Emerging Green Risks

In the Design and Construction of Green Learning Institutions

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Abstract: *Colleges and universities, K-12 private and public school systems, libraries, museums, and other institutions of learning are all at the forefront of implementing Green design principles in new buildings, existing building remodels and in campus-wide conceptual plans. New design ideas, new equipment, new performance standards, and new materials are being utilized in an effort to comply with Green laws while also meeting voluntary standards that these institutions hope will position them as leaders in sustainability. Although the goal is conservation and savings, the unexpected result for many institutions will be higher operating costs, non-compliant designs and construction, and premature failure of new technology-based equipment and materials. What are the greatest risks and how can they be avoided?*

Campus and school district specific design standards are nothing new nor are the federal, state, and local statutes and codes that establish the most basic requirements for new construction and remodel projects. Yet, it must be recognized that these requirements are not static and now, with the rapid introduction of new Green building codes and environmentally based design standards, there is a heightened risk of conflict and failure that was not present previously. The changes are generally heralded as positive steps because of their potential to improve air quality, preserve resources, and encourage innovation in building, but their collective impact on design and construction have not yet been fully evaluated nor have the risks that come with these new materials, new construction methods, and new compliance requirements.

Institutions of learning may find themselves exposed to additional risks beyond those experienced by typical commercial or residential facilities because of their tendency to take on

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an exemplary and leading position in regards to sustainable practices. With the evolving mandatory measures and the voluntary standards that colleges and school districts impose on themselves, risks abound. The discussion that follows will address a few of the key risks to be aware of including an assessment of:

- the most probable risks;
- risks known to have the most significant impacts; and,
- how to avoid or at least mitigate risk.

Green Building Standards in Schools

It is important to understand that Green building standards do not just apply to new buildings, remodels, and existing building certifications at schools and universities but are also typically related to campus wide planning principles, ongoing energy and water use, and overall school policies on sustainability. Green building standards may also directly influence day-to-day operational decisions including heating and cooling protocols, building use, and cleaning methods among others. Green standards are not limited to a single building or a single project.

In an increasing number of states, model building codes and associated acts and statutes are being modified to incorporate new Green building requirements and to make these requirements mandatory. In California, CalGreen was recently enacted as a firm requirement at the State level and is to be used in conjunction with the existing building codes and other pre-existing local Green requirements regardless of their inherent compatibility. For example, in San Francisco this requires reconciling the existing requirement for the U.S. Green Building Commission's Leadership in Energy and Environmental Design (LEED) certification of commercial buildings and Green Point ratings for residential projects with the new state mandated building code.

Other states, such as Maryland, have opted for a less complicated solution by directly adopting the International Green Construction Code which is designed as a complement to the other International model codes already in place in Maryland.[3] This reduces the likelihood of uncovering conflicting or incomplete provisions that can occur when uncoordinated standards are used.

These new codes and requirements typically include more stringent performance standards for mechanical systems, more efficient use of energy, water, and material resources, and other

[3] Maryland House Bill 972, passed May 10, 2011, acted to adopt the IGCC standards statewide in Maryland

stipulations that differ from the typical code requirements that traditionally only address life and safety issues. Before long, all states, cities, and counties will include some specific Green requirements in their codes or statutes and these will be applicable to work performed at public schools, universities, and other buildings, as well.

Although compliance with applicable codes and regulations is the basic requirement for new construction and remodel projects, most universities now also require a higher standard. It is now typical for projects to be required to achieve, at a minimum, a Silver ranking within the voluntary LEED certification process. This requirement adds administrative cost and complexity to projects and opens up the possibility of creating conflicts between code requirements, other campus standards, and the LEED requirements themselves. Furthermore, since LEED certification is established by accumulating points in a number of different sustainable categories, the specifics for compliance may vary from building to building. In other words, simply because a school or campus already has a LEED silver building does not mean that all potential conflicts have already been worked out.

The trend of increasing sustainable design in schools is unlikely to wane given the preponderance of initiatives geared toward encouraging it. In 2010 the U.S. Green Building Council (USGBC) adopted specific standards for school construction – LEED 2009 For Schools New Construction and Major Renovations – and also established the Center for Green Schools to focus on the Greening taking place in schools. The "Innovation in Green Building Award" that the USGBC's Center offers is an honor specifically targeted to schools. In the political arena, the Mayors Alliance for Green Schools focuses on gaining the support of local officials while the USGBC's 50 for 50 Green Schools Caucus Initiative targets higher levels of government.

Other organizations are equally involved. The Association for the Advancement of Sustainability in Higher Education (AASHE) has a variety of different optional programs including guidelines for Climate Action Planning which helps universities to structure and implement sustainability plans and STARS which standardizes and tracks sustainability performance for universities. Another effort, the American College and University Presidents Climate Commitment, seeks signed promises from university representatives indicating that they will commit their institutions to creating a plan to achieve net zero emissions and that they will make climate neutrality and sustainability part of the educational experience. The message to schools is clear – your participation is strongly desired.

It should also be noted that the voluntary Green measures, such as LEED certification, are often proposed by the policy-makers at a school district or university, not by those responsible for operating and maintaining the facilities or by those responsible for designing the facilities to

meet the proscribed criteria. Depending on how this criterion is developed and vetted within an organization, it is probable that differences of opinion will emerge as the new policies are implemented. The Regents, the School Administration, Facilities Managers, School Faculty, and Internal Design Review Boards all represent different interests. For example:

- Lower energy costs and consumption do not directly benefit the technician who may have to maintain a new piece of equipment or stock another type of light bulb.

- A LEED building may be correlated with slight increases in admissions but those increases do not typically help to pay directly for the additional costs of construction or administration.

- A department head interested in getting the largest building possible for a given budget may not be interested in the future cost savings associated with more expensive design elements.

- A design review board trying to maintain a certain campus landscape and building aesthetic may be less inclined to try new finishes, lighting, or new planting schemes just to cater to a new environmental trend.

In short, Green building standards in schools are defined by potentially conflicting legal requirements (codes, statutes, etc.), are further confounded by self-imposed voluntary standards (campuses requiring LEED compliance or other stand-alone conservation standards, etc.), and are ultimately implemented by the campus or building stakeholders who will also have their own departmental goals to serve. But isn't this the case with any campus construction or rehabilitation project? The discussion below explores how the risks in Green projects may be different.

The Risks

Given the wide-spread national adoption of Green design standards for learning institutions, it may now be more accurate to refer to the risks associated with Green design and construction simply as 'school building risks' or 'current building risks' for schools. Many of these so-called Green risks are very similar to issues traditionally associated with construction projects – uncoordinated drawings, construction delays, and non-compliant construction just to name a few. There are other risks that can be specifically related to sustainable design and construction practices primarily because of their use of Green materials, systems, and procedures. The top six Green risks for learning institutions are included in the matrix below along with the

likelihood of their occurrence, the likelihood of associated litigation, the financial significance of the risk, and the party/parties typically held responsible for the problem. Further descriptions of the risks and examples of them follow the matrix:

#	Risk Categories	Occurrence / Likelihood	Correlated to Litigation	Financial Impact	Responsible Parties
1	Higher than anticipated operating expenses - excessive energy use, water use, and maintenance	high	high	high	owner / designer / contractor
2	Establishing conflicting standards and potentially unachievable project requirements	high	mid	mid	owner
3	Construction cost and schedule impacts associated with delivering a sustainable building	mid	high	high	owner / contractor
4	Failure to meet Green code or Green Certification requirements - during the original design phase, due to end user design changes, or during construction	mid	mid	mid	owner / designer
5	Employing materials and equipment with reduced lifecycles or immediate failure (aesthetic or performance)	mid	high	mid / high	owner / designer
6	Damage to environmental and professional reputation	low	low	mid	owner

1. Higher than anticipated operating expenses – excessive energy use, water use, and maintenance

Since energy consumption and water use are considered to be core issues in sustainable design, it shouldn't come as a surprise that learning institutions are typically interested in conserving these resources, for both philosophical and practical reasons. The expectation is that long term savings will be associated with a conservation-oriented design; thus the design will allow less consumption and less consumption must equal more savings. This is not always the case. For example, a Wisconsin public high school, Northland Pines, was granted a LEED Gold rating in 2006 but several years later that rating was challenged and the building was found to not be in compliance with the basic LEED requirements for heating, cooling, and ventilation (ANSI/ASHRAE 62.1-1999).[4] Although it is generally believed that the problems at the school have since been corrected, it was not without cost or impact to the school - $40,000 was

[4] "*Questions Remain Regarding LEED Certification Challenge*," June 16, 2010 Green Building Law Update, Christopher Cheatham

expended by the school district to address the identified issues in its brand new school. [5] Also, although unquantified in this case, there is no doubt that the alleged improperly designed and improperly commissioned system consumed more energy than was intended before the issues were identified and corrected. If the problems were never identified; the actual energy use could have exceeded that of a traditional, inefficient building.

In fact, that is the claim being put forth in a pending lawsuit against the USGBC by Henry Gifford, a mechanical systems consultant.[6] Mr. Gifford believes he can demonstrate that the buildings being certified under the LEED criteria do not consistently perform more efficiently than buildings constructed to basic code requirements. It has been difficult to make that determination, however, since evaluating the as-built performance of LEED-certified school buildings has not been a requirement in the past versions of LEED for New Construction. That has now changed. LEED criteria now requires ongoing energy and water consumption be monitored in new LEED buildings and, in the case of an existing building rehabilitation, demonstrated improvements in resource consumption rates may be rewarded with additional points and higher ratings.

Regardless of the criteria that must be met to comply with state, county, city and campus standards, the risk is that projections of cost savings, savings that are initially invested with increased construction cost and time, may not be present in the completed building or at least not at the anticipated levels. If those savings are being achieved, are there other costs that are making the savings possible such as physical discomfort associated with poorly lit, heated, or ventilated spaces or constant equipment monitoring and adjustment? These are not typically considered to be reasonable tradeoffs for more efficient buildings.

Resource consumption is of interest to most schools because, other than the high cost of maintenance personnel, it represents a significant portion of the operating costs for such facilities. [7] It is also one of the mantras of sustainable design; consume fewer resources. Therefore, this is the greatest risk across all categories - it involves large dollar values, it is an issue in lawsuits that are already underway, and the burden of the risks fall to designers (engineers), contractors (sub-contractors), and owners (schools).

[5] "*Pines high school to stay at gold level, says Green Council*," 5/4/10 Vilas County News-Review, Eagle River, WI
[6] Henry Gifford, Gifford Fuel Saving, Inc. vs. U.S. Green Building Council, et al, August 8, 2010
[7] "*Into the Facilities Capital Planning Process*," March/April 2011, Susan Buchanan, LEED AP

2. Establishing conflicting standards – creating unachievable project requirements

New standards are being developed and instituted in school districts and at college campuses at such a pace that it is unreasonable to expect for them all to be compatible, complementary, and coherent. School designs must be able to satisfy the basic code requirements while also meeting the elevated requirements of LEED or any other standard adopted by the governing district head or administration. The majority of learning institutions have chosen to adopt LEED Silver certification as a default standard because it is based on an established and recognized system and it is administered externally.

What happens when the LEED standards do not mesh with the school's existing design standards? This occurred recently when an Atlanta area liberal arts college pursued a design for a new building on its campus, the first LEED building to be designed for that campus. New campus design standards were established and LEED Silver was determined to be an appropriate minimum. While the design was found to be compatible with the applicable building codes, the exterior lighting design, which was consistent with the campus design standards for lighting, did not satisfy the LEED requirement for minimizing outdoor light pollution. The issue was not identified until late in the design process and, since the cutoff for LEED Silver was only a point or two away, the only possible solution was to identify other areas where the points could be made up. Fortunately the issue was identified prior to the submission to the USGBC and LEED Silver was ultimately granted. In general, the adoption of LEED or other detailed environmental standards without a thorough review of their compatibility with other applicable building codes and standards is not recommended.

Even with review and consideration, some requirements are nearly impossible to establish in advance. In another LEED based project, a dormitory for a private university in Georgia, the design professionals chose to top a required fire lane with a grass paving matrix. The grass-filled paving was designed to support over 5000 psi, more than enough for a fire truck or any other emergency vehicle that might need to achieve access. The fire lane paving was also designed to increase the pervious nature of the site which equates with additional LEED points. After completing the design and confirming that it satisfied the code, as well as campus standards, the project was submitted to and approved by the planning department, the building department, and ultimately routed to the fire marshal for final approval. At the time of his final review, the fire marshal refused to approve the pervious fire lane and required that it be paved with concrete. The additional points for achieving a more pervious site were lost.

Two other recent examples, although not specific to schools, also relate to the problems that can occur when conflicting measures are adopted. In two separate litigation actions, one in Washington State and the other in Albuquerque, New Mexico, locally-instituted requirements

for the energy performance of new equipment in new construction was determined to be more stringent than what was allowed by Federal law.[8] Both of these circumstances arose out of a political decision to increase sustainability requirements regionally, without fully understanding the legal implications of doing so. Other public and semi-public entities such as school districts and state university systems can easily confront similar problems as they also attempt to increase the sustainability of their own standards.

In many cases, conflicting standards can be addressed as they emerge; campus standards can be brought into alignment with new codes or, instead, orders of precedence amongst the standards can be established to automatically make those corrections when they are identified. Where significant financial interests are at stake, as is the case with the manufacturers involved in the Washington and New Mexico court cases, litigation becomes a more likely possibility. If deeply conflicting standards or requirements do exist at the time a project is undertaken and they are not identified and resolved until after construction is underway, the potential for delays, significant cost overruns and the litigation that accompanies them is heightened.

3. Construction schedule and cost impacts associated with delivering a sustainable building

Delay is one of the most commonly litigated issues in construction and typically represents the largest dollar value in a dispute. Construction contracts often lean toward liquidated damages as a motivator to keep a contractor on schedule but the damages often end up in litigation because of their magnitude. While delay is not a new Green issue, the impact of delay on Green projects may lead to unexpected results and vice versa.

For example, in one of the first and most publicly discussed Green cases, Shaw Development v. Southern Builders, it was initially thought that the "Captain's Galley" condominium construction was in dispute because it failed to meet the LEED Silver certification level set forth in the construction contract.[9] In fact, the dispute was over a sizeable state tax credit that was lost because the project was delayed. While the delay in that case does not appear to have been specifically related to the sustainable nature of the project, the tax credit was a Green incentive and therefore it can be considered a Green delay case.

Delay can also arise from a lack of availability of materials. In 2005, one of the key ingredients used as a sustainable concrete additive, fly ash, was running short. This supply shortage was further compounded by an overall shortage in concrete supply. Since the use of the fly ash

[8] BIAW et al. v. Washington State Building Code Council and AHRI v. City of Albuquerque
[9] Shaw Development v. Southern Builders, Circuit Court, Somerset County, Maryland, Case No. 19-C-07-011405

waste product is associated with Material and Resource credits within LEED and since concrete is also a more sustainable material than steel and is credited accordingly, the concrete and fly ash shortage had the potential to substantially delay or derail a number of projects. While concrete or fly ash shortages may not be a problem in the future, it is likely that any other number of critical resources will fall in short supply and risk delaying projects that require them without substitution.

There are other examples where seemingly unimportant design decisions related to finish materials in a project may result in delay. One of the considerations in a LEED project is the distance of the material supply source to the project site. If a local manufacturer and supplier does not have the necessary, specified materials, it may not be an option to secure them from other suppliers that are farther away without risking the loss of points and potential certification. Material supply holdups are common in disputes involving construction delays and by mandating that the supply be location dependent, the risk of delay is increased.

Delay can also come from a lack of appropriate planning and understanding of the steps required to complete a Green construction project. In particular, commissioning of the building – thorough testing of the HVAC, Plumbing, and Electrical systems, among others – is a prerequisite for most sustainable design and can be complicated and time consuming. If the contractor is not familiar with the required testing standards (e.g. ASHRAE 90.1) and has not addressed it in his schedule, a delay of several weeks is likely.

Sustainable incentive programs are available throughout the United States for schools and universities and they all rely heavily on timetables and on compliant construction. In 2010 the USGBC issued a sizable document titled "*LEED Initiatives in Government Buildings and Schools*" which describes hundreds of incentives, all of which are intended to increase sustainable practices either by facilitating permitting, offering tax savings, or by relieving projects from other requirements.[10] Lack of timely project completion and/or lack of ultimate project compliance can put most of those incentives at risk.

As sustainable design processes and products become more common, designers, contractors, and owners will likely encounter fewer delays or supply issues that are Green specific. But in the meantime, as construction specifications are refined to accommodate more supply options and as builders become more versed in the complexities of compliance with Green standards, there will continue to be issues that arise. When these issues impact time and dollars, such as delays that trigger liquidated damages and tax losses, expensive litigation becomes more probable.

[10] Article/search tool available at http://www.usgbc.org/PublicPolicy/SearchPublicPolicies.aspx?PageID=1776

4. Failure to meet Green code or Green Certification requirements - during the original design phase, due to end user design changes, or during construction

Design and construction professionals have traditionally had an obligation to provide services that satisfy the requirements of the law, as well as the additional requirements of their contracts. When those obligations are not met, there are consequences. Green design and construction is really no different except the standards are newer, in many cases more complicated, and expectations may be higher.

A scenario involving a typical school building design and construction project may help to illustrate how simple decisions and mistakes made during design and construction can lead to these failures:

> A bond has been secured to fund a new high school. Based on the regional requirements, the school must be designed to be certified as LEED Silver. The complete design, represented in drawings and specifications, including architectural, structural and MEP disciplines, is completed and appears to meet the LEED requirements. Unfortunately, the specifications were drafted in a slightly outdated form, were not updated to meet current Green standards, and do not include all of the necessary contractor testing and procurement procedures. This goes unnoticed by all. After initial bidding and during value engineering discussions with the contractor and the facility representatives, enthalpy wheels specified for the ventilation system are determined to be inessential and unfamiliar equipment and are deleted from the work to save money. Later, shortly after construction commences, the facilities manager determines that the listed HVAC equipment is made by a different manufacturer than the one the district requires; this is changed and approved by the design professionals. With the construction nearly completed it is determined that the specified bamboo flooring is not acceptable to the teaching staff so a substitution is made to ceramic tile. The project is completed and submitted to the USGBC. The USGBC does NOT grant the LEED Silver rating. Why not?

In this case seemingly minor issues and decisions which are typical of those made during any construction project resulted in the loss of several LEED credits and ultimately, the Silver rating. The required testing, energy-saving HVAC equipment, and sustainable flooring were inadvertently omitted from the project without realizing the ultimate impact they would have.

Other times the failures are more significant and obvious, such as those found in a recent case involving a shopping center, Destiny USA, located in Syracuse, New York. The developers of Destiny USA received $255 million dollars in tax exempt bonds for their proposal to reclaim a Brownfield site and to LEED certify at least 75% of the square footage of the new construction.

Those commitments were not ultimately fulfilled and the IRS is currently seeking payment of the back taxes, an action that will add significant construction cost to the project. [11] In the Destiny USA case, not meeting the sustainable requirements may turn out to be a very expensive error.

When considering the risk associated with not meeting Green design standards it is important to remember that most of the local enforcement agencies or entities - building departments and the USGBC, for example – are not entirely inflexible. It is very rare that a certificate of occupancy is withheld due to a minor code infraction or that a narrowly missed LEED certification is not granted on appeal. Furthermore, if someone, such as a LEED Accredited Professional, is tracking the anticipated credits for the project, changes to flooring or equipment would likely be identified as potential problems and can be corrected contemporaneously.

If the failure to meet a requirement does ultimately become a stumbling block in completing a building or in being granted authority to occupy it, then litigation may be unavoidable.

5. Employing materials and equipment with reduced lifecycles or immediate aesthetic or performance failures

Schools and universities have traditionally sought out the most durable, long lasting, and time tested materials and equipment for their buildings; in other words, the most sustainable materials. Yet, with new codes and standards broadening the definition of sustainable, some of the obvious choices have changed. New products are being launched regularly, touting their LEED points and their sustainable performance. Some of these products have not been on the market for very long and, although most are tested in a laboratory to confirm their basic performance and code compliance, most are not extensively tested in the field.

An example of a new sustainable product is oriented strand board (OSB). In an effort to develop processed wood products that do not affect air quality in buildings (a prerequisite of LEED), the formulation of the resins that hold the materials together has been altered and formaldehyde has been eliminated. While this reconfiguration may not impact building materials that are well protected such as wall sheathing, it does affect doors. The newer OSB core doors are more expensive than their out-gassing predecessors and they are also more susceptible to impact and compression damage. In short, they will not last as long and will need to be replaced sooner. In this case the reconstituted product is Greener but in other ways it may be considered less sustainable.

[11] *"IRS to Audit Destiny USA's Green Bonds,"* April 19, 2011 Green Building Law Update, Christopher Cheatham

Other issues may arise when materials are repurposed for new, Green uses. In one example, a waterproofing membrane, originally designed to be used under a traditional roof system, was offered up as a viable solution for a Green roof of an important institutional complex in Virginia. The specified membrane was unable to sufficiently retain the soil and plantings on the roof because of the associated slope and, as a result, the entire roofing and planting system had to be replaced. The membrane, never originally intended for planted applications, was just too slick to retain the soil.

Maintenance and cleaning is another factor in the lifespan of Green materials and equipment. Depending on their composition, Green materials may require more cleaning and maintenance than conventional materials. They may also require the use of different cleaning products to preserve their luster and to protect them. Sustainable cleaning practices, which may be a requirement of a facility or tied to a particular Green certification, typically call for the use of cleaning materials that are less toxic to people and to the environment. This may also factor into the lifetime appearance and performance of the project.

While product inadequacy or failure is not exclusively a Green issue, it does appear that these types of claims will be on the rise as new products are rapidly developed, brought to market, and put into use. Depending on the areas impacted, the embedded nature of the product (how easy is it to remove and replace), and the necessity of a repair or replacement, Green material and equipment failures could represent small or large dollars.

6. Damage to environmental and professional reputation

As previously stated, the consideration of sustainability in learning institutions is a demonstrated priority that seems to go beyond purely economic decision-making. Although difficult to quantify, a school's commitment to sustainable practices has been shown to be a significant factor when prospective students are considering enrollment. In a 2009 survey of over 10,000 prospective students by Princeton Review, 68% said that information about a university's commitment to sustainability would be valuable for their assessment of whether to apply to that school. [12] In other words, conveying a Green image that is embodied in school policy is very important.

The Northland Pines case mentioned previously is one example of this. Although the USGBC has stood behind the school and supported their efforts to restore its LEED Gold status, many residents of the community have come out publicly against the school, its designers, and the USGBC. Whether or not the public nature of the challenge has damaged any of the involved

[12] "*The Role of the LEED Green Building Rating System in Higher Education: Recent Trends and Status,*" September 25, 2010, Brooks Doughtery

parties is open to discussion. At this time Northland Pines can still call itself the first LEED Gold certified school in the United States.

Although it is not a school project, the issue of unmet promises also came up in a Green/LEED related residential dispute at the Riverhouse in Battery Park City, New York. The case filed in 2010 by Steven Gidumal, was brought against the developer of a LEED Gold-hopeful condominium building who was alleged to have misrepresented the true sustainability of the building based on a variety of alleged construction defects including the inadequacy of the "Green" heating system and excessive air infiltration at the curtain wall.[13] This is another example of how Green promotion and promises can be challenged publicly. As of mid 2011, the developer still had several units left to market as it continued to promote its challenged Green features.

Risk to reputation is real but it is also difficult to quantify and difficult to anticipate. Protection and defense of a school's environmental reputation will be best served by its openness and consistency in developing an environmental policy, a policy that will surely include positions on construction and compliance.

Mitigating the Risks

Although the specific risks and their impacts do vary, the best approach to mitigating all of these risks is to allocate them clearly and appropriately in advance of a dispute. While it is typically the owner and their design professionals that carry the most risk, it is still in the interest of all participating parties to clearly allocate the risks before any work is performed.

In a Green project, contracts should allocate all special compliance requirements that are associated with the work including any specifics in the design, construction, commissioning, or documentation of the project. For example, if the project is slated to be LEED certified at any level, proper documentation related to disposal of materials must be secured during the course of construction as it may not be possible to obtain it later. This may require the participation of the general contractor, several subcontractors, and a LEED consultant.

It is also very important to ensure that contracts for Green construction projects do not provide any guarantees, particularly guarantees to meet subjective compliance levels (e.g. guarantees of LEED Gold certification). While it is the implicit and in some cases an explicit requirement for the designer and the builder to comply with building codes and regionally applicable statutes,

[13] *"Condo Owners Go for Green with Suit,"* 5/29/2010, Wall Street Journal

offering guarantees or promises that the completed design or completed building will be certified at a particular level by an independent organization such as the USGBC creates exposure that will not be covered by a standard insurance policy. This would be the equivalent of an architect guaranteeing an owner planning commission approval for its project – impossible and imprudent. Model contract forms and language are available from a variety of industry groups including the Associated General Contractors of America (Consensus Docs 310 Green Building Addendum) and the American Institute of Architects (Owner Architect agreement B214-2007).

In addition to adopting appropriate contracts, further consideration must also be given to the makeup and leadership of the project team. If at all possible, team members should have experience with Green design and construction and understand the new procedures and processes that are required. At the very least, project participants must be open to the type of collaborative working environment that is required. This has been consistently cited as the number one reason for success in Green projects. [14] Collaboration minimizes risk.

Throughout the project it is important to regularly revisit any previously stated or defined sustainable design goals and to affirm that they are being satisfied. This is true during design and during construction. For many professionals, this type of quality control review is already standard practice to ensure compliance with construction documents, with code, and with owner requirements. If it is not, it should be included as a contract requirement.

Finally, tight definition of roles and responsibilities as they relate to the project's Green requirements must be established at the beginning of the project to avoid any confusion as the project proceeds. For example, a single agent should be assigned to stay current on the federal, state and local environmental laws that impact the project and to keep the other participants informed of them throughout design and construction.

Beyond the general strategies listed above, schools and campuses need to set their own priorities regarding Green design in order to establish appropriate protections. If actual energy conservation and reduced water use are priorities, then rigorous monitoring and commissioning should be established regardless of the measures that are dictated by codes or by certification. If beautiful, durable, and sustainable buildings are important, it may be more prudent to use only tried and tested materials and systems; new is inherently riskier. In other words, it is essential that owners define the primary sustainable goals and work with their project teams to protect them throughout the design and construction process. This is one of

[14] *"Project Management and Green Buildings: Lessons from the Rating Systems"* Peng Wu and Sui Pheng Low, ASCE, April 2010

the challenges of using LEED certification as the aspiration for a project – LEED is not just one or two priorities, it is many. Furthermore, LEED is not even a single or static standard – it is changed every three years, and sometimes quite significantly.

Additional suggestions and strategies can be found in a Center for Green Schools Higher Education publication titled "*Roadmap to a Green Campus*" that is available for download on the Center for Green Schools website.[15] Although the USGBC is a primary sponsor of the publication, the guide is not geared toward its LEED system and includes numerous examples which are exclusive of any specific certification system.

Low Risk Greening

Whether it is a new building, a significant remodel, or the addition of high-profile Green equipment or systems, the draw to embark upon a Green project can be irresistible. In fact, true sustainable design can often be achieved more expediently and without taking on the various risks described above. Consider a few of the following Green risk-free possibilities before undertaking a risky capital project:

1. **Maximize utilization of space within existing school structures:** New construction by its very nature is not a particularly sustainable practice because it consumes resources, requires energy to perform, and once completed, consumes even more energy and resources. Is there unused space in an existing building that could be repurposed? Is currently filled space being well utilized? Space planning is a very Green exercise and, when pursued with a charter of improving sustainability, may find more acceptance among staff members who may otherwise feel negatively impacted by a money-saving space shuffle.

2. **Optimize the schedules that define demands on space**: Consider the impact that academic calendaring and daily scheduling has on space usage. The need for classroom or lecture space is often driven by demands that are related to overlapping daily lecture schedules, school hours, or school closures. Within reason, these impacts should be considered when new construction or remodeling is being planned.

3. **Achieve full lifecycle benefits from existing buildings and equipment:** Existing buildings and equipment already represent spent resources so it may not be a very sustainable move to rush to replace them simply because something newer and more

[15] "*Roadmap to a Green Campus*" on http://www.centerforgreenschools.org/campus-roadmap.aspx

efficient is available. Lifecycle cost analysis (LCCA) and/or lifecycle sustainability analysis (LCSA) should be performed to evaluate the economics and principal of the proposed work.

4. **Improve other sustainable campus practices in lieu of investing in optional certification programs:** Focusing too intently on one specific building or building system replacement plan may take attention and funds away from efforts that may yield far more sustainable results. What company does the campus buy its energy from? How about other products and supplies? Is there a recycling program? What about campus transit offerings? And the list goes on. Some of these items can be addressed by utilizing the USGBC's "Existing Building: Operations and Maintenance" program or others which evaluate and certify practices on existing buildings

Finally, if one of these risk-free options is not available and new sustainable construction is the only viable alternative left for Greening your school, remember a few key principles:

- Establish, prioritize, and monitor the guiding Green principles throughout the project;
- Secure a design and construction team that is experienced in Green design and construction and that is willing to be collaborative; and,
- If possible, reconcile the school's standards and policies with current laws and desired optional standards.