Value Beyond Cost Savings

How to Underwrite Sustainable Properties

Expanded Chapter V: Sustainable Property Financial Analysis

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GREEN BUILDING FINANCE CONSORTIUM
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About Expanded Chapter V

This publication is Expanded Chapter V of the Consortium's book: *Value Beyond Cost Savings: How to Underwrite Sustainable Properties. Value Beyond Cost Savings* presents the key findings and conclusions regarding the valuation and underwriting of sustainable properties based upon three years of independent research by the Green Building Finance Consortium.

Chapter V is one of six "Expanded Chapters" from *Value Beyond Cost Savings: How to Underwrite Sustainable Properties* which provide 400 additional pages of in-depth research, analysis, and performance information, all available without charge to the public from the Consortium's website and other locations.

This Expanded Chapter has the same table of contents as the book, enabling readers wishing to delve into more depth on a topic to easily find the appropriate sections in the Expanded Chapters. This book also references many checklists, databases, documents, and resource links in the Expanded Chapters and in the Consortium's web-based Research Library. This Chapter and the book include some color, but the publications are designed to print in black without loss of information.

The Green Building Finance Consortium maintains a searchable Research Library and Industry Links database on its website: http://www.GreenBuildingFC.com. The Research Library and Industry Links databases include thousands of documents coded using the GBFC's unique index designed for the sustainable finance and investment industry. The structure of the index is consistent with the organization of *Value Beyond Cost Savings: How to Underwrite Sustainable Properties*. Future sustainable performance and related research updating the book on an ongoing basis will be available in the Research Library.

The mission of the Consortium is to enable private investors to evaluate sustainable property investments from a financial perspective. To accomplish this, we have identified and developed suggested modifications to valuation and underwriting methods and practices and are widely communicating the results of our work through our book, other publications, web-based research library, speeches, and collaborations.

The Consortium is financed independent of green building product or professional organizations, relying on funding from The Muldavin Company, Inc. and Consortium Members which include leading real estate industry trade associations and companies, governments, and non-governmental organizations. Trade association members include BOMA International, the Mortgage Bankers Association, the Urban Land Institute, the Pension Real Estate Association, and the National Association of Realtors.

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Collaborators/Other Contributors

We are and have been involved in important collaborative efforts addressing database development, energy research, valuation practice, and many other areas critical to financial assessment of sustainable properties with at least the following organizations:

- **Lawrence Berkeley National Laboratory**—energy and health issues
- **CoreNet Global**—energy issues
- **Royal Institute of Chartered Surveyors**—valuation and policy issues
- **Appraisal Institute**—valuation issues, training
- **National Association of Realtors**—sustainability curriculum
- **North American Commission for Environmental Cooperation**—policy, finance
- **Vancouver Valuation Accord**—valuation and regulatory issues
- **Database for High Performance and Sustainable Buildings**—database design and development
- **Rutgers Green Building Research Center**—REIT valuation research, other
- **International Youth Leadership for a Sustainable Future**—youth education
- **World Business Council for Sustainable Development**—analytics and communications
- **California Energy Commission**—transaction disclosure documents

We also appreciate the scores of other individuals and companies who have provided significant input and assistance in the project through their research and data, review of Consortium work product, and participation in interviews and surveys.

About the Author

Scott Muldavin is Executive Director of the Green Building Finance Consortium, a group he founded in 2006, and President of The Muldavin Company, Inc. For over 25 years, Mr. Muldavin has advised leading real estate companies including CalPERS, RREEF, Bank of America, Mitsui Trust and Banking, Great West Life, Prudential Real Estate, Ohio State Teachers Retirement System, Wells Fargo Bank, The Government of Singapore Investment Corporation, Catellus Development Corporation, Equitable Real Estate, and Standard Insurance Company.

Mr. Muldavin has been a lead real estate consulting partner at Deloitte & Touche, co-founded the $3+ billion private real estate company Guggenheim Real Estate, served on the Advisory Board of Global Real Analytics, an advisor for $2 billion of REIT and CMBS funds, and completed over 300 consulting assignments involving real estate finance, mortgage lending, investment, valuation and securitization. Mr. Muldavin's

engagements and work experience provide him with broad experience in equity and debt transaction structuring, underwriting, due diligence, investment fund design, and corporate real estate.

Mr. Muldavin has advised scores of equity investors and developers. As a co-founder of Guggenheim Real Estate, Mr. Muldavin has been involved in capital formation, investment strategy, due diligence and served on the investment committee. He has assisted pension funds including CalPERS, Ohio State Teachers, and Alaska Permanent Fund in their investment and organizational strategies. He has advised investment managers including RREEF, Prudential Real Estate, Amstar, Hunt Realty, and others on strategy, capital formation, organizational change, and due diligence practices.

Mr. Muldavin has been involved in the Real Estate Investment Trust (REIT) market since the early 1980s advising clients including Merrill Lynch, CalPERS, Kilroy Realty and others concerning new REIT securities offerings and investment issues. As an investment committee member of Guggenheim Real Estate, he monitored the REIT market and participated in investment decisions concerning the allocation of hundreds of millions of dollars of REIT investments.

Mr. Muldavin has been involved in mortgage underwriting for over 25 years. He was the lead consultant that developed the first commercial mortgage risk-rating system for Standard & Poor's Corporation in the early 1980's and was a national leader of the Real Estate Financial Institutions practice for Deloitte & Touché, where he worked with financial institutions to improve their underwriting and servicing systems, assess risks in their mortgage portfolios, and estimate loan losses. He also authored the quarterly "Real Estate Finance Update" in *Real Estate Finance*, for 16 years; developed the Real Estate Capital Flows Index, which was published quarterly for many years by the Pension Real Estate Association and Institutional Real Estate Inc.; and authored key articles and reports on mezzanine financing, mortgage servicing, risk management, capital volatility, and other topics.

Mr. Muldavin was also a leader of the corporate real estate practice at Deloitte and Touché and during his career has advised corporations such as Texaco, Phoenix American Corporation, Nissan Motors, Pacific Enterprises, Universal Studios, House of Blues Corporation, Johns Manville, and many others on their leasing, acquisition and real estate strategies.

Mr. Muldavin has been involved in the structuring and due diligence of real estate property and business transactions for over 25 years. He has completed due diligence engagements involving the acquisition of office buildings, retail properties, hotels, multi-family properties, industrial properties, large land parcels, mortgage portfolios, mortgage companies, commercial banks, real estate service companies and other real estate assets.

As an advisor and Investment Committee member of Guggenheim Real Estate, Mr. Muldavin reviewed hundreds of retail, office, industrial and multi-family investment

opportunities throughout the United States, as well as investments in mezzanine loans, B-piece investment funds, preferred equity, and REITs.

Mr. Muldavin is a frequent speaker on real estate finance, investment, valuation and sustainability. He has authored over 225 articles published in *Real Estate Finance*, RICS Property World, *Bankers Magazine*, *Urban Land, European Real Estate Yearbook, The Journal of Property Management, The Pension Real Estate Quarterly*, *Real Estate Issues*, *The Investment Property and Real Estate Capital Markets Reports, Institutional Investor*, *Builder and Developer*, *The Real Estate Accounting and Tax Journal*, and other industry publications.

Mr. Muldavin is a graduate of UC Berkeley and Harvard University, and has been recognized by the American Society of Real Estate Counselors and the Royal Institute of Chartered Surveyors, each of who have awarded him their highest level of professional certification. Mr. Muldavin is also on the Advisory Board of the Journal of Sustainable Real Estate and an Honorary Fellow of the Institute of Green Professionals.

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Sustainable Property Financial Analysis

Underwriting Sustainable Property Investment					
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A. Introduction

Financial modeling and analysis are key components of an independent underwriting of sustainable property investment. Financial models are tools that enable investors to translate their opinions about the costs and benefits of a sustainable property investment into a measure of financial performance. Private sector investors typically require a financial model and analysis as part of the broader due diligence and underwriting of any investment decision. The focus of this chapter is on property level decisions. (See Chapter II, Section B: "Level of Investment Decision," for clarification of this important point)

1. Chapter V Outline: Six Steps to Sustainable Property Financial Analysis

The six-step process for thinking through and incorporating sustainability considerations into a property financial model analysis is shown below in Exhibit V-1**.**

Exhibit V-1
Six Steps to Sustainable
Property Financial Analysis

1. Select Financial Model
2. Evaluate Property "Sustainability"
3. Assess Costs/Benefits of "Sustainability"
4. Evaluate Financial Implications of Costs/Benefits
5. Determine Financial Model Inputs
6. Risk Analysis and Presentation (RAP)

One of the challenges of presenting how the traditional real estate financial analysis and valuation process needs to be modified to implement sustainable property financial analysis is the need for readers to have a base understanding of real estate financial modeling and analysis techniques. In this chapter, the discounted cash flow model is presented as the fundamental framework for evaluating the financial implications of sustainable property investment, but due to the complexity and length of the topic, a full discussion of real estate investment analysis and the use of Discounted Cash Flow analysis is not presented. Accordingly, some background in real estate investment analysis will be beneficial to readers to fully understand the material presented.

Following the six-step process outlined above, this chapter is presented in the following sections:

A. Introduction
B. Summary Conclusions
C. Step 1: Select the Financial Model
D. Step 2: Evaluate Property Sustainability
E. Step 3: Assess Costs/Benefits of Sustainability
F. Step 4: Evaluate Financial Implications of Costs/Benefits
G. Step 5: Determine Financial Model Inputs
H. Step 6: Risk Analysis and Presentation
I. Valuation Considerations
J. Conclusions

2. Applying Findings and Conclusions

This chapter on financial modeling and analysis has broad applicability to sustainable property investment decision-making. However, it is primarily directed to specific audiences and decisions in the private commercial real estate market as discussed below.

Target Audiences: The target audiences for this section are space users[1], equity investors, lenders, developers, appraisers, and commercial property brokers. Sustainable service providers and groups seeking capital for sustainable property investment will also benefit from this section, as well as students and industry practitioners seeking to understand the financial underpinnings of sustainable property investment.

Commercial Real Estate Properties: The Consortium focuses on commercial and multifamily properties. While many of the frameworks and methodologies will have some applicability to the single-family market, single-family property issues are not addressed in detail. Select single-family resources are also available in the Consortium's Research Library and Industry Links under index code 19.2.

Geographic Applicability: Individuals and organizations throughout the world influence The Consortium's work. Additionally, the Consortium's focus on fundamental methods and practices make its work particularly transferable across national boundaries. There is, however, a North American bias, given the author's background and experience.

Property Specific Investment Decisions: This section focuses on financial modeling and valuation of an individual property.

Property Life Cycle: This section will be applicable, in varying degrees, to sustainable property investment decisions involving new buildings, existing buildings, and tenant improvements.

Private Investment Decisions: The Consortium focuses on the underwriting of private investment decisions. However, understanding the types and magnitude of public benefits generated by a specific sustainable property investment is important to a private investor because of the potential to monetize public benefits by extracting the value they create for governments and tenants-investors.

Sustainable properties can have substantial social and environmental (public) value, and it is important to quantify and understand such benefits. Methodologically, public and private benefits should be assessed separately, and particularly from the perspective of valuation, it is critical to separate the concept of public and private value when evaluating a sustainable investment decision from a private sector perspective. This does not mean that public values and benefits cannot be considered by the private sector when making investment

[1] "Space user" is a term we use to describe the occupants or users of real estate. It is a term that includes corporate and non-corporate owner-occupants, tenants, retail customers or other non-owner or tenant users of space.

decisions, but only that such decisions should be made with a clear understanding of the differences between private and public values.

B. Summary Conclusions

The **most important conclusion** of this chapter is that financial models that generate results based solely or primarily on initial development costs and operating costs savings, like the most commonly used Simple Pay-Back or Simple Return on Investment (ROI) models, are inherently flawed because they fail to consider revenue or risk. These limitations are not new, but dramatic increases in regulator, user and investor demand for sustainable properties during the last few years has substantially enhanced the negative implications of these limitations.

Fortunately, the **second most important conclusion** is that the most widely recognized financial model for evaluating real estate investments—discounted cash flow analysis (DCF), is well suited to address the financial implications of sustainability. Discounted cash flow analysis provides a conceptual framework and model that enables the user to integrate quantitative and qualitative analysis to measure sustainable property financial performance. Most importantly, it provides the means to translate the "intermediate" sustainable property cost and benefit outcomes like health or productivity benefits, expedited permitting, or lower operating costs, into financial measures like rate of return or net present value traditionally used by real estate capital providers.

A third key conclusion is that even if you do not execute a full DCF model in your underwriting, you must employ the logic and linkages inherent in a DCF model to accurately articulate potential implications of sustainable property attributes on financial performance. If you do not rigorously follow the framework, it is easy to under- or over-estimate the magnitude, and even the direction of, potential financial performance implications.

A fourth important conclusion is that sustainable property financial modeling and analysis requires a more sophisticated and explicit analysis and documentation of the risks—both positive and negative—that influence the cash flow to provide decision-makers the proper context for interpreting rate of return, net present value, or valuation conclusions.

Thinking explicitly about what will constitute an effective investment package[2] will make documentation of the work product easier. Some investment decisions require formal appraisals and due diligence reports, while other decisions can be made based on brief business case white papers and/or oral presentations. Most lenders require formal third-

[2] Investment package refers to the written or digital product of an underwriting/due diligence process. This could be an underwriting summary and all the supporting loan write-ups and third party reports, closing binders, etc. that would be typical for a mortgage; or a memo, financial schedule and/or PowerPoint presentation typical for many higher level strategic decisions.

party appraisals and have structured underwriting requirements, while investors and corporations typically have their own customized formats for their real estate decisions.

The fifth key conclusion is that different types of decisions require different types of financial models, analysis and data. This concept, while obvious, is thoroughly examined in Chapter II, and is a primary theme in the Consortium's work.

Practically, many decisions involving sustainable property investment do not require sophisticated financial analysis in order to make the "Go" decision. For example, many operations and maintenance actions on existing properties cost little, or have Simple Payback (time required to pay back initial investment from operating cost savings) times of a year or less and can be paid for out of operating budgets or with minimal capital investment. However, even these decisions would be improved by consideration of risk and revenues—a more profitable (and environmentally beneficial) level of investment might be justified by a full financial assessment.

As society and the industry strive for higher levels of sustainability and energy efficiency, and investors move beyond the low hanging fruit, more structured financial analysis using the DCF framework and integrating risk and value considerations more explicitly will be required. Additionally, better financial models will enable more sophisticated decision-making about the level and phasing of sustainability investment.

Financial analysis and modeling, and particularly the presentation of the results of such analyses, need to be sensitive to the type of investor. Investors need models that properly allocate sustainable costs and benefits between tenant and landlord and take taxes and capital expenses into account. Corporations need to be able to integrate potential financial benefits to the enterprise (employee health, productivity, and retention, for example) and developers need models that capture the additional risks—both positive and negative—of sustainable development and accurately reflect their ability to monetize any longer term benefits prior to exiting the project. Lenders care most about default probability and loss severity in the event of default.

The final key conclusion is that the biggest challenge to sustainable financial analysis is not the modeling, but the integration of sustainability considerations into the determination of the input assumptions. Not only must the underwriter clearly identify potential costs and benefits of sustainable property features, but also properly consider non-sustainable factors when determining rents, occupancies, and other key financial model inputs. This sounds difficult, and is, but is not substantively more difficult than what investors, developers, and appraisers do every day when considering the myriad of factors that affect the value and success of an investment.

Investors historically have recognized that precise quantification of the relative value contribution of different property features—investment in landscaping versus investment in the lobby, for example—was not statistically reliable, nor did it need to be. Key financial model assumptions for a specific property, like rents, occupancies, absorption, or capitalization rates, are derived based on qualitative judgment and analysis of the best

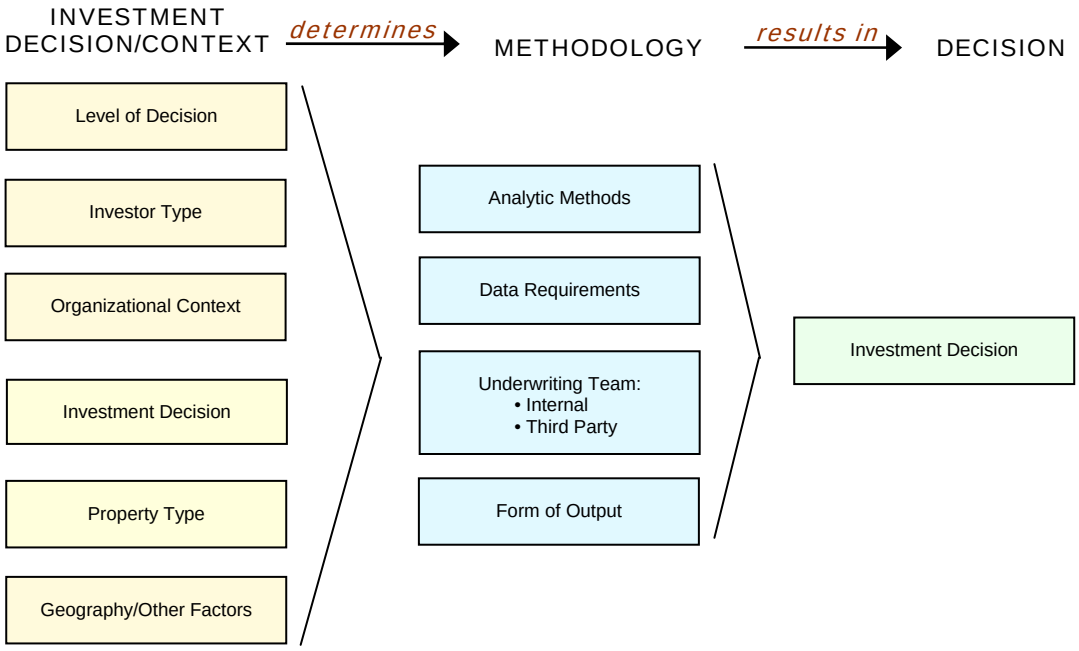
quantitative and qualitative information available. Real estate financial analysts and valuers need to accept and "own" the qualitative nature of their work, and get down to business doing a better job of it.

C: Step 1: Select Financial Model

1. Investment Context

The starting point for underwriting a sustainable property is to clearly understand the investment decision being addressed, and the context in which the decision is being made, as shown in Exhibit V-2.

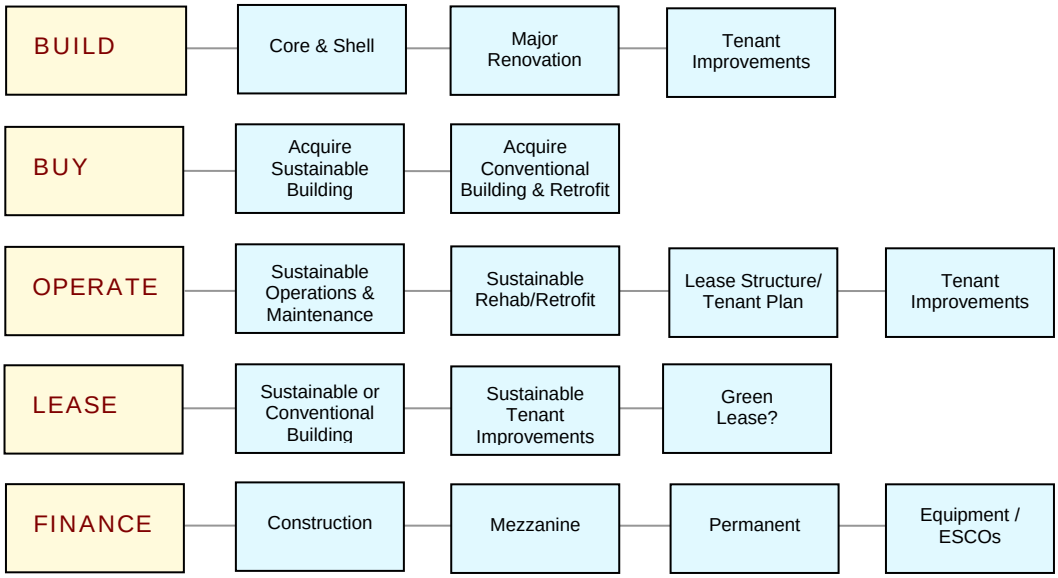
Exhibit V-2
Investment Context Drives Underwriting Methodology



Clear delineation of the decision and investment context is critical to selecting the best analytic methods, determining data requirements, assembling the underwriting team and preparing effective support for the decision.

The type of financial analyses required is significantly influenced by the sustainable property investment decision (see Exhibit V-3). New construction, retrofits, existing building acquisitions, or leasing and financing decisions have always required different models and data. Sustainable property financial analysis requires some new thinking and analytic techniques to properly collect and analyze the data inputs to the models, but the fundamental approaches to decision-making used by the real estate industry will remain largely the same.

Exhibit V-3
Sustainable Property Investment Decisions



2. Sustainable Property Financial Analysis Alternatives

There are many different types of financial analyses used for making sustainable investment decisions. In some cases the techniques are used to compare the relative merits of sustainable features like lighting alternatives or more capital-intensive HVAC system alternatives. In other cases, projected productivity or health benefits are calculated to demonstrate the magnitude of potential benefits to be considered by potential space users as a supplement to simple payback models that focus on operating cost savings. Many types of financial models and analyses are really sub-analyses employed to assist valuers/financial analysts in developing the many key assumptions required in a discounted cash flow analysis. Finally, financial analysis can also take into consideration financing costs, asset depreciation, and taxation.

For detail and background on existing office building retrofit decisions and building operations, "*Retrofitting Office Buildings to be Green and Energy-Efficient"*, published in late 2009 provides helpful background and insights. [3]

Financial analyses alternatives can logically be separated into four categories:

[3] "*Retrofitting Office Buildings to be Green and Energy-Efficient*", principal authors Leane Tobias and George Vavaroutsos, Urband Land Institute, 2009.

a) Traditional Sustainability Financial Analyses;

b) Traditional Real Estate Financial Analyses;

c) Sustainability Sub-Financial Analyses; and

d) Public Sustainable Benefits Analyses

A summary of approximately forty sustainable property financial analyses alternatives is listed below in Exhibit V-4. More detailed descriptions; examples, observations and key links are provided for each financial analysis alternative in Appendix V-A, and in the Research Library under index codes 1.1 to 1.5.

Exhibit V-4

Sustainable Property Financial Analysis Alternatives

A. Traditional Sustainability Financial Analyses

1. Simple Payback
2. Simple Return on Investment (ROI)
3. Simple Change in Asset Value: Direct Capitalization (SCAV-DC)
4. Simple ROI and General Cost-Benefit Analysis
5. Life Cycle Costing (LCC)
6. Value Engineering
7. ENERGY STAR Building Upgrade Value Calculator for Office Properties
8. ENERGY STAR Cash Flow Opportunity
9. Life Cycle Assessment (LCA)
10. Post Occupancy Analyses (POE)

B. Traditional Real Estate Financial Analyses

1. Cost Management
2. Discounted Cash Flow Analysis (DCF)
   - Change in Asset Value
   - Net Present Value
   - Internal Rate of Return
3. After Tax Cash Flow Analyses
4. Valuation
5. Total Occupancy Cost (Cost of Ownership) Analysis
6. Economic Value Added

C. Sustainability Sub-financial Analyses

1. Comparative First Cost Analysis
2. DCF Lease-Based Cost-Benefit Allocation Models
3. Sustainability Options Analysis
4. Churn Cost Savings Analysis
5. Productivity Benefits Analysis
6. Health Cost Savings Analysis
7. Government/Utility Incentives and Rebates Analysis
8. Enterprise Value Analysis
9. ENERGY STAR Financial Value Calculator
10. Risk Analysis and Presentation (RAP)

D. Public Sustainability Benefits Analyses

1. Reduced Infrastructure Costs
2. Environmental & Resource Conservation Benefits
3. Land-Use Benefits
4. Climate Change Reduction
5. Economic Benefits
6. Security Benefits

a) Traditional Sustainability Financial Analyses

The first ten models and analyses shown in Exhibit V-4 are those that have traditionally been used in the real estate industry to make energy efficiency/sustainability investment decisions for buildings, features and equipment. Historically, Simple Payback and Simple Return on Investment (ROI) models have been the primary financial analyses used in making energy efficiency or sustainability decisions. These simple methods factor in initial costs and cost savings. Even Life Cycle Costing, the most sophisticated and comprehensive of the traditional sustainable financial analyses, only focuses on costs and cost savings, rather than the full scope of costs and benefits that are incorporated into a traditional real estate financial analysis.

Traditional Sustainability Financial Analyses are appropriate and sufficient for many types of sustainable investment decisions that can be justified on cost savings alone. The Simple Payback or Simple ROI analysis combined with a general discussion of other potential benefits will be sufficient to make a go or no-go decision for most operations and maintenance related investments, investments in specific new equipment or systems, and many minor retrofits. It should be noted that even these decisions will be improved—optimal level of investment—through consideration of revenue and risk considerations.

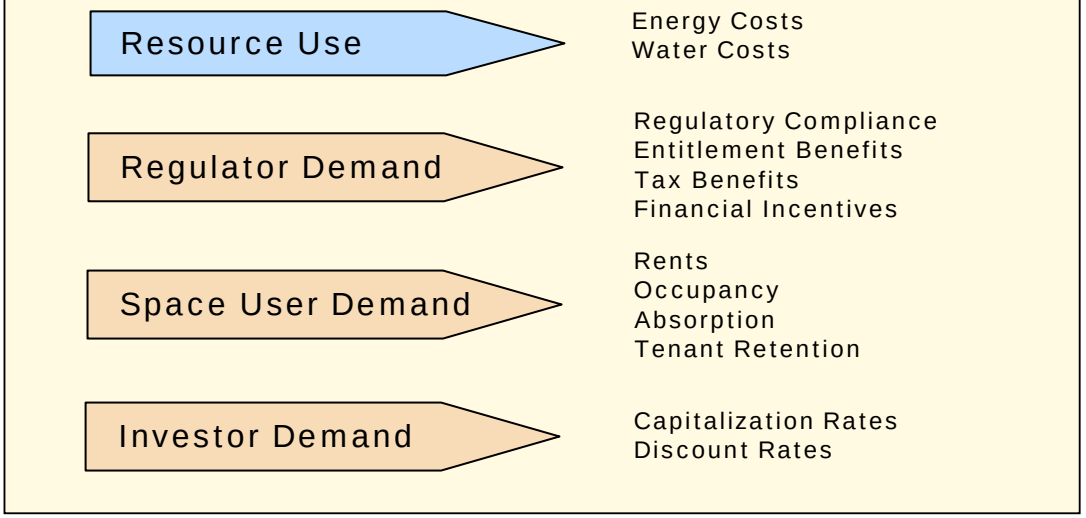
However, with major retrofits, the acquisition of an existing sustainable building, or new construction, more sophisticated analyses that consider all costs, benefits (revenue enhancement), and risks will be required to ensure proper allocation of sustainable property investment dollars. In these cases, traditional real estate analyses like Discounted Cash Flow Analysis will need to be employed.[4]

Traditional Sustainability Financial Analyses, which rely primarily on costs, have historically led to an under allocation of energy efficiency investment by corporations and investors. Today, and more so in the future, as regulators, space users and investors increase their demand for energy efficient and sustainable buildings, relying on Traditional Sustainable Financial Analyses that ignore revenue and risk will result in significant underperformance by investors.

Regulator, space user, and investor demand are critical to value, as shown below in Exhibit V-5. If valuers only considered resource use (energy costs, etc.) and ignored market performance, as measured by demand, key value issues affecting entitlements, rents, cap rates and other issues would be ignored. In essence, revenue and risk considerations would not factor into decision-making, a recipe for long-term underperformance.

[4] For many decisions it is not necessary or appropriate to complete a DCF analysis, but in order to properly account for present and potential revenue and risk implications, a conceptual understanding of the DCF model is required.

Exhibit V-5
Sustainability Demand Affects Value Inputs



Meeting demand for energy efficiency, or certified buildings by owner occupants, tenants and investors can increase rents, occupancies, tenant retention and other financial model inputs and reduce cash flow risk (reduce discount and cap rates). Clearly, energy efficiency and renewable energy investment is not just about costs, so decisions should no longer be made with outdated models/analyses, but with more traditional real estate analyses that factor in revenues and risk.

Summary of Traditional Sustainability Financial Analyses Alternatives

The ten Traditional Sustainability Financial Analyses shown in Exhibit V-4 are described in detail in Appendix V-A along with links to resources and examples. Comments on select alternatives are also presented below.

Life Cycle Cost Analysis (LCC) takes into account all of the costs of acquiring, operating/maintaining and disposing of a building or building system. LCC can be used to make decisions about whether an investment in a particular system has a positive net present value, but its primary purpose is for comparing building feature alternatives (with different initial costs and operating savings) to determine the alternative that maximizes net costs savings. LCC is considered a more rigorous analysis than either Simple Payback or Simple ROI calculations because it relies on a present value methodology, which considers variable cost savings over time and incorporates the investor's cost of capital through the choice of discount rate. Alternatively, Simple Payback and Simple ROI calculations only consider initial costs and a single year of costs savings.

Life Cycle Costing is also a substantial improvement over Simple Payback or Simple Return on Investment models because it factors in the benefits of reduced maintenance and

replacement costs, as well as reduced operating costs over a typical time period of twenty years. For example, if one light bulb costs $5, and another costs $3, but the $5 light bulb only needs to be replaced every five years instead of every two years, and uses 30% less energy, the Life Cycle Costing model enables all the "costs" to be factored into the decision. The challenge is that a twenty year, or even five-year time frame is not always relevant to a developer who will quickly (hopefully) sell their product or to a procurement officer or CFO who must meet budgets on an annual or quarterly basis.

Value engineering is actually a process, rather than a separate financial modeling technique. The field of value engineering has been around for over sixty years, with application to the construction and real estate industry picking up in the 1980s. The historically stated purpose of value engineering is to achieve the greatest "value" (based on achieving a specific function/outcome) for the least cost.

> Synonymous with the terms value management and value analysis, value engineering is a professionally applied, function oriented, systematic team approach used to analyze and improve value in a product, facility design, system or service—a powerful methodology for solving problems and/or reducing costs while improving performance/quality requirements.[5]

Properly implemented, value engineering should be started early in the design/ construction process, with substantial time spent on the specification—and agreement between key participants--of the values (functions or outcomes) to be achieved. A creative team approach to generating alternative methods to achieve the outcomes is also important. Since the ultimate "value" of a project, and a cost analysis, should not be constrained to looking at initial costs, life cycle costing, or an even more comprehensive approach that considered non-cost related benefits, is the preferred financial model to be utilized in a value engineering analysis.

Unfortunately, value engineering has become more synonymous with cost cutting than a structured process to maximize value at the lowest cost. The cost cutting focus of value engineering is due to the reality that value engineering is often initiated well into a project after budget problems have arisen. ASHRAE, the American Society of Heating, Refrigerating and Air Conditioning Engineers, in their 2006 Green Guide state it this way:

> Likewise, any 'value engineering' (VE) offers should be carefully studied for their impact on the project's green design goals. (VE is often offered under the assumption that first-cost savings are paramount to the owner and project team.) The need for careful study remains true even in the case of genuine VE done by trained professionals who perform real trade-off analyses to arrive at the best 'value' for a project.[6]

ENERGY STAR has two financial modeling tools that are widely used in the assessment and analysis of energy investments. ENERGY STAR Building Upgrade Value Calculator

[5] http://www.value-eng.org/

[6] ASHRAE *Green Guide, the Design, Construction, and Operation of Sustainable Buildings*, 2006, p. 349.

for Office Buildings estimates the financial impact of proposed investments in energy efficiency in office properties. The calculations are based on data input by the user, representing scenarios and conditions present at their properties. Required inputs are limited to general characteristics of the building, plus information on the proposed investments in energy efficiency upgrades. In addition to financial metrics, the calculator also estimates the impact the proposed changes will have on a property's ENERGY STAR rating.

ENERGY STAR's Cash Flow Opportunity Calculator is designed to help decision makers address three questions when evaluating energy efficiency projects:

- How much new energy efficiency equipment can be purchased from the anticipated savings?
- Should the equipment purchased be financed now or is it better to wait and use cash from a future budget?
- Is money being lost by waiting for a lower interest rate?

While not broadly applicable to all property types, these calculators provide useful tools, being incorporated into broader analyses of sustainability/energy efficiency options in the market today.

ENERGYSTAR guidance is also available for multifamily properties: http://www.energystar.gov/index.cfm?c=multifam_housing.bus_multifam_housing .

Post-Occupancy Evaluation (POE) is the general term for a broad range of activities aimed at understanding how buildings perform once they are built and how satisfied building users are with the environment that has been created. There is no industry-accepted definition of POE and there are many different terms in use, such as environmental design audits, building-in-use evaluations, post-occupancy assessment, facility assessment and building performance evaluations.

Thomas Lützkendorf and David Lorenz discuss POEs in their paper: "Sustainable property investment: valuing sustainable buildings through property performance assessment" published in *Building Research & Information* (2005):

> POE can be characterized (at least in theory) as follows:
>
> - design aid: as a means of improving building procurement, particularly through 'feed-forward' into briefing
> - management aid: as a 'geed-back' method for measuring building performance, particularly in relation to organizational efficiency and business productivity
> - benchmarking aid for sustainable development: for measuring progress in the transition towards sustainable production and consumption of the built environment (Cooper, 2001)
>
> Although the use of POE is widely advocated as best practice in guides to construction and facility management, POEs are far from being a 'mainstream' activity within the construction and property sector. The Probe studies are one of the first systematic and

rigorous attempts to investigate the performance of buildings, modern workplace environments and their occupant's responses (Bordass et al., 1999). They gave valuable insights into the functioning and performance of buildings and led to the identification of four 'killer variables' that positively correlate with occupant's comfort, satisfaction and perceived productivity (Leaman and Bordass, 1999):

- personal control: occupants' perception of control over their workplace environment (i.e. heating, cooling, lighting, ventilation and noise)
- responsiveness: the building's capability to meet occupants' needs very rapidly either in anticipation or as they arise (e.g. adaptability of spaces to accommodate change, speed of response to complaints by the facilities management, etc.)
- building depth: the building's depth of space (a depth of about 12m across the building seems optimal for human performance; the deeper the building gets, overall satisfaction and productivity tend to go down)
- workgroups: relates to room size and workspace organization; productivity is higher in smaller (less than four people) and more integrated workgroups.

A practical example of POE that was carried out for two buildings in Seattle provides some good insights into some of the practical issues that need to be addressed in conducting POEs.
http://www.paladinoandco.com/content/whitepapers/post-occupancy-evaluation-understanding-real-performance-sustainable-buildings. In this study, they identify 20 performance indicators, including resource use indicators, occupant related indicators, environmental indicators, and cost and value indicators. They also present an array of different evaluation methods including physical measurements, historical records, occupant surveys, calibrated simulations and calculations, extrapolations from comparable situations, and costs calculated from other savings. An article presenting the approach and implementation of a POE process developed by the architecture firm HOK provides further methodological suggestions and insights.
http://www.bdcnetwork.com/article/CA6389273.html

Facility performance evaluation (FPE) is an extension of what had been called "post-occupancy evaluation." FPE is a continuous process of systematically evaluating the performance and/or effectiveness of one or more aspects of buildings in relation to issues such as accessibility, aesthetics, cost-effectiveness, functionality, productivity, safety and security, and sustainability. Numerous federal and state agencies are actively involved with FPE, including the U.S. General Services Administration, Naval Facilities Engineering Command, U.S. Courts, U.S. Postal Service, California Department of General Services and many others.
http://www.wbdg.org/resources/fpe.php.
The California Department of General Services provides a good model for a FPE program.
http://www.poe.dgs.ca.gov/default.htm

Key Resources

There are a number of excellent resources and examples of Traditional Sustainability Financial Models and analyses. Some of these are presented below. (These sources and many others can be found in the Consortium's Research Library and Industry Resources sections under index code 1.2.)

US Department of Energy: Perhaps the most comprehensive listing of links to specialized feature or system based financial analyses using a combination of Life Cycle Costing, Simple ROI, Simple Payback and related financial models is shown on the US Department of Energy's Energy Efficiency and Renewable Energy Building Technologies Program Tools website:
http://apps1.eere.energy.gov/buildings/tools_directory/subjects_sub.cfm .

BetterBricks Briefings and Templates: This site has a full set of analytic processes and financial models organized by property type.
http://www.betterbricks.com/DetailPage.aspx?ID=716 The site is particularly good at organizing and focusing its material in a way that is logical for real estate owners, investors and tenants. Its High Performance Building Portfolio Framework is a particularly good outline of the process for initiating energy efficiency or sustainable investment.
http://www.betterbricks.com/graphics/assets/documents/BB_RealEstate_Framework_R4.pdf BetterBricks is the commercial building initiative of the Northwest Energy Efficiency Alliance (http://www.nwalliance.org/), which is supported by local electric utilities. Through the BetterBricks initiative, NEEA advocates for changes to energy-related business practices in Northwest buildings.

Whole Building Design Guide Tools: The Whole Building Design Guide Tool's website presents hundreds of financial analyses and models. http://www.wbdg.org/tools/tools.php

The International Initiative for a Sustainable Built Environment LCA Tools: The iiSBE has developed a set of methods and tools for Life Cycle Assessment Analysis.
http://www.iisbe.org/annex31/core_reports.htm

The International Initiative for a Sustainable Built Environment (iiSBE) is an International Non-Profit Organization whose overall aim is to actively facilitate and promote the adoption of policies, methods, and tools to accelerate the movement towards a global sustainable built environment.

ASTM International Standards on Building Economics: ASTM Committee EO6 on Performance of Buildings has jurisdiction over E06-81: Building Economics. They publish 25 detailed technical publications on the financial models and analyses of Building Economics including LCA calculations, net benefits, internal rate of return, and many other analyses. Each of these reports carries a price tag of $30 to $50 dollars.
http://www.astm.org/COMMIT/SUBCOMMIT/E0681.htm

ASTM Committee E06 on Performance of Buildings was formed in 1946. E06 meets twice a year, usually in April and October, with approximately 240 members attending three to four days of technical meetings. Committee E06 also periodically sponsors symposiums. The committee, with a current membership of 1050, has jurisdiction of over 245 standards, published in the Annual Book of ASTM Standards, Volume 04.11 a

b) Traditional Real Estate Financial Analyses

Traditional real estate financial analyses integrate comprehensive cost, benefit, and risk information into measures of return and/or value. Rate of return or value estimates are based on detailed specification of financial model inputs such as energy costs, rents, occupancy, tenant retention, discount rates, etc.

Traditional real estate financial analyses are differentiated from traditional sustainability financial analyses in that they are focused on property level decisions, rather than more limited decisions about specific sustainable features, strategies, or outcomes like energy efficiency, thermal comfort, or productivity. Most importantly, they are differentiated from traditional sustainability financial analyses in that they more explicitly consider revenues and risk, rather than focus primarily on costs, as is the case with traditional sustainability financial analyses.

As stated earlier, less comprehensive financial models, including Simple Payback or Simple Return on Investment, are appropriate in many situations, and full implementation of a traditional real estate financial analysis will not be necessary for every decision. For investors acquiring or building new buildings, lenders, and corporations interested in the full range of costs and benefits in their decisions, traditional real estate financial analyses will be necessary to properly support decision-making.

Summary of Traditional Real Estate Financial Analyses

A summary of a selection of the six traditional real estate financial analyses is presented below. More detailed descriptions, analysis, and key links are presented in Appendix V-A.

Traditional real estate Discounted Cash Flow (DCF) analysis is the most important financial analysis method and will be the basis of much of the discussion in this chapter. A technical description and the equations used to calculate an internal rate of return, net present value, and change in asset value is found in Appendix V-A.

It is not possible to do a complete financial assessment of the implications of sustainable property investment on a property without applying a traditional real estate financial analysis. For example, the Discounted Cash Flow Analyses (DCF) used by investors or lenders and the Total Occupancy Cost Analysis (cost of ownership) used by space users capture all the factors influencing the demand by space users and the positive and negative risks of implementing a sustainable investment strategy, not just costs.

Even if one does not complete a full DCF analysis, one must think through how financial performance is driven by key variables in the DCF model such as rent, occupancy, tenant retention, vacancy at turnover, and discount and capitalization rates in order to articulate, even in words, the implications of sustainable investment on financial performance. (This process is discussed in detail in Steps 3, 4 and 5 of this chapter.)

After tax cash flow analysis is just a variation on DCF analysis, where the implications of taxes, depreciation, and related issues are factored into the analysis. Valuation is a form of financial analysis that incorporates a DCF analysis (the income approach), a sales comparison analysis, and a cost approach analysis.

Cost management is a traditional real estate financial analysis that is not an integrated model incorporating all costs, revenues and other risks, but rather a set of analytical models focused on providing investors with the tools to identify and manage cost issues that could impair successful outcomes. Cost benchmarking, cost planning, procurement policies, and other analyses focus on assisting decision-makers to get the best possible outcomes for the least cost. Sophisticated cost management that provides proper coordination, guidance, and management of expected outcomes can provide particular dividends for sustainable investment given the myriad of choices and optional outcomes that can be specified at the initiation of a project.

Total Occupancy Cost Analysis (cost of ownership) is a term most popular in the corporate real estate sector where real estate decisions are best made by factoring in all costs of occupancy including:

- Financial aspects of a transaction
- Tenant improvement costs
- Infrastructure support costs
- Ongoing costs of facilities and operations
- Costs of managing space activities[7]

The most sophisticated space user decisions also factor in the implications of the real estate decision on the key strategic objectives of the company.[8] More detailed analysis of the contributions of sustainable real estate to the overall value of the enterprise is discussed in more detail below.[9]

[7] Rent can play a relatively minimal role in total occupancy cost analysis. It has been reported that total occupancy costs are made up of the work environment (70%), technical infrastructure (22%), and real estate (8%). Technological changes occur faster than expected and may cause equipment and supporting infrastructure to become inefficient or obsolete. The workflow and environment may become inefficient because office configuration and support systems no longer suit the changing situation. Employee turnover can increase due to frustrations at operating inefficiencies. ("Occupancy cost managers examine more than rent," *Puget Sound Business Journal*, Seattle, Ryann Morris, President and Managing Partner of Real Estate Partnerships and Alliances, Inc., Sept. 23, 2005.)

[8] "Space user" is a term we use to describe the occupants or users of real estate. It is a term that includes corporate and non-corporate owner-occupants, tenants, retail customers or other non-owner or tenant users of space.

[9] Corporations and other space users have traditionally used a combination of the traditional sustainability financial analyses, such as Simple Payback or Simple ROI, and other more sophisticated analyses in making their real estate investment decisions. In addition, there are specialized decision-making software and financial models for making lease, buy, consolidate, or relocation decisions as well as specialized models for sale-leaseback analysis, GAAP sublease

For space users—both corporate owner occupants and tenants—real estate decisions are best made based on a full consideration of occupancy cost, of which the cost of the real estate, or rent, is only one component. In most cases, rent is not the major component of occupancy costs. Most such occupancy costs are outside of the lease parameters. One analyst stated the break-out of total occupancy cost as work environment (70%), technical infrastructure (22%) and real estate (8%).[10] Some of the key considerations to include in a total occupancy cost analysis are:

- Rent
- Operating expenses
- Taxes
- Insurance
- Amortization of build out
- Commissions
- Telephone/electrical/data
- Lights
- Signage
- Moving costs
- Telecom equipment
- Furniture and equipment
- Security systems

Additionally, sophisticated models need to include assessments of things like churn costs, tenant turnover and retention, infrastructure support costs, transactions costs, and other less direct costs.

The IPD International Total Occupancy Cost Code has categorized occupancy costs into five broad categories (IPD 2001):

1. Real estate occupation costs
2. Adaptation and equipment costs
3. Building operation costs
4. Business support costs
5. Occupancy management costs

In addition, although not always included in the total occupancy cost analysis, disruption costs can be important. Disruption can occur due to several internal and external factors. Among these are absenteeism due to sick building syndrome, and organizational changes,

analysis, evaluation of capital vs. operating leases, and other specialized analyses. For the purposes of our work in this report, we will focus on Total Occupancy Cost Analysis and sustainability focused Enterprise Value Analysis presented in the next section.

[10] Ryan Morris (President and Managing Partner of Real Estate Partnerships and Alliances, Inc.), "Occupancy Cost Managers Examine More Than Rent," *Puget Sound Business Journal*, Sept. 23, 2005.

i.e. staff movement from one location to another within an occupied space due to promotion or movement due to a new business environment. This will result in disruption to business activities and lost productivity. These costs are estimated as a function of the rate of movement of individuals in an organization within the occupied space. This rate is particularly high during the early years of occupancy when occupants are getting accustomed to their new working environment.[11]

The critical point of total occupancy cost (cost of ownership) analysis is that space users make the decisions about the type of space they need on reasons well beyond real estate cost and/or sustainability or energy efficiency requirement. The specific underwriting/due diligence guidelines for space users incorporate more than total occupancy cost, focusing initially on the relationship of the space to overall strategic goal compliance including such issues as increasing the value of their assets, promoting marketing and sales, increasing innovation, increasing employee satisfaction, increasing productivity, increasing flexibility, and/or reducing costs. Other tools, such as the balance scorecard and other structured processes for incorporating nonfinancial considerations are often used in decision making.

c) Sustainability Sub-Financial Analyses

Sustainability sub-financial analyses are those analyses and models that provide quantitative insight/data that is typically combined with other information and analyses to aid valuers/financial analysts in their specification of key financial assumptions (rent, rent growth, occupancy, absorption, tenant retention, and operating costs) in a DCF analysis, or related traditional real estate financial model.

Sub-financial analyses are not unique to sustainable properties. For example, prior to making a determination of rental rate inputs in a pro-forma, valuers would typically develop or review forecasts of supply and demand, make adjustments to rent comparables for timing of lease signing, space differences, floor height, and other factors, and evaluate comparable property strategies relative to rents and occupancy levels. Each of these sub-financial analyses are then integrated qualitatively by the valuer with other information to set rent levels in the financial model.

The ten sustainability sub-financial analyses listed in Exhibit V-4 are a selection of some of the specialized analyses that have been developed in recent years to aid in the financial analysis of sustainable investment. These analyses include Comparative First Cost Analysis, DCF Lease-Based Cost-Benefit Allocation Modeling, Sustainability Options Analysis, Enterprise Value Analysis, and Risk Analysis and Presentation (RAP).

These ten are only a few of the scores of sub-financial analysis that have been developed by practitioners. While many sustainability sub-financial analyses are uniquely derived for specific property situations, the importance of quality independent analyses of this type is critical to the articulation of value and risk in sustainable properties.

[11] Halim A. Boussabaine, Richard L. Kirkham, *Whole Life Cycle Costing: Risk and Risk Responses,* Rockwell Publishing, 2004

An important point in understanding sustainability sub-financial analyses is that in most cases these analyses do not result in data that you can input directly into a DCF analysis. As their name implies, these types of analyses provide information and insight, which is combined with non-sustainable considerations in the final selection of key inputs such as rent, absorption and occupancy.

For example, there are scores of studies that demonstrate the relationship between building outcomes, such as increased ventilation rates, and improved health (reduction in sick building syndrome or asthma, for example). However, even if a specific dollar health cost savings could be estimated for a building, further analysis would have to be done to determine how the health cost savings would accrue to a potential space user.

For an owner-occupant (corporations, governments, institutions, non-corporate business entities), depending on the level of health costs paid by the building owners for their employees and a few other factors, much of the potential health cost savings may accrue to the building owners. However, for an investor owned building, the key issue in estimating the financial impacts of health cost savings is to look at how tenants value such potential benefits, and then how they value these benefits in the context of all the other benefits and factors that enter into their selection of space. Accordingly, any health cost benefits analysis is only a contributing factor to the development of financial inputs for a traditional real estate analysis. However, such analyses, if independently done and appropriately presented, can significantly influence leasing and/or investment decisions resulting in improved financial performance.

Summary of Sustainable Sub-Financial Analyses

Key sustainable sub-financial analyses are summarized below and in more detail in Appendix V-A.

Comparative analysis of the first costs between sustainable and non-sustainable buildings has emerged as a key issue. One of the first questions new developers or investors ask is: "How much more does a green building cost?" As clearly presented by Peter Morris in "What Does Green Really Cost?"[12]

In analyzing this question it is important to understand that the answer will vary greatly based on a wide range of factors, including building type, project location, local climate, site conditions, and the familiarity of the project team with sustainable design. The level of "green" and the commitment and integration of the design and construction team are also important.

Perhaps more important, underlying the broader question is another question: "Compared to what?" Mr. Morris made the following comment on this issue:

[12] Peter Morris and David Langdon, "What Does Green Really Cost?", *PREA Quarterly*, Summer 2007.
http://www.davislangdon.com/upload/images/publications/USA/Morris%20Article.pdf

> The most common comparison, at least in anecdotal reporting, is comparing the cost of the green project with the original project budget or the original anticipated cost of the project: 'The final project cost me this much; I originally thought it would cost that much; the difference must be what I spent on making it green.' Clearly, this approach has two substantial problems. It assumes the original budget was adequate in the first place, and it assumes that no other changes or enhancements were made.[13]

There are also difficulties in looking at the cost of individually added green features, which is effectively comparing the building to itself without the green features.

> Looking at the added cost of green features presumes that the features are, in fact, additive, and that they can be readily priced as separate items and makes assumptions regarding what would have been built. In some cases, this is easy, for example the cost of a variable frequency drive on a fan motor. However assessing the added cost of improved daylighting through good orientation in space planning is virtually impossible. This approach is also not practical with a truly integrated design process.[14]

More detail and a full set of links to additional resources is presented in Appendix V-A.1.

DCF Lease-Based Cost-Benefit Allocation Models are an extension of the Discounted Cash Flow modeling process. More focused and specialized attention to the specific distribution of costs and benefits to landlords and tenants is necessary to properly evaluate the financial performance of sustainable property investments. First, for any existing building with leases, or a new building with pre-leasing agreements, the specific terms of the lease are necessary to allocate the costs and benefits of sustainable improvements, particularly related to energy. The specific allocation of costs and benefits will vary based on whether it is a gross, net or fixed base lease, or some other hybrid; the specific terms and mechanics of expense recoveries, and other lease terms. The level of benefits to the tenant are also important in that energy cost savings is part of the total cost of occupancy in making a decision to be in a space.

Leases have an even more central role in assessing the financial performance of sustainable properties beyond cost and benefit allocation. Leases play an important role in 1) establishing clear environmental performance objectives; 2) management of tenant energy use including sub-metering, building operating hours and lighting controls; 3) clear standards for operational performance in HVAC systems and other systems; 4) clear guidelines for hazardous materials, green cleaning, recycling, the fit-out of tenant spaces; and 5) other building rules and regulations. Fortunately, significant attention has been paid to developing "model" green leases and these issues are starting to be addressed. (More detailed assessment of "Green Leases" and allocation issues can be found in numerous documents presented in the Consortium's Research Library and Industry Resources section under code 24.5.)

[13] Ibid.

[14] Ibid.

A set of principles and provisions to address the split-incentive issue is presented in: Energy Efficiency Lease Guidance to Address the "Split Incentive", authored by Sean Patrick Neill: http://cycle-7downloads.com/Downloads.html. Cycle-7 and HR&A Advisors developed this lease guidance under the auspices of the Natural Resources Defense Council. Financial support was provided from the New York State Energy Research and Development Authority (NYSERDA), the City University of New York (CUNY) Building Performance Lab, and the Rocky Mountain Institute (RMI). The guidance emerged from a series of three half-day seminars in New York City that included major national landlords, major tenants, attorneys, brokers, engineers, environmental advocates and government officials.

Some of the information necessary to evaluate the relative costs and benefits for landlords and tenants include:

- Current rent roll or lease abstracts;
- Detailed history of expenses affected by upgrades;
- Market leasing, valuation, and vacancy assumptions;
- Estimated upgrade cost on a tenant-by-tenant basis;
- Estimated savings on a tenant-by-tenant basis;
- Estimated timetable for upgrade completion;
- Cost recovery provisions and existing leases;
- Debt and tax assumptions, if applicable.

Whereas typical discount cash flow software can deal with the first three bullet points, additional analyses will be needed to address some of the other issues.

Sustainability options analysis has become important during the last few years as many corporations and large investment managers have made the decision to improve energy efficiency and/or sustainability across their portfolios.[15] Sustainability options analysis can take many forms. Essentially such analyses provide a series of options, typically stated as energy efficiency or sustainability outcomes or ratings, and identify costs associated with the options. This can be done on a relatively straightforward feature by feature basis or LEED point by LEED point basis, but to be most effective, an integrated modeling approach that evaluates the interactive effect of the different combinations of sustainability options, and related sustainable outcomes, preferred. However, in many cases the cost and sophistication of such approaches will not be necessary, or possible.

Sustainability options analysis is conducted at varying degrees of sophistication based on the particular demands and sophistication of the people conducting and consuming the analysis. In practice, limitations on the measurement and monitoring of many key energy and sustainability metrics—both as to availability and accuracy—have limited the sophistication of sustainability options analysis. Many companies interested in moving

[15] We use the term "Sustainability Options Analysis" to reflect the dynamic choices relative to the varying combinations of sustainable features, systems and outcomes that an owner might want to achieve. LEED EB or EnergyStar audits would be examples of Sustainability Options Analyses.

forward quickly with energy efficiency and sustainability investments have had to take a step backward—to determine what and how to measure sustainability or energy use—before they can move forward.

The quality of a sustainability options analysis will be largely driven by the factors considered in the analysis, the process for collecting data, the flexibility of the approach to address sustainability-cost trade-offs, and most importantly to the quality and experience of the person completing the site assessment, interviews, and analysis.

From a financial perspective, sustainability options analyses implemented to date have done a reasonable job at assessing initial costs, and a reasonable job at assessing potential operating cost savings for specific features or sustainability processes or strategies, but are still in their infancy relative to providing a dynamic capability to assess both the development costs of varying combinations of sustainable features, and the full financial benefits and risks resulting from projected sustainable outcomes. Further work to refine existing methodologies to accommodate the revenue and risk considerations presented in this chapter is needed.

The sample sustainability options analysis summary shown in Exhibit V-6 is modified from a sustainability options analysis carried out in a group format for a large corporate client. In this case, as one of the first buildings evaluated in the portfolio, a consultant developed their preliminary assessment of the key LEED elements to be addressed at the subject building, then along with facility managers, operational specialists in energy and other relevant fields, and senior management, came up with the estimated payback periods and additional value indicators. They later dug into more detail in the implementation phase, but this initial screen provided benefits and resulted in many of the easy decisions being made quickly.

Exhibit V-6
Sustainability Options Analysis
Sample Summary Assessment

LEED Element	Type*	Value			
		Payback	Savings	Reputation	Leadership
Sustainable Sites					
SS.1 Location/access to public transport	2	na		X	
SS.2 Incentives for alternative transportation	1	na		X	
SS.3 Green landscaping maintenance	2	na		X	
SS.4 Stormwater management	2	na		X	
SS.5 Light Pollution Reduction	1	1-2 year	X	X	
SS.6 Cool Roofs	1	< 1 year	X	X	
Water Efficiency					
WE.1 Water efficient landscaping	2	1-3 year	X	X	
WE.2 Water efficient buildings & grounds	1	1-2 year	X	X	
WE.3 Track water & sewer consumption	1	< 1 year	X	X	
WE.4 Overcome regulatory and trade barriers	3	na			X
Energy & Atmosphere					
A&E.1 Improve tracking of energy consumption	1	< 1 year	X	X	
A&E.2 Holistic accounting of greenhouse gases	2	na			X
A&E.3 Improve truck & vehicle fleet efficiency	2	na			X
A&E.4 Occupancy sensors	1	1-3 year	X	X	
A&E.5 Day cleaning for janitorial services	1	< 1 year	X		
A&E.6 Group re-lamping with Super T-8	1	1-3 year	X	X	
A&E.7 Identify and maximize energy retrofits	2	1-5 year	X	X	
A&E.8 Photovoltaics	2	5-10 year	X	X	X
A&E.9 Daylighting & controls	2	3-5 year	X	X	
A&E.10 Additional ozone protection	3	na		X	
A&E.11 Expanded demand response	1	< 1 year	X	X	
Indoor Environmental Quality					
IAQ.1 Low environmental impact cleaning	1	na		X	
IAQ.2 Chemical use reduction for cooling towers & HVAC	1	< 1 year	X	X	
IAQ.3 Standard for low-emitting building materials	2	na		X	
IAQ.4 Isolate & ventilate copy machine areas	2	na		X	
Materials & Resources					
MR.1 Portfolio recycling—general office waste	1	na		X	
MR.2 Green furnishing standards	2	na		X	
MR.3 Package reduction	2	na		X	
MR.4 Socially responsible suppliers	2	na		X	X
MR.5 Reduce lifecycle impacts on finishes	1	< 1 year	X		
MR.6 Green design & construction standards & methods	1	na		X	
MR.7 Local sourcing	2	na		X	

* 1 = straightforward, low or no cost, easy decision
2 = more effort/cost but significant opportunity to advance sustainable goals
3 = more difficult, costly, less clear potential positive cost/benefit trade-off

The sample LEED Existing Building Audit/Assessment shown in Exhibit V-7 provides an example, for four LEED points, of the types of issues, strategies, and cost considerations that are addressed by sustainability options analysis consultants. As can be seen in Exhibit V-7, the types of strategies that are considered, and the eventual cost estimates that are generated for each action, will be quite variable based on the experience and quality of the

person completing the work. A lower cost estimate, if it is underestimated, or if it results in a much lower net return, is not always the best answer. More detailed financial analysis is provided in a final report.

Exhibit V-7
Sustainability Options Analysis
Sample LEED EB Audit/Assessment*

Sustainable Sites

Credit 7—Light Pollution Reduction: 1 pt.

Requirements:

Site Lighting: Through site lighting calculation document that project meets LEED NC requirement SS Credit 8 **OR** Shield all outdoor lights over 50 watts so they don't direct light into the sky.

AND

Option A – Measure the night illumination levels at regularly spaced points around the perimeter of the property. The illumination levels measured with the lights on must not be more than 10% above the levels with the lights off.

OR

Option B – All non-emergency interior lighting shall be automatically controlled to turn off during non-business hours. Provide manual over-rides capability for up to 2 hours during non-business hours.

Document that the lighting control system is being properly used to adjust lighting levels during non-business hours.

Strategies:

Implement site lighting criteria to maintain safe light levels while avoiding off-site lighting and night sky pollution.

Cost & Feasibility:

Small to Medium Premium - Possible– Not very expensive – just make sure lights are pointing down instead of up and that ground lights have shields. Most Class A buildings have lighting controls.

Energy & Atmosphere

Credit 5—Refrigerant Management: 1 pt.

Requirements:

Option A – Do not use refrigerants

Option B – Select Refrigerants that minimize or eliminate the emission of compounds that contribute to ozone depletion or global warming. The base building HVAC&R equipment shall comply with a formula that sets a maximum threshold for the combined contributions to ozone depletion and global warming potential.

Do not install fire suppression systems that contain ozone-depleting substances (CFCs, HCFCs of Halons).

Strategies:

Where mechanical cooling is used, utilize base building HVAC and refrigeration systems for the refrigeration cycle that minimizes direct impact on ozone depletion and global warming. Select equipment with reduced refrigerant charge and increased equipment life. Maintain equipment to prevent leakage.

Cost & Feasibility:

Large Premium to install new equipment. Most of these refrigerants are facing upcoming bans. Look into equipment that uses R123 or R134.

Difficult to achieve if you don't already have new HVAC equipment.

Materials & Resources

Prerequisite 1: Sustainable Purchasing Policy: Required

Requirements:

Have in place an Environmental Preferable Purchasing (EPP) policy that includes, at a minimum, product-purchasing policies for the building and site addressing the requirements of MR Credit 1.

Additionally, extend the EPP policy to include product-purchasing policies for the building and site addressing the requirements of at least 1 of the credits listed below.

Credit 2 – Sustainable Purchasing: Durable Goods

Credit 3 – Sustainable Purchasing: Facility Alterations & Additions

Credit 4 – Toxic Material Source Reduction: Reduced Mercury in Light Bulbs.

Strategies:

Evaluate the items that are purchased for the building, identify more environmentally friendly alternatives when economically feasible. Work with suppliers to identify environmentally preferable products that meet the needs of the building.

Cost & Feasibility:

Small Premium to purchase reduced mercury lamps and that is the easiest of the 3 to attain in multi-tenanted buildings. Easy to achieve this requirement.

Indoor Environmental Quality

Credit 1.1 – IAQ Best Management Practices: IAQ Management Program: 1 pt.

Requirements:

Develop and implement on an ongoing basis an IAQ Management Program for buildings based on the EPA resource "Indoor Air Quality Building Education and Assessment Model (I-BEAM)," EPA Reference Number 402-C-01-001, December 2002, which is available on the EPA Web site: http://www.epa.gov/iaq/largebldgs/i-beam/index.html.

Strategies:

Operate a program to enhance IAQ performance by optimizing practices to prevent the development of indoor air quality problems in buildings and maintain the well being of the occupants. Survey building and evaluate systems to identify potential IAQ problems and implement an ongoing program to prevent these problems from occurring and to maintain a high level of IAQ on an ongoing basis

Cost & Feasibility:

Small premium – Download form, put together plan and document all IAQ complaints.

Could be Easy Point – Need Reference Guide to confirm.

* These four pages summarize the types of issues, strategy recommendations and cost analysis conducted in a LEED EB Audit/Assessment (Craig Sheehy, Envision Realty, 2008)

Churn Cost Savings Analysis: The Institute of Facility Management (IFMA) defines "churn" rate as the number of moves in a year expressed as a percentage of the total number of offices occupied. Churn rates averaged 36% in a 2007 IFMA survey, down from 44% in 1997 and 41% in 2002.

"More than 85% of the moves are 're-stacking' moves, which take place within the same building. Those re-stacking moves take different forms. Box moves, in which employees move to existing workspaces, involve relocating files and supplies, not furniture, wiring, or telecommunications systems.

Furniture moves are more complex and involve reconfiguring existing furniture or adding new furnishings, although changes to telecommunications are usually minimal. Construction moves are the most complex and include new walls and telecommunications systems and additional wiring for power and data.

Costs associated with the three major elements involved in these moves—furniture, cabling, and walls—vary depending on a number of factors. These include prevailing labor rates, materials used (Category 5e cable versus Category 6), and technology support required. A facility designed for wireless access can reduce costs considerably because no wiring is required.

IFMA-member companies reported that box moves average $152, whereas furniture moves cost $679 per move, excluding power and cabling changes. Moves that include changes to power and cabling range from $200 for simple changes to $600 for extra circuits and receptacles. Typically, costs per drop (bringing two or three cables into a workstation) are an additional $300 to $450, and that's only for data cabling; electrical is additional. Thanks to wireless networks that allow people to work from anywhere in the building, "soft costs," associated with downtime (lost productivity) are less of a problem than they used to be.[16]

The potential benefits of reducing churn costs will be a function of the level of churn for the types of space users that will be occupying the space, and the specific types of sustainable features (under floor air ventilation, carpet tiles, etc.).

According to IFMA research, the primary drivers of churn are

- Reorganization (70%)
- Routine churn (53%); which includes collocating groups to improve collaboration and maximize efficiencies within and between departments
- Expansion (46%)
- Consolidation (33%)
- Downsizing (11%) and mergers (9%) are the weakest drivers of churn. [17]

[16] Churn Reconsidered, Herman Miller 2008; "Project Management Benchmarks," IFMA, Research Report #28, 2007, p. 41.

[17] Ibid.

Enterprise value analysis is a new type of sustainability sub-financial analysis that needs to be more rigorously applied to the property markets. The focus of this analysis is on the value created by sustainable property investment at the enterprise level. Significant work has been done in recent years to better understand and measure the non-real estate (business unit or enterprise) value of real estate decisions. Non-real estate value is derived from employee attraction and retention, leadership value, promotional value; health cost savings, productivity gains, and related benefits.

The biggest challenge in the analysis and articulation of the value of sustainable property investment to the enterprise is in transitioning from a general discussion of these benefits to a discussion about the potential magnitude of these benefits for a specific property. The influence of potential enterprise value benefits on the decision of space users will vary based on the types of space users, their business strategies, the demographics of their employees, and the nature of the customers that they serve, among other factors.

The process for evaluating potential enterprise value, and the ability of an owner to monetize these benefits through higher rents, occupancies, faster absorption, etc., starts with an assessment of the types of space users (tenants or owner occupants) expected at a property. What key issues drive these particular types of occupants? Are they influenced by their internal or external commitments to carbon disclosure or reduction? Do they value potential health or productivity benefits? Is an environmentally-socially responsible reputation important to them, their customers, or employees?

Once an understanding of the key drivers of potential occupants is established, the next step is to assess the likelihood of whether the subject property will generate the types of sustainable building performance important to expected occupants. Key sustainable property performance indicators that generate enterprise value include:

- Reduction in resource use
  - Reduction in energy and water use
  - Reduction in building waste
  - Reduction in pollution emissions
  - Reduction in carbon footprint
- Superior location and access
  - Limits auto use
  - Environmental sensitivity
- Occupant performance
  - Occupant satisfaction
  - Improved health/absenteeism
  - Productivity: working environment—focus/energy level
- Flexibility/adaptability of occupied space
  - Design
  - Systems
  - Materials
  - Energy sources

- Sustainability compliance
  - Certifications
  - Regulations
  - External commitments
  - Internal policies

The success a subject property has in achieving the sustainable performance outcomes identified above will determine the extent to which the property will be able to achieve sustainable real estate-related enterprise value benefits. Key sustainably related enterprise value benefits are listed below:

- Reduction in enterprise costs
  - Reduction in churn costs
  - Reduction in employee costs: productivity
  - Reduction in employee health costs

- Improved reputation/leadership
  - Recruiting
  - Employee retention/satisfaction
  - Public relations/brand management
  - Retain "social license" to operate
  - Improved marketing and sales
  - Increase company market value
  - Increase company market liquidity
  - Address shareholder concerns
- Compliance with internal/external policies/initiatives
  - Corporate energy/sustainability requirements
  - Corporate social responsibility reporting
  - Global Reporting Initiative
  - Carbon Disclosure Project
  - Minimum requirements of socially responsible investment funds
- Reduced risk to future earnings
  - Legal risks—sick building syndrome and mold claims, business interruptions, building remediation costs, etc.
  - Reduced sub-leasing risk if downsizing, relocating, etc.
  - Reduced operating cost volatility
  - Reduced risk to reputation
  - Improved defense of competitive advantages
  - Reduced risk of future compliance costs

The level of potential influence on key DCF model inputs like rents, occupancies, absorption, tenant retention will depend on the specific types of tenants, level and type of sustainability achieved, and sophistication of the marketing of these benefits to target audiences. See Chapter VI: Section D: Underwriting Space User Demand for a more detailed treatment of this issue.

Health and productivity benefits analyses are critical sustainability sub-financial analyses due to the potential for significant benefits compared with conventional properties. While these two types of benefits are related, and overlap in some cases, they are most appropriately evaluated and underwritten separately. (See Chapter IV: "Sustainable Property Performance," Section F-4 for data on health and productivity performance.)

Employee salaries and benefits represent the largest portion of costs for most office-based and many other companies. Consequently, any increases in worker productivity can have a significant impact on a company's financial performance. Because sustainable buildings often include features that result in better lighting, increased ventilation, reduced window glare, better thermal comfort, etc., these buildings have been shown to increase worker productivity through, among other things, reduced absenteeism, lower incidence of respiratory ailments and staff turnover. In theory, a company should be willing to pay more, when leasing, purchasing or constructing space, where its employees will be more productive.

The majority of productivity calculations derive an annual cost savings estimate based on average salaries and time saved by employees. This annual productivity cost savings is then converted to a $/SF savings per employee based on an average amount of square feet occupied per employee. Many of these analyses employ a net present value calculation that estimates future benefits, discounted back to present value dollars (see Discounted Cash Flow – Net Present Value analysis above). The logic of translating the productivity gain into a $/SF figure is that decision-makers can then assess the reasonableness of a space premium for a building that provides these benefits.

Similarly, potential health benefits from sustainable properties can be very significant, particularly in comparison to conventional properties. The relationship between specific building attributes such as low ventilation rate, air conditioning and humidification systems, temperature and health effects are well established, as shown below in Exhibit V-8.

Exhibit V-8
Building Attributes and Health

	Health Effects					
Indoor Environmental Risk Factor	Asthma / Allergy	Building-Related Symptoms	Respiratory Infections	Chronic Pulmonary Disease	Other: Reproductive, Cataracts	Cancer
Low Ventilation Rate	✓	✓	✓			
Air-Conditioning and Humidification Systems		✓				
Microbiological Agents and Dampness, etc.	✓	✓	✓			
Combustion Products	✓	✓	✓	✓	✓	✓
Chemicals Emitted from Building or Contents (VOCs, SVOCs)	✓	✓	✓			✓
Temperature (High) and Relative Humidity (High or Low)		✓				
Ionizing Radiation						✓

Source: Adapted from M.J. Mendell, "Indoor Environments and Health: What Do We Know?" Presentation, Lawrence Berkeley National Laboratory, March 3, 2004.

Studies indicate that adverse health impacts alone could be costing U.S. building occupants on the order of tens of billions of dollars each year.[18] As a thought experiment, if $50 billion are divided by the approximately 15 million occupants thought to be affected in some way[19] and multiplied by a ratio of one occupant per 230 square feet of space,[20] one could estimate that mitigating the adverse health impacts could save approximately $14.50 per square foot. Although the above is only a thought experiment and excludes the vast potential value associated with positive occupant outcomes, $14.50 per square foot would certainly be of material value in the real estate value chain if someone were able to capture it.

Another conceptual way to approach the question of relative importance and potential value of occupant outcomes is to consider the cost structure of a typical occupant. In many

[18] M.J. Mendell, et al., "Improving the health of workers in indoor environments: priority research needs for a national occupational research agenda," *American Journal of Public Health* 92 (2002)

[19] Ibid.

[20] U.S. General Services Administration (GSA), "Frequently Asked Questions: Space Management," GSA web site

instances, even for various property types, people are the most important element in the equation. Particularly for service-based organizations, employee costs can dominate the cost structure at percentages of approximately 90% of a firm's total costs. Real estate costs are approximately one tenth of employee costs, and electricity costs are approximately one tenth of real estate costs.[21] With that kind of cost structure and a highly competitive labor market, which is expected to grow even more competitive in the coming decade, it is easy to see how gains in employee-related costs can mean large relative gains for occupants.[22]

Select Health and Productivity Research Resources

GBFC has identified over 200 health and productivity related building studies (see Appendices IV-C and IV-D). These studies are identified, and where possible links to actual studies are provided. The studies and other resources are also presented in the Consortium's Research Library. Health and productivity building performance evidence is also presented in Section E.4: "Occupant Performance" of Expanded Chapter IV: "Sustainable Property Performance." The descriptions of the relevant three Consortium Research Library codes are presented below:

10.0 Space User Productivity and Health

This section of the Research Library is for those documents that address the relationship between sustainable features or attributes and space user health and/or productivity. Studies that address both these issues are coded in this section, while studies that address either productivity or health independently are coded in sections 10.0—Space User Productivity or 10.2—Space User Health. Documents in this section are further coded and can be searched by inputting one of the two-character references (H1 to P7) in the title search box. The category references are:

H1 Health Gains -IEQ
H2 Health Gains - Temp Control
H3 Health Gains - Lighting
H4 Health Gains – Privacy and Interaction
H5 Health Gains – Ergonomics
H6 Health Gains – Natural Environment
H7 Health Gains – Whole Building

HP1 IEQ Occupant Satisfaction
HP2 Other References

P1 Productivity Gains - IEQ
P2 Productivity Gains – Temp Control
P3 Productivity Gains – Lighting
P4 Productivity Gains – Privacy and Interaction

[21] Greg Kats, "The Costs and Financial Benefits of Green Buildings," a report to the State of California's Sustainable Buildings Task Force, October 2003.

[22] These paragraphs are extracted from independent student research final report, completed for the Green Building Finance Consortium by Jackson Lehr, Harvard Business School, Fall 2006.

P5 Productivity Gains – Ergonomics
P6 Productivity Gains – Natural Environment
P7 Productivity Gains – Whole Building

10.1 Space User Productivity

This code covers documents that address the relationship between sustainable features or attributes and space user productivity. This section of the Research Library supplements V-C2, Appendix V-C, and Chapter VI: Section D which describe the process for evaluating Space User productivity and Section E-4 in Chapter IV, which presents the evidence for sustainability related space user productivity benefits.

10.2 Space User Health

This code covers documents that address the relationship between sustainable features or attributes and space user health. This section of the Research Library supplements V-C2, Appendix V-C, and Chapter VI: Section D which describe the process for evaluating Space User health and Section E-4 in Chapter IV, which presents the evidence for sustainability related space user health benefits.

http://www.greenbuildingfc.com/Home/ResearchLibrary.aspx .

A good source for independent opinion and access to research on the effects of Indoor Air Quality on health and productivity is provided at the Indoor Air Quality (IAQ) Scientific Findings Resource Bank (IAQ-SFRB). The IAQ-SFRB provides information summarizing the state of scientific knowledge about the relationships between people's health and productivity and the IAQ conditions or associated building characteristics in which the people work or reside. When possible, these relationships are expressed in quantitative terms using graphics, charts, or equations. The summaries also include brief descriptions of the actions that may be taken to improve the pertinent aspects of IAQ, including those related to building design, construction, operation, maintenance, and occupant activities. This web site also provides links for downloading published journal articles that were developed specifically for the IAQ-SFRB project. All of the information provided in the IAQ-SFRB has undergone review by multiple experts other than the authors. http://www.iaqscience.lbl.gov/

Carnegie Mellon's BIDS (trademark for Building Investment Decision Support) is a case-based decision support tool that generates a calculation of the economic value added of investing in high performance building systems, based on the findings of building owners and researchers around the world. It is a good example of Sustainability Sub-Financial Analysis in that the tool enables (and provides) scores of sub-financial analyses on different systems and features to aid in assessing financial performance.

BIDS™ has a comprehensive collection of health and productivity related case studies organized in database in a variety of ways with key categories being Air, Thermal, Lighting Control, Network Access, Privacy and Interaction, Ergonomics, Access/Natural Environment, and Whole Building. For each of these areas, a whole range of cost-benefit

factors can be analyzed including First Cost, O& M Energy, Churn, Productivity, Health, Attraction/retention, Tax, Litigation and Insurance, and Salvage/Waste.

The tool provides an excellent starting point for thinking how sustainable features and systems can add value to a property over the full life cycle of the building. Access to the full scope of BIDS™ is strictly limited. http://cbpd.arc.cmu.edu/bids/

One of the key features of the BIDS™ tool is its life-cycle assessment of the value of features or systems. The results are calculated for each feature or system utilizing case study/research findings and BIDS™ "life cycle assumptions" which factor in average salaries, building size, health data, and other demographics to calculate the benefits that can be compared to cost for the feature or system. These calculations are helpful, but users need to apply the results carefully because of the inherent difficulty of applying general study results on "productivity" or "health" to specific buildings and occupants.

The BIDS™ analyses that I have reviewed are an improvement from the historic norm in the industry because life cycle costs are analyzed, but they do not integrate risk and revenue considerations, and typically consider sustainable features and strategies in isolation. The analyses also do not typically address owner-tenant issues, so the work is most applicable to owner-occupants who can more directly assume they accrue the benefits from productivity, health, etc.

One of the more complete discussions of the key purpose and value of BIDS™ is contained in an undated article on the AIA website by the leaders of BIDS™. This article concludes that their database has become robust enough to convincingly argue generally for five critical improvements to buildings: daylighting; natural ventilation and mixed mode conditioning; high performance lighting; cool roofs; and under floor air.
http://www.aia.org/aiaucmp/groups/ek_public/documents/pdf/aiap080050.pdf

An overview of the tool presented by Beran Gurtekin-Celik, PhD is shown at: http://www.lcacenter.org/InLCA-LCM03/Gurtekin-presentation.pdf

A more recent presentation from early 2009 provides some additional perspectives on BIDS:

Risk Analysis and Presentation (RAP) becomes particularly important in sustainable property investment. Sustainable properties generate powerful risk benefits and costs that need to be specifically analyzed in the context of the property. Some of these key risks include energy cost volatility, litigation risk due to mold or sick building syndrome, regulatory risk, sub-leasing risk, exit risk, and development and construction risk. More sophisticated and property-specific analyses need to be conducted and clearly and independently communicated to aid decision-makers. This topic is more fully addressed in Section H: of this chapter.

d) Public Sustainable Property Benefits Analyses

Public sustainable property benefits analyses are financial analyses used to quantify potential public sector benefits. The concept is simple—if a building owner can clearly and factually articulate the public benefits that arise from their building, they are more likely to convince regulators, tenants and investors to pay for those benefits.

Such "monetization" of public value is created from governments or utility companies through enhanced entitlements/permitting, public grants, favorable financing, tax benefits, and carbon credits or payments, and from private companies through their contribution to Enterprise Value and resulting increases in space user demand.

Sophisticated sustainable property investors and developers will conduct their own detailed assessment of the public benefits of their projects to enable clear articulation to regulators, potential tenants, employees, and capital sources. A starting point for clearly articulating public benefits is to have a framework for thinking through and organizing public benefits analyses. One such framework is presented below in Exhibit V-9 and discussed in more detail in Appendix V-A. Public benefits research is presented in the Research Library and Industry Resources sections of the Consortium's website under index codes 1.5, 7.9, 11.0, 15.67, 15.77 and 20.5 as described below[23]:

1.5 Public Sustainability Benefits

Financial analyses used to quantify potential public sector benefits. These analyses contribute to private value through the potential ability to negotiate payment for public value. Such "monetization" of public value is created through enhanced entitlement, permitting benefits, public grants, financing, and other incentives.

7.9 Public Value: Triple Bottom Line

Documents that address public value or triple bottom line valuation methodologies are contained in this section of the library..

11.0 Government Regulations and Incentives

This section of the research library contains documents that address sustainable and/or energy related government regulations and incentives. Related topics include section 15.7—Market Performance: Regulators, where most of the specific studies that talk about regulator demand for sustainable property are coded, as well as section 20.5—Public Finance, 1.5—Public Sustainability Benefits, 7.9—Public Value: Triple Bottom Line, and sometimes in sections 25.0— Organizational Change/Strategies or 28.0--Sustainable Property Guides/Best Practices. This section of the research library supplements Section D5, "Valuing Regulator Demand" of Chapter VI: "Sustainable Property Valuation" of the *Underwriting Sustainable Property Investment* book.

[23] The descriptions below provide insight into how documents are coded in the Consortium's Research Library.

15.7 Market Performance: Regulators

This section contains documents that address the performance and/or reporting of the demand by regulators for sustainable properties. This section of the research library supplements Section F, "Market Performance" of Chapter IV.

20.5 Public Finance

This section contains documents that identify specific sources, vehicles, and strategies for the public finance of sustainable energy efficient properties. Public finance is also covered in 20.9—Subsidies/Incentives as well as in section 11.0—Government Regulations and Incentives.

Exhibit V-9
Public Benefits of Sustainable Buildings

Reduce Infrastructure Costs
• Water collection, storage, treatment and distribution • Energy production and distribution • Road & bridge construction/maintenance • More efficient use of existing infrastructure
Environmental & Resource Conservation Benefits
• Conservation of natural resources • Reduce carbon output • Landfill reduction • Reduce air pollution • Reduce water pollution • Increase biodiversity • Reduce soil erosion • Reduce deforestation • Reduce desertification • Preserve ozone layer • Reduce drought risk
Land Use Benefits
• Preserve open space and natural habitat • Protect agricultural land • Maintain vibrant urban areas • Reduce traffic congestion
Climate Change Reduction
• Reduce vulnerability to climate change • Reduce costs to respond to change • Reduce spread of infectious respiratory disease • Reduce acidification • Contribute to many environmental and resource conservation benefits • Improve public health
Economic Benefits
• Job creation • Improve public health and well-being • Reduce insurance costs • Reduce public health costs—Medicare • Government worker productivity: reduce government costs • Worker productivity: increase earnings and tax revenues • Community competitiveness—quality of life
Security Benefits
• Reduce reliance on foreign energy sources

In addition to the resources and analytic examples presented for each of the key public benefits categories presented above, a selection of additional sources is highlighted below. It should be understood that this is a massive area of study, with local, state, and federal governments working to understand and better quantify, measure, and monitor the public benefits of projects.

Select Resources for Evaluating Public Benefits

The STAR Community Index is a framework for improving the livability and sustainability of U.S. communities. ICLEI-Local Governments for Sustainability USA, the U.S. Green Building Council (USGBC) and the Center for American Progress (CAP) have established a partnership to develop STAR with the goal of launching this tool in January 2010. STAR is inspired by the success of the Leadership in Energy and Environmental Design (LEED) Green Building Rating System™ developed by USGBC.

The Steering Committee and Technical Advisory Committees will establish the structure, indicators, and metrics of STAR. Credits will cover a broad diversity of issues that jurisdictions are directly responsible for such as municipal operations and services as well as issues that jurisdictions have influence over such as environmental protection and quality of life. STAR indicators and metrics may include the following categories.

- Environment
  - Natural Systems (ecosystems and habitat, water and stormwater, air quality, waste, and resource conservation)
  - Planning & Design (land use, transportation and mobility, and parks, open space and recreation)
  - Energy & Climate (energy, emissions, renewable energy, and green building)
- Economy
  - Economic Development (clean technologies and green jobs, local commerce, tourism, and local food system)
  - Employment & Workforce Training (green job training, employment and workforce wages, and youth skills)
- Society
  - Education, Arts & Community (education excellence, arts and culture, and civic engagement and vitality)
  - Children, Health & Safety (community health and wellness, access to health care, and public safety)
  - Affordability & Social Equity (affordable and workforce housing, poverty, human services and race and social equity)

http://www.icleiusa.org/programs/sustainability/star-community-index/concept-overview

The **"Business Case for Green Buildings in Canada,"** March 2005, highlights the benefits of Green Building, as well as the challenges and barriers facing the Green Building

Industry in Canada. The report reflects an extensive search of published and unpublished papers and studies focusing on the nature and benefits of green buildings. Most of the referenced information is from North America, although a few selected European studies and papers were also included. All of the information was assessed in terms of its relevance to Canada.
http://www.greenbuildingfc.com/Home/DocumentDetails.aspx?id=400

"Institutional Efforts for Green Buildings in Canada and the US," by Alex Wilson, Jennifer Atlee and Douglas Webber, published by the North American Commission for Environmental Cooperation, provides outlines the wide variety of institutional approaches available to advance green building. It addresses performance measurement, finance, the role of government, and other key issues that provide a good foundation for thinking through the types of sustainability benefits that have historically been demanded by the public sector.
http://www.greenbuildingfc.com/Home/DocumentDetails.aspx?id=1066

David Lorenz's **135-page PowerPoint presentation** provides an excellent and thorough coverage of the implications of climate change and the role of real estate in resolving the problems. This presentation presents a good discussion and organization of the public and private benefits of sustainable real estate.
http://www.greenbuildingfc.com/Home/DocumentDetails.aspx?id=950

"Building Responsible Property Portfolios" provides an assessment and examples of the application of the new Principles for Responsible Property Investment (PRI). The Principles for Responsible Investment (PRI) are voluntary and aspirational guidelines for incorporating environmental, social, and governance (ESG) issues into mainstream investment decision-making and ownership practices. This report helps PRI signatories understand how they can apply the Principles to property assets through what some call responsible property investing (RPI). It does so by highlighting the work of leading practitioners. The PRI Secretariat and the UN Environment Programme Finance Initiative Property Working Group (PWG) produced this report.
http://www.unpri.org/property/

Business for Social Responsibility (BSR) works with its global network of more than 250 member companies to develop sustainable business strategies and solutions through consulting, research, and cross-sector collaboration. It has six offices in Asia, Europe, and North America. BSR produces many reports on the environment, economic development and other issues. that address public benefit analyses.
http://www.bsr.org/research/index.cfm

Climate Change Economics provides a significant listing of sustainable sources—with an index and commentary, much of which describes and analyzes the public benefits of sustainability and climate change.
http://www.climatechangeecon.net/index.php?option=com_mtree&task=listcats&cat_id=42&Itemid=20

D. Step 2: Evaluate Property Sustainability

Sustainable property definitions and certifications play an important role in the financial assessment of sustainable properties. Definitions and certifications provide a basis for investors to measure and compare properties, a critical foundation for financial analysis. This section summarizes information contained in Chapter III directly relevant to financial analysis.

Importantly, existing green building certifications like LEED®, BREEAM, GreenStar, or Green Globes™ measure environmental outcomes, not financial outcomes, and thus cannot be the sole basis for underwriting from a financial perspective. Practically, investors will also be confronted with underwriting properties with varying sustainable features, performance, and green certifications.

Accordingly, financial analysis of a specific property requires a more sophisticated understanding of the linkage between how a property is defined as "sustainable" and related value. More focus must be put on specific sustainable features and processes. No single certification or rating will suffice. At a minimum, the specific threshold sustainability requirements necessary to obtain benefits from regulators, users, and investors must be identified and evaluated for each property.

Again, from a financial perspective, the best way to deal with all the complexities of the various sustainable features and strategies is to focus on actual building performance. The problem with this approach is that most sustainable property investment involves forecasting how changes or additions to the sustainable features in the building will change energy or water use. Accordingly, underwriters and appraisers need to be able to conduct their due diligence on energy performance and other forecasts prior to getting actual building performance data. Additional information on the historical performance of specific sustainable features and strategies is presented in Chapter IV: "Sustainable Property Performance," Section D: "Feature Performance."

For the purposes of a financial analysis, it is also important to understand the range of assessment systems and tools that are in use or under development. In market-based financial analysis or valuation, numerous certification and assessment systems will typically be applied to a single property.

Most importantly, from a financial perspective, to determine which certification and assessment systems are important for a specific property, the underwriter/valuer must evaluate how regulators, users and investors utilize and rely upon different assessment systems or tools, and the specific sustainability thresholds to achieve benefits from each group for the subject property.

1. What is a Sustainable Property?

The answer to this question from a financial perspective is that it does not matter what the Consortium or anyone else says, only what regulators, potential space users, and investors in the property being analyzed say. Proper financial analysis of a property requires explicit consideration of the potential benefits that will accrue through meeting regulator, user, and investor thresholds for sustainability.

The specific certifications/definitions required by regulators, users, and investors will vary dramatically by country, government level, property type, property size, tenant mix and other factors. Fortunately, while evaluating sustainable certifications from a financial perspective can be complicated, analyzing regulator, user, and investor requirements is a core expertise practiced for decades by real estate appraisers and underwriters.

A property's "sustainability," for financial analysis purposes, must be based on a clear understanding of the property's combination of sustainable features and attributes, as well as its certifications. Underwriters and valuers must understand a property's features and attributes well enough to select and appropriately adjust evidence from comparable properties and determine the applicability of research, tenant surveys, and other information.

2. Financial Analysis, Value and Sustainable Property Certifications

Traditional real estate financial analysis and valuation, given its property-specific and qualitative nature, is well suited to address the complexity of multiple certification and assessment methods. Underwriters and appraisers must simultaneously consider many qualitative and quantitative factors when determining the appropriate rents, occupancies, absorption rates and other key variables in their financial analyses. In this regard, the level of certification, types of sustainable features, and the market's response to these features and certifications can be addressed as part of an analyst or appraiser's traditional process for evaluating data and supporting key assumptions.

Some of the key findings regarding financial analysis of certifications are presented below:

- Most importantly, financial analysis and valuation for any single given property is influenced by many sustainability definitions as shown in Exhibit V-10. Valuation and financial analysis is market driven, and the specific sustainability certifications and definitions that influence regulators, users, and investors will drive the financial analysis and valuation.

Exhibit V-10
No Single Definition Sufficient for Financial Analysis

Benefit Analysis	Potential Benefits	Key Certifications/Definitions
Government Regulation and Incentives	• Reduced risk of functional obsolescence • Faster project completion • Incentives • Lower cost of compliance	Sustainable threshold required by: • Federal, state, and local governments • ASHRAE 189P requirements • Utilities
Tenant/Owner Occupier Demand	• Increased revenues • Faster absorption • Better tenant retention • etc.	• Leased Space Leadership Consortium Guidelines • Global Reporting Initiative • Carbon Disclosure Project • IPD Environmental Code • Corporate Social Responsibility Reports
Investor Demand	• Higher sales price • Reduced exit/take-out risk • Reduced marketing time • Improved liquidity	• All certifications important to tenants are important to investors • LEED and EnergyStar gaining stature • Responsible Property Investment Classification • Public pension fund guidelines
Liability Costs	• Reduced property insurance costs	• LEED • Green Globes • GreenGuard (mold)
Operating Costs	• Reduced energy costs	• EnergyStar • Post occupancy performance assessments

- Sustainability is not a property type, but an attribute of a property determined by a set of sustainable features, outcomes, and certifications. Accordingly, sustainability is just one of many factors to consider in valuation or underwriting, with the majority of risk and value considerations being driven by traditional factors influencing a building's attractiveness to tenants and investors.
- Environmental certifications and assessments cannot be the primary basis for a financial analysis because:
  - Environmental certifications measure environmental performance, not financial performance;
  - Environmental certification levels are not comparable, because they can be based on entirely different combinations of sustainable features and outcomes;
  - Many properties with valuable sustainable features may not be certified.
- Sustainability is not too complicated to analyze. Every office building has different combinations of non-sustainable features and attributes, but somehow the industry is able to analyze and value office buildings.
- LEED certification has become the definitive market leader in the U.S. and a growing influence internationally for the institutional investment market, and, to a significant degree, the owner-occupant market. LEED and select other leading certification systems around the world add significant value independent of the attributes or performance of the certified property.

- Sustainable certificates with the strongest market acceptance by regulators, users, and investors will have the highest values independent of the sustainable features or building performance. This "premium" for a specific certification will very significantly by property type, market, and perhaps most difficult to assess in a 10 year financial model, over time.

E. Step 3: Assess Costs-/Benefits of Sustainability

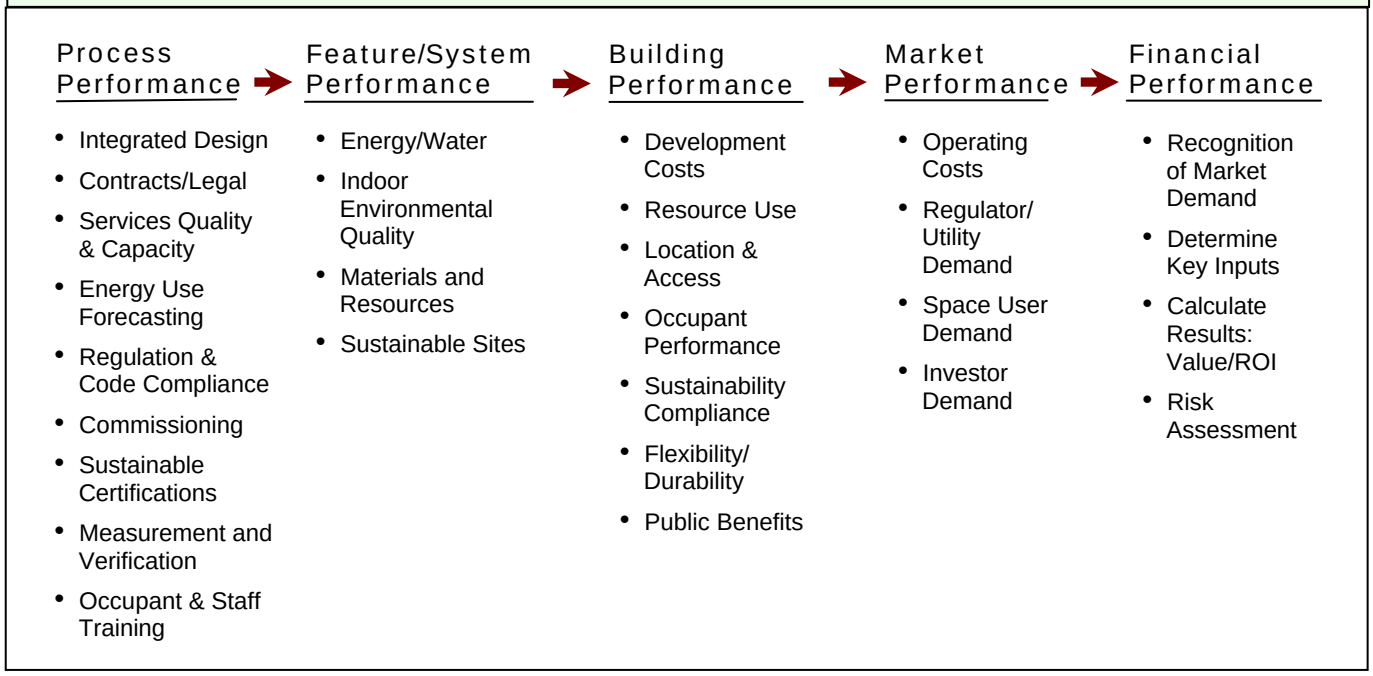
After selecting the most appropriate financial analysis and assessing the property's "sustainability," the valuer needs to evaluate the subject property's specific sustainable costs and benefits. It is this detailed **property specific analysis** that separates independent valuation and underwriting of a sustainable property from the more prevalent "general business case" analysis.

1. Understanding the Role of Cost-Benefit Analysis

Before we introduce GBFC's Sustainable Cost-Benefit Checklist, it is important to reflect back on the key drivers of sustainable property financial performance as presented below in Exhibit V-11 and in more detail in Appendix V-B.

Exhibit V-11

GBFC Sustainable Property Performance Framework



As illustrated in Exhibit V-11, to properly analyze financial performance you must understand how it is derived. Process execution drives the performance of individual

sustainable features/systems that determine the building's performance. Financial performance is calculated from financial model inputs (rents, occupancy, operating costs, etc.) that are derived based on an analysis of the market's response to building performance. For investment decisions based primarily on projected costs and performance, process execution and feature/system performance become critical to assessing the reliability/risk of forecasts.

The key point illustrated by Exhibit V-11 is that sustainable costs and benefits are not typically directly inputted into a financial model. For example, a commonly cited sustainable property benefit—increased worker productivity--is just one of the many sustainable factors that influence space user demand. To determine its impact on financial performance, the valuer/underwriter must assess the market's response to the productivity benefit, analyzed simultaneously with other non-sustainable factors, such as location, access, rent levels, etc. This process will enable selection of appropriate financial model inputs (occupancies, absorption, discount rates, etc.) resulting in an assessment of financial performance (rate of return, risk, value.)

Accordingly, sustainable costs and benefits are typically "intermediate" outcomes that must be integrated with other data and analysis during the process of making the final determination of financial model inputs. Any shortcuts in thinking or careless assertions regarding costs and benefits and their financial implications are almost certain to be wrong for a particular property.

2. Linking Sustainable Features/Outcomes and Costs-Benefits

One of the biggest challenges to underwriting sustainable property investment is to develop a process that enables an underwriter to assess financial performance implications resulting from any combination of sustainable features, products, materials, systems, and certifications. There is almost an infinite combination of features that can "define" a sustainable property. Reliance on traditional sustainability analyses like simple payback and "value" engineering have reinforced the focus on the incremental costs or benefits of individual features like water recycling systems, lighting upgrades, high efficiency HVAC, etc. Accurate assessment of the financial implications of sustainable properties requires underwriters to refocus their thinking on sustainable performance outcomes and the market's response to such performance.

The rationale for the focus on outcomes—like resource use, occupant performance, and sustainability compliance—is that this is what regulators, space users, and investors rely upon to make investment decisions. In fact, it is an axiom of sales that customers care more about benefits than attributes, and salespeople who understand this are invariably more successful. The task in sustainable property financial analysis, which is often based on projected outcomes, is to understand enough about the types of sustainable features and processes to assess the risk of achieving the building performance represented. Accordingly, the underwriter must not only assess the market's response to sustainable building performance, but also to the risks and uncertainty in the forecasts of such performance. (For a full discussion of sustainable property performance, see Chapter IV.)

There is also a growing body of knowledge to assist in understanding the logical links between sustainable building performance and financial performance. One good example of this is the value linkage chart presented in "Green Value, Green Buildings," re-created in Exhibit V-12. This chart shows the link between features/strategies like low-flow fixtures and daylighting techniques, and "Green Impacts" (another word for sustainable building outcomes) and then to value.

Another example of these linkages is shown in Exhibit V-13. This chart, extracted from David Lorenz and Thomas Lützendorf's 2008 paper "Sustainability in Property Valuation, Theory and Practice" presents the authors' view of the effects and benefits of sustainable buildings. It also shows that an evaluation of economic benefits is always influenced by the perception of the individual actor concerned.

Exhibit V-12
Linking Green Features/Strategies to Value

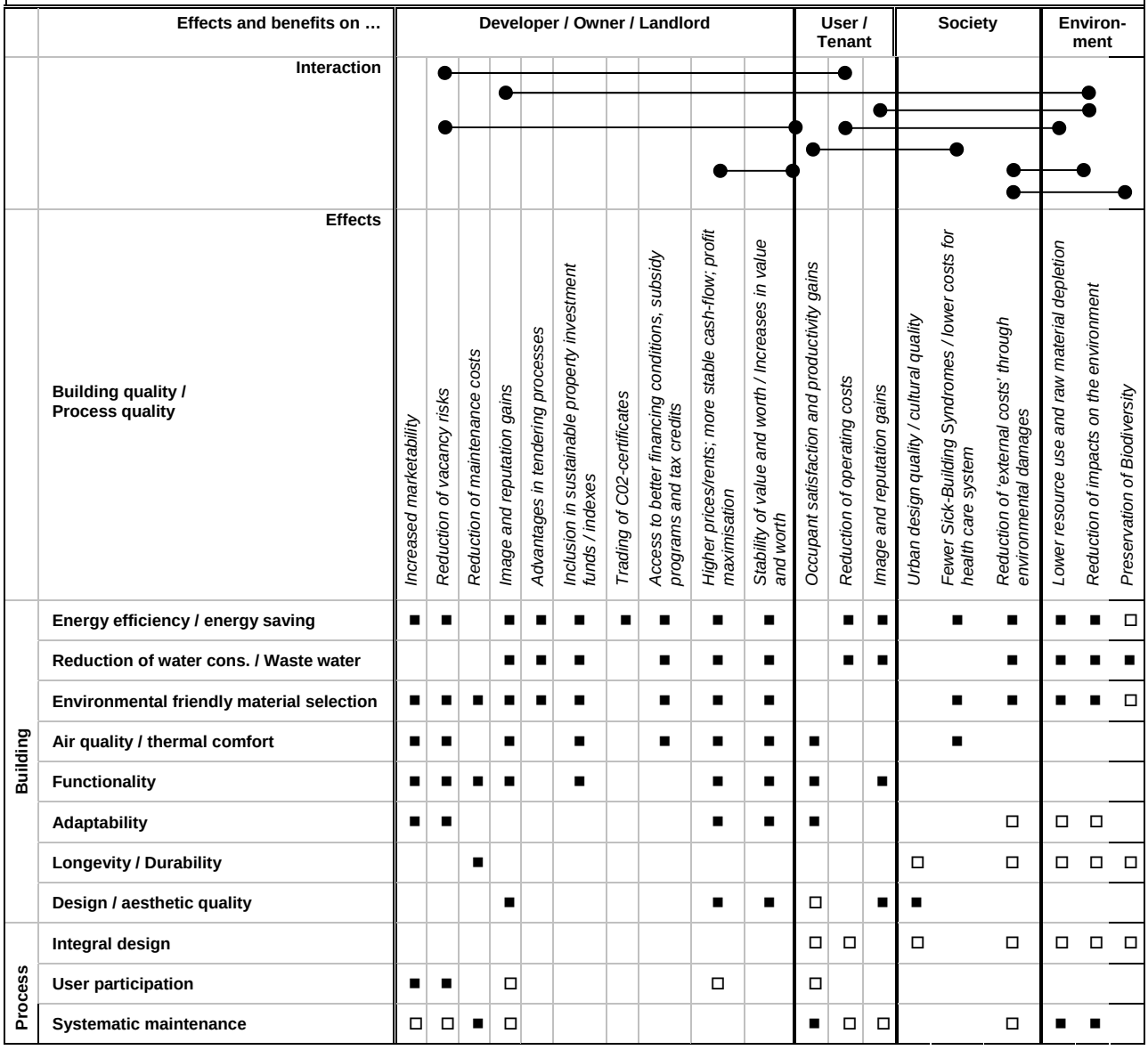
Green Objectives	Green Strategies/Features	Green Impact	Theoretical Linkage to Value
Sustainable site development	• Reduce site disturbance and soil erosion during construction • Use of natural drainage systems (e.g., swales) • Preserve or restore natural site features • Landscape and orient building to capitalize on passive heating and cooling.	• Improved site aesthetics • Greater public support for the development and accelerated local approval process, hence lower carrying costs. • Lower energy costs.	• Reduced development costs, improved marketability, reduced ongoing maintenance costs, improved natural appearance, higher sales/rents, absorption and re-tenanting, NOI*/ROI** benefits. • For gross leases, higher NOI. May have impact for net leases*** if benefit can be demonstrated to tenants.
Water efficiency	• Use captured rainwater for landscaping, toilet flushing, etc. • Treat and re-use greywater, excess groundwater, and steam condensate • Use low-flow fixtures and fittings (pressure-assisted or composting toilets, waterless urinals, etc.) and ozonation for laundry • Use closed-loop systems and other water reduction technologies for processes.	• Lower water consumption/costs.	• Lower tenant CAM**** charges. Direct NOI benefit for gross leases, potential for net leases requires communicating benefit to tenants.
Energy efficiency	• Use passive solar heating/cooling and natural ventilation • Enhance penetration of daylight to interior spaces to reduce need for artificial lighting • Use thermally efficient envelope to reduce perimeter heating and size of HVAC • Use energy management systems, monitoring, and controls to continuously calibrate, adjust, and maintain energy-related systems • Use third-party commissioning agent to ensure that the installed systems work as designed • Develop O&M manuals and train staff.	• Lower capital costs • Occupant benefits • Lower energy costs. • Operational savings (can offset higher capital costs) • Reduced capital cost of mechanical systems because control systems reduce the need for oversizing • Lower operating costs • Lower maintenance costs.	• Reduced operating costs, longer life cycle, lower development costs • Improved occupant productivity, lower churn, turnover, tenant inducements, etc. • Higher net income for gross leased buildings, improved yield. • Lower operating costs. On gross leases, higher ROI/NOI. On net leases, potential for improved ROI/NOI. • Marginally higher initial soft costs should be offset by long term operating cost benefits, higher ROI.
Indoor environmental quality	• Control pollutant sources • Use low-emission materials • Ventilate before occupancy • Enhance penetration of daylight and reduce glare • Provide outdoor views • Provide individual occupant controls when possible.	• Superior indoor air quality, quality lighting and thermal quality • Fewer occupant complaints • Higher occupant productivity.	• Risk reduction • Greater marketability • Faster sales and lets • Improved churn/turnover • Higher ROI/NOI.
Reduced consumption of building materials	• Select products for durability • Eliminate unnecessary finishes and other products • Reuse building shell from existing buildings and fixtures from demolished buildings • Use salvaged/refurbished materials • Design for adaptability.	• Longer building lifecycle • Lower maintenance costs.	• Lower depreciation typically after higher investment costs. • Lower construction costs, probable lower operating/ maintenance costs, higher ROI/NOI.

Key: * NOI: net operating income
** ROI: return on investment
*** Net lease: a lease that requires a lease to pay all their operating costs resulting from their occupation of the premises
**** CAM: common area maintenance

Source: "Green Value, Green Buildings," Growing Assets, Royal Institute of Chartered Surveyors, 2005.

Exhibit V-13
Effects and Benefits of Sustainable Buildings

■ = strong/direct impact; □ = weak/indirect impact



Source: "Sustainability in Property Valuation: Theory and Practice," David Lorenz and Thomas Lützkendorf, Journal of Property Investment & Finance, Vol. 26, No. 6, 2008, pp. 482-521.

The key to properly evaluating the link between sustainable property features (products, materials, systems, etc.) and financial performance is to understand that you must assess how the features contribute to building performance, then assess the market's response to

the building's performance.[24] A full menu describing the types of sustainable features and strategies is presented in Chapter III, Appendix III-A.

3. Sustainable Property Risk Mitigation

Assessing costs and benefits of sustainability also requires the assessment of sustainable property risk mitigation. In many cases, sustainable properties have risk increasing and risk decreasing attributes. Development costs are a good example where the direct cost may be somewhat higher, but through entitlement benefits, better planning, and reduced change orders, the additional direct costs can be mitigated through potential cost reductions. Risk is also mitigated directly through insurance, surety, contracts, and other mechanisms. Construction, carry, and exit/take-out risk and mitigation strategies are presented in Chapter VI: "Sustainable Property Underwriting Guidelines."

Sustainable property risk can also be significantly mitigated through an assessment of process and feature performance. Because most sustainable property investment decisions--with the exception of buying an existing sustainable building--must rely upon forecasts of costs and benefits, much of the effort in putting together an "accurate" estimate of financial performance involves risk mitigation. Referring again to Exhibit V-11, significant uncertainty in building performance can be reduced through an assessment of process performance and selection of lower risk features and strategies. With uncertainty reduced, investors can assess whether the level of return forecast is sufficient to compensate for risk taken. Less uncertainty reduces the return required to compensate investors resulting in cheaper capital. (See Expanded Chapter IV, Sections C, D, and E for more detail on this topic).

Confirmation of the importance of green building risk issues from the perspective of the construction industry is presented in "*Green Building: Assessing the Risks*", published by Marsh in 2009 (http://global.marsh.com/news/articles/greenbuildingsurvey/index.php). This report identifies the most significant risks associated with green design and construction based on a series of four interactive forums in major US cities. A total of 55 construction industry executives identified five major categories of risks as being most significant: financial, standard of care/legal, performance, consultants/subconsultants and subcontractors, and regulatory.

In addition to identifying the key risks, the Marsh Report also identified potential solutions and reaches the following conclusion in its Executive Summary:

> 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

[24] If you focus only on the marginal impact of a feature on operating costs it may be sufficient to support some decisions, but leaves revenue and risk out of the decision, which may result in a less environmentally and financially beneficial investment.

become more adept at assessing and quantifying the risks associated with green building, we may see a growth of green building-specific coverages.

4. Applying the GBFC Sustainable Property Cost-Benefit Checklist

GBFC's Sustainable Property Cost- Benefit Checklist is a comprehensive listing of the potential costs and benefits of sustainable properties. Put another way, it provides a comprehensive identification of potential positive and negative risks of sustainable property investment. It does not purport to be a complete listing of property costs and benefits, but only those incremental risks of sustainable property investment.

The organization of the list of costs and benefits is designed to make it easier to apply to financial analysis and valuation. First, costs and benefits are organized around eight categories related to financial model inputs: Development Costs, Development Risks, Space User Demand, Operating Costs, Building Operations, Cash Flow/Building Ownership Risks, Public Benefits, and Investor Demand. Separate lists of risks for potential building costs and potential building benefits are prepared for each of these eight categories. These separate "parallel" cost and benefit listings make it easier to analyze the "net" cost or benefit of a sustainable property.

The primary purpose of GBFC's Cost-Benefit Checklist is to provide an organized inventory of potential costs and benefits for sustainable property investment. For valuers or underwriters, the checklist can help in the determination of data and analysis requirements, and provide a comprehensive questionnaire to ensure that key costs and benefits are fully identified and addressed.

An important secondary use of the checklist is as a due diligence framework for use by due diligence officers and investment/lending committees. The checklist suggests questions to ask borrowers seeking a mortgage or operators seeking equity to develop judgments about the quality of thought and analysis that potential capital seekers applied in preparing their investment packages.

The process for implementing the Checklist for valuers and underwriters starts with an inventory of the specific costs and benefits that might be applicable to the subject property. To do this, the valuer/underwriter needs to go through the GBFC Sustainable Property Cost-Benefit Checklist presented in summary form in Exhibit V-14 and in significant detail in Appendix V-C, utilizing some sort of recording or analysis form (a sample of such a form is shown below in Exhibit V-15).

Appendix V-C provides important detail on each of the potential costs and benefits identified in Exhibit V-14. Benefits and costs are described, and the process for assessing the potential applicability of a benefits and costs from the general checklist to specific properties is presented. Additional detail on development and cash flow risks is also presented in Chapter V, Section H: "Step 6: Risk Analysis and Presentation."

Key questions to be addressed for each potential cost or benefit include:

1. Is the specific cost or benefit applicable to the subject property?
2. How was, or will, the specific benefit or cost be achieved?
3. What evidence supports the existence of the specific cost or benefit for the subject property?
    - Performance information
    - Research and risk analysis
    - Quantitative or qualitative assessments
4. What evidence or analysis supports the magnitude of the specific cost or benefit at a property level?
5. Is there evidence from the "Process Execution" or "Feature/System Performance" (see Appendix V-B) that provides support for the quantitative assessment of costs and benefits, and/or that provides insight into potential mitigation of cost concerns?
6. Which specific financial model inputs will be influenced by the specific cost or benefit?
7. What evidence is there of the magnitude and/or importance of the cost or benefit to the specific subject property, in the context of other factors influencing the property's financial performance?
    - Regulator response
    - Space user response
    - Investor response
    - Market conditions
    - Geographic considerations
    - Mitigating factors
8. Did the property/project sponsor consider the cost or benefit, and its potential implications on financial performance? Why or why not?

Exhibit V-14

GBFC Sustainable Property Cost-Benefit Checklist

I. Potential Building Benefits

A. Reduced Development Costs

1. Government incentives
2. Better private financing
3. Downsizing of some systems (HVAC, etc.)
4. Reduced number and magnitude of change orders
5. Reduced operational start-up costs

B. Reduced Development Risks

1. Reduce construction risk
2. Reduce carry risk
3. Reduce exit/take-out risk

C. Increased Space User Demand: Higher Revenues

1. Increased demand from space users concerned about enterprise value
2. Increased demand from government tenants with mandated sustainability
3. Increased demand from vendors/supply chain required by big customers (GE, Wal-Mart, etc.) to be more sustainable
4. Increased demand from tenants with direct tie to sustainability business—architects, engineers, consultants, contractors, lawyers, energy firms, product companies, etc. etc.
5. Increased demand from tenants wanting to "do the right thing"

D. Reduced Resource Use / Operating Costs

1. Lower energy use
2. Lower water use
3. Reduction in sewage/stormwater run-off
4. Reduction in building waste
5. Reduction in construction/demolition waste
6. Reduction in carbon footprint
7. Lower emissions
8. Lower property/casualty insurance costs
9. Lower maintenance costs

E. Improved Building Operations/Capital Costs

1. Reduced cost of changing space
2. Fewer tenant/occupant complaints
3. Reduced frequency of capital expenditures
4. Reduced tenant turnover/re-leasing
5. More reliable functioning of systems

F. Reduced Cash Flow/Building Ownership Risk

1. Improved ability to meet future regulatory requirements
2. Ability to capitalize on future government incentives
3. Improved ability to meet changing space user demand
4. Improved ability to meet changing investor demand
5. Prevent risk of loss of "social license" to operate building
6. Limit liability due to building related health issues—sick building, mold claims
7. Limit exposure to future compelling health and/or productivity research
8. Reduced risk of reliance on grid (terrorism)
9. Increased flexibility/adaptability
10. Reduced risk of building not operating as designed
11. Limit exposure to energy/water cost volatility
12. Reduced exit/take-out risk
13. Overall reduced potential loss of value due to functional, economic and physical obsolescence

G. Public Benefits[25]

1. Infrastructure cost benefits
2. Environmental and resource conservation benefits
3. Land-use benefits
4. Reduced climate change
5. Economic benefits
6. Security benefits

[25] Public benefits become private investor/landlord benefits when the investor/landlord can monetize the benefits through government regulatory relief, incentives, tax benefits, etc.

Exhibit V-14

GBFC Sustainable Property Cost-Benefit Checklist

(continued)

H. Increased Investor Demand

1. Reduced capitalization and discount rates: higher values
2. Reduced exit/take-out risk
3. Increased FAR—zoning---density bonuses
4. Improved access to debt financing

II. Potential Building Costs

A. Increased Development Costs

1. Certification, energy modeling, legal and commissioning costs
2. Higher cost specialized service providers
3. Higher cost products and systems
4. Higher tenant improvement costs for green improvements
5. Higher finance costs—more high cost equity; increased construction interest
6. Project delays

B. Increased Development Risk

1. Construction risk (cost and delays)
2. Legal/contractual risks
3. Exit/take-out risk

C. Decreased/Unchanged Space-User Demand

1. Excess investment cost relative to market demand
2. Space user demand does not meet expectations
3. Building operating problems

D. Increased Operating Costs

1. Higher maintenance costs--training, manuals
2. Vendor availability and pricing
3. Product or system failure/underperformance
5. More costly lease analysis and implementation
6. Higher real estate taxes
7. Costs of required additional monitoring/measurement
8. Resource cost increases

E. Building Operating Problems/Capital Costs

1. Products underperform
2. Service providers underperform
3. New systems learning curve for engineering staff/maintenance staff/etc.
4. New/different systems can reduce economies of scale for engineering staff for a concentrated portfolio of similar assets
5. Capacity/seasoning of service providers/contractors
6. Tenants do not cooperate

F. Increased Cash Flow Risk

1. Risk of rapid functional obsolescence
2. Process underperformance
3. Operating cost underperformance
4. Revenue underperformance
5. Value/sales price underperformance

G. Limited/No Increase in Investor Demand

1. Increase/no change in capitalization and discount rates
2. Energy cost declines increase pay-back periods, reduce value of sustainable investment
3. Existing leases limit ability to pass costs to tenants--capture sufficient benefits to justify costs
4. Failure of appraisers/brokers to accept value/enhanced performance

Exhibit V-15
Sample GBFC Sustainable Property Cost-Benefit Checklist and Analysis Form

Cost-Benefit Checklist	Applicability to Subject (Y/N)	Evidence/ Analysis[1]	Summary Findings[2]
I. Potential Building Benefits **A. Reduced Development Costs** 1. Government incentives • Increased FAR—zoning – density bonuses • Expedited permitting and approvals—City and State • Design and code flexibility • Rebates; construction cost off-sets; grants • Financing assistance, subsidy • Tax benefits: Federal, State, and Local—credits, favorable accounting treatment (Tenant improvements, etc), tax reductions, etc. • Government mandated carbon trade value 2. Better private financing • Improved access • Lower cost: rates, closing costs • Better terms: LTV, DSCR, reserves, hold-backs 3. Downsizing of some systems (HVAC, etc.) 4. Reduced number and magnitude of change orders 5. Reduced operational start-up costs			

1 In this section, describe why the cost or benefit is applicable to the subject, the performance information/research supporting the analyses, the strength and/or uncertainty in data/research relied upon.

2 In this section, add final comments on the relative magnitude or importance of the issue to the property overall and/or to specific financial inputs and any evidence of Process or Feature (see Appendix B), performance, or other mechanisms that would mitigate potential costs and/or affect the benefits assessment.

F. Step 4: Evaluate Financial Implications of Costs/Benefits

Now that sustainable property costs and benefits have been identified and evaluated, the next step is to determine how the subject property's sustainable costs and benefits will influence the financial performance of the property.

1. Linking Costs and Benefits to Financial Performance

For real estate investor, developer and lender decisions, financial modeling typically involves an estimate of the development, acquisition, or retrofit costs and construction of a pro forma cash flow statement outlining actual or projected revenues and operating expenses on a monthly, quarterly, and/or annual basis. Revenues are calculated based on assumptions for rents, periodic rent increases, absorption/lease-up timing, equilibrium occupancy levels, tenant retention and other variables. Operating expenses are estimated based on an analysis of energy, water, maintenance, management, landscaping, property taxes, and other operating expenses. For multi-tenant properties, financial models to assess incremental investments in sustainable attributes must also incorporate a specific consideration of the allocation of landlord and tenant costs and benefits based on lease terms**.**

Discounted cash flow analysis (DCF) is the standard approach used by real estate investors to assess commercial property value and financial potential. In DCF, the net present value, or return, on a project is determined by looking at the project outflows (development & operating costs) and inflows (revenues & net sales proceeds) over time. The net costs or revenues over time are converted to present value through a discount rate that reflects the risk of the cash flow as determined by investors.

While the specific type of financial model will vary based on the type of decisions being underwritten, the logic and structure of a DCF model provides the conceptual framework needed for interpreting how sustainable features influence return and/or value. Even if perfect data is not available, by thinking through the specific assumptions within a DCF model, users can gain important insights about the magnitude of the financial implications of sustainable property investments. The key financial model inputs of the DCF model directly affected by sustainable costs and benefits are shown below in Exhibit V-16.

Exhibit V-16
Linking Sustainable Costs-Benefits to Financial Model Inputs

Sustainable Costs/Benefits	Affected Financial Model Inputs
Development Costs	Rebates/incentives Financing costs Tax cost Cash flow received earlier
Development Risks	Discount rates Capitalization rates Sales prices
Space User Demand	Contract rents Rent growth Occupancy Absorption Tenant retention: renewal probability Downtime between tenants
Operating Costs	Energy costs Water costs Waste costs Insurance costs Maintenance costs
Building Operations	Tenant retention: renewal probability Tenant improvement costs
Cash Flow Risks	Discount rates Capitalization rates Sales prices
Public Benefits	Revenues—through impact on space user demand Development costs/risks—through impact on government demand Capitalization & discount rates—through impact on investor demand
Investor Demand	Capitalization rates Discount rates Sales prices

2. The Evaluation Process

First, it is important to conduct a sustainable cost-benefit net impact analysis as presented in the sample form in Exhibit V-17. The key point here is that while costs and benefits are presented in a linear form and analyzed independently in the Checklist in Exhibit V-14 and Appendix V-C, true insights and actionable information can only be developed through an analysis of the **net impact** of sustainable costs and benefits.

Exhibit V-17
Sample GBFC Sustainable Property
Cost-Benefit Net Impact Analysis

Sustainable Cost-Benefit Categories	Summary of Benefit Findings	Summary of Cost Findings	Net Impact Analysis[26]
Development Costs			
Development Risks			
Space User Demand			
Operating Cost			
Building Operations			
Cash Flow Risk			
Public Benefits			
Investor Demand			

GBFC's Sustainable Property Cost-Benefit Checklist in Exhibit V-14 and Appendix V-C is specifically designed to enable net impact assessment. First, all sustainable costs and benefits are organized under key categories that are closely tied to developing the inputs to financial models:

- Development costs
- Development risks
- Space user demand
- Resource use/operating costs
- Building operations/capital costs
- Cash flow/building ownership risk
- Public benefits
- Increased investor demand

[26] The net impact analysis should weigh the relative merits and magnitude of the evidence and analyses of both costs and benefits

By organizing the cost-benefit checklist in this manner, it feeds into the net impact analysis as shown in Exhibit V-17. While specific costs or benefits sometimes exist outside of the eight categories identified above, it is difficult to assess their potential implications on financial performance unless they can be appropriately categorized under one of the eight categories.

3. Assessing the "Net Impact" of Sustainable Costs and Benefits

This section provides a general summary discussion of the kinds of issues that come up in assessing the "Net Impact" of costs and benefits for each of the key Cost-Benefit categories used in the GBFC Sustainable Property Cost-Benefit Checklist. Appendix V-C provides a more detailed discussion of the considerations in assessing the potential applicability and magnitude of each of the 84 costs and benefits identified in the checklist.

In assessing the "net impact" of costs and benefits relating to any specific financial model input, risk mitigation must be considered. In many cases, potential risks (uncertainty) of sustainable property investment may appear to outweigh benefits. For sustainable property investment, "net impact" analysis should factor in the costs (risks) after consideration of risk mitigation measures including integrated design, specialized contracts, insurance, green leases, surety, commissioning, and service provider due diligence.

Development Costs

The net impact of sustainability on development costs is often misunderstood, or presented either as only a cost or a benefit issue, while a true understanding of the issue can only be determined by evaluating the net impact of costs and benefits after consideration of risk mitigation measures.

Sustainability can lead to increased development costs due to costs of certification, energy modeling, legal, and commissioning costs. Also, depending on the particular type of property, level of sustainability, and geographic market, products, materials, contractors, and service providers can also cost more than traditional non-sustainable investment. In addition, delays due to product or system deliveries, or over-stressed service providers or contractors can increase construction interest costs and delay the receipt of revenues.

Equally important, but seldom discussed, is the "cost" that developers, investors or owner occupants face due to required changes in their standard operating procedures. The most successful sustainable projects have specialized contracts, specialized subcontractors, more upfront planning and an integrated whole building approach to design and construction. Finding and developing new vendors, subcontractors, architects, and other service providers can be costly. Furthermore, learning new development processes, altering contracts and leases, and other required sustainable activities could be daunting to many. While experienced owners and service providers claim that costs and process issues are not significant, new investors to the sustainable property market need to be aware of these less quantifiable "costs."

Sustainable property investments can realize significant reductions in development costs through their ability to capitalize on incentives offered by utilities, local, state and Federal governments. Expedited permitting and approvals, design and code flexibility, rebates, financing assistance, and tax benefits are just some of the incentives available in the marketplace today to offset potential increases in development costs.

Development costs may also be reduced through improved private debt and equity financing. As the capital markets have shifted from ready availability of capital to limited access, a potential benefit of sustainable projects will be their improved access to financing. Improved access might take the form of better loan to value or debt service coverage ratios, more lenient reserve/holdback requirements, or simply meeting a minimum standard required by an investor. The growing availability of Socially Responsible Investment capital for real estate suggests that some sustainable real estate projects will have access to financing that might not otherwise have be available were they not sustainable projects.

It is important to caveat the discussion of the magnitude of potential financing benefits from sustainability because real estate finance is not driven by sustainability. Accordingly, it is unlikely that sustainable attributes will overcome the typical factors that prevent projects from accessing reasonable cost financing, including poor market conditions, insufficient equity, inexperienced sponsorship, unsubstantiated financial projections, bad location, or an unsustainable competitive advantage.

A critical component of an analysis of sustainable development costs is to evaluate a property on an integrated basis. While some sustainable features, such as renewable energy systems, green roofs, new windows, and other improvements can cost incrementally more than non-sustainable alternatives, it is often possible to downsize some systems (such as HVAC systems) and reduce costs in other parts of the budget.

Finally, while integrated design, improving contracts, and commissioning can increase costs, costs can also be reduced due to reductions in the number and magnitude of change orders, reduced operational startup costs, and other operational improvements.

Development Risks

The type and level of sustainability and the experience of the design and construction team significantly influence development risk. Owners seeking the highest levels of sustainability, where more pioneering design, construction, products and systems are employed, will experience higher levels of risk. While such risk is inherent in those companies or individuals taking a leadership role in sustainability, the positive benefits of leadership are also powerful and need to be carefully evaluated.

Development risk is driven by property cost uncertainty, property performance uncertainty and legal and contractual risks. Pioneering design and construction, the availability of experienced contractors and subcontractors, pioneering products and systems, building code and regulation complexities and limitations, and other issues drive property cost

uncertainty. Property performance uncertainty arises due to energy cost volatility, unreliable energy modeling, and underperformance of products, materials, systems or contractors. Legal and contractual risks arise due to the enhanced expectations on architects, contractors, subcontractors and LEED consultants. Finally, all of these risks can affect potential completion of the project, delaying revenues and increasing construction costs.

The most important way sustainable properties can reduce development risks is through the reduction of entitlement risk. Sustainable projects can be beneficial in overcoming potential neighborhood opposition, improving the timing and content of regulatory approvals. This risk benefit is most important when a project is first completed, but may continue over time as sustainability regulations continue to tighten.

The primary way development risks are addressed in sustainable properties is through mitigation. Integrated design, which encourages earlier and more explicit goal setting, value clarification among project participants, and better communications can reduce risk. Early, comprehensive, and ongoing commissioning can reduce costs and improve performance. Legal and related contractual risks can be addressed through more explicit service provider contracts, insurance, surety, and earlier and better communication.

Finally, it is important to place sustainably related development risks in context. New developments or major retrofits of any kind are risky endeavors. Cost volatility, product failures, subcontractor problems, delays, legal risks, and other issues are not "sustainability" issues per se, and the incremental aspect of sustainability needs to be kept in mind when evaluating "sustainability" risks.

Space User Demand: Revenue Impact

An increase in demand by space users primarily results from value that a potential space user believes a property contributes to its overall business or organization. With a rapid increase in demand for sustainability generally, and sustainable properties in particular, the number of potential space users interested in sustainable properties is on the rise:

- Companies concerned about cost reduction and volatility, occupant productivity and health, improved building operations, improved reputation/leadership, and compliance with internal or external sustainability policies and initiatives (companies with younger employees, competitive talent acquisition, high turnover, etc.).
- Government tenants with mandated sustainability requirements.
- Vendors and others in the supply chain who are being pressured to be more sustainable (by GE, Wal-Mart, etc.).
- Space users with a direct tie to the sustainability business: architects, engineers, consultants, contractors, lawyers, energy firms, product companies, etc., etc.
- Value driven tenants—"friends of sustainability"

Assessing the potential benefits of increased space user demand requires a specific consideration of the types of tenants and/or users of a particular property. Factors that influence or mitigate potential increases in space user demand and its potential implication on financial model inputs include lease structure, the education level of tenants, the importance of price and other factors in space use decisions, liability limits in marketing sustainability benefits, and other factors.

Additionally, it is important to make sure that attributes critical to space users are not traded away as part of the process of making a building more sustainable. If the building has experienced operating problems as a result of sustainability improvements, this could also reduce space user demand. Additional detail on space users is presented in Chapter VI, Section F: Underwriting Space User Demand.

Resource Use/Operating Costs

Evaluating resource use and related operating costs is more straightforward than evaluating space user demand, but is not without its challenges. Perhaps the most important challenge is that many, if not most, sustainable property investments are made based on projections of resource use and cost. Energy forecasts are not always reliable, and can vary based on changing energy costs, the schedule and use of a building, the quality of the data inputs, the energy model and energy modeler employed, and other factors. (See Chapter VI, Section E: Underwriting Energy-Carbon Reduction Investment for more detail)

The key to evaluating represented reductions in resource use or operating costs is a clear explanation of how the use and cost reduction is achieved. The benefit—cost reduction—is typically offset by high levels of uncertainty, so the assessment of “net impact” is primarily a due diligence activity to assess the quality of forecast savings. Careful evaluation of which parties realize cost savings is also important. Critical risk mitigation measures include commissioning, appropriate measurement and monitoring systems, staff and tenant training, lease review, and service provider due diligence and compensation assessment.

While forecasts of energy use can be tricky, reductions in property/casualty insurance costs, and lower maintenance costs due to reduced need to change light bulbs, vacuum, and some other savings can be reasonable estimated.

Building Operations/Capital Costs

Improved building operations can result from commissioning and re-commissioning, more durable and flexible design and materials, and a general reduction in tenant/occupant complaints due to satisfaction with the building and working environment. These benefits can improve the financial performance through reduced frequency of capital expenditures, reduced leasing commission and tenant improvement costs, and general increases in space user demand.

Improved space flexibility is particularly critical today as occupant space needs undergo rapid changes due to economic difficulties and rapid product development and sales cycles. Durability and flexibility are not just sustainable concepts, because for any building to remain economically and functionally relevant today, and in the future, it must be able to adapt. Durability and flexibility are a sustainability issue primarily due to the embodied energy in a building envelope and its tenant improvements.

Potential benefits to building operations must be carefully considered in light of potential building operating problems due to product or service provider underperformance, uncooperative tenants, new system learning curves for engineering and maintenance staff, and potential reductions in economies of scale for facilities management staff, who may have to learn and service a broader array of systems.

Cash Flow/Building Ownership Risk

By far the most important financial benefit of sustainable property investment is the potential reduction in cash flow/building ownership risk. Reduced cash flow/building ownership risk is an important contributor to an increase in space user demand, which can directly improve revenues, and to an increase in investor demand, resulting in higher values through reduced discount and capitalization rates.

Cash flow and ownership risks are most significantly reduced due to the ability of a sustainable/energy efficient building to cost-effectively meet the changing needs of regulators, space users, and investors. It is almost a certainty that local, state and federal regulations regarding sustainability will increase, perhaps dramatically, in the coming years. A building that cannot, at a reasonable cost, adapt to meet future regulatory requirements or capitalize on incentives, will be less valuable. A building that cannot adapt to meet increasing demand for sustainability by space users and investors will also lose value through economic obsolescence.

Sustainable buildings also reduce the risk of reliance on the energy grid (terrorism or natural disasters), limit exposure to energy/water cost volatility, and limit both current and future potential liability due to building-related health issues. All of these benefits reduce exit or takeout risk by maximizing the potential pool of buyers or investors, and the availability and cost of financing.

While the benefits related to cash flow risk can be significant, sustainable properties can increase cash flow/building ownership risk. For example, investments in new technologies, systems or products that are at risk of getting leapfrogged increases the risk of losing value due to functional obsolescence. Investors can also miss the market, over-investing in sustainability relative to market demand. Worse, features attractive to occupants could be eliminated to enable sustainable features or systems to be added.

The reliability and accuracy of energy forecasts, as well as the risk due to energy price declines, can also be important over a short time period. Finally, liability risk relative to performance claims and marketing need to be carefully evaluated. Risk issues are

extensively addressed throughout "*Value Beyond Cost Savings: How to Underwrite Sustainable Properties.*" Key sections include IV-C: Process Performance, IV-D: Feature Performance, Sections V-E: Assess Costs/Benefits of Sustainability, V-H: Risk Analysis and Presentation, and much of Chapter VI: Sustainable Property Underwriting Guidelines.

Public Benefits

The public benefits section of the GBFC Cost-Benefit Checklist is the only part that doesn't have a corollary cost category. While the focus of the Consortium's work is on private value—that public value which can be monetized—fully understanding and being able to articulate a project's potential public benefits is important. All sustainable projects will generate substantial public benefits beyond those of a non-sustainable property.

Such "monetization" of public value is created from governments or utility companies through enhanced entitlements/permitting, public grants, favorable financing, tax benefits, and carbon credits or payments, and from private companies through their contribution to Enterprise Value and resulting increases in space user demand.

Depending on the specific type of sustainable project, and the level of sustainability, it may generate substantial public benefits including reduced infrastructure costs, environmental and resource conservation, improved land use, less or more manageable climate change, financial benefits, and security benefits as was detailed in Exhibit V-6. Some of the sustainable features and performance that contribute to public and private benefits are shown below:

Location	• NOT on fragile landscapes • NOT contributing to urban sprawl • Close to mass transportation
Site	• Focus on surface water reduction (holding ponds, porous paving) • Xeriscape landscaping (no irrigation) • Lower impact on local ecology • Increased green space (small building footprint, minimal surface parking)
Building Exterior	• Window canopies or light shelves • Alternative energy systems (solar or wind) • Green roofs • Efficient, targeted exterior lighting (minimizing light pollution)
Building Interior	• Minimal materials (exposed structural materials) • Flexible layouts (movable walls, raised floors) • Occupant controls of heat and light (as opposed to large zone thermostats or light switches) • Abundant natural light and access to views • Good air quality • Plumbing fixtures with reduced water usage characteristics • Operational promotion of "green" practices (such as recycling)

Hidden Attributes	• Highly efficient building envelopes • Materials selected to meet building goals (low environmental embodied effect, low VOC's) • High efficiency mechanical systems integrated with electrical, structural, and architectural elements • Efficient lighting systems • The use of equipment without materials or components that could damage the environment (e.g., ozone depleting substances in air conditioners) • The use of maintenance materials (e.g., detergents) that also meet the green goals • Continued measurement and optimization of system performance over time.

Source: A Business Case for Green Buildings in Canada, Mark Lucuik, March 2005

What you need to know and do to effectively articulate a project's public benefits include:

- Develop a structured understanding of the types of public benefits a sustainable project can generate (see Exhibit V-9);

- Be able to articulate and show the link between types of property features, systems and sustainable outcomes and the specific public benefits;

- Analyze how the subject property specifically contributes to each of the public benefits claimed;

- Specify the magnitude of benefits, and appropriately caveat method used to quantify. Because in many cases a single property will contribute only a small portion of the broader public benefit, cite both the larger benefit and likely property contribution. Because substantial sums of money are spent to deal with peak demand loads and related infrastructure costs, which are not typically incremental costs, the marginal benefit of many sustainable features/systems, which can address peak demand issues, may be much higher than originally contemplated;.

- Present the subject property's public benefit contributions in relative terms to other conventional properties. This relative presentation, particularly if quantified, can provide a basis for a "relative" allocation of incentives or regulatory relief.

The challenge in the application of Sustainable Public Benefits Analyses is that most of the data and analyses that have been done to date have been done at a general industry level, not at a property specific level. For example, it is one thing to demonstrate the general relationship between certain sustainable features and productivity, but quite another thing to determine how the productivity research is applicable to a specific property, based on the types of building occupants and/or the particular market conditions. This is a challenge, and a constraint to the ability to "quantify" the financial implications of sustainable property investment. However, the types of analyses required are not materially different from the types of analyses that valuer/financial analysts complete every day.

In today's economy, and due to strong government interest in spreading the benefits of the Green Revolution, economic benefits of sustainability have become particularly central to government decision-makers. It is important in articulating economic benefits to not only talk about the number of jobs, but the types of jobs, the spread of jobs throughout the population, and the creation of long-term as opposed to just construction-related jobs.

Investor Demand

Investor demand for sustainable properties has and will continue to increase. Increased space user demand, lower operating costs; reduced cash flow risk, favorable depreciation and other tax benefits, and the reduced risk of functional and economic obsolescence are powerful motivators for investors. Reduced take-out risk and improved access to debt financing, as well as the potential for increased zoning and/or density bonuses are other key positives for investors.

Some of the potential limits to increases in investor demand include unsophisticated or uneducated investors, energy price declines that increase payback periods and reduce the value of sustainable investment, existing leases that limit the ability to pass costs to tenants, and the failure of appraisers, brokers, and lenders to accept the value or enhanced performance.

G. Step 5: Determine Financial Model Inputs

Step five is distinct from step four in that previously we were only trying to assess or measure and describe how a property's **sustainability** could affect key financial model inputs. In step five, the goal is to specify specific financial model inputs—like rents, occupancies, tenant retention, etc.--taking into consideration, simultaneously, all factors, both sustainable and non-sustainable, that affect the financial model inputs.

For example, as shown below in Exhibit V-18, many key factors, beyond sustainability issues, affect space user demand for office space. The relative importance of sustainability factors will be dependent on the importance of location-specific, building-specific, space-specific and other space user-specific issues for the particular tenants in a particular building.

Exhibit V-18
Factors Influencing Space User Demand for Office Space

Location Specific
- Proximity to executive housing
- Proximity to qualified employees
- Proximity to clients/customers
- Proximity to vendors/suppliers
- Proximity nearby amenities (restaurants, shops and services)
- Proximity to public transportation

Building Specific
- Quality of property management service
- Level of building security
- Age-functionality of building
- Adequacy of building systems
- Operating expense costs
- Building energy efficiency
- Building ceiling heights
- Floor plate size and configuration
- Paid versus free parking

Space Specific
- Lease terms
- Location of space (lower, middle or upper floors)
- Amount of natural lighting
- Open versus built-out floor plan
- Specific configuration and size versus requirements
- Common versus dedicated restrooms

Space User Specific
- Supportive of strategic mission—goals
- Internal integration with other business units
- Flexibility to meet changing space needs
- Rental rate (cost) for space
- Perceived building prestige
- Quality/mix of other building tenants
- Amount and cost of parking
- Appeal of lobby/exterior design

Select Sustainability Factors
- Resource use: energy, water, materials
- Occupant performance: IEQ improvements, daylighting, certification
- Reputation/leadership: certification, energy efficiency, etc.
- Internal policy compliance: separate meters, measurement, certification
- Reduced earnings risk: IEQ improvements, leases, contracts

For example, for most office space users, real estate decisions are driven by a host of key issues only marginally related to sustainable property:

- Supportive of strategic mission;
- Internal integration with other business units;
- Flexibility to meet changing space needs;
- Technology requirements; and

- Occupancy expense (cost) for space.

If a space cannot help space users achieve their strategic missions and provide the flexibility to meet changing needs, it will not be in strong demand. As the availability of sustainable space in the marketplace grows, it is likely that certain sustainable property attributes will become more of a minimum requirement, critical to implementing the strategic mission of space users. Given trends in the market, the very real possibility that this will be the case, at least for a significant sector of the space-using marketplace, is one of the key factors driving the value of sustainable properties.

1. The Discounted Cash Flow Model

In step four, we described the basic workings of the discounted cash flow (DCF) model. Prior to laying out the process for integrating sustainable and non-sustainable factors in the determination of discounted cash flow model inputs, it is important to understand in more detail the structure and input assumptions of the DCF model. To do this, we present a hypothetical DCF model based on a real world non-sustainable office building. The exhibits that follow in this chapter and the full presentation of the model in Appendix V-D are drawn from this example.

Our hypothetical example of a Discounted Cash Flow analysis is based on a 25-story, 375,000 square foot CBD office building located in one of Southern California's primary metropolitan areas. The building is a conventional (non-green) office building built in the mid-1980s. In addition to revenue received from office space leasing, the property also derives revenues from approximately 12,000 square feet of ground floor retail space and 750 parking spaces located in a subterranean parking garage. The DCF analysis presented reflects a 20% office vacancy rate during the first year.

The DCF model takes into consideration revenues and operating expenses to calculate net operating income, as shown below in Exhibit V-19 As shown in the more detailed Appendix V-D, discounted cash flow models typically cover a ten-year period, with the net operating income in year eleven capitalized to obtain a residual value. The residual value is important because the difference between the original acquisition price and the eleventh-year sales price captures the appreciation in value over the holding period. Revenues and operating expenses will change over a ten-year holding period based on the terms of new and existing leases, changing costs, and other factors.

The financial performance (internal rate of return value) of a property is determined by all the specific financial inputs shown in Exhibit V-19. Some assumptions, like rent, occupancy, or energy costs are very important, and others, like water costs, trash removal or insurance, are less important.

Consequently, in assessing how, and how much, sustainable property outcomes (energy efficiency, certifications, etc.) will affect financial performance; it is critical to understand the relative magnitude of the different financial model inputs for the specific subject property being evaluated. Typically, rent and revenue related assumptions will be more significant than operating cost assumptions. Accordingly, traditional sustainability

financial analyses that ignore revenues are often inappropriate or inaccurate measures of financial performance.

Just because water, trash removal, sewage and other operating costs are typically less significant when looking solely at their relative magnitude to revenues and other operating costs does not mean they do not have value. Sustainability features, systems and practices that reduce water, sewage, and trash, or achieve other sustainable goals, contribute significant public value and enable high level sustainability certifications, which can be critical to increased demand by regulators, space users, and investors. Demand by these groups drives potential revenue enhancement and risk reduction. Accordingly, “value engineering” as it is typically done today that focuses only on costs can potentially lead to cuts that will significantly reduce the value of a sustainable property.

Exhibit V-19
Discounted Cash Flow Model
Calculation of NOI

	Year 1
Revenues	
Contract and Market Rents	$14,535,362
Less: Absorption and Turnover Vacancy	(1,939,548)
Scheduled Base Rental Revenue	$12,595,814
Add: Expense Reimbursement Revenue	150,928
Add: Parking Other Income	2,273,518
Total Potential Gross Revenue	$15,020,260
Less: Credit and Vacancy Loss	
Effective Gross Revenue	$15,020,260
Operating Expenses	
Janitorial	222,572
Porter	72,816
Window Cleaning	44,625
Supplies	42,483
Trash Removal	28,150
Fire and Life Safety Supplies	31,760
Repairs and Maintenance	505,807
Tools and Equipment	13,500
Utilities	
- Electricity	647,633
- Gas	43,883
- Chilled Water	588,000
- Water and Sewer	21,797
Security	209,200
Landscaping Contract	23,200
Administrative	259,890
Advertising and Promotion	25,900
Real Estate Taxes	2,376,310
Non-Reimbursable Expense	37,670
Insurance	188,000
Management Fee	$300,405
Total Operating Expenses	$5,683,601
Net Operating Income	$9,336,659

In order to calculate the rate of return from a property over a ten-year holding period, it is necessary to determine the cash flow from property appreciation as shown in Exhibit V-20. The capitalization rate is applied to eleventh-year Net Operating Income to generate gross sales proceeds. Sales costs of 2% (broker commissions, transaction costs, etc.) are subtracted to get net sales proceeds, which are added to cash flow at the start of year 11. Property acquisition price is a negative cash flow applied at the start of the investment.

Exhibit V-20
Calculation of Net Sales Price and After-Tax Gain on Sale at End of Holding Period

	Year 11
Net Operating Income	$15,812,614
Residual Capitalization Rate	8.5%
Gross Sales Proceeds	186,030,758
Less: 2% Selling Costs	(3,720,615)
Net Sales Proceeds	182,310,142
Add: Depreciation Recapture	
Less: Original Property Cost Basis	
Taxable Gain on Sale	
Less: Capital Gains Tax	
After-Tax Gain on Sale	

The capitalization rate is a measure of investor demand that reflects the return required by investors to acquire the stream of net operating incomes from a property. The capitalization rate can significantly affect the rate of return of a property. If a sustainable property generates increased investor demand, its capitalization rate will be lower, increasing residual value and net sales proceeds. The financial impact of the higher sales price is reduced because proceeds are received in the future and must be discounted back to the present, but is still typically significant in a real estate investment.

The key financial performance indicator from a DCF model is the internal rate of return (IRR). Technically, the IRR is calculated by determining the discount rate applied to the stream of cash flows from the property that would generate a zero net present value.[27]

Investors rely upon the internal rate of return, or related variations of the technique, for many real decisions, but then must fully consider whether the risks inherent in the pro forma cash flow upon which the IRR is based are properly compensated by the internal rate of return that the property produces.

The DCF model is used by the appraisal profession as one of their three approaches to value. The three approaches are the Income Approach (typically a DCF Model), the Sales Comparison, or Market Approach, and the Cost Approach. To calculate value from the DCF model one selects a discount rate (based on market evidence) to apply to the stream

[27] In some cases, due to the reinvestment assumptions and other issues with the IRR calculation, a modified IRR or use of other measures—net present value, etc.—is warranted for decision-making

of cash flows to determine the net present value. The discount rate is the rate of return required by most likely buyers to invest in the subject property's projected net operating income. Accordingly, the discount rate, similar to the capitalization rate, incorporates the market's perception of the risk of a subject investment. The discount rate is used to translate cash flows received over the holding period to a present value. The higher the discount rate, the more risk an investor perceives in the pro forma cash flows, and the lower the net present value will be.

Reduced risk is perhaps the most significant benefit of sustainable property investment. To measure, or get a feel for the magnitude of value premiums due to potential risk reduction, one must evaluate how sustainable property investment influences discount and capitalization rates. Practically, with few sales of sustainable buildings completed to date, and the difficult chore of separating out the effect of sustainability on sales prices, evaluating risk benefits relies more on a structured assessment of positive and negative risks than a purely statistical or quantitative analysis. This will be discussed in more detail in Step 6: Risk Analysis and Presentation.

As shown in Exhibit V-21, the net operating income is not the end of the story in a DCF model. For investment decision-making purposes, investors often need to consider leasing and capital items, debt service costs, and taxes. Leasing and capital items can be critical components of returns on real estate investment. Capital expenses have typically averaged 1% to 2% for commercial and multi-family properties over the last 20 years, significantly reducing returns that are calculated based on the net operating income alone. Importantly, sustainable properties can achieve favorable timing and reduced costs for capital expenses, tenant improvements and leasing commission costs, improving returns to investors.

Exhibit V-21
Calculation of
After-Tax Cash Flow

Net Operating Income
Less: Leasing and Capital Items
- Tenant Improvements
- Leasing Commissions
- Capital Reserve

Cash Flow Before Debt Service and Taxes
Less: Debt Service

Cash Flow After Debt Service
Add: Loan Principal Paid
Less: Depreciation

Taxable Income
Less: Federal and State Taxes

After Tax Cash Flow

Prior to the last few years, low interest rates enabled debt to significantly increase financial performance. Essentially, investors could reduce their use of expensive equity, and replace it with low-cost debt, increasing their rates of return. Today, with debt service costs significantly higher, and loan to value and debt service coverage ratios lower, debt is less valuable than it used to be, but still cheaper than equity.

As shown in Exhibit V-21, calculation of after tax cash flow takes into consideration the amortization of loan principal by adding it back, then subtracting depreciation. Given the favorable depreciation schedules for many sustainable property attributes, and likely increases in these types of tax benefits in the future, the reduction of taxable income through increased write-offs of paper depreciation losses will also be a significant component improving after-tax returns for investors in sustainable properties.

Alan Whitson, in his article "Depreciation Without the Headache," describes the value of favorable depreciation:

> Depreciation is a 'non cash' expense that is used to recover the cost of something you have already paid for, that accountants and tax collectors didn't let you write off when you spent the money….When dealing with depreciation and buildings, there are two types of property: tangible real property and tangible personal property. Tangible real property is depreciated over 39 years, or 2.56 percent each year. Tangible personal property uses a 7-year depreciation schedule….Under a 39-year depreciation schedule, only 20.5 percent of costs you paid for something are recovered by the eighth year. In contrast to 7-year depreciation, it's 100 percent…
>
> If depreciation is a 'non cash' expense, why is it such a big deal? Simple: income taxes. Depreciation reduces a company's profits, and profits are taxed. At a 39-percent income tax rate, every $100 of depreciation can reduce income taxes by $39…
>
> Maximizing the use of tangible personal property in a project has tax benefits from 5 percent to 20 percent of construction costs. The standard for defining tangible personal property is based on Revenue Ruling 75-178. The key issue is the character of how an element is attached to the building, not its "nature and use." Elements like movable wall systems, raised access floors, carpet tile, modular cabling systems, lighting, sound-masking, and even Underfloor HVAC can be classified as tangible personal property.
>
> The intent of the taxpayer is crucial in determining what is tangible personal property. Therefore, common phrases like "permanently attached" in construction documents can literally cost a tenant or landlord millions of dollars. It is worth the effort to have your architects, engineers, accountants, and vendors address this issue."[28] (Excerpted from article)

[28] Alan Whitson is President of Corporate Realty, Design & Management Institute. Many short insightful articles are available at their website: www.squarefootage.net.

2. Discounted Cash Flow Model Inputs

The key financial model inputs for the discounted cash flow model are shown below in Exhibit V-22. Those inputs shaded are some of the assumptions most influenced by sustainable property investment.

Exhibit V-22
Discounted Cash Flow Model Inputs

Revenue

- Contract rental rates and other lease terms
- Market rental rates:
  - Ground floor retail $1.50/SF NNN
  - Office: floors 2-5 $2.50/SF FSG
  - Office: floors 6-10 $2.60/SF FSG
  - Office: floors 11-15 $2.85/SF FSG
  - Office: floors 16-19 $3.00/SF FSG
  - Office: floors 20-23 $3.20/SF FSG
- Annual rent growth
  - Year 1 3.0%
  - Year 2 6.0%
  - Year 3 5.5%
  - Year 4 5.0%
  - Year 5 4.5%
  - Years 6-10 4.0%
- Vacancy and collection loss - 5.0%
- Office lease terms and other assumptions - new and renewing tenants
  - Lease term - 5 years
  - Free rent - 0 months
  - Annual rent escalations - 3.5%
  - Downtime between tenants - 9 mos.
  - Renewal probability - 65.0%
- Parking revenues
  - Reserved parking - $225/space
  - Unreserved parking - $190/spacae
  - Annual parking revenue growth - 5.0%

Expense

	Year 1
Janitorial	$ 222,572
Porter	72,816
Window cleaning	44,625
Supplies	42,483
Trash removal	28,150
Fire & life safety supplies	31,760
Repairs & maintenance	505,807
Tools & equipment	13,500
Utilities	
– Electricity	647,633
– Gas	43,883
– Chilled water	588,000
– Water & sewer	21,797
Security	209,200
Landscape contract	23,200
Administrative	259,890
Advertising & promotion	25,900
Real estate taxes	2,376,310
Non-reimbursable expenses	37,670
Insurance	188,000

- Management fee - 2.0% of Effective Gross Income
- Growth factor for real estate taxes - 2.0%
- Growth factor for other expenses - 3.0%

Leasing Expenses & Capital Reserve

- Office tenant improvements
  - New tenants/2nd gen. space $ 15/SF
  - Renewing tenants $ 10/SF
  - Shell space $ 55/SF
- Leasing commissions
  - New leases 4.0%
  - Renewing leases 2.0%
- Capital reserves $0.35/SF

Property Acquisition & Disposition

- Property acquisition inputs
  - Purchase price $110.0 million
  - Closing costs 1.75% of purchase price
  - Loan fee 0.75% of loan amount
  - Total acquisitions costs $112.5 million
- Property disposition inputs
  - Residual capitalization rate 8.5%
  - Broker's fee and closing costs 2.0% of sales price

Investor Tax

- Ordinary income marginal tax rate 35.0%
- Capital gains tax rate 15.0%
- Cost recovery recapture tax rate 25.0%
- Allocation of cost basis to improvements 80.0%
- Depreciation schedule for improvements 39 years

Financing

- Loan amount $73.0 million
- Loan-to-value 65.0%
- Interest rate 7.5%
- Loan term 10 years
- Amortization schedule 25 years
- Loan points 1.0%
- Annual debt service $6.5 million

The model inputs are broken into the following categories:

- Revenue;
- Expense;
- Leasing Expenses and Capital Reserves;
- Property Acquisition and Disposition;
- Financing; and
- Investor Tax.

Key inputs influenced by sustainable properties include rental rates, annual rent growth, down time between tenants, renewal probability, utility expenses, tenant improvements and leasing expenses, and a growth factor for expenses other than real estate taxes. The input assumptions shown in Exhibit V-22 are those that generate the financial performance results as presented in the full DCF model presented in Appendix V-D.

As the DCF input sheet in Exhibit V-22 illustrates, many factors beyond rents or sales prices influence financial performance. In many cases, depending upon the particular market conditions and nature of the sustainability improvements, market rental rates or annual growth rates may not change significantly, but renewal probabilities, the downtime between tenants, absorption levels, operating expenses and other changes can result, increasing value. It will depend on the nature of the property, space users, market conditions, and other factors.

Perhaps most importantly, sustainable property investment can reduce the risk associated with a particular property's cash flow. As discussed earlier, lower risk could reduce capitalization rates applied to final year net operating income, increasing potential appreciation on a property and reducing the discount rate to apply to the property's cash flow over the holding period.

Investors evaluating property investment options should directly consider reduced risk due to sustainability investment. Investors are willing to accept lower returns if risks are demonstrably lower. For example, investors that are confronted with multiple options for their investment dollars will not always choose the investment with the highest rate of return. In the real world, different types of investments have highly different risks, and on an informal "risk adjusted" basis, lower risk, lower return investments are often selected over more risky, higher return investments. Factors like the quality and mix of tenants, the specific length and nature of existing leases, the level of implied occupancy increase in the cash flow, and many other factors affect the relative risks of a stream of cash flows. As will be discussed in the next section, better analysis and articulation of these risks will result in increased value for sustainable properties.

A well-constructed DCF model that enables detailed sensitivity analysis can be an important tool in determining the financial implications of alternative sustainable property investments. For example, in our real world office property, a 30% reduction in electricity costs can result in a 0.5% increase in the internal rate of return. Interestingly, the effect on financial performance of a 30% reduction in energy costs is equivalent to:

- A 2.5% increase in contract and market rental rates,
- A 2.1% increase in effective gross revenue, or
- A 60 basis point change in the year 11 capitalization rate.

In contrast, a 30% decrease in water costs results in an insignificant one basis point change in the internal rate of return, reinforcing the critical importance of integrating the importance of water use reduction to revenue and risk considerations due to its potential positive effect on regulator, space user and investor demand.

More likely, if the evidence shows that space user and investor demand for a sustainable property would be higher than for a conventional property, then you will see small changes in a variety of the key variables, including market rental rates, annual growth rates, tenant retention, vacancy and collection loss, office lease terms, office tenant improvements, leasing commissions, and other demand-related variables.

In a sensitivity analysis presented by the Australian Building Council in 2008, they found that the impact on market value of a Green Star building was the following:

Exhibit V-23
Impact on Market Value of GreenStar vs. Non GreenStar Building

	$ Value	% Value Change
GreenStar Building		
Increase in renewal probability from 50% to 75% in a green building	$3.2m	3%
Decrease of total downtime over 10 years from 12 months to 6 months in a GreenStar building	$3.2m	3%
Decrease of terminal yield from 6.25% in the base case to 5.75% for a GreenStar building	$5.3m	5%
Non-GreenStar Building		
Decrease in rental growth rate from 3.5% to 2%	-$13.9m	-13%

Source: "Valuing Green, How Green Buildings Affect Property Values in Getting the Valuation Method Right," Mr. Richard Bowman and Mr. John Wills, Green Building Council of Australia, 2008, p. 25.

3. The Process for Determining Financial Model Inputs

The starting point for determining DCF financial model inputs are the results from Step 4 — a detailed assessment of the net impact of sustainable property investments on the key cost and benefit issues:

- Development costs
- Development risks
- Space user demand

- Resource use/operating costs
- Building operations
- Cash flow/building ownership risk
- Public benefits
- Increased investor demand

The next step is to identify and assess the "non-sustainable" factors influencing the financial model inputs. As shown earlier in Exhibit V-18, key issues affecting space user demand such as support for the strategic mission, flexibility, and cost need to be evaluated for the subject property. In addition to space user demand, key "non-sustainable" factors influencing revenues, operating costs, leasing and capital costs, acquisition and disposition, financing, and taxes also need to be considered.

Next, the relative importance of each of the sustainable and non-sustainable factors needs to be evaluated. Some of the key analyses to be utilized include:

- Detailed analysis of comparable built and to be built properties. This analysis is done with a particular focus on the competitive advantages or disadvantages of the subject property, with a particular eye on the relative benefits of sustainable property attributes.
- Analyze existing national or local space user surveys. The key here is to evaluate survey research to see how the opinions and results might influence the specific space users identified for the subject property. Critical to this analysis are a very clear understanding of the respondents and the nature of the questions that were asked in these surveys. Many such surveys are done on a regular basis (See Chapter IV: Market Performance; Consortium Research Library and industry resources, index code 15.73, and Appendix V-A: Enterprise Value Analysis.)
- Develop a clear understanding of the existing and/or likely tenants in the property, and conduct an analysis of the potential demand for green buildings currently, and in the future. Key factors that will influence this are the specific region, industry, ages of occupants, specific ties to green or sustainable businesses, and other factors.
- Conduct market research. Do independent surveys of tenants, brokers, and others in the marketplace. Focus not only on existing trends or opinions, but expected trends over time. This will provide additional understanding of rollover risk.[29]

The process of measuring the relative importance of factors is by its nature a qualitative process, But should be based on significant quantitative research. Sophisticated forecasts of rents, occupancies, and other market factors are often relied upon. Market information

[29] Rollover risk refers to the risk of not being able to secure new tenants at favorable rates and terms when existing tenant leases in a building terminate. The risk also incorporates the leasing and tenant improvement costs to resign new tenants if tenants choose not to renew their leases. The rollover risk of a property will be unique to its particular portfolio of leases and markets conditions.

allowing segmentation of demand for green by different types of tenants (CoStar data on leases for example) and survey data that reflect different demographics, geographies, and other key issues is becoming more available.

For example, CoStar released some very interesting information on the leases and buildings that have been identified as green, as shown in Exhibit V-24. This chart shows that for all leases signed in the database that CoStar maintains, law firms were the most likely tenant sector to sign leases in green buildings, with over 14% of all leases signed nationally in green buildings. As this data gets more robust, and can be effectively analyzed at a submarket level, it will provide significant insights into the potential space user demand for sustainable buildings based on the likely tenant profile that an owner is focused on serving.

Exhibit V-24
Demand for "Green" Differs by Type of Tenant
CoStar Data: Leases March 2006 to March 2008

Rank by % Sq. Ft. Green	Industry Sector	Green Leases	Green Sq. Ft.	% Green Sq. Ft.
1	Law firms	131	2,219,470	14%
2	Insurance	49	953,423	10%
3	Financial Institutions	108	2,029,324	9%
4	Agricultural/Mining/Utilities	70	1,661,257	8%
5	Real Estate	38	305,006	5%
5	Accountants	17	127,266	5%
7	Computers/Data Process	43	952,157	4%
7	Engineers/Architects	39	391,518	4%
9	Business Services	95	862,683	3%
9	Medical	23	463,029	3%
9	Government	14	242,322	3%
12	Personal Services	67	899,447	2%
12	Communications	8	206,441	2%
14	Manufacturing	40	1,027,090	1%
14	Retailers/Wholesalers	34	733,814	1%
16	Transportation	6	138,687	0%

Source: CoStar Group Study—Presentation, April 2008

Finally, the last step is to integrate all the information collected on both sustainable and non-sustainable factors, for each of the key financial model inputs, and make decisions. For investors who rely on the discounted cash flow model and internal rates of return, they

will be focused on the key financial variables discussed in this section. Also, as discussed earlier, the particular allocation of cash flow benefits between owners and tenants as specified in leases, and related risks, need to be carefully assessed.

For corporations and other owner occupants, financial analysis including discounted cash flow or total occupancy cost analysis may be supplemented by financial assumptions for improved productivity, improved health, reduced litigation or health cost risk, worker satisfaction, improved recruiting and employee retention, as shown in Exhibit V-25. Whereas an investor must focus on an assessment of the market's response to the particular property that they are offering to the marketplace, a corporation or other owner occupant can presume to accrue many of the occupant-based building performance benefits. Owner occupants must assess the value they ascribe to potential health, productivity, reputation, and leadership benefits, and make decisions accordingly.

Exhibit V-25
Select and Support Financial Assumptions

Landlord-Investor	Owner-User (Corporation)
• Rental rates • Absorption rates • Equilibrium occupancy • Tenant retention rates • Rollover vacancy rates • Lease terms • Capital expenditures • Cap and discount rates • Increased development cost?	• Improved productivity • Improved health • Reduced litigation cost-risk • Reduced health cost-risk • Worker satisfaction • Improved recruiting • Improved employee retention • Increased development cost?

While the purpose of this section—and chapter—was to present the DCF model and key financial assumptions in some detail, to aid those in implementing a detailed DCF analysis of a sustainable property, it is critical to understand that for many sustainable investment decisions, a full DCF model will not be completed or necessary. However, in supplementing a simple ROI or Life Cycle Cost analysis with a more qualitative discussion of potential revenue or risk implications, it is important to understand the logic and financial relationships within a DCF model to accurately articulate potential costs and benefits on a property's financial performance.

4. Special Sources of Sustainable Revenue

Sustainable properties can generate specialized revenue streams from Power Purchase Agreements, Renewable Energy Certificates, and a wide variety of government and utility tax credits, rebates, and other subsidies.

Power Purchase Agreements

> A **Power Purchase Agreement** (PPA) is a legal contract between an electricity generator and a host site owner or lessor. The host site owner or lessor purchases energy or capacity (power or ancillary services) from the PPA Provider (the electricity generator). Such agreements play a key role in the financing of electricity generating assets. Under the terms of a PPA, the PPA provider (the electricity generator) typically assumes the risk and responsibilities of ownership when it purchases, operates, and maintains the turnkey facility.
>
> The PPA provider secures funding for the project, maintains and monitors the energy production, and sells the electricity to the host at a contractual price for the term of the contract. The term commonly ranges between 5 to 25 years. In some renewable energy contracts, the host has the option to purchase the generating equipment from the PPA provider at the end of the term, may renew the contract with different terms, or can request that the equipment be removed.
>
> In the United States, the solar power purchase agreement (SPPA) depends heavily on the existence of the solar investment tax credit, which was extended for eight years under the Emergency Economic Stabilization Act of 2008.
>
> Solar PPAs are now being successfully utilized in the California Solar Initiative's Multifamily Affordable Solar Housing (MASH) program. This aspect of the successful CSI program was just recently opened for applications.[30]

Power Purchase Agreements can be complex, but there has been significant experience with them in recent years and the process is improving with improved legal contracts, fair risk and reward sharing, and improving solar technology.

Clearly, the rationale for PPAs goes beyond just a revenue source, which can be modest in many cases depending on the energy generation potential, risks undertaken, and ability to sell back excess energy to utilities. Renewable energy investment can improve the ability to achieve valuable sustainable certifications, reduce carbon use, and accordingly assist space users meet government, stakeholder and internal sustainable compliance goals.

Proper legal assistance should be obtained to deal with many issues including roof access rights, maintenance obligations, termination issues, removal of solar components at the end of the term (guarantees, etc.), payment structures, tenant pass-throughs, owner rights relative to other energy efficiency investments, outdated equipment responsibilities, and entity structure issues.

Renewable Energy Certificates

Renewable Energy Certificates (RECs), also known as **Green tags, Renewable Energy Credits,** or **Tradable Renewable Certificates (TRCs),** are tradable environmental commodities in the United States which represent proof that one megawatt-hour (MWh) of electricity was renewable (generated from an eligible renewable energy resource).

[30] Selected excerpts from definition of Power Purchase Agreements, Wikipedia, August 2009.

There are two main markets for renewable energy certificates in the United States—compliance markets and voluntary markets.

Compliance markets are created by a policy that exists in 24 US states, plus the District of Columbia, called Renewable Portfolio Standard. In these states, the electric companies are required to supply a certain percent of their electricity from renewable generators by a specified year. For example, in California the law is 33% renewable by 2020, whereas New York has a 24% requirement by 2013.... Electric utilities in these states demonstrate compliance with their requirements by purchasing RECs; in the California example, the electric companies would need to hold RECs equivalent to 33% of their energy sales.

Voluntary markets are ones in which customers choose to buy renewable power out of a desire to go green. Most corporate and household purchases of renewable energy are voluntary purchases. Renewable energy generators located in states that do not have a Renewable Portfolio Standard can sell their RECs to voluntary buyers, usually at a cheaper price than compliance market RECs.[31]

RECs have been more widely used with specialized renewable energy sources like wind farms, but have growing applicability to buildings. Revenues likely will be limited relative to total revenues or revenue enhancement from increased occupant demand.

Government and Utility Tax Credits, Rebates and Other Subsidies

There are a growing number and variety of geographic-specific revenue sources available to sustainable property investors and tenants. These revenue sources can be significant, and in many cases are front-loaded, which is particularly valuable.

5. A Comment On Quantitative and Qualitative Data and Analysis

The practice of property financial modeling and analysis involves both quantitative analysis and a high degree of subjective analysis and qualitative judgment. The financial model itself is quantitative, translating many assumptions into a specific measure of financial performance. Quantitative assessment of comparable property rents, occupancies, absorption, and expenses provide important input for key revenue and expense assumptions. Many quantitative studies of potential health or productivity benefits of sustainable properties or surveys of tenant demand or actual leasing evidence for green buildings also provide important background for key assumptions.

Historically, case studies and business case analysis have not been used in traditional real estate underwriting or valuation. One of the fundamental tenets of the use of comparables analysis for determining rents, vacancy rates, and capitalization rates is that a complete set of similar comparable properties is available and analyzed. Case study analyses in the sustainable property market have not applied this discipline. Case studies and comparables

[31] Select excerpts from definition of Renewable Energy Certificates, Wikipedia, August 2009.

are an important part of any property specific analyses, but valuers must do a good job of understanding potential adjustments when utilizing existing case studies/comparables in their analysis due to potential selection bias.

Another important consideration in selecting financial model inputs, or in conducting due diligence on a pro-forma, is the testing of the reliability of energy and related resource use/cost. Whereas real estate valuers and underwriters could spend hours questioning someone seeking capital about their rent and occupancy assumptions, most real estate analysts do not have sufficient background underwriting energy use. A detailed assessment of the key factors critical to underwriting energy-carbon reduction investment is presented in Chapter VI, Section E.

H. Step 6: Risk Analysis and Presentation (RAP)

RAP is key to the future of sustainable property investment. Sustainable properties face increased risks due to new processes, products, materials, and regulations, but also benefit from reduced or mitigated market, regulatory, construction, legal, and operating risks. Sustainable property decisions require a clear organized presentation of both positive and negative risks to provide appropriate context for assessing sustainable options and related return on investment calculations.

One of the most important issues in underwriting the financial performance of sustainable properties is a full understanding of the risks associated with the pro-forma cash flows in the DCF model. For the purposes of improving sustainable investment decision-making, more detailed documentation of the risks of sustainable property investment, both positive and negative, are necessary to provide decision-makers with proper context for evaluating pro-forma financial performance.

RAP should be part of the investment package that goes to decision-makers for any investment decision. The form and content of the RAP will vary based on the context of the investment decision, but should be directly linked in the presentation to the quantitative valuation and rate of return calculation. .

In this section we address four important risk issues:

1. Property risk focus
2. Why RAP is key to the future of sustainable property
3. How to RAP
4. Background on Cash Flow and Building Ownership Risk

1. Property Risk Focus

Adair and Hutchison, in an article focused on property valuation, define risk “as the probability that a target rate of return will not be realized” and argue that the concept of

risk presumes that all outcomes together with their probabilities of occurrence are known. Uncertainty "denotes situations where outcomes and their probabilities are not known." [32] Accordingly, while we discuss the appropriate presentation of risk in this section, in fact we are recommending a focus on better articulation of the probability of outcomes being achieved-- a more clear and articulate statement of uncertainty-- when probabilities are not known.

This chapter focuses on the assessment and integration of risk analysis into property-level decisions. Property specific decisions include building retrofits, commercial interior build-outs, acquisition of an existing building, or new construction. The presentation and discussion of risk occurs in many different situations:

- **Feature Decisions:** Risk and uncertainty are often part of the general discussion and presentation of a simple payback, simple ROI, or life cycle costing analysis for a specific feature (green roof, HVAC system, etc.).

- **Investors/Valuers Cap Rate Selection:** Risk is, or should be, a central determinant in the **s**election of an appropriate residual capitalization rate in an existing property acquisition. This is most often discussed in assessing the relative cash flow and related risks of sales comparables.

- **Investment Due Diligence:** In the context of decision makers evaluating the reasonableness of a rate of return estimate from a DCF analysis. The rate of return (typically an internal rate of return) reflects the mathematical result of the underwriter or valuer's opinion on scores of specific inputs, without full consideration of risk or uncertainty. For example, three different retail property investments might have forecasted rates of return of 7%, 9% and 11%. To determine which is a better investment, investors consider the relative risks associated with each project and determine, on an informal "risk-adjusted" basis, which project best fits their needs. While this process of considering risks is not a formal mathematical process, it can, and should be, rigorous and well reasoned.

- **Corporate Real Estate Decisions:** Corporate real estate decision-makers consider many similar factors to an investor, but typically have different, and often unique, investment considerations and return hurdles. Businesses are particularly sensitive to risks that would threaten their ongoing operations and long term company value.

- **Valuation:** Valuers must also consider risks and uncertainty in their determination of discount and capitalization rates in order to calculate value using the Income Approach to Value. This is often done while evaluating the "comparability" of sales or rental comparables.

- **Lending:** Lenders' consideration of risk is more focused on the probability of default (which is a function of risk and uncertainty in the cash flows required to

[32] Adair, A. and Hutchison, N. (2005), "The Reporting of Risk in Real Estate Appraisal Property Risk Scoring," *Journal of Property Investment and Finance*, Vol. 23, No. 3, pp. 254-268.

pay debt service) and the severity of losses in the event of default (which is primarily a function of the loan to value ratio). Risk mitigation is key because unlike investors, lenders do not directly share the "upside" if a risk pays off, only the downside if it fails.

Real estate asset risk is also typically understood to have two components: systematic and unsystematic risk. Systematic, or market risk, cannot be mitigated through diversification, and is common to all assets. Unsystematic, or asset-specific risk is unique to a particular asset. Asset-specific risk can be mitigated through diversification--by increasing the number of assets randomly assembled in the portfolio. These concepts, and the relative covariance between real estate and other asset classes, are key concepts in the construction of real estate portfolios, but less important in our discussion of property-specific risk in this section.

2. Why RAP is Key to the Future of Sustainable Property Investment

Sustainable property investment has dramatically increased during the last few years. However, many investors and occupants still need to be educated, and many who are actively investigating sustainable property investment are under-investing due to insufficient or incorrect consideration of revenues and risk. Superior RAP will be a critical component of the changes necessary to overcome sustainable investment obstacles.

Some of the key reasons RAP is so important to the future of sustainable property investment include:

- Sustainable investment is relatively "new" and untested;
- Volume and magnitude of "positive" risk;
- Value of sustainable property to corporations/occupants;
- History of sustainable property advocacy;
- Critical role of risk mitigation;
- Enhanced role of risk in investment decision-making.

Uncertainty of "New" Investment Idea

New investment ideas are subject to higher uncertainty, and sustainable property investment is no different than the norm. Negative risks arise due to the pioneering nature of sustainable property investment, and required changes in organizations, processes, systems, and materials necessary to complete successful sustainable projects, as shown in Exhibit V-26. Sustainable property investment often involves a major retrofit or new construction, and related projected changes in operating costs and revenues. By definition such projects are more risky than investment in an existing seasoned property. However, it is important to make sure when evaluating the risks of sustainable property investment

that the very substantial normal risks of a conventional property are not attributed to sustainability.

Exhibit V-26

"Negative" Sustainable Property Risks

Negative Cash Flow Risks (Costs)	Negative Development Risks (Costs)
Increased Cash Flow Risks 1. Risk of rapid functional obsolescence Investment in "new" technologies, systems, products that risk getting leapfrogged-thus value of investment significantly diminished Residual value risk in ROI model for new technology 2. Process Underperformance Poor integrated design process Legal/contractual risks – Design firm professional liability – Green leases – Warranties – ESCO contracts – Misrepresentation and fraud: marketing an leasing – Regulatory compliance – Securities fraud Insurance – Environmental – Property coverage – Casualty coverage – Business interruption Inadequate commissioning Insufficient measurement and monitoring Insufficient training of property management 3. Operating cost underperformance Product or system failures/underperformance Excessive lease analysis / administrative costs Insufficient training / cooperation of property managers / occupants Reliability / accuracy of energy forecasts Sensitivity to potential declines in energy prices Reliability of water use forecasts 4. Revenue underperformance Delays due to regulator problems Space user demand underperformance – Risk of over improvement – Prioritizing the wrong systems upfront such that the assets competitive position is diminished relative to peer group – Incomplete assessment of building uses – Market change – Insufficient consideration of lease impacts (separate meters, etc.) – Insufficient value recognition by commercial broker – Insufficient value recognition by appraisers Loss of utility mark-up revenues 5. Value / Sales Price Underperformance Inaccurate / over assessment of investor demand Insufficient commercial sales broker recognition of value 5. Insufficient appraiser recognition of value	**Increased Development Risk** 1. Construction risk (cost & delays) Pioneering design and construction Contractor bidding climate and uncertainty: contractors demand payment for uncertainty in the bidding process Pioneering products/systems – Untested performance and reliability – Availability – Combining new systems/technology – Potential for rapid functional obsolescence Systems interoperability Increased new/retrofit construction complexity Potentially underestimated contingency reserves Building codes and regulation complexities/limitations Service provider capacity and experience Specialized subcontractors / equipment LEED / Certification compliance Regulatory compliance 2. Legal/contractual risks Design firm professional liability Construction contracts LEED/Certification Liability Misrepresentation and fraud risk: marketing and leasing protocols Warranties ESCO contracts Entitlements Insurance contracts 4. Exist/take-out risk Building envelope performance Product / system performance: combining new systems and technologies Energy cost volatility Contractor experience / performance Service provider performance Building underperformance Market underperformance

Volume and Magnitude of Positive Risks

The priority of risk analysis for sustainable property investment is further underscored by the many positive risk attributes (benefits) of sustainable properties as shown in Exhibit V-27. Given the rapid and dramatic shift in the demand for sustainable properties by regulators, space users, and investors, properties that are not at an appropriate level of sustainability for their market, or the cost to cure such potential functional economic obsolescence is too high, will suffer financially. Because of data limitations, the speed of change, and other factors, there is substantial uncertainty related to many of the potential benefits of sustainable properties (increased rents, lower discount on capitalization rates, access to regular government incentives, etc.) so a clear, well-supported discussion of potential benefits and their financial implications, specific to the subject property, is critical to support appropriate changes in DCF model assumptions.

Exhibit V-27

"Positive" Sustainable Property Risks

Positive Development Risks (Benefits)	Positive Cash Flow Risks (Benefits)
Reduced Development Risks 1. Reduce construction risk Reduced cost volatility – Commissioning – Integrated design – Local materials – Improved/earlier goal setting; "values clarification" – Better communications among key participants in process Reduced entitlement risk – Improve timing and content of neighborhood/public appearances – Improve timing and content of regulatory approvals • Reduce legal risks – More explicit service provider contracts – Better, earlier communication 2. Reduce carry risk Reduce time to construct Reduce time to lease-up Reduce "carry" risk insurance cost Increase pre-leasing Reduced entitlement risk 3. Reduce take-out risk Increase investor demand Increase value	**Reduced Cash Flow Risks** 1. Improve ability/cost to meet future regulatory compliance 2. Ability to capitalize on future government incentives 3. Improved ability to meet changing space users demand 4. Improved ability to meet changing investor demand 5. Prevent risk of loss of "social license" to operate building 6. Limit liability due to building related health issues—sick bldg, mold claims 7. Limit exposure to future compelling health and/or productivity research 8. Reduced risk of reliance on grid (terrorism) 9. Increased flexibility/adaptability 10. Reduce risk of building not operating as designed 11. Limit exposure to energy/water cost volatility 12. Reduced exit/take-out risk Improve financing—terms, price, availability, etc Increase flow of capital from SRI/RPI Funds 13. Overall reduced potential loss of value due to functional, economic and physical obsolescence

Value of Sustainable Property to Corporations

Evidence of the growing importance of sustainable property investment to reducing risk is growing. Ernst & Young, in their 2009 Business Risk Report, identify ten key risks, at least four of which are mitigated by investment in sustainable properties:

1. The credit crunch
2. **Regulation and compliance**
3. Deepening recession
4. **Radical greening**
4. Non-traditional entrants
6. Cost-cutting
7. **Managing talent**
8. Executing alliances and transactions
9. Business model redundancies
10. **Reputation risks**[33]

Sustainable property investment can be a key component of a business's corporate social responsibility reports and provide other reputational benefits that will aid in regulation and compliance. Sustainable property investment can mitigate property-related risks due to "radical" greening.

Sustainable property investment can be particularly important for "managing" talent. Ernst & Young describes talent management as not only competing for top talent, which continues in many sectors, but also, perhaps surprisingly, to struggle to retain key competencies during an economic downturn. While sustainable property investment is only part of a successful strategy, it has been shown to be an important attribute for many potential employees.

The priority and importance of sustainable property investment in mitigating risks is also seen by evaluating the top ten business risks for commercial real estate in 2009: [34]

1. Continued uncertainty and impact of the credit crunch
2. Global economic and market fluctuations
3. Impact of aging or inadequate infrastructure
4. **Global war for talent**
5. **Changing demographics**
6. Inability to find and exploit global and non-traditional opportunities
7. Pricing uncertainty
8. **Green revolution, sustainability and climate change**
9. Economic vulnerability and regulatory risks in developing markets
10. **Volatile energy costs**

Sustainability is even more important for commercial real estate than for businesses generally. Sustainability can help in the global war for talent, address and mitigate risks

[33] The "2009 Ernst & Young Business Risk Report, The Top Ten Risks for Global Business," early 2009. Ernst & Young, interviews more than 100 industry commentators representing 11 sectors in more than 20 academic disciplines, asking each interviewee to identify the top business risk for 2009. Next, to prioritize the top risks for each sector, they interviewed panels of sector experts including CEOs, strategy planning executives, analysts, journalists in trade publications, advisors and their own Ernst and Young practice professionals.

[34] Ibid.

related to the Green Revolution, sustainability and climate change, and very directly address the risks related to volatile energy costs.

The purpose and key point for presenting this information on the top ten risks for business and commercial real estate from Ernst & Young is to reinforce the contribution of sustainable property investment to reducing and mitigating both business and commercial real estate risks, rather than just reducing operating costs.

History of Sustainable Property Advocacy

A clear and independent presentation of risks is particularly important in the sustainable property investment sector due to the industry's history of advocacy. As with any "new" investment idea, there are advocates that promote the investment to get it off the ground, prior to the availability of empirical evidence and performance experience. Sustainable property investment is no different, and the surge into the mainstream in recent years was initiated through the committed work and support of many people. As is typical in any new investment sector, performance information, particularly in the early years, and particularly if presented by individuals or organizations that are not independent of the investment sector, will be of lower quality and reliability.

Accordingly, because of the sustainable property investment sector's typical history of advocacy, RAP can be particularly critical to providing the transparency required to overcome the objections of decision-makers who may have confronted misrepresentations or poor quality data on sustainable property risks and performance in recent years.

Critical Role of Risk Mitigation

As discussed above, with any "new" investment sector, there are substantial numbers of "negative" risks. In this regard, risk mitigation will be a critical component of building the confidence necessary to maximize investment by investors, lenders, and occupants. Risks can be mitigated in the traditional way, through contracts, insurance, guarantees, pre-leasing, and high quality due diligence, and these risk mitigation actions should be clearly presented in a RAP. Additionally, sustainable property nuances of traditional risk mitigation techniques should be discussed, as well as sustainably related risk mitigation due to reduced energy or water cost volatility, reduced entitlement risks, and other specific sustainable risk mitigation attributes.

Enhanced Role of Risk in Investment Decision Making

The final reason why RAP is key to the future of sustainable property investment is the enhanced role of risk in investment decision-making throughout the capital markets. With the collapse of the real estate capital markets in 2008, risk and uncertainty have risen from an afterthought to one of the central components of decision-making for most capital providers. Risk and uncertainty are no longer put in the appendix, or in the last pages of an investment package, but have taken on a more central role in investment presentations.

3. How to RAP

There are as many ways to RAP as there are different types of sustainable property investment decisions. However, the following guidelines should be helpful in thinking through the preparation of any RAP.

- **Clarity:** Perhaps the most important advice in preparing a RAP is that the presentation be clearly prepared and easy to consume. Discussions of positive and negative risks need to be specifically tied to the particular financial assumptions or other key assumptions in the investment package and/or financial model. The presentation should be logically consistent, discuss positive and negative risks, and provide rationale for how "net" risk impacts are assessed

- **Comprehensive**: Perhaps one of the most important guidelines is that risks be fully presented. Real estate decision-makers are well versed in dealing with highly complex and risky decisions, and a project has a much better chance of being approved if the risks are fully presented. There is nothing more damaging to an investment approval decision than an investment committee member uncovering biased or incorrect information in a presentation, or uncovering risks that were not presented.

- **Process and Feature Focus:** As presented in Chapter IV: "Sustainable Property Performance," the success of a sustainable property can be significantly increased if sustainable processes and features are appropriately undertaken. Proper integrated design, energy modeling, commissioning, and related processes are particularly critical to sustainable property risk mitigation. The selection and implementation of features can also reduce risk if properly done.

- **Enhanced Sensitivity Analysis:** Enhanced sensitivity analysis that enables decision-makers to understand the relative importance of particular risks can be particularly helpful in sustainable property investments. Many of the negative risks can be controlled through risk mitigation, and often the risks themselves are of relatively small magnitude, particularly in comparison to the positive risks possible through market and/or financial performance upside.

- **Risk Mitigation:** Risk mitigation that is undertaken through legal, surety, insurance, or other forms of due diligence should be clearly delineated.

- **Advanced Risk Analysis Techniques:** Depending on the type of decision, the sophistication of the underwriting/due diligence team, and the sophistication and requirements of the decision-makers, advanced risk analysis techniques should be considered. These types of risk techniques will vary based on the industry and situation, but would include multiple scenario analyses, alternative contracts and compensation, value at risk financial risk management tools, and many other techniques.

Sustainable property investors have a significant opportunity to maximize the level of investment in sustainable properties through better risk analysis and presentation. Real estate people like risk; it is how money is made. They just want to be able to understand it well enough to properly price and mitigate it.

4. Background on Cash Flow and Building Ownership Risks

By far the most important financial benefit of sustainable property investment is the potential reduction in cash flow/building ownership risk. Reduced cash flow/building ownership risk is an important contributor to an increase in space user demand, which can directly improve revenues, and to an increase in investor demand, resulting in higher values through reduced discount and capitalization rates.

Cash flow and ownership risks are most significantly reduced due to the ability of a sustainable/energy efficient building to cost-effectively meet the changing needs of regulators, space users, and investors. It is almost a certainty that local, state and federal regulations regarding sustainability will increase, perhaps dramatically, in the coming years. A building that cannot, at a reasonable cost, adapt to meet future regulatory requirements or capitalize on incentives, will be less valuable.

Analogously, a building that cannot adapt to meet increasing demand for sustainability by space users and investors will lose value through economic obsolescence. Sustainable buildings also reduce the risk of reliance on the energy grid (terrorism or natural disasters), limit exposure to energy/water cost volatility, and limit both current and future potential liability due to building-related health issues. All of these benefits reduce exit or takeout risk by maximizing the potential pool of buyers or investors, and the availability of financing.

While the benefits related to cash flow risk can be significant, sustainable properties can also increase cash flow/building ownership risk. For example, investments in new technologies, systems or products that are at risk of getting leapfrogged increases the risk of losing value due to functional obsolescence. Investors can also miss the market, over-investing in sustainability relative to market demand. Worse, the potential elimination of features attractive to occupants to enable sustainable features or systems to be added to a building can increase cash flow risk. The reliability and accuracy of energy forecasts, as well as the risk due to energy price declines also can be important over a short time period. Finally, liability risk relative to performance claims and marketing need to be evaluated.

Sustainable Property Investment Can Decrease Cash Flow Risk

Sustainable properties are well positioned to significantly reduce cash flow/building ownership risk. Lower risk will increase value by lowering discount and capitalization rates, and lower the required return necessary for investors/corporations to make a positive decision about sustainable property investment.

For investors or lenders, the most important risk benefit is the protection against future increases in demand for sustainable properties by regulators, space users, and investors. Given the dramatic increase in demand and the fact that lenders or investors will be evaluating cash flow streams well into the future, protection against future change will be a critical risk benefit.

Space users (tenants and corporate owner-occupants) will also be interested in the risk benefits from regulatory and investor demand change, but will have even more direct concern about the ability to limit liability due to building health-related issues, limiting the risk of future energy or water cost volatility, and other factors.

Checklist of Reduced Cash Flow/Building Ownership Risk

1. Improved ability to meet future regulatory requirements
2. Ability to capitalize on future government incentives
3. Improved ability to meet changing space user demand
4. Improved ability to meet changing investor demand
5. Prevent risk of loss of "social license" to operate building
6. Limit liability due to building related health issues—sick building, mold claims
7. Limit exposure to future compelling health and/or productivity research
8. Reduced risk of reliance on grid (terrorism)
9. Increased flexibility/adaptability
10. Reduced risk of building not operating as designed
11. Limit exposure to energy/water cost volatility
12. Reduced exit/take-out risk
13. Overall reduced potential loss of value due to functional, economic and physical obsolescence

The measurement and assessment of potential reduced cash flow/building ownership risk is based on a compilation of the underwriting of the subject property's attractiveness to regulators, space users, and investors, as well as an assessment of reduced resource use projections, and other factors.

Risk Analysis and Capitalization and Discount Rates

The traditional way discount and capitalization rates have been generated is through market research. Capitalization rates are calculated based on evaluating comparable sales of commercial properties, and discount rates are typically determined through an analysis of the most likely buyer of a project, and their rates of return requirements, through surveys or other means. Market derived discount and capitalization rates are then adjusted for the specific concerns and considerations of the particular property, given its risk attributes.

When market transactions are limited, and capitalization and discount rates are difficult to determine based on market evidence, or the number of property sales for a particular specialized property type is too low (as is often the case with sustainable properties), the derivation of capitalization and discount rates relies more upon a detailed articulation and reconciliation of the risk- increasing and risk-decreasing factors of a particular property.

While anecdotal (based on many interviews and discussions, but not a random or statistically significant survey), our research shows that for most institutional investors, new development projects are already seeking a relatively high level of sustainability, and institutions are moving rapidly to assess their existing portfolio's sustainability related potential for functional or economic obsolescence due to sustainability. Many of the largest real estate owners are developing specific acquisition screens to eliminate potential risks from properties that are unsustainable, or where the cost to cure potential obsolescence from sustainability is not financially feasible.

Additional surveys, anecdotal evidence, and actual valuation evidence will increase in the future, improving the capability to analyze this issue. One important caution in trying to determine the incremental effect of sustainability on property value is the tremendous increases in value between 2005 and 2007 and the subsequent substantial decreases in value starting in early 2008. Given these substantial valuation changes, as much as 2% a month during certain time periods, any statistical efforts to isolate sustainability will continue to be difficult.

Sustainable Property Investment Can Also Increase Cash Flow Risks

The most significant cash flow risk is to underperform pro-forma projections, rather than underperform compared to a property with no or limited sustainability attributes

The best way to assess potential sustainability related underperformance risk is to carefully consider the influence of incremental sustainability investment on key assumptions in the financial analysis or valuation. If the incremental contributions appear overstated, or are not clearly articulated, the risk of underperforming the pro-forma projections will increase.

Checklist of Increased Cash Flow Risk

- Risk of rapid functional obsolescence
- Process underperformance
- Operating cost underperformance
- Revenue underperformance
- Value/sales price underperformance

Risk of rapid functional obsolescence

New technologies in sectors of the industry with substantial ongoing research and development investment, like the sustainable property industry, are subject to heightened levels of functional obsolescence, which has a direct impact on value, but can also impact space user demand and cash flows.

For example, if an owner paid one million dollars for a new HVAC system, and two years later you could buy an HVAC system that was 15% more efficient for 10% less money, the value of the original investment has gone down due to functional obsolescence due to the introduction of leapfrog technology.

Major expenditures on new products, systems, or strategies should be evaluated for this risk and mitigated through supplier contracts, phasing of implementation, further research, and other means.

Process Underperformance

One of the biggest risks to cash flow is poorly executed sustainable property processes such as those identified below:

- Poor integrated design process
- Legal/contractual risks
  - Design firm professional liability
  - Green leases
  - Warranties
  - ESCO contracts
  - Misrepresentation and fraud: marketing an leasing
  - Regulatory compliance
  - Securities fraud
- Insurance
  - Environmental
  - Property coverage
  - Casualty coverage
  - Business interruption
- Inadequate commissioning
- Insufficient measurement and monitoring
- Insufficient training of property management

To assess the influence of process performance on cash flow risk, the valuer/underwriter must assess each of the key processes, particularly those that have led historically to underperformance like:

- Integrated design process
- Contracts
- Service provider capacity

- Energy modeling
- Commissioning
- Sustainable certification
- Measurement and verification
- Occupant and building management training

Operating cost underperformance

Failure on these processes has been found to lead directly to building underperformance and poor financial performance. (See Chapter IV of "Sustainable Property Performance" for more detail)

- Product or system failures/underperformance
- Excessive lease analysis / administrative costs
- Insufficient training / cooperation of property managers / occupants
- Reliability / accuracy of energy forecasts
- Sensitivity to potential declines in energy prices
- Reliability of water use forecasts

Revenue Underperformance

Revenues are the most significant cost component of net cash flow, so risks must be assessed. Key risks include:

- Delays due to regulator problems
- Space user demand underperformance
- Risk of over improvement
- Prioritizing the wrong systems upfront such that the assets competitive position is diminished relative to peer group.
- Incomplete assessment of building uses
- Market change
- Insufficient consideration of lease impacts (separate meters, etc.)
- Insufficient value recognition by commercial broker
- Insufficient value recognition by appraisers
- Loss of utility mark-up revenues

The potential for risk in revenue performance is a function of the aggressiveness of assumptions in the pro-forma regarding sustainability premiums. While historically revenue enhancement has not been an important part of sustainable property decisions, it will, and should be more important going forward, so more attention will have to be paid to this issue.

Value / Sales Price Underperformance

- Inaccurate / over assessment of investor demand
- Insufficient commercial sales broker recognition of value
- Insufficient appraiser recognition of value

Value/sales price underperformance can be assessed by evaluating the aggressiveness of sales price/value assumptions, the level and quality of analysis of most likely buyers, and a consideration of broker and appraiser recognition of value. For projects with projected sales more than a year or two in the future, and certainly for ten-year projection periods, the rapidly changing investor attitudes towards sustainable property investment need to be considered in selecting residual capitalization rates.

I. Valuation Considerations

The bulk of *Value Beyond Cost Savings: How to Underwrite Sustainable Properties* is applicable to valuation. Chapter II on investment decisions addresses critical issues in clearly specifying the valuation assignment. Chapter III on evaluating a property's sustainability addresses the implications of certifications and performance measurement on value. Chapter IV presents new valuation-focused performance frameworks and comprehensive sustainable property performance data. Chapter V provides detailed guidance on financial modeling and a six-step process for implementing the Income Approach to Value (Discounted Cash Flow Analysis). Chapter VI provides additional insights into sustainable property risks and risk mitigation, giving valuers better understanding of how capital sources think about sustainability, and also provides detailed guidance on underwriting service providers, energy, space user demand, regulator demand, and potential health and productivity benefits.

This section summarizes some of the Consortium's key findings and conclusions that arise from our research regarding valuation of properties with sustainable attributes:

1. Sustainable properties should be more valuable
2. Valuation is not just about formal full narrative reports
3. Valuers have skills to make significant contributions to sustainability
4. Fundamental valuation methodologies do not need to change
5. Sustainable valuation must look beyond costs
6. Public value has increasing importance to private value
7. The income approach is critical to understanding sustainable value
8. Valuers need to get better at integrating risk analysis into value
9. Valuers must prove value of sustainability one property at a time
10. Performance measurement is key to sustainable property performance

11. Energy is a more critical issue for sustainable property valuation

1. Sustainable Properties Should Be More Valuable

Sustainable property performance evidence presented in Chapter IV supports a compelling **general** argument that sustainable properties should be more valuable. Development costs are only marginally higher, and can often be mitigated or successfully managed.[35] Operating costs are lower. Revenues are higher as a result of regulator incentives and subsidies and enhanced space user demand. Investor demand is up as they begin to respond to potential regulator and space user demand increases and other investor climate change pressures. A detailed assessment of the "net" risks of sustainable properties is quite positive, lowering required discount and capitalization rates. Finally, many of the real risks of sustainable properties can be mitigated through contracts, insurance, and other strategies that have developed as the industry has matured.

2. Valuers Must Prove the Value of Sustainability One Property at a Time

The general business case for why sustainable properties should be more valuable provides a valuable "hypothesis" that must be tested for individual properties being valued.

One of the biggest challenges for valuers is that the general research methodologies and data supporting why sustainable properties should be more valuable is of limited use in quantifying the value of a specific property with its own unique combination of sustainable attributes. General statistical studies that support higher rents, higher values, lower energy use, better occupant satisfaction, and similar conclusions are typically based on average results from scores to thousands of properties. These studies, if appropriately applied, can help with property specific valuation assumptions, but the conclusions cannot be easily applied. There are no easy solutions to valuation of sustainable properties—they need to be valued the old fashion way—one property at a time. (Much more on this concept and its importance in interpreting current sustainable property performance evidence is presented in Chapter IV, Section F: Market Performance).

3. Valuation is not Just About Formal Full Narrative Reports

Many sustainable property investment decisions do not require formal full narrative valuation reports.[36] Formal full narrative valuation reports are typically required when third-party finance is involved, but in most other investments by corporations or investors, formal full narrative valuation reports by third-party valuers are not required or used in

[35] Substantial information on initial sustainable development costs indicate a 0-5% premium for new sustainable development costs, with experienced providers more likely to achieve the 0% premium. Research on premiums for major or minor retrofits is more limited, and it is more difficult to make general statements about initial development costs for existing buildings due to the wide variations in the types of retrofits and initial conditions in existing buildings.

[36] Valuation reports can include varying levels of analysis, documentation, and reporting depending on their purpose, the valuer, and the language used in the report.

practice. However, less formal valuation is used by many decision-makers and in almost all sustainable property investment decisions the concepts of value need to be more rigorously applied. Even if a formal report is not completed, applying the methods and practices of valuation will enable capital seekers to accurately assess and present the revenue and risk implications of sustainable property investment that are either left out, or poorly presented today.

The specific role of value, or a more formal full narrative evaluation or appraisal report, will vary based on the type of investor and investment decision. For example:

Corporate Real Estate Decisions

Corporate sustainable property investment decisions do not typically require or involve a formal full narrative real estate appraisal or valuation report. However, sustainable properties have value beyond reductions in energy, water or maintenance expense. Potential health or productivity benefits, recruiting, employee retention, and reputation value, reductions in liability and regulatory risk, and other benefits of sustainable properties or investment in sustainable property features are important.

Corporate owner/users have many of the same considerations and motivations as investors, however the primary difference is that all of the benefits of energy efficiency, and related higher sustainability ratings, flow directly to the owner/user. Some of these benefits include:

- Energy savings (both in the short- and long-run)
- Better recruiting and retention
- Improved corporate image
- Access to Socially Responsible Investment capital

Investors/Landlords

The majority of commercial and multi-family equity investment decisions are not typically based on a formal full narrative appraisal report, but discounted cash flow analysis and internal rate of return analyses and risk assessments. Because of the reliance on discounted cash flow analysis for decision-making, the important concepts of value can be integrated into investment decision-making, with the key constraint being the availability of data and knowledge of how to effectively do that. Value is explicitly considered in the selection of a residual capitalization rate and discount rates.

Developers

Sustainable investment decisions made by developers are significantly influenced by formal appraisals because appraisals are required for construction and/or permanent take-out loans necessary to move development projects forward. Less formal valuation considerations need to be more rigorously used by developers during the design and “value” engineering process. Developers have the most difficult challenge with valuation

because they are dependent on assessments by third-party valuers hired by capital sources who may not yet have the education and experience to properly value properties with sustainable features.

Lenders

Lenders, particularly if they are federally regulated in the United States, require formal market appraisals prepared by licensed appraisers following the Uniform Standards of Appraisal Practice (USPAP), governed by the Appraisal Foundation prior to originating a commercial mortgage.[37]

Lenders have been slow to recognize the benefits of sustainability and/or energy efficiency in their underwriting practices. Some smaller banks are offering more favorable financing terms for green buildings, including higher LTVs and lower interest rates. Some larger banks are in the process of developing programs that provide some recognition of sustainable property attributes, but both larger and smaller bank lending policies and procedures are undergoing significant change, beyond sustainability, due to current financial market upheavals.

4. Valuers Have the Skills Necessary to Make Significant Contributions to Sustainability

Valuers, underwriters, or brokers, not engineers or architects, are better positioned and trained, and have the requisite skills and experience to judge how space users and investors will respond to a building's sustainable performance (resource use, occupant performance, etc.). In fact, as illustrated in GBFC's Sustainable Property Performance Framework discussed in Chapter IV, valuers and brokers play a critical role because there is no way to assess the financial implications of sustainable property investment without measuring the market's response to a building's sustainable property performance.

For example, once the science is clearly presented about how a sustainable property could affect occupant health, it is up to the valuer, underwriter or broker to judge whether the occupants for a particular subject property will "value" such benefits, and at what level, in the context of the particular types of occupants expected in a building, current market conditions, and the many other factors driving occupant space decisions.

Not only should all certified valuation professionals have the requisite skills to contribute to sustainable property valuation (with appropriate additional education), they will need such skills to value any property in the future. As sustainable attributes and outcomes become more important to regulators, space users and investors, no credible valuation of a non-sustainable property will be possible without consideration of potential sustainability related economic or functional obsolescence. As sustainable considerations increase in prominence, valuer sales comparison analysis, lease/rental comparables analysis,

[37] The Appraisal Foundation has international representation, not purely U.S. direction. Sixty countries support the International Valuation Standards Committee.

operating expense analysis, etc. for non-sustainable properties will have to appropriately consider sustainability.

5. Fundamental Valuation Methodologies Do Not Need to Change

The fundamental approaches to value, in most cases, do not need to change. Fortunately, discounted cash flow analysis (Income Approach) is well suited to deal with the challenges of integrating the new information and "sub-financial" analyses necessary to accurately assess the implications of sustainability on value. Valuers will need to think about the world, and properties a bit differently, but the changes required, while significant, are analogous to changes necessary to deal with globalization, outsourcing, warehousing and industrial sector technology changes, the Internet, significant demographic transformations, and the increased technology component of buildings. For these game-changing trends, valuers just had to get smarter, and do some new types of analysis without changing fundamental methods, and sustainability is no different.

A few areas that need to evolve include building performance measurement, property descriptions (for both subject properties and comparables), and enhanced consideration and presentation of risks.[38]

6. Sustainable Valuation Must Look Beyond Costs

Valuation is critical to sustainable property investment. To date, most sustainable property investment decisions have been based on simple-payback or simple return on investment analyses that factor in development costs and operating cost savings, but fail to properly consider revenue and risk implications. This failure to properly integrate revenue and risk considerations has contributed to bad decisions historically, but with recent (since 2008) dramatic increases in the demand for sustainable/energy efficient properties by regulators, space users and investors, the problem has escalated. Relying on such practices in the future will erode the quality of sustainable property investment decisions further.

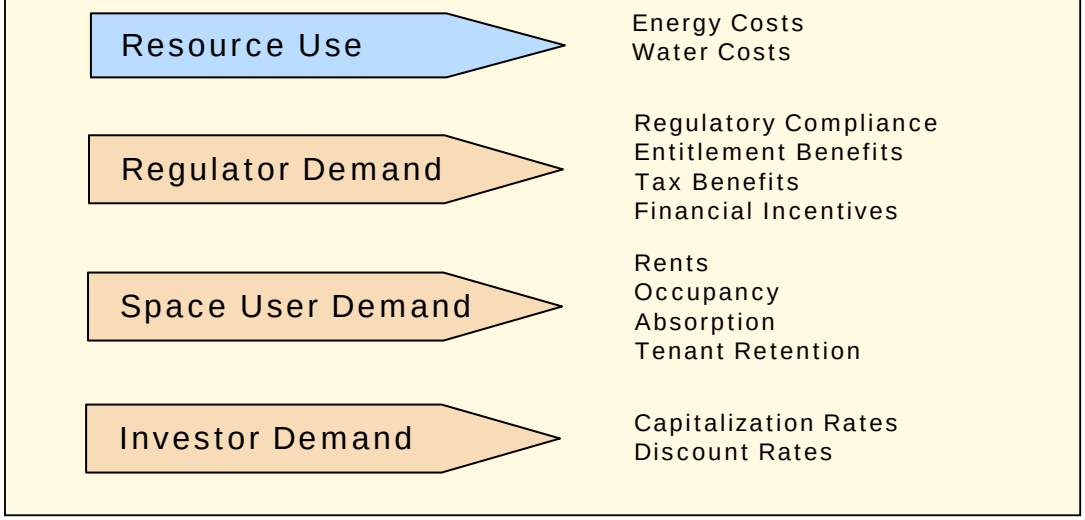
Regulator, space user, and investor demand are critical to value, as discussed throughout *Value Beyond Cost Savings: How to Underwrite Sustainable Properties* and illustrated below in Exhibit V-28. If valuers only consider resource use (energy costs, etc.) and ignore the affect of sustainable property investment on market demand, key value issues affecting entitlements, rents, cap rates and other issues would be ignored. In essence, revenue and risk considerations would not factor into decision-making, a recipe for long-term underperformance.

For example, the benefits of investment in sustainable features that lead to significant energy efficiency extend well beyond energy cost savings to potential increases in tenant demand due to corporate sustainability requirements, the ability to utilize government incentives, the general reduction in the risk of projected cash flows due to reduced energy

[38] It could be argued that these are fundamental changes in methodology, but we see them more as data and presentation issues rather than changes in basic methods.

cost volatility and protection against future government regulatory actions effecting energy efficiency.

Exhibit V-28
Sustainability Demand Affects Value Inputs



The Consortium's mission is to enable private investors to evaluate sustainable properties from a financial/fiduciary basis. Accordingly, *Value Beyond Cost Savings: How to Underwrite Sustainable Properties* focuses primarily on market value:

> The most probable price, as of a specified date, in cash, or in terms equivalent to cash, or in other precisely revealed terms, for which the specified property rights should sell after reasonable exposure in a competitive market under all conditions requisite to a fair sale, with the buyer and seller each acting prudently, knowledgably, and for self-interest, and assuming that neither is under undue duress.[39]

In considering owner-occupant real estate decision-making, the concept of investment value, or worth is appropriate to consider. In such situations, decision-makers are not just considering a property's market value, but the value of the property to their specific enterprise, which may go beyond what typical market participants consider.

7. Public Value Has Increasing Importance to Private Value

Public value has become more valuable to private value because of the increasing demand for sustainability by regulators, space users and investors. The concept is simple—if a building owner can clearly and factually articulate the public benefits that arise from their

[39] *The Appraisal of Real Estate*, 12th Edition, The Appraisal Institute, 2001, page 22

building, they are more likely to convince regulators, tenants and investors to pay for those benefits.

Such "monetization" of public value is created from governments or utility companies through enhanced entitlements/permitting, public grants, favorable financing, tax benefits, and carbon credits or payments, and from private companies through their contribution to Enterprise Value and resulting increases in space user demand. If space user demand increases, private owners can monetize private benefits through rent premiums, faster absorption, higher occupancies, or other direct financial measures.

Sophisticated sustainable property investors and developers will conduct their own detailed assessment of the public benefits of their projects to enable clear articulation to regulators, potential tenants, employees, and capital sources. A starting point for clearly articulating public benefits is to have a framework for thinking through and organizing public benefits analyses. One such framework is outlined in Exhibit V-4 and discussed in more detail in Appendix F.

While the concept of public interest value, and the move for the valuation industry to take a more direct role in assessing public values is important, the key public values for determining private market value are those that can be monetized through government incentives, protection against enhanced competitive response to government regulations, and premiums paid by occupiers and/or investors.

8. The Income Approach is Critical to Understanding Sustainable Property Value[40]

Valuation involves a consideration of three approaches to value: the Income Approach, the Market Approach, and the Cost Approach. Final value opinions reflect the valuer's reconciliation of the three approaches, applying appropriate weighting (consideration) to each approach based on the specific fact and valuation context.

The Income Approach to Value, of which Discounted Cash Flow (DCF) is a primary methodology, is most important in most cases in valuing commercial properties. For properties with sustainable attributes, the income approach offers the best method to factor in the "value" of sustainability because it is based on detailed revenue and expense information, forecasts of performance, and explicitly addresses risk and the timing of expenses and revenues. **More definitively, if one does not at least conceptually understand the DCF methodology, it is difficult if not impossible to accurately assess the financial implications of sustainable property investment**. The DCF methodology forces one to make explicit links between sustainable property performance and financial inputs like rents, and reinforces that such analysis can not be done in isolation of all the other non-sustainable factors that also influence financial inputs, like rents.

[40] These observations are a general discussion of a complex and involved topic. The three approaches to value are for a market value appraisal. There are many other types of value that use different methods and terminology, and terminology will vary by region and country.

The Market, or Sales Comparison Approach, is also important for commercial and multi-family properties. In this methodology, "comparable" sales (to the subject property being valued) are identified, and sales price adjustments are made between the subject and comparables based on a review of their comparability on key issues such as location, zoning, access, size, market quality, property quality, date of sale, etc. The valuer typically makes a series of qualitative adjustments to each variable based on quantitative and qualitative analyses of the subject and comparable sales. The importance of the market approach is enhanced if there are numerous high quality comparable sales in the submarket and high quality data is available on the key attributes of properties that valuers judge are important to sales price.

As of early 2010, the Market Approach has significant limitations in most sustainable property valuations due to a lack of a sufficient number of comparable sales, limitations on the availability of key sustainable property performance data on subjects and comparables, insufficiently detailed property descriptions in sales comparable databases, and the challenges inherent in the broader market due to the reduction in the number of sales transactions and significant value declines (upwards of 50% in many cases) which make date of sale adjustments difficult and sometimes unreliable.

However, the Market, or Sales Comparison Approach, can still provide significant insights into the behavior of regulators, space users, and investors that will provide context for interpreting Income Approach results and determining key financial model inputs. Additionally, the Income Approach also extensively relies upon property market comparisons as a basis for selection of rents, occupancies, absorption, tenant retention and expenses.

The Cost Approach can be important for commercial properties, primarily as a cross check for the Income and Market Approaches. The Cost Approach is typically more reliable with newer properties, where depreciation estimates are more reliable due to the limited passage of time. (In the Cost Approach, the cost to build a new property is adjusted for depreciation). Depreciation, which is calculated by evaluating a property's physical, economic and functional obsolescence can be quite complicated to calculate and involves much of the market, economic and comparables analysis that is done in the other approaches from a different perspective.

For sustainable properties, the cost approach has limitations due to data availability, the difficulty of properly incorporating positive functional and economic obsolescence, and other factors. In particular, in the corporate world real estate assets are often booked at cost, which will typically under-value sustainable properties and features, often negatively affecting the proper allocation of capital to sustainable improvements.

9. Valuers Need to Get Better at Integrating Risk Analysis into Value

Valuers have historically done a poor job of analyzing and presenting their assessment of how property risk affects property value. In formal full narrative valuations, where a

complete DCF is implemented, valuer's assessment of risk is largely reflected in their selection of discount and residual capitalization (cap) rates.[41] Valuer's selection of discount and cap rates is primarily based on their assessment of the returns required by investors to invest in a particular property. Generally, the assessment of risks is not well presented, with a focus on the source of market rates. When market data on required capitalization and discount rates is limited, valuers do more work to assess and present potential risks and "build-up" likely discount rates.

Because so many sustainable property investment decisions are not based on formal full narrative valuations, but on internal rates of return, simple payback analysis, and other types of financial analyses, where risk and related value considerations are often not well presented, valuers that want to assist decision-makers when completing less formal valuation work need to do a more rigorous and logically presented assessment of risks. Valuers are further compelled to more thoroughly understand risk issues because sustainable property valuation issues are largely tied to risk considerations (see 40-page GBFC Costs and Benefits Checklist in Appendix G).

While valuers need to do a better job, investors and lenders have even more compelling reasons to improve their practices as discussed in the Risk Analysis and Presentation section of this Chapter. Valuers need to be aware of the potential valuation affects of enhanced risk consideration by investors as the industry matures.

10. Performance Measurement Is Key to Sustainable Property Performance

Valuation quality is significantly influenced by the access to proper data that is consistently available for both the subject property and comparables. For sustainable properties, property information from the subject and comparables has to be sufficiently detailed in the areas of property descriptions, resource use, occupant satisfaction, and select other areas to enable valuers to properly adjust sales and lease comparables to reflect the value of sustainable attributes.

As discussed in depth in Chapter IV, Section F., valuers need to improve their assessment of the market response to sustainable building performance. Better data and methods are needed to consistently measure regulator, space user and investor demand.

11. Energy is a More Critical Issue for Sustainable Property Valuation

Energy/Carbon reduction is more critical to sustainable property value because of the substantial projected energy savings of many sustainable properties and the growing importance of the value of energy/carbon reduction investment beyond its operating cost savings.

[41] In a ten-year DCF analysis, capitalization rates are typically applied to 11th year Net Operating Income to estimate a residual sales price, which is then discounted back to the present along with the Net Operating Incomes from years 1-10 to get a present value.

Many sustainable properties project energy savings of 30% or substantially more. The cost savings alone from a 30% reduction in energy costs can result in 2+% increase in value. Accordingly, since such savings can not be verified by historic energy use data for similar (non-sustainable buildings) or traditional rules of thumb, valuers need to apply more due diligence to such estimates than they have in the past. In Chapter VI, Section E, we present an entire section on underwriting energy/carbon reduction investment that focuses on assessing the reliability and accuracy of forecasts.

More important than costs is the critical role that reduced energy/carbon use has in achieving environmental certifications and meeting growing space user and investor thresholds for minimum energy/carbon efficiency. It is important to understand that while energy/carbon efficiency may contribute significantly to value, the value loss due to obsolescence (because property does not meet current market standards) will be limited and affected by the cost to cure such obsolescence.

J. Conclusions

Sustainable property financial modeling and analysis presents challenges in integrating qualitative costs and benefits information into more quantitative financial decision-making measures like value and rates of return. Fortunately, traditional discounted cash flow analysis, widely used and understood in the real estate industry, provides an excellent framework for conducting this analysis.

Appendix V-A

Sustainable Property Financial Analysis Alternatives

A. Traditional Sustainability Financial Analyses[42]

1. Simple Payback
2. Simple Return on Investment (ROI)
3. Simple Change in Asset Value: Direct Capitalization (CAV-DC)
4. Simple ROI and General Cost-Benefit Analysis
5. Life Cycle Costing (LCC)
6. Value Engineering
7. ENERGY STAR Building Upgrade Value Calculator for Office Properties
8. ENERGY STAR Cash Flow Opportunity
9. Life Cycle Assessment (LCA)
10. Post Occupancy Analyses (POE)

B. Traditional Real Estate Financial Analyses[43]

1. Cost Management
2. Discounted Cash Flow Analysis (DCF)
   - Change in Asset Value
   - Net Present Value
   - Internal Rate of Return
3. After Tax Cash Flow Analyses
4. Valuation
5. Total Occupancy Cost (Cost of Ownership) Analysis
6. Economic Value Added

[42] These models and analysis are those that have traditionally been used in the real estate industry to make energy efficiency/sustainability investment decisions for buildings, features, and equipment.

[43] Traditional real estate financial analyses are integrated models that endeavor to incorporate comprehensive cost, benefit, and risk information to generate return/value results based on specification of financial model inputs such as energy costs, rents, occupancy, tenant retention, discount rates, etc.

Appendix V-A

Sustainable Property Financial Analysis Alternatives

C. Sustainability Sub-Financial Analyses[44]
1. Comparative First Cost Analysis 2. DCF Lease-Based Cost-Benefit Allocation Models 3. Sustainability Options Analysis 4. Churn Cost Savings Analysis 5. Productivity Benefits Analysis 6. Health Cost Savings Analysis 7. Government/Utility Incentives and Rebates Analysis 8. Enterprise Value Analysis 9. ENERGY STAR Financial Value Calculator 10. Risk Analysis and Presentation (RAP)
D. Public Sustainable Benefits Analyses[45]
1. Reduced Infrastructure Costs 2. Environmental & Resource Conservation Benefits 3. Land-Use Benefits 4. Reduced Climate Change 5. Economic Benefits 6. Security Benefits

[44] Sustainability Sub-Financial Analyses are those analyses and models that provide quantitative insight/data that is typically combined with other information and analyses to aid the valuer/financial analysts in their specification of key financial assumptions in a discounted cash flow (DCF) analysis or related model. Key financial assumptions include rent, rent growth, occupancy, absorption, tenant retention, operating costs, etc. These type of analyses are done for every DCF analysis, but the analyses in this list are a selection of some of the specialized analyses that have been developed in recent years to aid in the financial analysis of sustainable property investment.

[45] Financial analyses used to quantify potential public sector benefits. These analyses contribute to private value through the potential ability to negotiate payment for public value. Such "monetization" of public value is created through enhanced entitlement/permitting benefits and related public grants, financing, or other incentives. This category is focused on those financial analyses resulting in public benefits from private sector buildings.

Appendix V-A
Sustainable Property Financial Analysis Alternatives

Analysis/Model	Description/Commentary	Key Links/Examples
A. Traditional Sustainability Financial Analysis		
1. Simple Payback Period (SPP)	As an example, we present the Simple Payback Period method of evaluating an energy investment. In simple terms, the SSP model considers the length of time that it will take for the investor to receive benefits equal to the costs of the initial investment. SPP = ICC/S Where S = (AES x EC) – AOC + ROC SPP = Simple Payback Period (years) ICC = Initial Capital Costs (dollars) S = Net Annual Energy Savings (dollars) AES = Annual Energy Savings (kBtu) EC = Energy Costs (dollars/kBtu) AOC = Additional Operating Costs (dollars) ROC + Reduced Operating Costs (dollars) As its name implies, the SPP approach is intended to provide a simple evaluation of an investment without the need for refined data or detailed assumptions. It is easily applied and generally appropriate for investments that are relatively small in scale and that involve technologies with a track record that allows for reasonably accurate estimates of the cost to implement and reasonably accurate estimates of energy cost savings. The SPP metric does not take into account the time value of money, that is, discounting of the future benefits.[46] As presented here, the SPP does take into consideration additional or reduced operating costs that may result from the implementation of the energy efficiency upgrade. For example, a new energy-saving device may require annual maintenance costs that were not previously required, hence the energy cost savings must be offset by this additional cost, at least in the short run. Alternatively, for example, if lamps/light bulbs need to be replaced much less frequently, maintenance (operating) costs would be reduced.	**US Department of Energy**: Perhaps the most comprehensive listing of links to specialized feature or system based financial analyses using a combination of Life Cycle Costing, Simple ROI, Simple Payback and related financial models is shown on the US Department of Energy's Energy Efficiency and Renewable Energy Building Technologies Program Tools website: http://apps1.eere.energy.gov/buildings/tools_directory/subjects_sub.cfm . **Whole Building Design Guide Tools**: The Whole Building Design Guide Tool's website presents hundreds of financial analyses and models. http://www.wbdg.org/tools/tools.php **ASTM International Standards on Building Economics:** ASTM Committee EO6 on Performance of Buildings has jurisdiction over E06-81: Building Economics. They publish 25 detailed technical publications on the financial models and analyses of Building Economics including LCA calculations, net benefits, internal rate of return, and many other analyses. Each of these reports carries a price tag of $30 to $50 dollars. http://www.astm.org/COMMIT/SUBCOMMIT/E0681.htm **GreenandSave.com's Master ROI Table** provides an example of the results of simple payback and ROI models. http://www.greenandsave.com/master_roi_table.html

[46] The Royal Institute of Chartered Surveyors "Energy Appraisal of Existing Buildings – a Handbook for Surveyors" makes reference to a Discounted Payback metric which is the same as the SPP but utilizes the present value of each of the Net Annual Energy Savings over the relevant period.

Appendix V-A

Sustainable Property Financial Analysis Alternatives

Analysis/Model	Description/Commentary	Key Links/Examples
2. Simple Return on Investment (ROI)	The Return on Investment metric is another relatively simple measure that considers the energy savings in relation to the initial investment.[47] It presumes that the benefits are ongoing and permanent. ROI = (S / ICC) x 100 Where ROI = Return on Investment (percent) ICC = Initial Capital Costs (dollars) S = Net Annual Energy Savings (dollars) The ROI is the inverse of the SPP, and therefore requires the exact same inputs with the same limitations and will have similar applicability. Given its relative simplicity, it is generally appropriate for investments that are relatively small in scale and that involve technologies with a track record that allows for reasonably accurate estimates of the cost to implement and reasonably accurate estimates of energy cost savings. As generally applied, the investment decision will be accepted if the ROI exceeds an internally established threshold such as the company's cost of capital or return on other competing investments.	See links for Simple Payback Period identified above and more listed in text of Chapter.
3. Simple Change in Asset Value: Direct Capitalization (CAV-DC)	Another method of evaluating energy investment decisions is to consider the impact on property value that the investment will have by applying a direct capitalization approach. As generally applied, this approach capitalizes the change in NOI resulting from the Net Annual Energy Savings and compares it to the Initial Capital Cost as follows: Asset Valuation: Direct Capitalization = S/R0 - ICC Where S = Net Annual Energy Savings (dollars) R0 = Going In Capitalization Rate (percent) ICC = Initial Capital Costs (dollars) S = (AES x EC) – AOC + ROC AES = Annual Energy Savings (kBtu) EC = Energy Costs (dollars/kBtu) AOC = Additional Operating Costs (dollars)	

[47] This metric is referred to as the Accounting Rate of Return in the Royal Institute of Chartered Surveyors "Energy Appraisal of Existing Buildings – a Handbook for Surveyors".

Analysis/Model	Description/Commentary	Key Links/Examples
	ROC + Reduced Operating Costs (dollars) This metric presumes that the benefits are ongoing and permanent. Similar to the metrics discussed above, this metric is considered "simple" because it does not take into consideration the time value of money nor does it consider changes in future energy costs, or in most cases, as used, potential non-cost related benefits of energy/carbon reduction. An advantage is that it incorporates at least some of the elements of change in property value through changes in NOI, to the extent that the decision-maker is able to determine all of the impacts on NOI. If the increase in property value resulting from the investment exceeds the Initial Capital Cost, the metric is greater than zero, and would suggest a positive investment decision.	
4. Simple ROI and General Cost-Benefit Analyses	As discussed above, simple ROI provides an analysis of the simple return of an initial capital investment based on the cost savings, presuming the cost savings continues indefinitely. For decisions where the Simple Return on Investment is high, and accordingly the Simple Payback time period would be short, nothing else is typically necessary to support the decision. However, as payback periods get longer, and capital investments become greater, some investors have been supplementing simple ROI or Simple Pay-Back analyses with a summary of their a project's other potential benefits. As a starting point, general Cost-Benefit Analysis should include a discussion of potential productivity or health cost saving benefits, potential churn cost savings, recruiting or employee retention benefits for space users, and a general reduction in litigation risk, energy cost volatility, regulatory risk, exit risk and other issues. The effectiveness of the additional Cost-Benefit Analysis will be based on how it is articulated. For a specific property-level decision, the discussion of potential benefits needs to be property specific. An assessment of potential productivity benefits needs to address the specific evidence for productivity benefits for the types of occupants, and an assessment of how such occupants will value such potential benefits. The more detail that can be provided to give decision-makers some idea of the magnitude and direct applicability of a potential benefit for a specific property will be very beneficial. To date, this type of detailed property-specific analysis is in its	General industry cost-benefit studies can be found in the Research Library and Industry Resources links section of the Green Building Finance Consortium website (index code 3.0), Sections D. and E. in Chapter IV also provide a detailed evaluation of sustainable property costs-benefits and guidance on assessing their applicability to specific sustainable property processes and features.

Analysis/Model	Description/Commentary	Key Links/Examples
	infancy. At its best, the Simple ROI and general articulation of the Cost-Benefit Analysis can be quite powerful, even if more precise financial analysis (see Steps 4 and 5 in Chapter V, Sections F and G.) is required to truly understand the financial implications of sustainable investment. As discussed in detail in Chapter V, true understanding of potential implications of sustainability on financial performance requires specific translation of how potential costs and benefits affect DCF input assumptions like rent, vacancy, and tenant retention. Perhaps most importantly, the most successful articulation of a Cost-Benefit analysis will not just speak to benefits, but also address the specific risks and/or additional costs, and provide a discussion and articulation of potential ways the risks have been mitigated, or that the pricing has appropriately addressed the additional risks.	
5. Life Cycle Cost Analysis (LCC)	Life Cycle Cost Analysis (LCC) takes into account all of the costs of acquiring, operating/maintaining and disposing of a building or building system. LCC can be used to make decisions about whether an investment in a particular system has a positive net present value, but its primary purpose is for comparing building feature alternatives (with different initial costs and operating savings) to determine the alternative that maximizes net costs savings. LCC is considered a more rigorous analysis than either Simple Payback or Simple ROI calculations because it relies on a present value methodology, which considers variable cost savings over time and incorporates the investor's cost of capital through the choice of discount rate. Alternatively, Simple Payback and Simple ROI calculations only consider initial costs and a single year of costs savings. The following is a good description of life-cycle costing: "Life-cycle costing accounts for factors beyond initial design and construction cost of a building and includes costs that occur during the operational phase (e.g. energy, water, maintenance) as well as future costs (e.g. floor or siding replacement, final disposal/recycling of materials). For example, energy-efficient windows may cost more upfront, but reduce monthly energy bills down the road. Unlike traditional costing, life cycle costing takes into account the benefits associated with these future cost savings which offset, at least in part, the incremental purchase cost of better windows. Of course, future costs and savings must be adjusted to their equivalent value today (i.e. their 'present value'). Such discounting procedures provide for the expression of cost	See, "A Business Case for Green Buildings in Canada," Morrison Hershfield, Mark Lucuik et al, March 31, 2005, pp. 21-22. http://www.cagbc.org/resources/market_value/articles105.htm The Whole Building Design Guide (WBDG) website contains a 10 page, detailed description of how to implement a Life Cycle Cost Analysis and has a variety of helpful links on the subject. http://www.wbdg.org/resources/lcca.php "Life Cycle Costing for Facilities," (Stephen J. Kirk & Alphonse Dell'Isola – 2003), published by RS Means can be purchased for $99.95. This useful guide provides a number of examples of how LCC can work for a wide variety of projects including several types of buildings, to roads & bridges, to HVAC and electrical upgrades, to materials and equipment procurement: http://www.rsmeans.com/bookstore/detail.asp?sku=67341 "Whole-life costing: risk and risk responses" is another book that offers a thorough grounding in both the theory and practical application of WLCC. Practical frameworks

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	streams over time on a consistent basis, and allow for meaningful cost comparisons among different projects or building approaches." ["The Costs & Benefits of Green Affordable Housing," New Ecology Inc., William Bradshaw et al, 2005, pg 35].	both for assessing whole life risks and risk responses, as well as guidance on developing WLCC budget estimates are also developed. By Halim A. Boussabaine, Richard L. Kirkham, Published by Wiley-Blackwell, 2004 ISBN 1405107863, 9781405107860 http://books.google.com/books?id=HAu8HdFGfTsC **The International Initiative for a Sustainable Built Environment LCA Tools:** The iiSBE has developed a set of methods and tools for Life Cycle Assessment Analysis. http://www.iisbe.org/annex31/core_reports.htm The International Initiative for a Sustainable Built Environment (iiSBE) is an International Non-Profit Organization whose overall aim is to actively facilitate and promote the adoption of policies, methods, and tools to accelerate the movement towards a global sustainable built environment.
6. Value Engineering	"Synonymous with the terms value management and value analysis, value engineering is a professionally applied, function oriented, systematic team approach used to analyze and improve value in a product, facility design, system or service—a powerful methodology for solving problems and/or reducing costs while improving performance/quality requirements." http://www.value-eng.org/. "Value engineering (VE) is a systematic method to improve the 'value' of goods or products and services by using an examination of function. Value, as defined, is the ratio of function to cost. Value can therefore be increased by either improving the function or reducing the cost. It is a primary tenet of value engineering that basic functions be preserved and not be reduced as a consequence of pursuing value improvements." (Lawrence D. Miles Value Engineering Reference Center: Wendt Library, Wikipedia). As clearly implied by the definitions above, value engineering is a broad field of study covering much more than the real estate industry. Value engineering, or value management, has evolved to be applied in many strategic situations and at its most sophisticated level involves a process	Some examples of poorly implemented value engineering, and the implications, are shown in an article by Don Proctor in the Fall 2008 issue of the TIAC Times: http://tiactimes.com/magazine/article/_Value_engineering_means_poor_economic_return.html Additional resources and information are available at the SAVE International website. SAVE International is an international society devoted to the advancement and promotion of the value methodology (also called value engineering, value analysis, or value management). SAVE International's knowledge bank is an excellent searchable research database on the topics of value engineering and related issues. http://www.value-eng.org/ An article by Stephen J. Kirk, Ph.D., FAIA, FSAVE, CVS, LEED AP and Alphonse J. Dell'Isola, PE, HRICS, FSAVE, CVS called "Sustainability/LEED and Life Cycle Costing—Their Role in Value-based Decision Making," provides

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	that includes an orientation and diagnosis phase, a workshop phase, and an implementation phase. Regardless of the particular industry segment, well-executed value engineering follows a structured process, and perhaps is most valuable if sufficient time is spent (during the workshop phase) to fully understand and define "value" from the perspectives of the different participants in a project. In many ways, this "workshop phase" is similar to the "Charette" that is a critical part of the integrated design process. Value engineering is meant to be a systematic process following a multi-stage Job Plan, including steps such as • preparation • information • analysis • creation • evaluation • development • presentation • follow-up. Value engineering is a financial analysis process, but relies upon simple payback, simple return on investment, and life cycle costing financial analyses to answer the questions that arise as part of the VE process. Unfortunately, in the real estate and construction sector, value engineering has become synonymous with "cost cutting." Rather than employ the more sophisticated process of value engineering, value engineers are typically brought in late in a project where budgets have been blown and short-term cost cutting is the requirement. Accordingly, particularly with developers who will not hold the project property long term, "value engineering" decisions are made based on simple payback or an initial comparative cost basis, ignoring the longer term value that can be generated through operating cost, or replacement cost savings. Fundamentally, value engineering as currently practiced does not take into consideration all the value and risk implications of sustainable property investment. Even if it is done correctly, it utilizes life cycle costing as its primary financial analysis vehicle, and thus does not take into consideration any value considerations beyond cost. That said, if sufficient time is spent up front during the workshop or Charette phase, and a thorough understanding of what "value" will mean for the occupants of the building or potential investors is undertaken, a more thorough consideration of value	some interesting examples of the application of life cycle costing in a value framework. http://www.value-eng.org/knowledge_bank/dbsearch.php?c=view&id=67&ref=dbsearch.php%3Fc%3Dquery%26category%3D%26keywords%3Dsustainable+buildings%26match%3Dall%26pg%3D1 In "A Reappraisal of Value Methodologies In Construction," Steven Male and John Kelly provide an interesting history on the development of value management practices throughout the world since 1940 and provides some insights and examples of more sophisticated value engineering applications. http://www.value-eng.org/knowledge_bank/dbsearch.php?c=view&id=69&ref=dbsearch.php%3Fc%3Dquery%26category%3D%26keywords%3Dvalue+engineering+%26match%3Dall%26pg%3D2 In the article "It's In the Details, Engineering for Low Cost and High Efficiency," Jeff Stein and Steven Taylor provide an interesting assessment of the Electronic Arts phase 2 building in Palo Alto and the application of value engineering and detailed coordination to improve the engineering, cost and functionality of the building. http://www.taylor-engineering.com/downloads/articles/ASHRAE%20Journal%20-%20Electronic%20Arts%20Technology%20Award-Stein%20&%20Taylor.pdf Wikipedia's definition of Value Engineering is also pretty good. http://en.wikipedia.org/wiki/Value_engineering Significant additional detail from the Research Collections of Lawrence D. Miles, one of the founders of Value Engineering as a profession are available at: http://wendt.library.wisc.edu/miles/index.html

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	implications could be applied in the determination of the value standards on which cost based value engineering would be implemented.	
7. ENERGY STAR Building Upgrade Value Calculator for Office Properties	The Building Upgrade Value Calculator estimates the financial impact of proposed investments in energy efficiency in office properties. The user, representing scenarios and conditions present at their properties, bases the calculations on data input. Required inputs are limited to general characteristics of the building, plus information on the proposed investments in energy efficiency upgrades. The calculator's analysis includes the following information: • Net investment • Reduction in operating expense • Energy savings • Return on investment (ROI) • Internal rate of return (IRR) • Net present value (NPV) • Net operating income (NOI) • Impact on asset value In addition to the above outputs, the calculator also estimates the impact the proposed changes will have on a property's ENERGY STAR rating. The tool provides two ways to use its calculations: users can save and print a summary of their results, or generate a letter that highlights the financial value for use as part of a capital investment proposal.	This tool provides a combination of the metrics identified in the Description/Commentary section and can be found on the EPA's ENERGY STAR website at: http://www.energystar.gov/index.cfm?c=comm_real_estate.building_upgrade_value_calculator
8. ENERGY STAR Cash Flow Opportunity	ENERGY STAR's Cash Flow Opportunity (CFO) calculator is designed to help decision-makers address three questions when evaluating energy efficiency projects: How much new energy efficiency equipment can be purchased from the anticipated savings? In other words, how much equipment could be installed without increasing existing capital or operating budgets? CFO results are based on the energy performance of existing buildings, and an estimate of energy savings. Given financing terms and an assumption about the percent of energy savings to be allocated to the energy investments, the	A link to ENERGY STAR's Cash Flow Opportunity Calculator can be found under the Financial Evaluation heading on the following webpage: http://www.energystar.gov/index.cfm?c=tools_resources.bus_energy_management_tools_resources

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	spreadsheet works as a "reverse financial calculator" to determine the amount of equipment that could be financed with the future energy savings. Should the equipment purchase be financed now or is it better to wait and use cash from a future budget? Using a 12-year DCF model, the calculator determines which of two options results in the higher present value – Option A: installing today using financing or Option B: deferring the installation until funding becomes available in a future budget. Is money being lost by waiting for a lower interest rate? The calculator provides an analysis of the quantitative trade-off between waiting for more favorable financing terms and foregoing energy cost savings. The first tool is actually just another way of looking at either an NPV or IRR metric, relating future cash flows to current investment, except with the twist that only a portion of the energy cost savings are allocated to paying for the energy investments. ENERGY STAR makes two very important observations: 1) that an investor working with an Energy Services and Products Provider (also known as Energy Service Companies or ESCOs) may be able to obtain a guarantee that energy savings will be realized and 2) an investment grade energy audit, conducted by a qualified engineering company, will be necessary to determine the actual opportunity for energy savings.	
9. Life Cycle Assessment (LCA)	"A full building Life Cycle Assessment can be used to develop the typical production and potential reductions of greenhouse gas emissions related to buildings. LCA is a compilation and evaluation of the inputs, outputs and the potential environmental impacts of a product system throughout its life cycle. From a building perspective, LCA quantifies the environmental effects of the building materials, its operation, and its demolition (i.e. cradle to grave analysis)." LCA analysis, while inherently complicated given the long material and buildings lives, and the difficulty in data collection and quantification, is becoming more important as carbon reduction has become more important, and the high level "embodied" energy of products/materials has become better known.[Description of LCA as adapted from "A Business Case for Green Buildings in Canada," Morrison Hershfield, Mark Lucuik et al, March 31, 2005, pg. 14.]	This site has a full range of LCA tools, case studies, software offerings etc.http://buildlca.rmit.edu.au/links.html The ATHENA Impact Estimator can be used for evaluating whole buildings and assemblies based on internationally recognized life cycle assessment (LCA) methodology: http://www.athenasmi.org/tools/impactEstimator/index.html The German Green Building Council is extending the LCA methodology. Under current plans, the "German LEED" will feature two elements unique to the current LEED system: a manufacturer-supplied life-cycle assessment of all building products based on Environmental Product Declarations, EPD (ISO 14025 and ISO 21930) and a

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	A paper by Thomas Lutzkendorf and David Lorenz, two world leaders in thinking through, and writing about, the relationship between sustainability and value: "Sustainable property investment: valuing sustainable buildings through property performance assessment" published in Building Research & Information (2005) provides some analysis of Life Cycle Assessment and Life Cycle Costing: "L/C calculations usually consist of the following elements: • initial capital cost for design and construction or acquisition • management and operating costs • costs for maintenance and renovation • costs incurred or benefited from the building's disposal Recently, however, attempts are being made also to include the income generated by the property within the calculation. An ISO Standard Under Development currently investigates these issues (ISO DIS 15686-5, 2004d)." "But LLC techniques have several limitations that have to be understood in order to interpret the results. For example, it is very difficult to estimate future maintenance and operation costs. Observation and longitudinal evidence are also needed to determine the life of building materials and components. Furthermore, very few owners pay all the costs of the acquisition and ownership of a building and therefore regard some costs more important than others." "Usually LCA examines energy and mass flows in order to provide information on resource consumption and determine the origin of harmful environmental loads which have potential effects on global warming, acidification, ozone depletion, biodiversity, eco-toxicity, human toxicity and on occupational and living health. There are now a number of LCA-based assessment methods and tools that have emerged worldwide, e.g. BREEAM and ENVEST (UK), Eco-Quantum (the Netherlands), Okoprofil (Norway), ESCALE (France), SimaPro (the Netherlands), etc. But most of these tools assess buildings after they are designed and do not account for future life cycle costs of the building. Due to the complexity of integrating LCA and LCC methodology, only a few tools exist that allow for a combined determination and assessment of cost, environmental and occupational health issues in the planning phase. The basic goal of these combined assessment approaches is to allow professionals to appreciate a design or	"transparency" feature that will require certified buildings to estimate all life-cycle costs for building operations, including energy, water and cleaning costs. This moves beyond the "snapshot" requirements of the LEED system, to more of a "movie" of long-term building operations. http://www.greenbuildconsult.com/blog/comments/german-green-building-council-advances-with-life-cycle-assessment-tools-for/

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	building solution simultaneously form different points of view and within different life cycle scenarios. First examples of combined tools are LEGOE/LEGEP (Germany) and OGIP (Switzerland). For a detailed description of approaches for an 'integrated life-cycle analysis', see Kohler and Lützkendorf (2002). The software BEES, a building materials selection tool developed by the US Government's National Institute of Standards and Technology (NIST), allows measuring environmental and cost performance of single building products. One major problem, however, associated with combined or/and mere LCA-based assessment approaches is the lack of standardization in terms of scope, definition of performance indicators and weighting of different environmental aspects (Todd et al., 2001). While current assessment schemes take the issue of occupant health into consideration, there is less focus on occupant satisfaction, functional fit and productivity. They do not provide information on what kind of building solutions work besting practice and why. This is the goal of POE."	
10. Post Occupancy Evaluation (POE)	Post-Occupancy Evaluation (POE) is the general term for a broad range of activities aimed at understanding how buildings perform once they are built and how satisfied building users are with the environment that has been created. There is no industry-accepted definition of POE and there are many different terms in use, such as environmental design audits, building-in-use evaluations, post-occupancy assessment, facility assessment and building performance evaluations. ["A Market-Friendly Post-Occupancy Evaluation: Building Performance Report," New Buildings Institute, David Hewitt et al., March 17, 2005.] Thomas Lützkendorf and David Lorenz also discussed POEs in their paper: "Sustainable property investment: valuing sustainable buildings through property performance assessment" published in *Building Research & Information* (2005) p: "POE can be characterized (at least in theory) as follows: • design aid: as a means of improving building procurement, particularly through 'feed-forward' into briefing • management aid: as a 'geed-back' method for measuring building performance, particularly in relation to organizational efficiency and business productivity • benchmarking aid for sustainable development: for measuring progress	For a sample POE, see "A Market-Friendly Post-Occupancy Evaluation: Building Performance Report," New Buildings Institute, David Hewitt et al. March 17, 2005: http://www.newbuildings.org/downloads/papers/FinalReport-BPR_ContractC10091_.pdf ASHRAE has been working on Performance Measurement Protocols for Commercial Buildings, which provide some structure for POEs. http://www.greenbuildingfc.com/Home/DocumentDetails.aspx?id=1101 The New Building Institute has addressed this issue with their: A Market Friendly Post Occupancy Evaluation. http://www.greenbuildingfc.com/Home/DocumentDetails.aspx?id=957

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	in the transition towards sustainable production and consumption of the built environment (Cooper, 2001) Although the use of POE is widely advocated as best practice in guides to construction and facility management, POEs are far from being a 'mainstream' activity within the construction and property sector. The Probe studies are one of the first systematic and rigorous attempts to investigate the performance of buildings, modern workplace environments and their occupant's responses (Bordass et al., 1999). They gave valuable insights into the functioning and performance of buildings and led to the identification of four 'killer variables' that positively correlate with occupant's comfort, satisfaction and perceived productivity (Leaman and Bordass, 1999): • personal control: occupants' perception of control over their workplace environment (i.e. heating, cooling, lighting, ventilation and noise) • responsiveness: the building's capability to meet occupants' needs very rapidly either in anticipation or as they arise (e.g. adaptability of spaces to accommodate change, speed of response to complaints by the facilities management, etc.) • building depth: the building's depth of space (a depth of about 12m across the building seems optimal for human performance; the deeper the building gets, overall satisfaction and productivity tend to go down) • workgroups: relates to room size and workspace organization; productivity is higher in smaller (less than four people) and more integrated workgroups"	
B. Traditional Real Estate Financial Models		
1. Cost Management	Cost management is a Traditional Real Estate Financial Analyses that is not an integrated model incorporating all costs, revenues and other risks, but rather a set of analytical models focused on providing investors with the tools to identify and manage cost issues that could impair successful outcomes. Cost benchmarking, cost planning, procurement policies, and other analyses focus on assisting decision-makers to get the best possible outcomes for the least cost. Sophisticated cost management that provides proper coordination, guidance, and management of expected outcomes, can provide particular dividends for sustainable investment, with the myriad of choices and optional outcomes that can be specified at the initiation of a project.	

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2. Discounted Cash Flow Analysis – Change in Asset Value	This approach considers the impact on value that the investment will have utilizing the discounted cash flow (DCF) approach to value as opposed to the direct capitalization approach. This method takes into consideration the benefits of the energy investment over a 10-year holding period, including the annual energy savings and the incremental property value that results from the energy savings at the end of the holding period (net of selling costs). Change in Asset Valuation: Discounted Cash Flow = DCF Value – ICC Where DCF Value = f (S1…S10, RT, RDISC, SCOST) S1…S10 = present and future Net Annual Energy Savings (dollars) RT = Terminal Capitalization Rate (percent) RDISC = Discount Rate (percent) SCOST = Selling Costs (percent) ICC = Initial Capital Costs (dollars) This metric takes into consideration both the time value of money and changes in future energy prices and presumes that the benefits are ongoing and permanent. Similar to the Simple Direct Cap valuation measure, the CAV-DCF has the advantage of incorporating at least some of the elements of change in property value through changes in NOI. CAV-DCF is therefore a more robust measure of the merits of the energy investment than the simple change in Asset Value discussion above in Section A.3,, applicable to higher-ICC investments or where there are data uncertainties surrounding ICC or cost savings. It is particularly appropriate in its more expanded application, where the investment has measurable impacts on other valuation components.	
3. Discounted Cash Flow Analysis – Net	The Net Present Value (NPV) metric is analogous to the DCF technique except that it focuses only on the energy savings over the expected useful	

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Present Value	life of the investment and does not take into consideration the impacts on property value. NPV = DCF Energy Savings – ICC Where DCF Energy Savings = f (S1…S10, RDISC) S1…S10 = present and future Net Annual Energy Savings (dollars) RDISC = Discount Rate (percent) ICC = Initial Capital Costs (dollars) This approach takes into consideration both the time value of money and changes in future energy prices. Since it assumes a fixed time period over which benefits are realized, it is applicable to less durable investments. For such investments, it is a robust measure and applicable to higher-ICC investments or where there are data uncertainties surrounding ICC or cost savings. As generally applied, if the NPV metric is greater than zero, the decision is accepted.	
4. Discounted Cash Flow Analysis – Internal Rate of Return	As is the case with most underwriting analysis, the NPV and IRR metrics are two sides of the same coin. If the NPV is greater than zero, then the IRR exceeds the discount rate hurdle. If the IRR exceeds the discount rate hurdle, the NPV is greater than zero. The IRR calculation is based on the same cash flow projections as the NPV analysis and determines the IRR that equates to an NPV of zero. IRR = f (S1…S10, ICC) Where IRR = Internal Rate of Return (percent) S1…S10 = present and future Net Annual Energy Savings	

Analysis/Model	Description/Commentary	Key Links/Examples
	(dollars) ICC = Initial Capital Costs (dollars) This approach takes into consideration both the time value of money and changes in future energy prices. It can be applied solely to the annual energy savings over the expected useful life of the investment, or it can also include the anticipated change in property value and net sales proceeds at the end of the holding period. When analyzing investments with limited durations, this metric will have similar applicability as the NPV metric and is a robust measure, applicable to higher-ICC investments or where there are data uncertainties surrounding ICC or cost savings. When the IRR metric is applied to investments with ongoing, permanent benefits, it becomes a robust measure of the merits of the investment, including changes in property valuation. It then becomes analogous to looking at the CAV-DCF metric and solving the same equation for a different variable – the IRR. Importantly, this model, when implemented for a real estate property investment, enables direct consideration of the impacts of sustainable investment on revenues and risk, in addition to costs, and thus is the basis of the financial methodology presented in Chapter IV. As generally applied, the decision will be accepted if the IRR exceeds an internally established threshold such as the company's cost of capital or return on other competing investments.	
5. After-Tax Cash Flow Analysis	After-tax cash flow is just an extension of the DCF analysis that incorporates tax consequences. Because of the individual and often temporary nature and complexity of tax analysis, valuation professionals and financial analysts typically evaluate properties on a before-tax basis. However, given the substantial tax advantages available to sustainable properties from many levels of government, after-tax analysis can be important considerations in making go-no go decisions on sustainable property investment, particularly for specific decisions regarding renewable energy investment or other energy efficiency investments.	See discussion and sample model framework in section G of Chapter V. and in Expanded Chapter V, Appendix V-D.

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6. Total Occupancy Cost Analysis	For space users—both corporate owner occupants or tenants—real estate decisions are based on a full consideration of occupancy cost, of which the cost of the real estate, or rent, is only one component. In fact, according to Ryan Morris in his article "Occupancy Cost Managers Examine More Than Rent," rent is no longer the major component of occupancy costs. Today, most such costs are outside of the lease parameters. Current percentages of the total occupancy cost are work environment (70%), technical infrastructure (22%) and real estate (8%).[48] Some of the key considerations to include in a total occupancy cost analysis are: • Rent • Operating expenses • Taxes • Insurance • Amortization of buildout • Commissions • Telephone/electrical/data • Lights • Signage • Moving costs • Telecom equipment • Furniture and equipment • Security systems Additionally, sophisticated models need to include assessments of things like churn costs, tenant turnover and retention, infrastructure support costs, transactions costs, and other less direct costs. The IPD International Total Occupancy Cost Code has categorized occupancy costs into five broad categories (IPD 2001): 1. Real estate occupation costs	Measuring the Added Value of Corporate Real Estate Management-- Beyond Cost Minimization is a good overview article and model for the types of non-cost factors that are critical to corporate/owner occupant real estate decisions. http://www.tkk.fi/Yksikot/Kiinteisto/sivut/lisaarvo/j/Eres2005%20paper_final.pdf The IPD Occupiers International Cost Code is a well-recognized standard for measuring cost internationally. This code aims to capture the total cost of property occupation, which includes occupational, facilities, and management costs. This code can be downloaded at http://www.ipd.com/Home/GlobalEstateMeasurementStandards/HowdoImeasurecost/tabid/1381/Default.aspx A presentation by Michael Flynn provides some additional detail on Total Occupancy Cost Management: http://www.expensemanagement.com/article.cfm?id=310 A framework, glossary and definitions for An Asset Lifecycle Model for Total Cost of Ownership Management were created through an industry Consortium. The publications have many formulas and detailed definitions for measurement and analysis. http://www.ifma.org/tools/research/Asset_Lifecyle_Model.pdf This article has some interesting information on the relative importance of rent in many occupancy decisions "Occupancy Cost Managers Examine More than Rent" http://www.bizjournals.com/seattle/stories/2005/09/26/focus11.html?from_rss=1 Some introductory information on the Balanced Scorecard

[48] "Occupancy Cost Managers Examine More Than Rent," *Puget Sound Business Journal*, Ryan Morris (President and Managing Partner of Real Estate Partnerships and Alliances, Inc.), Sept. 23, 2005.

[49] *Whole Life Cycle Costing: Risk and Risk Responses*, Halim A. Boussabaine, Richard L. Kirkham, Rockwell Publishing, 2004 (insert web page)

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	2. Adaptation and equipment costs 3. Building operation costs 4. Business support costs 5. Occupancy management costs In addition, although not always included in the total occupancy cost analysis, disruption costs can be important. Disruption can occur due to several internal and external factors. Among these is absenteeism due to sick building syndrome, and organizational changes, i.e. staff movement from one location to another within an occupied space due to promotion or movement due to a new business environment. This will result in disruption to business activities and lost productivity. These costs are estimated as a function of the rate of movement of individuals in an organization within the occupied space. This rate is particularly high during the early years of occupancy when occupants are getting accustomed to their new working environment.49 The critical point of total occupancy cost (cost of ownership) analysis is that space users make the decisions about the type of space they need on reasons well beyond real estate cost and/or sustainability or energy efficiency requirement. As discussed in more detail in Chapter VI, the specific underwriting/due diligence guidelines for space users incorporate more than total occupancy cost, focusing initially on the relationship of the space to overall strategic goal compliance including such issues as increasing the value of their assets, promoting marketing and sales, increasing innovation, increasing employee satisfaction, increasing productivity, increasing flexibility, and/or reducing costs. Other tools, such as the balance scorecard and other structured processes for incorporating nonfinancial considerations are often used in decision making.	Approach that has been used for some time in business to address measurement of non-financial criteria and is beginning to be more widely used in the real estate industry. http://www.balancedscorecard.org/BSCResources/AbouttheBalancedScorecard/tabid/55/Default.aspx
7. Economic Value Added	Economic Value Added (EVA[50]) is a financial performance method to calculate the true economic profit of a corporation. The basic formula for EVA is: EVA = NOPAT – (Invested Capital x Cost of Capital) Where Net Operating Profit After-Taxes (NOPAT) = Net Sales – Operating	Forbes' Investopedia provides a description of EVA detailing how to calculate NOPAT, Invested Capital , and how to interpret the results: http://www.investopedia.com/university/EVA/ For a description of how the grocery store chain Whole Foods Market uses EVA, see:

[50] EVA is a registered trademark of the consulting firm Stern Stewart & Co.

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	Expenses – Taxes Invested Capital = ($amount of debt + $ amount of equity) Cost of Capital = Return (expressed as a %), reflecting the combination of both debt equity By including a project's Cost of Capital as an expense, EVA allows decision-makers to accept only those projects that enhance overall shareholder wealth since a positive EVA indicates an excess profit beyond a company's Cost of Capital. The EVA methodology can be used for decisions at the company level, the department-level, the store or branch-level, and/or the project level. A number of firms including Whole Foods use EVA for determining incentive compensation.	http://www.wholefoodsmarket.com/company/eva.php
C. Sustainability Sub-Financial Analyses		
1. Comparative First Cost Analysis	For reasons discussed below, conducing a comparative first cost analysis should either not be done, or done very carefully to avoid making bad decisions. Fundamentally, sustainability should not be viewed as something to be added, versus an integrated part of building design. Most importantly, a first cost analysis that compares initial buildings costs of a sustainable building to a "non-sustainable" building ignores potential operating cost savings or any value implications. However, despite the logic that the question does not make a lot of sense, procurement officers, CFOs, developers, and facility managers are often confronted with short-term budget constraints and the anticipated "premium" for sustainable building still gets cited as one of the most important barriers to further adoption of sustainable property investment.[51] The question of comparative cost is also very difficult to answer on a general basis. However, it is much more feasible to address the question of how much sustainability will cost on a specific project. In answering the question for a specific project, you must specify explicitly the level of green or sustainability goals and consider the role of integrated design in promoting trade-offs that enable reduced costs in some areas to offset increased costs of some sustainable features. For example, improved	Many of the ideas in this appendix and in the book relating to comparative first cost-analysis emanated from Peter Morris at Davis Langdon. His article in the Pension Real Estate Quarterly provides the best concise summary we have seen on some of the issues that need to be considered in thinking about this question. "What Does Green Cost", PREA Quarterly, Summer 2007. http://www.davislangdon.com/upload/images/publications/USA/Morris%20Article.pdf The best analysis of comparative cost to date is shown in: "The Cost of Green Revisited: Reexamining the Feasibility and Cost Impact of Sustainable Design in the Light of Increased Market Adoption," Lisa Matthiessen, Peter Morris, David Langdon, 2007 http://www.davislangdon.com/USA/Research/ResearchFinder/2007-The-Cost-of-Green-Revisited/ The 2007 Davis Langdon report updates a prior report in 2004 and examined a larger sampling of buildings and

[51] Much of the information in this section is derived from conversations with Peter Morris of David Langdon and a review of his article, "What Does Green Really Cost?" published in the PREA Quarterly in the summer of 2007. This article is available on the Green Building Finance Consortium website at [insert web link here].

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	energy efficiency due to improved insulation, window replacements, improved controls, or management changes can offset the new or replacement costs for HVAC systems. The next part of the analyses is to determine what you are going to compare sustainable costs to. One approach is to compare the cost of green to the original budget or the original anticipated cost. A limitation to this approach is that it assumes that the original budget was adequate and that no other changes or enhancements were made. Is it reasonable to assume that the building would have been designed to a minimum energy standard, or would some of the "sustainable" features have been designed in anyway? As the marketplace has become more accepting of sustainable property investing, the base for an original building budget has been moving. Equally important, investors' and space users' assessment of building quality is also changing as sustainable features and outcomes become more important than other expensive building features that used to be required for a top quality building. Another method of comparing cost is to look at the individual cost of added green features. Again, this approach fails to consider offset costs and assumes that features or outcomes can be separately priced. Perhaps most importantly, doing a comparison of initial costs for specific sustainable materials or features ignores important advantages in life cycle operating costs and value due to improved appeal to tenants and investors, as well as regulators. Perhaps the biggest cost barrier for sustainable property investment is not measured in dollars, but in implementation time and risk. For example, you can show a developer that studies have shown that a sustainable building will only cost 1% to 2% more, but from the developer's perspective, who has set up a smooth process with his contractors and subcontractors, architects, and others in the development process, the sustainable process will require new types of contracts, leases, insurance, subcontractors, contractors, and require a more integrated design and project management process, different than what the developer has been used to. What is the cost of these required changes? Sophisticated discussion of costs, and interpretation of the surveys that are done in the marketplace, will require consideration of this question. In answering the comparative cost question, it is important to understand the significant differences between existing buildings and new construction. Many of the most prominent studies looking at comparative costs are based	additional building types. The report demonstrates that costs for LEED and non-LEED projects are quite variable, and that LEED certification is not correlated with higher costs. http://www.davislangdon.com/USA/Research/ResearchFinder/2004-Costing-Green-A-Comprehensive-Cost-Database-and-Budgeting-Methodology/ Greg Katz and a group of contributing authors have recently completed a study, "Green Buildings and Communities: Costs and Benefits," that looked at 150 buildings from the U.S. and ten other countries and concluded that the additional cost for building sustainable versus conventional non-green buildings was approximately 2% (median of 1.6%, mean of 2.5%). The detail necessary to analyze the relevance and applicability of this work to specific properties is not publicly available, but may become available when the findings are published in a book in 2009. For example, given that thousands of green buildings have now been built, the specific randomness of the selection of the 150-building sample will be key to interpreting the results. (The 150 buildings were located in 33 states and 10 countries and built from the period 1998 to 2008.) http://www.goodenergies.com/news/-pdfs/Web%20site%20Presentation.pdf This recent work confirms the earlier work authored by Mr. Kats, "The Cost and Financial Benefits of Green Buildings: A Report to California's Sustainable Building Task Force," that was completed in 2003 and found that the green premium on average was about 2% of the original cost of a building. http://www.greenbuildingfc.com/Home/DocumentDetails.aspx?id=398 The GSA commissioned a Study by Stephan Winters on LEED costs which was generally supportive and consistent with other findings. http://www.greenbuildingfc.com/Home/DocumentDetails.a

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	on new construction, and do not fully consider existing buildings. Comparative cost analysis for existing buildings is significantly more difficult due to the wide variety of building types, the varying ways sustainability is achieved, and the significant underlying variances in the age, construction type, and other variables that will affect comparative cost.	spx?id=1007 A somewhat outdated study by the David and Lucille Packard Foundation in October of 2002 provides an interesting methodological approach, looking at six different sustainability scenarios and evaluating costs and benefits. This study resulted in higher premiums for the first cost for sustainable buildings, although life cycle analysis provided a positive conclusion about sustainable investment http://www.greenbuildingfc.com/Home/DocumentDetails.aspx?id=485
2. DCF Lease-Based Cost-Benefit Allocation Models	More focused and specialized attention to the specific distribution of costs and benefits to landlords and tenants is necessary to properly evaluate the financial performance of sustainable property investments. First, for any existing building with leases, or a new building with pre-leasing agreements, the specific terms of the lease are necessary to allocate the costs and benefits of sustainable improvements, particularly related to energy. The specific allocation of costs and benefits will vary based on whether it is a gross, net or fixed base lease, or some other hybrid; the specific terms and mechanics of expense recoveries, and other lease terms. Leases have an even more central role in assessing the financial performance of sustainable properties, beyond cost and benefit allocation. In addition to the specific terms allocating the costs and benefits of sustainability improvements, leases play an important role in establishing clear environmental performance objectives, management of tenant energy use including sub-metering, building operating hours and lighting controls; clear standards for operational performance in HVAC systems and other systems; and clear guidelines for hazardous materials, green cleaning, recycling, the fit-out of tenant spaces, and other building rules and regulations. Fortunately, significant attention has been paid to developing "model" green leases and these issues are starting to be addressed. Some of the information necessary to evaluate the relative costs and benefits for landlords and tenants include: • current rent roll or lease abstracts;	Some additional information and insight into the DCF Lease-Based Cost-Benefit Allocation Models is presented in a presentation on sustainability and leasing by Mark Jewell, President of Realwinwin [insert website here]. Some examples and information on green leasing can be found on the Green Building Finance Consortium's website, both the Research Library and Industry Resources sections under the code 24.5 for Green Leasing. http://www.greenbuildingfc.com/Home/ResearchLibrary.aspx A set of principles and provisions to address the split-incentive issue is presented in: Energy Efficiency Lease Guidance to Address the "Split Incentive", authored by Sean Patrick Neill: http://cycle-7downloads.com/Downloads.html. Cycle-7 and HR&A Advisors developed this lease guidance under the auspices of the Natural Resources Defense Council. Financial support was provided from the New York State Energy Research and Development Authority (NYSERDA), the City University of New York (CUNY) Building Performance Lab, and the Rocky Mountain Institute (RMI). The guidance emerged from a series of three half-day seminars in New York City that included

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	• detailed history of expenses affected by upgrades; • market leasing, valuation, and vacancy assumptions; • estimated upgrade cost on a tenant-by-tenant basis; • estimated savings on a tenant-by-tenant basis; • estimated timetable for upgrade completion; • cost recovery provisions and existing leases; • debt and tax assumptions, if applicable. Whereas typical discount cash flow software can deal with the first three bullet points, additional analyses will be needed to address some of the other issues.	major national landlords, major tenants, attorneys, brokers, engineers, environmental advocates and government officials.
3. Sustainability Options Analysis (BIM, DL, EB analyses)	**Sustainability Options Analysis** has become important during the last few years, as many corporations and large investment managers have made the decision to improve energy efficiency and/or sustainability across their portfolios.[52] Sustainability Options Analysis can take many forms. Essentially such analyses should provide a series of options, typically stated as energy efficiency or sustainability outcomes or ratings, and identify costs associated with the options. This can be done on a relatively straightforward feature by feature basis or LEED point by LEED point basis, but to be most effective, an integrated modeling approach that evaluates the interactive effect of the different combinations of sustainability options, and related sustainable outcomes, preferred. However, in many cases the cost and sophistication of such approaches will not be necessary, or possible. Sustainability Options Analysis is conducted at varying degrees of sophistication based on the particular demands and sophistication of the people conducting and consuming the analysis. In practice, limitations on the measurement and monitoring of many key energy and sustainability metrics—both as to availability and accuracy—have limited the sophistication of Sustainability Options Analysis. Many companies interested in moving forward quickly with energy efficiency and sustainability investments have had to take a step backward—to determine what and how to measure sustainability or energy use—before they can move forward. The quality of a Sustainability Options Analysis will be largely driven by the	

[52] We use the term "Sustainability Options Analysis" to reflect the dynamic choices relative to the varying combinations of sustainable features, systems and outcomes that an owner might want to achieve. LEED EB or EnergyStar audits would be examples of Sustainability Options Analyses.

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	factors considered in the analysis, the process for collecting data, the flexibility of the approach to address sustainability-cost trade-offs, and most importantly to the quality and experience of the person completing the site assessment, interviews, and analysis. From a financial perspective, Sustainability Options Analyses implemented to date have done a reasonable job at assessing initial costs, and a reasonable job at assessing potential operating cost savings for specific features or sustainability processes or strategies, but are still in their infancy relative to providing a dynamic capability to assess both the development costs of varying combinations of sustainable features, and the financial benefits resulting from projected sustainable outcomes. Further work to refine existing methodologies to accommodate the revenue and risk considerations presented in this Chapter is needed.	
4. Churn Cost Savings Analysis	"Churn" costs are the costs associated with moving employees and getting them set-up and functional in a new location. This can involve moving from one part of a building to another or from one building to another. These costs can include some construction (i.e. moving walls, adding private offices, etc.), physically moving equipment and furniture, installing phone lines, and reconfiguring HVAC ducting and lighting. It has been shown that "churn" costs are significantly reduced in buildings that incorporate flexible design features. There is a variety of analyses including Simple Payback, Discounted Cash Flow analysis, etc. that can be used to calculate "churn" cost savings.	For examples of churn cost savings analysis, see "The Costs and Benefits of Green Buildings," Greg Kats, October 2003, pp 75-77: http://www.cap-e.com/ewebeditpro/items/O59F3259.pdf An interesting article on churn was produced by Henry Miller: http://www.pacificofficefurnishings.com/pdf/11_11_11_ChurnWorkpl.pdf
5. Productivity Benefits Analysis	Employee salaries and benefits represent the largest portion of costs for most office-based and many other companies. Consequently, any increases in worker productivity can have a significant impact on a company's financial performance. Because sustainable buildings often include features that result in better lighting, increased ventilation, reduced window glare, better thermal comfort, etc., these buildings have been shown to increase worker productivity through, among other things, reduced absenteeism, lower incidence of respiratory ailments and staff turnover. In theory, a company should be willing to pay more, when leasing, purchasing or constructing space, where its employees will be more productive. The majority of these productivity calculations use an annual cost savings estimate, which is then translated into a productivity gain in dollars per	GBFC has identified over 200 health and productivity related building studies. These studies are identified, and where possible links to actual studies are provided. http://www.greenbuildingfc.com/Home/ResearchLibrary.aspx . Carnegie Mellon's BIDS (trademark for Building Investment Decision Support is a case-based decision support tool that generates a calculation of the economic value added of investing in high performance building systems, based on the findings of building owners and researchers around the world. It is perhaps the best example of Sustainability Sub-Financial Analysis in that

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	square feet based on an average amount of square feet, and average space occupied per employee. Many of these analyses employ a net present value calculation that estimates future benefits, discounted back to present value dollars (see Discounted Cash Flow – Net Present Value analysis above). The logic of translating the productivity gain into a $/SF figure is that decision-makers can then assess the reasonableness of a space premium for a building that provides these benefits. Of course, to understand the real financial implications of productivity benefits, productivity sub-financial analysis must be integrated into the broader financial analysis of a property as discussed in detail in Sections E., F., and G. of Chapter V. A more detailed analyses and discussion of health and productivity related valuation considerations are presented in Chapter IV, Section E.4: Occupant Performance.	the tool enables scores of sub-financial analyses on different systems and features to aid in assessing financial performance. BIDS has the most comprehensive collection of case studies organized in database in a variety of ways with key categories being Air, Thermal, Lighting Control, Network Access, Privacy and Interaction, Ergonomics, Access/Natural Environment, and Whole Building. For each of these areas, a whole range of cost-benefit factors can be analyzed including First Cost, O& M Energy, Churn, Productivity, health, attraction/retention, tax, litigation and Insurance and Salvage/Waste. One of the more complete discussions of the key purpose and value of BIDS is contained in an undated article on the AIA website by the leaders of BIDS. This article concludes that there database has become robust enough to convincingly argue for five critical improvements to buildings including: day lighting; natural ventilation and mixed mode conditioning; high performance lighting; cool roofs; and under floor air. http://www.aia.org/aiaucmp/groups/ek_public/documents/pdf/aiap080050.pdf An overview of the tool presented by Beran Gurtekin-Celik, PhD is shown at: http://www.lcacenter.org/InLCA-LCM03/Gurtekin-presentation.pdf A presentation from early 2009 provides some additional perspectives on BIDS: http://www.purdue.edu/discoverypark/energy/events/green_building_workshop_jan2009/presentations/HighPerformance%20BIDS_MingQu_Jan22_F.pdf Examples of general productivity related analysis are presented in “The Costs and Benefits of Green Buildings,” Gregory Kats, October 2003, pp 59-60: http://www.cap-e.com/ewebeditpro/items/O59F3259.pdf

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		This cost-benefit study of 30 green schools in ten states provides a framework for analyzing productivity gains associated with higher lifetime earnings, asthma reduction, colds & flu reduction, and teacher retention. ["Greening America's Schools – Costs and Benefits," Gregory Kats, October 2006, pp 12-14] http://www.cap-e.com/ewebeditpro/items/O59F12807.pdf The University of California's Center for the Built Environment is involved in many research activities regarding building performance, including significant research on occupant satisfaction and productivity, which is available on their website: http://www.cbe.berkeley.edu/research/research_ieq.htm.
6. Health Cost Savings Analysis	Health cost savings analyses are driven by measures of health improvement—reduced absenteeism; reduced health expenditure costs for individuals, companies, or the public; reduced severity of certain health conditions, etc. Measures of improvement are then monetized by looking at the specific population of building occupants relative to their compensation, health costs, demographics, etc. to get an estimate of potential benefits. Next, it is important to allocate the benefits to the individuals, companies, or the public appropriately, to understand how potential health cost savings will influence sustainable property investment decision-makers. (See more detailed analyses and discussion of these issues in Chapter V, Section D.4.) The key criteria for evaluating the quality of health or productivity sub-financial analyses is whether it produces information that would influence sustainable property decision-makers, or would be expected to influence potential tenants. Accordingly, information that is as specific to the subject property as possible, with realistic, unbiased interpretations of potential health or productivity outcomes, will be most persuasive and valuable. To the extent credible estimates of the potential magnitude of benefits can be assessed, that can also be important.	GBFC has identified over 200 health and productivity related building studies. These studies are identified, and where possible links to actual studies are provided. http://www.greenbuildingfc.com/Home/ResearchLibrary.aspx . A good source for independent opinion and access to research on the effects of Indoor Air Quality on health and productivity is provided at the Indoor Air Quality (IAQ) Scientific Findings Resource Bank (IAQ-SFRB). The IAQ-SFRB provides information summarizing the state of scientific knowledge about the relationships between people's health and productivity and the IAQ conditions or associated building characteristics in which the people work or reside. When possible, these relationships are expressed in quantitative terms using graphics, charts, or equations. The summaries also include brief descriptions of the actions that may be taken to improve the pertinent aspects of IAQ, including those related to building design, construction, operation, maintenance, and occupant activities. This web site also provides links for downloading published journal articles that were developed specifically for the IAQ-SFRB project. All of the information provided in the IAQ-SFRB has undergone review by multiple experts other than the authors.

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		http://www.iaqscience.lbl.gov/ Carnegie Mellon's BIDS (trademark for Building Investment Decision Support, as discussed above in the productivity benefits section, is also is a good resource for information and analytic methodologies looking at feature based health impacts. One of the key features of the BIDS tool is its life-cycle assessment of the value of features or systems. The results are calculated for each feature or system utilizing case study/research findings and BIDS "life cycle assumptions" which factor in average salaries, building size, health data, and other demographics to calculate the benefits that can be compared to cost for the feature or system.
7. Government/Utility Incentives and Rebates Analysis	Depending on the specific type of sustainable project, and the level of sustainability, it may generate substantial public benefits including reduced infrastructure costs, environmental and resource conservation, improved land use, less or more manageable climate change, economic benefits, and security benefits. If a building owner can clearly and factually articulate the public benefits that arise from their building, they are more likely to convince regulators, tenants and investors to pay for those benefits. Such "monetization" of public value is created from governments or utility companies through enhanced entitlements/permitting, public grants, favorable financing, tax benefits, and carbon credits or payments, and from private companies through their contribution to Enterprise Value and resulting increases in space user demand. Sophisticated sustainable property investors and developers will conduct their own detailed assessment of the public benefits of their projects to enable clear articulation to regulators, potential tenants, employees, and capital sources. The financial analyses of these benefits for a specific property requires a close look at the sustainable thresholds required to achieve benefits with the specific governments/regulators in the market. Benefits come in the form of tax benefits, entitlement related benefits, and other financial benefits. The	Substantial resources identifying the many types of incentives/subsidies are identified in the Green Building Finance Consortium's website, under Research Library and Industry Resources code 11.0. Select examples are presented below. The database of State Incentives for Renewables and Efficiency is the most comprehensive State-by-State listing of incentives. State, local and utility incentives are identified. http://www.dsireusa.org/ Mark Jewell of RealWinWin presents "Best practices for finding and applying for Rebates. A bit dated—from 2005, but still some good points. http://www.realwinwin.com/White_Papers/0402_Show_Me_the_Money.pdf Rebates for 26 different types of features and systems are identified on RealWinWin website. http://www.realwinwin.com/threelinks_CorporateClients_RebateAdmin.htm The ICLEI website is a particularly good source of local

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	financial contribution of each of the potential benefits identified can be estimated by conducting sensitivity analyses with the key variables affected in the cash flow model including timing of cash flow, tax savings, increased revenue potential through entitlement bonuses, lower entitlement risk, etc.	government sustainability information. http://www.iclei.org/ The US Green Building Council also has a public policy searchable web site database that is very helpful: http://www.usgbc.org/DisplayPage.aspx?CMSPageID=1779
8. Enterprise Value Analysis	Enterprise Value Analysis is a new type of sustainability sub-financial analysis that is being applied to the property markets, based on the value created by a real estate decision at the enterprise level. Significant work has been done in recent years to better understand and measure the non-real estate (business unit or enterprise) value of real estate decisions. The types of benefits from sustainability investment that are analyzed in this type of analysis include employee attraction and retention, leadership value, promotional value, health and productivity benefits, and other related benefits. The biggest challenge in the analysis and articulation of the value of sustainable property investment to the enterprise is in transitioning from a general discussion of these benefits to a discussion about the potential magnitude of these benefits for a specific property. The influence of potential enterprise value benefits on the decision of space users will vary based on the types of space users, their business strategies, the demographics of their employees, and the nature of the customers that they serve, among other factors. The process for evaluating potential Enterprise Value, and the ability of an owner to monetize these benefits through higher rents, occupancies, faster absorption, etc., starts with an assessment of the types of space users (tenants or owner occupants) expected at a project. What key issues drive these particular types of tenants? Are they influenced by their internal or external commitments to carbon disclosure or reduction? Do they care about potential health or productivity benefits? Is an environmentally-socially responsible reputation important to them, or their customers or employees? Once an understanding of the key drivers of potential space users is established, the next step is to assess the likelihood of whether the subject property will generate the types of sustainable outcomes-building performance important to expected occupants. Some of the key sustainable property outcomes that generate Enterprise Value include:	Turner Construction's 2008 Survey of Commercial Real Estate Executives: http://www.turnerconstruction.com/greenbuildings/content.asp?d=5785 2008 Study by Incisive Media's Real Estate Forum, the Building Owners and Managers Association (BOMA) International and the US Green Building Council The survey focused on the application of green methodologies and technologies in existing commercial buildings and on the financial and marketing benefits of these efforts. It was distributed to Incisive Media's national database of ownership, investment and operational entities, as well as to BOMA International's members. http://www.boma.org/AboutBOMA/pressroom/press111908-2.htm LaSalle Study released in November 2008 found that of more than 400 CRE executives surveyed, 69 percent said sustainability is a critical business issue for their real estate departments. When CoreNet and Jones Lang LaSalle asked the same question in 2007, 47 percent said it was a critical issue. http://www.joneslanglasalle-boston.com/en-US/news/PressReleases/Jones+Lang+LaSalle+-+Companies+Focus+on+Sustainability+to+Reduce+Costs.htm Panel Intelligence Study shows corporate world still moving forward on sustainability issues. http://www.panelintelligence.com/docs/PI_Sustainability_Study_Q4-08_Final.pdf

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	Reduction in resource use • Reduction in energy and water use • Reduction in building waste • Reduction in pollution emissions • Reduction in carbon footprint Superior location and access • Limits auto use • Environmental sensitivity Occupant performance • Occupant satisfaction • Improved health/absenteeism • Productivity: working environment—focus/energy level Flexibility/adaptability of occupied space • Design • Systems • Materials • Energy sources Sustainability compliance • Certifications • Regulations • External commitments • Internal policies The success a subject property has in achieving the key sustainable outcomes identified above will determine the extent to which the property will be able to achieve sustainable real estate-related enterprise value benefits. Key examples of the types of sustainably related enterprise value benefits are listed below: Reduction in enterprise costs	A comprehensive study was published in early 2009 that addresses the integration of environmental, social and governance (ESG) issues in the financial industry. http://www.ifc.org/ifcext/sustainability.nsf/AttachmentsByTitle/p_SI_WCW08_report_WEB.pdf/$FILE/p_SI_WCW08_report_WEB.pdf

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	• Reduction in churn costs • Reduction in employee costs: productivity • Reduction in employee health costs Improved reputation/leadership • Recruiting • Employee retention/satisfaction • Public relations/brand management • Retain “social license” to operate • Improved marketing and sales • Increase company market value • Increase company market liquidity • Address shareholder concerns Compliance with internal/external policies/initiatives • Corporate energy/sustainability requirements • Corporate social responsibility reporting • Global Reporting Initiative • Carbon Disclosure Project • Minimum requirements of socially responsible investment funds Reduced risk to future earnings • Legal risks—sick building syndrome and mold claims, business interruptions, building remediation costs, etc. • Reduced sub-leasing risk if downsizing, relocating, etc. • Reduced operating cost volatility • Reduced risk to reputation • Improved defense of competitive advantages • Reduced risk of future compliance costs The level of potential influence on key DCF model inputs like rents, occupancies, absorption, tenant retention will depend on the specific types	

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	of tenants, level and type of sustainability achieved, and sophistication of the marketing of these benefits to target audiences. Chapter VI, Section D: Underwriting Space User Demand presents the information discussed above in a more targeted discussion of underwriting.	
9. ENERGY STAR Financial Value Calculator	ENERGY STAR's Financial Value Calculator (FVC) is designed to help decision-makers determine the impact of energy savings on the market valuation of both publicly- and privately-held companies. "The FVC uses the prevailing price/earnings ratio to estimate the market value of increased earnings that can result from increased energy efficiency."[53] The calculator demonstrates potential changes to: Net Income Earnings Per Share Market Value The FVC may be an appropriate tool for the owner/user who chooses to evaluate the investment decision on an enterprise level as opposed to the property level.	A link to ENERGY STAR's Financial Value Calculator can be found under the Financial Evaluation heading on the following webpage: http://www.energystar.gov/index.cfm?c=tools_resources.bus_energy_management_tools_resources

[53] See http://www.energystar.gov/index.cfm?c=tools_resources.bus_energy_management_tools_resources under Financial Evaluation.

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10. Risk Analysis and Presentation (RAP) • Energy Cost Volatility • Litigation Risk (mold, SBS, contracts, etc.) • Regulatory Risk • Reduced sub-leasing risk • Cash flow risks • Development-Construction risk analysis • Exit-risk analysis	Risk Analysis and Presentation (RAP) becomes particularly important in sustainable property investment. Sustainable properties generate powerful positive and negative risks that need to be specifically analyzed in the context of the property. Some of these key risks include energy cost volatility, litigation risk due to mold or sick building syndrome, regulatory risk, sub-leasing risk, exit risk, and development and construction risk. More sophisticated and property-specific analyses need to be conducted and clearly and independently communicated to aid decision-makers. Risks are addressed throughout Value Beyond Cost Savings: How to Underwrite Sustainable Properties. They are presented in detail in the GBFC Sustainable Property Cost-Benefit Checklist, and in the discussion of process and feature performance in Chapter IV, Sections C and D. The RAP process is presented fully in Section H of Chapter V.	Climate Change Economics has an interesting section clarifying the distinction between risk and uncertainty. While focused on public benefits issues, this section, and other parts of the website provide important points in thinking through the economics of sustainability. http://www.climatechangeecon.net/index.php?option=com_content&task=view&id=8&Itemid=22 The American Association of Architects Chapter 12 of their Best Practices publication contains over a dozen different publications addressing risk management issues. http://www.aia.org/practicing/bestpractices/AIAS077005 Energy Budgets at Risk is a book that presents a financial management tool for assessing energy related risk at a company level: http://www.jjacksonconsulting.com/eriskm.htm
D. Public Benefits Analyses		
1. Reduced Infrastructure Costs • Water collection, storage, treatment and distribution • Energy production and distribution • Road & bridge construction/maintenance • More efficient use of existing infrastructure	Infrastructure cost benefit analyses seek to quantify cost savings that accrue to the public from buildings that incorporate various “green” features, which reduce or eliminate the need for public infrastructure investment. By quantifying these benefits, the public sector can more accurately assess the appropriate level of expenditure to make or incentives to provide in order to achieve the desired outcome. Buildings that use less water and/or incorporate features that minimize storm runoff can help reduce infrastructure costs related to water collection, storage, treatment and distribution. Buildings that are more energy efficient or generate a portion of their energy needs on-site can help reduce the need for additional energy generation plants and expansion of the distribution system. Buildings that promote the use of public transportation by workers or that have locations that can rely on existing transportation infrastructure can reduce or eliminate costs associated with additional construction and maintenance of these improvements.	Towards a Green Building & Infrastructure Investment Fund is a report commissioned by The City of Vancouver, the Vancouver Organizing Committee for the 2010 Olympic and Paralympic Winter Games (VANOC), Vancity, BC Hydro and Tides Foundation who were interested in the possibility of using the 2010 Olympic and Paralympic Winter Games in Vancouver to launch a Green Building & Infrastructure Investment Fund as a legacy of the Games. The overall structure for the analysis and specific sub-analysis provide a perspective on assessing the financial impacts of sustainable investment. http://www.greenbuildingfc.com/Home/DocumentDetails.aspx?id=386 **Climate Change Economics** has an interesting section

Analysis/Model	Description/Commentary	Key Links/Examples
	Another cost consideration has to do with the duplication or under-utilization of infrastructure improvements as a result of urban sprawl. When new communities are developed outside existing urban areas the effect on infrastructure is twofold: 1) There must be a duplication of existing infrastructure already in the urban area; and 2) Out-migration to the suburbs can leave the existing infrastructure under-utilized and reduce the number of taxpayers available to support these improvements. Several of the infrastructure cost benefit analyses use a present value calculation to estimate the value of these public benefits. We believe this is a logical approach since buildings that incorporate these features will produce the benefits over many years. Given the small impact of any particular building, presenting the total public benefits, and the relative contribution of the subject building to costs is a good idea. Since infrastructure costs are not typically incremental, but require substantial expenditures to ensure excess capacity, often to meet peak demand, the marginal benefits to reducing peak demand, a goal of many sustainable systems, can be significantly higher than average costs.	laying out the Basic Economics of evaluating sustainability. This section, and the other key sections on issues in applying economic analysis are important for infrastructure and all public, and many private benefits of sustainability. http://www.climatechangeecon.net/index.php?option=com_content&task=category&sectionid=4&id=10&Itemid=22 Water Collection, Storage, Treatment and Distribution**:** Cost-benefit study of 30 green schools in ten states calculates an average water-use reduction of 32%. The author translates this reduction in water-use and wastewater treatment into a net present value estimate (over 20 years) of $0.84/SF. [“Greening America’s Schools – Costs and Benefits,” Gregory Kats, October 2006, pg. 7] http://www.cap-e.com/ewebeditpro/items/O59F12807.pdf Water Supply & Wastewater Treatment**:** This report presents a net present value analysis (over 20 years) of avoided marginal water supply costs and delayed expenditures from the construction of new wastewater facilities by the public sector. The study calculates an average “avoided” marginal water supply cost savings of $5,075 per acre foot, a wastewater facilities “avoided” cost savings of $953 per acre foot and a wastewater O&M “avoided” cost savings of $201 per acre foot. See, “The Costs and Benefits of Green Buildings,” Gregory Kats, October 2003, pp 42-43: http://www.cap-e.com/ewebeditpro/items/O59F3259.pdf
2. Environmental and Resource Conservation Benefits • Conservation of natural environment • Landfill reduction • Reduce air pollution	Environmental & natural resource conservation benefits analyses seek to quantify public benefits associated with those green building features that minimize the detrimental effects of water treatment and use, promote landfill reduction, cleaner air, cleaner water, and reduce drought risk.	Resources from Waste: Integrated Resource Management is a very detailed analytic study, which presents many creative quantitative techniques to assess the costs and benefits of an integrated waste management system. The study is an independent report on integrated resource management that examines approaches for local governments across British Columbia to use solid and liquid waste to create energy, reduce greenhouse gas emissions, conserve water, and recover nutrients. Benefits cited include:

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Sustainable Property Financial Analysis Alternatives

Analysis/Model	Description/Commentary	Key Links/Examples
• Reduce water pollution • Increase biodiversity • Reduce soil erosion • Reduce deforestation • Reduce desertification • Preserve ozone layer • Reduce drought risk		• Reduce greenhouse gas emissions by 25% • Power the equivalent of 10% of homes • Heat the equivalent of 30% of homes • Run the equivalent of 10% of cars • Recover clean, usable water • Limit tax increases http://www.cd.gov.bc.ca/ministry/whatsnew/IRM.htm The Organization for Economic Co-operation and Development (OECD) has published a 2005 reference manual entitled "Strategic Waste Prevention." As part of its on-going efforts towards assisting governments with actions that support increased resource efficiency and sustainable development: http://www.olis.oecd.org/olis/2000doc.nsf/LinkTo/NT00001066/$FILE/00081387.PDF Construction & Demolition (C&D) Waste Diversion: This report presents a calculation of the economic impacts of C&D waste diversion for both new construction and for renovations of existing buildings requiring demolition. The report includes a calculation of public (environmental and tax) benefits associated with an additional 25% in C&D diversion equating to a $0.03/SF benefit for construction only and a $0.14/SF benefit for construction preceded by demolition. This is not a present value calculation. See, "The Costs and Benefits of Green Buildings," Gregory Kats, October 2003, pp 47-53 and Appendix H: http://www.cap-e.com/ewebeditpro/items/O59F3259.pdf Many of the sources cited in the text and covered in other parts of Public Benefits provide additional detail on analyzing Environmental and Resources Conservation Benefits.
3. Land-Use Benefits • Preserve open space and natural habitat • Protect agricultural	Land-use benefits analyses attempt to quantify public benefits associated with reduced traffic congestion & air pollution, and preserving open-space & natural habitat, protecting agricultural lands and keeping urban areas vibrant.	The Green Communities Criteria Checklist and Manual provide a detailed listing of criteria for sustainable housing developments with a particularly good assessment of site location and related issues. http://www.greenbuildingfc.com/Home/DocumentDetails.a

Analysis/Model	Description/Commentary	Key Links/Examples
land and economic diversity • Maintain vibrant urban areas • Reduce traffic congestion and air pollution	Examples of the types of issues that a land-use benefits financial analysis might consider include increased worker productivity due to shorter commute distances, reduction on quality of life as a result of the loss of open-space, tax revenue loss as a result of a decrease in the amount of productive agricultural land.	spx?id=1072 The Holland Barrs Planning Group authored "Playbook for Green Buildings and Neighborhoods - Strategic Local Climate Solutions". The Playbook presents tools that cities and counties can use to take immediate action on climate change through: Green building, green neighborhoods, and sustainable infrastructure. http://www.greenbuildingfc.com/Home/DocumentDetails.aspx?id=978 Brownfield's Capital: Unlocking the Value of Environmental Redevelopment by Glenn Mueller provides some insights into an important sustainable land-use issue. http://findarticles.com/p/articles/mi_qa3759/is_200501/ai_n9484608 The Urban Land Institute has long been a leader in "Smart Growth" and all the issues related to real estate and related intelligent use of land. At the 2007 ULI Fall Meeting in Las Vegas, the Trustees directed Chairman Todd Mansfield to form an Advisory Group to study and advise on the issues of climate change and energy and how ULI as an organization might best engage in these issues. The Climate, Land Use and Energy (CLUE) Advisory Group is made up of a diverse body of ULI members who span the fields of finance, investment, development, design and the insurance industries. The study can be found at: http://www.uli.org/sitecore/content/ULI2Home/ResearchAndPublications/Reports.aspx Resources on Smart Growth can be found at: http://www.uli.org/ResearchAndPublications/Reports/Smart Growth.aspx
4. Reduced Climate Change • Reduce vulnerability	Reduced emissions benefits analyses consider the value of improved public health resulting from cleaner air and water, and from reductions in carbon emissions that cause global warming. In the improved indoor air quality example, the analysis looks at the costs saved based on a reduction in the	The IPCC has extensive publications and analysis of the costs of Climate Change across a wide range of areas. http://www.ipcc.ch/about/index.htm

Analysis/Model	Description/Commentary	Key Links/Examples
to climate • Reduce costs to respond to change • Reduce spread of infectious respiratory disease • Reduce acidification • Contribute to many environmental conservation benefits • Improve public health	number of asthma cases. In the reduced pollutants example, the analysis assigns dollar amounts to the various pollutants and then calculates an overall value based on a reduced level of emissions. Both analyses calculate a present value that is appropriate since buildings that incorporate these features will realize these benefits over many years.	The IPCC was established to provide the decision-makers and others interested in climate change with an objective source of information about climate change. The IPCC does not conduct any research nor does it monitor climate related data or parameters. Its role is to assess on a comprehensive, objective, open and transparent basis the latest scientific, technical and socio-economic literature produced worldwide relevant to the understanding of the risk of human-induced climate change, its observed and projected impacts and options for adaptation and mitigation. Climate Changes Futures - Health, Ecological and Economic Dimensions by Paul Epstein and Evan Mills is the result of The Center for Health and the Global Environment, Swiss Re and the United Nations Development Programme three-year effort to examine the physical and health risks of climate instability. http://www.greenbuildingfc.com/Home/DocumentDetails.aspx?id=91 Ceres (pronounced “series”) is a national network of investors, environmental organizations and other public interest groups working with companies and investors to address sustainability challenges such as global climate change. They have many publications dealing with climate change and their impacts. http://www.ceres.org/Page.aspx?pid=415 Climate Change Economics provides a significant listing of sustainable sources—with an index and their commentary about the site which ties into resources to describe the public benefits of sustainability and climate change. http://www.climatechangeecon.net/index.php?option=com_mtree&task=listcats&cat_id=42&Itemid=20 Reduced Pollutants: This report presents a net present value analysis (over 20 years) that concludes a $1.18/SF emissions benefit due to a reduction in electricity generation. The analysis is based on a 36% reduction in Carbon Dioxide, Sulfur Dioxide, Nitrogen Oxides and

Analysis/Model	Description/Commentary	Key Links/Examples
		Particulates. "The Costs and Benefits of Green Buildings," Gregory Kats, October 2003, pp 38-39: http://www.cap-e.com/ewebeditpro/items/O59F3259.pdf Improved Indoor Air Quality–Asthma Reduction**:** Cost-benefit study of 30 green schools calculates a present value of $3.00/SF as a result of a 25% reduction in asthma cases (over 20 years) associated with children attending a green school with better indoor air quality compared to a conventional school. See, "Greening America's Schools – Costs and Benefits," Gregory Kats, October 2006, pg. 13: http://www.cap-e.com/ewebeditpro/items/O59F12807.pdf Improved Public Health from Cool Roofs**:** This report estimates health benefits for the state of California, principally due to reduced smog creation as a result of the installation of "cool roofs." The report estimates the health benefit to be $0.70/SF based on a report produced by PG&E in 2000 and other findings of a Lawrence Berkeley Labs (LBL) senior scientist. See, "The Costs and Benefits of Green Buildings," Gregory Kats, October 2003, pp 77-80: http://www.cap-e.com/ewebeditpro/items/O59F3259.pdf Consider using another example here (not much detail): Cost-benefit study of 30 green schools in ten states calculates a present value (over 20 years) of emissions reduction of $0.53/SF from a green school. See, "Greening America's Schools – Costs and Benefits," Gregory Kats, October 2006, pg. 6: http://www.cap-e.com/ewebeditpro/items/O59F12807.pdf
5. Economic Benefits • Job creation • Improve public health and well-being • Reduce insurance costs	Economic benefits analyses seek to quantify public benefits associated with job creation, recycling, reduced public health costs, increased tax revenues associated with greater educational achievement, and community competitiveness. Examples of this include investments in "green" schools that have been shown to have a positive impact on academic performance that in turn has a positive impact on lifetime earnings and tax revenues. Benefits such as these, which are realized over many years, are most	This is a vast area analyses that is based on the historic foundation used by governments in Cost-Benefit analysis that is adapted for the purposes of addressing sustainability related benefits. Two examples from Mr. Kats are presented below. Worker Productivity-Increased Earnings & Tax Revenue**:** Cost-benefit study of 30 green schools in ten states

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Sustainable Property Financial Analysis Alternatives

Analysis/Model	Description/Commentary	Key Links/Examples
• Reduce public health costs—Medicare • Government worker productivity: reduce government costs • Worker productivity: increase earnings and tax revenues • Community competitiveness—quality of life	accurately valued using some type of present value calculation.	calculates a public financial benefit of $2,700 per student or $20.00/SF over a 20 year period from increased federal, state and local tax benefits associated with higher earnings from students attending green schools. See, "Greening America's Schools – Costs and Benefits," Gregory Kats, October 2006, pg. 13] http://www.cap-e.com/ewebeditpro/items/O59F12807.pdf Employee Retention**:** Cost-benefit study of 30 green schools calculates a financial savings of $4.00/SF over a 20 year period from increased teacher retention. See, "Greening America's Schools – Costs and Benefits," Gregory Kats, October 2006, pg. 14] http://www.cap-e.com/ewebeditpro/items/O59F12807.pdf
6. Security Benefits • Reduce reliance on foreign energy sources	Security benefits analyses are an attempt to quantify the value of reduced reliance on foreign energy sources. Our dependence on certain foreign energy sources contains a number of hidden costs including increased risk of energy cost volatility due to supply shock, significant wealth transfer to hostile regimes, and increased risk of a costly US military intervention.	See, "The Hidden Cost of Oil: An Update," The National Defense Council Foundation, Milton Copulos, January 2007: http://www.ndcf.org/ Energy Insecurity; testimony of J. Robinson West Chairman PFC Energy on September 21, 2005 concerning the increasing security implications of our reliance on foreign energy supplies. http://www.greenbuildingfc.com/Home/DocumentDetails.aspx?id=286

Appendix V-B

GBFC Sustainable Property Performance Framework

Process Performance

Integrated Design
Everyone, early, every issue

Contracts/Legal
Proper performance incentives, sustainability incorporated into requirements, etc.

Services Quality & Capacity
Financing, construction, leasing, procurement, management

Energy Use Forecasting
Experienced modeler, proper model, inputs

Regulation & Code Compliance

Commissioning
Bring Cx agent on early, ensure all other trades buy in to Cx process

Sustainable Certifications
Experienced coordination and management of process, paperwork

Measurement & Verification
Proper metrics, systems, O&M staff buy-in

Occupant & Staff Training
Behavior modification required

Feature/System Performance

Energy/Water
HVAC system
Daylighting
High efficiency lighting
Window glazing
Water-efficient landscaping
Low-flow toilets & faucets

Indoor Environmental Quality
Low-emitting paints & flooring
Exterior windows views
Under-floor ventilation
Enclosed, ventilated mechanical rooms

Materials & Resources
Certified or renewable materials
Construction waste management plan

Sustainable Sites
Reflective roof surface/ green roof
Stormwater management

Building Performance

Development Costs
Hard/soft costs
Timing
Tax savings grants
Financing costs

Resource Use
Energy, water, insurance, waste disposal, cap ex., etc.

Location & Access
Non-auto accessibility
Accommodation of low-energy autos
Environmental sensitivity of site

Occupant Performance
Satisfaction
Health
Productivity

Sustainability Compliance
Certifications
Regulations
Occupant policy

Flexibility/ Adaptability
Design
Materials
Systems
Energy sources

Public Benefits
Infrastructure cost reduction
Environmental benefits
Land-use benefits
Emissions improved
Economic benefits

Market Performance

Operating Costs
Energy, water, etc,

Regulator/ Utility Demand
Level of regulation
Entitlement benefits
Tax benefits
Financial incentives

Space User Demand
Occupant type
Internal requirements
External requirements
Cost-benefit allocation
Sustainable property options

Investor Demand
Investor type
Internal requirements
External requirements
Recognition of regulator/ space user demand

Financial Performance

Recognition of Market Demand
Brokers
Appraisers
Lenders

Determine Key Inputs
Rent
Occupancy
Absorption
Tenant retention
Sales price (residual)
Discount rates
Capitalization rates
Capital expenditures and tenant improvements

Calculate Results
Net present value
Internal rate of return
Total occupancy cost
Value

Risk Assessment
Development costs
Development risk
Operating costs
Revenues
Regulatory risk
Liability risk
Exit/financing risk

Appendix V-C
GBFC Sustainable Property Cost-Benefit Checklist

Potential Property Benefits	Description of Benefit	Applicability Analysis[54]
A. Reduced Development Costs 1. Government incentives	Significant benefits are available from local, regional, state or provincial, and federal governments as well as utilities and other organizations. These benefits can be quite substantial and include: • Increased Floor Area Ratio and zoning/density bonuses • Expedited permitting and approvals • Design and code flexibility • Rebates; construction cost off-sets; grants • Financing assistance, subsidies • Tax benefits: Federal, State, and Local—credits, favorable accounting treatment (Tenant Improvements, etc), tax reductions, etc. • Government mandated carbon trade value	The specific sustainability or energy efficiency thresholds required by each governmental level in order to obtain incentives must be identified and evaluated. These thresholds should then be compared to the project's actual or projected sustainable outcomes/performance to enable an assessment of the magnitude of potential benefits. Expanded Chapter III, Appendix III-D provides a listing of many certification and assessment systems. Assessment of the likelihood of achieving benefits will be enhanced by a clear understanding and articulation of the property's Public Benefits (see section V-C2 a) Public Sustainability Property Analysis in Expanded Chapter V.)
2. Better private financing	Sustainable properties have the potential for better private equity and debt financing due to their generally lower risk profile, the growth in specialized energy or sustainable financing sources, including Socially Responsible Investment funds and other private financing, and other factors. Better private financing can be achieved in a number of ways: • Improved access	This benefit has been elusive since debt and equity sources have not been able to effectively integrate "non-cost" benefits into their decisions. Accordingly, only a few smaller debt and equity sources have offered very limited rate discounts or other benefits. The ability of a project to achieve better private financing will largely be determined by the quality of their Investment Request Package[55] and their ability to articulate, at a very property specific level, the net benefits of sustainable investments and their impacts on risks and

[54] This column provides select guidance on assessing the applicability of a general cost-benefit to a specific property.

[55] An Investment Request Package refers to any collection of documents submitted to a lender, equity investor, corporate CFO, or other real estate decision-maker responsible for a capital investment decision.

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GBFC Sustainable Property Cost-Benefit Checklist

Potential Property Benefits	Description of Benefit	Applicability Analysis[54]
	• Lower cost: rates, closing costs • Better terms: LTV, DSCR, reserves, hold-backs	returns. Given the deterioration of the debt financing market, which accelerated in the fourth quarter of 2008, (interest rates up 2% or more, loan to value limits closer to 50% than 70%, and more severe debt service coverage ratio, reserves, holdbacks, and guarantees against rollover risk), the marginal benefits of sustainable property investment will continue to be dwarfed by broader capital markets changes. However, certified sustainable properties, or at least properties with some combination of sustainable features, have a good chance of becoming a minimum standard or strategic imperative that could significantly increase access and provide some pricing/terms advantage to financing. While rates and terms may be slow to be revised, it is also likely that private "sustainable" property financing will be available from most conventional sources, rather than relegated to specialist "green" lenders or investors.
3. Downsizing of some systems (HVAC, etc.)	Developing sustainable properties, particularly certified properties, requires additional expenditures not required for conventional properties. Offsetting these additional costs are reductions in costs due to the down or right sizing of some systems, like HVAC systems. For example, a smaller, less expensive HVAC system may be possible when energy costs are significantly reduced. Additionally, as more space users start to view sustainability as a prerequisite for a Class A building, more cost-effective sustainable products/features may replace more expensive products previously considered essential to a Class A property.	The key issue here is in reviewing cost estimates underwriters/valuers should understand that both higher costs in some areas, and lower costs other areas is the norm for sustainable property developments. Properties with no such trade-offs may be exposed to excessive costs.
4. Reduce number and magnitude of change orders	Sustainable properties can experience fewer and less significant change orders due to more forward-thinking development processes. Depending on the magnitude and number of change orders, costs can be substantial.	Properly run sustainable property investments will involve more significant upfront planning involving key stakeholders, including the owner, architects, engineers, building operators, and others, enabling better communication and a more clear understanding of the "values" that are being sought in a building. This more holistic approach is formalized in the sustainability

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GBFC Sustainable Property Cost-Benefit Checklist

Potential Property Benefits	Description of Benefit	Applicability Analysis[54]
		process through integrated design and related requirements in most certification programs. Commissioning, particularly if started early in the project, is also a key indicator of reduced change orders. (More detail in Chapter IV, Section C: Process Performance and Section D: Feature Performance) Studies of construction projects have found that risks are typically determined in the initial phases of a project, while the impacts are not experienced until the construction phases, supporting the value that the enhanced upfront coordination typical of sustainable projects can deliver.[56] The design-build model, where the design and construction phases are overlapped and the contractor takes on more risk, can be a good choice for sustainable property projects. As a design-builder, the general contractor can redesign a facility if cost overruns are anticipated to still meet the goals of the owner. This process has risk and responsibility issues that must be addressed up front, but can add flexibility to significantly reduce budget risk that is inherent in the design-bid-build delivery model where multiple contractors bid on construction drawings, which can reduce flexibility and increase the frequency and cost of change orders.
5. Reduce operational start-up costs	Sustainable properties can experience fewer problems during their initial operations, enabling space users to move in more quickly and requiring less management time. These benefits, while not typically of large magnitude, are primarily the results of a more holistic building design approach implemented through integrated design and commissioning, which ensures that systems and products operate as designed.	Key evidence of potential benefits for a specific property are based on an assessment of the quality of the integrated design process and the quality and thoroughness of commissioning and the commissioner. Potential benefits could be offset by the use of products, materials or systems that are too pioneering that take significant time and money to calibrate and get operating efficiently.

[56] Mbachu, J. and Vinasithamby, K. (2004), "Sources of Risk in Construction Project Development: An Exploratory Study."

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GBFC Sustainable Property Cost-Benefit Checklist

Potential Property Benefits	Description of Benefit	Applicability Analysis[54]
B. Reduced Development Risks		
1. Reduce construction risk	Sustainable projects can reduce construction risk through: • Reduced cost volatility • Commissioning • Integrated design • Local materials • Improved/earlier goal setting; "values clarification" • Better communications among key participants in process • Reduce entitlement risk • Improved timing and content of neighborhood/public appearances • Improved timing and content of regulatory approvals • Reduce legal risks • More explicit service provider contracts • Better, earlier communication	Construction risk is the risk that a project will not be completed to the planned quality level on time or within the allocated budget. Construction risk can result from delays, financial problems, contractual issues, legal problems, design issues, operational problems or environmental issues. Construction risk is also unique to each project. Each project has its own stakeholders, regulatory issues, and other factors that are unknown or unknowable at the start of a project. The primary way that construction risk is mitigated is through higher equity requirements, fixed price construction contracts, retainage, budget contingencies, and payment, completion, and performance bonds. Based on a survey by Marsh published in early 2009, the surety markets (that provide payment, completion and performance bonds) have not specifically responded to the green industry. They noted the specific concerns revolving around onerous contract provisions and the risk of inadvertently guaranteeing a specific performance or efficacy for energy usage, water consumption, and/or LEED certification. These markets are looking at green contracts more closely, and it is possible, as more positive experiences are achieved, that new products will be available in this area.[57] To assess potential benefits due to reduced construction risk, as a result of sustainability, it is important to evaluate the specific sustainability experience of the contractor, subcontractors, design team and other project participants. Given the added potential communication problems from having additional participants, team experience working together, or a plan to mitigate lack of prior team experience can be important. A specific assessment of the key factors that can reduce cost volatility, entitlement risk, and legal risk should be

[57] "The Green Built Environment in the United States, 2008 Year-end Update of the State of the Insurance Market," Marsh, February 2009.

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GBFC Sustainable Property Cost-Benefit Checklist

Potential Property Benefits	Description of Benefit	Applicability Analysis[54]
		made for the subject property.
2. Reduce carry risk	• Reduce time to construct • Reduce time to lease-up • Reduce "carry" risk insurance cost • Increase pre-leasing • Reduced entitlement risk	Carry risk addresses the possibility that a construction loan will default in the payment of interest during the construction lease-up period. This risk is most acute in the later years of the term of a construction or mini-perm loan. Interest reserves are established to cover the expected time to build and lease up the project, together with a small contingency. Insurance policies can also be obtained that backstop loan payments until establishment of an adequate stabilized debt service coverage ratio (typically 1.0 or better). A letter of credit or an advancing mechanism may also be used, and hedges and caps are also important in mitigating carry risk. The primary additional attributes of a sustainable project that will reduce carry risk are those that support a compelling favorable lease-up story relative to the specific space users expected to occupy the property. While reducing the cost of carry insurance is one potential benefit, this is not yet possible in the marketplace as of early 2009.[58]
3. Reduce exit/take-out risk	The risk that the construction loan's balloon payment will not be executed as planned is referred to as take-out risk.[59] If a construction loan does not have a highly rated take-out lender, then the risk of executing the take-out is a function of the economics of the completed real estate project. Accordingly, sustainable properties with proven demand by regulators, space users, and investors, and the resulting increase in value and financial performance will have significantly lower take-out risk.	A loan's potential for reduced take-out risk is directly related to the clear articulation of the subject property's superior economics as a result of increased regulator demand, space user demand, and investor demand. A property's exit risk (for equity investors/developers) is also significantly reduced by anything that increases the demand from investors or buyers for their final product. This benefit should be common in many sustainable projects, but it is important not to overestimate the magnitude of this benefit, given the many other factors that affect investor and space user demand on any particular project. The best evidence of these benefits will

[58] Ibid.

[59] "US CMBS: Moody's Approach to Rating Commercial Real Estate Construction Loans," January 20, 2006. This section discussed loan-related take-out risk as well as exit-risk, a similar concept for equity investors/developers, who must eventually sell their property to capitalize on its value.

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GBFC Sustainable Property Cost-Benefit Checklist

Potential Property Benefits	Description of Benefit	Applicability Analysis[54]
		be information that is supportive of the key economic arguments given the subject property's specific attributes.
C. Increased Space User Demand	A potential increase in demand for a sustainable property by space users is one of the most important benefits that a property can achieve.[60] Space User demand will be enhanced from at least the following segments of potential space users: 1. Those significantly influenced by Enterprise Value; 2. Government tenants with sustainability mandates; 3. Vendors/suppliers encouraged/required by customers to consider sustainability; 4. Space Users with direct ties to sustainability 5. Friends of sustainability.	The process for evaluating enhanced Space User Demand, and the ability of an owner to monetize these benefits through higher rents, occupancies, faster absorption, etc., starts with an assessment of the types of space users (tenants or owner occupants) expected at a project. What key issues drive these particular types of tenants? Are they influenced by their internal or external commitments to carbon disclosure or reduction? Do they care about potential health or productivity benefits? Is an environmentally-socially responsible reputation important to them, or their customers or employees? Once an understanding of the key drivers of potential space users is established, the next step is to assess the likelihood of whether the subject property will generate the types of sustainable outcomes-building performance important to expected occupants. Some of the key sustainable property outcomes that generate enterprise value include: **Reduction in resource use** Reduction in energy and water use Reduction in building waste Reduction in pollution emissions Reduction in carbon footprint **Reduction in enterprise costs** Reduction in churn costs Reduction in employee costs: productivity Reduction in employee health costs Reduced selling costs **Superior location and access** Limits auto use Environmental sensitivity

[60] "Space user" is a term we use to describe the occupants or users of real estate. It is a term that includes corporate or non-corporate occupants, tenants, retail customers or other non-owner or tenant users of space.

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GBFC Sustainable Property Cost-Benefit Checklist

Potential Property Benefits	Description of Benefit	Applicability Analysis[54]
		Occupant performance Occupant satisfaction Improved health/absenteeism Productivity: working environment—focus/energy level **Flexibility/adaptability of occupied space** Design Systems Materials Energy sources **Sustainability compliance** Certifications Regulations External commitments Internal policies The success a subject property has in achieving the key sustainable outcomes identified above will determine the extent to which the property will be able to achieve sustainable real estate-related enterprise value benefits. Key examples of the types of sustainably related enterprise value benefits are listed below: **Improved reputation/leadership** Recruiting Employee retention/satisfaction Public relations/brand management Retain "social license" to operate Improved marketing and sales Increase company market value Increase company market liquidity Address shareholder concerns **Compliance with internal/external policies/initiatives** Corporate energy/sustainability requirements Corporate social responsibility reporting Global Reporting Initiative Carbon Disclosure Project Minimum requirements of socially responsible

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GBFC Sustainable Property Cost-Benefit Checklist

Potential Property Benefits	Description of Benefit	Applicability Analysis[54]
		investment funds **Reduced risk to future earnings** Legal risks—sick building syndrome and mold claims, business interruptions, building remediation costs, etc. Reduced sub-leasing risk if downsizing, relocating, etc. Reduced operating cost volatility Reduced risk to reputation Improved defense of competitive advantages Reduced risk of future compliance costs Finally, the above analysis is combined with a specific assessment of the subject property's space-user market and importance of segments expected to have a higher demand for sustainable properties: 1. Those significantly influenced by Enterprise Value; 2. Government tenants with sustainability mandates; 3. Vendors/suppliers encouraged/required by customers to consider sustainability; 4. Space Users with direct ties to sustainability 5. Friends of sustainability. More detail on the process for Underwriting Space User Demand is available in Expanded Chapter VI: Section D: Underwriting Space User Demand.
1. Increased demand from space users concerned about enterprise value	Space user demand will be partially driven by the value of the sustainable property investment to the overall enterprise. The incremental value of sustainable property investment to an enterprise will be driven by the key issues identified below: **Reduction in resource use** • Reduced energy & water use • Reduction in building waste • Reduction in carbon footprint	The process for assessing potential demand enhancement from this segment is discussed above. Logically, most space users have an interest in increasing enterprise value, but different companies and industry segments will view the importance of this topic quite differently, as well as their views of the Importance of their real estate decision to create this value.

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Potential Property Benefits	Description of Benefit	Applicability Analysis[54]
	• Reduction in pollution emissions **Enterprise cost reduction** • Reduced "churn" costs • Reduced employee costs: productivity • Reduced health costs	
	Superior Location and Access • Limits auto use • Environmental sensitivity	
	Occupant Performance • Occupant Satisfaction • Improved health • Improved productivity	Occupant performance from sustainable properties can create value in ways as articulated below and as fully evaluated in a separate section on occupant performance in Expanded Chapter IV, Section E-4. **Improved occupant satisfaction** • Reduce turnover and/or defection to competing firms – Interruption in responsibilities – Lost clients – Lost ideas / institutional knowledge – Lost intellectual property – Downtime until new hire picks up responsibilities – Recruiting costs – direct / indirect – Training costs – Overall employee morale • Reduce HVAC noise and pitch distractions • Reduce "too hot / too cold" complaints given the implementation of specific HVAC systems • Increase access to daylight and overall facility quality **Improved occupant health** • Reduce absenteeism • Increase employee retention • Reduce spread of colds, flu, etc among co-workers given greater outdoor air circulation, better MIRV air filtration • Possible reduction in health care premiums given corporate-wide facility standardization and pushing of health care providers to acknowledge benefits

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GBFC Sustainable Property Cost-Benefit Checklist

Potential Property Benefits	Description of Benefit	Applicability Analysis[54]
		Improved occupant productivity • Reduce employee salary cost/unit output • Improved profitability
	Improved reputation/leadership • Improve cost/quality of recruiting • Improve employee retention/satisfaction • Improve public relations/brand management • Retain "social license" to operate • Improved marketing and sales • Increase company market value • Increase company market liquidity • Address shareholder concerns	The importance of improved reputation/leadership to potential space users can be deduced by evaluating the specific space users and the level of sustainability contemplated for a project. Companies with an emphasis on brand promotion and external marketing, larger companies, companies with potentially controversial products or practices, companies that public and promote corporate social responsibility reports, and others are good candidates to be positively influenced by sustainable property investment. Sustainable properties that make a leadership position in sustainability or energy efficiency will be more likely to influence potential space users in this regard.
	Compliance with internal/external policies/initiatives • Corporate energy/sustainability requirements • Corporate social responsibility reporting • Global Reporting Initiative • Carbon Disclosure Project • Minimum requirements of socially responsible investment funds	Properties whose potential space users, either individually or as a sector, have made it a policy to comply with external policies and initiatives such as the Global Reporting Initiative or Carbon Disclosure Project will be more likely to be influenced by sustainable property investment. These external policies have in many cases led to more detailed and important internal corporate real estate or related occupancy policies that can place a high priority on sustainable property occupancy.
	Reduced risk to future earnings • Legal risks—sick building syndrome and mold claims, business interruptions, building remediation costs, etc. • Reduced sub-leasing risk if downsizing, relocating, etc • Reduced operating cost volatility • Reduced risk to reputation • Improved defense of competitive advantages • Reduced risk of future compliance costs	Evaluating potential space user understanding of how sustainable properties can reduce risk to future earnings is a bit less direct. While the risk benefits are quite clear and compelling, it is likely that the overall influence of reduced risk to future earnings and its influence on space user demand will be best reflected in surveys of tenant or space user interest, or other anecdotal information and trends regarding space user understanding of the value of sustainable property investment. Research on the risk-reducing attributes of sustainable investment generally has become well publicized, with substantial financial benefits accruing to companies that incorporate sustainability concerns into their overall business.

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Potential Property Benefits	Description of Benefit	Applicability Analysis[54]
2. Increased demand from government tenants with mandated sustainability	Local, state and federal governments are increasingly requiring that their employees work in sustainable properties. Sustainable property requirements for new construction have been prominent in many governments for some time, and requirements for government leases are increasingly being implemented as leases turn within government organizations. With over 18% of all commercial space in the United States government owned, and significantly more in many other countries (approximately 13% of which is office space), this is a significant market that will have broader influence on leasing policies throughout the country.[61]	The potential impact for a specific property will be a function of evaluating the level of government leasing in the subject property's submarket, trends relative to government leasing, government lease rollover expectations, and the specific sustainability thresholds required by different levels of government compared to the subject property. Evaluation of this potential benefit must take into consideration not only sustainability issues, but also the suitability of the subject property relative to other minimum requirements of government tenants related to security and other issues.
3. Increased demand from vendors/supply chain required by big customers (GE, Wal-Mart, etc.) to be more sustainable	Many large companies like General Electric and Wal-Mart are beginning to put sustainability requirements on their vendors and others in their supply chain to be more sustainable. These initiatives have grown over time, and while relatively small today, are likely to increase.	Evidence of this phenomenon can be ascertained for a property in a particular marketplace by studying the profile of tenants in the marketplace. Again, this is just another of the many issues influencing space user demand, but is likely to grow. For example, nearly 1,500 global businesses signed on to the United Nation's Global Compact in 2008, signaling the growing interest of businesses that want to align their practices with the initiatives in environmental, social, and governance principles. Approximately 7% of the 700-plus respondents in the annual survey of Global Compact participants indicated that they require Global Compact participation when selecting suppliers. About a third said they extended their commitment to the Global Compact to their subsidiaries. While these numbers are still small, they represent a significant and growing trend to extend the leadership of certain powerful companies on sustainability issues down through the supply chain.
4. Increased demand from tenants with direct tie to sustainability business—architects, engineers,	There are a growing number of tenants that have a direct tie to the sustainable property business: architects, engineers, consultants, contractors, lawyers, energy firms, product companies, etc. etc.	There is increasing evidence of the growing size of the sustainable property market and companies with direct ties to the industry. For example, membership in the U.S. Green Building Council has grown dramatically to nearly

[61] "Who plays and who decides; the structure and operation of the commercial building market," March 2004, Innovologie, LLC for DOE.

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Potential Property Benefits	Description of Benefit	Applicability Analysis[54]
consultants, contractors, lawyers, energy firms, product companies, etc. etc.		19,000, with over 81,000 LEED-accredited professionals.[62]
5. Increased demand from "Friends of Sustainability"	Demand from space users is also heightened by those individuals who want to "do the right thing," independent of evidence of financial benefit. It is difficult to quantify the size of this marketplace, but service providers, builders, tenants and others that took on a leadership role without "proof", initiated the green building industry.	Demographics can play a key role here with younger people and people in certain geographic locations more likely to be concerned about sustainability ideals independent of financial considerations.
D. Reduced Resource Use / Operating Costs		
1. Lower energy use 2. Lower water use 3. Reduction in sewage/stormwater run-off 4. Reduction in building waste 5. Reduction in construction / demolition waste 6. Reduction in carbon footprint 7. Lower emissions 8. Lower property/casualty insurance costs 9. Lower maintenance costs	In this section, the key benefits are a reduction in operating costs due to the reduction in resource use. For example, for energy, the operating cost benefit is a function of the amount of energy reduction and the price of energy, and its expected price change over time. Each of the reductions in resource use are sustainable property outcomes, which should be the foundational requirements of measurement and verification programs and policies. In addition to the direct operating cost savings, strong building performance in each of the nine categories of reduced resource use are the primary contributors to sustainable certification compliance and meeting the demands by regulators, space users, and investors. The indirect benefits of reduced resource use as a result of their impacts on regulators; space users and investors are identified and described as benefits in other parts of the GBFC Sustainable Property Cost-Benefit Checklist.	The first step in analyzing the applicability of this benefit is to evaluate actual or projected resource use and cost, and assess the reasonableness of measurements and reporting. Are the measurement metrics correct? Are appropriate historic time periods used? Are projected benefits based on a combination of sustainable features and strategies logically estimated? Reduced resource use, particularly reductions in energy and water use, and resulting cost savings, have typically been perceived as the easiest to analyze and assess quantitatively, and thus have been emphasized by real estate decision makers. This perception is largely accurate, particularly for existing sustainable properties with seasoning, but there are still key issues to consider when evaluating the financial performance of a property as a result of reduced resource use. Key issues include the reliability and accuracy of forecasts, the durability of reduced resource use over time, the influence of changing resource prices, the effect of lease structure and allocation of benefits over time, and the quality/reliability of measurement and verification practices. The specific challenges and methodology to assess the

[62] U.S. Green Building Council, February 2009.

[63] "The Green Built Environment in the United States, 2008 Year-end Update of the State of the Insurance Market," Marsh, February 2009.

[64] Ibid.

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Potential Property Benefits	Description of Benefit	Applicability Analysis[54]
		reliability and accuracy of energy forecasts is presented in Chapter VI, Section E: Underwriting Energy-Carbon Reduction. Energy is by far the most important issue in understanding the value and financial performance of sustainable properties, and thus should be focused on in the underwriting or due diligence analysis. Energy costs are significant in the operating cost budget and reduced energy use is also the most integrally tied to regulator, space user and investor demand. Many of the other non-energy related resource use benefits are of less magnitude, and it is more reasonable to rely upon forecasted savings based on design intent and an analysis of sustainable property process and feature risks. There is direct evidence of lower property/casualty insurance costs for sustainable properties, based on policies offered by Fireman's Fund Insurance, Lexington, ACE, Traveler's, Liberty Mutual Property, and others.[63] In evaluating the cost savings from insurance policies it is important to assess both the actual cost savings as well as benefits due to coverage enhancements and other changes. [64] Lower maintenance costs can be achieved through reduced expenditures to clean carpets, less frequent light bulb replacement, and changes in the schedule and nature and cleaning, among other factors.

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Potential Property Benefits	Description of Benefit	Applicability Analysis[54]
E. Improved Building Operations	Improved building operations can contribute to increased space user demand due to: • Reduced cost of changing space • Fewer tenant/occupant complaints • Reduced frequency of capital expenditures • Reduced tenant turnover/re-leasing • More reliable functioning of systems	Improved building operations are primarily a result of a more thorough planning process and integrated design; commissioning which improves the functioning and reliability of systems; and more flexible and adaptable workspaces due to under-floor air ventilation and other attributes. As a result of these sustainable attributes, specific building performance relative to tenant/occupant complaints, the speed and cost of tenant improvements, and the frequency of capital expenditures can be improved. Given the rapid change in many organizations, both in building owners and tenants, space that is built to be very flexible has significant advantages in its ability to adapt to changing needs at the smallest possible cost. Flexibility is not only a sustainable issue, but sustainable attributes can contribute to flexibility. Further, a building that is flexible and durable enough to meet changing needs over a longer period of time is more sustainable.
1. Reduced cost of changing space	The Institute of Facility Management (IFMA) defines "churn" rate as the number of moves in a year expressed as a percentage of the total number of offices occupied. Churn rates averaged 36% in a 2007 IFMA survey, down from 44% in 1997 and 41% in 2002. "More than 85% of the moves are 're-stacking' moves, which take place within the same building. Those re-stacking moves take different forms. Box moves, in which employees move to existing workspaces, involve relocating files and supplies, not furniture, wiring, or telecommunications systems. Furniture moves are more complex and involve	The potential benefits of reducing churn costs will be a function of the level of churn for the types of space users that will be occupying the space, and the specific types of sustainable features (under floor air ventilation, carpet tiles, etc.). According to IFMA research, the primary drivers of churn are Reorganization (70%) Routine churn (53%), which includes collocating groups to improve collaboration and maximize efficiencies within and between departments Expansion (46%)

[65] Churn Reconsidered, Herman Miller 2008; "Project Management Benchmarks," IFMA, Research Report #28, 2007, p. 41.

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Potential Property Benefits	Description of Benefit	Applicability Analysis[54]
	reconfiguring existing furniture or adding new furnishings, although changes to telecommunications are usually minimal. Construction moves are the most complex and include new walls and telecommunications systems and additional wiring for power and data. Costs associated with the three major elements involved in these moves—furniture, cabling, and walls—vary depending on a number of factors. These include prevailing labor rates, materials used (Category 5e cable versus Category 6), and technology support required. A facility designed for wireless access can reduce costs considerably because no wiring is required. IFMA-member companies reported that box moves average $152, whereas furniture moves cost $679 per move, excluding power and cabling changes. Moves that include changes to power and cabling range from $200 for simple changes to $600 for extra circuits and receptacles. Typically, costs per drop (bringing two or three cables into a workstation) are an additional $300 to $450, and that's only for data cabling; electrical is additional. Thanks to wireless networks that allow people to work from anywhere in the building, "soft costs," associated with downtime (lost productivity) are less of a problem than they used to be.[65]	Consolidation (33%) Downsizing (11%) and mergers (9%) are the weakest drivers of churn. [66]
2. Fewer tenant/occupant complaints	Well-designed sustainable properties can result in fewer tenant/occupant complaints. This can be as a result of greater control (windows that open, individual office environmental controls), improved thermal comfort, improved functioning of equipment (commissioning and recommissioning), increasing the amount of daylight, and other factors.	The primary evidence supporting this potential benefit would be tenant/occupant satisfaction studies that cover the type of building and/or potentially the types of tenants in the subject property. Similar information obtained from local brokers, the subject property building manager, and/or interviews or discussions with tenants could also supplement this analysis. It is not important to precisely quantify the magnitude of this potential benefit, but incorporate findings into the overall discussion and understanding of improved building

[66] Ibid.

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Potential Property Benefits	Description of Benefit	Applicability Analysis[54]
		operations, and potential implications on operating costs and space user demand.
3. Reduced frequency of capital expenditures	Sustainable properties can benefit from more durable products and materials and longer life due to more frequent recommissioning. More flexibly designed interior improvements and core and shell designs can improve the longer-term durability/adaptability of a property.	Hard evidence of the reduced frequency of capital expenditures is not yet available in the U.S. due to the longer-term nature of such data, and the relatively recent growth of the sustainable property market. Those seeking capital should provide strong articulation of potential benefits, and the potential for reduced capital expenditures should probably be treated as a risk benefit, rather than a specific adjustment in potential capital expenses, unless it can be convincingly demonstrated.
4. Reduced tenant turnover/re-leasing	Reduced tenant turnover due to higher tenant retention rates due to improved space user demand for the property will reduce the costs of tenant turnover as well as releasing expenses. Tenant improvement and leasing expenditures for new versus returning tenants are substantially greater.	The best evidence for potential reduced tenant turnover is the overall determination of the potential for increased space user demand, discussed fully in Chapter VI: Section F: Underwriting Space User Demand.
5. More reliable functioning of systems	Sustainable properties have the potential for more reliable functioning of systems due to the improved communication among participants in the development process due to integrated design, commissioning, and recommissioning.	The potential for more reliable functioning of systems needs to be offset by potential difficulties of systems if they are too pioneering in nature. Additionally, this is just one of many points that support improved building operations, which is part of what will attract both space users and investors. It is not necessary to precisely quantify the incremental contribution of more reliable functioning of systems, just include it in the articulation of potential benefits if warranted by the subject property.
F. Reduced Cash Flow/Building Ownership Risk		
1. Improve ability/cost to meet future regulatory compliance	Sustainable properties are well positioned to significantly reduce cash flow/building ownership risk. Lower risk will increase value by lowering discount and capitalization rates, and lower the required return necessary for investors/corporations to make a positive decision about sustainable property investment. (More detail in Chapter V: Section E: Assess Costs/Benefits of Sustainability) For investors or lenders, the most important risk benefit is the protection against future increases in demand for sustainable properties by regulators, space users, and investors. Given the dramatic increase in demand and the fact that lenders or investors will be evaluating cash flow	The measurement and assessment of potential reduced cash flow/building ownership risk is based on a compilation of the underwriting of the subject property's attractiveness to regulators, space users, and investors, as well as an assessment of reduced resource use projections, and other factors. The traditional way discount and capitalization rates have been generated is through market research. Capitalization rates are calculated based on evaluating comparable sales of commercial properties, and discount rates are typically determined through an analysis of the most likely buyer of a project, and their rates of return requirements,
2. Ability to capitalize on future government incentives		
3. Improved ability to meet changing space users demand		
4. Improved ability to meet changing investor demand		
5. Prevent risk of loss of "social license" to operate building		
6. Limit liability due to building		

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Potential Property Benefits	Description of Benefit	Applicability Analysis[54]
related health issues—sick bldg, mold claims	streams well into the future, protection against future change will be a critical risk benefit. Space users (tenants and corporate owner-occupants) will also be interested in the risk benefits from regulatory and investor demand change, but will have even more direct concern about the ability to limit liability due to building health-related issues, limiting the risk of future energy or water cost volatility, and other factors.	through surveys or other means. Market derived discount and capitalization rates are then adjusted for the specific concerns and considerations of the particular property, given its risk attributes. When market transactions are limited, and capitalization and discount rates are difficult to determine based on market evidence, or the number of property sales for a particular specialized property type is too low (as is the case with sustainable properties), the derivation of capitalization and discount rates relies more upon a detailed articulation and reconciliation of the risk-increasing and risk-decreasing factors of a particular property. While anecdotal (based on many interviews and discussions, but not based on a random or statistically significant survey), our research shows that for most institutional investors, new development projects achieve a relatively high level of sustainability, and institutions are moving rapidly to assess their existing portfolio's sustainability related potential for functional or economic obsolescence due to sustainability. Many of the largest real estate owners are developing specific acquisition screens to eliminate potential risks from properties that are unsustainable, or where the cost to cure potential obsolescence from sustainability is not financially feasible. Additional surveys, anecdotal evidence, and actual valuation evidence will increase in the future, improving the capability to analyze this issue. One important caution in trying to determine the incremental effect of sustainability on property value is the tremendous increases in value between 2005 and 2007 and the subsequent substantial decreases in value after that time. Given these substantial changes, with values changing as much as 2% a month during certain time periods, any statistical efforts to isolate sustainability will be very difficult.
7. Limit exposure to future compelling health and/or productivity research		
8. Reduced risk of reliance on grid (terrorism)		
9. Increased flexibility/adaptability		
10. Reduce risk of building not operating as designed		
11. Limit exposure to energy/water cost volatility		
12. Reduced exit/take-out risk Improve financing—terms, price, availability, etc. Increase flow of capital from SRI/RPI Funds		
13. Overall reduced potential loss of value due to functional, economic and physical obsolescence		

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Potential Property Benefits	Description of Benefit	Applicability Analysis[54]
G. Public Benefits[67]		
1. Infrastructure Cost Benefits	Water collection, storage, treatment and distribution • Energy production and distribution • Road & bridge construction/maintenance • More efficient use of existing infrastructure	See Public Benefits discussion in Expanded Chapter V-C2-a.
2. Environmental & Resource Conservation Benefits	Conservation of natural resources • Landfill reduction • Reduce air pollution • Reduce water pollution • Reduce soil erosion • Reduce deforestation • Reduce desertification • Preserve ozone layer • Reduced drought risk	See Public Benefits discussion in Expanded Chapter V-C2-a
3. Land-Use Benefits	Preserve open space and natural habitat • Protect agricultural land • Maintain vibrant urban areas • Reduced traffic congestion	S See Public Benefits discussion in Expanded Chapter V-C2-a.
4. Reduced Climate Change	Reduce vulnerability to climate change • Reduce costs to respond to change • Reduce spread of infectious respiratory disease • Reduce acidification • Contribute to many other environmental benefits • Improve public health	See Public Benefits discussion in Expanded Chapter V-C2-a
5. Economic Benefits	• Job creation • Improve public health and well-being • Reduce insurance costs	See Public Benefits discussion in Expanded Chapter V-C2-a.

[67] Public benefits become private investor/landlord benefits when the investor/landlord can monetize the benefits through government regulatory relief, incentives, tax benefits, etc.

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Potential Property Benefits	Description of Benefit	Applicability Analysis[54]
	• Reduced public health costs—Medicare • Reduced government employee costs • Increased worker earnings and tax revenues • Community competitiveness – quality of life	
6. Security Benefits	Reduce reliance on foreign energy sources	See Public Benefits discussion in Expanded Chapter V-C2-a
H. Increased Investor Demand		
1. Reduced capitalization and discount rates	The primary benefit of increased investor demand is to reduce capitalization and discount rates, which result in higher property values. Increased investor demand is largely tied to: • Increased space user demand • Lower operating costs • Reduced cash flow risk • Favorable depreciation/other tax benefits • Reduced risk of functional obsolescence	As discussed briefly in the reduced cash flow/building ownership risk section above, the evidence for increased investor demand is difficult to quantitatively determine, and will continue to be difficult to incrementally assess for sustainability. However, as is commonly done with conventional real estate, underwriters and valuers develop a detailed understanding of the most likely buyers of a potential property and assess the property attributes that are important to these groups. This research is based on surveys of investors by third parties, surveys by underwriters and valuers, analysis of qualitative and quantitative work evaluating investor demand for property, and other information. Understanding an investor's interest in sustainability is no more difficult than ascertaining their interest in particular building designs, locations, floorplate sizes, lobby or landscape quality, or other factors that are conventionally considered in a real estate analysis. New sources of third-party research concerning investor demand are beginning to appear and will grow in their scope and sophistication.
2. Reduced exit/take-out risk	Another key benefit of increased investor demand is reduced exit risk for developers, who sell their finished products, and reduced take-out risk for construction lenders, who must rely upon permanent take-out financing to exit their commitments.	See argument above.
3. Increased FAR—zoning--density bonuses	One of the potential benefits of sustainable properties is increased floor area ratio, density bonuses, or other zoning benefits that can increase the volume of space that can be	Looking at local government regulations for the subject property, and determining if the subject property's sustainable performance meets threshold requirements

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Potential Property Benefits	Description of Benefit	Applicability Analysis[54]
	built on a particular piece of land, increasing the value of the land, and the value of the project to investors and developers.	can help determine a property's potential FAR/zoning density bonuses.
4. Improved access to debt financing	Improved access to debt financing will increase the demand for a property by investors. Favorable financing, particularly relative to access, even if costs are not significantly lower, would be a substantial benefit in today's property debt financing marketplace.	This needs to be assessed through understanding of most likely capital sources and their position towards sustainable properties.

Potential Property Costs	Description of Cost	Applicability Analysis[68]
A. Increased Development Costs		
1. Certification, energy modeling, legal and commissioning costs 2. Higher cost specialized service providers 3. Higher cost products and systems 4. Higher tenant improvement costs for green improvements 5. Higher finance costs—more high cost equity; increased construction interest 6. Project delays	One of the most hotly debated issues in the sustainable property sector is whether sustainable properties or retrofits cost more than conventional properties. This "first cost" analysis is discussed at some length in Section F-3 of Chapter V and in more depth in Chapter IV, Section E-1 on Development Costs. As fully discussed in those sections, the clarification of the cost question, as well as a full consideration of cost-increasing and cost-decreasing attributes of a sustainable project are critical to addressing this issue. Sustainable properties do have additional costs compared to conventional properties. Sustainable certifications, more sophisticated energy modeling, and higher legal and commissioning costs increase development costs over conventional projects. Higher costs for products, materials, systems, and specialized service providers are possible, and to be expected in some cases, but this will vary dramatically by project and geography, as well as the particular market conditions relative to the contractor bidding climate and other factors. There have been dramatic improvements in the cost and	Potential increased development costs can be evaluated through assessing development budgets, sustainable process and feature issues, and other mitigation strategies. The potential for increased development costs can be mitigated through an evaluation of the integrated design process, contracts, service provider capacity, and a review of the nature of the sustainable features and systems to check for any pioneering or higher risk design and construction elements. Another key issue in thinking about the incremental cost of sustainable construction is to be careful to not attribute too much of any construction cost increase, or volatility, to sustainability alone. For example, in the four years prior to the economic collapse in 2008, the Producer Price Index (prices of materials and components for the construction industry) went up 40%, compared to just 18% for the consumer price index.[69] Some of the key inputs into the construction process increased at a much faster rate during this time period: Crude oil: 301% Diesel: 252%

[68] This column provides select guidance on assessing the applicability of a general cost-benefit to a specific property.

[69] Smart Construction: Economical Building Solutions to Offset Soaring Materials Prices, Leo Pardo Construction, Bureau of Labor Statistics, Jan. 04 to Jan. 08 Time Period, 2008.

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Potential Property Costs	Description of Cost	Applicability Analysis[68]
	availability of sustainable products, systems and materials in recent years, and growing sophistication and capacity of service providers. However, projects seeking a leadership position as to their sustainability rating, or in the use of pioneering products or systems, will experience both higher costs, and greater uncertainty than conventional properties. We have not seen specific evidence of higher tenant improvement costs or higher financing costs, but both are possible. Higher tenant improvement costs could result from the use of relatively expensive glass or lighting systems in internal spaces, or from product or service provider capacity and experience issues. Financing costs could be higher if lenders do not recognize the value of some sustainable improvements, increasing the amount of high cost equity that is needed. Additionally, with greater up front expenditures for planning and other activities, construction interest may also increase due to earlier and larger loan draws. Development costs can also increase through project delays due to the complexity of sustainable construction, delayed product or system deliveries, or capacity issues relative to contractors and subcontractors. Such delays can increase construction cost due to timing and management problems and an increase in construction period interest.	Asphalt: 190% Gasoline: 167% Copper and brass: 146% Iron and steel: 114% Concrete: 36% Consumer Price Index: 18% The rapid increase in the cost of fuel during this time period influenced most costs. It affects petroleum-based materials such as asphalt, plastic, rubber, PVC, insulation and roofing shingles, and every single construction material requires manufacturing and transportation, sometimes across thousands of miles, which consumes fuel. Accordingly, while fuel prices are significantly down in 2009, sustainable products and practices (emphasis on local materials) can both mitigate construction costs and construction cost volatility. It is also important to remember when evaluating potential incremental increases in development costs for sustainability, that it is often difficult to get a statistically significant answer, given the relatively high variance in bids by contractors for the same construction plan. While estimates of bid variance of 5% to 10% for construction contracts is a reasonable rule of thumb, a recent study of commercial interiors projects found that average bid swings for many components, such as ceiling tile and carpets, had an average bid swing of 5%, while electrical bid swings pushed as high as 20%. This was important in that approximately 25% of the interior construction costs was spent on electrical, based on the study's results.[70] While this type of analysis is important for any project, it should be noted that the key issue in making a sustainable property investment decision is not whether the initial costs are more than a conventional project, but whether the additional costs, if any, are supported by sufficient benefits to justify potentially higher initial costs.

[70] Ibid.

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Potential Property Costs	Description of Cost	Applicability Analysis[68]
B. Increased Development Risk		
1. Construction risk	Sustainable property investment can increase construction risk, which is defined as the risk that a project will not be completed on time or within the allocated budget. Some of the key issues that can increase construction risk include: Pioneering design and construction • Contractor bidding climate and uncertainty: contractors demand payment for uncertainty in the bidding process • Pioneering products/systems o Untested performance and reliability o Availability o Combining new systems/technology o Potential for rapid functional obsolescence • Systems interoperability • Increased new/retrofit construction complexity • Potentially underestimated contingency reserves • Building codes and regulation complexities/limitations • Service provider capacity and experience • Specialized subcontractors / equipment • LEED / Certification compliance • Regulatory compliance • Credit capacity of subcontractors • Capacity of sureties to handle green projects	An evaluation of construction risk is similar to the evaluation of the potential for increased development costs above. While much of the risk can be mitigated through using experienced contractors and service providers; limiting untested or pioneering design, construction and features; and engaging an experienced sustainable certification consultant to lead you through the process, paperwork, and other required tasks, many sustainable properties will still experience significant additional construction risk. One example of increased risk can occur with building codes and related regulations. With over a hundred years of building codes based primarily on life and safety factors, even well-intentioned municipal and state governments cannot eliminate the conflicts that exist with some aspects of sustainable properties. Waterless urinals have been a particular issue as many local governments, due to union and other pressures, either do not allow waterless urinals, require dual sets of plumbing, or do not allow waterless urinals for an individual tenant build-out. With governments, building owners, and tenants starting to come together on these issues, it is hoped that these kinds of risks can be further mitigated in the future. Performance bonds, payment bonds, completion bonds, and other types of surety are also used to mitigate construction risk. Performance bonds protect lenders in the event the contractor fails to complete the project as agreed. Payment bonds are an undertaking by the surety that all persons supplying labor and materials to the project will be paid. Completion bonds involve the surety agreeing to complete the project, regardless of cost.[71] Sustainable projects, like conventional projects, can mitigate risk through these types of surety. Based on a survey by Marsh in early 2009, sureties have not developed any new products or services for the green

[71] US CMBS: Moody's Approach to Rating Commercial Real Estate Construction Loans, January 20, 2006.

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Potential Property Costs	Description of Cost	Applicability Analysis[68]
		building marketplace, and have made no specific adjustments to their underwriting criteria to deal with this sector. Some sureties surveyed did have specific concerns revolving around onerous contract provisions and the risk of inadvertently guaranteeing a specific performance or efficacy for energy usage, water consumption, and/or LEED certification. Green contracts are being closely monitored. Marsh also reports that some jurisdictions have implemented regulations that require bonds to guarantee LEED certification and specific performance standards. Such regulations have generated scrutiny from surety companies both individually and on the part of the industry association. However, green building ordinances that contain surety requirements have not yet been pushed down to the contractor level. There have been no known issues of green related contractor defaults.[72] Standard construction loan risk management techniques will also reduce potential risks. Reputable and experienced borrowers, construction managers, or a guarantor of debt by a credit-worthy borrower guarantor is one method. Construction loan draws should be linked to construction performance, based on inspections and lender approvals. Delay cost reserves covering any potential expenses that could be incurred (such as might be payable to a key tenant due to delay) can also be put in place. Budget contingencies, typically at 5% to 10% of the total project budget, are also usually required.
2. Legal/contractual risks	Sustainable properties introduce a number of important legal and related contractual risks that increase development risk if not appropriately mitigated through improved contracts, training, and behavior. Some of these risks include: • Design firm professional liability • Construction contracts • LEED/Certification Liability • Misrepresentation and fraud risk: marketing and	**Design firm professional liability.** Design firm professional liability is primarily an issue for architects and design firms who want to limit the potential for litigation, but improved and more clearly specified contracts will also help investors. For any owner or investor who has gone through litigation, they know that even the winners often do not "win."

[72] Extracted from "The Green Built Environment in the United States, 2008 Year-End Update of the State of the Insurance Market," Marsh, early 2009.

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GBFC Sustainable Property Cost-Benefit Checklist

Potential Property Costs	Description of Cost	Applicability Analysis[68]
	leasing protocols • Warranties • ESCO contracts • Entitlements • Insurance contracts	From the owner perspective, design and construction is already complex, and additional sustainability requirements and issues can make it even more so. Given the leadership of architects and designers in sustainability, it is natural and appropriate for owners to look to architects for education and guidance in this new field. However, it is important that the owner understand that their job is to communicate the importance of the economics, and the values that they are seeking in a project, and it is to their benefit to have contracts that clearly lay out the relative risks and responsibilities between architects and designers and owners. The architectural community has stepped up their responsibilities to sustainable design in recent years: "Looking at AIA B101-2007, the standard form of contract between architect and owner, sustainable duties are immediately apparent. That document provides, in pertinent part: 3.2.5.2 The architect *shall* consider environmentally responsible design alternatives such as material choices and building orientation, together with other considerations based on program and aesthetics that are consistent with the Owner's program, schedule and budget for Cost of the Work. (Emphasis added) Thus under the AIA contract, for the very *first* time, the

[73] Frederick F. Butters, "Greening the Standard of Care: Evolving Legal Standards of Practice for the Architect in a Sustainable World," *Real Estate Issues*, Counselors of Real Estate, Vol. 33, No. 3, 2008.

[74] Ibid.

[75] Extracted from "The Green Built Environment in the United States, 2008 Year-end Update of the State of the Insurance Market," Marsh, February 2009.

[76] Paul Arelli, "Selling and Governing the Green Project: Owner Risks in Marketing, Entitlement and Project Governance," *Real Estate Issues*, Counselors of Real Estate, Vol. 33, No. 3, 2008.

[77] Cathy Turner and Mark Frankel, "Energy Performance of LEED® for New Construction Buildings," New Buildings Institute Final Report, March 2008, pp. 1-4.

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		architect is actually required to consider and evaluate green or sustainable design alternatives as part of the base services. The AIA Canons of Ethics create and impose similar duties, taken one step further. Under the modern Canons, the architect now actually has duties running to the environment. In that regard, Canon IV – Obligations to the Environment, specifically provides.: Members should *promote* sustainable design… E.S.6.1 Sustainable Design: In performing design work, members should be environmentally responsible and ***advocate*** the design, construction and operation of sustainable buildings and communities. E.S.6.3 Sustainable Practices: Members should use sustainable practices within their firms and professional organizations, and they should ***encourage*** their clients to do the same. (Emphasis added.)"[73] Architects and owners need to be careful and understand the role of an "advocate" for sustainable design, and appropriately recognize their relative responsibilities and roles. Frederick Butters, in his article[74], provides an example of this issue: "For example, the architect who takes the AIA documents' admonishment to "advocate" for sustainable design and sustainable products to heart and recommends to the owner an HVAC system based on a heat pump package that draws on a geothermal or water source. Unfortunately, the projections regarding the temperatures at which the geothermal or water source run are erroneous and the actual temperatures are warmer than projected. As a consequence, the system is less efficient and unable to maintain comfort on 10 percent of the

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Potential Property Costs	Description of Cost	Applicability Analysis[68]
		warmest days in the summer. Tenants are angry and withholding rent. Vacant space remains vacant. The owner is faced with a complete retrofit of the HVAC system in order to resolve the problem at substantial expense. The owner looks to the design professional to correct the problem. While it may seem like a good idea, geothermal-based energy sources are unpredictable. If the architect does not clearly and sufficiently indicate the positives and negatives of the HVAC options, the client will be looking to the architect to make him or her whole. Becoming an advocate for many types of sustainable approaches may cause the design professional to overlook the messy reality for the sake of being a good advocate." The American Institute of Architects understands the importance of risk issues and has a series of 14 different memoranda in the risk management best practices strategies section on their website. Other potential design risks include: "Liability for the increased cost of certain types of damages, such as lost profits, lost business opportunities, increased tax burdens, and energy costs. Liability for warranting an outcome without having complete control over things such as construction means and methods and operation and maintenance. Liability for structural problems and leaks associated with green roofs. Lack of proper green experience and qualifications on the part of the design team. Lack of control over material specifications and substitutions on the p art of the contractors."

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Potential Property Costs	Description of Cost	Applicability Analysis[68]
		The 2009 Marsh Report made the following observations: "As of May 2008, all markets surveyed acknowledged that it is premature to draw any conclusions or to offer new coverage. Much will likely depend on the claim activity or lack thereof. Insurers already have experienced claim activity. Below are several examples: • Claim by developer against architect because building did not achieve LEED Gold Certification. • Claim against architect and structural engineer due to water infiltration from green roof. • Claim against design team because the cork flooring they specified resulted in water retention and mold. • Claim against architect because lack of green product availability caused project delays. • Claim against architect because health problems of tenants' employees increased despite warranties that the indoor air quality would improve. Most markets believe that traditional design professional liability policies provide a significant amount of coverage for the negligent performance of professional design services. However, the general consensus is that a key difference between traditional design and green design involves enhanced performance expectations (i.e., energy savings, employee productivity, etc.) and an evolving standard of care, which may not be covered by traditional architects and engineers professional liability insurance policies. As of the date of creating this report, no insurance

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Potential Property Costs	Description of Cost	Applicability Analysis[68]
		companies surveyed have made changes to their underwriting criteria, pricing and/or coverage with respect to the design of green buildings. Several insurers do provide risk and contract management advice for their design firm clients. Focus is placed on the avoidance of performance guarantees, the appropriate standard of care, and a well-defined scope of services."[75] **Marketing risk** Owners could also be subject to significant legal risk in the marketing of their projects. Sustainable property investors and developers are subject to claims of misrepresentation and fraud resulting from property marketing. These risks arise largely because the marketing process begins well before a project is certified, a lack of knowledge about the studies and data they cite, insufficient consideration of the specific application of studies and data to their project, and the actual variability in sustainability outcomes achieved by properties to date. As a result, sales and leasing brokers or principals marketing their projects have the potential to make claims that are untrue at the time that they make them. Many in the market are confused about the difference between pre-certification, registration, certification, and other varying levels of sustainability. It is also important to be careful in making "first in market" claims or other claims that are not carefully researched. Given the long time frame in which marketing documentation often exists, these kinds of claims can also become untrue over the life of a document.[76] It is particularly important not to cite industry studies without appropriate caveats and/or limitations. Many studies show that actual energy performance is quite volatile with a wide scatter among the individual results that make up an average energy savings. Consequently, if an owner cites averages in marketing their project, there

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Potential Property Costs	Description of Cost	Applicability Analysis[68]
		is a high likelihood that they will be wrong. [77] There is also a substantial risk in presenting or promoting a project with unsupported claims in that capital providers, as part of their due diligence, often will uncover poorly supported or misleading facts and statistics, thus undermining the credibility of all of the appropriately argued and supported information in a funding request. These risks can be mitigated through training of staff and the development of protocols for reviewing marketing and promotion materials. A good discussion of these and other issues can be found in “Selling and Governing the Green Project: Owner Risks in Marketing, Entitlement and Project Governance,” Paul D. Arelli, *Real Estate Issues,”* Counselors of Real Estate, Vol. 33, No. 3, 2008. On a similar note, unsubstantiated or over-stated claims made during the entitlement process can also lead to problems, and potentially be turned around on a developer by becoming part of the requirement(s) of the development agreement. The Federal Trade Commission has published a brochure, “Complying with the Environmental Marketing Guides” that provides the FTC staff's view of the law's requirements. The FTC Act gives the Commission the power to bring law enforcement actions against false or misleading marketing claims, including environmental or “green” marketing claims. The FTC issued its Environmental Guides, often referred to as the "Green Guides," in 1992, and revised them most recently in 1998. The Guides indicate how the Commission will apply Section 5 of the FTC Act, which prohibits unfair or deceptive acts or practices, to environmental marketing claims. Like other industry guides issued by the FTC, the Environmental Guides “are administrative interpretations of laws administered by the Commission for the guidance of the public in conducting its affairs in conformity with legal requirements.” Conduct that is inconsistent with the positions in the Environmental Guides may result in corrective action by the Commission,

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		if after investigation, the Commission has reason to believe that the conduct violates prohibitions against unfair or deceptive acts or practices. The Environmental Guides apply to all forms of marketing for products and services: advertisements, labels, package inserts, promotional materials, words, symbols, logos, product brand names, and marketing through digital or electronic media, such as the Internet or email. They apply to any claim, express or implied, about the environmental attributes of a product, package or service in connection with the sale, offering for sale or marketing of the product, package or service for personal, family or household use, or for commercial, institutional or industrial use. See the complete text of the Environmental Guides. http://www.ftc.gov/bcp/edu/pubs/business/energy/bus42.shtm Construction contracts, warranties, escrow contracts, insurance documents, and other specialized legal documents also add risk, simply because they are new and may be untested by owners and developers. Appropriate legal representation and/or other specialized services should be retained to mitigate these types of risks.
3. Exit/take-out risk	Sustainable property developments, like all developments, are subject to exit or take-out risk. Take-out risk is the risk that a construction loan's balloon will not execute as planned. Exit risk relates to the sufficiency of the price an owner would be able to achieve at the time of sale. Failure to execute a take-out could be due to rising interest rates, capital market distress, and/or sustainable property underperformance in areas like those shown below: • Building envelope performance • Product / system performance: combining new systems and technologies • Energy cost volatility • Contractor experience / performance	The key issues in assessing the implications of sustainability on exit or take-out risk for a specific property include those issues addressed above in the construction and legal risk sections, but are even more heavily focused on real estate market risk. The financial performance and value of a property is key to exit/take-out risk. Permanent take-out loans will typically have specific requirements relative to pre-leasing, pre-sales, or other specific targets that must be met. Sufficient value is key to equity investors, particularly developers; whose profitability is driven by sales prices once the project is complete. Unlike conventional properties, not only does the market

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	• Service provider performance • Building underperformance • Market underperformance	have to be strong for the property, but there is also a more significant issue relative to commercial broker and appraiser recognition of that value. While both the commercial brokerage and appraisal industries are ramping up their training and education efforts in the sustainability area, it will take a number of years for these service providers to increase their understanding and acceptance of sustainability benefits. One of the key market risks that need to be assessed is whether the level of sustainable property investment matches the demand by tenants and investors in the marketplace. For example, while a high level platinum or gold LEED building is a very desirable outcome, depending on the types of space users and most likely buyers in the marketplace, it is possible that the level of expenditures required to reach the highest levels of sustainability might be viewed as an over-investment relative to the market. This type of risk is similar to that experienced by all developers, who must match their building design and quality successfully with market demand, or risk the consequences. Another interesting area of risk that needs to be considered is that of the building enclosure. Daniel Lemieux, AIA, in a recent article, stated it this way: "Energy efficiency is not the only goal of a sustainable building. Other goals include indoor environmental quality and durability. Simply put: uncontrolled rainwater penetration, condensation and moisture ingress are three of the most common threats to the long-term durability, structural integrity and performance of the building enclosure. In the past, statistical data has suggested that collectively they represent up to 80% of all construction related claims in the United States."[78] Mr. Lemieux goes on further to say that "since 2004, a new pipeline of litigation has begun to form, partially stimulated by the growing demands of sustainability for

[78] Daniel J. Lemieux, "Trust, But Verify: Building Enclosure Commissioning in Sustainable Design," AIA, *Real Estate Issues*, Counselors of Real Estate, Vol. 33, No. 3, 2008; Bomberg, M. T., and Brown, W.C. (1993), "Building Envelope and Environmental Control: Part I – Heat, Air and Moisture Interactions," Construction Canada 35 (1), 15-18.

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		improved energy and related resource use. He suggests that the primary problems in the context of building enclosure failure originate from errors and omissions arising from the frequently short-circuited design process, one that reflects the compartmentalization of design and, in many instances, the attempt to relocate design responsibility downstream to the subcontractors and trades responsible for the work."[79] Mr. Lemieux suggests that specialized building enclosure commissioning can assist in reducing potential problems with the building enclosure.
C. Decreased/Unchanged Space-User Demand		
1. Excess investment cost relative to market demand	• Invested more than market willing to pay • Selected incorrect combination/mix of sustainable features	Every real estate project faces risk from over-investment—spending more on a building or project than the market is willing to pay for it. For sustainable properties, which are often difficult to clearly define, and certainly the marketplace have an unclear understanding of the differences in levels of sustainability, this issue can be even more important. To assess the applicability of this particular risk, you need to compare the level of sustainability planned for a project, and the related costs, with the particular profile of the space users expected in the building. This analysis of space users, which is described in more detail in Chapter VI: Section F. will provide perspective on space user needs. Tenant surveys and an initiative like the Sustainable Leasing Initiative, which provides a minimum checklist of the types of sustainability requirements multinational corporations want, can provide some indications of the minimum standards required by the space user market. While the evidence is anecdotal, the Consortium's research suggests that achieving the highest levels of sustainability (a gold or platinum level for a LEED certification) is probably not needed to capture much of the space user demand. This may change over time as the market matures and higher levels of sustainability become the norm, and will certainly not be

[79] Ibid.

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		true for the LEED headquarters buildings of most major space users, where a high level of certification is typically desired.
2. Space-user demand does not meet expectations	• Price/non-sustainable factors dominate specific target occupiers • Tenants not educated enough • Less demand from smaller tenants in smaller buildings • Gross-lease market does not encourage tenant focus on cost savings • Liability limits marketing benefits • Incorrect assessment of likely space users	To assess the applicability of this particular risk, the valuer/underwriter needs to consider the sophistication and education of likely space users, market conditions, which could make rent a dominant factor for some types of users, potential limitations in marketing benefits, and consideration of the specific terms of leases (particularly if it is an existing building).
3. Building operating problems	• Products underperform • Service providers underperform • New systems learning curve for engineering staff/maintenance staff/etc. • New/different systems can reduce economies of scale for engineering staff for a concentrated portfolio of similar assets • Capacity/seasoning of service providers/contractors • Tenants do not cooperate	This potential risk is particularly applicable for existing buildings, which sometimes experience underperformance problems in the initial ramp-up after a sustainability retrofit as tenants, management, and maintenance staff learn about operations of the newly retrofitted building.
D. Increased Operating Costs		
1. Higher maintenance costs--training, manuals 2. Vendor availability and pricing 3. Product or system failure/underperformance 4. More costly lease analysis and implementation 5. Higher real estate taxes 6. Costs of required additional monitoring/measurement 7. Resource cost increase	In most cases, sustainable property investment will not result in increased operating costs, but perhaps operating costs that are higher than initially projected. For example, while the original projections could be for a 40% reduction in energy use, insufficient training of engineers, maintenance staff, and tenants, as well as systems or service providers that do not meet performance expectations, could limit the reduction in energy use to a lower number, say 25%. Additionally, energy costs could have gone down significantly, like they did in 2008, reducing operating cost reductions, while resource use reduction may have met original projections. Additionally, sustainable properties require additional	(See Section I-D of this Appendix)

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Potential Property Costs	Description of Cost	Applicability Analysis[68]
	monitoring and measurement of sustainability outcomes, and, in addition to the capital cost to put in such systems, there are additional operating costs which will be required, including, at least initially, additional time and expense to administer and address lease issues. If values go up due to the sustainable property investment, higher real estate taxes could result, increasing operating costs beyond historical norms.	
E. Building Operating Problems		
1. Products underperform 2. Service providers underperform 3. New systems learning curve for engineering staff/maintenance staff/etc. 4. New/different systems can reduce economies of scale for engineering staff for a concentrated portfolio of similar assets 5. Capacity/seasoning of service providers/contractors 6. Tenants do not cooperate	Building operating problems can occur on sustainable properties primarily due to products, systems, service providers, maintenance staff, and other factors in the production and operation of a sustainable building that are more pioneering, or untested relative to their reliability. These learning curve issues are more likely to occur in the early operations of a building, but can also occur later due to untested durability and functioning over time of some systems.	The primary way to address the applicability of this potential risk is through evaluating the process and features of a sustainable property. Much of the risk of potential building operations problems can be mitigated through proper planning, modeling, contracts, and the selection of features and systems with more proven track records.
F. Increased Cash Flow Risk		
	The most significant cash flow risk is to underperform pro-forma projections, rather than underperform compared to a property with no or limited sustainability attributes	The best way to assess potential sustainability related underperformance risk is to carefully consider the influence of incremental sustainability investment on key assumptions in the financial analysis or valuation. If the incremental contributions appear overstated, or are not clearly articulated, the risk of underperforming the pro-forma projections will increase.
1. Risk of rapid functional obsolescence	New technologies in sectors of the industry with substantial ongoing research and development investment, like the sustainable property industry, are subject to heightened levels of functional obsolescence, which has a direct impact on value, but can also impact space user demand and cash flows.	Major expenditures on new products, systems, or strategies should be evaluated for this risk and mitigated through supplier contracts, phasing of implementation, further research, and other means.

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Potential Property Costs	Description of Cost	Applicability Analysis[68]
	For example, if an owner paid one million dollars for a new HVAC system, and two years later you could buy an HVAC system that was 15% more efficient for 10% less money, the value of the original investment has gone down due to functional obsolescence due to the introduction of leapfrog technology.	
2. Process Underperformance	One of the biggest risks to cash flow is poorly executed sustainable property processes such as those identified below: • Poor integrated design process • Legal/contractual risks o Design firm professional liability o Green leases o Warranties o ESCO contracts o Misrepresentation and fraud: marketing an leasing o Regulatory compliance o Securities fraud • Insurance o Environmental o Property coverage o Casualty coverage o Business interruption • Inadequate commissioning • Insufficient measurement and monitoring • Insufficient training of property management	To assess the influence of process performance on cash flow risk, the valuer/underwriter must assess each of the key processes, particularly those that have led historically to underperformance like: • Integrated design process • Contracts • Service provider capacity • Energy modeling • Commissioning • Sustainable certification • Measurement and verification • Occupant and building management training See Chapter IV, Section C: Process Performance for more detail on this topic.
3. Operating cost underperformance	Failure on these processes has been found to lead directly to building underperformance and poor financial performance. (See Chapter IV of "Sustainable Property Performance" for more detail) • Product or system failures/underperformance • Excessive lease analysis / administrative costs • Insufficient training / cooperation of property managers / occupants	Each of these issues needs to be evaluated in the context of the specific circumstances with the subject property being analyzed.

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Potential Property Costs	Description of Cost	Applicability Analysis[68]
	• Reliability / accuracy of energy forecasts • Sensitivity to potential declines in energy prices • Reliability of water use forecasts	
4. Revenue underperformance	Revenues are the most significant cost component of net cash flow, so risks must be assessed. Key risks include: • Delays due to regulator problems • Space user demand underperformance o Risk of overimprovement o Prioritizing the wrong systems upfront such that the assets competitive position is diminished relative to peer group. o Incomplete assessment of building uses o Market change o Insufficient consideration of lease impacts (separate meters, etc.) o Insufficient value recognition by commercial broker o Insufficient value recognition by appraisers • Loss of utility mark-up revenues	The potential for risk in revenue performance is a function of the aggressiveness of assumptions in the pro-forma regarding sustainability premiums. While historically revenue enhancement has not been an important part of sustainable property decisions, it will, and should be more important going forward, so more attention will have to be paid to this issue.
5. Value / Sales Price Underperformance	• Inaccurate / over assessment of investor demand • Insufficient commercial sales broker recognition of value • Insufficient appraiser recognition of value	Value/sales price underperformance can be assessed by evaluating the aggressiveness of sales price/value assumptions, the level and quality of analysis of most likely buyers, and a consideration of broker and appraiser recognition of value. For projects with projected sales more than a year or two in the future, and certainly for ten-year projection periods, the rapidly changing investor attitudes towards sustainable property investment need to be considered in selecting residual capitalization rates.
G. Limited/No Increase in Investor Demand		
1. Increase/no change in capitalization and discount rates	• Investors in subject market not educated enough/don't care • Non-sustainable factors dominate pricing/investor demand • Less sophisticated/smaller property owners • Liability limits ability to market advantages • Property improvements built to wrong standard: changing investor "sustainability" requirements	Investors are significantly influenced by space-user demand and the priority that sustainability issues are being given by the providers of capital. Capitalization and discount rates are market derived based on a detailed understanding of many of the issues identified in this Appendix.

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Potential Property Costs	Description of Cost	Applicability Analysis[68]
2. Energy cost declines increase pay-back periods, reduce value of sustainable investment	Resource use could meet expectations but if energy or other resource costs go down, revenues and investor interest could suffer.	Evaluate sources and cost history of resources for the subject property.
3. Existing leases limit ability to pass costs to tenants--capture sufficient benefits to justify costs	• Existing leases in place limit cost pass-throughs on green retrofits • Net leases constrict ability to pass-through higher first cost investments in a competitive market	Evaluate lease structure and potential for lease changes at rollover dates.
4. Failure of appraisers/brokers to accept value/enhanced performance	Negative effect on value and financing	Market research and interviews with local community will help address these concerns.

Appendix V-D

Discounted Cash Flow Model Inputs

Revenue Inputs

Contract rental rates and other lease terms

Market rental rates:

- Ground floor retail $1.50/SF NNN
- Office: floors 2-5 $2.50/SF FSG
- Office: floors 6-10 $2.60/SF FSG
- Office: floors 11-15 $2.85/SF FSG
- Office: floors 16-19 $3.00/SF FSG
- Office: floors 20-23 $3.20/SF FSG

Annual rent growth

- Year 1 3.0%
- Year 2 6.0%
- Year 3 5.5%
- Year 4 5.0%
- Year 5 4.5%
- Years 6-10 4.0%

Vacancy and collection loss - 5.0%

Office lease terms and other assumptions - new and renewing tenants

- Lease term - 5 years
- Free rent - 0 months
- Annual rent escalations - 3.5%
- Downtime between tenants - 9 mos.
- Renewal probability - 65.0%

Parking revenues

- Reserved parking - $225/space
- Unreserved parking - $190/spacae
- Annual parking revenue growth - 5.0%

Expense Inputs

	Year 1
Janitorial	$ 222,572
Porter	72,816
Window cleaning	44,625
Supplies	42,483
Trash removal	28,150
Fire & life safety supplies	31,760
Repairs & maintenance	505,807
Tools & equipment	13,500
Utilities	
– Electricity	647,633
– Gas	43,883
– Chilled water	588,000
– Water & sewer	21,797
Security	209,200
Landscape contract	23,200
Administrative	259,890
Advertising & promotion	25,900
Real estate taxes	2,376,310
Non-reimbursable expenses	37,670
Insurance	188,000

Management fee - 2.0% of Effective Gross Income

Growth factor for real estate taxes - 2.0%

Growth factor for other expenses - 3.0%

Financing Inputs

Loan amount	$73.0 million
Loan-to-value	65.0%
Interest rate	7.5%
Loan term	10 years
Amortization schedule	25 years
Loan points	1.0%
Annual debt service	$6.5 million

Investor Tax Inputs

Ordinary income marginal tax rate	35.0%
Capital gains tax rate	15.0%
Cost recovery recapture tax rate	25.0%
Allocation of cost basis to improvements	80.0%
Depreciation schedule for improvements	39 years

Leasing Expenses & Capital Reserve Inputs

Office tenant improvements

- New tenants/2nd gen. space $ 15/SF
- Renewing tenants $ 10/SF
- Shell space $ 55/SF
- New tenants/2nd gen. space $ 15/SF

Leasing commissions

- New leases 4.0%
- Renewing leases 2.0%

Capital reserves $ 0.35/SF

Property Acquisition & Disposition

Property acquisition inputs

- Purchase price $110.0 million
- Closing costs 1.75% of purchase price
- Loan fee 0.75% of loan amount
- Total acquisitions costs $112.5 million

Property disposition inputs

- Residual capitalization rate 8.5%
- Broker's fee and closing costs 2.0% of sales price

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Discounted Cash Flow Model Inputs

Revenue Inputs

Contract rental rates and other lease terms

Market rental rates:

- Ground floor retail $1.50/SF NNN
- Office: floors 2-5 $2.50/SF FSG
- Office: floors 6-10 $2.60/SF FSG
- Office: floors 11-15 $2.85/SF FSG
- Office: floors 16-19 $3.00/SF FSG
- Office: floors 20-23 $3.20/SF FSG

Annual rent growth

- Year 1 3.0%
- Year 2 6.0%
- Year 3 5.5%
- Year 4 5.0%
- Year 5 4.5%
- Years 6-10 4.0%

Vacancy and collection loss - 5.0%

Office lease terms and other assumptions - new and renewing tenants

- Lease term - 5 years
- Free rent - 0 months
- Annual rent escalations - 3.5%
- Downtime between tenants - 9 mos.
- Renewal probability - 65.0%

Parking revenues

- Reserved parking - $225/space
- Unreserved parking - $190/spacae
- Annual parking revenue growth - 5.0%

Expense Inputs

	Year 1
Janitorial	$ 222,572
Porter	72,816
Window cleaning	44,625
Supplies	42,483
Trash removal	28,150
Fire & life safety supplies	31,760
Repairs & maintenance	505,807
Tools & equipment	13,500
Utilities	
– Electricity	647,633
– Gas	43,883
– Chilled water	588,000
– Water & sewer	21,797
Security	209,200
Landscape contract	23,200
Administrative	259,890
Advertising & promotion	25,900
Real estate taxes	2,376,310
Non-reimbursable expenses	37,670
Insurance	188,000
Management fee - 2.0% of Effective Gross Income	
Growth factor for real estate taxes	- 2.0%
Growth factor for other expenses	- 3.0%

Financing Inputs

Loan amount	$73.0 million
Loan-to-value	65.0%
Interest rate	7.5%
Loan term	10 years
Amortization schedule	25 years
Loan points	1.0%
Annual debt service	$6.5 million

Investor Tax Inputs

Ordinary income marginal tax rate	35.0%
Capital gains tax rate	15.0%
Cost recovery recapture tax rate	25.0%
Allocation of cost basis to improvements	80.0%
Depreciation schedule for improvements	39 years

Leasing Expenses & Capital Reserve Inputs

Office tenant improvements

- New tenants/2nd gen. space $ 15/SF
- Renewing tenants $ 10/SF
- Shell space $ 55/SF
- New tenants/2nd gen. space $ 15/SF

Leasing commissions

- New leases 4.0%
- Renewing leases 2.0%

Capital reserves $ 0.35/SF

Property Acquisition & Disposition

Property acquisition inputs

- Purchase price $110.0 million
- Closing costs 1.75% of purchase price
- Loan fee 0.75% of loan amount
- Total acquisitions costs $112.5 million

Property disposition inputs

- Residual capitalization rate 8.5%
- Broker's fee and closing costs 2.0% of sales price

Property Type: CBD Office
Square Feet: 375,000
Stories: 25

Appendix V-D

Discounted Cash Flow Model Inputs

		Year 1	Year 2	Year 3	Year 4	Year 5	Year 6	Year 7	Year 8	Year 9	Year 10	Year 11
Revenues												
Contract & Market Rents		$14,535,362	$14,681,099	$14,891,176	$15,413,827	$16,038,704	$16,341,311	$16,931,934	$17,308,906	$18,161,525	$19,357,235	$19,989,350
Less: Absorption & Turnover Vacancy		(1,939,548)	(234,360)	(35,459)	(208,510)	(153,671)	(318,318)	(501,959)	(14,579)	(2,414,068)	(449,023)	(1,147,250)
Scheduled Base Rental Revenue		$12,595,814	$14,446,739	$14,855,717	$15,205,317	$15,885,033	$16,022,993	$16,429,975	$17,294,327	$15,747,457	$18,908,212	$18,842,100
Add: Expense Reimbursement Revenue		150,928	336,333	482,641	619,902	745,691	819,584	905,880	1,057,583	950,642	668,362	634,719
Add: Parking Other Income		2,273,518	2,661,759	2,772,061	2,887,698	3,008,978	3,143,035	3,280,040	3,426,672	3,585,445	3,749,516	3,921,436
Total Potential Gross Revenue		$15,020,260	$17,444,831	$18,110,419	$18,712,917	$19,639,702	$19,985,612	$20,615,895	$21,778,582	$20,283,544	$23,326,090	$23,398,255
Less: Vacancy & Collection Loss			(649,600)	(871,835)	(737,561)	(835,998)	(696,879)	(553,934)	(1,075,079)		(739,733)	(80,025)
Effective Gross Revenue		$15,020,260	$16,795,231	$17,238,584	$17,975,356	$18,803,704	$19,288,733	$20,061,961	$20,703,503	$20,283,544	$22,586,357	$23,318,230
Operating Expenses												
Janitorial		222,572	269,116	281,665	287,024	296,553	301,445	307,831	327,095	297,086	339,226	335,269
Porter		72,816	75,000	77,250	79,568	81,955	84,414	86,946	89,554	92,241	95,008	97,859
Window Cleaning		44,625	45,964	47,343	48,763	50,226	51,733	53,285	54,883	56,530	58,226	59,972
Supplies		42,483	51,367	53,762	54,785	56,604	57,537	58,756	62,433	56,705	64,749	63,993
Trash Removal		28,150	34,037	35,624	36,302	37,507	38,126	38,934	41,370	37,575	42,904	42,404
Fire & Life Safety Supplies		31,760	32,713	33,694	34,705	35,746	36,819	37,923	39,061	40,233	41,440	42,683
Repairs & Maintenance		505,807	526,019	542,366	558,246	575,110	591,857	609,276	628,822	642,654	666,132	684,332
Tools & Equipment		13,500	13,905	14,322	14,752	15,194	15,650	16,120	16,603	17,101	17,614	18,143
Utilities												
- Electricity		647,633	715,651	742,576	761,086	785,037	803,708	824,580	861,541	838,853	904,515	914,425
- Gas		43,883	49,093	51,003	52,231	53,888	55,114	56,507	59,182	57,068	62,026	62,506
- Chilled Water		588,000	605,640	623,809	642,523	661,799	681,653	702,103	723,166	744,861	767,207	790,223
- Water & Sewer		21,797	24,385	25,334	25,944	26,767	27,375	28,068	29,396	28,346	30,809	31,047
Security		209,200	215,476	221,940	228,598	235,457	242,520	249,796	257,290	265,008	272,959	281,148
Landscaping Contract		23,200	23,896	24,613	25,351	26,112	26,895	27,702	28,533	29,389	30,271	31,179
Administrative		259,890	267,686	275,718	283,989	292,508	301,284	310,322	319,632	329,221	339,097	349,270
Advertising & Promotion		25,900	26,677	27,478	28,302	29,151	30,025	30,926	31,854	32,810	33,794	34,808
Real Estate Taxes		2,376,310	2,423,836	2,472,313	2,521,759	2,572,195	2,623,638	2,676,111	2,729,633	2,784,226	2,839,910	2,896,708
Non-Reimbursable Expense		37,670	38,800	39,964	41,163	42,398	43,670	44,980	46,330	47,720	49,151	50,626
Insurance		188,000	193,640	199,449	205,433	211,596	217,944	224,482	231,216	238,153	245,297	252,656
Management Fee		$300,405	$335,905	$344,772	$359,507	$376,074	$385,775	$401,239	$414,070	$405,671	$451,727	$466,365
Total Operating Expenses		$5,683,601	$5,968,806	$6,134,995	$6,290,031	$6,461,877	$6,617,182	$6,785,887	$6,991,664	$7,041,451	$7,352,062	$7,505,616
Net Operating Income		$9,336,659	$10,826,425	$11,103,589	$11,685,325	$12,341,827	$12,671,551	$13,276,074	$13,711,839	$13,242,093	$15,234,295	$15,812,614
Calculation of Net Sales Price:												
Sales Price (Based on Year 11 NOI)												$186,030,758
Less: Selling Costs												($3,720,615)
Net Sales Proceeds												$182,310,142
Leasing & Capital Items												
Tenant Improvements		$2,393,710	$1,746,344	$48,853	$255,930	$70,237	$505,521	$774,869		$2,540,912	$689,209	$649,595
Leasing Commissions		$263,606	$217,857	$20,703	$121,646	$30,022	$198,432	$339,303		$1,341,019	$336,496	$282,295
Capital Reserve		$131,250	$135,188	$139,243	$143,420	$147,723	$152,155	$156,719	$161,421	$166,264	$171,251	$176,389
Total Leasing & Capital Items		$2,788,566	$2,099,389	$208,799	$520,996	$247,982	$856,108	$1,270,891	$161,421	$4,048,195	$1,196,956	$1,108,279
Cash Flow Before Debt Service & Taxes		$6,548,093	$8,727,037	$10,894,790	$11,164,328	$12,093,845	$11,815,444	$12,005,182	$13,550,418	$9,193,899	$14,037,338	$14,704,335
Less: Debt Service		($6,473,563)	($6,473,563)	($6,473,563)	($6,473,563)	($6,473,563)	($6,473,563)	($6,473,563)	($6,473,563)	($6,473,563)	($6,473,563)	($6,473,563)
Cash Flow after Debt Service		$74,530	$2,253,474	$4,421,227	$4,690,766	$5,620,282	$5,341,881	$5,531,620	$7,076,855	$2,720,336	$7,563,776	$8,230,773
Internal Rate of Return Calculation (Before-Tax/Unleveraged)												
Original Purchase Price	($112,472,500)											
Cash Flow Before Debt Service & Taxes		$6,548,093	$8,727,037	$10,894,790	$11,164,328	$12,093,845	$11,815,444	$12,005,182	$13,550,418	$9,193,899	$14,037,338	$14,704,335
Net Sales Proceeds												$182,310,142
Total	($112,472,500)	$6,548,093	$8,727,037	$10,894,790	$11,164,328	$12,093,845	$11,815,444	$12,005,182	$13,550,418	$9,193,899	$14,037,338	$197,014,478
Internal Rate of Return	12.4%											

Appendix V-D

Discounted Cash Flow Model Inputs

Revenue Inputs

Contract rental rates and other lease terms

Market rental rates:

– Ground floor retail	$1.50/SF NNN
– Office: floors 2-5	$2.50/SF FSG
– Office: floors 6-10	$2.60/SF FSG
– Office: floors 11-15	$2.85/SF FSG
– Office: floors 16-19	$3.00/SF FSG
– Office: floors 20-23	$3.20/SF FSG

Annual rent growth

– Year 1	3.0%
– Year 2	6.0%
– Year 3	5.5%
– Year 4	5.0%
– Year 5	4.5%
– Years 6-10	4.0%

Vacancy and collection loss - 5.0%

Office lease terms and other assumptions - new and renewing tenants

- Lease term - 5 years
- Free rent - 0 months
- Annual rent escalations - 3.5%
- Downtime between tenants - 9 mos.
- Renewal probability - 65.0%

Parking revenues

- Reserved parking - $225/space
- Unreserved parking - $190/spacae
- Annual parking revenue growth - 5.0%

Expense Inputs

	Year 1
Janitorial	$ 222,572
Porter	72,816
Window cleaning	44,625
Supplies	42,483
Trash removal	28,150
Fire & life safety supplies	31,760
Repairs & maintenance	505,807
Tools & equipment	13,500
Utilities	
– Electricity	647,633
– Gas	43,883
– Chilled water	588,000
– Water & sewer	21,797
Security	209,200
Landscape contract	23,200
Administrative	259,890
Advertising & promotion	25,900
Real estate taxes	2,376,310
Non-reimbursable expenses	37,670
Insurance	188,000

Management fee - 2.0% of Effective Gross Income

Growth factor for real estate taxes	- 2.0%
Growth factor for other expenses	- 3.0%

Financing Inputs

Loan amount	$73.0 million
Loan-to-value	65.0%
Interest rate	7.5%
Loan term	10 years
Amortization schedule	25 years
Loan points	1.0%
Annual debt service	$6.5 million

Investor Tax Inputs

Ordinary income marginal tax rate	35.0%
Capital gains tax rate	15.0%
Cost recovery recapture tax rate	25.0%
Allocation of cost basis to improvements	80.0%
Depreciation schedule for improvements	39 years

Leasing Expenses & Capital Reserve Inputs

Office tenant improvements

– New tenants/2nd gen. space	$ 15/SF
– Renewing tenants	$ 10/SF
– Shell space	$ 55/SF
– New tenants/2nd gen. space	$ 15/SF

Leasing commissions

– New leases	4.0%
– Renewing leases	2.0%

Capital reserves $ 0.35/SF

Property Acquisition & Disposition

Property acquisition inputs

– Purchase price	$110.0 million
– Closing costs	1.75% of purchase price
– Loan fee	0.75% of loan amount
– Total acquisitions costs	$112.5 million

Property disposition inputs

– Residual capitalization rate	8.5%
– Broker's fee and closing costs	2.0% of sales price

Property Type: CBD Office
Square Feet: 375,000
Stories: 25

Appendix V-D

Discounted Cash Flow Model Inputs

		Year 1	Year 2	Year 3	Year 4	Year 5	Year 6	Year 7	Year 8	Year 9	Year 10	Year 11
Revenues												
Contract & Market Rents		$14,535,362	$14,681,099	$14,891,176	$15,413,827	$16,038,704	$16,341,311	$16,931,934	$17,308,906	$18,161,525	$19,357,235	$19,989,350
Less: Absorption & Turnover Vacancy		(1,939,548)	(234,360)	(35,459)	(208,510)	(153,671)	(318,318)	(501,959)	(14,579)	(2,414,068)	(449,023)	(1,147,250)
Scheduled Base Rental Revenue		$12,595,814	$14,446,739	$14,855,717	$15,205,317	$15,885,033	$16,022,993	$16,429,975	$17,294,327	$15,747,457	$18,908,212	$18,842,100
Add: Expense Reimbursement Revenue		150,928	336,333	482,641	619,902	745,691	819,584	905,880	1,057,583	950,642	668,362	634,719
Add: Parking Other Income		2,273,518	2,661,759	2,772,061	2,887,698	3,008,978	3,143,035	3,280,040	3,426,672	3,585,445	3,749,516	3,921,436
Total Potential Gross Revenue		$15,020,260	$17,444,831	$18,110,419	$18,712,917	$19,639,702	$19,985,612	$20,615,895	$21,778,582	$20,283,544	$23,326,090	$23,398,255
Less: Vacancy & Collection Loss			(649,600)	(871,835)	(737,561)	(835,998)	(696,879)	(553,934)	(1,075,079)		(739,733)	(80,025)
Effective Gross Revenue		$15,020,260	$16,795,231	$17,238,584	$17,975,356	$18,803,704	$19,288,733	$20,061,961	$20,703,503	$20,283,544	$22,586,357	$23,318,230
Operating Expenses												
Janitorial		222,572	269,116	281,665	287,024	296,553	301,445	307,831	327,095	297,086	339,226	335,269
Porter		72,816	75,000	77,250	79,568	81,955	84,414	86,946	89,554	92,241	95,008	97,859
Window Cleaning		44,625	45,964	47,343	48,763	50,226	51,733	53,285	54,883	56,530	58,226	59,972
Supplies		42,483	51,367	53,762	54,785	56,604	57,537	58,756	62,433	56,705	64,749	63,993
Trash Removal		28,150	34,037	35,624	36,302	37,507	38,126	38,934	41,370	37,575	42,904	42,404
Fire & Life Safety Supplies		31,760	32,713	33,694	34,705	35,746	36,819	37,923	39,061	40,233	41,440	42,683
Repairs & Maintenance		505,807	526,019	542,366	558,246	575,110	591,857	609,276	628,822	642,654	666,132	684,332
Tools & Equipment		13,500	13,905	14,322	14,752	15,194	15,650	16,120	16,603	17,101	17,614	18,143
Utilities												
- Electricity		647,633	715,651	742,576	761,086	785,037	803,708	824,580	861,541	838,853	904,515	914,425
- Gas		43,883	49,093	51,003	52,231	53,888	55,114	56,507	59,182	57,068	62,026	62,506
- Chilled Water		588,000	605,640	623,809	642,523	661,799	681,653	702,103	723,166	744,861	767,207	790,223
- Water & Sewer		21,797	24,385	25,334	25,944	26,767	27,375	28,068	29,396	28,346	30,809	31,047
Security		209,200	215,476	221,940	228,598	235,457	242,520	249,796	257,290	265,008	272,959	281,148
Landscaping Contract		23,200	23,896	24,613	25,351	26,112	26,895	27,702	28,533	29,389	30,271	31,179
Administrative		259,890	267,686	275,718	283,989	292,508	301,284	310,322	319,632	329,221	339,097	349,270
Advertising & Promotion		25,900	26,677	27,478	28,302	29,151	30,025	30,926	31,854	32,810	33,794	34,808
Real Estate Taxes		2,376,310	2,423,836	2,472,313	2,521,759	2,572,195	2,623,638	2,676,111	2,729,633	2,784,226	2,839,910	2,896,708
Non-Reimbursable Expense		37,670	38,800	39,964	41,163	42,398	43,670	44,980	46,330	47,720	49,151	50,626
Insurance		188,000	193,640	199,449	205,433	211,596	217,944	224,482	231,216	238,153	245,297	252,656
Management Fee		$300,405	$335,905	$344,772	$359,507	$376,074	$385,775	$401,239	$414,070	$405,671	$451,727	$466,365
Total Operating Expenses		$5,683,601	$5,968,806	$6,134,995	$6,290,031	$6,461,877	$6,617,182	$6,785,887	$6,991,664	$7,041,451	$7,352,062	$7,505,616
Net Operating Income		$9,336,659	$10,826,425	$11,103,589	$11,685,325	$12,341,827	$12,671,551	$13,276,074	$13,711,839	$13,242,093	$15,234,295	$15,812,614
Calculation of Net Sales Price:												
Sales Price (Based on Year 11 NOI)												$186,030,758
Less: Selling Costs												($3,720,615)
Net Sales Proceeds												$182,310,142
Leasing & Capital Items												
Tenant Improvements		$2,393,710	$1,746,344	$48,853	$255,930	$70,237	$505,521	$774,869		$2,540,912	$689,209	$649,595
Leasing Commissions		$263,606	$217,857	$20,703	$121,646	$30,022	$198,432	$339,303		$1,341,019	$336,496	$282,295
Capital Reserve		$131,250	$135,188	$139,243	$143,420	$147,723	$152,155	$156,719	$161,421	$166,264	$171,251	$176,389
Total Leasing & Capital Items		$2,788,566	$2,099,389	$208,799	$520,996	$247,982	$856,108	$1,270,891	$161,421	$4,048,195	$1,196,956	$1,108,279
Cash Flow Before Debt Service & Taxes		$6,548,093	$8,727,037	$10,894,790	$11,164,328	$12,093,845	$11,815,444	$12,005,182	$13,550,418	$9,193,899	$14,037,338	$14,704,335
Less: Debt Service		($6,473,563)	($6,473,563)	($6,473,563)	($6,473,563)	($6,473,563)	($6,473,563)	($6,473,563)	($6,473,563)	($6,473,563)	($6,473,563)	($6,473,563)
Cash Flow after Debt Service		$74,530	$2,253,474	$4,421,227	$4,690,766	$5,620,282	$5,341,881	$5,531,620	$7,076,855	$2,720,336	$7,563,776	$8,230,773
Internal Rate of Return Calculation (Before-Tax/Unleveraged)												
Original Purchase Price	($112,472,500)											
Cash Flow Before Debt Service & Taxes		$6,548,093	$8,727,037	$10,894,790	$11,164,328	$12,093,845	$11,815,444	$12,005,182	$13,550,418	$9,193,899	$14,037,338	$14,704,335
Net Sales Proceeds												$182,310,142
Total	($112,472,500)	$6,548,093	$8,727,037	$10,894,790	$11,164,328	$12,093,845	$11,815,444	$12,005,182	$13,550,418	$9,193,899	$14,037,338	$197,014,478
Internal Rate of Return	12.4%											

Appendix V-D

Discounted Cash Flow Model Inputs

Revenue Inputs

Contract rental rates and other lease terms

Market rental rates:

- Ground floor retail $1.50/SF NNN
- Office: floors 2-5 $2.50/SF FSG
- Office: floors 6-10 $2.60/SF FSG
- Office: floors 11-15 $2.85/SF FSG
- Office: floors 16-19 $3.00/SF FSG
- Office: floors 20-23 $3.20/SF FSG

Annual rent growth

- Year 1 3.0%
- Year 2 6.0%
- Year 3 5.5%
- Year 4 5.0%
- Year 5 4.5%
- Years 6-10 4.0%

Vacancy and collection loss - 5.0%

Office lease terms and other assumptions - new and renewing tenants

- Lease term - 5 years
- Free rent - 0 months
- Annual rent escalations - 3.5%
- Downtime between tenants - 9 mos.
- Renewal probability - 65.0%

Parking revenues

- Reserved parking - $225/space
- Unreserved parking - $190/spacae
- Annual parking revenue growth - 5.0%

Expense Inputs

	Year 1
Janitorial	$ 222,572
Porter	72,816
Window cleaning	44,625
Supplies	42,483
Trash removal	28,150
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Repairs & maintenance	505,807
Tools & equipment	13,500
Utilities	
– Electricity	647,633
– Gas	43,883
– Chilled water	588,000
– Water & sewer	21,797
Security	209,200
Landscape contract	23,200
Administrative	259,890
Advertising & promotion	25,900
Real estate taxes	2,376,310
Non-reimbursable expenses	37,670
Insurance	188,000

Management fee - 2.0% of Effective Gross Income

Growth factor for real estate taxes - 2.0%

Growth factor for other expenses - 3.0%

Financing Inputs

Loan amount	$73.0 million
Loan-to-value	65.0%
Interest rate	7.5%
Loan term	10 years
Amortization schedule	25 years
Loan points	1.0%
Annual debt service	$6.5 million

Investor Tax Inputs

Ordinary income marginal tax rate	35.0%
Capital gains tax rate	15.0%
Cost recovery recapture tax rate	25.0%
Allocation of cost basis to improvements	80.0%
Depreciation schedule for improvements	39 years

Leasing Expenses & Capital Reserve Inputs

Office tenant improvements

- New tenants/2nd gen. space $ 15/SF
- Renewing tenants $ 10/SF
- Shell space $ 55/SF
- New tenants/2nd gen. space $ 15/SF

Leasing commissions

- New leases 4.0%
- Renewing leases 2.0%

Capital reserves $ 0.35/SF

Property Acquisition & Disposition

Property acquisition inputs

- Purchase price $110.0 million
- Closing costs 1.75% of purchase price
- Loan fee 0.75% of loan amount
- Total acquisitions costs $112.5 million

Property disposition inputs

- Residual capitalization rate 8.5%
- Broker's fee and closing costs 2.0% of sales price

Appendix V-D

Discounted Cash Flow Model Inputs

Property Type: CBD Office
Square Feet: 375,000
Stories: 25

		Year 1	Year 2	Year 3	Year 4	Year 5	Year 6	Year 7	Year 8	Year 9	Year 10	Year 11
Revenues												
Contract & Market Rents		$14,535,362	$14,681,099	$14,891,176	$15,413,827	$16,038,704	$16,341,311	$16,931,934	$17,308,906	$18,161,525	$19,357,235	$19,989,350
Less: Absorption & Turnover Vacancy		(1,939,548)	(234,360)	(35,459)	(208,510)	(153,671)	(318,318)	(501,959)	(14,579)	(2,414,068)	(449,023)	(1,147,250)
Scheduled Base Rental Revenue		$12,595,814	$14,446,739	$14,855,717	$15,205,317	$15,885,033	$16,022,993	$16,429,975	$17,294,327	$15,747,457	$18,908,212	$18,842,100
Add: Expense Reimbursement Revenue		150,928	336,333	482,641	619,902	745,691	819,584	905,880	1,057,583	950,642	668,362	634,719
Add: Parking Other Income		2,273,518	2,661,759	2,772,061	2,887,698	3,008,978	3,143,035	3,280,040	3,426,672	3,585,445	3,749,516	3,921,436
Total Potential Gross Revenue		$15,020,260	$17,444,831	$18,110,419	$18,712,917	$19,639,702	$19,985,612	$20,615,895	$21,778,582	$20,283,544	$23,326,090	$23,398,255
Less: Vacancy & Collection Loss			(649,600)	(871,835)	(737,561)	(835,998)	(696,879)	(553,934)	(1,075,079)		(739,733)	(80,025)
Effective Gross Revenue		$15,020,260	$16,795,231	$17,238,584	$17,975,356	$18,803,704	$19,288,733	$20,061,961	$20,703,503	$20,283,544	$22,586,357	$23,318,230
Operating Expenses												
Janitorial		222,572	269,116	281,665	287,024	296,553	301,445	307,831	327,095	297,086	339,226	335,269
Porter		72,816	75,000	77,250	79,568	81,955	84,414	86,946	89,554	92,241	95,008	97,859
Window Cleaning		44,625	45,964	47,343	48,763	50,226	51,733	53,285	54,883	56,530	58,226	59,972
Supplies		42,483	51,367	53,762	54,785	56,604	57,537	58,756	62,433	56,705	64,749	63,993
Trash Removal		28,150	34,037	35,624	36,302	37,507	38,126	38,934	41,370	37,575	42,904	42,404
Fire & Life Safety Supplies		31,760	32,713	33,694	34,705	35,746	36,819	37,923	39,061	40,233	41,440	42,683
Repairs & Maintenance		505,807	526,019	542,366	558,246	575,110	591,857	609,276	628,822	642,654	666,132	684,332
Tools & Equipment		13,500	13,905	14,322	14,752	15,194	15,650	16,120	16,603	17,101	17,614	18,143
Utilities												
- Electricity		647,633	715,651	742,576	761,086	785,037	803,708	824,580	861,541	838,853	904,515	914,425
- Gas		43,883	49,093	51,003	52,231	53,888	55,114	56,507	59,182	57,068	62,026	62,506
- Chilled Water		588,000	605,640	623,809	642,523	661,799	681,653	702,103	723,166	744,861	767,207	790,223
- Water & Sewer		21,797	24,385	25,334	25,944	26,767	27,375	28,068	29,396	28,346	30,809	31,047
Security		209,200	215,476	221,940	228,598	235,457	242,520	249,796	257,290	265,008	272,959	281,148
Landscaping Contract		23,200	23,896	24,613	25,351	26,112	26,895	27,702	28,533	29,389	30,271	31,179
Administrative		259,890	267,686	275,718	283,989	292,508	301,284	310,322	319,632	329,221	339,097	349,270
Advertising & Promotion		25,900	26,677	27,478	28,302	29,151	30,025	30,926	31,854	32,810	33,794	34,808
Real Estate Taxes		2,376,310	2,423,836	2,472,313	2,521,759	2,572,195	2,623,638	2,676,111	2,729,633	2,784,226	2,839,910	2,896,708
Non-Reimbursable Expense		37,670	38,800	39,964	41,163	42,398	43,670	44,980	46,330	47,720	49,151	50,626
Insurance		188,000	193,640	199,449	205,433	211,596	217,944	224,482	231,216	238,153	245,297	252,656
Management Fee		$300,405	$335,905	$344,772	$359,507	$376,074	$385,775	$401,239	$414,070	$405,671	$451,727	$466,365
Total Operating Expenses		$5,683,601	$5,968,806	$6,134,995	$6,290,031	$6,461,877	$6,617,182	$6,785,887	$6,991,664	$7,041,451	$7,352,062	$7,505,616
Net Operating Income		$9,336,659	$10,826,425	$11,103,589	$11,685,325	$12,341,827	$12,671,551	$13,276,074	$13,711,839	$13,242,093	$15,234,295	$15,812,614
Calculation of Net Sales Price:												
Sales Price (Based on Year 11 NOI)												$186,030,758
Less: Selling Costs												($3,720,615)
Net Sales Proceeds												$182,310,142
Leasing & Capital Items												
Tenant Improvements		$2,393,710	$1,746,344	$48,853	$255,930	$70,237	$505,521	$774,869		$2,540,912	$689,209	$649,595
Leasing Commissions		$263,606	$217,857	$20,703	$121,646	$30,022	$198,432	$339,303		$1,341,019	$336,496	$282,295
Capital Reserve		$131,250	$135,188	$139,243	$143,420	$147,723	$152,155	$156,719	$161,421	$166,264	$171,251	$176,389
Total Leasing & Capital Items		$2,788,566	$2,099,389	$208,799	$520,996	$247,982	$856,108	$1,270,891	$161,421	$4,048,195	$1,196,956	$1,108,279
Cash Flow Before Debt Service & Taxes		$6,548,093	$8,727,037	$10,894,790	$11,164,328	$12,093,845	$11,815,444	$12,005,182	$13,550,418	$9,193,899	$14,037,338	$14,704,335
Less: Debt Service		($6,473,563)	($6,473,563)	($6,473,563)	($6,473,563)	($6,473,563)	($6,473,563)	($6,473,563)	($6,473,563)	($6,473,563)	($6,473,563)	($6,473,563)
Cash Flow after Debt Service		$74,530	$2,253,474	$4,421,227	$4,690,766	$5,620,282	$5,341,881	$5,531,620	$7,076,855	$2,720,336	$7,563,776	$8,230,773
Internal Rate of Return Calculation (Before-Tax/Unleveraged)												
Original Purchase Price	($112,472,500)											
Cash Flow Before Debt Service & Taxes		$6,548,093	$8,727,037	$10,894,790	$11,164,328	$12,093,845	$11,815,444	$12,005,182	$13,550,418	$9,193,899	$14,037,338	$14,704,335
Net Sales Proceeds												$182,310,142
Total	($112,472,500)	$6,548,093	$8,727,037	$10,894,790	$11,164,328	$12,093,845	$11,815,444	$12,005,182	$13,550,418	$9,193,899	$14,037,338	$197,014,478
Internal Rate of Return	12.4%											

Appendix V-D

Discounted Cash Flow Model Inputs

Revenue Inputs

Contract rental rates and other lease terms

Market rental rates:

- Ground floor retail $1.50/SF NNN
- Office: floors 2-5 $2.50/SF FSG
- Office: floors 6-10 $2.60/SF FSG
- Office: floors 11-15 $2.85/SF FSG
- Office: floors 16-19 $3.00/SF FSG
- Office: floors 20-23 $3.20/SF FSG

Annual rent growth

- Year 1 3.0%
- Year 2 6.0%
- Year 3 5.5%
- Year 4 5.0%
- Year 5 4.5%
- Years 6-10 4.0%

Vacancy and collection loss - 5.0%

Office lease terms and other assumptions - new and renewing tenants

- Lease term - 5 years
- Free rent - 0 months
- Annual rent escalations - 3.5%
- Downtime between tenants - 9 mos.
- Renewal probability - 65.0%

Parking revenues

- Reserved parking - $225/space
- Unreserved parking - $190/spacae
- Annual parking revenue growth - 5.0%

Expense Inputs

	Year 1
Janitorial	$ 222,572
Porter	72,816
Window cleaning	44,625
Supplies	42,483
Trash removal	28,150
Fire & life safety supplies	31,760
Repairs & maintenance	505,807
Tools & equipment	13,500
Utilities	
– Electricity	647,633
– Gas	43,883
– Chilled water	588,000
– Water & sewer	21,797
Security	209,200
Landscape contract	23,200
Administrative	259,890
Advertising & promotion	25,900
Real estate taxes	2,376,310
Non-reimbursable expenses	37,670
Insurance	188,000
Management fee - 2.0% of Effective Gross Income	
Growth factor for real estate taxes	- 2.0%
Growth factor for other expenses	- 3.0%

Financing Inputs

Loan amount	$73.0 million
Loan-to-value	65.0%
Interest rate	7.5%
Loan term	10 years
Amortization schedule	25 years
Loan points	1.0%
Annual debt service	$6.5 million

Investor Tax Inputs

Ordinary income marginal tax rate	35.0%
Capital gains tax rate	15.0%
Cost recovery recapture tax rate	25.0%
Allocation of cost basis to improvements	80.0%
Depreciation schedule for improvements	39 years

Leasing Expenses & Capital Reserve Inputs

Office tenant improvements

- New tenants/2nd gen. space $ 15/SF
- Renewing tenants $ 10/SF
- Shell space $ 55/SF
- New tenants/2nd gen. space $ 15/SF

Leasing commissions

- New leases 4.0%
- Renewing leases 2.0%

Capital reserves $ 0.35/SF

Property Acquisition & Disposition

Property acquisition inputs

- Purchase price $110.0 million
- Closing costs 1.75% of purchase price
- Loan fee 0.75% of loan amount
- Total acquisitions costs $112.5 million

Property disposition inputs

- Residual capitalization rate 8.5%
- Broker's fee and closing costs 2.0% of sales price

Property Type: CBD Office
Square Feet: 375,000
Stories: 25

Appendix V-D

Discounted Cash Flow Model Inputs

		Year 1	Year 2	Year 3	Year 4	Year 5	Year 6	Year 7	Year 8	Year 9	Year 10	Year 11
Revenues												
Contract & Market Rents		$14,535,362	$14,681,099	$14,891,176	$15,413,827	$16,038,704	$16,341,311	$16,931,934	$17,308,906	$18,161,525	$19,357,235	$19,989,350
Less: Absorption & Turnover Vacancy		(1,939,548)	(234,360)	(35,459)	(208,510)	(153,671)	(318,318)	(501,959)	(14,579)	(2,414,068)	(449,023)	(1,147,250)
Scheduled Base Rental Revenue		$12,595,814	$14,446,739	$14,855,717	$15,205,317	$15,885,033	$16,022,993	$16,429,975	$17,294,327	$15,747,457	$18,908,212	$18,842,100
Add: Expense Reimbursement Revenue		150,928	336,333	482,641	619,902	745,691	819,584	905,880	1,057,583	950,642	668,362	634,719
Add: Parking Other Income		2,273,518	2,661,759	2,772,061	2,887,698	3,008,978	3,143,035	3,280,040	3,426,672	3,585,445	3,749,516	3,921,436
Total Potential Gross Revenue		$15,020,260	$17,444,831	$18,110,419	$18,712,917	$19,639,702	$19,985,612	$20,615,895	$21,778,582	$20,283,544	$23,326,090	$23,398,255
Less: Vacancy & Collection Loss			(649,600)	(871,835)	(737,561)	(835,998)	(696,879)	(553,934)	(1,075,079)		(739,733)	(80,025)
Effective Gross Revenue		$15,020,260	$16,795,231	$17,238,584	$17,975,356	$18,803,704	$19,288,733	$20,061,961	$20,703,503	$20,283,544	$22,586,357	$23,318,230
Operating Expenses												
Janitorial		222,572	269,116	281,665	287,024	296,553	301,445	307,831	327,095	297,086	339,226	335,269
Porter		72,816	75,000	77,250	79,568	81,955	84,414	86,946	89,554	92,241	95,008	97,859
Window Cleaning		44,625	45,964	47,343	48,763	50,226	51,733	53,285	54,883	56,530	58,226	59,972
Supplies		42,483	51,367	53,762	54,785	56,604	57,537	58,756	62,433	56,705	64,749	63,993
Trash Removal		28,150	34,037	35,624	36,302	37,507	38,126	38,934	41,370	37,575	42,904	42,404
Fire & Life Safety Supplies		31,760	32,713	33,694	34,705	35,746	36,819	37,923	39,061	40,233	41,440	42,683
Repairs & Maintenance		505,807	526,019	542,366	558,246	575,110	591,857	609,276	628,822	642,654	666,132	684,332
Tools & Equipment		13,500	13,905	14,322	14,752	15,194	15,650	16,120	16,603	17,101	17,614	18,143
Utilities												
- Electricity		647,633	715,651	742,576	761,086	785,037	803,708	824,580	861,541	838,853	904,515	914,425
- Gas		43,883	49,093	51,003	52,231	53,888	55,114	56,507	59,182	57,068	62,026	62,506
- Chilled Water		588,000	605,640	623,809	642,523	661,799	681,653	702,103	723,166	744,861	767,207	790,223
- Water & Sewer		21,797	24,385	25,334	25,944	26,767	27,375	28,068	29,396	28,346	30,809	31,047
Security		209,200	215,476	221,940	228,598	235,457	242,520	249,796	257,290	265,008	272,959	281,148
Landscaping Contract		23,200	23,896	24,613	25,351	26,112	26,895	27,702	28,533	29,389	30,271	31,179
Administrative		259,890	267,686	275,718	283,989	292,508	301,284	310,322	319,632	329,221	339,097	349,270
Advertising & Promotion		25,900	26,677	27,478	28,302	29,151	30,025	30,926	31,854	32,810	33,794	34,808
Real Estate Taxes		2,376,310	2,423,836	2,472,313	2,521,759	2,572,195	2,623,638	2,676,111	2,729,633	2,784,226	2,839,910	2,896,708
Non-Reimbursable Expense		37,670	38,800	39,964	41,163	42,398	43,670	44,980	46,330	47,720	49,151	50,626
Insurance		188,000	193,640	199,449	205,433	211,596	217,944	224,482	231,216	238,153	245,297	252,656
Management Fee		$300,405	$335,905	$344,772	$359,507	$376,074	$385,775	$401,239	$414,070	$405,671	$451,727	$466,365
Total Operating Expenses		$5,683,601	$5,968,806	$6,134,995	$6,290,031	$6,461,877	$6,617,182	$6,785,887	$6,991,664	$7,041,451	$7,352,062	$7,505,616
Net Operating Income		$9,336,659	$10,826,425	$11,103,589	$11,685,325	$12,341,827	$12,671,551	$13,276,074	$13,711,839	$13,242,093	$15,234,295	$15,812,614
Calculation of Net Sales Price:												
Sales Price (Based on Year 11 NOI)												$186,030,758
Less: Selling Costs												($3,720,615)
Net Sales Proceeds												$182,310,142
Leasing & Capital Items												
Tenant Improvements		$2,393,710	$1,746,344	$48,853	$255,930	$70,237	$505,521	$774,869		$2,540,912	$689,209	$649,595
Leasing Commissions		$263,606	$217,857	$20,703	$121,646	$30,022	$198,432	$339,303		$1,341,019	$336,496	$282,295
Capital Reserve		$131,250	$135,188	$139,243	$143,420	$147,723	$152,155	$156,719	$161,421	$166,264	$171,251	$176,389
Total Leasing & Capital Items		$2,788,566	$2,099,389	$208,799	$520,996	$247,982	$856,108	$1,270,891	$161,421	$4,048,195	$1,196,956	$1,108,279
Cash Flow Before Debt Service & Taxes		$6,548,093	$8,727,037	$10,894,790	$11,164,328	$12,093,845	$11,815,444	$12,005,182	$13,550,418	$9,193,899	$14,037,338	$14,704,335
Less: Debt Service		($6,473,563)	($6,473,563)	($6,473,563)	($6,473,563)	($6,473,563)	($6,473,563)	($6,473,563)	($6,473,563)	($6,473,563)	($6,473,563)	($6,473,563)
Cash Flow after Debt Service		$74,530	$2,253,474	$4,421,227	$4,690,766	$5,620,282	$5,341,881	$5,531,620	$7,076,855	$2,720,336	$7,563,776	$8,230,773
Internal Rate of Return Calculation (Before-Tax/Unleveraged)												
Original Purchase Price	($112,472,500)											
Cash Flow Before Debt Service & Taxes		$6,548,093	$8,727,037	$10,894,790	$11,164,328	$12,093,845	$11,815,444	$12,005,182	$13,550,418	$9,193,899	$14,037,338	$14,704,335
Net Sales Proceeds												($6,473,563)
Total	($112,472,500)	$6,548,093	$8,727,037	$10,894,790	$11,164,328	$12,093,845	$11,815,444	$12,005,182	$13,550,418	$9,193,899	$14,037,338	$8,230,773

Appendix V-D

Internal Rate of Return 12.4%

Discounted Cash Flow Model Inputs

Revenue Inputs

Contract rental rates and other lease terms

Market rental rates:

- Ground floor retail $1.50/SF NNN
- Office: floors 2-5 $2.50/SF FSG
- Office: floors 6-10 $2.60/SF FSG
- Office: floors 11-15 $2.85/SF FSG
- Office: floors 16-19 $3.00/SF FSG
- Office: floors 20-23 $3.20/SF FSG

Annual rent growth

- Year 1 3.0%
- Year 2 6.0%
- Year 3 5.5%
- Year 4 5.0%
- Year 5 4.5%
- Years 6-10 4.0%

Vacancy and collection loss - 5.0%

Office lease terms and other assumptions - new and renewing tenants

- Lease term - 5 years
- Free rent - 0 months
- Annual rent escalations - 3.5%
- Downtime between tenants - 9 mos.
- Renewal probability - 65.0%

Parking revenues

- Reserved parking - $225/space
- Unreserved parking - $190/spacae
- Annual parking revenue growth - 5.0%

Expense Inputs

	Year 1
Janitorial	$ 222,572
Porter	72,816
Window cleaning	44,625
Supplies	42,483
Trash removal	28,150
Fire & life safety supplies	31,760
Repairs & maintenance	505,807
Tools & equipment	13,500
Utilities	
– Electricity	647,633
– Gas	43,883
– Chilled water	588,000
– Water & sewer	21,797
Security	209,200
Landscape contract	23,200
Administrative	259,890
Advertising & promotion	25,900
Real estate taxes	2,376,310
Non-reimbursable expenses	37,670
Insurance	188,000

Management fee - 2.0% of Effective Gross Income

Growth factor for real estate taxes - 2.0%

Growth factor for other expenses - 3.0%

Financing Inputs

Loan amount	$73.0 million
Loan-to-value	65.0%
Interest rate	7.5%
Loan term	10 years
Amortization schedule	25 years
Loan points	1.0%
Annual debt service	$6.5 million

Investor Tax Inputs

Ordinary income marginal tax rate	35.0%
Capital gains tax rate	15.0%
Cost recovery recapture tax rate	25.0%
Allocation of cost basis to improvements	80.0%
Depreciation schedule for improvements	39 years

Leasing Expenses & Capital Reserve Inputs

Office tenant improvements

- New tenants/2nd gen. space $ 15/SF
- Renewing tenants $ 10/SF
- Shell space $ 55/SF
- New tenants/2nd gen. space $ 15/SF

Leasing commissions

- New leases 4.0%
- Renewing leases 2.0%

Capital reserves $ 0.35/SF

Property Acquisition & Disposition

Property acquisition inputs

- Purchase price $110.0 million
- Closing costs 1.75% of purchase price
- Loan fee 0.75% of loan amount
- Total acquisitions costs $112.5 million

Property disposition inputs

- Residual capitalization rate 8.5%
- Broker's fee and closing costs 2.0% of sales price

Property Type: CBD Office
Square Feet: 375,000
Stories: 25

Appendix V-D

Discounted Cash Flow Model Inputs

		Year 1	Year 2	Year 3	Year 4	Year 5	Year 6	Year 7	Year 8	Year 9	Year 10	Year 11
Revenues												
Contract & Market Rents		$14,535,362	$14,681,099	$14,891,176	$15,413,827	$16,038,704	$16,341,311	$16,931,934	$17,308,906	$18,161,525	$19,357,235	$19,989,350
Less: Absorption & Turnover Vacancy		(1,939,548)	(234,360)	(35,459)	(208,510)	(153,671)	(318,318)	(501,959)	(14,579)	(2,414,068)	(449,023)	(1,147,250)
Scheduled Base Rental Revenue		$12,595,814	$14,446,739	$14,855,717	$15,205,317	$15,885,033	$16,022,993	$16,429,975	$17,294,327	$15,747,457	$18,908,212	$18,842,100
Add: Expense Reimbursement Revenue		150,928	336,333	482,641	619,902	745,691	819,584	905,880	1,057,583	950,642	668,362	634,719
Add: Parking Other Income		2,273,518	2,661,759	2,772,061	2,887,698	3,008,978	3,143,035	3,280,040	3,426,672	3,585,445	3,749,516	3,921,436
Total Potential Gross Revenue		$15,020,260	$17,444,831	$18,110,419	$18,712,917	$19,639,702	$19,985,612	$20,615,895	$21,778,582	$20,283,544	$23,326,090	$23,398,255
Less: Vacancy & Collection Loss			(649,600)	(871,835)	(737,561)	(835,998)	(696,879)	(553,934)	(1,075,079)		(739,733)	(80,025)
Effective Gross Revenue		$15,020,260	$16,795,231	$17,238,584	$17,975,356	$18,803,704	$19,288,733	$20,061,961	$20,703,503	$20,283,544	$22,586,357	$23,318,230
Operating Expenses												
Janitorial		222,572	269,116	281,665	287,024	296,553	301,445	307,831	327,095	297,086	339,226	335,269
Porter		72,816	75,000	77,250	79,568	81,955	84,414	86,946	89,554	92,241	95,008	97,859
Window Cleaning		44,625	45,964	47,343	48,763	50,226	51,733	53,285	54,883	56,530	58,226	59,972
Supplies		42,483	51,367	53,762	54,785	56,604	57,537	58,756	62,433	56,705	64,749	63,993
Trash Removal		28,150	34,037	35,624	36,302	37,507	38,126	38,934	41,370	37,575	42,904	42,404
Fire & Life Safety Supplies		31,760	32,713	33,694	34,705	35,746	36,819	37,923	39,061	40,233	41,440	42,683
Repairs & Maintenance		505,807	526,019	542,366	558,246	575,110	591,857	609,276	628,822	642,654	666,132	684,332
Tools & Equipment		13,500	13,905	14,322	14,752	15,194	15,650	16,120	16,603	17,101	17,614	18,143
Utilities												
- Electricity		647,633	715,651	742,576	761,086	785,037	803,708	824,580	861,541	838,853	904,515	914,425
- Gas		43,883	49,093	51,003	52,231	53,888	55,114	56,507	59,182	57,068	62,026	62,506
- Chilled Water		588,000	605,640	623,809	642,523	661,799	681,653	702,103	723,166	744,861	767,207	790,223
- Water & Sewer		21,797	24,385	25,334	25,944	26,767	27,375	28,068	29,396	28,346	30,809	31,047
Security		209,200	215,476	221,940	228,598	235,457	242,520	249,796	257,290	265,008	272,959	281,148
Landscaping Contract		23,200	23,896	24,613	25,351	26,112	26,895	27,702	28,533	29,389	30,271	31,179
Administrative		259,890	267,686	275,718	283,989	292,508	301,284	310,322	319,632	329,221	339,097	349,270
Advertising & Promotion		25,900	26,677	27,478	28,302	29,151	30,025	30,926	31,854	32,810	33,794	34,808
Real Estate Taxes		2,376,310	2,423,836	2,472,313	2,521,759	2,572,195	2,623,638	2,676,111	2,729,633	2,784,226	2,839,910	2,896,708
Non-Reimbursable Expense		37,670	38,800	39,964	41,163	42,398	43,670	44,980	46,330	47,720	49,151	50,626
Insurance		188,000	193,640	199,449	205,433	211,596	217,944	224,482	231,216	238,153	245,297	252,656
Management Fee		$300,405	$335,905	$344,772	$359,507	$376,074	$385,775	$401,239	$414,070	$405,671	$451,727	$466,365
Total Operating Expenses		$5,683,601	$5,968,806	$6,134,995	$6,290,031	$6,461,877	$6,617,182	$6,785,887	$6,991,664	$7,041,451	$7,352,062	$7,505,616
Net Operating Income		$9,336,659	$10,826,425	$11,103,589	$11,685,325	$12,341,827	$12,671,551	$13,276,074	$13,711,839	$13,242,093	$15,234,295	$15,812,614
Calculation of Net Sales Price:												
Sales Price (Based on Year 11 NOI)												$186,030,758
Less: Selling Costs												($3,720,615)
Net Sales Proceeds												$182,310,142
Leasing & Capital Items												
Tenant Improvements		$2,393,710	$1,746,344	$48,853	$255,930	$70,237	$505,521	$774,869		$2,540,912	$689,209	$649,595
Leasing Commissions		$263,606	$217,857	$20,703	$121,646	$30,022	$198,432	$339,303		$1,341,019	$336,496	$282,295
Capital Reserve		$131,250	$135,188	$139,243	$143,420	$147,723	$152,155	$156,719	$161,421	$166,264	$171,251	$176,389
Total Leasing & Capital Items		$2,788,566	$2,099,389	$208,799	$520,996	$247,982	$856,108	$1,270,891	$161,421	$4,048,195	$1,196,956	$1,108,279
Cash Flow Before Debt Service & Taxes		$6,548,093	$8,727,037	$10,894,790	$11,164,328	$12,093,845	$11,815,444	$12,005,182	$13,550,418	$9,193,899	$14,037,338	$14,704,335
Less: Debt Service		($6,473,563)	($6,473,563)	($6,473,563)	($6,473,563)	($6,473,563)	($6,473,563)	($6,473,563)	($6,473,563)	($6,473,563)	($6,473,563)	($6,473,563)
Cash Flow after Debt Service		$74,530	$2,253,474	$4,421,227	$4,690,766	$5,620,282	$5,341,881	$5,531,620	$7,076,855	$2,720,336	$7,563,776	$8,230,773
Internal Rate of Return Calculation (Before-Tax/Unleveraged)												
Original Purchase Price	($112,472,500)											
Cash Flow Before Debt Service & Taxes		$6,548,093	$8,727,037	$10,894,790	$11,164,328	$12,093,845	$11,815,444	$12,005,182	$13,550,418	$9,193,899	$14,037,338	$14,704,335
Net Sales Proceeds												$182,310,142
Total	($112,472,500)	$6,548,093	$8,727,037	$10,894,790	$11,164,328	$12,093,845	$11,815,444	$12,005,182	$13,550,418	$9,193,899	$14,037,338	$197,014,478
Internal Rate of Return	12.4%											

Appendix V-D

Discounted Cash Flow Model Inputs

Revenue Inputs

Contract rental rates and other lease terms

Market rental rates:

- Ground floor retail $1.50/SF NNN
- Office: floors 2-5 $2.50/SF FSG
- Office: floors 6-10 $2.60/SF FSG
- Office: floors 11-15 $2.85/SF FSG
- Office: floors 16-19 $3.00/SF FSG
- Office: floors 20-23 $3.20/SF FSG

Annual rent growth

- Year 1 3.0%
- Year 2 6.0%
- Year 3 5.5%
- Year 4 5.0%
- Year 5 4.5%
- Years 6-10 4.0%

Vacancy and collection loss - 5.0%

Office lease terms and other assumptions - new and renewing tenants

- Lease term - 5 years
- Free rent - 0 months
- Annual rent escalations - 3.5%
- Downtime between tenants - 9 mos.
- Renewal probability - 65.0%

Parking revenues

- Reserved parking - $225/space
- Unreserved parking - $190/spacae
- Annual parking revenue growth - 5.0%

Expense Inputs

	Year 1
Janitorial	$ 222,572
Porter	72,816
Window cleaning	44,625
Supplies	42,483
Trash removal	28,150
Fire & life safety supplies	31,760
Repairs & maintenance	505,807
Tools & equipment	13,500
Utilities	
– Electricity	647,633
– Gas	43,883
– Chilled water	588,000
– Water & sewer	21,797
Security	209,200
Landscape contract	23,200
Administrative	259,890
Advertising & promotion	25,900
Real estate taxes	2,376,310
Non-reimbursable expenses	37,670
Insurance	188,000
Management fee - 2.0% of Effective Gross Income	
Growth factor for real estate taxes	- 2.0%
Growth factor for other expenses	- 3.0%

Financing Inputs

Loan amount	$73.0 million
Loan-to-value	65.0%
Interest rate	7.5%
Loan term	10 years
Amortization schedule	25 years
Loan points	1.0%
Annual debt service	$6.5 million

Investor Tax Inputs

Ordinary income marginal tax rate	35.0%
Capital gains tax rate	15.0%
Cost recovery recapture tax rate	25.0%
Allocation of cost basis to improvements	80.0%
Depreciation schedule for improvements	39 years

Leasing Expenses & Capital Reserve Inputs

Office tenant improvements

- New tenants/2nd gen. space $ 15/SF
- Renewing tenants $ 10/SF
- Shell space $ 55/SF
- New tenants/2nd gen. space $ 15/SF

Leasing commissions

- New leases 4.0%
- Renewing leases 2.0%

Capital reserves $ 0.35/SF

Property Acquisition & Disposition

Property acquisition inputs

- Purchase price $110.0 million
- Closing costs 1.75% of purchase price
- Loan fee 0.75% of loan amount
- Total acquisitions costs $112.5 million

Property disposition inputs

- Residual capitalization rate 8.5%
- Broker's fee and closing costs 2.0% of sales price

Property Type: CBD Office
Square Feet: 375,000
Stories: 25

Appendix V-D

Discounted Cash Flow Model Inputs

	Year 1	Year 2	Year 3	Year 4	Year 5	Year 6	Year 7	Year 8	Year 9	Year 10	Year 11
Calculation of After-Tax Cash Flow:											
Cash Flow after Debt Service	$74,530	$2,253,474	$4,421,227	$4,690,766	$5,620,282	$5,341,881	$5,531,620	$7,076,855	$2,720,336	$7,563,776	$8,230,773
Add: Loan Principal Paid											
Less: Depreciation											
Taxable Income											
Less: Federal & State Taxes (Taxable Income X Marginal Tax Rate)											
After-Tax Cash Flow											
Calculation of After-Tax Gain on Sale:											
Net Sales Price											$182,310,142
Add: Depreciation Recapture											
Less: Original Property Cost Basis											
Taxable Gain on Sale											
Less: Capital Gains Tax											
After-Tax Gain on Sale											

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