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Sustainability: The Engine that Drives Corporate Social Responsibility

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Introduction

Al Gore's book, *An Inconvenient Truth*, awakened us to how our life styles and business practices are impacting our world; accelerating pace of melting polar ice caps, rising seas, toxic chemicals in our water and food supplies, climate changes, and limited access to resources. Concern over a toxic environment is not new. Rachel Carson exposed the dangers of pesticides in her book, *Silent Spring*. Now we understand the impact industry and life styles have on our environment, and we are requiring a personal and professional environmental accountability for our actions.

Businesses are looking for green solutions. Corporate social responsibility is becoming the new yard stick that individuals, society, and companies are using to determine who they will work for, invest in, and do business with. It is no longer acceptable to do no harm; you now must do some good for your employees, the environment, and your community. Companies are seeking out these new business solutions that address profits, the environment, and society which is referred to as the "Triple Bottom-Line."

Companies have a sense of urgency to implement green solutions. The safety, health and environmental professional is taking on a risk management role, looking at a 360° view of possible solutions, beyond the task and solution and evaluating how these changes can introduce new loss exposures to the workplace and community. These professionals will evaluate new technology and chemical/mechanical/biological exposures for which little information may be available. Many of these potential hazards are not regulated, evaluated, or adequately addressed by existing OSHA standards. Hazardous chemical exposures in particular present challenges because substitution is not always a workable solution. These chemicals may not have complete safety analysis, be too costly, or they may not fit the task's technical requirements. Socially responsible companies demand the highest level of job safety, creating a culture of protection as opposed to a culture of compliance or, as Ray Anderson of Interface calls the practice, "being as bad as the law will allow."

Sustainable Culture and Business

Sustainability is defined as economic development that takes full account of the environmental consequences of economic activity and is based on the use of resources that can be replaced or renewed and, therefore, are not depleted. Sustainability is often referred to as “greening,” which means: (1) reduce the use of hazardous products and materials in housekeeping and maintenance (also reduces the amount of hazardous wastes needing to be disposed); (2) use more energy-efficient equipment in heating, cooling, and lighting, as well as in construction materials; (3) recycle electronic goods, building materials from renovation projects (an example would be rubble for future projects or unpainted wood turned into mulch), and share usable windows and plumbing supplies with the needy; (4) use reusable-reclaimed products; (5) use energy-efficient or alternative fuel vehicles; (6) practice energy and environmental conservation (use ride-share programs and "work-at-home" programs to minimize travel/traffic); (7) conserve water; and (8) participate in community environmental initiatives.

The burning of carbon-based fuels to produce energy contributes heavily to an increase of carbon dioxide and greenhouse gases in the atmosphere, which are responsible for the changes in our weather patterns, global warming, and a deterioration of our health. Buildings are the largest contributor to greenhouse gas emissions. Companies understand their “brand value” is affected by society’s perception of their stewardship for our natural resources. They are transforming their business models addressing the “triple bottom-line”. Carbon Trust, an independent company, states that “tackling climate change could create opportunities for a company to increase its value by up to 80% if they are well positioned and proactive.”

There are businesses that provide products and services that enable a “green” transformation across the entire economy, known as the “core green economy.” These businesses are focused on (1) providing alternatives to carbon-based energy sources, (2) conserving the use of energy and natural resources, and (3) reducing pollution and repurposing waste. There are 15 segments to the “core green economy:”
(1) Air and Environment,
(2) Renewable Energy Generation,
(3) Recycling,
(4) Energy Efficiency,
(5) Energy Storage,
(6) Water Conservation,
(7) Green Building,
(8) Sustainable Land Management,
(9) Alternative Transportation Fuels,
(10) Financing,
(11) Manufacturing Process and Sustainable Packaging,
(12) Research Institutes,
(13) Business Services,
(14) Advanced Materials, and
(15) Energy Infrastructure. (34)

Corporate Social Responsibility

A 2009 Greener World Media survey* of 65 large and multinational organizations showed that 59% of them set environmental objectives at the board and senior management level. "Live Green or Die" is how a recent Business Week cover story describes General Motors Corp.'s current challenge. Companies are getting beyond environmental compliance and looking to profit and grow through sustainability which is becoming a strategic value that is changing their culture.

Corporate social responsibility is not new. Ray Anderson, CEO, Interface Inc. one of the world's largest interior furnishings companies realized over 15 years ago the need for society to take care of our environment, our natural resources and this planet. Ray read the book "The Ecology of Commerce by Paul Hawken it opened his eyes to how industry was destroying the environment. In 1995 his company produced $802 million worth of products that required 1.224 billion pounds of earth's materials (400 million were abundant inorganic materials from the earth's crust and 800 million pounds was petro based which were irreplaceable, non-renewable, exhaustible resources. Ray and his team decided to change their practices: they cut carbon emissions 99% within 4 years, they lease their carpet guaranteeing the recycling of all their vinyl carpet backing & proper disposal, redesigned manufacturing to reduce waste, prohibited the use of virgin petroleum based products, in the process they diverted 100 million pounds of carpet and waste from landfills and saved $300 million in energy and waste use in five years in the process they went from plundering the earth's resources to being responsible for their actions saving the earth and enhancing their company brand. (33)

What we are witnessing taking place is a Business Revolution with a value shift in society. You have to be aligned with the new values or consumers will not be interested in what you have to offer and you will be out of business. Social Responsibility is an outgrowth of the quality revolution to reduce defects and improve the user experience. The pace of change is rapid and technology makes it impossible to hide from your actions. Corporate scandals take center stage in the media. Post 9-11 there is a heightened expectation of corporate citizenship as Americans said they are willing to punish companies that do not share their values. As recently as 2006 a national survey found 75% of Americans gave U.S. companies less than high marks in social responsibility. In 2007 there was public outcry for drastic action on the environment.

Business understands profits and environmental laws, now companies are seeking business solutions that will allow them to build good practices and make a positive impact on the environment, community and society. (23) They are turning to business schools for advice and information about what peer companies are doing in this area. Businesses realize successful companies need to incorporate social responsibility in the core of their business plans and use those values in their day to day decisions. This is not an American issue, it is global in nature. You cannot be a global enterprise without understanding the social issues that matter most in your target countries such as access to food, water, clean air, fair trade, or social justice.

Business schools are not only providing information but also building fee based websites for sharing information on this topic, as well as company specific training programs. Bottom-line corporate social responsibility is a business opportunity. Actively supporting social responsibility is helping companies positively shape their public image and reputation. A 2003 Stanford University study found 97% of the 1000 MBA graduates from Americas top 10 business schools stated they will forgo financial benefit to work for a company with ethics and a better reputation. (24) In the past the talent pool was abundant and outsourcing was looked upon as a solution to fill

any labor gap. In 1998 McKinsey & Company released a report *The War for Talent* which suggested in the upcoming decade the most critical resource will be talent as America ages, baby boomers are retiring, and job seekers look for progressive companies that have a reputation as being inclusive; offering equal opportunity and core values based on doing good. Socially responsible companies which utilize these values to guide their operations have a competitive advantage over their peers.

Companies are embracing ISO 14000, an International Standard that encourages them to develop, maintain, and continue to manage their environmental programs with ongoing improvements. They involve their associates by creating cross functional teams to help the organization focus on reducing is environmental footprint. Creating a sustainable culture requires hundreds of small personal innovations by everyone contributing to the companywide culture.

Corporate image is important as society makes purchasing decisions based on which companies act responsibly and support good causes such as human rights, health & education. These buying decisions will change corporations and governments. Companies are also aware that ignoring environmental issues in business exposes them to attacks from environmental groups. It is more beneficial for a company to integrate environmental/moral quandaries early on into their business decision making process. They need to address the social & environmental issues properly, practice good corporate governance, avoid a corporate crisis, and be accountable for their actions.

There are many examples of how being responsible and doing the right thing is a win-win for everyone. Wheaton Plastics worked with a client to increase postconsumer content in their plastic packaging to 80% from 40%. The result was reduced packaging weight, $1 million in lower shipping costs, and they avoided using 140 million tons of unsustainable virgin plastic material. Ray Anderson of Interface Carpet Co. developed the idea of sustainable carpet solutions making carpet from reclaimed materials and putting carpet down in squares that could be recovered and replaced vs. replacing all the carpet. Other carpet companies have followed Interface's environmental commitment so today the industry's carbon emissions are lower than 1990 and they are producing 40% more carpet.

Associate Labels of Vancouver BC, Canada was founded on the PEQ Triangle of "people, ethics and quality." The company has always been committed to charitable causes; printing promotional labels for the Royal Canadian Mounted Police for community projects. They learned of need for safe drinking water in a village in Kagula Uganda. The community water supply was contaminated and young woman of this village were required walk 9 miles a day for safe drinking water. Associate Labels committed to and built a well that provides safe water. This project improved the quality of life and health in the village and the young woman of the village can now go to school instead of fetching water. 18 moths after Katrina Timberland held an annual sales meeting in New Orleans. They inject a local community service project into their meetings. After a project was completed they visited the 9th Ward which was devastated when asked what was needed, it was shoes, all 200 sales reps took off their shoes, donated them and over the next few months other employees at Timberland helped out as well as employees in the hotel where they were meeting. A single act by the first employee created a chain reaction. In less than 2 decades, Timberland employees have contributed 250,000 hours of time to more than 200 communities. The service work is one of the top 2 sources of employee job satisfaction and a great perk for recruiters, employees can contribute 40 hours a year in communities while on the clock.

Food companies are learning that “going green” can translate into increased sales and profitability. The food industry is confronting rising consumer concerns about food safety and sustainability and look to regain consumer confidence with meaningful sustainable solutions. The Ecological Food Manufacturers Assn. has been formed to help food companies meet these growing consumer demands. The association is looking to create a seal or comprehensive score to be carried on packaging that will tell shoppers at a glance how well the products scored on the issues of safety, nutrition, and sustainability. (32)

Plastic product manufacturers face ongoing challenges from environmentalists. Next Generation Films of Ohio is out to change that mind-set. They are using high-tech source reduction in it’s products, maintaining a net zero-waste operation, and establishing a wind-powered recycling center. They won the 2009 Award for Sustainability. Technology allows them to build a 3 layered film product with strength characteristic of a 7 layer film. They also are able to run faster line speeds saving their customers 5%. They use polyactic-acid vs. petroleum-based plastics. They recycle waste, they re-pelletize their scrap. Some of the pellets are sold and they use some as a scrap based resin for new products (inner layer of the film). Finally they run their recycling center with a 150 kilowatt wind turbine (80’ blades). (30)

These changes are not going away no one is going to say global warming’s been reversed due to lack of interest. Nor is society going to make an announcement in the next two years that fair trade isn’t required because the developing world no longer needs justice. Corporate social responsibility, sustainability, and ethics will only take on greater importance over time. Good, smart companies succeed; stakeholders give back to companies that take care of them. The process of executing corporate social responsibility requires a communication and education strategy. Companies need to communicate their vision and educate customers and employees what sustainability is, why it is important, how it affects people inside and outside the company, what the company is doing and how it will benefit everyone. They also need to communicate to vendors and suppliers their requirements in a sustainable world, setting new expectations in their business relationship with the company. In the end, a company whose values and practices embrace corporate social responsibility will reduce their risks, build brand value, and customer loyalty.

Government Initiatives

In 2007, the Securities and Exchange Commission was approached by leaders in 17 states requesting all publicly held companies be required to disclose their full environmental liabilities to all potential investors. In 2007, nine Midwestern governors signed the Midwestern Regional Greenhouse Gas Reduction Accord with significant reductions targeted in carbon dioxide. Beginning January 2008 California is tripling fines for diesel vehicle idling and will prevent registration of units with outstanding citations. 39 states, four Canadian provinces, one Mexican state, and three Indian tribes have joined The Climate Registry which is developing standards for measuring, reporting and verifying greenhouse gas emissions. In 2009 the world met in Copenhagen for the U.N. climate talks centered on reductions of carbon dioxide and other greenhouse gases to control global warming.

California law, AB 1103, allows commercial building owners, prospective buyers, financiers and lessees to see how they stack up against their peers in terms of energy consumption. Energy efficient buildings will have a competitive advantage with higher occupancies and higher lease rates. Under the law, electric and gas utilities are required to maintain records of the energy consumption data of all nonresidential buildings to which they provide service and, upon request of an owner, upload those records to a secure online interactive energy management tool maintained by the US Environmental Protection Agency (Portfolio Manager) that tracks and assesses energy and water consumption. Now anyone looking to buy, finance or lease an entire building will be entitled to obtain the building's Energy Star Portfolio Manager benchmarking data & ratings, buildings within the top 25% will be recognized as an EPA Energy Star Building.

Mr. Chu, energy secretary advocates research into alternative energy is essential to combat global warming. President Obama has also pledged to spend $150 billion over five years in green technology and is calling for new buildings to be carbon neutral by 2030, and in the next decade improving new building efficiency by 50% and existing building efficiency by 25% over.

In 2010, OSHA and NIOSH stated they want to make "Green Jobs" safe as a fundamental dimension of true sustainability. They define defines Green Jobs as jobs and practices that help improve the environment. Their approach includes: (1) understand how green jobs affect worker Health & Safety- track injuries, illness & hazards (2) evaluate all Green Jobs for Health & Safety, (3) Integrate Health & Safety with energy conservation & environmental protection, (4) Plan Early, (5) Make Health &Safety part of Green Job training, (6) Add Health & Safety to green benchmarks

Toxic Products

The Ecology Center, in Michigan tested 1,500 toys for toxic substances, 33% had significant levels of lead, mercury, cadmium or other chemicals. 21% of toys from China had detectable levels of lead, but so did 16 % of toys from all other countries. Of the 17 toys made in the United States that were tested, 35% had detectable levels of lead, with two exceeding the federal limit for recalls. Overall, lead was detected in 20% of toys, and 54 products exceeded the U.S.'s limit for lead paint recalls, and others exceed the new 2009 CPSC standards. (13)

Mattel sold toys containing dangerous levels of lead, some 800% above the allowable limit of 600 ppm. They were sued, had to recall 2,000,000 toys, pay $12 million and must maintain records for four years regarding any subcontractors that manufacture parts of any of its toys. (3)

Sustainability through Actions & Goals

Companies can drive employee actions and ownership for sustainability through their own corporate leadership. The EPA and Rensselaer Polytechnic Institute study in 2003 found natural light improves employee vision, function, and productivity. Herman Miller furniture factory redesigned their facility with bigger windows and skylights to harvest the sunlight. Employee moods improved as well as productivity and staff retention increased. Some workers that had left for high wages returned stating they did not want to work in the dark at other factories. Maximizing daylight, the Lockheed Missile facility in Sunnyvale Ca. has cuts it's electric bill

75% and improved the employee working environment. Natural sunlight can cause cancer so Oak Ridge National Labs developed a hybrid lighting system which pulls sunlight into a roof top dish and pipes it into the building spraying it directly into a room while filtering out any harmful rays.

Stories about toxic products from China in 2008 brought new urgency to reduce or eliminate hazardous materials in everything from toys to Toyotas. Target said it would eliminate or reduce polyvinyl chloride (PVC) from a range of products and packaging, including infant and children's products, shower curtains, and tableware. Sears, Wal-Mart, Microsoft, Johnson & Johnson, and Apple announced similar measures. All told, 13 resolutions aimed at reducing toxics were introduced by investors of major U.S. corporations. Wal-Mart promotes green by encouraging its 1.3 million U.S. employees to develop "Personal Sustainability Projects, to improve their health and the health of the environment. Individuals and companies who embrace sustainability become a "Saver Soldier" who Tim Sanders describes as understanding: (1) their company business requirements and at the same time serving the world, (2) the interdependence of company owners, other companies, governments and natural environment, (3) the Law of Abundance, thinking in terms of abundance rather than scarcity, (4) the Law of Reciprocity or giving back, (5) the Law of the Long View to make a difference and (6) the Law of the Last Mile, finishing what you start.

Energy and Air Quality Impact in Buildings & Occupants

Buildings use 40% of our energy and emit 39% of our GHG. The world energy consumption is expected to grow 60% in 20 years. The United States Green Building Council (USGBC) developed the Leadership in Energy and Environmental Design (LEED) System to provide guidance and a rating system for Green buildings which efficiently manage our natural resources, use environmentally preferred materials vs. toxic materials, reduce waste, promote a healthy indoor environment, and endorse sustainable development. Property owners and developers see green buildings as demonstrating their commitment to the quality of the building, the experience of people using it, and allows them to be viewed as an environmental steward, a responsible corporate citizen and they have lower operating costs. The EPA states every $1 in energy savings is equivalent to increasing operating margins by $2 to $3. These companies also create a healthier environment that attracts and retains quality employees/tenants (in 2008 CoStar Group reported LEED certified buildings had a 3.8 percent higher occupancy rate than traditional buildings), encourages public trust, lowers their healthcare costs, and builds Brand image.

There are tangible business results from going green beyond the energy & utility cost savings. Charles Lockwood, in the June 2006 issue of *Harvard Business Review* stated" Employers have experienced significant workforce benefits in green buildings, including stronger employee attraction and retention, as well as fewer illnesses and lower absenteeism, which relates to lower health care costs." Similar comments have been echoed by Lacy Muszynski of Building Operating Management in her article "Tenant Satisfaction Guaranteed". She stated "Safeguarding the health of occupants is at the top of facility executives' priority lists. Green design — especially applied to interiors — shares the same tenet. And as the list of research studies and surveys linking occupant health and happiness to productivity grows, more and more companies are taking notice. "A company's business is based on humans," says Jack Davis, program manager with BetterBricks. "Once an organization realizes that green factors track against less employee sick days, that becomes a huge incentive to go green." Mr. Lockwood also reported in the *Harvard Business Review* that green buildings boosted employee productivity nearly 15%.

Gregory Kats, Chair of the Energy and Atmosphere Technical Group for LEED said “A 1 percent increase in productivity – is equal to $600- $700 per employee per year. The relatively large impact of productivity and heath gains reflects the fact that direct and indirect cost of employees is far larger than the cost of construction and energy.” For these reasons and other companies are beginning to understand a healthy employee makes better decisions and employee retention is a profit booster. As Yvon Chouinard, head of Patagonia stated “There is No Business to Be Done on a Dead Planet.”

The Energy Policy Act of 2005 provides tax incentives to encourage more energy-efficient buildings. These tax incentives are linked to improving the energy efficiency of either the entire building or one of it’s 3 sub-systems; lighting, HVAC, or the building envelope. To qualify for the deductions, energy use must be cut compared to the limits specified an ASHRAE 90.1-2001. This incentive tax plus ongoing energy savings are inducements to take action plus energy efficient equipment often has a longer life which will reduce replacement costs and labor costs.

LEED applies to new construction, commercial building renovation, campuses of buildings, existing building operations and maintenance systems, commercial interiors, homes, and schools. The four levels of LEED certification: (1) Certified, (2) Silver, (3) Gold, and (4) Platinum are based on points gained through: (A) Sustainable Sites, (B) Water Efficiency, (C) Energy & Atmosphere , (D) Materials & Resources , (E) Indoor Environmental Quality, and (F) Innovation and Design Process.

Plastics in building construction provide outstanding energy performance, a complete air and moisture barrier, and can improve overall building strength. They are light weight, there is little waste. In 1992 polyurethane foam insulation saved 3.4 trillion BTUs in manufacturing energy as compared to fiberglass insulation. Plastics when they are encased in steel core such as pre-insulated panelized walls and roofs guard against insect infestation, mildew, mold, and will not dry rot. Wall panels made with 20-gauge steel core encapsulated in 6-inch-thick expanded polyurethane insulation provide R-24.8 rating saving energy costs year round. (5)

Completed buildings are commissioned to verify the initial energy model met it’s goals and all operating systems are working as designed. The National Institute of Building Sciences states commissioning a building will mean it will cost 8 to 20 percent less to operate than a non-commissioned building. Older buildings undergo retro-commissioning for the same reason to bring operating systems back to peak efficiency. After constructing a certified building, protect it with “Green” insurance where the insurance company will rebuild it to it’s original specifications and will have it re-commissioned.

Energy Use in America

In 1909, Thomas Edison "I shall make electricity so cheap only the rich people will be able to afford candles." In 2008, unregulated electrical costs went up 40-60%. Energy costs were even more volatile in unregulated areas that charge by the spot price of oil & gas. The United States spends $1.5 to $2.0 trillion every year on energy, and at average productivity levels that are 30% to 40% lower than the EU average and most modern Asian production facilities. Good energy-management programs have at least four dimensions: improved procurement, low-cost/no-cost

efficiency measures, investment-based efficiency measures, and investment in fundamentally new process technology. Enhanced energy productivity is a key competitive differentiator.

We need to make the right energy choices. Mark Z. Jacobson, professor of Engineering at Stanford states ethanol-based biofuels will actually cause more harm to human health, wildlife, water supply and land use than current fossil fuels. The raw energy sources that Jacobson found to be the most promising are, in order, wind, concentrated solar (the use of mirrors to heat a fluid), geothermal, tidal, solar photovoltaics (rooftop solar panels), wave and hydroelectric. He recommends against nuclear, coal with carbon capture and sequestration, corn ethanol and cellulosic ethanol, made of prairie grass. Cellulosic ethanol was worse than corn ethanol because it results in more air pollution, requires more land to produce and causes more damage to wildlife.

The "Electric Power Annual 2007" from the U.S. Energy Information Administration reported for the first time, non-hydroelectric renewable energy, led by wind power, was the leading source of new electric generating capacity in the U. S. The wind power resources in place as of December 31, 2008 supplied an estimated 73 billion kilowatthours (kWh) in 2009, enough to serve the equivalent of close to seven million average U.S. homes. The goal is to have 20% of our electric energy from wind by 2030.

Currently, states, utilities, and other organizations are spending around $2 billion per year on efficiency programs, saving customers nearly $6 billion annually. As an example: Southern California Edison announced in 2008 the completion of the largest solar installation in the state (the first of 150), two square miles of 33,700 thin film solar panels on the roof of the Prologis distribution building in Fontana. This installation will provide 250 million watts of peak capacity—enough power for 1,300 homes. (12)

A lighting audit will allow you to evaluate your energy use and prioritize your future actions. The audit includes: (1) identify all illuminated areas, (2) determine the number of lamps in each area, (3) calculate total fixture watts (multiply the lamps by the wattage), then multiply that number by the hours of daily use to get the total wattage. At the same time optimize your utility bills; create a database by paying electronically, use sub metering to track use and utilize the Energy Star Portfolio Management System to benchmark you current performance.

Energy Solutions

Power Generation, Developers Diversified Realty has formed an income-producing solar energy program in partnership with SunEdison, North America's largest solar energy services provider. The program will enable them to incorporate solar photovoltaic (PV) systems through a multi-phase deployment at the company's shopping centers in the U.S. and Puerto Rico. Developers Diversified and their tenants will be able to purchase power generated by the solar systems at rates less than retail energy rates and Developers Diversified will receive significant rental stream from the program by converting unused rooftop space into a revenue-generating asset. A similar solar example is in San Francisco, where they will have the largest solar photovoltaic system in the state, and the largest municipal system in the country. They will install a 5 MW solar array on the roof over the Sunset Reservoir. Upon completion in 2010 and the city will have a 25-year contract to purchase the power for $1.6 million per year. By contracting the project to Recurrent Energy, they become eligible for tax credits not available to a municipality, and those tax savings

will mean cheaper power for the city. The project will produce approximately 3 percent of the 210 MW SFPUC needs and will cost an estimated 23.5 cents per kilowatt-hour.

Energy Star is a joint program of the Dept. of Energy & EPA. It's portfolio manager provides a benchmarking tool to manage your energy and water consumption within a building and across your portfolio. You can rate and compare your building's performance on a scale of 1-100 relative to similar use buildings nationwide taking into account weather variations, physical, and operating characteristics. Energy Star impact, in a 2 yr. period active Energy Star partners stock outperformed less active and non-partners by over 18%. Energy Star labeled buildings have 44% lower energy use than market average. There are 6200 buildings awarded the Energy Star nationwide and the annual utility savings for those structures is $1.7 billion. Hines Property Management in Houston controls 135 Energy Star buildings, they save $1.37 per square foot or $105 million a year compared to their non-green buildings!

The amount of light required is dependant on the application including safety and security considerations. Lighting energy costs can exceed 20% of your electric bill, a solution lower the lighting, people prefer it, and it reduces the heat build-up & cooling load in your property. Also install occupancy sensor controls that turn lights off in unoccupied areas and replace some electric lighting with daylight through photoelectric dimming. Replace incandescent light bulbs with lamps that use less energy. Compact fluorescent lamps (CFL); use 25% of the energy of incandescent bulbs, save about $30+ in electric costs over the life of the bulb, last almost 10,000 hours longer, and reduces the carbon dioxide emissions. LED lamps use less than 20% of the energy of an incandescent bulb, last 10 years vs. 3 months, are brighter than fluorescents, save resources (manpower & equipment required to change lamps), and provide illumination for: emergency Exit signs, grocery store refrigeration units, and street lighting. Your utility company may provide financial incentives to replace old equipment with new energy-efficient products.

Mechanical Systems, selecting the correct sized equipment will control costs and energy starts. An oversized chiller plant leads to diminished comfort with greater on-off cycles of fan systems (accelerating their aging process and higher energy costs). Operation and maintenance programs on existing systems targeting energy efficiency can save 5%-20% on energy bills with limited capital investment & cost. Tools that help increase efficiency and decrease energy consumption include: perform scheduled maintenance on equipment, regularly clean filters and air-conditioning coils to improve efficiency (you can also save energy and improve air quality by using a high-output ultraviolet-C (UVC) device in the air handling duct after the coils by the condensate pan, the UVC can also possibly earn LEED Credit), and seal the duct work. A success story on a cooling retrofit, the Orlando World Center Marriott had a 23 year old chiller plant that was inefficient, deteriorating and undersized. They implemented a $1.9 million dollar renovation installing new stainless steel cooling towers (increased cooling capacity by 300 nominal tons) with induced draft which reduced the electrical load to the cooling tower fans by 400 hp. Variable speed drives were installed on each of the nine cooling tower fans and the two main 1200 ton chillers. The chiller impellers were upgraded to larger blades. The energy savings in the first quarter 2008, $225,000! (1)

Edible byproducts from food plants are being used as animal feed and for land applications (fertilizer). The water content in these byproducts leads to spoilage and drives up transportation costs. There is a new process of maceration, steam heat, cooking and centrifuge; these byproducts

can be converted to a biodiesel fuel, solids and water. The cost of this process versus traditional rendering is 80% less and produces the new revenue stream. (22)

Water Resources

The green Holy Grail of sustainability includes water. It impacts capitol costs, consumer values, and environmental integrity. Key factors are: 1) availability will change as a result of climate change, 2) industry uses 22% of the earth's available clean water, and 3) scarcity is more widespread as world population & economic development continue to grow. Water prices rose 27% between 2001 and 2006 and are forecasted to continue to increase. Population growth will cause water quality to decline from increases in waste and non-point pollution. (7) Communities have begun reusing their wastewater streams. Due to increasing levels of pharmaceuticals and endocrine distributing compounds, municipalities are being forced to turn to new technologies to manage their water as ozone advanced oxidation technologies and water from desalination.

According to the California Integrated Waste Management Board the average hotel guest uses 218 gallons of water daily. Hotels bring their guests into the conservation process by educating them on their environmental initiatives such as use of waterless toilets in public restrooms and asking for their help, see the Marriott example later in this document. Water leaks can create mold spore exposures and waste water. Leak detection can be approached through Preventative Maintenance that includes visual inspection, and use of imaging of a pipeline borescope.

Water is a local and time-specific issue, and should be treated as such when a company develops a water management plan. Conserving one unit of water in a water-stressed region has a greater value than the same unit of water in a wet region (and usually a greater cost). Water conservation measures should be prioritized at facilities located in water-stressed regions such as the southeast and southwest United States. Good water management plans include: (1) Regular assessment & goal setting, (2) Process & product innovation focused on conservation and (3) Partnerships with state and local governments and utilities. Water has uses beyond personal consumption, corporate services & manufacturing; heating, ventilation and air conditioning units require water as well as fire safety systems.

Boilers and steam generators use large quantities of water (and energy) to make up for amounts lost to leaks and "blow-down". Chemicals used to treat the water also impacts costs. Installing makeup and blow-down meters for cooling tower could amount to significant cost savings. In a cooling tower, water is lost through the evaporative cooling process and makeup water must be added. The makeup meter tracks the amount of water that passes through the meter as it goes to the cooling tower. The blow-down meter tracks the amount of water leaving the cooling tower before it actually enters the city's wastewater system. Businesses save money with these meters paying only for the wastewater that reaches the city system. Some companies capture and reuse the condensate in their cooling systems collecting it at the coils and reuse it as makeup water in the cooling towers saving thousands of gallons a day or week.

Safety Professionals Address Health Concerns and Green Solutions

Employee and community health and safety are key elements in corporate social responsibility. A safety professional plays a pivotal corporate role in supporting corporate social responsibility initiatives beyond safety and health of the employees and community; they will be navigating through a series of complex environmental regulations, assisting in planning for climate change, and planning and responding to the changes brought about as the company becomes a sustainable enterprise. Ultimately, through their actions they will ensure the company is in full compliance with all laws, regulations, and record-keeping requirements for the products they purchase, produce, and dispose of. (31) Environmental regulation compliance (Restriction of Hazardous Substances, Waste Electric and Electronic Equipment, Globally Harmonized System of Classification and Labeling of Chemicals, and REACH Regulations in Europe) focuses on chemicals used, products produced/processed. It includes labeling, storage practices, transportation, handling, emissions, and disposal. These complex regulations and new green solutions require a professional to full compliance with all laws and regulations.

Climate change requires a safety professional to evaluate how their operations can be affected by extreme weather events, rising sea levels (expected to rise 16 inches by 2050 and possibly 55 inches by 2100 per the California State Lands Commission), and for those operating in extreme northern climates, the melting of the “Perma Frost” (stable land masses are now freezing and thawing, causing heaves and cracking foundations). The new emergency response plan must be able to address risk of climate change, unavailability of critical employees, and managing through possible limited access to water and an unreliable energy supply.

Back injuries are the number one reportable employee injury type for employees engaged in floor cleaning, averaging $24,000 per workers’ compensation claim. (27) The solution requires floor-care tools that have cost-saving benefits; reduces employee turnover; improves productivity and employee health. Microfiber products are effective for cleaning with a positive charge that attracts dust and holds it tightly. Microfiber mopping eliminates rinsing and wringing a heavy loop mop. It leaves a light film of water on the floor that dries quickly, resulting in less opportunity for slips and falls on a wet floor. Microfiber mops cost twice as much as loop mops, but the useful life of a microfiber mop is about 10 times as long as a loop mop. Mopping costs are down, and employee morale is improved.

Outbreaks of methicillin-resistant Staphylococcus aureus (MRSA) in schools have ignited a rush for harsh disinfectants products to protect children from this "superbug" infection. Widespread use of harsh disinfectants reduce indoor air quality, burden the immune system, aggravate respiratory problems, such as asthma, and are suspected as a contributor to the development of resistant strains of bacteria similar to the way that overuse of antibiotics led to the development of MRSA. A cleaning protocol that includes basic hygiene and green cleaning will prevent the spread of MRSA, and reduce the environmental impact, as outlined in the Center for Disease Control and Prevention’s guidelines for controlling MRSA in schools.

Toxins such as lead, asbestos, mold, and mercury are in our buildings. Building renovation and weatherproofing for energy efficiency exposes the worker to falls from ladders and scaffolds, electrical hazards, confined spaces, and health exposures to fiberglass, isocyanates, and asbestos.

These hazards need to be evaluated, managed, and remediated to OSHA and EPA standards. Old thermostats, fluorescent lights, and CFLs contain mercury. A recycling plan and an emergency response plan to breakage (as outlined by the EPA) are required to ensure safe handling and disposal methods are practiced.(14) Mercury creates liability exposures when a CFL is used in areas with food products, such as refrigerated coolers, or under commercial cooking vent hoods. When these lamps break, besides the cleanup and disposal issues, there is a potential for contaminated food. Mishandling mercury can be dire; 1/70 of a teaspoon can contaminate a 25-acre lake, and mercury exposure can damage vital organs, including lungs and kidneys.

As companies search for ways to reduce their energy use and cost, new challenges are created. Wind power is safe clean energy, but working over 100' above the ground and having wind turbines that can throw off their blades (some are 80' long) presents new challenges beyond those encountered during turbine construction and commissioning. Working on wind turbines requires a safety and rescue plan that addresses fall protection, working in an exposed environment, hazardous energy, confined space, and self evacuation. The safety plan requires physical fitness, training, and strict adherence to safety rules. Solar power is clean, cost-efficient and environmentally friendly. Operations include employee exposure to ladders, working from heights, lifting, and electrical safety. Solar panels present fire-fighting challenges, such as the concern over power in the cells (an energized DC power in the conduit from the panels to the inverter in the daytime). Therefore, fire fighters must secure all utilities and stay away from the panels and the conduit in the daytime. They also do not want to break a panel with an axe or related forcible entry tools as each solar panel in the string could be carrying the full voltage of that string (120-400 VDC), not just one panel, so they need to vent elsewhere and kill the utilities at the main panel. Now thieves are stealing solar panels off roofs of buildings. Risk management procedures are being employed, such as having identifying bar codes burned into every panel, installing alarms to the panels, using unique bolts and keys securing the panels, padlocking the panels to the roofs, and blocking access to exterior ladders.(26)

Companies are looking to biogas to fuel their boilers. The raw material requirements create storage and transportation issues. A flexethanol plant capable of producing 50 million gallons of fuel grade ethanol yearly requires 1,500 tons of supply-side material daily. The fuel production introduces new safety concerns around plant access, pollution control, fire safety, and distribution. Companies also look to save energy through building insulation specifically with polyurethane, which provides an excellent R value but it is highly flammable. In frame construction, a thermal barrier is required to control fire spread. Two-part polyurethane spray foam contains MDI, which can cause asthma or cancer to the person operating the sprayer. Biodiesel is a recycled alternative fuel product to petroleum-based diesel but not all equipment is compatible with it. There are no easy answers to going green, energy conservation or environmental management. A safety professional's expertise is invaluable because new technologies introduce new hazards.

Waste Management: Cradle to Cradle

Improving our environment requires us to reduce our waste stream, recycle and reuse resources, so they move through a succession of lifecycles. We need to reduce our waste, reuse our resources, and recycle. Universal waste management regulations are designed to simplify the requirements for some wastes generated by commercial, agricultural, and community activities. The program aims to make separation of these materials from municipal wastes easier, promoting

proper treatment and recycling. Universal wastes include batteries, canceled pesticides, equipment that contains mercury, and hazardous waste lamps. The regulations impact waste handlers, transporters, and destination facilities. The individuals handling these wastes are potentially exposed to hazardous materials. Proper waste management requires a safety professional's expertise for training on safe handling/cleanup procedures, personal protective equipment (PPE), containment, recovery, and labeling/tracking.

An example of cradle-to-cradle is command packaging. It created an integrated business model of a closed-loop, zero waste, plastic environmental bag product for retail stores and restaurants. It's recycling center (officially licensed by the California State Department of Conservation as an approved plastic film and bag recycling center and the **first** U.S. manufacturer to receive the Environmentally Preferred Rating (EPR) as an endorsed partner of the U.S. EPA) collects plastic waste from local businesses, diverts the waste away from landfills, and turns it into a sustainable-packaging solution. After reprocessing the collected plastic waste, the recycled plastic is used as the raw material for command packaging's Encore™ environmental carryout bag line, which is made from 100% recycled plastic and can be recycled at their end of life. These recyclables have a low carbon footprint, use less energy, reduced raw material, and transportation costs. It is an economical and sustainable solution for retailers, the environment, customers, employees, and bottom-line profits.

Manufacturers are being held responsible for the safe disposal of their goods at the end of their functional life. New e-waste recycling laws passed in 15 states require electronics manufacturers to pay for the recycling of their products. As an example, it is expected that as much as 12 million pounds of electronics will be recycled in Oregon and about 25 million pounds in Washington in 2010. There is a similar movement in Japan with a financial twist. The city of Odate has begun diverting small electronics from landfills and using the town's mining history to salvage precious metals from the waste. They have gather about 19 tons of e-waste a year. The city has reduced its trash burden and found a source of income from waste. Their results; half a kilogram of tantalum, one kilogram of gold, and 4 kilograms of silver and palladium.

Corporate Solutions

Industry accounts for 33% of the U.S. energy consumption and has a potential for significant energy savings. The easiest way to address energy use is through load shedding, i.e. only run systems when they are needed, and using variable frequency drives, so delivery equals demand need. You can also use a soft start to your motors versus a quick start that requires peak power demand, use motors that are right-sized versus over-sized, and using energy via a common dc bus when at least two variable frequency drives are combined and coordinated (energy produced during deceleration can be reused and recycled back into the line but this application requires engineering and new controls. (20) The sections below provide insights on how companies have embraced corporate social responsibility and developed sustainable business solutions that increase their profitability, reduced their carbon footprint, created a safer workplace, lowered their overall environmental impact, while providing a greener future. As you read these sections, look for safety and risk management opportunities where you can add value.

Coca Cola

Corporate values of Coca Cola on sustainability and social responsibility reflects their commitment and vision for success in the 21st century. Their focus on productivity and efficiency

goals include ways in which they are engaging with stakeholders and communities on issues such as water stewardship; energy and climate protection; sustainable packaging; active, healthy living; workplace rights; and community development. They feel that these efforts are helping them attract and retain the best and brightest people throughout their system that, according to their President and CEO, will make their company and their bottling partners stronger. They are embedding sustainability into their strategic planning process, and sustainability is a key criterion in evaluating business plans and performance. They see accelerating sustainable growth will improve their earnings and competitive position, as well as strengthen their business practices. They are building sustainability into the personal accountability and objectives of their associates and are committed to communicating about their sustainability progress to their external audiences and partners, assessing their progress on meeting existing commitments, creating new shared value for their customers and partners, and engaging others through their leadership team. Their key sustainability initiatives are water stewardship, sustainable packaging, energy management, and climate protection.

Their goal is to safely return to nature and to communities an amount of water equivalent to what they use in all their beverages and production:

(1) *Recycle:* All the water returned to the environment from their manufacturing operations is required to meet applicable laws and regulations with an internal standard that it is capable of supporting aquatic life. Their goal is to have all their facilities aligned with these standards in 2010; and

(2) *Replenish:* They have set a goal to offset the liters of water used in their finished beverages (approximately 122 billion liters in 2007), through locally relevant projects that support communities and nature (currently involved in 120 community water projects in more than 50 countries). They consider water resources when planning new manufacturing sites, deciding on plant closings, making acquisitions or expanding production at existing plants.

Energy Management has been implemented through:

(1) Cold-drink equipment, improving the efficiency of coolers, vending machines, and fountain equipment, and reducing greenhouse gas emissions produced by this equipment;

(2) Facilities and bottling plants, improving energy efficiency, and productivity and reducing manufacturing emissions; and

(3) Increased use of hybrid passenger cars for their sales force and diesel-electric hybrid delivery trucks to bring their products to market.

In 2000, they made a commitment to improve the energy efficiency of their cooling equipment (drink machines) by 40 to 50 percent by 2010, their proprietary energy management system delivers energy savings of up to 35 percent. They have placed 1 million of these units in markets around the world, saving 1.1 billion kilowatt hours per year. In 2006, all new refrigeration equipment has insulation foam free of hydrofluorocarbons, avoiding three-quarters of the direct greenhouse gas emissions from their old equipment. Refrigerant gases are a big challenge as the same HFCs taken out of their insulation foam are the chemical backbone of most of the current generation of cooling equipment and a potent greenhouse gas. Their alternative is carbon dioxide, also a greenhouse gas, but when used in cooling systems, it is 1,300 times less potent than the HFC.

Packaging Initiatives are focused on three goals: (1) reduce, by designing consumer-preferred packages that use the least amount of resources, while maintaining product quality; (2) recover, by building packaging management systems to collect post-consumer packaging; and (3) reuse, by using post-consumer packaging materials again to deliver sustainable value. They have reduced the weight of their eight-ounce glass bottle by more than 50 percent, the 12-ounce aluminum can by more than 30 percent, and the 20-ounce PET bottle by 25 percent. They do not reduce a primary package so much that it requires additional secondary or transport packaging to avoid breakage. In recovery, they work in partnership with local communities to help develop economically and environmentally effective solutions tailored to meet their specific needs. For reuse, in 2007, they invested $40 million to build the world's largest plastic bottle-to-bottle recycling plant, a 30-acre facility located in Spartanburg, S. C. It can produce approximately 100 million pounds (the equivalent of 2 billion 20-ounce PET bottles) of PET plastic for reuse annually. (11)

Duke Energy Corporation

Duke Energy helped a beer distributor in N.C. deal with the requirement to keep the beer cold, and reduce their need for emergency power. The solution includes efficiency lighting that only operates only when workers are in that area, and they use the chilled beer as a thermal mass, which eliminates the need to run the chiller around the clock. Chillers in the winter are shut down from 6 AM to 1PM and, in the summer, the chillers are off from 1 PM to 9 PM, allowing the beer to warm slowly but still maintaining an acceptable temperature. If the cartons get below 60°F in the summer, excess condensation on the trucks weakens the cartons, so a somewhat higher temperature is desirable. Now there is no need for emergency generators and they were able to cut their energy bill.(8)

Hacros Chenicals

Harcros Chemicals' batch plant in Kansas City was faced with a set of environmental and safety challenges around valve opening and closing procedures when their reactors require washouts. There are a large number of valves in a plant, and their access is often located behind piping systems, making them hard to see and reach. A valve left open after a washout creates an exposure to toxic emissions and employee exposure to chemicals when they try to close the open valve. Their team developed a solution by using positive-close, spring-loaded valves that operate off a wireless position monitors that provide minute-by-minute, updated information on valve positions. They use redundancy to insure accuracy and allow them to respond before things get out of hand. This reduces the likelihood of an environmental impact, improves employee safety, improves production schedules, and lowers costs. (28)

Anheuser Busch Inc.

Anheuser Busch defines its commitment to corporate social responsibility by:

1. *Responsibility:* A decades-long commitment to preventing alcohol abuse, including drunk driving and underage drinking;
2. *Environment:* Newly implemented projects designed to harness renewable energy, technological advances employed to supplement the company's already-successful water conservation and greenhouse-gas reduction efforts, and initiatives through which the company is working with its partners to improve efficiencies and reduce waste throughout the value chain;
3. *People:* Information on employee health and safety, development, and diversity, including special recognitions;

4. *Community:* Philanthropic contributions the company and its employees make to improve the communities in which they live and work; and
5. *Accountability*: Their commitment to ethical business practices.

As an example, the water use ratio has declined more than 7 percent in 5 years, saving of 4.3 billion liters of water. The breweries use a large volume of water to meet high quality standards; they treat and return large volumes to the local watersheds; in 2007, they returned on average more than 70 percent of the total water used at their facilities back to the local watershed. In 2007, due to a drought threat in the Atlanta area, the plant reduced water use to 4.3 hectoliters per hectoliter of packaged beer, a 12 percent reduction over 2006 results. The recycling corporation recycles the equivalent of five aluminum cans for every four they package. The company also made two packaging changes that reduced material requirements. They reduced their 15-pack/24-ounce can tray and saved 2.3 million pounds of cardboard; they also changed the carton liner for the 24-pack/12 ounce package and saved another 2 million pounds of liner material. (10) The company has also undertaken projects to reduce energy use such as more than 6 acres of ground-mounted photovoltaic solar arrays are now up and running at the Anheuser-Busch brewery in Fairfield, California (an arrangement made between them and SunEdison, who financed, installed, and operates the solar power system, which has a capacity of almost 1.2 MW, generating the equivalent about three percent of the brewery's electricity needs). The company is considering expanding the solar installation and diversifying the on-site generation of renewable energy by putting in a wind turbine.

The facility also installed a *bio-energy recovery system* to generate more than 15 percent of the brewery's fuel needs by capturing the nutrients in brewing wastewater for conversion into biogas. Use of the renewable fuel enables the brewery to decrease its use of natural gas. Other recent eco-friendly changes in operations at the Fairfield facility include a steam recovery project to heat water in the brewhouse; installing more efficient boiler burners and air compressors; and a lighting upgrade that included replacing fixtures with energy efficient gear and timers.

<u>Procter & Gamble (P&G)</u>

Proctor and Gamble (P&G) defines their commitment to sustainable development as "ensuring a better quality of life for everyone, now and for generations to come." They have a long heritage as a sustainability leader and remain committed to improving consumers' lives through P&G brands and by contributing to the sustainability of our planet and the communities in which we all live and work. They set a *goal* to deliver a 40% reduction (per-unit production) in CO_2 emissions, energy consumption, water consumption, and disposed waste from P&G plants.

Progress that has been made includes:

I. Energy Usage: 6% -46%,
II. CO_2 emissions: 8% -52%,
III. Waste disposal: 21% -50%, and
IV. Water usage: 7% -51%.
V. Their methodology is based on:
    a. Products from waste,
    b. Product sizing,
    c. Energy conservation, and
    d. Transportation.

Examples of products from waste include:

(1) *Perfume re-use at their manufacturing site in Avenel, N.J.:* They developed a new process for blending scrap material for reprocessing as an ingredient for potpourri; the annual generation of scrap waste at the site has dropped from 50,000 kg to zero.

(2) *Paper:* Some P&G tissue and towel plants, the paper "fines," which are a wet by-product of the paper making process, are reclaimed for energy to run the plant. The fines are also used to manufacture housing and roofing tiles.

(3) *Soap:* Wastewater from shampoo and liquid soap plants has a new life; the mixture is sold and repackaged for use in automatic car washes.

Product resizing initiatives include:

(1) *Charmin:* MegaRoll was created, with four times as many sheets per roll than a regular roll, which meets consumer needs, and requires the use and disposal of fewer cardboard cores. In addition, the product allows more tissue to fit on a truck, saving on fuel consumption and CO_2 emissions associated with transportation. One million consumers, switching from a regular roll to Charmin MegaRoll, save: 321,000 liters of fuel per year, 140 million cores per year, and 226,000 Kg of plastic per year.

(2) In 2007, they converted their North American liquid laundry detergent portfolio to a "2X" concentrated formulation, allowing consumers to use less. Product concentration also reduced CO_2 emissions by more than 100,000 metric tons a year, saving more than 500 million liters of water a year, requiring 15,000 metric tons a year less in packaging materials. This new size required 40,000 fewer truck loads a year.

Energy Conservation has been accomplished through:

(1) *Heat Recovery:* Much of the heat energy is in the form of steam and combustion gases used in drying paper lost. At their Mehoopany, Pennsylvania, facility, a proprietary process was developed that enables the plant to recover this heat, saving 422,000 GJ of energy and 13,600 metric tons of CO_2 emissions per year. Examples of low-cost improvements that have reduced 6 to10 percent of site energy use include: use of water spray instead of electric power to cool water; recover waste heat from washout and sanitization water; and use high-efficiency, long-life lighting. Transportation savings have been realized through the SmartWay Transport Partnership (collaboration with leading organizations and the EPA) by: efficient designs of distribution centers; increased the use of inter-modal and railroad transport; reduced inter-plant truck shipments; encouragement of all existing carriers to join the SmartWay initiative; development and implementation of a sourcing strategy that included efficient and environmentally friendly transportation. By 2012, the SmartWay Transport Partnership expects to eliminate 33 to 66 million metric tons of CO_2 emissions, along with up to 200,000 tons of NOx emissions. This represents savings of as much as 150

million barrels of fuel per year, the equivalent to taking about 12 million cars off the road. (9)

Dell

In the next 4 years, Dell plans to eliminate 20 million pounds of packaging for its desktop and laptop computers, saving $8.1 million. The company will make the remaining packaging greener; 75 percent will be curbside recyclable by 2012. Dell will utilize air-filled cushion technology, molded pulp cushions, and recycled high-density polyethylene (containing 100% recycled content equivalent to 33 million milk jugs), and thermal-formed cushions to replace current foam cushioning.(6)

Department of Energy (DOE)

To meet the energy and environmental goals outlined in Executive Order 13423, the Energy Policy Act of 2005, and the Energy Independence and Security Act of 2007, the DOE awarded a contract to Honeywell to implement up to $5 billion of energy-efficiency, renewable-energy and water-conservation projects at federally owned buildings and facilities, nationally and internationally, over the next 10 years. Project examples include: replacing a 1950s vintage coal-powered steam plant at Savannah River Site, South Carolina, with a clean, renewable plant powered by waste-wood biomass (expected to save about $1.5 million per year); and installing a 375- kilowatt solar installation Luke Air Force Base, Glendale, AZ (producing energy to power a 100 homes saving an estimated $21.8 million in energy & operational costs). (19)

Hewlett Packard (HP)

HP released the industry's first line of business PCs that meet the Energy Star 4.0 hardware requirements, reducing power use as much as 52%. HP was also the first company to enable all business PCs with S3 power management to automatically switch machines to standby during times of inactivity. HP has recycled one billion pounds of electronics and HP print cartridges. HP is internally applying a global duplex (two-sided printing) standard to all their locations and expects to save 800 tons of paper annually. HP-managed print services at 3M cut their costs in the U.S. by $3 million in two years (including printer devices reduced by 47%, duplex printing, per-page costs were reduced 90%, use of standardized energy efficient high-speed equipment, centralized control on printing and consistent recycling to return goods to a supplier or reclaim product or components at the end of their useful life). (16)

St. Olaf College

St. Olaf created a green chemistry initiative, a first of its kind, that uses water- based reactions to decrease lab waste and the need for conditioned air.

NetApp

Net App received a $1.4 million rebate from Pacific Gas and Electric Company for energy-efficient building design on its new Sunnyvale engineering data center with power efficiency and reduced cooling needs with a variable primary chiller plant, flywheel, uninterruptible power supply (UPS) systems, energy-efficient transformers, and outside air economizers. (15)

Marriott Corporation

Marriott's green initiative, ECHO, provides guidance to their properties in five key areas:

(1) *Water and energy conservation* (ENERGY STAR Partner of the Year (2005-2007): Guests are encouraged to re-use bath towels and linens, bathrooms have low flow shower heads, faucets and toilets).
(2) *Clean air initiatives*: Marriott is targeting to reduce its greenhouse gas emissions by one fifth by 2010, approaching 1 million tons of climate warming gases, all hotels in U.S. and Canada are 100% smoke free, paints and stains water based.
(3) *Waste management*: Recycled materials are used in construction and energy recovery units were installed.
(4) *Wildlife preservation*: Environmentally-friendly building materials will be used and wood is certified as coming from renewable sources.
(5) *Clean-up campaigns*: With Energy Star laundry, the washer uses half the water of a standard machine , and rinses with repeated high-pressure spraying instead of soaking them in a full tub of water, which spins faster, extracting more water and reducing drying time, saving energy and wear and tear on linens. They also use front-loading models with a horizontal or tumble-axis basket to lift and drop clothing into the water, instead of rubbing clothes around a central agitator.

Burt's Bees
This company is turning garbage into gold; in 2007, they set a goal of zero waste to landfills by 2020. The company quickly went from producing 40 tons of waste per month down to an impressive 10 tons per month by aggressively recycling and introducing composting at its Durham, N.C., corporate office and manufacturing plant. To emphasize recycling, the company piled two weeks' worth of garbage in their parking lot, then asked their employees to wade through it, looking for recycling opportunities. They cut the company's waste in half while generating $25,000 in estimated annual savings, turning their waste stream from a cost center into a profit center. The company quickly jumped from 80 percent compliance in recycling to 98 percent. (2)

Maker's Mark
Maker's Mark is fueling their operations with bourbon waste. They have a new treatment system at its distillery, turning waste into energy. An anaerobic digestion facility was installed by waste management provider Ecovation. It will process stillage, the water, grain and yeast waste left over from making bourbon, and produce a methane and carbon dioxide biogas for use in the distillery's boilers. The stillage treatment, which was incorporated into the facility's existing wastewater treatment system, is expected to offset 15-30% of the distillery's natural gas use. The $8 million system is estimated to produce 85 million BTUs a day, and will eventually produce up to 165 million BTUs a day as the distillery increases its production of bourbon from 840,000 cases to 2.2 million cases a year over the next 10 years. Anaerobic digestion is a process in which organic materials are broken down by microorganisms. Previous to using the system, Maker's Mark would dry and ship its stillage to farmers for use as cattle feed. (4)

Conclusion

The solutions presented here and those you develop present new safety challenges; biogases, heat recovery and transfer, water treatment, hybrid vehicles, changes in manufacturing/ packaging/ material handling systems, modifying logistics, and product reuse and recycling. Going green requires a cultural shift involving staff, vendors, suppliers, customers; it's everyone's job. (17)

Businesses don't cut power consumption or recycle; people do. Be a leader in the responsibility revolution; if not you, who?

Start small: Focus on the actions that create ROI. Assess your building(s): Start with the oldest one first, evaluate its operating systems (HVAC- filters/coils/thermostats), lights, water, mechanical, building envelope, and the presence of toxins. Is all maintenance up to date, and are systems operating within designed specifications? Ask your HVAC service company for assistance. Engage your employees and/or tenants about how they feel about issues such as: indoor air quality, personal comfort, and lighting. This provides *you* with information and *generates* ideas *and* ownership from these stakeholders. Look at your energy, water, and waste removal costs for the last two years. Talk to your local utility company about available incentives and rebates. Look at your OSHA logs, EPA reports, employee turnover numbers, and costs of waste removal as benchmarks and opportunities to be sustainable. Communicate your strategy, implement change, and document your successes

As a SH&E professional, you will need to ramp up your technical expertise quickly and collaborate with other professionals across multiple disciplines (e.g., the NIOSH Prevention through Design initiative for safety in green jobs and sustainability) to stay on top of these fast-paced changes. You will be required to apply risk management principles to your decisions. Green solutions require the ability to address safety, health and environmental needs today and into the future by selecting solutions that are safe to execute and good for the environment through product lifecycle, including reuse opportunities at the end of its original lifecycle.

It's not easy "being green," lamented Kermit the Frog. In fact, it is a big leap from that quiet lily pad to the more complicated world of energy efficiency and the systems that support it.

Footnotes

(1) Building Operation Management, December 2008, pg 10.
(2) GreenBiz.com, "Dumpster Diving : "From Garbage to Gold," January 2009.
(3) GreenerDesign.com, "Mattel will Pay $12 Million to settle Toxic Toys Lawsuit," December 2008.
(4) GreenBiz.com, "Maker's Mark fuels operation with Bourbon waste," December 2008.
(5) "Green Building Insulation," Honeywell White Paper, December 2008,
(6) GreenerDesign.com, "Dell's Packaging Plan: Cut 20 Million Pounds, Save $8 Million," December 2008.
(7) GreenBiz.com, "You can't go Green without adding a little Blue," December 2008.
(8) Wall Street Journal, "Cold Power," November 17, 2008.
(9) Proctor and Gamble Corporate Sustainability Report 2008.
(10) Anheuser- Busch Corporate Social Responsibility Report 2007.
(11) The Coca Cola Company, Sustainability Review 2007/2008.
(12) Earth2tech.com, California's Largest Solar Roof to Power Up.
(13) GreenerDesign.com, "Toxins Present in one third of Toys," December 2008.
(14) Energystar.com, "Break a Bulb? EPA Safety Tips Can Keep You and Your Workplace Safe."
(15) Businesswire.com, "NetApp Receives $1.4 Million Rebate From PG&E for Data Center Energy Efficiency," December 2008.
(16) HP Eco Solutions program, 2008.

(17) Hotel Business, March 2009, “Lodging Sustainability is much more than being green,” pg. 6.
(18) Modern Materials Handling, January 19, 2009, “Patagonia takes LEED in Sustainability.”
(19) Control Engineering, January 2009, “Energy Management, First Steps Toward Greater Efficiency”, pp 32-35.
(20) Control Engineering, January 2009, “Honeywell receives a Department of Energy contract to reduce energy consumption.”
(21) Environmental Protection, February 2009, “Renewable Energy Accounts for Capacity Increase.”
(22) Food Manufacturing, “From Waste Stream to Energy Stream,” January 2009, pp 14-15.
(23) Wall Street Journal, Networking for Social Responsibility,” November 19, 2009, pg. B8.
(24) “Saving the World at Work,” by Tim Sanders, Doubleday 2008.
(25) “Universal Waste Management,” Environmental Resource Center 2007.
(26) Wall Street Journal, “Stop That (Solar) Thief,” October 19, 2009.
(27) Building Services Management, October 2009, “Proven Product Performance,” pp 40-42.
(28) Industrial Networking, Q4 2009, “Wireless Washouts Make Plant Safer,” pp 18-20.
(29) Converting Magazine, November 2009, “Community Service: Associated Labels”, pp 26-27
(30) Converting Magazine, November 2009, “Sustainability: Next Generation Films,” pp 22-24.
(31) Plant Services, November 2009, “Climate Risk Management,” pp 46.
(32) Food Processing, November 2009, “Ecological Food Manufacturers Assn. Is Formed,” pp 12.
(33) Mid-Course Correction, Chelsea Green Publishing 1998.
(34) Many Shades of Green, Next 10 Corporation, December 2009.