Green Building: Assessing the Risks
Feedback from the Construction Industry
Green Building: Assessing the Risks
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Publishers
Catha Pavloff, LEED AP
Michael Feigin

Editor
Al Modugno

Project Leader
Patrick Mullen

Designer
Brad Hoss

Graphics Coordinator
Cameron Miller

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“The challenges we face globally to reduce greenhouse gas emissions and also adapt to the changes that are inevitable are enormous.”

Adele Simmons
Keynote Speaker: Chicago forum
Director, Marsh & McLennan Companies, Inc.
Co-Chair, Mayor of Chicago’s Task Force Preparing a Climate Change Plan for the City of Chicago

"The race for talent increasingly requires a credible commitment to the environment."

Jim Dinegar
Keynote Speaker: Washington, D.C. forum
President and CEO
Greater Washington Board of Trade
Introduction

It isn't often that a new idea comes along that will fundamentally alter the way we think about design and construction. As it continues to gain momentum, the green building movement appears to be such an idea. Green design and construction enables us to look beyond the usual paradigms of time, money and quality by using the green-built environment as a way to work toward improving our planet.

The number of green buildings in the United States is increasing – as of March 2009, the United States Green Building Council’s (USGBC) Leadership in Energy and Environmental Design (LEED®) program has 18,468 LEED® registered commercial projects and 2,384 LEED® certified commercial projects. This continued growth seems to be minimally impacted by the current economic environment.

The market’s resilience may be traced to two primary causes (1) an increasing awareness that green buildings tend to be more economical to operate, and (2) the implementation of new government policies that will help promote or perhaps mandate eco-friendly features. For example, when President Obama recently announced some of his administration’s green initiatives, they included modernizing and greening schools, greening federal buildings, weatherization assistance programs, energy efficiency and conservation block grants, greening public housing, and green job training.

While the numerous potential benefits of building green have been the subject of a great deal of news media coverage, the risks associated with green building have received less visibility. Nonetheless, an understanding of potential exposures, as well as approaches to manage and mitigate them, is critical both to the economic viability of the green-built environment and to maintain the momentum behind the green design and construction movement.

With this in mind, the Marsh Green Building Team (see box on page 2) held a series of four interactive forums in major U.S. cities to identify the most significant risks associated with green design and construction, based upon feedback from those in a position to understand these risks the best: the owners, builders and designers of green buildings. This report presents the findings from our forums, as well as some of the potential solutions to the risk issues identified.

No doubt, the tremendous momentum around green building today is translating into a wide range of exciting design and construction opportunities around the country. As you drive your enterprise to make the most of these opportunities, we believe a clear understanding of the risks and a framework for addressing them will go a long way toward helping you achieve your objectives and enhance your results.

Sincerely,

Michael Feigin
Marsh Global Construction Practice Leader

Catha Pavloff, LEED AP
Marsh Green Building Team Leader
The number of green building projects across the U.S. is continuing to grow despite the current worldwide credit crisis. Indeed, the trend in the U.S. may accelerate due to federal, state, and local requirements to build green and green incentives included in the economic stimulus package introduced by President Obama’s administration.

Despite the widespread focus on the opportunities associated with building green, there has been relatively little attention given to the risks of these projects.

A total of 55 construction industry executives participated in one of a series of four half-day forums that Marsh held recently in major U.S. cities. They identified five categories as their biggest concerns with respect to green building projects. The five risk categories the participants consider most serious on the basis of potential cost impact and likelihood of occurrence are: financial, standard of care/legal, performance, consultants/subconsultants and subcontractors, and regulatory.

The financial risks identified in Marsh’s forums related to the impact of green design, construction and ownership on profitability, cost, and the ability to complete projects on budget. They encompass such variables as the sustainability of green building in the context of the current economic downturn, the availability of affordable insurance solutions, volatility of commodity prices, subcontractor credit capacity, the availability and cost of surety bonds, lack of understanding by lenders and financial institutions with respect to the green building environment, and the cost of the LEED® certification process.

Risks related to standard of care/legal issues include challenges associated with achieving appropriate LEED® certification as required by the owner, tenant, or other critical third party, defining standard of care as the green building environment evolves, competency of team members, and evolving building codes with the potential for strict liability standards.

Performance risks center around the ability of products, systems and buildings to perform in a green environment.

Risks related to the use of consultants/subconsultants and subcontractors include challenges associated with making sure firms assigned to a project have the appropriate training and expertise, and questions about the ability to replace a defaulting contractor with one that has appropriate certifications and qualifications.
- **Regulatory** exposures involved uncertainty about how the regulatory environment might evolve with respect to green building, including the concern that the potential for punitive damages might drive owners to seek warranties and guarantees to recapture costs from contractors and subcontractors.

- The five risk categories cited as the most significant were not fully reflected in the findings for each of the four forums. Participants in each city identified a different set of risks, although the five risk categories cited here were the most widely mentioned. Other significant risks included supply chain challenges, technology, brand and reputation exposures, education, and return on investment.

- Despite the concerns about these exposures, many of these risks can be addressed to varying degrees through the availability of commercial insurance and surety solutions, or in some instances mitigated through contractual agreements. The commercial insurance market is evolving with respect to green building exposures. As underwriters become more adept at assessing and quantifying risks associated with green building, we may see a growth of green-building-specific coverages.

- Most of the forum participants have experience in the LEED® rating system. Their perspectives are reflected throughout the report.

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**About Marsh’s Green Building Team …**

Established in 2008, the Marsh Green Building Team focuses on the U.S. green-built industry. The team includes Marsh experts in all risk and insurance disciplines associated with design and construction, real estate development and management, and environmental issues. The team provides information, tools and resources for Marsh colleagues and clients throughout the U.S. to understand, assess, and manage the wide range of potential risks associated with green design, construction, and building ownership.

In 2008, Marsh published *The Green-built Environment in the United States: The State of the Insurance Marketplace*, the first report on insurance market conditions for green projects. The report was an outgrowth of Marsh’s effort to assess how the commercial insurance marketplace addresses green risks through its products and service offerings.

In the next phase of its work to understand and report on the potential exposures associated with green design, construction, ownership, and management, Marsh held a series of forums in four U.S. cities to gain an understanding of how executives who manage design and construction in various parts of the country evaluate risks and opportunities in this sector, and to uncover opportunities to develop solutions to exposures related to the green-built environment. This report summarizes the findings of these discussions.
"With the down market, it has become even more important for industry players to capture the opportunity created by the demand for more sustainable buildings, not only in the U.S., but around the world."

Harvey M. Bernstein, F. ASCE, LEED AP
Keynote Speaker: New York City forum
Vice President of Industry Analytics, Alliances & Strategic Initiatives
McGraw-Hill Construction
To succeed in the evolving green-built environment, executives and managers who are responsible for design, construction, and building ownership need to have a clear understanding of the potential risks associated with green building, as well as some familiarity with the approaches that can be used to identify, assess, manage and mitigate these risks.

In order to gain perspective on the major risks issues associated with green design and construction, Marsh reached out directly to those currently best positioned to articulate their concerns about risk, notably the owners, builders, and designers of green buildings.

To engage these executives, Marsh held a series of interactive forums in 2008 and early 2009 in four U.S. cities where green building has gained significant momentum: Chicago, Washington, DC, San Francisco, and New York. An average of 15 executives attended each of the forums, making for a combined total of 55 participants. These executives included CEOs, CFOs, partners, principals, senior operational personnel, general counsels, risk managers, and directors of sustainability from owners, developers, homebuilders, contractors and design firms. The participants all had experience with one or more aspects of owning, developing, designing, or construction of green structures.

The forums all had a single format. Each forum began with the perspective of a prominent keynote speaker, followed by a presentation on the state of the green insurance market conducted by Marsh. Next was a roundtable discussion involving all of the forum’s participants on what they perceived to be the key risks associated with the green-built environment. The risks identified by the participants then were consolidated into 10 categories. Each participant was asked to map these risks graphically based on their likelihood of occurring and potential cost impact. Despite the rapid and unexpected downturn of the economy, the feedback did not change materially between the first forum, which was held in Chicago on June 25, 2008, and the final forum, which was held in Washington, DC, on January 29, 2009.

While the results that follow might be characterized as anecdotal, they do represent direct feedback from members of the industry who based their commentary on their experiences in the green building sector. Thus, we are able to provide a composite of what these participants consider to be the most significant potential risk issues confronting those involved in green-built projects.
The Green Building Risk Forums provided the opportunity to identify the most significant potential risks participants felt are associated with green building, and then to rank and map them on the basis of their likelihood of occurring and potential cost impact. The following is an outline of the process Marsh used in each of the forums:

- **Identifying perceived risks** – This involved a facilitated brainstorming session in which each participant identified risks they perceived to exist in the green-built environment. The risks were listed by the facilitators during the discussion in the order they were received without any initial ranking for likelihood or cost impact. The facilitators subsequently identified key themes and grouped the risks into 10 broad categories.

- **Ranking risks** – The participants ranked the 10 risk categories according to their likelihood and cost impact, based on guidelines provided by Marsh (see table entitled, “Green Forum Risk Mapping: Key to Ratings”). Marsh developed a composite average of this feedback to produce an overall risk map identifying the results of the forum. This risk map was circulated to the participants, together with a list of specific exposures included under each risk category.

- **Risk management tools & strategies** – Each forum concluded with a roundtable discussion where all participants were asked to identify existing or potential insurance solutions and other risk management approaches that might help to manage or mitigate the risks identified in the forum.

### The Risk Mapping Process

In its most fundamental form, a risk map technically is a scattergram that displays graphically the risks facing a business, entity, organization, or industry. Risks are plotted in a two-dimensional graph based on their potential cost impact and likelihood of occurring. Typically, the vertical axis is used to plot cost impact and the horizontal axis, likelihood. Thus, using these parameters, the most significant risks in terms of likelihood and cost impact will appear in the upper right-hand quadrant of the risk map, while risks with low likelihood and low cost impact will appear in the lower left-hand quadrant.
A risk map for an individual company or industry can represent actual occurrences over an extended period of time, which may be used for business planning and as a tool to make insurance purchasing and risk management decisions. In this case, risks identified in the forums were mapped on the basis of perceptions, and do not represent actual events. Nonetheless, with respect to the green-built industry, risk mapping may help facilitate the following:

- Enable multiple stakeholders (owners/developers, contractors and design firms) to reach consensus on risks that may have material impact on building green.
- Prioritize the risks identified in terms of likelihood of occurring and potential cost impact.
- Evaluate the efficacy of existing controls.
- Identify and prioritize risk management protocols.

Green Forum Risk Mapping: Key to Ratings

<table>
<thead>
<tr>
<th>Likelihood</th>
<th>Numerical</th>
<th>Ranking</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>1-2</td>
<td>Rare</td>
<td>1-2</td>
<td>Rare, very unlikely to occur during a three-year period.</td>
</tr>
<tr>
<td>3-4</td>
<td>Unlikely</td>
<td>3-4</td>
<td>Unlikely to occur within a three-year period.</td>
</tr>
<tr>
<td>5-6</td>
<td>Moderate</td>
<td>5-6</td>
<td>May occur at least once every three years.</td>
</tr>
<tr>
<td>7-8</td>
<td>Likely</td>
<td>7-8</td>
<td>Likely to occur at least once every three years.</td>
</tr>
<tr>
<td>9-10</td>
<td>Almost Certain</td>
<td>9-10</td>
<td>Almost certain to occur several times during a three-year period.</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Potential Cost Impact</th>
<th>Numerical</th>
<th>Ranking</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>1-2</td>
<td>Insignificant</td>
<td>1-2</td>
<td>Minimal direct loss/opportunity cost; transient health impact; high staff turnover in non-critical areas; transient environmental or community impact; reputation intact; minimal to no impact on shareholder support.</td>
</tr>
<tr>
<td>3-4</td>
<td>Minor</td>
<td>3-4</td>
<td>Small but noticeable direct loss/opportunity cost; serious health impact on one person; general staff morale problems or key employee leaves; immaterial effect on environment or community; intra-industry knowledge of event but no media attention; marginal decrease in shareholder support.</td>
</tr>
<tr>
<td>5-6</td>
<td>Moderate</td>
<td>5-6</td>
<td>Noticeable direct loss/opportunity cost; environmental harm with community complaints privately made; poor reputation as an employer; adverse local media coverage; concerns raised by shareholders; lesser regulatory disciplinary action; serious health impact on multiple people.</td>
</tr>
<tr>
<td>7-8</td>
<td>Major</td>
<td>7-8</td>
<td>Serious direct loss/opportunity cost; a single fatality; major environmental hazard and high profile community concerns; some key executives leave, company not perceived as an “Employer of Choice” with high staff turnover in critical areas; adverse media coverage in a significant city, significant decrease in shareholder support; major regulatory disciplinary action.</td>
</tr>
<tr>
<td>9-10</td>
<td>Catastrophic</td>
<td>9-10</td>
<td>Near-catastrophic direct loss/opportunity cost; multiple fatalities; a large number of key executives or directors leave; catastrophic environmental harm and community outrage – potential for class action litigation; adverse global/national media coverage; major public concerns raised with major loss of shareholder support; loss of regulatory authorization.</td>
</tr>
</tbody>
</table>
While individual risk maps were created for each of the forums (see appendix), a composite risk map was developed and is presented below. This map was designed to capture the perspectives of all 55 participants involved in this process. At each forum, the participants expressed their concerns about individual risks and challenges and then participated in a risk mapping session by “voting” on the cost impact and likelihood of each risk category.

The composite risk map resulted in the following top five risk categories:

1. Financial
2. Standard of Care/Legal
3. Performance
4. Consultants/Subconsultants & Subcontractors
5. Regulatory

Here is a brief description of each of the risk categories, along with feedback from the participants that delineate specific exposures under each category.

### Composite Risk Map

<table>
<thead>
<tr>
<th>#</th>
<th>Risk Category</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Brand and Competitive Edge/Reputation</td>
</tr>
<tr>
<td>2</td>
<td>Consultants/Subs</td>
</tr>
<tr>
<td>3</td>
<td>Education</td>
</tr>
<tr>
<td>4</td>
<td>Financial</td>
</tr>
<tr>
<td>5</td>
<td>Performance</td>
</tr>
<tr>
<td>6</td>
<td>Regulatory</td>
</tr>
<tr>
<td>7</td>
<td>Return on Investment</td>
</tr>
<tr>
<td>8</td>
<td>Standard of Care/Legal</td>
</tr>
<tr>
<td>9</td>
<td>Supply Chain</td>
</tr>
<tr>
<td>10</td>
<td>Technology</td>
</tr>
</tbody>
</table>
Financial

These risks relate to the impact of green design, construction and ownership on profitability, cost, and the ability to complete projects on budget. Specific issues associated with financial risks include:

- Concerns about whether green is sustainable in an economic downturn
- The ability to obtain insurance solutions at a fair price
- Volatility of world commodity prices
- Credit capacity of subcontractors
- Surety capacity to support green construction
- Ignorance of lenders and financial markets with respect to green
- Failure to secure incentives and grants as part of overall project
- Cost of the LEED® certification process
- Increased risk of delay because the building is green
- Lack of knowledge and experience resulting in flawed return on investment (ROI) analysis and decision not to go green
- Danger of investing in something clients may not want to buy
- Lack of knowledge about green buildings’ long-term performance affecting ability to accurately determine ROI

Standard of Care/Legal

These risks center on determining and applying an appropriate standard of care and how the application of that standard might affect project participants. They include:

- Not attaining the level of LEED® certification expected by owner, tenant, or other third party
- Challenge of determining an appropriate standard of care as green building expertise continues to evolve
- Evolving building codes with potential for application of a strict liability standard
- Competence of team members
- Uncertainty with respect to allocating fault and determining responsibility. Lines may be blurred between owner decisions, design and construction means and methods
- Lack of operation standard for new construction
- Taking design to the edge – more aggressive design may mean less room for error
- Many green standards currently are voluntary, not required under law
- Untested contract language
- Reluctance of parties to share risk
- An attractive nuisance (playing on green roofs, swimming in collection pools)
- Relationship between designer and commissioning agent
- Longer term liability exposure from new products and systems
- Not getting risk management staff involved until after the fact
- Concerns about whether contractors are taking on design responsibility not covered by insurance
Performance

These risks center on the ability of products, systems and buildings to perform in a green environment and include:

- Product performance and reliability
- Longevity and warranty of new products
- Use of untested materials, unknown quality of green materials
- Ability to quantify the results, especially if the game changes in the middle of the project
- Measuring both product and building performance
- Impact of post construction build-out or operations on sustainability and performance
- Concern that green certification will be seen as trumping building code and good building practices
- Potential exposures for owners to longer term ownership issues because of changing standards; even if not “required,” owner may not be able to keep up with expectations

Consultants, Subconsultants & Subcontractors

These risks involve the challenges associated with identifying and using the right consultants, subconsultants, and subcontractors on a project and include:

- Contractors and subcontractors agreeing to standards which are not within their control
- Using consultants and subcontractors that have inadequate training and expertise
- Lack of a quality control interface
- Default of a qualified subcontractor and challenge of replacing them with another qualified subcontractor

Regulatory

These exposures involve uncertainty about how the regulatory environment might evolve with respect to green building and include:

- Risk of regulatory demands becoming punitive; if regulations become integral with the meaning of being green, there is potential for direct economic impact on a business
- Risk that punitive damages will be a driver for owners to seek warranties and guarantees to recapture costs from other project participants
- Risk that green regulations increase as number of green product and service providers diminishes
- Concern that standard of what is green evolves and project owners and participants lose potential benefit
- Long-term liability of changing requirements and buyer expectations, such as: “The building was LEED® certified when I moved in and should continue to meet LEED® requirements forever.”
Beyond the top five risk categories, several other risk categories were identified by participants during one or more of the forums. These risks include the following:

- **Brand and competitive edge/reputation**, which centers on the potential impact of green design, construction and ownership on a company's brand and reputation. This includes concern about green merely being a fad, or the opposite occurring where companies that forgo building green lose competitive advantage and fail to attract tenants, buyers, as well as the best available talent.

- **Education**, which involves the need to have appropriate experience and education with respect to the green-built environment. Issues related to education include recruiting and retaining qualified staff, and having the ability to think through and resolve problems that may arise during a project requiring specialized green expertise.

- **Return on investment (ROI)**, which involves the ability to determine whether the benefits of green outweigh the costs. This category encompasses measuring ROI across various aspects of a project, including delays related to obtaining green building materials, investment in appropriate levels of LEED® certification, uncertainty surrounding the long-term performance of green buildings, and the potential failure to attract tenants or buyers.

- **Supply chain**, which involves issues related to the competence levels of employees, consultants and vendors with respect to green, control over contractors, including those farther down the chain, and the availability and timely delivery of specialized materials and those in short supply.

- **Technology**, which involves concerns about the availability and use of technology suitable for green design, construction and ownership, as well as building green into Building Information Modeling and the potential lack of technological sophistication and experience of certain team members.
Across all of the forums, participants gave priority rankings to risks that directly affected the bottom line including financial, return on investment and standard of care/legal liability. These perceptions may be underscored today in light of the current economic crisis, evolving green legal standards, and the volatility of the regulatory environment – not to mention the relative newness of green systems and products.

Interestingly, most participants did not view the categories related to brand, competitive edge, reputation, supply chain, and technologies as critical risks. "Brand" was placed in the "low risk" category and technology, return on investment, education, supply chain, and consultants, subconsultants & subcontractors ranked as "moderate risks." Only three risk categories were observed “high risks” in the composite risk map: financial; standard of care/legal, and performance.

The following is a breakdown of the top five risk categories ranked by the individual forums:

<table>
<thead>
<tr>
<th>Top Five Risk Categories</th>
<th>Chicago</th>
<th>Washington, D.C.</th>
<th>San Francisco</th>
<th>New York City</th>
</tr>
</thead>
<tbody>
<tr>
<td>1 Financial</td>
<td>Financial</td>
<td>Financial</td>
<td>Performance</td>
<td></td>
</tr>
<tr>
<td>2 Performance</td>
<td>Education</td>
<td>Regulatory</td>
<td>Standard of Care/Legal</td>
<td></td>
</tr>
<tr>
<td>3 Standard of Care/Legal</td>
<td>Consultants, Subconsultants &amp; Subcontractors</td>
<td>Performance</td>
<td>Consultants, Subconsultants &amp; Subcontractors</td>
<td></td>
</tr>
<tr>
<td>4 Supply Chain</td>
<td>Return on Investment</td>
<td>Education</td>
<td>Technology</td>
<td></td>
</tr>
<tr>
<td>5 Regulatory</td>
<td>Technology</td>
<td>Return on Investment</td>
<td>Return on Investment</td>
<td></td>
</tr>
</tbody>
</table>

In comparing findings for each of the forums, there were a number of similarities as well as several notable distinctions. While the timing of the forums and the evolving economic backdrop may account for some of the variations, geography and other factors may also be at play in trying to explain some of the unique findings associated with individual forums. The following are some observations worth noting:

- Not one of the composite top five risks was ranked in the top five by participants in every one of the forums.
- Although financial was the top risk in the forums held in Chicago, Washington, D.C., and San Francisco, it was not included in the top five of the New York forum. It is worth noting the latter forum was held in January 2009 when the U.S. economy hit a recent low.
- Performance was listed in the top five in all forums except Washington, D.C.
- Standard of care/legal appeared in the top five in Chicago and New York City only.
- Regulatory appeared in the top five in Chicago and San Francisco only.
- Supply chain appeared only in Chicago’s top five.
- Education appeared in the top five in Washington, D.C. and San Francisco only.
- Technology appeared in the top five in Washington, D.C. and New York City only.
"We are being regularly asked today if the continuing downturn in the economy has reduced the emphasis on sustainability. In many ways, the answer is actually the reverse. At its core, sustainability is about conservation and there is even more reason to conserve today."

David Pogue
Keynote Speaker: San Francisco forum
National Director of Sustainability
CB Richard Ellis
The Marsh Green-Built Forums were designed to identify and prioritize, or map, the most significant potential risks associated with the green-built environment in the opinion of owners, builders, and designers of green buildings. While there may not be ready solutions to transfer or mitigate many of the exposures uncovered by the participants, the commercial insurance marketplace may be able to address some of the exposures while a number of others could potentially be addressed through sound risk management practices.

We examined each of the top five risk categories identified by the participants and examined them in the context of potential solutions. The following chart summarizes this exercise, which organizes the solutions into three broad categories: insurance/surety, contractual and operational. Some of the solutions are applicable to multiple risk categories.

We elaborate on each of the solutions in this section of the report.
### Top Five Risks Categories - Several Potential Solutions

<table>
<thead>
<tr>
<th>Risk</th>
<th>Insurance/Surety</th>
<th>Contractual</th>
<th>Operational</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Financial</strong></td>
<td>• Collaborate with underwriters</td>
<td>• Fair and equitable risk allocation</td>
<td>• ROI and lifecycle analysis</td>
</tr>
<tr>
<td>The impact of green design,</td>
<td>• Pay close attention to property, business interruption, and extra expense</td>
<td>• Mutual waivers of consequential damages.</td>
<td>• Appropriate measurement and verification</td>
</tr>
<tr>
<td>construction and ownership</td>
<td>limits</td>
<td>• Compensation tied to scope</td>
<td>• Proper budget contingency</td>
</tr>
<tr>
<td>on profitability, cost and the</td>
<td></td>
<td>• Equitable standard of care</td>
<td>• Build enough LEED® time in the schedule</td>
</tr>
<tr>
<td>ability to complete projects on</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>time</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Standard of Care/Legal</strong></td>
<td>• Insurance should track with contractual risk allocation</td>
<td>• Equitable standard of care; Policies typically only respond to a</td>
<td>• Avoid vague, misleading and unverifiable green representations and</td>
</tr>
<tr>
<td>The impact on the level and</td>
<td>• Insurers’ risk and contract management training services</td>
<td>negligent standard of care</td>
<td>advertising</td>
</tr>
<tr>
<td>application of the standard of care</td>
<td>• Performance obligations to green should not void any insurance obligations</td>
<td>• Specific language regarding roles and responsibilities during the LEED®</td>
<td>• Design firms should resist signing LEED® letter templates</td>
</tr>
<tr>
<td>and the impact of this on project</td>
<td></td>
<td>process</td>
<td>• Avoid mismatched expectations</td>
</tr>
<tr>
<td>participants</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Performance</strong></td>
<td>• Collaborate with underwriters on risk</td>
<td>• Establish an equitable standard of care</td>
<td>• Avoid performance claims</td>
</tr>
<tr>
<td>The ability of products, systems</td>
<td>• Surety products</td>
<td>• Specific scope for LEED® credits</td>
<td>• Underwriters Laboratories certification program</td>
</tr>
<tr>
<td>and buildings to perform in a green</td>
<td>• Performance obligations do not void any insurance obligations</td>
<td>• Define who is responsible for investigating green products/</td>
<td>• Due diligence in specifying materials, products and design solutions</td>
</tr>
<tr>
<td>project</td>
<td>• New insurance products</td>
<td>systems</td>
<td>• Quality Assurance/Quality Control Programs</td>
</tr>
<tr>
<td>**Consultants/Subconsultants and</td>
<td>• Surety products</td>
<td>• Proper contractual risk allocation</td>
<td>• Subcontractor prequalification process</td>
</tr>
<tr>
<td>Subcontractors**</td>
<td>• Appropriate GL, WC and other insurance coverages</td>
<td>• Clear roles and responsibilities regarding each LEED® credit</td>
<td>• LEED® Training for subs</td>
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<td>The impact of using the right</td>
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<td>• Training for O&amp;M staff</td>
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<td>consultants, contractors, and</td>
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<td>subcontractors on a project</td>
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<tr>
<td><strong>Regulatory</strong></td>
<td>• Know the risks and how insurance responds</td>
<td>• Define who is responsible for securing “green” tax credits and/or</td>
<td>• Understand existing legislation, regulations, codes and possible tax</td>
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<td>The impact of green standards and</td>
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<td>density bonuses</td>
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<td>regulations</td>
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<td>• Equitable standard of care</td>
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<td>**Consultants/Subconsultants and</td>
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<td></td>
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<tr>
<td>Subcontractors**</td>
<td>• Surety products</td>
<td>• Proper contractual risk allocation</td>
<td></td>
</tr>
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The list of exposures identified by the forum participants that ultimately comprised the financial category ranged from risks that are well within the control of the green-built industry, such as failure to secure incentives and grants as part of the overall project, to those that are beyond the realm of an individual entity or the insurance industry altogether to resolve, such as how green building might be affected by a significant economic downturn.

**Insurance/Surety**

As the green building sector continues to expand – and its risks and benefits evolve – those involved in related design, construction, and real estate initiatives, should work with their insurance advisors to monitor how commercial insurance underwriters view and underwrite the risks.

The underwriting community is currently at the beginning of a learning curve and will likely look to various segments of the construction industry to help them understand and assess these exposures.

Similarly, insurance buyers should be aware of how the coverage they obtain is designed to respond to unique green risks, which can range from vegetative roofs and performance guarantees to regulatory fines and penalties.

We believe that the most effective way to ascertain whether insurance coverage is aligned with critical exposures is through a risk assessment that highlights the unique green risks.

At present, the majority of the commercial insurance market continues to be in a “wait-and-see” mode with respect to specialized green coverage and pricing. A key exception to this situation involves the property and builder’s risk markets. With respect to these coverages, it is important to check green risks against relevant property coverages and to pay close attention to the availability of appropriate limits for property damage, business interruption, and extra expense. As necessary, firms need to recognize and fund for higher deductibles and coverage sublimits (for example, as may be applied to vegetative roofs).

**Contractual**

Firms involved in one or more aspects of green building should seek the services of an attorney with experience in green risks. Specific contractual issues related to financial risks in the green-built environment may include:

- Fair and equitable risk allocation based on the respective abilities of the parties to understand and manage risk
- Consideration of mutual waivers of consequential damage
- Prudent use of liquidated damages clauses
- Compensation tied to scope – the appropriate identification and allocation of the cost of complying with a LEED® credit

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Equitable and appropriate standards of care or appropriate compensation for an elevated standard of care or guarantee (Note: Neither of these two contractual provisions should abrogate the coverage provided under the firm’s insurance policies.)

Operational
At the initial stages of a construction project, it is important to understand the lifecycle impact of financial risks.

This can be accomplished through a return-on-investment study, which includes requirements for an effective and disciplined measurement and verification plan for energy and water usage.

Lenders and investors should understand these studies and the impact of green risks and benefits on the ability to repay debt service and to reach performance goals.

Additionally, in construction, budgets should include the cost of pursuing LEED® credits. A budget contingency should be established for anticipated changes in the LEED® credits to be pursued. It may also be prudent to establish a “LEED® contingency” – LEED® point options to enable the project to achieve a desired standard even if points originally planned for cannot be attained.

The schedule should include the critical path impact of the LEED® process, including the acquisition and installation of new systems and technologies.

Performance risks range from the risk of not achieving LEED® certification to the inability of a green product to perform over an anticipated time period. These risks can be significant and may have a significant impact on an owner or tenant’s lease agreement, the ability to repay debt service and compliance with regulations.

Insurance/Surety
Few traditional insurance products currently available are designed to guarantee performance of a building, a company, or a product. An exception is surety, which, by definition, is not insurance but a true performance obligation.

It is important to understand what aspects of performance risks may be insurable and to learn how to manage properly those risks that are not. Equally important is to make sure green-related performance obligations do not void any insurance provisions.

The area of performance risk is evolving – and it may be an exposure that represents an opportunity for the insurance industry to play a role in crafting new products and services.
Contractual
Managing the performance risks of achieving LEED® certification typically involves collaboration between owners/developers, contractors, designers and others (such as commissioning agents and LEED® consultants, for example).

No single entity is responsible for achieving LEED® certification. Thus, it is difficult for any one entity to guarantee contractually the achievement of LEED® certification. In most cases, insurance will not respond to costs arising out of failing to comply with such a guarantee. The parties should work with their legal advisors to contemplate contract language designed to mitigate this shortcoming through an equitable standard of care or appropriate compensation for an elevated standard of care or guarantee. There may be situations where the inclusion of a bonus/liquidated damages provision may make sense.

Performance risks are likely to become increasingly critical and to have wider repercussions if LEED® becomes less voluntary and more mandatory, i.e. through emerging federal, state, and local legislation that mandates LEED® certification.

It is important to determine who is responsible for investigating green products and systems – their availability, purchase, and installation. This process can help mitigate problems from improper material specifications and substitutions related to LEED® credits. It can also help to identify and minimize supply chain risks and their impact on the project schedule and the ability to meet a certain level of LEED® certification. Overall, contracts should clearly delineate who is responsible for what.

Operational
With respect to concerns over product durability, project participants should establish due diligence protocols in specifying materials, products and solutions. These protocols may take the form of quality assurance/quality control programs that contemplate the use of green materials and systems. In addition, the Underwriters Laboratory has developed a new green product certification system that ultimately may help the industry gain wider acceptance for these products.

Document control can be an important aspect of mitigating performance risk as it relates to the achievement of LEED® certification. This may include a quality-control LEED® Action Plan that identifies the what, who, and how of the LEED® administration process, and LEED® credit management spreadsheet to track progress.

It is critical that all project participants be properly vetted with respect to experience, understanding, application, technology and processes associated with green design and construction and achieving desired certification outcomes.

Finally, it is important to avoid incorporating performance and related green claims in marketing materials.
The forum participants generally acknowledged that much of this risk emanates from a lack of experience among consultants, contractors, and subcontractors with respect to green projects. Thus, as part of an effort to mitigate this risk, someone with a thorough understanding of the LEED® credit system should be responsible for the overall management and supervision of a project. The risks related to inexperienced consultants and contractors can impede a green project’s ability to achieve LEED® certification, result in schedule delays and increase the risk of improper material specifications.

The lack of appropriate training and experience on the part of the operations and maintenance staff can be just as critical and may negatively affect an owner’s ability to achieve the projected return on investment.

Insurance/Surety
As is the case with traditional (non-green) construction, it is important to verify and monitor the adequacy of the insurance coverages of consultants, contractors, and subcontractors. Particular attention should be paid to professional liability, general liability, including products and completed operations, workers’ compensation and surety. These coverages should be monitored not only through the design and construction phases, but also post occupancy. In reviewing coverages, special attention should be paid to any unique green exclusions, for example, vegetative roof exclusions.

Effective professional liability insurance is very important for contractors, design professionals, consultants and even some subcontractors. Currently, there are no exclusions in professional liability policies for green design and construction. But policies should be reviewed to confirm that is the case. This is especially true for new evolving green consultants, which range from a newer hierarchy of LEED® Accredited Professionals (AP) to commissioning agents.

Contractual
As with the other risk categories, equitable risk allocation is important here. Roles and responsibilities should be clearly defined with respect to the pursuit of each LEED® prerequisite and each credit. The role of the architect vs. the commissioning agent should be clearly spelled out. Just like the other risk categories, an appropriate standard of care should be established, elevated standards should be compensated appropriately, duties and obligations should be spelled out clearly and firm guarantees should be avoided so as not to inadvertently eliminate valuable insurance coverages.

Operational
A proper prequalification process is important. Management and supervision of the project should be done by someone with a working knowledge of the LEED® credit system. The same should apply to the selection of the commissioning agent.

Training is critical, particularly on the LEED® process, proper documentation and new
technologies. The operations and maintenance staff should be trained where feasible, but, at the very least, be given written manuals and, where applicable, purchaser orientation. Quality assurance/quality control is critical.

Regulatory

As the forum participants noted, many U.S. cities and states have adopted green building codes and regulations – many of which incorporate LEED® and other green standards. Green building seems to be evolving from being voluntary to being mandatory. This will likely have a substantial impact on the risk implications associated with green design and construction. Non-compliance with regulations could impact all stakeholders, including the owner, design firms, contractors, LEED® APs, commissioning agents and others.

At the same time, these cities and states are offering financial incentives, including tax credits and density bonuses. This landscape calls for close monitoring as changes are occurring rapidly.

Insurance/Surety

Most insurance policies do not respond to non-compliance with regulatory requirements. (Exceptions include some environmental and financial policies.) Thus, it is very important to know the regulatory risks, including the risk of non-compliance, who is impacted by related actions and how insurance responds, if at all.

Contractual

In all contracts it is important to identify the firms responsible for securing green tax credits, density bonuses and any other financial incentives. Equally important is to identify and include the potential consequences of a failure to comply with any regulatory requirements.

Operational

Firms involved in green building projects should identify those responsible for keeping current on existing legislation, regulations, codes and proposed tax incentives, and for communicating them as appropriate to the project team. Developers, in particular, should stay apprised of regulatory requirements.

Standard of Care/Legal

This is another risk area that will likely continue to evolve. It will be affected by the creation of green contract language, the AIA Canons of Ethics and the growing adoption of green building codes and regulations by cities and states. In addition, it likely will be tested through claims activity and in the courts.
Insurance

First and foremost, it is important to understand that currently, virtually no insurance coverage responds to performance guarantees and warranties. In particular, professional liability policies that cover design firms and other consultants typically only respond to a negligent standard of care and typically exclude contractual warranties and guarantees.

Where feasible, it is important that insurance coverage tracks contractual risk allocation and vice versa. In addition, many insurance carriers offer contract management services for firms involved in green design and construction, often at no additional charge.

Contractual

It is important to work with attorneys who are experienced in green design and construction risks and liabilities. The same principles set forth above with respect to setting appropriate standards of care apply here. As stated above, all parties should be careful not to void valuable insurance programs.

Operational

Firms should avoid vague, misleading and unverifiable green representation and advertising. Design firms should resist signing LEED® letter templates, because by doing so they could inadvertently warrant or guarantee an outcome. It is important to avoid mismatched expectations between the owner and the design construction teams.
Green design and construction, while relatively new, should not be feared or avoided. Like any other risk, it needs to be understood and managed. It wasn’t long ago that Computer Aided Design was new and untested. Now it is just another tool in the design and construction process.

It will likely not be too long before Green Design and Construction is also just another part of the process of building. But it is not there yet. Until it is, we will continue to facilitate these discussions, and to explore ways to better identify, quantify and manage the risks inherent in the green-built environment.

The work we undertook with the help of 55 industry executives and our keynote speakers during our forums represents an important first step in this process. Their insights provide a timely perspective on the most critical risks facing those involved in various aspects of green design, construction, ownership and management today.

While the green-built sector is still in its infancy, these types of dialogues may help lead to the development of more targeted and effective insurance and risk management solutions for green design and construction. In turn, they may help reduce volatility associated with these projects, facilitating wider investment from the private sector, improved performance and enhanced success for all participants.

In the meantime, we will continue the mission of the Marsh Green Building Team: To keep Marsh colleagues and clients apprised of the risks, opportunities and solutions in green design, construction and building ownership.

As we progress along this path, we will continue to invite you to be a critical part of this journey.
Appendix

Chicago Forum | June 25, 2008

Keynote Speaker:
Adele Simmons
Director, Marsh & McLennan Companies, Inc.
Co-Chair, Mayor of Chicago’s Task Force Preparing a Climate Change Plan for the City of Chicago

Key Comments:
“‘The challenges we face globally to reduce greenhouse gas emissions and also adapt to the changes that are inevitable are enormous.’

“The Chicago Climate Action Plan confirmed that there is much that can be done without great additional cost to reduce emissions and also to reduce risk as well as cost of doing business.”

Green-Built Forum Demographics

Risk Map

<table>
<thead>
<tr>
<th>#</th>
<th>Risk Category</th>
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<tbody>
<tr>
<td>1</td>
<td>Supply Chain</td>
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<td>2</td>
<td>Regulatory</td>
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<tr>
<td>3</td>
<td>Standard of Care/Legal</td>
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<td>4</td>
<td>Return on Investment</td>
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<td>Education</td>
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<td>Information Technology</td>
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<td>Financial</td>
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<td>8</td>
<td>Performance</td>
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<td>9</td>
<td>Reputation</td>
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<td>10</td>
<td>In this forum only nine risks were mapped. Consultants/Subs was not included.</td>
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Low Risk, Moderate Risk, High Risk
Key Comments:

"Green is the competitive advantage between law firms, real estate developers, HR departments and even among cities and regions of the country."

"The race for talent increasingly requires a credible commitment to the environment."

"Investors, governments and demanding tenants are focusing more attention on the long-term nature of real estate development, and they are demanding more green benefits. And economic development officials are realizing that the ability to attract new business to town is greatly enhanced by access to environmental resources as well as connections to specific companies operating in the ‘green space’ of technology, innovation, research and development."

"It is exciting and enticing, yet worth careful attention to detail as the euphoria of the moment must be approached with the wisdom of risk assessment and clearheaded decision-making informed by experts."

Risk Map

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Green-Built Forum Demographics

- Owners & Developers: 54%
- Contractors: 40%
- Design Firms: 6%

TOP FIVE RISK CATEGORIES
1. Financial
2. Education
3. Consultants/Subconsultants and Subcontractors
4. Return on Investment
5. Technology
Key Comments:

"We are being regularly asked today if the continuing downturn in the economy has reduced the emphasis on sustainability. In many ways, the answer is actually the reverse. At its core, sustainability is about conservation and there is even more reason to conserve today."

"In speaking with the sustainability teams from most of our clients, both institutional owners and corporate users over the past few weeks, they all have made it clear that sustainability is still an important part of their business model."

"While there appears to be a reluctance to initiate significant capital intense projects, and there may even be a lull in seeking LEED® certification, a focus on low- or no-cost sustainability efforts in building operations is an excellent way to increase efficiencies and lower costs during these difficult times. We believe that green is here to stay."

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Low Risk Moderate Risk High Risk
Key Comments:

“Once an emerging trend, green building has become a growing part of today’s construction industry.”

“With the down market, it has become even more important for industry players to capture the opportunity created by the demand for more sustainable buildings, not only in the U.S., but around the world.”

“From decreased operating costs to improved occupant health, building green has many benefits.”

“Moving forward, green building is no longer a trend, but an accepted way of designing and constructing buildings.”

TOP FIVE RISK CATEGORIES
1. Performance
2. Standard of Care/Legal
3. Consultants/Subconsultants and Subcontractors
4. Technology
5. Return on Investment
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