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@ Your Service: Greening Your Company & Creating an Environmentally Sustainable Culture

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Introduction

Much has been written about the benefits of "Greening" (environmental improvements). Many businesses see greening as an opportunity to maximize ROI and increase brand equity. Some of the benefits of greening include reducing the need for Personal Protective Equipment (PPE), improved air quality and enhancing personal comfort between the work or customer environments. Additional benefits will accrue as a company meets or exceeds regulatory requirements and initiates greening programs that will distinguish them from their competition.

Greening can be represented the term is **Sustainability** which 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.

Greening means; (1) reduce the use of hazardous products and materials in housekeeping or 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 construction materials, (3) recycle electronic goods, building materials from renovation projects (example rubble for future projects or unpainted wood turned into mulch) and share usable windows & plumbing supplies with the needy (30), (4) use reusable products, (5) use energy efficient or alternative fuel vehicles, (6) practice energy and environmental conservation (ride share programs & "work at home" programs to minimize travel/traffic), (7) water conservation, and (8) participate in community environmental initiatives.

Historical Prospective of Greening

Greening began in the in the early 1970's as energy management to address the escalating cost of energy and the 1973-1974 Oil Embargo by the Middle East. Aspects of **greening** were reflected

in water conservation, recycling, more efficient equipment, involvement of staff in reducing use of electrical power and architectural considerations; to name but a few. At that time, the lodging industry became the most knowledgeable industry as to actual energy use.

By the early 80's, hotel properties would focus on techniques to control energy use, implement water conservation and re-use programs, recycling initiatives and activities that helped with wildlife and wetland preservation, especially in resort locations.

Beginning in the 90's, a close working relationship was developed with the Environmental Protection Agency (EPA) and the American Hotel & Lodging Association. During recent years, the lodging industry has actively participated in and supported the EPA's **Energy Star program.**

2008 Perspective on Going Green

The long-term success of your business is defined by profitability, quality of your goods/ services, and the value of your brand. Today, there is a heightened awareness of our fragile environment; it is a topic of debate for the upcoming presidential election. We are seeing dramatic climatic changes, limitations on our natural resources and the negative impact businesses can have on our environment. Many scientists feel that the burning of carbon based fuels to produce energy contributes heavily to increase of carbon dioxide and greenhouse gases in the atmosphere; this is responsible for the changes in our weather patterns, global warming, and a deterioration of our health. A company's "Brand Value" can be affected by society's perception of their stewardship for our natural resources. In 2008 we are still looking at energy and water use and financial costs, but society is now looking at this as a "**value of life"** issue. People are concerned about their personal health, they want to work in and visit an environment that is safe and healthy. Marriott International reports 40% of its corporate clients ask about environmental issues in their requests for corporate rates.(15) The Travel Industry Association of America reports 43 million travelers say they prefer to do business with companies that share their concern about the environment. Now is the time to take action to conserve our resources and provide a safe and healthy environment today and for future generations. Generation X and Y customers and investors are creating a preference for Green in the selection of hotels and restaurants. Associations such as the Green Hotel Association are committed to supporting, encouraging, and promoting ecological consciousness in the hospitality industry.

Property owners and developers look at developing a green building as exhibiting their commitment not only to the quality of the building itself and the experience of people using the building, it also allows them to be viewed as a good environmental steward and a good corporate citizen in the community (10). This commitment to "Go Green" and create a sustainable building has potential financial gains from reduced construction and building operating costs. The financial benefits on a multi-location operation can save millions of dollars which also appeals to their stock holders and investors, according to the EPA 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, encourages public trust, and lowers their healthcare costs. Some companies of LEED certified buildings proudly display their green building features as signage in their building to attract tenants and customers. (10)

The United States Green Building Council (USGBC) has developed the Leadership in Energy and Environmental Design (LEED) System to provide guidance and a rating system for Green buildings. This is a voluntary standard that covers; (1) new construction & major renovations, (2) existing building operations, (3) commercial interiors projects, and (4) core and shell projects. In Japan the certification process is called CASBEE and in Europe it is called "energy passport". (11)

Government Initiatives

Government initiatives are taking place on a global and on local levels. In the November 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. This registry will be a standard repository for companies and organizations to file and update their greenhouse gas emissions. The states will rely on this information for their voluntary, regulatory or market based programs. The greenhouse gas emissions will most likely be tracked by fueled burned.

States such as California are looking at legislation that will extend the responsibility of the manufacturer of a product to the product's life cycle including takeback, recovery, and final disposal of the product. (26)

Advantages of Going Green

Green buildings efficiently manage our natural resources such as energy and water. They use environmentally preferred materials, reduce waste, use less toxic materials, promote a healthy indoor environment, and endorse sustainable development. Ultimately these buildings are differentiated by LEED certification and lower operating costs which allow them to build the Brand image and target their marketing efforts to companies and individuals that look at environmental responsibility as a "**value of life"** issue. Being a personal value, people will make their future decisions that are consistent with that value.

Many experts talk about the tangible business results from going green beyond the obvious 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, now 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."

The Energy Policy Act of 2005 provides tax incentives to encourage more energy-efficient buildings. The new 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, they must cut energy use compared to the limits specified an ASHRAE 90.1-2001. This incentive tax plus ongoing energy savings is an inducement to take action. New energy efficient equipment often has a longer life which will reduce replacement costs and labor costs.

Hotels, Food Service & Insurance Industry Trends

Many corporations and associations are conscious of their image and the perceptions of others. They are making their hotel and convention selections based on the property's "Green Initiatives". In a response to corporate, public and environmental concerns many hoteliers have taken positive steps to energy management and environmental stewardship such as Fairmont Hotels green program in 1990. In 2000, Accor North America joined ENERGY STAR; they can benchmark their entire portfolio of hotels to track energy performance. Marriott has a green initiative known as Environmentally Conscious Hotel Operations, ECHO.

Current hospitality projects and initiatives: Starwood Capital Group has created "1 Hotels & Residences" using environmentally sustainable architecture. Each property will be LEED certified. A few Starwood properties are experimenting with 250kW and 500kW fuel cell energy systems to supply 25% of the hotel's energy needs. (15) Fairmont Hotels has a proactive approach to sustainability and the environment (for over 15 years they have focused on waste management, energy and water use); they are developing their first green hotel. The MGM Mirage has a green hotel project, City Center, in Las Vegas. Marriott's green initiative, ECHO encourages all hotels to promote and participate with. The program provides guidance to our properties in five key areas: (1) water and energy conservation (Marriott was named an ENERGY STAR Partner of the Year by the US Environmental Protection Agency in 2005-2006 plus guests encouraged to re-use bath towels and linens versus receiving new every day); (2) clean air initiatives (Marriott is targeting to reduce it's greenhouse gas emissions by one fifth by 2010, approaching 1 million tons of climate warming gases, also all hotels in U.S. & Canada are 100% smoke free, paints and stains water based no hazardous vapors); (3) waste management (recycle materials are used in construction and energy recovery units installed); (4) wildlife preservation (use of environmentally friendly building materials (wood is certified as coming from a renewable source); and (5) clean-up campaigns. Marriott's web page that outlines their green initiatives at http://www.marriott.com/marriott.mi?page=environmentalInitiatives.

The Alliance to Save Energy helps hotels and resorts in several countries improve their energy management and efficiency. The Alliance's "Energy Efficiency Industry Partnership Program" works with energy efficiency technology and services in developing countries. (8)

Industry is challenged when it is asked to select the best “green” products for use. They want to select products that are energy efficient, safe to dispose of, cost effective, and allow them to maintain their service standards. An article in the 09-11-07 edition of the Wall Street Journal addresses this topic. There are many products that claim to be green, based on their low carbon foot print, use of recycled materials, energy efficiency, etc. Only the Environmental Protection Agency’s Energy Star program has public recognition for listing energy efficient devices. As industry struggles to identify and quantify it’s green product selection and it is important for everyone to keep current on Green information and challenge suppliers to prove their product’s claim of their being “green” and effective for it’s intended use. Industry’s challenges go beyond product selection to selecting an agency to certify the facility as “green”. Later in this paper the Leadership in Energy and Environmental Design (LEED) Rating System administered by the U.S. Green Building Council will be discussed. There are other agencies that are certifying hotels as green such as the Green Seal in Washington DC.

Continental Airline’s company owned food service kitchens recycle plastics, plastic wrap, cardboard, and aluminum. The obvious benefits are reducing pollution to our environment and resource management. But their key secondary benefit is the recycling proceeds go into a fund they call “We Care”. The fund assists co-worker’s who are going through a period of hardship. Their food service operation in Houston alone will raise over $100,000 this year allowing them to retain staff that need support. (6)

Fireman's Fund Insurance Company became the first insurance company to offer specialized coverage to owners of commercial buildings who have green-certified property, are in the process of making green improvements, or wish to upgrade to green in the event of a loss. They will provide insurance for; (1) owners of buildings that are not certified, and may or may not include green features, who will be covered for the cost to make defined upgraded repairs. In case of a total loss to a green building, they will pay the cost to rebuild, top to bottom, as a green-certified structure, (2) for owners of Leadership in Energy and Environmental Design (LEED) or Green Globes-certified buildings to make repairs that meet green qualifications, and (3) they will pay for the cost to hire a commissioning engineer to oversee repairs to ensure that all of the building's systems are operating at peak performance and are in agreement with one another. They also provide a customer website known as *i*Customer with an online collection of articles, tools, and links to help them understand the Green building movement and its many benefits.

An insurance company data center in Florida studied the affects of temperature on worker efficiency. They raised the temperature from 68°F to 77°F; key output was raised 150%, errors were reduced by 44%, and energy costs were reduced by $2 per hour per employee!

Opportunity for the Safety Professional in Going Green

Safety professionals have the expertise needed to lead or play a significant role in company’s “Go Green” effort as a technical resource to the facilities and management teams. “Go Green” uses the safety professional’s expertise in employee safety, Industrial Hygiene including Indoor Air Quality, Ergonomics – quality of lighting for improved productivity and well- being, Environmental Sciences, food safety, etc.

Lighting is an area of significant concern because of it's impact on productivity, vision, and safety. Proper lighting reduces fatigue, improves accuracy, supports high levels of productivity, improves morale, and allows for a cleaner facility with improved visibility. Older people may have impaired vision and they adjust slowly to poor lighting conditions which affects their safety, comfort and effectiveness. Proper lighting improves safety, people can better identify a hazard and changes conditions and adjust to them. A safety professional knows how to evaluate lighting levels and can assist management in maintaining optimum light levels as they change lighting systems to control their energy use. The change in lighting systems may include relamping and the installation of new equipment both of which can present safety challenges where a safety professional can provide assistance.

Indoor Air Quality is an issue that affects everyone who works or visits an inside of a building, according to Pure Solutions, a Buffalo, NY firm 70 million Americans suffer from allergies, 12 million from asthma, and 10 million from environment-related illness or chemical sensitivity. A separate study by the Research Institute, Cornell University found 58% of travelers would be willing to pay slightly more for allergy-free rooms. The same study reported that 90 percent of business travelers and 82% of pleasure travelers expressed an interest in allergy-free rooms.(15) A recent Cleaning & Maintenance Management Poll ranked above-the-floor dusting as the number one complaint in office environments. (2) Dust includes fungal spores, mites, chemical pollutants and it is a trigger of asthma, allergy attacks, headaches, and respiratory illnesses, it is a health hazard. Companies are searching out environmental solutions that will include introducing new equipment and chemicals into the workplace to meet this concern. The challenge will be to improve employee and occupant health and safety with these changes. At the same time, the U.S. Department of Labor's Occupational Safety & Health Administration (OSHA) lists custodial operations as fourth among all industries in the number of worker injuries and in costs associated with those injuries. Selecting cleaning chemicals and equipment such as new vacuums and extractors will require a safety professional's evaluation of ergonomic and chemical impact to the custodian and they will measure the analytical effectiveness of the equipment to remove the toxins.

As we implement new methods to improve indoor air quality and lighting we are changing thermostats and fluorescent lights both of which contain mercury. They are classified as "Universal Wastes" by the Environmental Protection Agency. The safety professional can ensure safe handling and disposal methods for these waste materials. The disposal controls can include the use of a device that crushes the tubes to a 100% recyclable materials and still capturing 99.9 percent of the vapors released (creates less waste, lower costs and operator safety. (27) If the fluorescent tube breaks the safety professional will know how to safely handle this issue. They will not use a standard vacuum which will spread mercury containing dust throughout the area as well as potentially contaminating the vacuum. What they will do is:

- Keep people and pets away from the breakage area so that the mercury in the powder inside the bulb is not accidentally tracked into other areas.
- Ventilate the area by opening windows.
- Wear appropriate personal protective equipment, such as rubber gloves, safety glasses, old clothing or coveralls, and a dust mask (if you have one) to keep bulb dust and glass from being inhaled.
- Carefully remove the larger pieces and place them in a secure closed container, preferably a glass container with a metal screw top and gasket seal like a canning jar.

- Next, begin collecting the smaller pieces and dust. You can use a disposable broom and dustpan or two stiff pieces of paper to scoop up pieces.
- Put all material into the glass container. Pat the area with the sticky side of duct, packing or masking tape. Wipe the area with a damp cloth or paper towels to pick up fine particles.
- Put all waste and materials used to clean up the bulb in the glass container and label it "Universal Waste - broken lamp".
- Take the container for recycling as universal waste.

"Going Green" requires knowledge of hazards and controls.

LEED™ Green Building Rating System and Safety

"The average commercial structure will cost 10 times as much to operate over its typical 100-year life span as it cost to build," said architect Phillip Bernstein in "Going Green," a Forbes magazine article published in August. Green buildings cost less to operate. Buildings can be certified as "Green" by the Leadership in Energy and Environmental Design (LEED) Rating System created and administered by the U.S. Green Building Council (www.usgbc.org). The USGBC was founded in 1993 and launched LEED in 1998. Initially LEED was created for new construction of commercial buildings.

LEED is now being applied to other issues such as commercial renovation, campuses of buildings, existing building operations and maintenance, homes, and schools. LEED applies to the following areas in the hospitality industry; new construction, major renovations, existing building operation, and maintenance systems.

There are four levels of LEED certification a building can obtain:

- LEED Certified
- LEED Silver
- LEED Gold
- LEED Platinum.

To achieve certification you need to include items in the project manual that meet LEED credits such as low/no VOC paints, and use of materials with recycled content. Once the building is completed it s important to have the building commissioned to verify the initial energy model met it's goals after construction. The commissioning agent will also verify that building systems failures are detected and control measures are implemented such as a generator coming on line after the electrical system goes down. Often the system failures are due to complex systems with multiple components that provided by several contractors operating independently. 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. The value of commissioning a building goes beyond energy savings. The property owner receives a functional test of all their equipment and a complete review of operations which includes maintenance manual review, verification of warrantees, and their staff are trained in maintenance & operational procedures. Some companies

tag their equipment upon completing successful testing with preventative maintenance information, maintenance schedules and warrantees.

These levels achieved are based on points gained through:

- Sustainable Sites
- Water Efficiency
- Energy & Atmosphere
- Materials & Resources
- Indoor Environmental Quality
- Innovation and Design Process

In 2007 there are currently at least three major resort/casino projects being built on the Las Vegas strip seeking LEED Silver certification.

Examples of LEED initiatives and potential safety professional influence are as follows:

Sustainable Sites
Many locations have acres of landscaping that need to be managed, often with the use of utility vehicles including all terrain vehicles. These sites and others may have vehicles that are needed to transport employees and/or customers. In the search for sustainability companies are looking at propane vehicles, electric, and bio-diesel. A safety professional can advise management on the safety concerns around occupant safety, vehicle fueling and maintenance. Buildings heights can be designed to 4 stories or less to encourage use of stairs instead of energy consuming elevators. Carpet cleaning needs can be determined by the use of a colorimeter which determines analytically when cleaning is required, use then of green chemicals that also require less water and have a shorter dry time. (27)

Water Efficiency
Landscaping can involve the use of hazardous chemicals and machinery, designing it in a way that will minimize both issues could help prevent worker injuries and illnesses in the future. Rain water can be directed from roofs and pavement to native landscaping which is selected based on it's drought tolerance. Rain water can also be retained with a bio-retention system. Air conditioning condensate can be collected in a cistern and used for a irrigation.

Energy and Atmosphere
Improperly designed and difficult to reach mechanical equipment often leads to difficult and time consuming maintenance. Because of this, proper maintenance may not occur, which can lead to malfunctioning ventilation equipment and other mechanical systems and consequently poor air quality. The safety professional can assist in the design phase to limit these issues by providing input in safe access to all key equipment including refrigerant management.

Materials and Resources
When existing building materials are to be reused in an effort to conserve resources the safety professional can lend their knowledge to evaluate the exposure to hazardous materials such as lead based paint, asbestos, mercury switches, PCBs, etc. They can also provide guidance to select less least toxic materials for cleaning & paints.

Indoor Environmental Quality
Indoor environmental quality (IEQ) is a key concern. The EPA estimates that tens of billions of dollars are lost each year by American businesses in reduced productivity and medical costs due to poor IEQ. Selecting low emitting furnishings and carpeting could save significant dollars in the future operation of the building and business. LEED will allow the use of windows that can open. As the building owner you need to weigh the potential advantage of fresh air against noise pollution and air contaminants both of which are present in an inner city.

Systems
This is an area that the safety professional could assist in design issues which are less expensive to implement at the beginning of the project instead of retrofitting them latter. These may include window washer anchor points, insure access to fire and smoke dampers, fixed ladder design and installation, etc. It is important to consider how to maximize the efficiency of systems so overall construction and operating costs are minimized.

Commissioning a building is a great first step. Over time the building will continue to operate while it's operating systems, HVAC equipment, mechanical controls, and energy management systems go out of alignment. Energy costs will go up, the building population will dissatisfied with temperature controls & air quality and there will be equipment reliability issues. The solution is to have the building re-commissioned and bring all operating systems back to original design specifications. An example of this process is at Texas A&M University where over 3.5 years they re-commissioned 34 buildings, the savings in chilled water, hot water, and electricity was over $10,000,000. An older building that was never commissioned can have still the process done at any time; this process is called retro-commissioning.

LEED Web Resources
- www.greenhotels.com
- www.environmentallyfriendly**hotels**.com
- www.globalstewards.org/hotel.htm
- www.ceres.org/industryprograms/ghi.php
- www.greentravelmarket.info
- www.iisd.org/greenstand/default.htm
- www.greenlodgingnews.com/default.aspx
- www.gsa.gov/Portal/gsa/ep/home.do?tabId=10
- www.ciwmb.ca.gov/EPP/GreenLodging/Hotels/
- www.greenseal.org/programs/lodging.cfm

What You Can Do in Your Current Building

Benchmarking where you are today is one method to start the development process of "Green" Best Practices in an existing building. You need to evaluate: (1) how people feel about the working and visiting environment (ask how people feel about air quality, lighting, personal comfort levels this engages others and allow you to build relationships and establish a ownership for future actions), (2) your costs (energy, water, waste), (3) staff absenteeism, (4) employee retention rates, (5) work quality, health & safety records, and (5) productivity. With this information you can develop a plan to improve the environment and working conditions which

will lower absenteeism, improve health and safety, reduce your operating costs, and improve your customer experience.

Existing buildings have multiple operating systems from HVAC, to water heaters, electric controls, etc. Over time thermostats, vents, heating and cooling systems no longer operate within their design specifications. Having your building "Commissioned" will insure proper system alignment and calibration so all systems are operating at their designed efficiency, ducts are connected, insulation is provided in ducts conditioned spaces, sensors are operational (sensors can control lighting & HVAC), lighting control systems are properly functioning, and drainage is provided when needed, etc. The companies that perform commissioning are certified by three organizations: (1) Building Commissioning Association, (2) Associated Air Balance Council, and (3) National Environmental Balancing Bureau. Select a commissioning company that has a track record of involvement as a conference speaker, serves on committees for commissioning and has demonstrated field expertise with current and prior clients. You may want to do the "Commissioning" prior to your benchmarking the employees and guests about their perceptions of the building environment.

Efficient use of resources is a good starting point look at usage such as lighting and water. Water conservation saves money and this invaluable resource. The California Integrated Waste Management Board states the average hotel guest uses 218 gallons of water daily. Some properties may be on a private well system. Private water systems demand conservation from a use basis. These properties have additional issues of water treatment, reuse of this resource for irrigation so the water is then cycles back into the soil & aquifer, and from a property protection standpoint this resource is vital for maintaining the viability of their fire protection systems (private hydrants, automatic fire sprinkler system). Bring your guests into the conservation process tell them what you are doing to protect the environment and ask them for their help. You may be able to use waterless toilets in the public restrooms. Water leaks can create mold spore exposures and leaking toilets waste water. Locating water leaks is a challenge especially behind wall panels and under floors. Leak detection can be approached through a Preventative Maintenance Program that can include visual inspection, use of imaging technology, and the use of a pipeline borescope. The thermal imaging technology can also be used to identify HVAC problems, building envelop heat loss, and electric distribution system losses (30)

Plants add to the interior décor but their placement can affect indoor air quality:

- Containers should be off the floor and have adequate capacity to collect water to prevent seepage into the carpeting and cause mildew or mold
- Plant sprays should not be toxic
- Locate plants so they do not block HVAC vents
- Treat plants with an appropriate Green pesticide to control unwanted pests

Hot water wastes energy and is a safety concern, it can cause scalding burns. Hot water used for personal washing should be kept under 125ºF so as not to scald individuals and waste energy. Note; over 100,000 people are treated annually in hospitals for scald burns. The most susceptible individuals to scald burns are youngsters under 5 years old and people over 65 years old. Maintaining lower water temperatures prevents employee and customer burn injuries. Hot water heated in tanks can potentially leak and grow bacteria. A solution can be installing tankless hot water heaters. These units have a longer life span, use less gas, emit less nitrogen oxide

emissions, provide tighter temperature control, there is no tank to leak and they do not have problems related to the growth of bacteria such as Legionella. Water use for floor cleaning can be dramatically reduced with the use of micro fiber mops that can get the dirt out, remove bacteria, and do not require frequent changes of the cleaning solution in the bucket.

Next to temperature, no other building system has a profound effect on occupant comfort and productivity as light.(13) Lighting is now treated as an ergonomic issue by engineers and architects. We are striving to have energy efficient light that is comfortable, provides pleasure and is energy efficient (lighting metrics; a T8 lamp produces 2900 lumens while consuming 30 watts yielding 100 lumens per watt, a compact fluorescent lamp provides 70 lumens per watt and an incandescent lamp yields 20 lumens per watt). The amount of light required is dependant on the application including safety and security considerations. Lighting energy costs can exceed 20% or your electric bill. Reduce your electric use by lowering lighting, people prefer it, you are also lowering the heat build-up and cooling load in your property. Replace your incandescent light bulbs with compact fluorescent energy-efficient bulbs that use a fraction of the electricity (25% of the energy and saves you about $30+ in electric charges over the life of the bulb), last almost 10,000 hours longer, and reduce the carbon dioxide emissions. Check with your utility company, there may be financial incentives to replace old equipment with new energy-efficient products. Buildings can also save on power costs by utilizing LED exit signs or light emitting diodes use less than 20% of the energy of an incandescent bulb and last 10 years vs. 3 months, saving money, resources and providing a failsafe emergency signage at Exit ways. An additional action; install occupancy sensor controls that turn lights off in unoccupied areas (guest/ meeting rooms, hallways, stairwells, garages, and restrooms) and replace some electric lighting with daylight through photoelectric dimming (28). Some hotels are using the room key card to activate lights and HVAC by inserting it into a fixture in the room, when you leave the utilities are shut off. It is recommended to turn off lights if they are not needed for two or more minutes. Remember over 90 percent of the overall costs of a lighting system is electrical cost!

Some examples of the possible electrical energy savings range from the Fairmont's Sonoma Mission Inn and Spa where they changed out 4400 incandescent light bulbs for energy efficiency and are savings $61,000 a year in electricity costs, which equals 203,000 kilowatt hours and 300,000 pound of carbon dioxide in the atmosphere to Philadelphia's Sheraton Rittenhouse Square which installed compact fluorescents and saved 78% in energy costs, with a payback in 2 years.(15) The lighting selection you choose should be based on not only energy savings but quality of light, maintenance costs, and disposal costs. The latter two costs can be influenced by access issues and handling hazardous materials both of which are safety issues.

America is shifting to a 'green culture,' with more and more businesses understanding that environmental responsibility is everyone's responsibility," said Marcus Peacock, EPA's Deputy Administrator. "EPA commends the leading Green Power Partners for making a long-term commitment to protecting the environment." EPA maintains a list of its Top Green Power Purchasers list highlighting organizations committed to purchasing green power. The National Top 25 list of Green Power Partners accounts for more than 6 billion kilowatt-hours (kWh) per year of green power purchasing, more than 60 percent of the total kWh in the Green Power Partnership; reducing greenhouse gas emissions equivalent to those of more than 700,000 vehicles.

Some companies are looking to cogeneration as both an energy and cost savings solution. The Crown Casino (six star casino, 460 rooms, 12 million visitors annually) in Melbourne Australia installed a cogeneration plant that cost $4,000,000 and saves them $30,000 per month in energy costs and reduces their greenhouse gas emissions by 25,000 tons annually. It generates electricity and heat. The system also is available as emergency backup if any of the main High Voltage Feeders fail.

Your waste stream detracts from the environment, recycle. If you can separate the white paper, cans, bottles, glass, plastic, and mixed paper from the wet garbage you can forego plastic bags, saving money (the average cost per ton of material disposed at a landfill is approximately $50) (1), you maybe able to reduce the number of garbage pick-ups saving additional dollars and also you reducing the waste stream.

A quick fix to improve air quality can be accomplished by eliminating smoking in buildings (Marriott is "No Smoking" at all their properties) and establishing strict chemical standards for cleaning chemicals to reduce employee/ customer exposure to toxins (low or zero V.O.C. {volatile organic compounds} and non-odorous chemicals). Chemical exposure is important to many people, a 2007 survey by the Ashkin Group of Bloomington Indiana revealed 75% of their newspaper subscribers think green cleaning is important to their business while another 20% said it was somewhat important. One way to go green in cleaning is by selecting green floor care products that have been certified by either Green Seal® or EcoLogoM, the leading North American green certification organizations. A floor care chemical and its ingredients must be analyzed to be green certified. To earn certification, the product must show that it:

- has a reduced impact on the environment when compared to similar products used for the same or similar purpose;
- includes ingredients (or a greater number of ingredients) that are biodegradable and non-toxic;
- performs as well as, if not better than, a comparable non-green product;
- does not include (or has considerably fewer) harmful ingredients, such as VOCs, carcinogens, and endocrine disruptors, which can harm glands, hormones, and many body functions;
- does not contain hazardous by-products;
- is packaged in recyclable materials; and
- meets all safety standards for use of the product.

The use of green cleaners not only is better for the environment, they improve air quality in the building and they reduce/eliminate some of the requirements for Personal Protective Equipment and medical monitoring for employees using them. Removing toxins from cleaning chemicals also lowers your disposal costs if they are not considered hazardous. Green Seal® a leading North American green certification organization has created an Environmental Standard for Cleaning Services known as GS-42 which encompasses all indoor activities typically required to clean commercial, public and industrial buildings. As of December 2007 one commercial cleaning contractor has met the standard, Clean Power LLC, Milwaukee, Wisconsin. (21)

There are also steam vapor cleaning machines that heat water to 298oF and use super heated vapor to clean and sanitize surfaces. This technology also kills bacteria, mold, mildew, fungus, e-Coli and Norwalk virus which improves the health of all people inside the building.

Buildings undergo constant regiment of painting to maintain surface conditions that are clean, easy to maintain, and create an eye appealing working environment. The U.S. Environmental Protection Agency (EPA) is working in Southern California with the South Coast Air Quality Management District (SCAQMD) on permissible VOC's for interior architectural coatings. There are other groups throughout the country looking at the same issues. VOCs of traditional solvent based alkyd paints are 400-500 grams VOC per liter and latex paints are 200-300 grams per liter. The SCAQMD has set a limit of 50 grams per liter. (3) The trend is to continue to lower the permissible VOCs. Choosing a paint that meets the new standard will improve the air quality for the person doing the painting and the other people in the building.

Building maintenance, repair, and operations all introduce potentially hazardous chemicals into the workplace. To manage this exposure to sustainable & green starts by first identifying chemicals of concern (carcinogens or PBTs), next consider alternatives to the chemicals you want to eliminate, and finally decide what constitutes green or desirable chemical characteristics. To accomplish these goals consolidate the purchasing function and inventory controls.

Managing building temperature at a consistent level, increasing the use of natural light and increased ventilation improves the building environment, people feel better and they are more productive. HVAC factors affecting indoor air quality can include: (A) lack of fresh air coming into the building, particularly during cold and hot months. Fresh-air intakes are generally adjusted during cold and hot months to lower the cost of heating or cooling the fresh air being processed through the ventilation system; (B) dirty air filters or diffusers; (C) air intakes located too close to the air exhaust system; (D) air intakes located too close to truck delivery areas or parking lots; and (E) air contamination from odors emanating from new carpets or tiles applied with chemical adhesives, flooring contractors should use odor-free adhesives, use portable fans to increase the air exhaust and ventilate these areas at night until the odors have diminished.

Hotels are using: (1) cotton towels and linens with no petrochemical components, (2) low flow shower heads, (3) low flow toilets or use water displacement devices with your current toilets, (4) low flow faucets, (5) linen and towel re-use, and (6) recyclable disposables vs. plastic products. In the laundry use dryers with moisture sensors to control energy use, prevent over drying/damage to materials, and shorten drying cycles to improve laundry room productivity.

Food service operations utilize energy and are faced with numerous safety/ health hazards and food safety hazards. There are actions that can be taken to improve results in all areas. Installing strip curtains and automatic door closures in the walk in coolers and freezers controls energy loss, saves on energy costs, and maintains the food products within a safe temperature range. You can also install anti-sweat controls and gaskets on display cases. This again saves energy and reduces water dripping on the floor which prevents potential slip and fall injuries. No-Touch devices that dispense paper towels and water control the release of their resource and prevent cross contamination when the user has been recently handling raw meats, or toxins. Put lids on pots to reduce boiling time, save energy, and prevent employee burns from hot liquids.

Hot food holding cabinets use electrical energy. These costs can be reduced and food can be safer by using insulated cabinets. California law requires that any new holding cabinet purchased must be at least insulated to Energy Star standards or better. Now you have a reason to by a product that allows you to keep the temperature consistently above 135ºF and the food safe for consumption. You may also qualify for a utility rebate. (5)

Operating a walk-in with too little refrigerant strains the compressor, drives up energy use, increases the risk of the unit's failure and food spoilage. Monitor the refrigerant in the sight glass; if you see bubbles, it is time to recharge. (5)

These changes translate to increased safety, customer satisfaction, and sales.

Benefits from Using Energy-Efficient Equipment

Whether you have an existing building or you are planning to build a new structure the operational equipment you select has a major impact on your operating costs and safety. New standards are being promulgated daily. An example, National Sanitation Foundation International has a standard for commercial hand dryers in restrooms. These dryers eliminate paper waste and promote sanitation. The standard P335, Hygienic Commercial Hand Dryers, requires drying hand completely in 15 seconds, with HEPA filtered air, hands-free operation. This is important for sustainability and safety as wet hands can transfer 1000 times more bacteria onto surfaces than dry hands and the moisture left behind can aid to prolong the survival of microorganisms left behind. (22)

What You Can Do with New Construction or Major Renovation

There are resources available for you and your architect from United States Green Building Council (USGBC), EPA, and other organizations. It is found that buildings under 50,000 square feet get their biggest lift by managing the exterior skin of the building including roof materials (reflective roofing reduces heat loads in hot environments), window films & canopies, wall materials including air penetration seals between segments. Window related energy costs account for 5% of all energy used in America. Laminated glass windows with Low e coating will provide protection from flying glass chards in hurricanes and earthquakes and is energy efficient controlling heat and glare. (7)

A couple examples of architectural features that provide a sustainable design without incurring additional costs are building orientation, window location, and floorplates. Building orientation i.e. an east-west orientation will help mitigate energy consumption by making it easier to minimize western sun exposure, the most difficult in terms of solar heat gain and glare. Concentrate window openings on the south side of the facility, where summer sunlight will be less intense and shading can be used to control glare. To maximize natural lighting and lower your energy demand, design narrow floorplates which will allow sunlight to penetrate deeper into the facility. (14)

Roof failure is costly and often hazardous to repair working at heights possibly with propane heated tar kettles. Leaks can cause property damage, can lead to mold, electrical shorts, water intrusion that creates slip and fall exposures for employees and customers, Roof insulation affects your energy consumption. Creating a Green Roof is a solution that can double your roof life (less exposure to ultraviolet light and temperature extremes) and reduce your cost of energy for heating and cooling by up to a third. These roofs reduce your drain requirements, are quieter, and once installed are virtually maintenance free. The green roofs can be planted over your entire roof as a

single plot or it can be modular in plastic trays that can be moved, access to roof top equipment is a consideration as well as weight. Planting directly on the roof material requires 6-8" of soil where the plantings in plastic trays on top of the roof material require 2"-6" of soil. You can get further information on Life-Cycle Cost Benefit Calculations from Green Roofs for Health Cities. (12) The largest green roof in the America is 10.4 acres at the Ford Motor Company in Dearborn Michigan, for examples of green roofs in hospitality see the photos in the Appendix.

After the construction or renovation phase having the building "Commissioned" will insure proper system alignment and calibration so they are all operating at their designed efficiency.

Resource Utilization beyond your Building

Resource use goes far beyond your structures. Your transportation resources and on-site amenities use/waste energy and emit carbon dioxide. Examples of these include power boats, heated pools, jet skis, company vehicles, and helicopters. There are ways to conserve resources through smaller engines, monitors on engines, use of hybrid engines, energy efficient equipment, solar powered systems, and establishing a minimum number of people in a conveyance before it can leave its location.

Michelin has announced an initiative to reduce tire-related fuel consumption to half by 2030. An example of this initiative is the X One wide-single truck tire that converts 18-wheelers to 10 wheelers by replacing two dual tires with one single wide. These save 4 percent in fuel and reduce tractor trailer weight 720 pounds allowing more freight and lessening the need for more tractor trailers. (25)

You can create a sustainable environment within your operation by the choices you make with how goods are packaged and dispensed. Many hotels are looking at eliminating the little plastic shampoo and soap dispensers. The packaging industry has created the Sustainable Packaging Coalition which reports in a recent industry survey that two thirds of the responder's first priority is to use recycled materials followed closely by renewable packaging materials. (26). Companies are selecting recycled paper certified by the Forest-Stewardship Council (provides guidelines for sustainable forestry practices) for menus and stationary.

Where you get Help

- US EPA, Green Buildings, http://www.epa.gov/greenbuilding
- United States Green Building Council (USGBC), www.usgbc.org
- Steel Joist Institute, http://www.steeljoist.org
- Building Operation Management (BOMA), Facilitiesnet, http://facilitiesnet.com
- BOMA Energy Efficiency Program, http://www.boma.org/TrainingAndEducation/BEEP
- Sustainable Solutions for Green Hotels, http://www.globalstewards.org/hotel.htm
- Environmentally Friendly Hotels, http://www.environmentallyfriendlihotels.com
- Energy Star, http://energystar.gov
- Alliance to Save Energy, http://www.ase.org
- Green Roofs for Healthy Cities, http://www.greenroofs.org/

- Blackstone Renovation case study, http://greencampus.harvard.edu
- Report on Commercial Buildings & Energy Savings, http://www.airadvice.com/commercial/report-form.php
- LexisNexis has created an online portal for news and commentary on climate change legal issues, http://law.lexisnexis.com/practiceareas/Environment-Climate

Conclusion

The demand for green and sustainability is coming from investors, customers, employees and the public. Many companies send a questionnaire to the hotel prior to booking a meeting asking about their "Green" practices, they make buying decisions that are consistent with corporate policies. Take a leadership role to address this business requirement, start with benchmarking; measure your "Carbon Footprint" (there are calculators available to assist you), ask guests and associates for their perceptions of the indoor environment, and measure your current consumption of electricity, gas, water and waste discharge (volume and cost).

You can implement a Green initiative within your existing building. Look at Green Cleaning (purchase cleaning supplies with MSDS hazard rating of "1" or less, paints that have low or zero VOC's) and recycle (recycle food products to food banks or farms for feed and recycle aluminum, paper, cardboard, paper, and oil). Green Product Procurement will not cost much but can have immediate benefits; (1) replace light bulbs with compact fluorescent bulbs, (2) install presence sensing devices, (3) use low flow toilets (until replacement time place a solid object in the reservoir) and low flow shower/faucet heads, and (4) use paper towels that are at least 40% post consumer recycled materials. Going forward, purchase ENERGY STAR equipment that is environmentally friendly. In the office, email as much as possible, use remanufactured toner cartridges (ink jet printer use less ink than laser jet) and print on both sides of the paper. Use laptop computers and LCD screens to save power.

You modify how you do business. Implement a bed linen and towel re-use program. Control guestroom temperature with housekeeping setting the thermostat at 78oF and closing the draperies during hot months to reduce thermal heating. Dispense soaps and shampoos with bulk dispensers instead of individually wrapped or in plastic containers. In mail and supply, reuse boxes and packing materials, verify mailing list accuracy.

In food service don't pre-fill water glasses let the customer request a glass of water, use containers (boxes, wrapping, and cups) that can be reused or that breakdown quickly in the soil and are sustainable. Use cloth instead of paper napkins and china instead of paper plates. Purchase foods locally to reduce the transportation carbon foot-print. Also purchase and serve condiments and other items in bulk. Save directional and food and beverage signs for future use.

Once you determine to "Go Green" employee support and active participation is essential in sustaining the initiative. They purchase and use equipment and supplies, make decisions on resource use, and equipment maintenance. They make thousands of decisions daily that can support or derail your program. They communicate to your customers; their words and actions speak volumes to your customers and vendors.

Finally bring your customers and guests into the initiative, tell them what you are doing ask them to take a role by supporting the linen and towel re-use program, setting thermostats at reasonable temperatures and turning the HVAC off when they leave the room. Request they share cabs, take public transportation, recycle their name badges at the end of their conference, and use ticketless travel reservations.

Implementing a "Go Green" initiative re-defines your company's values and mission. Publicize it and celebrate the launch with every employee, guest, customer, and vendor.

Footnotes

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3. Building Operating Management July 2007 pp 56
4. Hotel Business, July 2007 supplement pp 9A
5. Flex your power. Org "Boosting Restaurant Profits with Energy Efficiency
6. Continental.com magazine August 2007 pp22
7. Alliance to Save Energy – Window Technology
8. Alliance to Save Energy- Alliance Hotel Initiatives
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10. Building Operating Management, August 2007, pp26-32
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12. Plant Services, August 2007, pp34-42
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27. Building Service Management, January 2008, pp 12-14, 32-35

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30. Maintenance Solutions, January 2008, pp 6-7, 22