

SUSTAINABILITY Once you push past the myths relating to sustainability and green design, you'll find several strategies that will work for your commercial buildings, no matter what your location

A Smart Approach to Sustainability



By Leah B. Garris

Myth and misinformation surround the topic of sustainability, clouding its definition and purpose, and blurring the lines between green fact and fiction.

"Some [facilities professionals] think that a green building will require sacrifice in terms of comfort. That's certainly understandable ... it goes back to Jimmy Carter wearing his cardigan and telling us all to turn down the thermostat. But, we've come a long way since then; there are strategies today that can provide the same level of comfort with much less energy use," says Ralph DiNola, principal, Green Building Services, Portland, OR.

Along with the assumed forfeit of comfort also comes apprehension about the way a green building might look. "There are opportunities for creative architects and engineers to make a building 'look' very green – *if* that's what the owner wants to do. But, there are also so many things you can do with a building that are nearly invisible or that can be seamlessly integrated with the design. You can have a green building that doesn't really 'look' any different than any other building," says Alan Scott, principal, Green Building Services, Portland, OR. Simply designing a green building that looks "normal" can be a unique way to achieve a level of sustainability. "People don't really talk about the value of aesthetics in terms of the longevity of a building. A beautiful building will be kept by a culture much longer than an ugly building. Aesthetics is very much a part of longevity, and

longevity is key to sustainability," says DiNola.

Dan Meza, an architect at Emeryville, CA-based Ratcliff, points out that this trend is happening with manufacturers as well. "A lot of the things we're used to specifying in our buildings actually don't look any different than they did before, but the process by which they were manufactured, their recyclability, their efficiency, etc. has changed."

When you cut through the lingo and get down to reality, sustainability isn't about spending more on fancy gadgets in hopes of earning an eventual return on investment. It's not about environmentally responsible buildings that ultimately sacrifice tenant/occupant comfort; it's not about "greenwashing" your building, packing in as many sustainable products as possible without giving it much thought. To Meza, practicing sustainability means adding an extra layer of scrutiny to every decision you make about your building. That's not to say that purchasing green products, abiding by green-cleaning standards, and recycling assets at the end of their useful lives isn't sustainable – without a doubt, carrying out these tasks *is* good for the environment, your tenants/occupants, and, oftentimes, the bottom line. But, sustainability is also about something

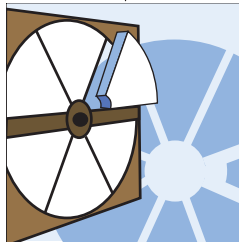
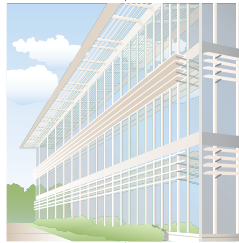
Sustainability is Coming

In 2002, Kansas City, MO-based BNIM Architects designed six different versions of a building for the Los Altos, CA-based David and Lucile Packard Foundation: 1) a market building (a typical Class-A building), 2) a LEED Certified building, 3) a LEED Silver building, 4) a LEED Gold building, 5) a LEED Platinum building, and 6) a living building (having zero net annual impact on the environment from an operational standpoint). Since 2002, two of the buildings that were designed as part of the project (the market building and the LEED Certified building) are now operating *below* California code. "Just 4 to 6 years later, you can't build those buildings anymore. Sustainability is coming, and it's coming from different directions – designers, owners, and regulatory agencies," says Brad Nies, director of BNIM Architects' sustainable design consulting division, Elements.

more. “So much of it *isn’t* really about whiz-bang products; it’s about using the basic building blocks we all have, but using them in a much more intentional way,” says DiNola.

Before jumping on the green bandwagon, take time to research what will work best for your building and provide the best return on investment. Instead of buying in to the myths that can sink your efforts to be sustainable, do some investigating on your own so that you’ll be able to weigh your options and make the right decisions. When there is no time designated to sorting through the variety of sustainable technologies, it’s often a decision that’s made at the last minute; whether it’s new construction or a renovation, the project team ends up scrambling to find products and materials that will “green things up.”

What if you used a different type of window glazing? What if you added shading devices to the exterior or put more insulation in the roof? Scott emphasizes that testing your options via energy modeling and design analysis *before* installation allows you to understand how they will work with the building’s surrounding climate and existing equipment. “Seeing how things work interactively means that you’re not just [making] a gross assumption about what may or may not work well; you’re taking a scientific or systematic approach to find the best combination of strategies.” Maybe the shading devices and extra insulation you want to add will allow you to downsize the boiler or chiller – there’s no way to *truly* know how systems will affect each other unless you do some research in advance.



ALL ILLUSTRATIONS BY SCOTT EASTON

and what your climate is like,” says Meza.

In addition to understanding your surrounding climate, Chris Jarrett, associate professor and associate director at Atlanta-based Georgia Institute of Technology’s College of Architecture, says that understanding microclimates (variations within a city, county, or state) is also crucial. “Even in terms of hot/arid and hot/humid climates, microclimates also need to be determined, because they *do* exist.”

Brad Nies, director of Kansas City, MO-based BNIM Architects’ sustainable design consulting division, Elements, emphasizes that you also need to identify and reduce your building’s need for resources that are scarce (water and energy, perhaps) and increase the use of abundant, available resources (sun, rainwater, wind, etc.). Knowing the climate also means knowing what’s being provided to you for use: the sun for heating and lighting, the wind for ventilation, and the rainwater for irrigation and other water requirements.

When talking sustainability, it’s common to look at five areas: 1) site conservation, 2) water conservation, 3) energy efficiency, 4) materials conservation, and 5) the indoor environment (this is a universal list, modeled after the Washington, D.C.-based U.S. Green Building Council’s LEED rating system). Of these five subjects, two (the indoor environment and materials conservation) are almost entirely independent of climate – they’re important and relevant everywhere. Site conservation does depend on climate, but on a level that’s very specific to a particular site and to the ground on which your building is sitting.

The last two areas (water conservation and energy efficiency) both vary, depending primarily on the climate. Each U.S. region has a different climate: If you don’t understand which resources are readily available and which aren’t, and you use the wrong technique in

the wrong location, costs will inevitably increase, which is something you want to avoid.

No matter what your location, your buildings have the opportunity to take advantage of the surrounding environment. Although certain areas of the United States are gaining attention for their environmental projects, success in sustainability is possible anywhere. In fact, as DiNola points out, “When you have greater climate extremes, you have even better opportunities for savings.”

To help you make sense of some of the sustainable technologies that are growing in popularity throughout the United States, the next four pages give you the information you’ll need to make an educated decision about what will work best (and what won’t) for your buildings.

Leah B. Garris (leah.garris@buildings.com) is senior associate editor at Buildings magazine.

“When it comes to sustainability, in every existing building that I go into, I look around and all I see is opportunity.”

– Ralph DiNola, Principal, Green Building Services, Portland, OR

Sustainability Starts with the Climate

Simply put, green strategies are green because they work *with* surrounding climatic and geographic conditions instead of *against* them. With that description in mind, Meza points out that you have to know about the environment in which you’re designing and building to know whether or not you’re truly being green. “It has to do with being in sync with the conditions that you’re given and using them to your advantage.” To achieve the ultimate in sustainable design, you should be familiar with year-round weather conditions (average temperature, humidity, rainfall, etc.), topography, prevailing winds, indigenous plants, etc. “All of that goes into what makes a building green, so sustainability has to be based on where you are. Measuring the success of sustainable design involves comparing building performance to a baseline condition. That baseline condition has everything to do with where your building is located





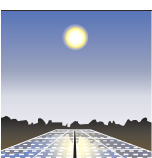

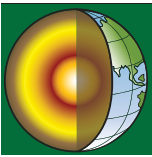



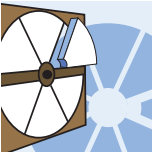

Sustainable Strategies for Your Buildings

What it is	How it Works	Possible Savings	Where it Works Best	When to Use it	Don't Forget ...
Passive solar heating 	Integration of building components – exterior walls, windows, and building materials – to provide solar collection and heat storage/distribution	Modest usage can reduce heating requirements by 5 to 25 percent; aggressive usage can reduce heating by 25 to 75 percent		New construction	Best for small buildings
External solar shading 	Reduction of heat gain and glare via fins or louvers installed vertically, horizontally, or at an angle above windows or glass elevations	Estimated energy savings range from single digits to 35 percent		New construction or renovation	Ideal for buildings that don't allow installation of specialty windows or window films, and in buildings with south-facing windows
Solar water heating 	Absorption of sunlight via a surface within a solar collector or storage tank, where heat-transfer fluid or potable water "picks up" the heat and is stored in a separate preheat tank or conventional water heater tank until needed	Can efficiently provide up to 80 percent of hot-water needs with minimal operation and maintenance expenses		New construction or renovation	A sunny climate helps, but isn't required (in 2003, the three largest markets were Florida, California, and New Jersey)
Xeriscaping 	A water-wise approach to landscaping that stresses smart plant choices (drought-tolerant plants), grouping them according to water needs and sun and moisture conditions	Can reduce water use and maintenance requirements by as much as 60 percent (or more)		New construction or renovation	Easiest to achieve in the Southwest, since most plants there thrive on little water

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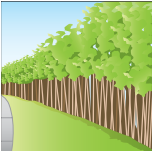
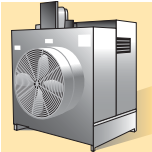
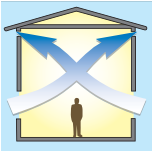
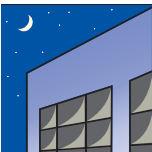



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<p>Wind power</p> 	<p>Conversion of wind into electricity via wind turbines</p>	<p>Savings depend considerably based upon a variety of factors (turbines on-site vs. off-site, etc.)</p>		<p>New construction or renovation</p>	<p>On-site applications are typically only feasible in rural areas; placing turbines near tall buildings isn't recommended (the building could produce wind turbulence and disturb turbine performance)</p>
<p>Photovoltaics (PV)</p> 	<p>Using solar cells or solar photovoltaic arrays (mounted onto the roof or integrated into the façade) to convert energy from the sun directly into electricity</p>	<p>Savings depend considerably based upon a variety of factors</p>		<p>New construction or renovation</p>	<p>Depending on the system chosen, commercial-scale arrays can take away from aesthetics because of visible PV modules</p>
<p>Geothermal (ground source)</p> 	<p>Relying on the thermal stability of the ground to act as a heat source in the winter and a heat sink in the summer</p>	<p>Energy consumption can be 25- to 50-percent less than traditional heating and cooling systems</p>		<p>New construction or renovation</p>	<p>It can be challenging to find the right ground condition and location to set up a geothermal power station</p>
<p>Garden roofs</p> 	<p>Vegetated roof covers with growing media and plants, which take the place of bare membrane, gravel ballast, shingles, or tiles</p>	<p>Can cut heating and cooling costs by 5 percent (or more)</p>		<p>New construction or renovation</p>	<p>A roof garden can double the life of a roof, provide additional insulation against winter cold and summer heat, and reduce runoff by 50 percent or more</p>
<p>Energy recovery ventilation</p> 	<p>Reclamation of energy from heated or cooled exhaust air that is transferred to the fresh air coming into the building</p>	<p>Although general savings can be hard to calculate, payback periods range from less than 1 year up to 3 years</p>		<p>New construction or renovation</p>	<p>In mild climates, the cost of the electricity consumed by system fans may exceed energy savings from not having to condition the supply air</p>


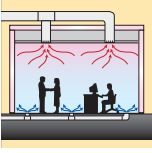

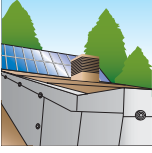
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Sustainable Strategies for Your Buildings

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Vegetative wind breaks 	Controlling dust and wind by planting sturdy trees/plants that will stand up to brutal weather	These wind breaks can reduce winter heating costs by 40 percent; they can reduce summer cooling costs by as much as 50 percent	A	New construction or renovation	Make sure wind breaks don't interfere with lines of sight; use deciduous trees if you have a passive solar system
Evaporative cooling 	Using water to draw heat from inflow air; a simple pump (coupled with a fan) is used to blow outside air through a soaked mat	An evaporative cooler can use as little as 10 percent of the energy consumed by other air-conditioning systems; payback occurs within 6 months to 5 years	SW	New construction or renovation	In large commercial buildings, evaporative cooling can't meet total cooling loads; when combined with air-conditioning, it can meet total loads during milder cooling periods and decrease compressor load under peak conditions
Cross ventilation 	Making use of pressure differentials to move air through a building, with air flowing through windows, open doorways, and across rooms and corridors	Savings can range from 5 to 20 percent (or more)	SW SE NW	New construction or renovation (renovation difficulty may depend on building orientation, window location, etc.)	Cross ventilation works best when the maximum building depth is 49 feet or less between external faces
Night cooling 	Flushing cool air through a building at night, offsetting heat gains generated during the day that are absorbed and released over a period of time	Energy savings can fluctuate from 5 to 17 percent (or higher)	SW NW	New construction or renovation (renovation difficulty may depend on building orientation, window location, etc.)	Night cooling works best in climates with a diurnal temperature swing of 20 degrees F. or higher and requires a building with traditional hours of occupancy
Rainwater harvesting 	Collection and storage of rain from roofs or from a surface catchment for future use	It's possible to achieve 40-percent water savings (or more); payback ranges from 10 to 15 years	NW	New construction or renovation	Taller buildings won't collect as much debris in the rainwater storage tank (2- and 3-story buildings may require screens, debris excluders, etc. to keep out leaves and dirt)

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 <p>Daylighting</p>	Using natural light to illuminate buildings	Lighting energy use can be cut by 75 to 80 percent; many commercial buildings can reduce total energy costs by one-third	A	New construction or renovation (older buildings with poor orientation will present the most challenges)	Diffuse light from overcast skies can sometimes provide better natural lighting; daylighting is most challenging in sunny climates due to the amount of sunlight that needs to be controlled
 <p>Displacement ventilation</p>	Utilizing buoyancy forces (generated by people, lighting, computers, electrical equipment, etc.) to move contaminants and heat from the occupied zone to the return or exhaust grilles	Cooling energy savings levels can reach 30 to 50 percent	M P	New construction or renovation	May not be appropriate in spaces with low ceilings; works best in schools and offices
 <p>Mixed-mode (hybrid) ventilation</p>	Space conditioning that combines natural ventilation with mechanical ventilation and cooling	Savings can range from 5 to 20 percent (or more)	SW SE NW	New construction or renovation	Ideal for older, naturally ventilated buildings with increased internal loads due to higher occupancy or equipment loads
 <p>Passive stack ventilation</p>	Using a combination of cross ventilation, the rising of warm air, and the venturi effect (wind around a high-level opening creating suction) to circulate air through a building without a fan	Savings can range from 5 to 20 percent (or more)	SW SE NW	New construction or renovation (success depends on existing floorplans)	Works best in smaller buildings (4 stories or less) like schools