Risk Management Issues on Green Building Projects
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Program Overview

The program will identify and discuss:
- key project facets and considerations in green building projects
- the resultant risk issues
- variances and the interplay between design, construction and operations
- management and execution techniques to mitigate or manage those risks
- how to resolve disagreements or disputes should they arise.
- identify which party is best suited to address certain risks
- overview current industry practice
- current industry trends which alter the project delivery process and the allocation of risks.

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Learning Objectives

- Identify the risks that are particular to green building projects;
- Determine the source of those risks and which party is best suited to cope;
- Present management and/or mitigation strategies to address those risks;
- Identify other industry trends which also alter the project execution landscape.

The Big Picture - Human Footprint Value

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A simpler way to look at it...

Where do buildings fit in the picture?

Environmental Impact of Buildings
Percentage of U.S., Annual Impact

<table>
<thead>
<tr>
<th>Percentage</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>42%</td>
<td>Energy Use</td>
</tr>
<tr>
<td>40%</td>
<td>Atmospheric Emissions</td>
</tr>
<tr>
<td>30%</td>
<td>Raw Materials Use</td>
</tr>
<tr>
<td>25%</td>
<td>Solid Waste</td>
</tr>
<tr>
<td>25%</td>
<td>Water Use</td>
</tr>
<tr>
<td>20%</td>
<td>Water Effluents</td>
</tr>
<tr>
<td>13%</td>
<td>Other Releases</td>
</tr>
<tr>
<td>12%</td>
<td>Land Use</td>
</tr>
</tbody>
</table>
Green Building Objectives

- greater efficiency
  - energy, water & resources
- lower life cycle cost
- healthier environment
  - better siting,
  - design,
  - construction,
  - operations & maintenance,
  - waste removal
- higher asset value

“Traditional” or “sustainable”
What’s the difference?

The objectives...
- ...more energy efficient
- ...reduced resource demand
- ...a healthier indoor environment

Performance metrics
- Energy use
- Resource use
- Environmental Quality
- Operating expenses
- Certifications*
The objective is 'high performance' buildings
lower costs, better environment, higher value

Does 'high performance' require...
- Additional design time and effort?
  - How does this affect fee?
- Specialty consultants?
  - How does this affect “Standard of Care”?
- Special construction techniques?
  - How does this affect 'custom & practice'?

* "Operations" is assumed to be 'by Owner'
The implications of ‘performance’
Nature of Risk – Nature of Damages

Energy - Design/Installation/Performance
- “A consequence of...” or “A direct result of...”?
  - Standard of Care
  - Defective Workmanship
  - On-going Operations

Building Certification/Rating
- Would “failure to achieve” imply...
  ...an ‘error’ or ‘omission’?
  - As a requirement of contract (a “guarantee”?)
  - Mandated by statute

What does this do to liability insurance?

Green Building Tax Credits...
- An Owner’s commitment to performance?
  - Is this a ‘guarantee of performance’?
  - An “Implied Warranty”?

- If performance or cert application fails
  is the credit rescinded?
  - is that ‘foreseeable’?

What does this do to liability insurance?
What about the contractor?

Materials, means & methods...

- **Product substitutions**
  - pricing, delivery, interruption

- **Product “compatibility”**
  - defective workmanship?

- **Defaults**
  - “suitable replacement”
    - Failure to replace in a “timely fashion”
    - Potential delay or LD costs.

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The Owner

some new considerations

*Does the Owner impact performance?*

*How is that mitigated?*

**Guidelines or criteria**
for “proper” operation & use?

An Owner’s Manual?
Establishing Performance Targets

- Establish targets which accommodate some “misbehavior”.
- Learn what is “customary” based on industry ‘norms’ including first cost.

Can you spot the high performance building?

Typical Energy Use Breakdown

- 32% Space Heating
- 23% Lighting
- 15% Water Heating

Building Performance Certificate
Some Tools…

**Performance...**
- original input, assumptions and criteria...
  - used as a basis to evaluate operations performance.
  - Include some weather data ‘basis’
    - and some acceptable deviation
- Documentation:
  - ‘what did I say’ of design...
  - ‘what did I mean’ of operations...
- Modeling, monitoring, and optimization.

Is a new framework required?

- **Indemnification**
  - May not be possible.
- **Limits of Liability**
  - on-going “operating costs”?
  - ‘consequentials’ of marketplace?
    - ‘economic loss’ theory
- **PLI for ‘specialty’ consultants**
  - Energy modelers
  - Commissioning Agents
In Design...

**Monitoring and Measurement**
Consider...
- Audit and Verification Clause
  - If a dispute arises, allow design/construct team to monitor/audit operation and performance history. (“notice” and “opportunity” to “cure”)
  - 3rd Party Auditor
    - Use the BAS to track compliance

**Building Automation Systems can provide...**
- Data Logging, Retention and Trending
  - Enhance the Operator’s capacity to “mitigate” operational damages

In Construction ...

**Delays, Defaults, Substitutions, etc.**
- ‘time is of the essence’ ...
  - a waiver of certification requirements
    - “EB” instead of “NC”
  - compensation for ‘extended duration’ costs

**Defaults**
- Surety: ‘qualified’ replacement contractors

**Certification ‘failure’**
- Performance bonds to cover remedial work
In Operations…

Go beyond traditional operating manuals.
- **Training Programs for Owners/Operators**
  - include methods, modes and schedules of operation;
  - develop maintenance guidelines.
  - integral with project execution
  - require sign-off
Consider...
- Videotaping training sessions
- ‘fault-tree’ studies and analysis (up front!)

Challenges to Sustainability

- **Balancing Economic Pressures and Technological Possibilities**
- Guard against ‘overstating’ capabilities
  - “Underpromise” and “Overdeliver”
Focus on performance and not ‘medals’
- Rating systems help to...
  - Align thinking
  - Create common language
  - But!
- Too much “alignment” can lead to ‘group think’
  - thinking only ‘on the checklist’
What becomes of Sustainability?

- value will increase as demand increases;
  - Both ‘resource’ driven and ‘market’ driven

- integration into ‘the custom and practice’;
  - New contractual context for new ‘custom and practice’.

- Differences in execution, delivery and evaluation of sustainable projects will require new approaches to defining a successful project...

... and evaluating contract compliance.

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- As value is calculated, measured performance will become more critical.
Thank you

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Mr. Swann has over 20 years of extensive experience on both domestic and international projects in the areas of management consulting and problem solving, engineering design, project and construction management, forensic engineering and construction claims analysis. Mr. Swann’s career includes the analysis, evaluation and design of complex systems across a wide range of industries and buildings types including commercial, institutional and industrial facilities, hospitals, laboratories, pharmaceutical manufacturing, microelectronic operations and data centers. Mr. Swann has chaired technical committees within national and international organizations and been a contributing author and editor for a number of technical publications and journals. He is a frequent speaker both nationally and internationally and is a listed member of the speakers' bureau in the Distinguished Lecturer program of ASHRAE. He has recently presented on Green Building issues in Abu Dhabi, Dubai, Delhi, Detroit, Chicago, Seattle, New York City, Indianapolis, Kansas City, Virginia and Delaware. He is a contributing author to the ASHRAE “Green Guide – The Design, Construction and Operation of Sustainable Buildings” and co-author of the ASHRAE Survival Guide to Design/Build Project Execution.

Professional Affiliations:

Other Activities:
Pennsylvania Environmental Council - Board
The Engineer’s Club of Philadelphia – Board of Directors
Enterprise Heights CDC - Board Chair
Drexel University - Alumni Board of Governors
National Association of Asian American Professionals (Philadelphia Chapter) – Board of Directors
National Society of Black Engineers Greater Philadelphia Chapter – President Emeritus

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MDC Systems is a project and construction management consultancy with over 40 years of experience serving a wide array of clients and industries both nationally and around the globe.

MDC has worked on projects as diverse as residential property developments to pharmaceutical plants to highway excavation and construction.

MDC concentrates its services in primarily four areas: program management, project management consulting, forensic engineering and construction claims consulting.

One of the key facets of MDC’s professional staff is our expertise in the technology driven issues that are so frequently at the heart of today’s complex projects.

MDC’s construction claims consulting practice combines all of the skills inherent to our other service offerings and deploys it for our clients when and where projects don’t go quite as smoothly as everyone had hoped. MDC is an industry leader in the area of construction schedule development and analysis including delay, acceleration, interruption and extended duration. MDC pioneered the court tested and approved Time Impact Analysis methodology for scientifically analyzing construction schedules and the impact of events upon their execution and completion.

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MDC Systems® Summary of Services

Program & Project Development including:
- Performance Assessment & Benchmarking

Project Modeling including:
- "What if..." Scenario Analyses
- Variability/Sensitivity Analyses
- "Out of Bounds"/"Go – No Go" Limits

Project Planning including:
- Feasibility Studies
- Master Scheduling including...
  - Resource & Constraint Analysis

Project Monitoring including:
- Schedule Compliance
- Cash Flow & “Burn rate” projections
- Resource Utilization

Consulting Services including:
- Sustainability/Green Buildings
- Peer Review
- Practice Management

Forensic Analyses including:
- Building Systems:
  - Architectural incl. Building Envelope
  - HVAC/Mechanical, Electrical & Piping
  - Structural
  - Instrumentation & Controls
- Design Errors & Omissions (Standard of Care)
- Differing Site Conditions

Forensic Project Management:
- Schedule Analysis
- Delay, Disruption, Suspension & Acceleration
- Labor Productivity & Inefficiency
- Scope Definition and Change
- Termination - Default or Convenience
- Procurement - Bid/Award Transparency

Forensic Accounting including:
- Valuation of Damages
  - Overhead & General Conditions
  - Business Interruption & Lost Profit
Selected Recent Assignments

**Engineering Consulting and Technical Analyses:**
- Analysis of Moisture Migration and RH Control in a Microelectronics Product R&D Facility (Colorado).
- Analysis and Improvement of Energy Consumption at a "Green" School (Pennsylvania).
- Peer Review & Design Supervision for a Radiant Heating/Cooling Floor System (New Jersey).
- Peer Review of Schematic Engineering Design Effort for Hospital Complex (Qatar).
- Analysis of Formaldehyde Outgassing from Construction Materials (Pennsylvania).
- HVAC System Failures in Pharmaceutical Packaging Facility (New Jersey).
- Analysis of Process Technology Failure at Waste Treatment Plant (New Jersey).
- Analysis of Piping System Joint Failures at a Hospital central Plant (New Jersey).
- Analysis of Destructive Vibration\Harmonics on Large Industrial Compressors at a Chemical Plant (Louisiana).

**Project Management, Execution & Construction Claims:**
- Electrical Contractor Inefficiency Claim on Multi-Prime Project (New Jersey).
- Electrical Usage Charge Dispute Between Landlord & Tenant (New York).
- Schedule Delays and Change Orders on multiple Airport Projects for Major Equipment Supplier (various).
- Schedule Delays and Associated Cost Overruns for Underwater Pipeline Project (Ireland).
- "Standard of Care" Defense - Design of a Food Processing Facility (Pennsylvania).
- "Custom & Practice" – Specifications Development and Bid Transparency Issues (California).