ISO 26000 and ISO 14000

ISO 26000:2010 (guidance on social respect responsibility) and ISO 14000 (environmental management) belong to the ISO’s family of management and leadership standards. The ISO 26000 standard, launched in November 2010, offers guidance on social responsibility practices. According to the Corporate Sustainability and Reputation website csidentity.com, ISO 26000 is important because “sustainable businesses for organizations means not only providing products and services that satisfy the customer, and doing so without jeopardizing the environment, but also operating in a socially responsible manner.”

ISO 26000 does not define requirements; rather, it provides voluntary guidance, and therefore is not certifiable. Nonetheless, ISO followed its standards development processes involving global stakeholders and complex issues in order to develop direction in this area.

The ISO website states that ISO 26000:2010 “provides harmonized, globally relevant guidance for private and public sector organizations of all types, based on international consensus among expert representatives of the main stakeholder groups, and so encourage the implementation of best practice

in social responsibility worldwide.” ISO also states that this standard “draws upon best practice developed by existing public and private sector social responsibility initiatives.”

The ISO 14000 family of standards seeks to minimize harmful effects on the environment by an organization’s activities and to achieve continual improvement of its environmental performance. The ISO 14000 series addresses various aspects of environmental management and offers a certifiable standard, where an authorized, independent certifying body issues a certificate or written assurance confirming that an organization’s management system conforms to the requirements.

ISO 14001:2004 and ISO 14004:2004 cover environmental management systems (EMS). ISO 14001:2004 provides the requirements for an EMS, while ISO 14004:2004 furnishes EMS guidelines. Other standards and guidelines in the family “address specific environmental aspects including labeling, performance valuation, lifecycle analysis, communication and auditing.” ISO 14000 applies to a range of organizations and maturity levels by encouraging organizational commitment to regulatory compliance and continuous improvement, instead of specifying certain levels of environmental performance.

Regarding the 14000 series, the ISO website states:

- 14001:2004 gives the generic requirements for an environmental management system. The underlying philosophy is that whatever the organization’s activity, the requirements of an effective EMS are the same, which has the effect of “establishing a common reference for communicating about environmental management issues between organizations and their customers, regulators, the public and other stakeholders.”
- Because ISO 14001:2004 does not lay down levels of environmental performance, the standard can be implemented by a wide variety of organizations, whatever their current level of environmental maturity. However, a commitment to compliance with applicable environmental legislation and regulations is required, along with a commitment to continual improvement for which the EMS provides the framework.

GRI

The GRI is a network-based organization that produces a comprehensive sustainability reporting framework that is widely used around the world. Based in Amsterdam, GRI is a not-for-profit organization supported by grants from government, foundations and corporate sponsors. It has strategic partnerships with the UN Global Compact, ISO (in development of ISO 26000), and the Organization for Economic Cooperation and Development.

The reporting framework sets out the principles and performance indicators that organizations can use to measure and report their economic, environmental and social performance. According to globalreporting.org, “the framework enables all organizations to measure and report their economic, environmental, social and governance performance—the four key areas of sustainability.”



PERSPECTIVES FROM APICS MAGAZINE

APICS magazine is an award-winning publication featuring innovative ideas and real-world strategies for inventory, materials, production and supply chain management; planning and scheduling; purchasing; logistics; warehousing; transportation and logistics; and more. Visit apics.org/magazine to view current and archived issues and to learn more about the magazine.

FROM END TO END

Guiding new product development with life cycle assessments

The APICS Interview



Editor's note: Sustainability concerns increasingly guide the creation and deployment of new products and services. Supply chain leaders at myriad organizations increasingly rely on researchers and scientists to inform decisions surrounding questions of environmental impact and social responsibility, as well as how they affect supply chains. *APICS* magazine staff editor Christopher Jablonski recently spoke with Procter & Gamble (P&G) sustainability expert Annie Weisbrod about the company's supply chain initiatives, life cycle analyses, carbon foot printing and new product development.

Jablonski: Could you share with our readers your background and what you do for P&G?

Weisbrod: I have a bachelor's degree in zoology and a Ph.D. in environmental toxicology. At P&G, I study pollution and the impacts humans have on everyone else. My job today is to develop new metrics, methods and studies to help guide sustainable product development. These help us determine what is actually meaningful for environmental conservation as well as what is appropriate to communicate externally.

Jablonski: How does P&G define sustainability?

Weisbrod: Sustainability is about ensuring a better quality of life, now and for generations to come. P&G does this by making the products and services we offer in an environmentally responsible manner and through our social responsibility programs that improve the lives of those in need around the world.

Jablonski: What are some sustainability-related initiatives P&G has implemented in its supply chain, particularly in the procurement of raw materials?

Weisbrod: The most important and public one is our environmental sustainability scorecard and ratings process for suppliers. Starting in 2008, the results from multiple product life cycle analysis studies led P&G to conduct limited surveys of suppliers to understand how large, medium and small manufacturers worked toward sustainability.

Many companies were interested in improving the eco-efficiency of their own operations and understanding more about the environmental and social impacts of their supply chains, but quite a few were looking for help in how and where to start. So, our first step was to find a way to effectively guide and provide encouragement for our suppliers' development of appropriate measurement systems and then to ensure the involvement and growth of technical experts there.

Jablonski: What is the P&G supplier sustainability scorecard, and how does it work?

Weisbrod: P&G started a supplier sustainability board with more than 20 of its leading suppliers from around the world. Environmental science, engineering and business experts from diverse companies aligned on measurement system principles for a scorecard to be used in P&G's annual supplier performance ratings process. The intents were to lay the foundation for an industry-wide standard, promote a working discussion, and determine common supply chain evaluation processes across all industries. Key suppliers and agencies were also encouraged to use the scorecard with their suppliers and other customers to further improve total supply chain environmental sustainability.

The first P&G supplier sustainability scorecard was launched in May 2010 and was sent to P&G's top 400 suppliers. While responding to the request did not affect ratings, about 81 percent responded. In April 2011, a revised scorecard was launched via a webinar to about 600 suppliers. (See pgsupplier.com/en/current-suppliers/environmental-sustainability-scorecard.shtml.) Completion of the scorecard is now factored into supplier ratings. Supplier responses for environmental sustainability are integrated with metrics for commercial, operational, relationship and innovation-related performance indicators.

Jablonski: What is P&G's third-party audit program?

Weisbrod: It's a process to ensure all suppliers adhere to appropriate standards of conduct. P&G publishes sustainability guidelines for supplier relations. We rely on an external auditing process and a data system run by a nonprofit organization. Third-party audits examine a wide range of quality and reliability metrics and can include social responsibility investigations. Environmental sustainability metrics will be included in the future, now that they are part of the rating process.

Jablonski: How do life cycle analyses influence or guide new product developments?

Weisbrod: Life cycle analysis is the only holistic framework that exists today to help us understand the many ways a product or service can affect the environment from [that product's] very beginning to end. Life cycle analysis forces a rational examination of many indicators throughout a product's life cycle, from cradle to gate or cradle to grave. It enables us to make decisions about product development based on factual inventories rather than assumptions or opinions.

Jablonski: Can you go into the distinction between cradle-to-gate and cradle-to-grave analysis?

Weisbrod: You need to define scope to figure out where the boundaries are in your analysis. For example, I have a coffee cup in front of me made of some sort of ceramic. If I were performing a life cycle analysis, I could look from cradle—the extraction of the minerals out of the earth that get processed into making the ceramic—and stop that assessment at the gate—at the end of the factory.

For many suppliers of materials, they perform life cycle analyses just until their material leaves their factory gates and get shipped to companies such as P&G, where we then take it and convert it to a consumer product. It goes through the rest of the life cycle, through additional gates and transportation steps, through consumer use, and ultimately to the end of its life or disposal.

At P&G, we generally conduct cradle-to-grave assessments because we have information on the entire life cycle. But, as a lot of our suppliers do not, they're only able to go cradle to gate.

Jablonski: And where is the grave for most products?

Weisbrod: It usually means something like a landfill, an incinerator, or a wastewater treatment plant for chemical products. A detergent might go down your drain, and its end of life would be passing through a wastewater treatment plant. More than 95 percent of the chemicals in that detergent are rapidly biodegraded within a wastewater treatment plant, and then there are a few inert materials that will pass through and then leave with the effluence.

Jablonski: What are the environmental impacts that matter most to P&G when performing life cycle analyses?

Weisbrod: Our life cycle impact assessment methods estimate 10 to 20 potential impacts in four damage categories: ecosystem quality, climate change, resources and human health. We identify which of the impact indicators are actually relevant for a particular product. For example, aquatic toxicity is an important indicator for laundry detergents because they are disposed into wastewater systems. We then use environmental risk assessment, comparing toxicity effect and exposure concentrations, to understand true risk.

For example, aquatic toxicity is not an important impact indicator for disposable diapers, but non-renewable energy and global warming are, since many materials are derived from fossil fuels. The results of our life cycle analyses conducted over 20 years show that—for some kinds of consumer products, such as those

involving the use of hot water—the consumer use phases drive environmental impacts and are the most important to work on. But for other kinds of products, like batteries or diapers, raw material supply chains are the primary contributors to potential environmental impacts.

Jablonski: Why is the carbon footprint an important environmental marker?

Weisbrod: Carbon footprint is a surrogate measure of climate change. Carbon footprints are not measured, but calculated from a variety of inputs. The analysis accounts for the cumulative amount of greenhouse gases emitted by a product or service during its life cycle.

P&G views carbon footprints as an important tool to identify the greatest opportunity areas for reducing greenhouse gas emissions from an operation or across a product's life cycle. However, P&G does not support the use of carbon labels on consumer products because they are inherently uncertain.

This uncertainty comes from it being the result of a life cycle analysis model having uncertain input variables, often compiled from a variety of sources. There is uncertainty in the input numbers selected, the model itself, and the scenarios considered. In all, it is nearly impossible to make an “apples to apples” comparison of competing products' carbon footprint numbers, given their complexity, uncertainty and dynamic nature.

Jablonski: Why is carbon footprint derived rather than measured?

Weisbrod: Because most people don't have the equipment to actually measure their greenhouse gas emissions. For example, in some manufacturing organizations you would have to put a machine on all your stacks that would measure some number of individual greenhouse gases. That measurement is actually quite expensive and complicated, so almost no one does that.

However, everybody pays their electricity bill, so they know how much electricity they use, and it's easy to research how the electricity is generated in a given area. Is it from burning coal, or is it coming from a nuclear power plant or from water? If the electricity comes from coal or natural gas, for example, then they calculate how much carbon dioxide and other greenhouse gases are released from the burning to create electricity. That's generally how it is derived for one site.

Jablonski: What were some of the thoughts that went into the development of the Tide Cold Water detergent?

Weisbrod: In 2001 and 2010, our environmental scientists compiled the results of life cycle analyses for 13 kinds of consumer products that we make. The chart for the cumulative energy demand for those product categories was striking, in that energy use by consumers of laundry detergent was about six times higher than any other energy use across all the other products and life cycle phases.

If every U.S. household used cold water for laundry, the energy savings would be 70 to 90 billion kilowatt-hours per year, which is three percent of the nation's total household energy consumption.

Therefore, the most significant impact that P&G can have in reducing energy use was to create an effective product for people to wash their clothes in unheated water. It took about five years to develop new formulations for cold water laundry detergents Tide and Ariel, launched in North America and Europe in 2007.

Jablonski: Are there challenges in convincing stakeholders of the importance of green initiatives?

Weisbrod: I work collaboratively with a team of product and process engineers, material scientists, communications experts and others to determine what kind of green initiative would be beneficial economically and meaningful environmentally for that product category. So far, I have not found that justifying a green initiative is any more difficult than any other initiative. As we move toward the estimate of 9 billion people living on our finite Earth, many who consume more than they actually need, the case for resource conservation and balancing environmental and social responsibility become obvious. We know that consumers want environmentally friendly products without trade-offs in price or performance.

Making a thorough investigation to clearly define the right vision and goal areas for a company's product or service and making a public commitment is important. At P&G, we see that investors pay attention to our sustainability vision and goals and expect us to deliver on them, as well as on our commitments to P&G shareholders, who count on us for reliable, long-term growth.

THE GREEN WAREHOUSE

A significant step toward sustainability

By Giuseppe Lovecchio, CFPIM, CSCP, CMC



Greening your supply chain not only is essential to compliance with increasingly rigorous environmental regulations, but also enables businesses to dramatically reduce or even banish waste. In the post-crisis global economy, a new mind-set is necessary in order for operations and supply chain management professionals to take advantage of these opportunities and solve environmental issues. While its role often is underestimated, the warehouse actually is the most essential factor in successful sustainability efforts.

Investing in a green warehouse can create greater profitability and heightened company reputation and image, which in turn can lead to a major increase in competitiveness. One must build and manage green warehouses according to three categories using a practical and holistic approach. These categories are:

- Warehouse location in a supply chain context
- Warehouse design principles
- Warehouse management methods and techniques

Building Design

To be globally competitive, companies are following the trend of consolidation. The idea is to place manufacturing activities and inventories in fewer strategic locations. This enables businesses to better manage risk, optimize economies of scale, reduce transportation costs and eliminate midlevel or extra warehouses. Of course, the fewer warehouses a company has, the more it will pay for transportation.

The key is to place fewer warehouses close to intermodal infrastructures that are built with the scope to speed up intermodal operations and reduce cost. Additionally, locating warehouses in brown fields (previously polluted areas that have been cleaned for reuse) can be an attractive approach. Instead of consuming green fields, this enables companies to make a new installation more sustainable. Table 1 shows criteria decision makers should assess when choosing a warehouse location.

Table 1: Location criteria for traditional and green warehouses

TRADITIONAL	GREEN
Accessible to roads	Accessible to intermodal infrastructures
Proximity to market	Proximity to ports, airports and distribution parks
Focus on low price	Focus on balance between supply chain costs, energy and carbon intensity

Buildings account for 36 to 40 percent of a warehouse environment’s total energy consumption, so they are the largest sources of emissions. Improving their energy performance clearly supports carbon footprint-reduction policy. The long-term goal is to build and manage a profitable, zero-carbon and zero-waste warehouse by enhancing traditional warehouse operations, inbound and outbound logistics and employee travel.

An advanced design also is an important “lean and green” warehouse prerequisite. Expert engineers and consultants can help make the most of warehouse design best practices, such as passive building methodologies, which consider orientation, materials used, available daylight and more. Before investing in complex solutions, it can be smart to explore the principles of passive building.

A flexible layout also is essential. Changes in distribution strategies happen frequently, and it is imperative that flexible and modular warehouses have the capability to easily change their layouts. The ability to reuse a warehouse for a different business in the coming years is very valuable. Consider expanding the building’s height, reducing the number of pillars or columns, and installing inclines and ramps instead of stairways.

Insulation also should be a priority. If doors must be left open or are not hermetic, it may be better to divide the layout in areas where the temperature is homogeneous. This provides reduced energy consumption. Consider using large roof fans, which can move a big amount of air slowly, similar to a convection airflow. This reduces temperature gradients from floor to ceiling and thus cuts energy requirements.

Day lighting—achieved through skylight installations—is another great carbon footprint-reduction tactic and contributes to a healthier work environment. It also can be implemented very quickly. New lighting technologies offer around a 70 percent savings compared to high-pressure sodium or mercurial vapor lighting and benefit the environment by reducing the amount of hazardous waste. Additionally, a more comfortable work environment is achieved thanks to cleaner and brighter light, without dangerous glare effects for operators. Other savings are possible with sensor and motion-control devices that regulate lighting.

The self production of energy with photovoltaic installations can be taken into account when large roofs (at least 5,000 square meters) are available after a proper feasibility analysis has been performed on orientation, latitude parameters and the like. Similarly, wind-energy investments should be evaluated, particularly because of available tax advantages.

Finally, gray water (from the shower, bath, bathroom sink and so on) can be used for irrigation, which reduces the use of potable water.

Warehouse Management Methods

Shareholders, stakeholders, managers and operators must take into account the growing awareness of environmental issues and find innovative ways to manage their warehouses without cutting profitability. Picking and handling activities represent the largest energy consumption in a warehouse and thus offer the greatest opportunity for green advancement.

Stock location must be energy-oriented. Floating location is preferred, with the support of an effective warehouse management system, when appropriate. Fast-moving items should be located close to shipping areas; slow movers in the back. Heavy items should reside on low shelves and light ones on top racks.

Electric or hybrid forklifts contribute to energy savings, especially if their use is reinforced by properly organizing picking operations. The four picking methods (order, batch, zone and wave) need to be evaluated accurately and selected for use based on their ability to minimize total duration and picking routes. The queue time of trucks at the warehouse must be as short as possible in order to save fuel. Better planning coupled with time windows enable this savings.

Employees can save fuel in many ways, as well. The use of bicycles can be encouraged by installing dressing rooms and showers. Also consider hybrid car sharing.

Packaging is another concern. For a zero landfill-waste target to be achieved, returnable packaging is paramount. Develop a shared project with suppliers and customers where modularization and standardization will help find common solutions.

Lastly, do not underestimate the five Ss and housekeeping. One simple and effective approach is the use of microorganisms to boost waste recycling and contribute to a more comfortable and hygienic work environment.

The Right Outlook

A truly green warehouse depends on proper design and construction, streamlining worker activities, the right technology and more. But most importantly, supply chain and operations management professionals must employ the correct attitudes and behaviors in order to succeed sustainably.

The Value of Your Investment

Measurable environmental targets such as zero landfill waste, zero carbon emission, and minimum energy and water consumption need to be evaluated together with traditional key performance indicators. They can help determine the “greenness” of a warehouse by clearly defining metrics, best practices and internationally recognized standards.

Energy building and warehouse certifications enable constructors and logistics company professionals to evaluate energy and waste efficiency, sustainability, the market value of warehouses and more. Following are some examples.

LEED stands for Leadership in Energy and Environmental Design. It is a voluntary certification program developed by the U.S. Green Building Council. LEED building certification has four levels: certified, silver, gold and platinum—which can be used in any country. Points are awarded according to the type of facility and its performance in different areas, such as sustainable site development, water efficiency, energy efficiency, innovation and design, and indoor environmental quality.

BREEM was developed by the British Research Establishment (BRE). BREEM stands for BRE Environmental Assessment Method, which is a five-level rating system, with five stars representing the highest level of environmental performance. The standard assesses buildings against set criteria and provides an overall score of past, good, very good, excellent or outstanding.

Green Star certification was developed by the GBCA (Green Building Council Australia). There are different rating tools depending on the type of facilities being assessed. GBCA awards a “Green Star Certified” rating when minimal requirements are satisfied.

CASBEE, Comprehensive Assessment System for Building Environmental Efficiency, was developed by the Japan GreenBuild Council and Japan Sustainable Buildings Consortium. CASBEE assesses four fields: energy efficiency, resource efficiency, local environment and indoor environment, with ratings including class C (poor), class B-, class B+, class A and class S (excellent).

The European Union (EU) has defined increasingly demanding climate and energy targets that must be met by 2020. These include:

- A reduction in EU greenhouse gas emissions of at least 20 percent below 1990 levels
- Getting the amount of EU energy consumption derived by renewable resources to 20 percent
- A 20 percent reduction in primary energy use compared with projected levels, to be achieved by improving energy efficiency

These three points are known as the 20-20-20 targets.

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INNOVATION OVER CARBON IDEOLOGY

Cut waste the right way

By William A. Levinson, CFPIM



Genuine social responsibility requires an organization to serve all its stakeholders— investors, employees, suppliers and customers—which, in turn, enriches society as a whole. Conversely, efforts to strictly measure and reduce carbon dioxide emissions are either the wrong thing for the wrong reason (conformance to a politically correct ideology) or the wrong thing for the right reason (identification and removal of energy waste from a supply chain). Supply chain waste can easily hide behind a favorable carbon footprint or the purchase of carbon offset credits. But that same waste cannot hide from more straightforward and comprehensive metrics.

Bad assumptions lead to bad decisions, so the first step must be to evaluate the premise that carbon dioxide is a pollutant. China's plans to bring hundreds of coal-fired power plants online demonstrate that the nation's leaders do not seem to think so. Even though global warming would affect much of its land, the country's priority is cheap and reliable energy. Instead, China's pledge to reduce the carbon intensity of its operations (meaning, carbon emissions per unit of output) is actually a promise to reduce costs and increase profits by removing energy waste from its supply chains—something that any intelligent business person would want to do.

Observation is the best metric

Operations and supply chain managers can increase value for stakeholders by paying attention to everything that goes into a shipment, as well as everything that does not go into a shipment. Anything in your trucks, ships or trains that does not add value for the customer at the other end is waste. Everyone from hourly workers to engineers to managers must be trained to recognize waste on sight. For example, shipping pre-bottled tea is far more wasteful than an equivalent amount of tea bags or loose tea because of the added water.

Packaging material is a necessary evil: It's necessary for protection against handling damage, but it adds no value for the customer. Thus, Henry Ford had his suppliers send shipments in wooden boxes of a very specific size so the wood could be used as floor boards for Model Ts.

Empty space in a shipping container, truck, or other conveyance is waste (unless the shipment's weight equals the vehicle's capacity). Learn to see not only the value-adding cargo, but also the empty space that surrounds it. It is worth a supply chain professional's time to visit the loading dock and see how shipments arrive and depart. As soon as air between packages is seen, the need for redesign becomes obvious. The ability to ship more product per load reduces not only per-unit transportation cost, but also per-unit carbon footprint. Take Walmart, for example, which recently started using square

bottles in its pharmacies. Somebody apparently paid attention to not only what was shipped, but also what was not shipped: Using cylindrical containers wastes about 20 percent of the capacity of a truck train, or other vehicle. This is why office furniture generally is shipped in unassembled form—this allows for more units in a shipment.

These examples illustrate how smart operations professionals can learn to deliver lower prices to customers, higher wages to employees and greater profits to investors—simultaneously. These types of initiatives teach not only the supply chain professional, but also the hourly worker, to identify waste that otherwise would hide in plain view.

Dollars are the second-best metric

Just as smoke is an indicator of fire, carbon emissions are indicators of fossil fuel consumption. However, it is easier to measure dollars than carbon emissions—and dollars reveal the use of energy from non-carbon sources. If trucks burn fuel uneconomically or loads are packed inefficiently, the per-unit transportation cost will reflect this. Thus, there is no need to spend time or money quantifying carbon emissions. Carbon emission data cannot identify forms of energy consumption (and possible waste) that are not visible through straightforward dollar measurements. Yet dollars—and also what chemical engineers call “material and energy balances”—can identify wastes about which carbon emission metrics are totally oblivious.

Consider the argument over whether companies should require trucks to operate below the legal speed limit in order to reduce fuel consumption: This is socially irresponsible if the driver is paid by the mile. A socially responsible employer’s profits come from what would be waste, not from worker wages. Even if the company pays the driver by the hour regardless of miles driven, the capital cost of the truck is an issue. Say a logistics firm directs its drivers to drive 55 mph in 65 mph zones. It will need 18 percent more trucks and drivers to move the same amount of freight. Operation at a lower speed to save fuel makes sense only if there is excess capacity and all the work can be handled by its existing fleet.

The Ford Motor Company and Eaton have developed a hydraulic, regenerative braking system for trucks up to 11,000 pounds. It costs \$2,000, but reduces fuel consumption by 25 percent (more than driving 55 mph in a 65 mph zone can achieve). It looks especially useful for delivery trucks that make frequent stops. This is the kind of innovative, mutually beneficial thinking that improves supply chain value for all stakeholders and has the accompanying effect of reducing carbon emissions.

A truck that idles in heavy traffic represents increased lead times and more inventory, fuel burned for no purpose, and paying a driver to stare at the bumper in front of him. It may be cost effective to give drivers a shift premium to go through major urban areas late at night or early in the morning to avoid traffic. Sophisticated global positioning system equipment also can help route vehicles around traffic jams.

Material and energy balances

There are analytical tools that the practitioner can use to identify manufacturing waste. Chemical engineers use a material and energy balance, which is similar to debit/credit accounting: Everything that goes into a process (debit) must balance everything that comes out (credit). Traceability of every material and energy stream forces all forms of waste to become immediately and conspicuously visible—a task for which carbon emission metrics are very poor substitutes.

Pay attention to the doughnut and the hole. A bill of material lists every thing that is necessary to make a unit of product. However, by adapting the material and energy balance concept to a bill of outputs for use by supply chain professionals, the result is a balanced account of everything that goes into and out of a process, thus forcing all material wastes to become highly visible.

Still want to reduce carbon emissions?

The tools and techniques described in this article are far more effective than carbon footprint for identifying all forms of waste. The simpler ideas can be put into practice by every member of the supply chain—and, once implemented, these concepts offer the incidental result of reducing carbon emissions ... if that kind of thing is still important to you.

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FOLLOW THE GARDEN PATH

Easing your company into a sustainable energy program

By Tim Becker



For the past few years, energy consumption and production have been front and center business issues, largely because of concerns about global warming. Solar panels and wind turbines are sprouting on rooftops and mountaintops, smart grids are snaking their way into our homes and businesses, and electric vehicles are making splashy debuts. A wide and ever-expanding array of products and services are being offered by proliferating green technology companies, fueled by venture capital and private equity.

In the third quarter of 2010 alone, \$1.6 billion in venture capital was directed into the clean technology sector, which has overtaken information technology and biotechnology as the most funded sector. The majority of this venture capital was put toward energy technologies.

Such market frenzy should give you pause. Although smaller in scale, the green wave in business is reminiscent of the dot com and real estate waves that eventually crashed upon the rocks of reality, causing pain to irrational or ill-informed investors, suppliers and customers. Keeping this in mind, you should proceed deliberately when formulating and executing green strategies. The most successful initiatives are focused and carefully designed, and they conform to well-established business principles.

The first step is to filter out the green hype. This requires education. You must take the time and make the investment necessary to understand your company-specific energy issues and options. This requires you to explore both externally and internally.

Look externally for examples of well-documented, successful energy initiatives. You need not reinvent the wheel; instead, learn from the experience of others. Especially be alert to examples of dramatic changes in energy efficiency, as your objectives should include inspiring your organization and ultimately creating a self-sustaining green culture. For instance, Whirlpool's front-loading, steam-cleaning washing machines use 77 percent less energy and 73 percent less water than its top-loading washers manufactured just four years earlier. United Technologies has invented a gearless elevator that uses half the electricity of a conventional elevator, and the company also reduced its energy consumption by two percent per year over the past 10 years.

It is equally important to develop a clear profile of your internal energy situation. There are many questions to be answered: how much energy is used in total, as well as by specific purpose or specific device? How do usage and per unit costs vary over time and by season? Unfortunately, the data needed to answer these and other pertinent questions frequently is unavailable, difficult to access, scattered across the company, or incomplete and inaccurate. Modest investments in measurement technologies—such as clamp-on submeters—may be required to get a sufficiently granular energy profile. You might also work with local utility companies to obtain billing and metering data for facilities. I recommend disseminating your baseline energy data and periodic updates throughout your organization, as the mere act of measurement often can drive managers to make improvements. Or consider adding an energy metric or two—and their associated targets—to your company's balanced scorecard.

Once the baseline, metrics and goals have been established, the second step is to identify and screen potential initiatives. The following are some guidelines to maximize the impact and minimize the cost of your energy program.

Choose a handful of easy-to-implement initiatives. This might prove daunting, as there is a wide array of energy solutions vying for your attention in the marketplace. I suggest winnowing down potential initiatives to a manageable number by getting your organization aligned around a few simple initiatives. These will serve as a foundation for subsequent projects that are larger and more difficult to implement.

Place a strong emphasis on simplicity and quick results. Begin with energy initiatives that anyone in the company can understand and do not require significant attention. The intent is to create fast and unambiguous results that can build momentum and enthusiasm. Examples include replacing incandescent lighting with fluorescent lighting, installing weather stripping and caulking windows. Some companies also have achieved good results with programs associated with reducing the energy drain of devices in standby mode.

Choose meaningful initiatives. Simplicity and fast results must be balanced with materiality. Many corporate energy programs are littered with trivial, feel-good initiatives that erode confidence in the leadership's green commitment and cause the organization to lose sight of the big picture.

Begin with people and process initiatives. These tend to involve large swaths of people across the organization, thereby fostering the green culture necessary for long-term sustained results. Such initiatives also avoid capital expenditures. Do not be leeward by the siren song of capital-intensive, high technology solutions: They may have their place in a longer program, but only once you have achieved a certain level of success and possess sufficient education about energy issues.

Focus initially on conservation rather than alternative energy sources. Conservation initiatives are easier, simpler, faster, lower-cost and less risky. Conservation measures also are less controversial and less political than decisions regarding power sources. However, once conservation opportunities are exhausted and you are an energy veteran, you can shift your attention—for example, switching from high-carbon to lower-carbon sources of energy.

Ensure any candidate fits within your broader technology strategy and portfolio—in particular, that it matches your risk tolerance.

After you've screened and selected strategies, the third step is developing a detailed business plan that will serve as a reference point for your initiatives. During implementation, your business case should be populated with the actual results from your initiatives, serving as a feedback mechanism for your energy program.

In developing business cases, there is much to consider. First, ensure that both soft benefits and soft costs are addressed and quantified where possible. For riskier strategies, particularly those involving high technology, include sufficient contingency costs in the business case, such as degradation in performance over time. Second, make sure you have tapped into incentives, tax breaks and subsidies offered by local, state and federal governments. Sometimes, funds are available from companies—particularly utilities—and nonprofit organizations such as environmental advocacy and interest groups. Third, include sensitivity analyses in your business case to better understand and illustrate worst and best case scenarios for return on investment.

The final step in executing green strategies is to find reliable business partners to assist with implementation. There is no reason to go it alone. There are many resources able to provide implementation assistance, such as the U.S. Department of Energy and local utility companies. Solution vendors are also plentiful. However, a gold-rush mentality in the energy marketplace is attracting a lot of rookie organizations, so exercise particular caution in screening potential suppliers. Small startups often offer the most innovative solutions and lowest costs, but carry a higher risk of failure.

In one hour, the earth receives enough power from the sun to meet the energy needs of our entire population for a full year. The theoretical wind generation capacity of the U.S. Atlantic coast alone is more than one trillion watts of electricity. Other such statistics about the potential of cleaner energy sources abound. However, much research and development are needed to realize the promise of these plentiful, cleaner energy sources. The full transition to sustainability will take decades. In the meantime, however, there are many quick and simple actions that companies can take to reach the goal of greener and more sustainable energy practices.

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