HOW TO CALCULATE AND PRESENT DEEP RETROFIT VALUE

A GUIDE FOR INVESTORS

1820 FOLSOM STREET | BOULDER, CO 80302

PUBLISHED APRIL 2015
DOWNLOAD AT: WWW.RMI.ORG

AUTHORS

Michael Bendewald, Douglas Miller, Scott Muldavin

** Authors listed alphabetically*

CONTACTS

Michael Bendewald, mbendewald@rmi.org

Douglas Miller, dmiller@rmi.org

Editorial Director: Peter Bronski
Editor: Laurie Guevara-Stone

Art Director: Romy Purshouse
Designer: Mike Heighway

ACKNOWLEDGEMENTS

The authors thank the following individuals and organizations for offering their insights and perspectives on this work:

James Finlay — Founding Partner, Finlay Consulting
James Gray-Donald — VP Sustainability, Bentall Kennedy
Ken McMackin — Senior Associate, Deloitte
Curtis Probst — Managing Director, Rocky Mountain Institute
Tom Thibodeau — Professor and Academic Director, University of Colorado-Boulder
Brenna Walraven — President and CEO, Corporate Sustainability Strategies, Inc.

TABLE OF CONTENTS

HOW TO CALCULATE AND PRESENT
DEEP RETROFIT VALUE

EXECUTIVE SUMMARY

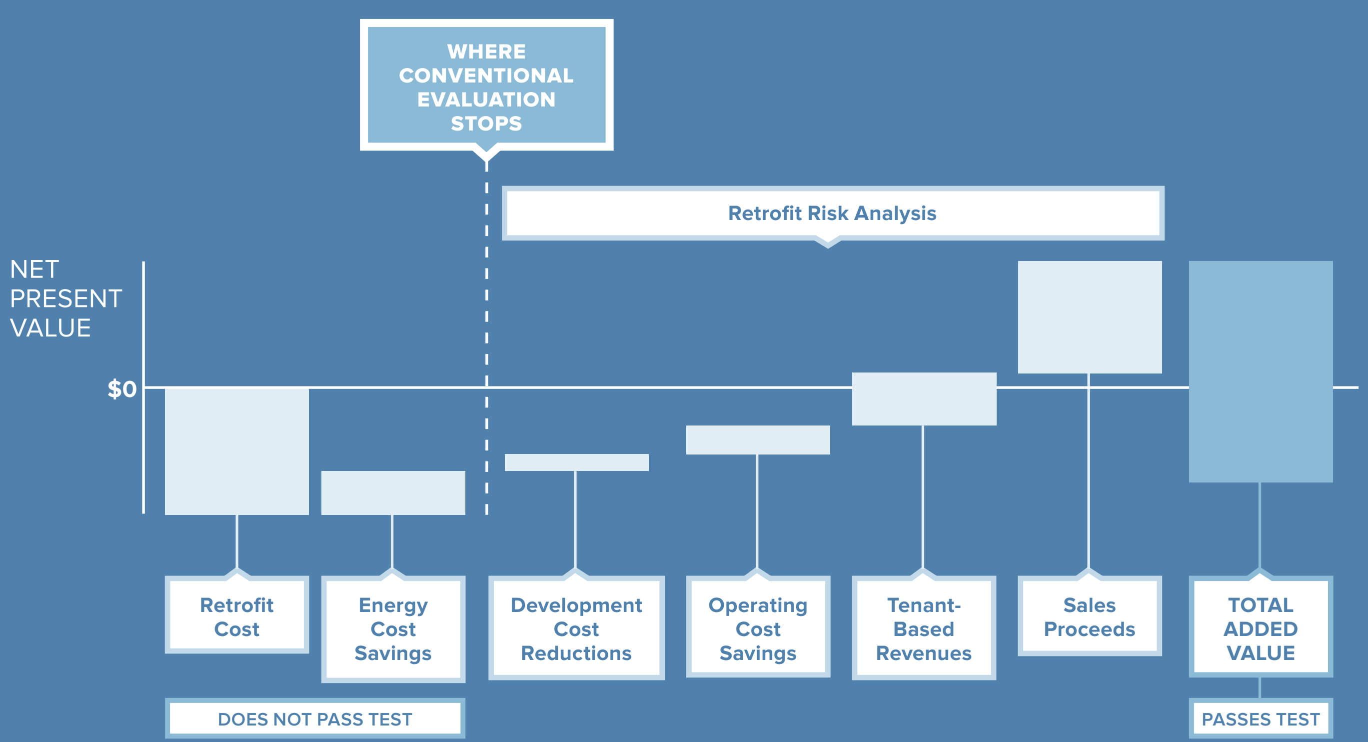
EXECUTIVE SUMMARY

Energy efficiency building retrofits in the United States and around the world are attractive investments, but receive far less attention and capital than they deserve. This is in part due to a narrow definition of their value, typically focused on energy cost savings alone, and in part due to confusion and uncertainty about how to calculate, present, and justify such value as part of a retrofit capital request. This guide addresses this confusion and uncertainty, providing practical guidance to enable real estate investors to incorporate all the benefits of efficiency retrofits into their decision making.

Real estate investors have an opportunity to earn higher returns from their properties by implementing certain types of efficiency investments known as deep energy retrofits. Deep energy retrofits employ an integrated array of energy efficiency measures, often as part of a multi-year or portfolio-level plan, to reduce energy consumption by 30 percent or more compared to the pre-retrofit energy use while achieving superior sustainability performance. These types of retrofits reduce operating costs and are able to improve the satisfaction and health of occupants. Further, the improved energy performance that deep retrofits deliver plays a critical role for tenant companies in increasing sustainability leadership, reputation, and risk management.

FIGURE ES1

WHY DEEP RETROFIT VALUE MATTERS



Source: Sample Deep Retrofit Value Report

The purpose of this practice guide is to enable real estate investors to tap into these tenant values through higher rents, occupancy, and tenant retention. These revenue benefits supplement lower operating costs to improve overall net operating income and property sales prices.

Deep retrofit value matters because it can completely change the outcomes of retrofit decision making (Figure ES1). A deep retrofit that has a negative net present value considering only the energy cost savings can actually be a lucrative investment. This practice guide enables the preparation of a well-reasoned and supported deep retrofit value (DRV) report to be presented as part of a retrofit capital request. A DRV report may take the form of a series of slides to senior decision makers, or be presented in detail with full supporting documentation and financial models to due diligence analysts. While it takes some cost and time to develop the report, this is a small price to pay to make more informed decisions about energy efficiency investments.

The practice guide defines and provides clear guidance for identifying, calculating, and presenting the following elements of deep retrofit value:

VALUE ELEMENT 1
RETROFIT DEVELOPMENT COSTS:

These costs represent the initial capital investment against which future cost savings and other benefits are measured. Many retrofit projects have little cost premium if timed with other capital improvement projects.

VALUE ELEMENT 2
NON-ENERGY OPERATING COSTS:

Deep retrofits can reduce operating costs associated with maintenance costs, insurance costs, and occupant churn rate. They can also increase a building's occupied space through equipment downsizing and better occupant use of space.

VALUE ELEMENT 3
RETROFIT RISK ANALYSIS:

Retrofit risk analysis helps maximize value from the other elements. The identification and evaluation of these risks enables action to mitigate and accurately price them.

VALUE ELEMENT 4
TENANT-BASED REVENUES:

Tenant-based revenues from deep retrofits are generated when building owners are able to monetize enhanced demand resulting from a deep retrofit by increasing rents, occupancies, absorption, and tenant retention.

VALUE ELEMENT 5
SALES REVENUES:

Sales revenue premiums from deep retrofits result from higher net operating income (due to expense savings and increased tenant revenues), increased investor demand (which can lower cap and discount rates), and risk reduction (which further contributes to cap and discount rate reduction).

HOW TO CALCULATE AND PRESENT DEEP RETROFIT VALUE

GETTING STARTED

1

INTRODUCTION

Real estate investors predominantly view energy efficiency as an opportunity to reduce energy costs for a quick payback relative to other investments. However, certain types of energy efficiency investments—known as deep energy retrofits—deliver much greater value that is often unrecognized or unknown. The purpose of this practice guide is to address the failure of the market to fully recognize this value. Investors who begin using the methodology presented in this guide can immediately begin to consider this value during capital planning.

Most energy retrofit approaches are considered "simple" or "light" because they focus only on upgrading lighting equipment and adding new motors to the heating and cooling systems. By contrast, a deep energy retrofit employs an integrated array of energy efficiency measures, often as part of a multi-year or portfolio-level plan, to reduce energy consumption by 30 percent or more compared to the pre-retrofit energy use while delivering superior sustainability performance.

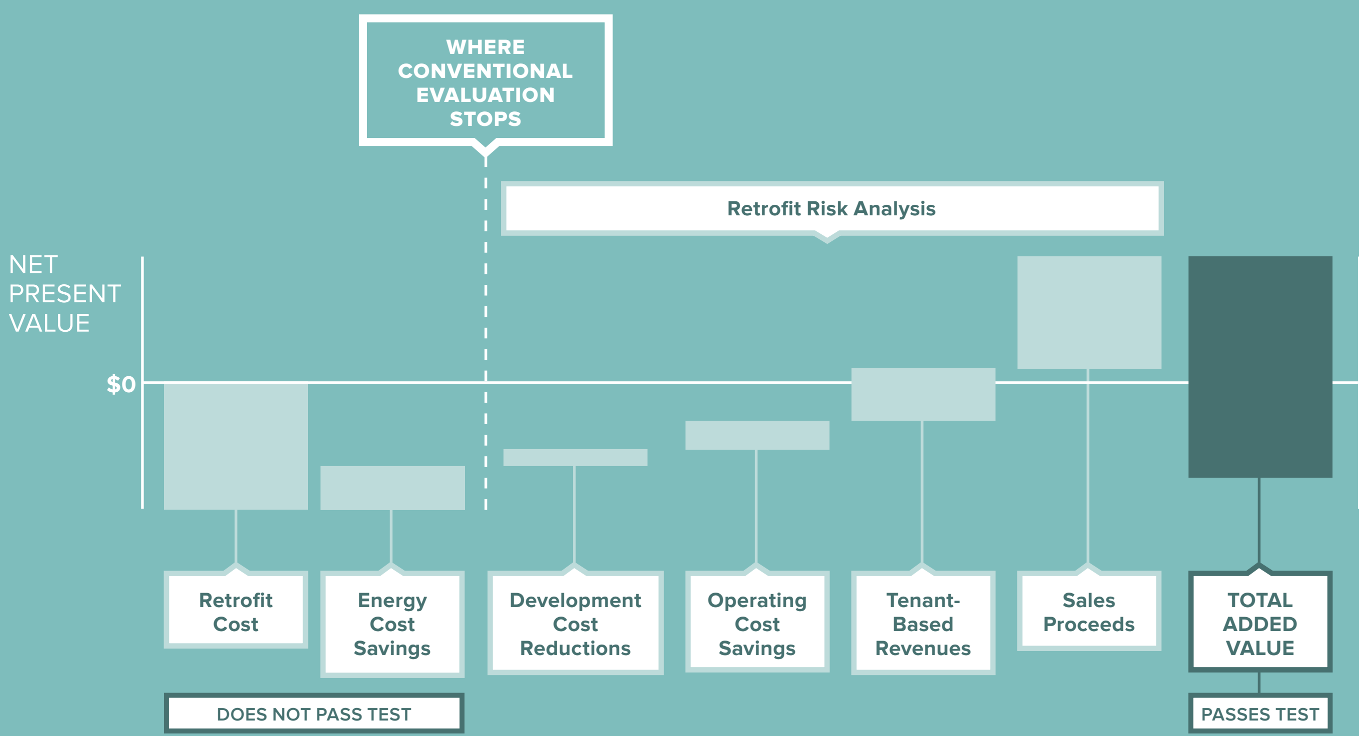
In addition to substantial reductions in energy costs, deep energy retrofits also create significant yet often unrecognized additional value, or deep retrofit value. Tenants can realize improved employee satisfaction and health, sustainability leadership and reputation, improved risk management, and reductions in non-energy operating costs. Investors can tap into these tenant values through higher rents, occupancy, and tenant retention. These revenue benefits supplement lower operating costs to improve overall net operating income and property sales prices.

To date, investment in deep energy retrofits has been limited in large part by a lack of a compelling business case.[1] Energy efficiency investments that are made today typically have to provide a 30 percent return on investment (3.5 year payback) based on energy cost savings alone.[2] Deep energy retrofits can come close to meeting this hurdle (see e.g., Empire State Building, 1525 Wilson, and The Aventine) but many do not.

The figure below illustrates the concept of considering deep retrofit value in order to improve the perceived business case. Standard practice is to consider only the energy cost savings, which for a deep energy retrofit can yield very low or negative net present value. Properly calculating and presenting additional values can make the investment lucrative. In other words, standard practice can lead to underinvestment in a valuable commodity.

FIGURE 1

WHY DEEP RETROFIT VALUE MATTERS



The guide and its companion, *How to Calculate and Present Deep Retrofit Value for Owner-Occupants*, are both freely available on the Rocky Mountain Institute website at http://www.rmi.org/retrofit_depot_deepretrofitvalue. In addition, Rocky Mountain Institute guides for managing deep retrofits and identifying design opportunities are freely available at http://www.rmi.org/retrofit_depot_download_the_guides.

OBJECTIVES OF THE GUIDE

This practice guide enables the preparation of a well-reasoned and supported deep retrofit value (DRV) report to be presented as part of a retrofit capital request.[i] This analysis can be presented in a deep retrofit value (DRV) report. A DRV report may take the form of a series of slides to senior decision makers, or presented in detail with full supporting documentation and financial models to due diligence analysts. A sample report is provided in Chapter 4. This report can accompany a traditional cost-based analysis and/or incorporate all costs and benefits into a single report.

DEFINING DEEP RETROFIT VALUE

Deep retrofit value for an investor is defined as the present value of all the benefits beyond the energy cost savings minus the costs accruing to a property as a result of executing a deep retrofit. In this case, value is a market value.[ii] We focus on the calculation of the marginal change in property market value resulting from execution of a deep retrofit, but the methodology can be applied, with minor modification, to the development of the income approach to value in a full property valuation. We acknowledge that many additional public benefits from deep retrofits, including reduced carbon emissions, improved national security, and public health benefits are not fully analyzed or captured in a market value analysis.

This practice guide provides a comprehensive framework to capture all value beyond energy cost savings resulting from the execution of a specific deep retrofit project. Value elements are carefully defined, with appropriate supporting research and analysis, followed by a step-by-step methodology for analyzing and calculating the financial impact of the value element. Profiles of "deep retrofit value leaders" are provided where possible to illustrate those who have already implemented portions of the methodology.

The guide provides the terminology and accounting to make sure values are not missed or double counted, comprehensively addresses the role of risk in determining value and making retrofit capital decisions, and evaluates how sustainability performance affects the key assumptions (e.g., rent, occupancy, expenses, cap rates) that generate value.

While the DRV report integrates projected energy cost savings into its analyses and conclusions, it does not focus on the development of the energy cost savings analysis itself, which is assumed to be done in a report that would be a critical part of any retrofit decision. More about building energy modeling and forecasts can be found in RMI's report *Building Energy Modeling for Owners and Managers.*

[i] The term value beyond energy cost savings (VBECS) is used often in this report to refer to all of the value created by a retrofit beyond energy cost savings.

[ii] Market value is defined as "the most probable price that the specified property interest should sell for in a competitive market after a reasonable exposure time, as of a specified date, in cash, or in terms equivalent to cash, under all conditions requisite to a fair sale, with the buyer and seller each acting prudently, knowledgeably, for self-interest, and assuming neither is under duress." Dictionary of Real Estate Appraisal, 5th Edition, 2010. Other definitions exist such as in the Interagency Guideline of Market Value.

WHO SHOULD USE THIS GUIDE

This guide is useful to anyone interested in better understanding how energy efficiency retrofits create value for class A and B office buildings, but is generally useful for:

- Commercial and multi-family investors including private real estate investment managers, REITs, and private investors and developers;
- Asset managers, property managers, sustainability directors, energy managers, and others responsible for preparing retrofit capital requests;
- Acquisition analysts, capital budgeting analysts, investment committee members, CFOs, and others responsible for investment due diligence;
- Sustainability directors, research directors, and senior leadership developing portfolio-level sustainability and energy management strategies and budgets;
- Third-party property and asset mangers, consultants, architects, engineers, and other service providers developing retrofit capital requests or conducting due diligence on such investments; and
- Valuation professionals, appraisers, and accountants responsible for asset appraisal and fair value determination.

The basic value framework presented in this guide can be applied, with adjustment, to other property types, including residential properties, new construction, tenant improvements, and equipment replacements.

TABLE OF CONTENTS
EXECUTIVE SUMMARY
GETTING STARTED
PRELIMINARY ANALYSIS
VALUE ELEMENT ASSESSMENT 1 2 3 4 5
SAMPLE REPORT
CONCLUSION
APPENDIX A
APPENDIX B
APPENDIX C
END NOTES

OVERVIEW OF DEEP RETROFIT VALUE METHODOLOGY

Our methodology has three components:

1. Conduct a preliminary analysis that improves the efficiency and effectiveness of completing the following two steps.
2. Assess the value elements that generate the value of a deep retrofit in addition to energy cost savings.
3. Develop a DRV report based on an evaluation of selected value elements that are to be used to make a compelling presentation to decision makers and other important stakeholders.

The five value elements serve as a menu of the potential types of value that a deep energy retrofit can create. It is not necessary to evaluate and present all five value elements, but only those applicable to a particular retrofit project or portfolio strategy.

VALUE ELEMENT 1
RETROFIT DEVELOPMENT COSTS:

These costs represent the initial capital investment against which future cost savings and other benefits are measured. Many retrofit projects have little cost premium if timed with other capital improvement projects.

VALUE ELEMENT 2
NON-ENERGY OPERATING COSTS:

Deep retrofits can reduce operating costs associated with maintenance costs, insurance costs, and occupant churn rate. They can also increase a building's occupied space through equipment downsizing and better occupant use of space.

VALUE ELEMENT 3
RETROFIT RISK ANALYSIS:

Retrofit risk analysis helps maximize value from the other elements. The identification and evaluation of these risks enables action to mitigate and accurately price them.

VALUE ELEMENT 4
TENANT-BASED REVENUES:

Tenant-based revenues from deep retrofits are generated when building owners are able to monetize enhanced demand resulting from a deep retrofit by increasing rents, occupancies, absorption, and tenant retention.

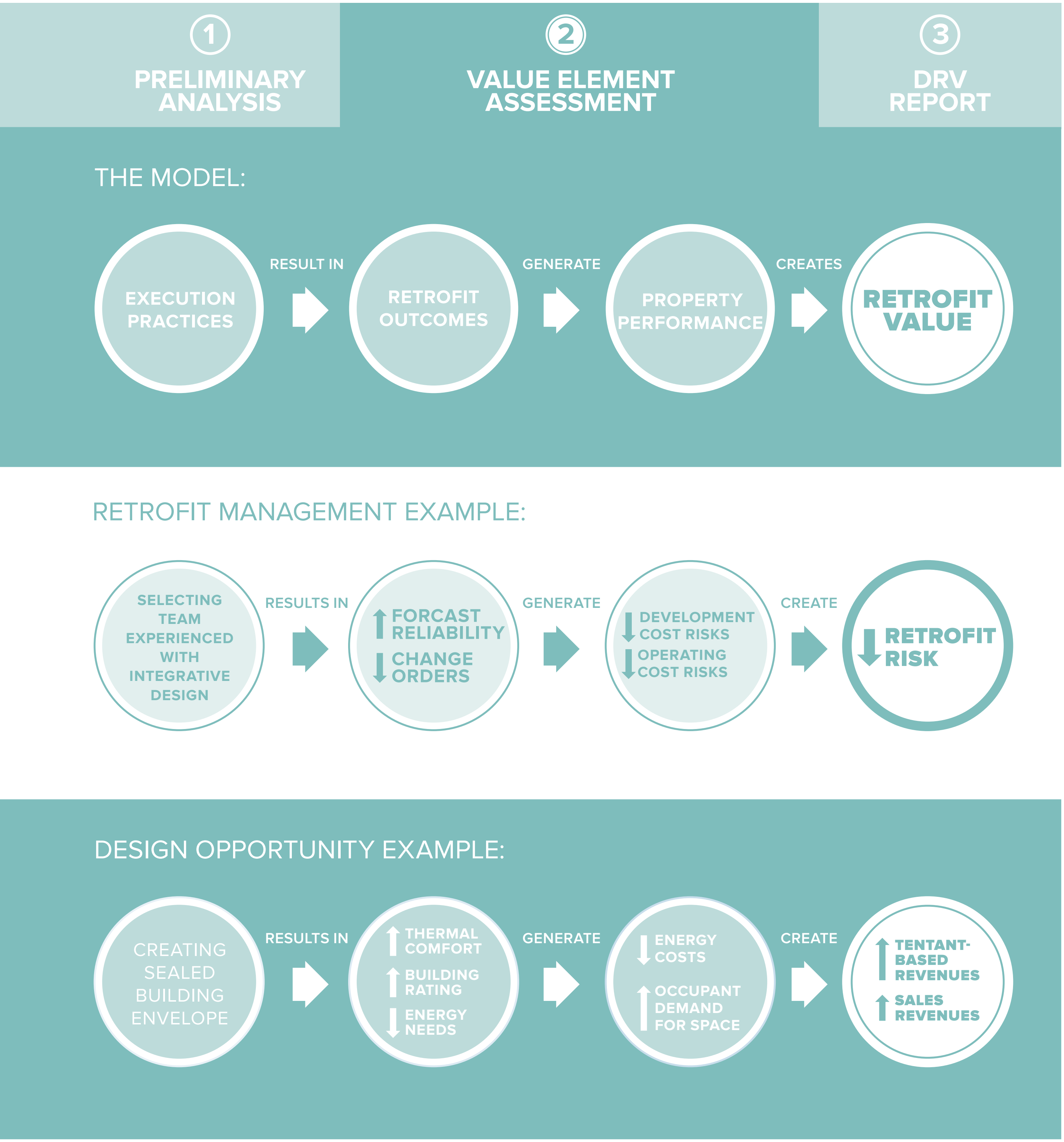
VALUE ELEMENT 5
SALES REVENUES:

Sales revenue premiums from deep retrofits result from higher net operating income (due to expense savings and increased tenant revenues), increased investor demand (which can lower cap and discount rates), and risk reduction (which further contributes to cap and discount rate reduction).

Key to the consideration of value elements is the RMI Retrofit Value Model shown in Figure 2. The model illustrates the linkages between process (or management) and design decisions with deep retrofit value. Two examples are provided.

FIGURE 2

RMI RETROFIT VALUE MODEL FOR INVESTORS



We use a discounted cash flow (DCF) model because it accounts for all potential sources of value. While it might seem difficult to determine how much a property achieving high levels of sustainability performance could affect rents, tenant retention, or operating expenses, this kind of analysis is exactly the same as real estate investment analysts do every day. The benchmark holding period in the industry is 10 years, which we also assume for our methodology. Argus software for real estate investment and valuation provides a perfect complement to our methodology. Spreadsheets are also suitable.

ABOUT DISCOUNTED CASH FLOW MODELING

Discounted cash flow (DCF) models calculate financial metrics based on cash flows over any length of time, typically a few years for a development project or 10 years for real estate investment analysis or valuation. Net operating income (NOI) from a property is calculated by subtracting total operating expenses from revenues. Cash flow from the sale of the property is calculated in the year it is assumed to be sold by dividing the NOI by the subsequent year's capitalization rate to determine its sales price. All the annual operating cash flows (NOI) and the cash flow from the sale are converted to present value using a discount rate. Some decision makers will desire separate discount rates for cash flows based on the type of cash flow. A more detailed explanation of the discounted cash flow model and key assumptions that are influenced by energy efficiency improvements is presented in Chapter V: Sustainable Property Financial Analysis, *Value Beyond Cost Savings: How to Underwrite Sustainable Properties*, Scott Muldavin, 2010.

HOW TO CALCULATE AND PRESENT
DEEP RETROFIT VALUE

PRELIMINARY ANALYSIS

2

PRELIMINARY ANALYSIS

Once a decision has been made to prepare a DRV report, or if it is being considered, completion of some preliminary analysis can help ensure that the remaining work is efficient and effective.[3]

ASSESS ORGANIZATIONAL CONTEXT INFLUENCING RETROFIT DECISIONS

It is critical to have a clear understanding of who the key decision makers are and what they need to support a deep retrofit capital request.[4] Some questions to address include:

- What are the retrofit's hot points for key decision makers?
- What are key goals and or problems to be solved and how can a retrofit address both?
- What other stakeholders need to be considered?
- What was included, and in what formats, in successful retrofit capital request funding packages, or other non-retrofit capital funding requests?
- What is most important about energy efficiency to primary tenants and owners?
- How strong is the internal support/cooperation for sustainability—especially energy efficiency—and DRV analysis among market/acquisition analysts, property managers, human resources, risk management, etc.?
- Do asset managers have subject property leases and financials already modeled? And if not, how hard/costly is it going to be to collect data necessary for the DRV analysis?

BUILD SUPPORT FOR INCORPORATING VALUE CONSIDERATIONS EARLY

Since most companies still rely upon energy cost savings for retrofit decision making, it is important, even prior to consideration of a specific retrofit proposal, to build internal support for incorporating value and risk into decisions. Some suggested actions include:

- Seeking support from senior leadership for changes to retrofit decision-making practices.
- Recommending and seeking support for refinements to the form and content of a retrofit funding request, such as the inclusion of a supplementary DRV report.
- Incorporating value and risk considerations at start of planning/design and any initial retrofit planning meetings or workshops.
- Engaging internal market/acquisition analysts, human resource professionals, risk managers, etc., in early discussions.
- Assessing and soliciting support from asset and property managers.
- Assessing and soliciting support from service providers.

IDENTIFY AND PRIORITIZE EFFICIENCY OPPORTUNITIES ACROSS THE PORTFOLIO

There are situations that are especially ripe for the sustainability performance improvements that deep energy retrofit investments can produce. While some buildings have such high energy use or high energy prices that deep retrofits are easier to justify economically (see 1515 Wilson), many buildings will need to carefully plan the timing and approach of deep retrofits to take advantage of property- or market-level changes to maximize value creation and limit risk. This important preliminary analysis step is also a key component of portfolio level risk mitigation strategies as discussed in value element three: risk analysis.

Figure 3 provides an illustrative two-dimensional framework for prioritizing buildings in a portfolio for deep energy retrofit. Along the vertical dimension are property-level changes that typically indicate capital is about to be spent on the building. Along the horizontal dimension are local energy efficiency market capacity and demand factors. A complete list of indicators and factors is below. Buildings that fall in the upper right quadrant should be prioritized for deep energy retrofit.

FIGURE 3

FRAMEWORK FOR PRIORITIZING BUILDINGS FOR DEEP ENERGY RETROFIT

PROPERTY-LEVEL DISRUPTION	LOCAL DEMAND AND CAPACITY: Low	LOCAL DEMAND AND CAPACITY: High
High	**SMALL BITES:** Move quickly to capture the opportunity	**LOW HANGING FRUIT:** Start developing a robust Deep Retrofit Value report
Low	**TOUGH HOE:** De-prioritize until situation changes	**LONG TERM HARVEST:** Put plans together now

PROPERTY-LEVEL DISRUPTION

Property-level changes or events that can improve the economics and mitigate the risks of investment opportunities for sustainability performance upgrades include:

1. **Adaptive reuse or market repositioning**

   Adaptive reuse or market repositioning requires (perhaps over several years) significant capital expense to which the cost of a deep retrofit would be incremental and likely small in comparison. A deep retrofit can be a very valuable part of a market repositioning to attract top tenants and rents.

2. **New acquisitions or refinancing**

   New acquisitions and refinancing provide the opportunity to put in place attractively financed building upgrades as part of the transaction including budgets for new tenant upgrades and building level improvements.

3. **Major tenant/occupancy change**

   A company or tenant moving a significant number of people or product into a building or major turnover in square footage presents a prime opportunity for a deep retrofit for a number of important reasons. First, a deep retrofit can generate layouts that improve energy and space efficiency, and can create more leasable space through downsizing mechanical equipment. Second, ownership can leverage tenant investment in the fit-out. Finally, planning around tenant disruption in a major retrofit is much easier during a natural workplace transition.

4. **Roof, window, or siding replacement**

   Planned roof, window, and siding replacements provide opportunities for significant improvements in daylighting and efficiency at small incremental cost, providing the leverage for a deep retrofit that reduces loads and therefore the cost of replacing major equipment such as HVAC and lighting.

5. **End- (or near end) of-life HVAC, lighting, or other major equipment replacement**

   Major equipment replacements provide opportunity to also address the envelope and other building systems as part of sustainability performance improvements. After reducing thermal and electrical loads, the marginal cost of replacing the major equipment with much smaller equipment (or no equipment at all) can be negative.

6. **Upgrades to meet code**

   Life safety upgrades may require substantial disruption and cost, enough that the incremental investment and effort to radically improve the building efficiency becomes not only feasible but also profitable.

7. **Building greening**

   An owner- or tenant-driven desire to achieve green building or energy certification may require significant work on the building and its systems, which may then make a deep retrofit economical.

8. **Significant indoor environmental quality (IEQ)/thermal comfort issues**

   Tenant or human resource department complaints about temperature, temperature fluctuations, odors, sickness, or other indoor environment quality issues may require investment supportive of sustainability performance objectives.

LOCAL DEMAND AND CAPACITY

Local market capacity and demand factors that improve the retrofit opportunity include:

1. **Local market demand for increased sustainability performance**

   The value and ease of execution of a deep retrofit will be significantly influenced by the demand for such space by tenants, employees, regulators, and the public.

2. **Market competition and green building penetration**

   The level of sustainability performance in the submarket and indirect peer group competitors and overall green building market penetration will provide important insights about market and property retrofit priorities.

3. **Availability of utility/government incentives**

   Many utilities will subsidize the cost of a deep retrofit, covering initial evaluations through construction. In some regions, the incentives might be large enough to make the deep retrofit economical.

4. **Execution risk**

   Certain properties/retrofit situations will be more risky than others due to potential risk to tenant revenues and/or satisfaction, sophistication of local building staff and vendors, local market for deep retrofit (workforce, building operators, service provider capacity/skill), and other factors. Major risk factors could be an important determinant of timing and/or level of investment.

5. **Local low-carbon development areas/districts**

   Special districts, municipal programs, and voluntary initiatives (including eco-districts, net-zero energy districts, 2030 districts, etc.) are emerging to address carbon emissions and health concerns. As these districts emerge, sustainability performance improvements in buildings take on added value. Additional subsidies and incentives may also be available.

DETERMINE DECISION METRICS

It is important to consider financial analysis alternatives and understand the specific financial metrics required from the financial model selected and other non-financial considerations that are likely to drive decision making.

KEY FINANCIAL DECISION METRICS

- Energy cost savings
- Levered or unlevered ROI
- Internal rate of return
- Net present value
- Capital appreciation, or increase in asset value
- Before or after tax

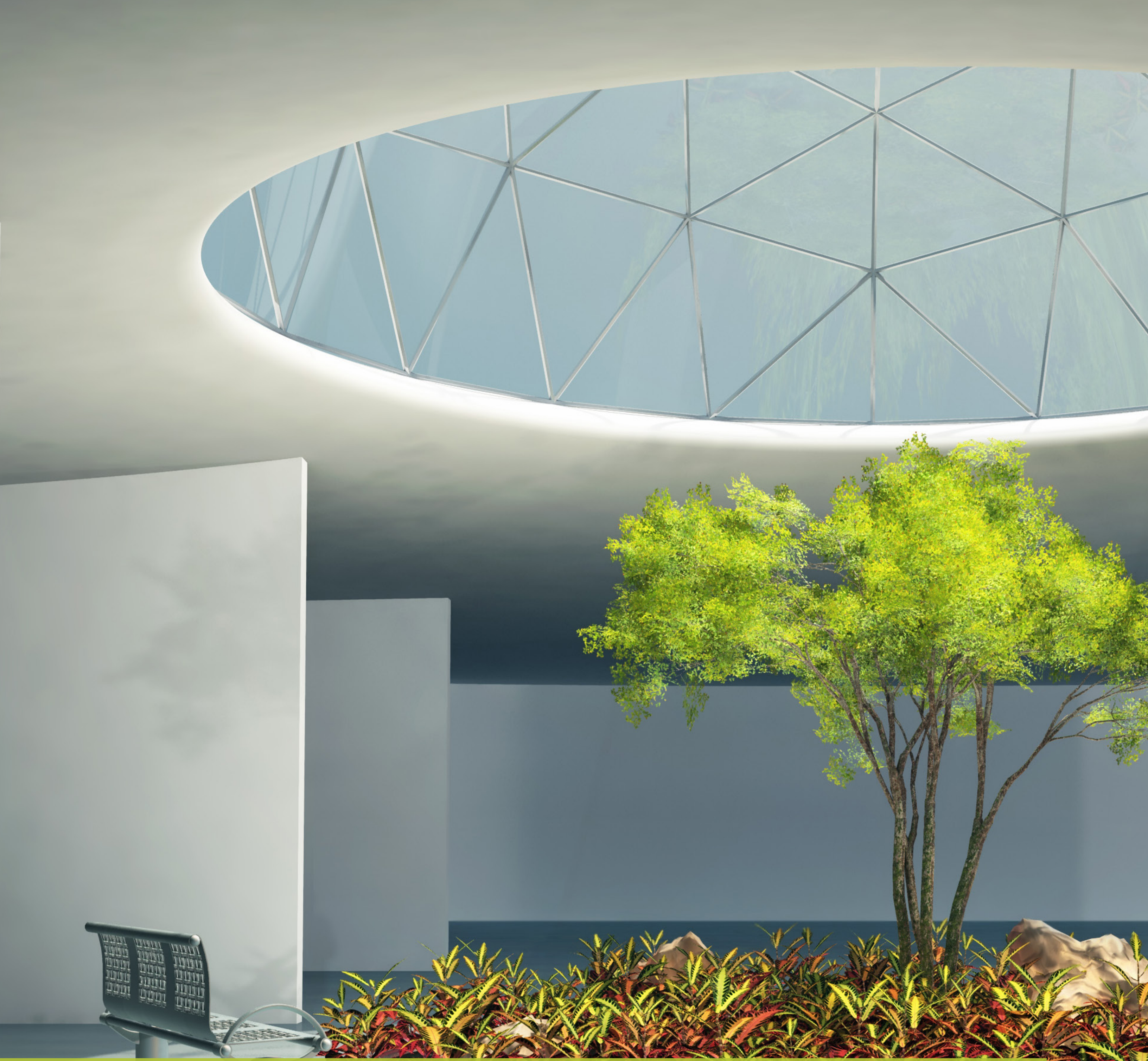
KEY NON-FINANCIAL DECISION METRICS

- Tenant impact assessment—disruption, demand for greater energy efficiency, cost concerns, frequency/type of tenant complaints, etc.
- Level of leadership (brand support) demonstrated by investment
- Maximum utilization of regulatory, tax, and related subsidies
- Board, passive investor, other stakeholder satisfaction
- Functional obsolescence risk, building competitiveness, etc.

HOW TO CALCULATE AND PRESENT
DEEP RETROFIT VALUE

VALUE ELEMENT ASSESSMENT

3



RETROFIT CAPITAL COSTS

VALUE ELEMENT: 1 2 3 4 5

VALUE ELEMENT 1: RETROFIT CAPITAL COSTS

Development costs for deep energy retrofits represent the capital investment against which future cost savings and other benefits are measured. These capital costs vary dramatically based on a wide variety of property factors, can occur over many years, and should take into account the notion that every building has an ongoing need for capital upgrades regardless of sustainability performance.

A successful capital request will clearly note how costs are defined and calculated, and carefully explain any benchmarks used for cost comparisons. Equally important is a thorough presentation of how retrofit development risks will be managed and mitigated, which is the focus of value element three (page 35). While a complete presentation of how to calculate deep retrofit development costs is beyond the scope of this practice guide, in this section we define retrofit capital costs, identify opportunities to reduce development costs, and discuss special presentation issues.

RETROFIT CAPITAL COST EQUATION

(Gross Capital Cost) – (Avoided Capital Costs) – (Cost Savings Through Design) – (Cost Subsidies and Incentives)
=
RETROFIT CAPITAL COST

GROSS COSTS

Gross cost is the cash flow required to execute the deep energy retrofit. The gross cost of a deep energy retrofit will vary greatly based on a wide range of factors, including building type, age, location, site conditions, project team experience, and the varying ways energy use reductions are achieved. An article in the *Journal of Sustainable Real Estate* stated that the gross capital cost of a major retrofit of all energy-using systems (i.e., envelope, lighting, HVAC, and plug loads) in a typical 500,000-square-foot office building is $10–$75 per square foot.[5] Case studies from both New Buildings Institute and Rocky Mountain Institute of recent deep retrofits of office buildings indicate gross capital costs of $67 per square foot on average.[6] According to the U.S. Department of Energy's Advanced Energy Retrofit Guides, the gross capital cost for the deep retrofit of a 200,000 square foot prototypical office building is between $4 and $5 per square foot and the soft cost of a deep energy retrofit in general can total as much as $0.50 per square foot.[7]

AVOIDED CAPITAL COSTS

Avoided capital costs are those that can be avoided as a result of executing the deep retrofit. For example, if the deep retrofit plan includes replacing a chiller next year that otherwise only had about five years of life according to the property conditions assessment report, then the cost of replacing that chiller five years from now can be avoided as a result of the deep retrofit. Hence, the financial model could show a positive cash flow (to the owner) in year five for the estimated cost of that chiller replacement. This assumes the chiller purchased today would be in service until a comparable date as the chiller that would otherwise be installed in year five.

Deep energy retrofits take the place of or accelerate many costly (but standard) building upgrades, including HVAC, lighting, and roofs. While capital planning with a large degree of certainty rarely extends beyond one year, a range of potentially avoided costs can be taken into account. These costs can be estimated from property condition assessment reports (PCAs), historical budgeting, or the BOMA Experience Exchange Report data, and as part of a competitive bid one can ask for the cost to keep and maintain the existing property.

Avoided cost depends on the current state and age of the building components, tenant rollover, and how far into the future the analysis extends. Buildings with old and failing equipment, or many tenants about to rollover, have larger potential for avoided costs in the near term. The further a deep energy retrofit analysis looks forward in time, the larger the avoided costs can be because every building at some point needs major upgrades to the common areas and/or tenant spaces.

COST SAVINGS THROUGH DESIGN

In many cases the incremental cost of a deep energy retrofit can be reduced through design and construction best practices. For example, as noted in *Cost Control Strategies for Zero Energy Buildings*, the design team for the Packard Foundation's recently constructed LEED Platinum, zero-energy headquarters building in Los Altos, California, was able to avoid the cost of a $150,000 perimeter heating system and more than $300,000 in additional PV by investing $75,000 in triple-pane glazing to reduce perimeter thermal gains and losses.[9] While most applicable and documented for new construction, such cost-saving approaches can be impactful for deep energy retrofits.

It is important to not double count avoided costs and cost savings through design and construction. For example, the Empire State Building retrofit saved $17 million by reducing cooling loads enough to avoid a larger chiller and a very costly installation. We would classify this cost saving as avoided cost, despite it being enabled by a design that emphasized cooling load reduction.

DEEP RETROFIT VALUE LEADERS:

AVOIDED COSTS IN THE EMPIRE STATE BUILDING

In 2007, the Empire State Building was slated for new air handling units (AHUs), a chiller replacement, windows resealing, and conventional tenant fit-outs that would take place over the course of several years as tenant rollover occurred. However, instead of following this conventional plan, the owner decided to make a new plan that would save close to 40 percent of energy costs using a deep energy retrofit. The originally planned capital costs are now being avoided, leaving only $13 million (14 percent) of the $106 million deep energy retrofit as the incremental cost.[8]

COST SUBSIDIES AND INCENTIVES

Incremental retrofit development costs must include a deduction for any development cost subsidy that would not have otherwise been available for the retrofit project. As appropriate, the cost for obtaining the subsidies should also be accounted for as an additional cost of development.

Subsidies and incentives provided by federal, state, and local governments and utilities offer the most direct offset for deep retrofits. Subsidies and incentives fall into four broad categories:

1. Tax credits and incentives
2. Grants, rebates, and other financial subsidies
3. Entitlement-related benefits
4. Subsidized lending

A useful resource for initially determining eligibility for subsidies and incentives is the Database of State Incentives for Renewables and Efficiency (DSIRE) as well as local municipalities and utilities. In addition to generally available subsidies and incentives, larger energy users can go directly to utilities and negotiate outside of formal programs.

Tax Credits and Incentives

There is a plethora of credits and incentives at every level of government. Capturing the full value of tax credits and subsidies can often involve tax planning. Additionally, sometimes an equipment vendor or counter party is actually taking the incentive from the retrofit and it is important to fully understand the underlying economics of the deal to effectively negotiate terms.

Grants, Rebates, and Other Financial Subsidies

State and local governments often offer grants, rebates, and financial incentives. Utilities likewise have numerous grant, rebate, and technical assistance programs for energy efficiency, renewables, and water projects. Programs range from incentives for specific features or energy efficiency measures to paying for performance or retro-commissioning incentives that add savings to the initial outlay.

Entitlement-Related Benefits

Many local governments around the country offer entitlement-related benefits, which include expedited planning and permitting, site density bonuses, and fee waivers or reductions.

Subsidized Lending

In the place of traditional debt from banks, life insurance companies, or commercial mortgage-backed securities conduit lenders, the sustainable/energy retrofit debt markets have evolved around utility, local, state, or federal subsidies and sponsorship. These government and utilities-related energy efficiency financing programs offer various credit enhancements such as loan loss reserves, loan guarantees, and interest-rate buy downs, and by direct lending using revolving loan funds.

In all cases, the amount of debt financing is limited by the requirement that annual energy cost savings cover the debt service cost of the energy loan. The amount of energy cost savings financing will not be sufficient for many deep retrofits, but such debt can significantly reduce the retrofit cost of capital and magnitude of equity required from investors.

Property-assessed clean energy (PACE) loans are emerging as a potentially effective source of capital for borrowers with differing levels of creditworthiness. These loans are particularly attractive because they are secured by a property tax lien, they typically qualify as a pass through to tenants, and they offer low interest rates. Additionally, because they are not due upon sale of the property, the terms of the loans can be much longer than traditional energy efficiency finance enabling deeper retrofits. PACENow offers a listing of states, counties, and cities where PACE programs and/or enabling legislation are available.

On-bill financing and repayment programs are growing in scale and scope. With utility on-bill financing programs, the utility provides the financing, whereas with on-bill repayment programs, states or other sources provide the funds. In both cases, payment of debt is made through the utility bill. These programs have broad application across property and credit types, and in the case of programs structured as tariffs—as opposed to customer loans—an important benefit is the debt obligation stays with the meter. The cost of financing can often be attractive, but will vary depending on the transaction structure and any levels of subsidy.

Federal incentives are primarily focused on tax credits and deductions, but a number of loan-related programs under the Small Business Administration (SBA) and various programs through the Department of Housing and Urban Development (HUD) are also available. In addition,

DEEP RETROFIT VALUE LEADERS:

HILTON LOS ANGELES/UNIVERSAL DEEP RETROFIT FUNDED THROUGH PACE

The Hilton Los Angeles/Universal used PACE financing to achieve its $7 million deep retrofit completed in 2014. PACE provided long-term, non-recourse, off-balance-sheet financing for upgrades to the HVAC system and controls, elevators, chillers, lighting, and other equipment. Driven by a goal to improve the comfort and experience of hotel guests as well as to meet Hilton's sustainability standards, this project added $335,000 in net operating income in year 1 and increased the estimated value of the property by more than $30 million.[10]

the Department of Energy is authorized to issue loan guarantees for projects that "avoid, reduce or sequester air pollutants or anthropogenic emissions of greenhouse gases; and employ new or significantly improved technologies as compared to commercial technologies in service in the United States at the time the guarantee is issued." The loan guarantee program has been authorized to offer more than $10 billion in loan guarantees for energy efficiency, renewable energy, and advanced transmission and distribution projects. Loan amounts vary, but the program focuses on projects with total project costs over $25 million. This incentive program is open to commercial, industrial, nonprofit, school, state and local government, agricultural, institutional, non-federal entity, and manufacturing facility projects. Applicable technologies include: solar thermal electric, thermal process heat, daylighting, and photovoltaic solar panels; wind; geothermal electric; hydroelectric, tidal energy, wave energy, and ocean thermal; fuel cells and fuel cells using renewable fuels; and biodiesel.[11]

Applicability, Level of Benefit, Terms, Timing, and Complexity

Determining the applicability, level of benefit, terms, and timing of subsidies and incentives can be complex. The number and types of programs and variability of sponsoring governments and organizations creates some challenges. The documentation, timing, and related requirements needed to receive benefits can be cumbersome. However, with widely available and significant benefits—amounting to 10 percent or more—it can be worth the effort in many cases to identify the opportunities available through subsidies and incentives to offset costs.

PRESENTING RETROFIT DEVELOPMENT COSTS

The key to presenting retrofit development costs is providing enough information to convince the decision maker that everything that potentially impacts the project costs has been included and an appropriate cost contingency has been built into the budget. It is also important to distinguish

A RESOURCE FOR INCENTIVES AND POLICIES TO OFFSET DEEP RETROFIT COSTS

The Database of State Incentives for Renewables & Efficiency (DSIRE) is a comprehensive, reliable, and regularly updated source of information on about 30 specific types of incentives and policies for renewable energy and energy efficiency. Summary maps and tables offer descriptions about available incentives/policies and show the availability of these different incentives/policies in detail at the federal, state, and local level.

costs among capital, operations, and tenant improvement (TI) budgets. Categorizing costs appropriately helps to properly assess what really needs to be funded or financed. Moreover, a successful presentation will cite the ways that retrofit development costs can be offset, including tax incentives and credits, entitlement-related benefits, and subsidized lending, as well as grants, rebates, and other financial subsidies.

Development costs are always subject to significant risk due to weather, labor issues, material costs, execution uncertainties, and other issues. Significant cost contingencies and other risk mitigation strategies are used to deal with this standard level of risk. The gross cost of a deep retrofit is also subject to risks of pioneering products, technologies, systems, design, and contracts as well as potential inexperience in service providers and contractors. In addition, there can be large uncertainty around the business-as-usual and premium costs. Accordingly, the most successful presentations of retrofit development costs will document how complexities are handled and special risks mitigated.

NON-ENERGY COST SAVINGS

VALUE ELEMENT: 1 ② 3 4 5

VALUE ELEMENT 2: NON-ENERGY COST SAVINGS

Non-energy operating cost savings can increase building value and profitability.[iii] Deep retrofits can reduce these costs, which include maintenance and insurance.[iv] In some cases, a deep retrofit can also increase the amount of rentable space through equipment downsizing.

Non-energy operating cost savings create value directly for the property owner by increasing net operating income, which is capitalized at the time the property is sold to create property value.

MAINTENANCE

We define maintenance to include:

- routine maintenance (including grounds and janitorial)
- deferred maintenance (non-capital) projects
- processing work orders

Studies show green buildings generally cost 5 to 10 percent less to maintain than the average building. While some common sense hypotheses like reduced time to change light bulbs, maintain landscaping, and vacuum carpets may explain the maintenance cost reductions found in many highly efficient buildings, little research has been done to precisely identify all the relevant factors.

One increasingly important area in building management is the use of technology to reduce energy and operating costs, often referred to as applying analytics to "big data." Performance information can now be collected on every light bulb, fan, plug, and other device or system within a building on an almost continuous basis. For example, Darrell Smith, Director of Facilities and Energy for the Microsoft Campus, said recently that Microsoft collects "500 billion data points from the campus every day." Software programs analyze vast volumes of that data to detect whether HVAC equipment is simultaneously heating and cooling due to a failed sensor or other problem, adjust system operations to match space occupancy, help maintain optimal set-points for systems and equipment, and increase the visibility of and focus on energy waste.

While most of the cost savings from big data analytics come from energy savings, two other benefits include fault detection and diagnosis and alarm management.[13] Fault detection and diagnosis software can automatically identify and prioritize problems for building engineers. Maintenance staff can go straight to the problem, and bring the right repair tools and parts. Continuous equipment maintenance can avoid waste and improve resource allocation. Similarly, alarm management can prioritize and structure the numerous notifications generated by building

[iii] *Value Beyond Cost Savings: How to Underwrite Sustainable Properties* presents additional detail on underwriting energy/carbon reduction investment in Expanded Chapter VI, pages 24 to 55. For more detailed descriptions and analyses of many of the studies cited in this section see Expanded Chapter IV.

[iv] While building specific carbon taxes/offsets are a reality in some parts of the world, and may become more geographically prevalent in the future, they are not included in the analysis.

systems, focusing attention on the most critical things, thereby lowering costs and improving employee/tenant satisfaction. Given the substantial amount of attention that this area is receiving, and the many claims of cost savings, it is important to recognize important value benefits, but also be diligent in not double counting benefits in deep retrofit value presentations.

REDUCED MAINTENANCE COSTS

- A 2008 Leonardo Academy study found that properties certified with LEED for Existing Buildings (LEED-EB) had a median maintenance and repair (not including janitorial) cost of $1.17 per square foot compared to the regional average of $1.52 per square foot.[14] After accounting for slightly higher janitorial costs ($1.24 vs. $1.14 per square foot), the overall cost of maintenance was $0.25 per square foot cheaper, or a 9 percent annual maintenance cost savings.
- According to a 2010 Aberdeen Group study, adopting a data and performance management strategy can cut 14 percent or more of maintenance costs, allowing for visibility and routine tracking of key performance metrics such as operating costs, budget, and energy consumption; and increased collaboration between departmental stakeholders.[15]
- A study conducted for the U.S General Services Administration (GSA) found that 12 green GSA buildings had maintenance costs on average 13 percent less than the baseline.[16]

INSURANCE

More and more insurance companies are recognizing the benefits of green buildings and rewarding property owners with lower premiums and improved protection against loss.[v]

Specific energy efficiency measures like commissioning, efficient windows, and daylighting can help reduce disruption and loss from natural events and other building liabilities that are currently covered by various insurance products (Table 1).[17]

TABLE 1

ENERGY-EFFICIENT TECHNOLOGIES AND THE PREVENTION OF LOSSES

EEM	Fire & Wind Damage	Ice & Water Damage	Power Failures	Professional Liability	Health & Safety (Lighting)	Health & Safety (Indoor)
Building Commissioning	X	X		X	X	X
Daylighting			X		X	X
Demand-Controlled Ventilation	X		X			X
Efficient Duct Systems	X	X		X		X
Efficient Windows	X	X				
Energy Audits & Diagnosis				X	X	X
Extra Interior Gypsum Board	X					
Heat-Recovery Ventilation		X				X
Insulated Water Pipes		X				

INSURANCE BENEFITS

- Today, Liberty Mutual Insurance, Fireman's Fund, and others offer pricing discounts to qualifying green commercial properties.[18]
- In the event of major loss or damage, several providers now provide products that cover the added expense of sustainability upgrades and certification.
- For the Chubb Group of Insurance Companies, expanded coverage for sustainability upgrades does not require a higher premium. Instead, the coverage is based on a higher property asset value, effectively producing a lower premium cost relative to coverage.
- The Lawrence Berkeley National Laboratory website highlights other ways insurance companies are going green.

[v] Recent willingness by insurance companies to reduce premiums for green buildings does appear to support the contention that commissioning and sustainable design improve human health, reduce sick building syndrome claims, and may also reduce damage claims from both human and natural hazards (Nalewaik, A., & Venters, V. (2009). Cost benefits of building green. *Cost Engineering*, 51(2), 28-34).

SPACE OPTIMIZATION

Deep retrofits can downsize and consolidate mechanical equipment to free up space for lease. In some cases, mechanical, server, and other support spaces can be completely eliminated. This has been a major driver of value for deep retrofits in high-cost markets like New York City.

Today, shared workspaces offer even greater opportunity. Many companies with traditional offices find meeting and collaboration space are in high demand, while offices are vacant a majority of the time. Organizations on average allocate 190 usable square feet per person. Yet through hoteling (sharing workspaces), telecommuting, and other initiatives, this number can go as low as 80 square feet per person.[19] These changes are happening in both the public and private sectors.

SPACE OPTIMIZATION

The deep retrofit of the Deutsche Bank Twin Towers reduced mechanical equipment enough to free up an entire floor in one building, which was converted to meeting rooms.[20]

DEEP RETROFIT RISK

VALUE ELEMENT: 1 2 ③ 4 5

VALUE ELEMENT 3: DEEP RETROFIT RISK

While comprehensive risk analysis is common practice for real estate investors, it has not been commonly applied to energy retrofits. Investors perceive retrofits as risky, which is demonstrated by the fact that investment in retrofits has been limited to that which can be paid back through energy savings in approximately 3.5 years,[21] on average, indicating a simple return requirement of nearly 30 percent. This onerous requirement suggests investors perceive significant risk even in the simplest of energy retrofits. Proper risk analysis will reduce investment risk, increase value, and break down many of the most pervasive barriers put up by reluctant property owners.

No investment can be intelligently evaluated without a clear documentation of the risks inherent in the cash flow. This would include an assessment of the risks related to the recommended investment and risk mitigation strategies, as well as alternative investment scenarios. This section provides guidance to 1) identify and assess retrofit project development and operating risks, 2) evaluate risk mitigation strategies, and 3) apply and present the results of the risk analysis for value creation.

WHY RISK MATTERS

An annual $1,000 retrofit cash flow benefit valued assuming a 5 percent return requirement would be valued at $20,000. The same $1,000 cash flow valued using a 10 percent return requirement (due to perceived higher risks) would be worth only $10,000, a 50 percent value reduction.[vi]

TABLE 2

DEEP RETROFIT RISK OVERVIEW

DEEP ENERGY RETROFIT RISKS	RISK MANAGEMENT AND MITIGATION STRATEGIES
NEGATIVE (DOWNSIDE) RISKS • Regulation/Certification • Execution Team • Legal/Insurance • Development Cost Performance • Operating Cost Savings Performance • Operating Revenue Performance • Sales Revenue Performance **POSITIVE (UPSIDE) RISKS**	• Portfolio Risk Management • Traditional Insurance and Related Risk Management Mechanisms • Specialized Green Building Due Diligence • Execution of Retrofit Process Best Practices

[vi] This example assumes simple direct capitalization of the cash flow stream for illustrative purposes.

RETROFIT RISK IDENTIFICATION AND ASSESSMENT

Fully identifying investment risks is critical to the successful funding of a retrofit.[22] Real estate investors profit when they fully understand risks and properly price and allocate capital based upon their understanding of risk and potential opportunity. Real estate investors do not like uncertainty; uncertainty arising from risks not fully identified or disclosed is almost a certain deal killer. Failure to disclose or assess even small risks can kill a deal if they are discovered during an investment committee review because they call into question the overall reliability of the analysis supporting the capital request.

Best practice risk analysis must be able to anticipate and address the questions of capital providers. As the full value of retrofits is incorporated into decision making, risk analysis must move beyond just energy costs to consider the risks related to operating and sales revenues, and do a better job of documenting risk mitigation. Additionally, the critical positive risk attributes of retrofits should be assessed and presented.

The risk categories and lists of potential risks identified below provide a starting point for property risk identification and assessment. Most projects will only be exposed to a subset of risks identified below. Additionally, some risks might be more important to a particular project or decision maker and appropriately should be prioritized in any analysis. This risk identification and assessment process will provide the foundation for determination of appropriate risk mitigation strategies to pursue as discussed in the next section.

DEEP RETROFIT VALUE LEADERS:

THE INTERNATIONAL MONETARY FUND (IMF) USES A DEEP ENERGY RETROFIT AT ITS HEADQUARTERS AS A RISK MITIGATION STRATEGY

The IMF strengthened the case for a deep energy retrofit at its headquarters (HQ1) by assessing and presenting both the positive and negative risks. The positive risks from the deep retrofit included: reduced risk of business interruption from the failure of critical buildings systems, a downgrade in building market classification, and compliance with new energy efficiency codes. The IMF also prioritized reducing the negative risks by engaging with a diverse group of stakeholders early in the process to build broad support for the project, and by developing a plan for phased implementation to minimize disruptions to staff.[23]

NEGATIVE OR DOWNSIDE RISKS

The risks listed below are those that lead to reduced performance or greater uncertainty.

REGULATION/CERTIFICATION

While high performance retrofits create many regulatory/certification benefits, there are risks associated with the assumption of such benefits in a financial model:

- Failure to obtain and retain third-party sustainability and energy certifications
- Failure to meet government requirements to achieve entitlement, tax, and other subsidies
- Delays due to regulatory/certification process
- Delays/costs due to building code and regulation complexities and newness
- Meeting increasingly higher regulatory and certification requirements

EXECUTION TEAM

- Lack of early owner involvement/buy-in
- Insufficient expertise of service providers
- Insufficient occupant and property manager/ engineering engagement
- Lack of skilled construction management
- Lack of integrated design/holistic thinking among team members due to existing silos

LEGAL/INSURANCE

- Design underperformance/failure, liability
- Contractor underperformance/failure, liability
- Unenforceable, unclear contracts with energy service companies
- Unclear, unenforceable, sustainable finance contracts that hinder closing and potential securitization
- Weak, unenforceable product/service contracts/ warranties that could hinder delivery timing and performance
- Leases that limit cost pass-through, proper risk, and reward allocation, and fail to clarify tenant/ landlord behavior standards and responsibilities
- Misrepresentation and fraud-marketing and leasing protocols
- Failure to achieve entitlements/entitlement subsidies
- Occupant business interruption from retrofit execution
- Inadequate property and casualty insurance
- Ineffective or insufficient other insurance, surety, and related risk mitigation contracts

DEVELOPMENT COST PERFORMANCE

- Poor cost estimating and modeling
- Poorly estimated certification, modeling, and commissioning costs
- Unanticipated complexity, which is often due to poor plans/construction issues
- Product/system performance and delivery problems
- Building code/regulatory complexities
- Overestimation of avoided costs
- Overestimation of ability to pass costs on to tenants
- Overestimation of finance/other subsidies

OPERATING COST SAVINGS PERFORMANCE[vii]

- Energy costs drop or rise slower than forecast
- Improperly implemented energy modeling
- Vendor availability and pricing
- Product/system failure/underperformance
- More costly lease analysis and implementation costs
- New systems learning curve for maintenance/engineering
- Poorly estimated maintenance and training costs
- Poorly estimated measurement and monitoring costs
- Overestimation of durability of savings without additional capital costs
- Uncooperative/unengaged tenants/managers
- Equipment installation mishaps
- Overestimation of big data cost savings

OPERATING REVENUE PERFORMANCE (MARKET DEMAND)

- Overestimated ability to meet regulatory and certification requirements
- Overestimated operating cost savings and energy performance
- Over-improvement (i.e., excess cost relative to market demand)
- Selected incorrect combination/mix of energy/sustainability measures
- Tenants insufficiently educated on benefits
- Gross-lease market de-emphasizes tenant focus on savings
- Smaller tenants do not attribute a high value to improvements
- Liability concerns limit ability to effectively market
- Improperly specified tenant segmentation over-emphasizes tenants with higher demand for sustainability

SALES REVENUE PERFORMANCE (NET PROCEEDS FROM SALE)

- Overestimated operating cost and revenue benefits, resulting in overestimation of the net operating income (NOI) that is capitalized to determine value
- Buyers in market are most likely insufficiently educated on value of sustainability, or care less than forecasts project
- Liability concerns limit the ability to properly market sustainability advantages
- Failure of appraisers and brokers to recognize, calculate, and articulate value of sustainability
- Anticipated financing and other subsidies not available at time of assumed sale

---

vii A detailed analysis of performance evidence, risks, and best practices for six key sustainability measures: underfloor air distribution, green roofs, daylighting, lighting controls, waterless urinals, and materials is presented in *Value Beyond Cost Savings: How to Underwrite Sustainable Properties*, Expanded Chapter IV, Green Building Finance Consortium, 2010, pages 54 to 78. A detailed analysis of performance evidence, best practices, and risks for seven retrofit processes: integrated design, contracts/legal, service provider quality and capacity, energy use forecasting, regulations and code compliance, commissioning, and measurement and verification is presented on pages 7 to 45.

POSITIVE OR UPSIDE RISKS

The most important positive benefit of a sustainable/energy efficient building is its ability to cost-effectively meet the changing needs of regulators, tenants, 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.

Similarly, a building that cannot adapt to meet increasing demand for sustainability by tenants and investors will lose value through 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.

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.

CHECKLIST OF REDUCED (POSITIVE) RETROFIT RISKS
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, which is exposed to risks such as extreme weather and 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

RETROFIT RISK MITIGATION

RETROFIT RISK MITIGATION

The retrofit-related negative risks identified above can be mitigated in four primary ways:

1. Portfolio Risk Management Strategies
2. Traditional Insurance and Related Risk Management Mechanisms
3. Specialized Green Building Due Diligence
4. Execution of Retrofit Process Best Practices

The specific mix of strategies and approaches to risk mitigation will be determined by the characteristics/context of the investment.

PORTFOLIO RISK MANAGEMENT STRATEGIES

Portfolio diversification is a critical strategy employed by institutional investors to mitigate risk of overconcentration in particular property types, geographies, ownership structures, and tenant types. Institutional investors also manage risk through their selection of more (opportunistic) or less (core) risky investment strategies and a full range of research-based acquisition strategies and due diligence practices.

Standard real estate portfolio level risk management strategies mitigate some energy efficiency and renewable investment risks at a portfolio level. For example, varying geographic and property type investment limits some risk due to energy price volatility, changing occupant demand, service provider quality and cost, and other factors. However, investors can much more effectively reduce risk and increase value potential through more direct and effective strategies and actions implemented at a portfolio level.

Ten key portfolio-level risk reducing strategies and actions include:

1. **Identifying and prioritizing retrofit investment opportunities**
2. **Establishing baselines, benchmarks, and goals**
3. **Establishing retrofit decision-making practices that incorporate appropriate value and risk integration**
4. **Providing appropriate IT and internal departmental coordination to enable proper value and risk analysis**
5. **Identifying and executing finance**
6. **Creating and implementing green lease policies and practices**
7. **Developing procurement/vendor selection criteria**
8. **Managing environmental, social, and governance (ESG) compliance**
9. **Coordinating energy performance measurement and monitoring**
10. **Aligning staff and vendor compensation with sustainability performance goals**

Of the ten issues, perhaps the most powerful risk management practice to enhance the financial performance of a retrofit is the first one: intelligent identification and prioritization of retrofit investment opportunities. This type of analysis is best conducted during the preliminary analysis stage as discussed in Chapter 2.

TRADITIONAL INSURANCE AND RELATED RISK MANAGEMENT MECHANISMS

Many of the risks of deep energy retrofits can be mitigated through normal insurance and surety practices at the property level. In some cases, appropriate insurance and surety products can be found from traditional sources that may slightly modify some practices to address the special considerations of deep energy retrofits, and in other cases new companies have developed more specialized products. As with all insurance and surety products, it is important to carefully consider the cost and benefits of any purchase given a project's size, risk profile, and other factors.

Deep retrofit projects use many of the same types of traditional risk management tools, some modified to reflect the sustainable nature of the project, and some not. A listing of some of the key risks and applicable risk management tools are presented below in Table 3.

TABLE 3

RISK MITIGATION FOR ENERGY EFFICIENCY

NOTABLE EXPOSURES	RISK FINANCING TOOLS
TANGIBLE PROPERTY / FIXED ASSETS	
"All Risk" Causes of Loss/Construction, including: > Theft, Vandalism, and Fire > Materials in Transit, including Loading & Unloading > Materials Stored Off Premise	Builder's Risk or "All Risk" Property Policy
Loss or Delay of Business Income (relevant if income generating assets are affected) "All Risk" Causes of Loss, including: Fire, Windstorm, Vandalism, Lightning, Earthquake	Property Policy
Sudden and Accidental Equipment Breakdown Business Income / Equipment Breakdown	Machinery & Equipment Breakdown
Flooding / Selected Locations	Flood Insurance
LIABILITY/THIRD PARTY - INJURY TO WORKERS AND BODILY INJURY AND PROPERTY	
Site & Operations BI & PD Injuries to Others	Commercial General & Excess / Umbrella Liability
Vehicle Related BI & PD Injuries to Others	Automobile & Excess / Umbrella Liability
Injuries to Employees	Workers' Compensation
PERFORMANCE	
Contractor Insolvency Inability to Complete Construction	Bid & Performance Bonds
Failure to Deliver Material	Supply Bond
Defect in Means & Methods of Construction Negligent Supervision of Subcontractors	Contractors Errors & Omissions*
Non-Payment due to Credit Risks such as Default, Insolvency or Bankruptcy	Trade Credit Insurance / Contract Frustration
Equipment Design / Manufacturing Defect	Product Warranty
Equipment Output Deficiency	Performance Warranty
Shortfall in Projected Energy Savings	Energy Saving Warranty

Source: From the Energi Risk Mitigation Reference Guide for new energy Financing, 2012, courtesy of Energi.

* The risk financing tools suggested (property and casualty insurance, surety bonds, warranties and hedging) may not be available in all cases.

SPECIALIZED GREEN BUILDING DUE DILIGENCE

A summary of the kinds of new risk issues specific to green buildings can be found in a 2009 report completed by Marsh, the world's leading insurance broker and risk advisor.[24] Marsh conducted a series of four forums with construction industry executives to identify the top risk categories associated with green building projects. While focused on construction, the results were relevant in many cases to retrofits.

- Financial risks: The additional costs of green buildings may affect completing projects on time and on budget, but must be weighed against the cost of not going green.
- **Standard of care/legal:** Mandates regarding LEED certification bring an increased risk of legal liability for green building design and construction professionals.
- **Performance:** Project owners/developers increasingly require additional contract provisions and warranties regarding the energy efficiency of green buildings, causing additional exposure to liability for breach of contract or warranty.
- **Consultants/subconsultants and subcontractors:** Lack of green construction experience by these parties can lead to problems obtaining LEED certification, delays, improper material specifications, and inflated bids.
- **Regulatory:** New building codes and mandates associated with green construction can mean an increased liability to everyone involved in the building process.

DUE DILIGENCE

A recent article by Peter Britell, author of Green Buildings: Law, Contract and Regulation, 2012, in the *New York Law Journal* indicated several practical categories of due diligence keyed to the goals of the buyer, tenant, or lender:[25]

1. Review of LEED or other green rating applications for projects in development or completed projects
2. Review of compliance with government green building zoning codes for new and completed projects
3. Review of major tenant compliance with green lease requirements
4. Review of landlord compliance with major tenant green lease requirements
5. Review of compliance with green rules in mortgages and other funding documents
6. Review of tax credit, property tax, zoning, green tax-exempt bond, and other incentive rules and compliance/qualification for new or completed projects
7. Review of energy benchmarking, such as the Energy Star rating, and/or compliance with energy-use reporting and retrocommissioning laws

EXECUTION OF RETROFIT PROCESS BEST PRACTICES

Best practices in the design and execution of a deep retrofit can significantly reduce the risk of property underperformance by increasing the reliability of development and operating financial forecasts. Yet often retrofit capital requests do a poor job of identifying potential risks and explaining how risks have been mitigated or managed.

To date, the focus of most energy retrofit industry risk analysis has been on identifying and managing the risks of development and energy cost savings forecasts. Some key best practice efforts include the following:

- ASTM International's Building Performance Assessment (BEPA) guidelines (ASTM E279-11) provide a standardized methodology for sustainability performance reporting in real estate transactions.[26]
- The International Performance Measurement and Verification Protocol (IPMVP) defines standard terms and has enabled standardization of measurement and verification plans.[27]
- The Investor Confidence Project's Energy Performance Protocols (EPP) provide an amalgam of existing best practices standards, practices, and documentation in order to create the data necessary to enable underwriting or managing of energy performance risk.[28]
- BOMA provides a BOMA Energy Performance Contract toolkit and overview to address some of the concerns/risks of energy performance contracting: http://www.boma.org/sustainability/info-resources/Pages/boma-energy.aspx
- Rocky Mountain Institute's *Building Energy Modeling for Owners and Manager*s describes building energy modeling, modeling services, and the contracting process to help owners: http://www.rmi.org/PDF_Building_Energy_Modeling_Owners_Managers.

As might be expected, there are numerous issues throughout the five key stages of a retrofit execution—launch, design, finance, construct, and operate—that influence the reliability of a project's financial forecasts. RMI has identified 27 important retrofit execution processes that influence the risk/success of retrofit projects.

These processes are detailed in Appendix B: Deep Retrofits and Risk Mitigation—27 Best Practices.[viii]

[viii] Detailed analysis of the risks and best practices for integrated design/project delivery, contracts/legal, service provider quality and capacity, energy use forecasting, regulation, and code compliance, commissioning, and measurement and verification, is presented in "Value Beyond Energy Cost Savings, How to Underwrite Sustainable Properties," Expanded Chapter IV, pages 9 to 45, Green Building Finance Consortium, 2010.

Investors/due diligence analysts can use this list of retrofit best practices as a guide to question retrofit sponsors on the specifics of their retrofit capital request. Key issues like the quality and experience of service providers, potential tenant disruption, contracts and insurance, manager and tenant engagement, energy modeling, commissioning, and measurement and verification strategies are typical issues that will come up in most retrofits. Of course, sponsors of retrofit projects can use the list to anticipate the kinds of things due diligence will address to improve the chance of project approval.

Retrofit risk analysis should be applied in two ways: 1) creation of a deep retrofit value report and 2) executing financing and contracting arrangements.

Deep retrofit value report.

Retrofit risk analysis is central to the development of a deep retrofit value report. The risk analysis primarily informs the selection of the discount rate to be used to calculate the present value of the cash flows. In addition, the risk analysis is the central project-specific input for the determination of potential capitalization rate adjustments used to calculate sales revenues in value element five.

Financing and contracting.

Comprehensive risk analysis is critical to executing finance and contracting arrangements. Risk analysis transforms uncertainty into risk, which enables contract or finance participants to properly allocate and price risk. Comprehensive risk analysis and documentation is particularly critical to setting up loan loss reserve programs, loan warehousing operations, energy performance contracts/services agreements, product and services contracts, and all potential securitization strategies.

Applying retrofit risk analysis involves the collection, analysis, and presentation of information, much of which is textual rather than statistical or numerical. Decision makers need to understand that key risks were identified and addressed (presenting checklists, etc.). Risks that present special concern or require more sophisticated mitigation measures need to be more thoroughly presented. Presentation can be in narrative text, in a PowerPoint, or part of standard due diligence presentation package, but often requires verbal presentation as part of an investment committee discussion.[29]

TENTANT-BASED REVENUES

VALUE ELEMENT: 1 2 3 **4** 5

VALUE ELEMENT 4:
TENANT-BASED REVENUES

Tenant-based revenues from deep retrofits are generated when building owners are able to monetize enhanced demand resulting from a deep retrofit by increasing rents, occupancies, absorption, and tenant retention.

Calculation of the value derived from tenant-based revenues can be accomplished with an industry standard discounted cash flow (DCF) analysis. Assumptions about the marginal increases in key tenant demand assumptions are input into the model, holding all other factors constant, to determine the value contribution attributable to tenant-demand increases in property revenues.

While the calculation is straightforward, the determination of the key assumptions influenced by the tenant demand for energy efficiency improvements is more involved. The process for evaluating overall tenant demand for a property and determining related DCF model inputs varies dramatically by property type and investment decision. In this section, we present a 7-step methodology for determining how sustainability performance improvements affect tenant demand. Our methodology is consistent with traditional market analysis and valuation practice.

The seven steps are illustrated below in Figure 4:

FIGURE 4

7-STEP METHODOLOGY FOR EVALUATING TENANT-BASED REVENUES

Step 1: Finalize Analytic Methodology

Step 2: Assess Key Tenant Demand Assumptions

Step 3: Evaluate Projected Outcomes of Sustainability Performance Improvements

Step 4: Evaluate Existing Property Tenants

Step 5: Assess Market Conditions for Sustainability Performance Improvements

Step 6: Finalize Tenant Demand Assumptions

Step 7: Calculate Value of Enhanced Tenant Demand

DEEP RETROFIT VALUE LEADERS:

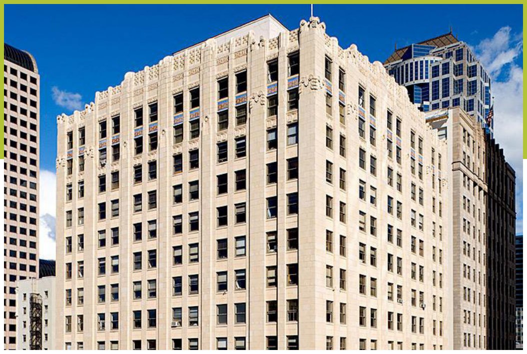
435 INDIO DEEP RETROFIT YIELDS FASTER LEASE-UP AND INCREASE IN RENT

Sharp Development recently repositioned a Class C- 1970s single-story office building (435 Indio) in Silicon Valley into a Class B+ net-zero energy facility. Instead of taking a more standard approach to getting to Class B+, owner Kevin Bates emphasized energy efficiency and on-site energy generation. The net-zero facility strongly appealed to the local market and, as a result, the lease-up time decreased from an expected 18 months to only 3 months and an increase in rent by $7.55 per square foot.[30]

DEEP RETROFIT VALUE LEADERS:

JOSEPH VANCE BUILDING INCREASES OCCUPANCY FROM 68% TO 96%

In 2006, the Rose Smart Growth Investment Fund I, L.P., acquired the historic Joseph Vance Building in downtown Seattle with the purpose of transforming it into "the leading green and historic class B" building in the marketplace. By 2007 its Energy Star score had increased from a 93 to 98 out of 100. The owners emphasized that "greening alone did not take the project from 68% to 96% leased, but marrying a green vision with an assiduous attention to real estate investment, development, and operating fundamentals has attracted a dynamic tenant mix, increasing topline revenues, net operating income, and value."[31]



STEP 1:
FINALIZE ANALYTIC METHODOLOGY

The first step in analyzing the influence of improved energy performance on tenant demand is to revisit the preliminary analysis conducted regarding the goals and purpose of the DRV report, the broader context for decision making, preferred presentation styles and formats of decision makers, and the level of support and documentation required for decision making.[ix]

Next, decisions need to be made regarding the analytic model that will be used to generate financial results and the key financial metrics required (rates of return, net present values, market value, total occupancy cost, simple payback, etc.). While simplified retrofit decision-making practices based on energy cost savings alone may be appropriate for some types of retrofit decisions, deep retrofits require more sophisticated analyses that consider all costs, benefits (revenue enhancement), and risks. In these cases, traditional real estate analyses like discounted cash flow analysis will need to be employed.[x]

After selecting the financial model, a specific list of the key underlying market assumptions influenced by tenant demand for sustainability performance upgrades, and background support needed for the final presentation package, can be created to guide data collection and analysis. While the specific factors to be analyzed will vary based on the type of property and financial analysis, key factors include rents, vacant space absorption, tenant retention, and lease terms.

RENTS

Rent assumptions that could be positively influenced by increased demand for improved sustainability performance by tenants include market rental rates and market and contract annual rent increases. Market rents represent average asking rates applied to vacant or vacated space which is leased during the time period of the analysis; actual rents may vary further by the views, existing tenant improvements, and other space specific factors.

Higher rents resulting from increased tenant demand can only be monetized when existing leases are re-signed or when space vacant at the time of the retrofit or vacated by existing tenants is re-leased. Accordingly, the existing lease terms are critical to analyzing creation of value beyond energy cost savings. Fortunately, lease terms are typically modeled as part of the underwriting and asset management process in most multi-tenant commercial properties.

INITIAL VACANT SPACE ABSORPTION

Assumptions about the speed of leasing vacant space are typically referred to as absorption. Increased tenant demand can enhance absorption. The value of absorption is partially derived from faster leasing of space that is vacant at the time a building retrofit is completed. Faster leasing generates rental revenues more quickly. An additional absorption benefit is also seen due to higher tenant retention.

TENANT RETENTION

Improved tenant retention due to enhanced demand for sustainability performance improvements can be reflected in the existing

[ix] Additional details on the project and client specific considerations that need to be considered in this step are discussed in Chapter 2: Preliminary Analysis

[x] 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.

TABLE OF CONTENTS
EXECUTIVE SUMMARY
GETTING STARTED
PRELIMINARY ANALYSIS
VALUE ELEMENT ASSESSMENT 1 2 3 4 5
SAMPLE REPORT
CONCLUSION
APPENDIX A
APPENDIX B
APPENDIX C
END NOTES

tenant renewal probability, which can be applied generally for a project or individually to major tenants in the lease-by-lease analysis that is the foundation of a multi-tenant property pro-forma. Value is created by increased tenant retention because of the differential cost of tenant improvements and leasing commissions between new and renewing tenants (typically about half the cost). Additionally, because it takes time to rent the space that becomes vacant when a tenant does not renew—referred to above as "months vacant at turnover"—value can be created if improved sustainability performance increases tenant demand and reduces time to re-lease.

LEASE TERMS

Increased demand for sustainability performance upgrades could also result in more positive lease negotiations with new and renewing tenants. This could result in direct monetary benefits like reduced need for free rent, above standard tenant improvements, or more favorable expense sharing, but might also result in qualitative benefits like higher quality tenants, longer or more favorable lease lengths, and leases that better lay out tenant and owner responsibilities.

A critical part of a market analyst/appraiser's job in every property he or she analyzes is to both clearly understand all aspects of tenant demand and to make the determination about how that demand will be realized in the subject property being analyzed. For example, are tenants more likely to show their demand by willingness to pay higher rents? Or will the property owner choose to keep rents down and drive occupancy and absorption higher, or improve rent escalations or lease terms, or simply be content with higher renewal levels by major tenants? Decisions about how to allocate the benefits of higher demand will be influenced by both the market and the owner's historical strategy in this regard.

STEP 2: *ASSESS KEY TENANT DEMAND ASSUMPTIONS*

The goal here is to document preliminary thoughts on the range of likely values for the key tenant demand assumptions based on review of third-party research with modifications based on an assessment of the specific definitions of improved sustainability performance and property- and retrofit-specific information conducted in earlier analysis. This preliminary documentation will assist in identifying the kinds of questions that need to be answered in the more detailed market analysis conducted in steps 4 and 5.

Existing Evidence of Tenant Demand for of Performance Improvements

The evidence of enhanced property revenues from properties achieving high levels of sustainability performance comes from a number of sources including 1) statistics-based analyses, 2) expert-based analyses, and 3) surveys and market research.[xi] It is important to understand that while research to date provides strong evidence that office property sustainability performance can generate a value premium, these results, and related results for other property types, provide a baseline hypothesis that then must be tested for a specific proposed retrofit given the specific market conditions, building tenants, lease structure, retrofit features, and other property-specific factors. A summary assessment of research for office buildings is presented below.

[xi] In this section, we evaluate the evidence of the demand for property sustainability from occupants and investors because much of the research in the field covers both these topics in their studies.

TABLE OF CONTENTS
EXECUTIVE SUMMARY
GETTING STARTED
PRELIMINARY ANALYSIS
VALUE ELEMENT ASSESSMENT 1 2 3 4 5
SAMPLE REPORT
CONCLUSION
APPENDIX A
APPENDIX B
APPENDIX C
END NOTES

1. STATISTICS-BASED RESEARCH

Statistical studies are typically conducted by academics applying modeling techniques to large databases of properties to isolate the evidence of how sustainability performance—typically measured by LEED, Energy Star, or similar sustainability/energy rating systems—influences rent, occupancy, or sales prices.

- On average, statistical studies have found office rental price premiums for LEED or Energy Star certification of 3 to 6 percent, occupancy premiums of approximately 10 percent, and sales price premiums of 10 to 13 percent.[32]

TABLE 4

EVIDENCE OF SUSTAINABLE OFFICE VALUE

STUDY	Rental Premium	Occupancy Premium	Sale Price Premium
Eicholtz, Kok & Quigley Dec 2010[33]	ES: 2.1% LEED: 5.8%	N/A	ES: 13% LEED: 11.1%
Wiley et al. 2010[34]	ES: 7–9% LEED: 15–17%	ES: 10–11% LEED: 16–18%	N/A
Fuerst and McAllister Mar 2011[35]	ES: 4% LEED: 5%	N/A	ES: 26% LEED: 25%
Newell, Kok, et al.; Australian Study Sep 2011[36]	Green Star: 5% NABERS: N/A	N/A	Green Star: 12% NABERS: 2–9%
Pogue et. al.; Do Green Bldgs. Make $ & Sense 3.0 Fall 2011[37]	LEED: 4.11%	3.14%	N/A
Bernstein, Russo, McGraw Hill/Siemens 2012[38]	13%	16%	10%
Chegut, Eicholtz, Kok, et al. Jan 2013[39]	BREEAM London 19.7%	N/A	14.7%
Kok, Miller, and Morris 2012[40]	LEED EB: 7%	N/A	N/A

* ES signifies Energy Star

2. EXPERT-BASED RESEARCH

Expert-based financial analyses are conducted primarily by real estate market experts (e.g., appraisers, market analysts, etc.) on a property-by-property basis following traditional market analysis practices. Expert-based studies often provide a more sophisticated assessment of how sustainability performance can influence property revenues as they include not only rent and occupancies, but also other important value-increasing attributes, like faster absorption, better lease terms, higher tenant retention rates, and lower risks (discount and cap rates).

Expert-based studies findings include:

- Faster absorption of tenants—improved pre-leasing;
- Competitive rents—in some cases higher than competitors;
- Reduced tenant turnover;
- Higher equilibrium occupancies;
- Competitive lease terms;
- Reduced operating and maintenance costs;
- Attracting superior grants, subsidies, and other incentives; and
- Higher tenant satisfaction.

3. SURVEYS AND MARKET RESEARCH

Surveys and related market research make up the bulk of what actual appraisers and underwriters use to value and underwrite the risks of properties with high levels of sustainability performance. This category includes a broad array of research including tenant/occupant surveys, investor surveys, surveys of corporate sustainability and real estate trends, sustainability performance related market or demographic research, tenant segmentation analysis, and other research that would contribute to an understanding of tenant and investor demand and its implications on their willingness to pay more for real estate with high levels of performance.

The key to extracting value and insight from industry-wide surveys is to look at the survey trends over time, the questions asked, the date the survey was taken, the independence of the survey organization, and most importantly, as much specificity as possible about the types of tenants, investors, or other respondents that are surveyed.

Surveys and market research can be separated into three categories:

Tenant and Investor Surveys: These surveys provide insight into the potential magnitude and/or direction of demand for sustainability performance upgrades by type of tenant or investor. Example findings include:[xii]

- A steady increase in tenant and investor interest in energy upgrades beginning in 2005.
- 66 percent of office tenants worldwide surveyed by the Building Owners and Managers Association (BOMA) said that sustainability is important or very important to their operations.[41]
- Over 80 percent of investment managers surveyed by Cushman Wakefield said their investors are becoming more interested and 60 percent said the pace of interest is increasing.
- Nearly 85 percent of investment managers said that tenants are becoming more demanding in terms of wanting energy-efficient space.[42]

[xii] See Table IV-15: "Space User and Investor Sustainability Surveys" in *Value Beyond Cost Savings: How to Underwrite Sustainable Properties*, Expanded Chapter IV, Muldavin, 2010 for a chronological list of survey research including space user and investor surveys, surveys of other real estate industry professionals, and surveys of corporations regarding their general preferences for sustainability. Many of these surveys and more up-to-date information is available on the Green Building Finance Consortium's website under index code 15.73 in the Research Library.

Corporate Sustainability Surveys and Research: The focus of corporate sustainability research from a real estate perspective is to understand how potential corporate tenants value sustainability, and how important their real estate sustainability strategy is as part of their overall sustainability initiatives.

Research looking at the real estate components of the Global Reporting Initiative, Carbon Disclosure Project, or corporate social responsibility reporting is some of the types of work that would be included here, as well as general surveys of corporate sustainability interests, and any comments they have specifically on real estate. Additionally, more specialized studies of how corporations value sustainability-related benefits like reduced churn cost, increased space flexibility, or improved health and productivity of employees could also be included here.

- As early as 2010, a survey of 766 CEOs from around the world found that 93 percent view sustainability as a critical driver of their company's future success.[43]
- A 2014 CEO study by McKinsey indicated 36 percent of CEOs now identify sustainability as one of the top three business issues.[44]

Tenant Demographics and Market Segmentation: This category of market research covers any kind of academic research or related study that provides a detailed understanding of tenant demand for sustainability performance improvements. This research has found that tenant demand is not consistent across types of tenants.[45] Government organizations, larger corporations, tenants with an affiliation or relationship with the sustainable industry, high technology organizations, and certain other tenant groups tend to show the strongest interest and demand for energy efficient properties. Larger, more sophisticated properties and owners are more focused on sustainability performance generally, but enhanced demand in the multi-family and smaller building segments appears to be growing, though it is hard to pin down based on surveys done to date.

STEP 3:
EVALUATE PROJECTED OUTCOMES OF SUSTAINABILITY PERFORMANCE IMPROVEMENTS

The next step before going to the market to evaluate tenant demand for a property's sustainability is to understand and describe a property's projected sustainability performance upon completion of the proposed retrofit. An analyst must know enough about a property's actual or potential sustainability performance to assess how existing and future tenants will react to the property. At a minimum, it is important to identify and evaluate the specific threshold sustainability performance requirements necessary to attract primary target tenants and tenant segments.

It should be noted that the threshold for many tenants and investors related to the level of detail and precision they require in their prospective retrofit decision making, particularly as it relates to interpreting tenant demand, may not be as high as sometimes presumed. Investors and tenants like to focus on retrofit outcomes, such as certifications, energy and water savings, and most important, tenant satisfaction and demand for sustainability performance upgrades as determined by talking with tenants, brokers, and property managers. Precise detail on the systems, technology, or even performance is important only if that level of detail is a key determinant of tenant behavior.

One other factor that limits how much you can use detailed system specifications on the subject property is that even if you have highly detailed project-specific sustainability performance information, it is difficult, if not impossible to filter through competitive projects on databases because the detail on energy efficiency features/systems is often not available. It can even be difficult to get detailed information on competitive properties that you can physically visit. Databases are improving, but the level of system detail is likely to remain limited for some time.

With the limitations in mind, a property's sustainability, or energy performance, for financial analysis purposes must be based on a clear understanding of the property's combination of energy efficiency features and attributes, as well as its projected ratings/certifications and other outcomes regarding resource use and occupant performance. Sustainable property certifications like LEED®, BREEAM (U.K., Europe), GreenStar (Australia), CASBEE (Japan), or Green Globes™ (U.S., Canada) are a good start, but since certifications can be achieved through adoption of a wide combination of different sustainable features, processes, and outcomes, more information is needed. For example, some of the outcomes valued by tenants require execution of specific measures such as daylighting, which is key to productivity and employee satisfaction.

Analysts must also understand a property's projected features, attributes, and outcomes well enough to select and appropriately adjust evidence from comparable properties and determine the applicability of research, tenant surveys, and other information. The Royal Institution of Chartered Surveyors (RICS) provides some useful guidance on assessing building sustainability characteristics in the context of valuation.[46]

Evaluating Property Sustainability Certifications/ Ratings

Since tenants are more focused on outcomes—like the level of rating/certification and its effect on employees, potential employees, customers, and other stakeholders—it is more important to focus on whole building measurements—such as ratings/certifications, cost savings, and overall execution risk than on the specific benefits and costs of specific retrofit measures (HVAC, lighting systems, etc.).

TABLE OF CONTENTS
EXECUTIVE SUMMARY
GETTING STARTED
PRELIMINARY ANALYSIS
VALUE ELEMENT ASSESSMENT
1
2
3
4
5
SAMPLE REPORT
CONCLUSION
APPENDIX A
APPENDIX B
APPENDIX C
END NOTES

One of the challenges of evaluating ratings/certifications is that there are literally hundreds of sustainability/energy performance assessments and certification systems in use around the world today.[xiii] Fortunately, while the number and complexity of systems can be daunting, the selection of appropriate sustainability/energy performance assessments and/or certification systems becomes much easier when the focus is on a specific property, retrofit proposal, location, and targeted tenant sector. The number of rating systems, retrofit options, and types of tenants is limited and data collection and analysis is more easily accomplished.

The task is also eased due to how tenants think about energy today and how that thinking might change over time. Tenant decisions about leasing and energy investments are driven less by retrofit features (type of HVAC, lighting systems, etc.) and more by outcomes like reputation and leadership, employee health, productivity and satisfaction, and risks they perceive in execution and promised performance, all of which are heavily influenced by certifications and ratings.

There are many ways to think about measurement and certification systems. One of the most important for financial analysis is the difference between certification or assessment systems based on modeled criteria versus those based on actual performance (e.g., water use, energy use, carbon output, quality of the indoor environment, etc.). For certification or assessment systems based on modeled criteria, underwriters need knowledge and expertise on how to assess the accuracy and reliability of forecasts. For systems based on actual performance, key issues include selecting the correct items to measure, accurately measuring them, and employing a consistent approach between properties to enable comparisons.

Clearly, the best way to deal with all the complexities of the various energy performance features and strategies is to focus on actual building performance. Unfortunately, decisions on proposed retrofits require forecasting energy and broader sustainability performance as well as determining how tenants today and in the future will respond to this performance. Accordingly, a critical part of determining how a tenant will react to a property's sustainability is to understand how well risks are being identified, mitigated, and managed—something that is often overlooked (see value element three, risk analysis).

What Sustainability Performance Outcomes/ Features Matter to Tenants

In order to determine the market demand by tenants for a property's sustainability performance, it is critical to understand specifically how they define and measure property energy performance and what related measures or outcomes are most important to them. In this step, it is only necessary to conduct a preliminary assessment of the sustainability performance attributes/outcomes in demand by tenants/potential tenants. Preliminary information on tenant demand for sustainability performance upgrades can often be obtained during a preliminary charrette that is typically recommended in executing deep retrofits.[xiv] More detailed understanding of these issues will be obtained in the tenant analysis in steps 4 and 5.

Additional insights on tenant demand and the value of specific energy efficiency systems or measures can be found in prior research and analysis, much of it summarized in RMI's

[xiii] Detail on definitions of sustainability, descriptions of scores of major rating systems, and analysis of how rating systems affect value can be found in *Value Beyond Cost Savings: How to Underwrite Sustainable Properties*, Expanded Chapter III: Evaluating Property Sustainability, Scott Muldavin, Green Building Finance Consortium, 2010

[xiv] A charrette is an early meeting of owners, service providers, property managers and other stakeholders designed to clarify goals, expectations, design issues, and execution strategies.

publication evaluating deep retrofit value for tenants/owner occupants.[47] Substantial research has also focused on how specific measures reduce energy use or increase health or productivity, with some estimates of cost savings and financial performance. Other research has evaluated the energy cost savings of retrofit processes like commissioning (13 percent).[48]

The financial benefits of improved data collection and analysis (big data analytics) as a result of improved technology and systems have also been studied, with potential energy savings of 10 to 15 percent or more commonly cited.[49] All of this data and research is most useful when making investment decisions on a piecemeal basis when replacing particular systems, upgrading property/portfolio technology, or doing minor retrofits.

Underfloor air can be an important asset to companies with high churn rates.[xv] Churn rate is the frequency with which building occupants are moved, either internally or externally, including those who move but stay within a company, and those who leave a company and are replaced. Median annual churn rates in corporations are around 45 percent (i.e., 45 percent of the people are moved annually), with median move costs per person at around $400 for a company with 10,000 employees;[50] the median annual cost would therefore be $1.8 million.

STEP 4:
EVALUATE EXISTING PROPERTY TENANTS

The purpose of this step is to document the demand for greater energy efficiency by existing tenants. It is important to be able to provide support for both the interest in energy efficient property attributes/outcomes as well as the relative importance of sustainability performance to other factors driving tenant-leasing decisions. The process for completing this step involves four key activities:

1. Identify and Collect Background Information on Tenants:
   This first task can be accomplished in many different ways, depending on the quality and availability of information from the owner. The goal is to have sufficient information on the tenants (or at least the primary tenants leasing the majority of space) to be able to analyze potential demand for improved sustainability performance. Building rent rolls and lease information should be collected—hopefully electronically.
2. Conduct Preliminary Segmentation Analysis:
   As a starting point for evaluating the demand among existing tenants for sustainability performance upgrades, the following five tenant market segments can be used:[xvi]

[xv] Five studies demonstrate an average 80 percent reduction in churn costs due to underfloor air. NSF/IUCRC Center for Building performance and Diagnostics at Carnegie University, http://tateinc.com/pdf/CMufa.pdf and Guidelines for High Performance Buildings 2004, http://cbpd.arc.cmu.edu/ebids/images/group/cases/ufa.pdf

[xvi] These same tenant market segments will also be used in the market level analysis in step 5.

Tenants significantly influenced by enterprise value considerations

Enterprise value is value created by energy efficient 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. The types of benefits from sustainability performance investment that are analyzed in this type of analysis include employee attraction and retention, promotions and marketing cost reduction, health and productivity benefits, customer access and sales, and enterprise risk reduction.

The types of tenants most influenced by enterprise value considerations are typically larger (including most of the S&P 2000 for example), public, focused in higher cost geographic areas and in businesses where attracting and retaining employees is a critical part of the business, in businesses with greater public/consumer communications challenges, and/or in businesses with higher concentrations of customers/stakeholders concerned about sustainability issues.

Government tenants with sustainability performance real estate policies or mandates

Local, state, and federal governments are increasingly requiring that their employees work in energy efficient properties. Property requirements for high levels of sustainability performance in 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 government owning over 18 percent of all commercial space in the United States, this is a significant market that has broad influence on leasing policies throughout the country.[51]

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 performance 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.

Vendors/suppliers encouraged/required by customers to consider sustainability

Many large companies like General Electric and WalMart are beginning to require their vendors and others in their supply chain to be more sustainable. These initiatives have grown over time and in a 2012 survey of corporations by Ernst & Young and GreenBiz, over 83 percent of respondents said they were directly working with their suppliers or talking with them about how to measure sustainability.[xvii]

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 tenant demand, but is growing in importance.

Tenants with direct ties to sustainability

There are a growing number of tenants that have a direct tie to the energy-efficient and sustainable

[xvii] Based on a survey of 272 business respondents (85 percent in the U.S.) in companies across 24 business sectors with over $1 billion in revenues. "Six Growing Trends in Corporate Sustainability," Ernst & Young and GreenBiz, 2012.

business: architects, engineers, consultants, contractors, lawyers, energy firms, product companies, etc. Given how widespread sustainability has become in the business world, the number of companies with a direct tie to sustainability continues to grow. As an example of this, in one of the largest surveys of 766 CEOs from around the world in 2010, over 93 percent said sustainability was key to their future success and 81 percent indicated sustainability was important in strategy and operations.[52]

Friends of sustainability

Demand from tenants 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 the green building industry was at least in part initiated by a large segment of service providers, builders, tenants and others that have taken on a leadership role without requiring the level of business case proof that many market actors want before investing. 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.

Major tenants and other business sector groupings of smaller tenants can be assessed to determine which market segments they might fit in and to highlight other facts that might influence their demand for improved sustainability performance.

3. **Assess Applicability of General Market Research to Tenants:**
   Evaluate research on evidence of tenant demand from step 3 in light of more detailed knowledge of tenants and document analysis. Make any adjustments to preliminary hypothesis on tenant demand assumptions.

4. **Collect Direct Evidence on Tenant Demand for Sustainability Performance Upgrades:**
   Interview major tenants, building property and asset managers, building leasing brokers, and owner to test basic hypothesis of energy performance upgrade demand by tenants.

Questions to tenants and others knowledgeable about tenants in the building should include other aspects of the tenant's business not related to sustainability performance—changing strategy, mergers or acquisitions, planned work to refine interior workspaces, etc. The importance of sustainability performance to tenants will vary significantly depending on a tenant's overall context for real estate decision making.

Questions should also be addressed to changes in the environment that might change a tenant's demand for energy efficiency over time. Has it become more important recently? Is this trend expected to continue? How do your employees feel about energy efficiency and the firm's leadership in this area? How about related benefits like improved indoor air quality and lighting?

It is particularly important to document direct tenant responses to questions about energy efficiency because this evidence will be most compelling to investors making retrofit capital decisions. The more specificity—"tenant A said X level of energy performance was a minimum standard for consideration of a renewal"—the better. It should be noted that if major tenants are strong supporters of improved energy performance, even if they make up less than the majority of the building, that can be enough to economically support, and motivate, an owner to execute a deep retrofit. It is also particularly important to report questions asked and findings accurately; presume investors will call the major tenants to discuss.

STEP 5:
ASSESS MARKET CONDITIONS FOR SUSTAINABILITY PERFORMANCE IMPROVEMENTS

In step 5, the market conditions for energy performance improvements in the real estate market are examined to provide context for determining if, and how much of, a related premium is warranted in tenant demand assumptions.[xviii]

The sources for this information include local market brokers, property managers and owners, tenants, market research and appraisal specialists, and real estate data providers and analysts. Some market research data providers are beginning to adapt their databases to enable more sophisticated related market research, but for many markets and property types, direct interviews with experts will be the key source for market information.[xix]

It is important to assess the ability of investors to demand premiums for high levels of sustainability performance that might exist in the market. Landlords in strong markets might be able to achieve higher premiums than in markets where tenants and/or the economy are struggling. Interestingly, another response in a weak market is to spend money on whatever you can to increase your competitiveness. In this type of market, the value of sustainability energy performance will likely show up with faster absorption and higher occupancy—and might be harder to attribute to rent increases (more likely demand would be shown as rents not going down as much). Key questions include:

- What is the overall supply-demand balance (strength of the market) for properties similar to the subject property in the broader market and submarket?
- What are the key non-energy trends driving future market conditions?
- How would you describe the relative bargaining power of tenants vs. landlords?

It is also useful to confirm preliminary assessments of the subject property tenants and provide support for tenant assumptions affecting vacant space lease-up and related assumptions in the subject building. Documentation of information, particularly anything that specifically addresses the subject property's market position on sustainability performance relative to the peer group of competitors, will be very important to decision makers. This can be obtained by asking:

- What support is there for demand by tenants for sustainability performance improvements in the broader market and the more directly competitive submarket and peer group of buildings it is most competitive with?

Questions to help build support for both the overall demand for sustainability performance upgrades in the market as well as for assumptions about specific tenants in the building include:

- Does the demand for improved sustainability performance by tenants in the market suggest any clear tenant segmentation?
- Do the tenant segments suggested in step 4 make sense in the market? If not, how should they be adjusted?[xx]

[xviii] In this case, we refer to the broader real estate market for properties similar to the subject property as well as the submarket or peer group of most competitive properties.

[xix] CoStar, a national real estate data provider, has been a leader in identifying the sustainability of properties in its large international database of property sales and leasing information which enables identification of the types of tenants that are most likely to lease in sustainable buildings and enables other sustainability-related market research.

[xx] Tenant market segmentation around sustainability demand can vary significantly by market. Tenants of similar types compete more in some markets than others. Sustainability is more accepted in some markets than others.

Questions to assess how the specific proposed retrofit measures and outcomes in the subject property meet the demand from the market include:

- What types of sustainability, and level of sustainability performance, are in demand in the market?
- What level of differentiation by level of sustainability performance is evident?
- Are there particular systems or measures that appear particularly important to the market—solar, indoor air quality, big data analytics, daylighting, biophillia, etc.?

Questions to assess the relative value of the proposed retrofit compared to competition in the marketplace today and in the future and to provide information on a floor sustainability performance standard that may be developing in the market include:

- What is the availability of certified or rated energy efficient properties—existing, new, under-construction and planned supply—in the market?
- What is the penetration rate for high sustainability performance in the market?

It is also important to obtain general guidance on the magnitude of potential premiums for sustainability performance improvements in tenant demand assumptions. Given the substantial difficulties in controlling for all the factors that affect tenant demand variables, it is generally not possible to use statistical analysis to set the magnitude of premiums for sustainability performance improvements, but this information, if organized correctly, may provide compelling evidence of the financial advantages of high sustainability performance buildings. Questions include:

- Is there any evidence—either broader statistical studies or more likely based on expert opinions of those who study the market—of premiums for the key tenant demand variables: rent, occupancy, absorption, tenant retention, improved lease terms, or other key assumptions?
- If opinion, what is their opinion based upon?

STEP 6:
DETERMINE TENANT DEMAND ASSUMPTIONS

In this step, all the information and analysis from steps 2 through 5 are merged to generate final assumptions about the effect of the proposed property retrofit on the key tenant demand assumptions identified in step 1. Low and high assumptions are typically produced for:

- rents and rent growth;
- occupancy;
- absorption;
- tenant retention; and
- lease terms.

The critical part of this step is the documentation of a cohesive argument supporting every key tenant demand assumption. The argument should describe the projected sustainability performance outcomes of the property (including expected certification/rating level) upon which the analysis was based; present the relevant general evidence of how sustainability performance affects key assumptions, as modified for the specific characteristics of the retrofit; detail specifics about existing tenant and market interviews that support your conclusions; and describe how overall market conditions and key factors driving tenant leasing decisions impacted final conclusions. Importantly, any information that suggests no effect or a negative effect of sustainability performance improvements on tenant demand assumptions should be identified and addressed.

TABLE OF CONTENTS
EXECUTIVE SUMMARY
GETTING STARTED
PRELIMINARY ANALYSIS
VALUE ELEMENT ASSESSMENT 1 2 3 4 5
SAMPLE REPORT
CONCLUSION
APPENDIX A
APPENDIX B
APPENDIX C
END NOTES

It is important to integrate some understanding of the key non-sustainability performance related factors that affect tenant-leasing decisions into the supporting argument. Doing this helps to ensure that the magnitudes for potential premiums are reasonable in light of all of the factors that are important to tenants. For example, for most office tenants, real estate decisions are driven by a host of key issues only marginally related to the sustainability performance of a property, including:

- strategic mission;
- internal integration with other business units;
- flexibility to meet changing space needs;
- technology requirements; and
- occupancy expense (cost) for space.

A space must help tenants achieve their strategic missions and provide the flexibility to meet changing needs. As shown in Table 5, while energy efficiency is rated last as a factor influencing tenant decisions during the recession of 2008, sustainability/energy efficiency retrofits have a positive impact on some of the more important factors influencing leasing including staff retention, space flexibility, space efficiency, higher quality environment, and higher building profile.

Finally, it is recommended that reasonable ranges be set for each of the tenant demand assumptions to enable market/research-based sensitivity analysis to be prepared as part of any retrofit capital request.

TABLE 5

KEY FACTORS IN LEASING NEW SPACE

1.	Rental cost
2.	Retention of key staff
3.	Lease flexibility
4.	Space efficiency
5.	Higher quality environment
6.	Occupational flexibility
7.	Proximity to public transport
8.	Proximity to clients/competitors
9.	Higher building profile
10.	**Energy efficiency**

Source: Knight Frank, Central London Occupiers Survey, September 2008. 100 firms with over 40,000 Employees leasing 10 million square feet of space were surveyed.

STEP 7:
CALCULATE VALUE OF ENHANCED TENANT DEMAND

The calculation of the value of increased tenant demand for the subject property requires an adaptation of the standard industry DCF model described on page 12: Overview of Deep Retrofit Value Methodology. The model may need to handle multiple tenants with different rents, lease terms, and rollover dates when calculating tenant-based revenues. Standard industry pro-forma financial analysis software like Argus is designed to handle all aspects of a DCF analysis including full integration of leases. Tenant-based revenues can also be calculated using Excel, or other spreadsheet programs, as has been done in the Sample DRV report in Chapter 4.

The basic approach involves first calculating the net present value (NPV) of a stream of tenant-based cash flows assuming no change in the tenant demand variables or any other of the input assumptions. Next, a second NPV is calculated with the changes in tenant demand assumptions due to sustainability performance upgrades. The incremental difference in value is that attributable to increased tenant demand. Sensitivity analysis using a range of tenant demand assumptions is also recommended. A full description and execution of the model on a multi-tenant office building is presented in Chapter 4: Sample Deep Retrofit Value Report.

SALES REVENUE

VALUE ELEMENT: 1 2 3 4 5

VALUE ELEMENT 5:
SALES REVENUE

Sales revenue premiums from deep retrofits result from higher net operating income (due to expense savings and increased tenant revenues), increased investor demand (which can lower cap and discount rates), and risk reduction (which further contributes to cap and discount rate reduction).

The process for the analysis and calculation of a sales price premium due to sustainability performance improvements in an office building is presented in the four steps below, with a full description and execution of the calculation in the DRV sample report presented in Chapter 4. What is most important to remember in this analysis is that it is focused on the marginal change in sales price revenue as a result of the deep retrofit. Step 1, which is outlined in greater detail below, entails background research collection and analysis to provide support for the assumptions and analysis of sales price premiums. In steps 2–4, marginal retrofit effects on NOI and residual capitalization rates are estimated to enable a direct calculation of sales price (NOI/residual cap rate).

DEEP RETROFIT VALUE LEADERS:

CAISSE DÉS DÉPÔTS ET CONSIGNATIONS PREDICTS A 10% VALUE PREMIUM

In anticipation of a new regulation to decrease energy consumption, the Caisse des Dépôts et Consignations (CDC) established a process to optimize energy retrofit investments through consideration of asset values. The analysis examined the correlation between higher energy use buildings and vacancy periods between leases as well as differences in rental and exit values. As part of this analysis, the CDC estimated that a deep retrofit of a 1930s-era building in the Paris Central Business District would increase asset value by 10 percent. This analysis resulted in the decision to move forward with the deep retrofit of the building, which is now completely retrofitted and commercialized.[53]

STEP 1:
EVALUATE EVIDENCE OF SALES PRICE PREMIUMS

The first step is to evaluate research on how sustainability performance upgrades influence office property sales prices. Existing research can then be evaluated on its relevance to the subject property to develop a preliminary assessment of potential sales price premiums.

The hypothesis that certified/highly rated deep retrofits can increase office property sales prices beyond those that result from energy cost savings alone is well established by research in the field as shown in Table 6 below. Sales price premiums range from 2 to 26 percent with a clustering around 10 to 13 percent.

As with the conclusions from such studies on rent and occupancy premiums, there is still debate about the accuracy and applicability of the magnitudes, but they clearly provide a positive relationship between sustainability/energy efficiency certification and value.

There is also evidence beginning to emerge that higher levels of sustainability performance achieve greater premiums, and that low levels of performance are actually being discounted. As reported in a study of NABERS-rated buildings in Australia, buildings with higher levels of performance (NABERS 5) tended to achieve sales price premiums of 21 percent while lower levels of performance (NABERS 2-2.5) reported discounts of 13 percent.[54]

These generalized statistical studies of sales price premiums should be supplemented with any available locally specific research. Given the difficulty of controlling for all the factors that affect sales price, locally-specific statistically based studies will be difficult to find and are not particularly useful beyond establishing a baseline relationship between sustainability performance and value.

Other general evidence of a potential sales price premium for high sustainability performance can be found in surveys of investors, brokers, or other market specialists.

TABLE 6

EVIDENCE OF SUSTAINABLE OFFICE SALES PRICE PREMIUMS[xxi]

STUDY	SALE PRICE PREMIUM
Eicholtz, Kok & Quigley Dec 2010	ES: 13% LEED: 11.1%
Fuerst and McAllister Mar 2011	ES: 26% LEED: 25%
Eicholtz, Kok, et al. April 2012	ES: 13% LEED: 13%
Newell, Kok, et al.; Australian Study Sep 2011	Green Star: 12% NABERS: 2–9%
Bernstein, Russo, McGraw Hill/Siemens	10%
Chegut, Eicholtz, Kok, et al. Jan 2013	14.7%

[xxi]This chart represents many of the most well-known studies during the last 5 years. Full citations are available in the endnotes.

STEP 2:
DEVELOP ESTIMATE OF NET OPERATING INCOME PREMIUM

The next step in calculating the sales price premiums is to develop an 11th year net operating income (NOI) estimate to be capitalized. Both a base model NOI (that just includes 50 percent reduction in energy costs) and a value beyond energy cost savings (VBECS) model (that incorporates the adjustments to tenant-based and other revenues and reduces expenses from non-energy operating cost savings) will be needed to calculate the incremental sales price premium resulting from sustainability performance improvements.

The easiest way to get the base NOI numbers is to obtain them from the asset managers/owners that often keep this kind of forecast for each property. Alternatively, both the base model and VBECS NOI can be estimated using the results from the tenant-based revenue model presented in detail in Chapter 4: Sample DRV Report.

The tenant-based revenue model provides most of what is needed for an estimate of effective gross revenue (see the partial sample pro-forma below). The only additional line items that need to be added to revenue to get effective gross revenue are estimates of expense reimbursement, parking, and other revenues. Estimates of these should be available from the asset manager/ owner or they can be conservatively estimated.[xxii]

Finally, the benefits from reduced leasing commissions and tenant improvement costs as a result of higher renewal probability should not be included in the NOI that will be capitalized to generate sales prices. These revenues are an important part of VBECS tenant-based revenues, but in a traditional valuation based on capitalizing the NOI they are accounted for below the NOI line, so they must be netted out before NOI is capitalized.

The standard formula for getting from revenues to net operating income in an office property is shown below:

REVENUES
- Contract and Market Rents
- Less: Absorption and Turnover Vacancy

SCHEDULED BASE RENTAL REVENUE
- Add: Expense Reimbursement Revenue
- Add: Parking
- Add: Other Revenue
- Total Potential Gross Revenue
- Less Vacancy and Collection Loss

EFFECTIVE GROSS REVENUE
- Minus: Operating Expenses

NET OPERATING INCOME
- Less: Tenant Improvements
- Less: Leasing Commissions
- Less: Capital Reserves

BEFORE TAX CASH FLOW

[xxii] This is due to the fact that all revenue added back in is being added to both the base and VBECS models—thus the differential will only be based on the slightly lower cap rate at which income is capitalized. In our sample report, we calculate the full NOI to get the most precise estimate.

Total pre-retrofit operating expenses can typically be obtained from the asset manager/owner. Projected energy and non-energy cost savings should be subtracted from operating expenses.

Finally, NOI is calculated by subtracting operating expenses from effective gross revenues as shown in the partial pro-forma above.

STEP 3: *ESTIMATE RESIDUAL CAPITALIZATION RATE RETROFIT PREMIUM*

A residual capitalization rate (cap rate) is used to capitalize net operating income to estimate sales price (value) in discounted cash flow analyses. The term residual is used to indicate that the capitalization rate is applied to the NOI in the future when the property is assumed to be sold.

Estimating residual capitalization rates requires understanding current market based cap rates for similar properties and making adjustments for the particular attributes of the subject property and expected changes in capital market conditions (interest rates, etc.), investor demand (most likely buyers), and other potential changes in the fundamental risks of the property that could occur over time. A typical starting point for many appraisers when determining a residual cap rate is approximately a 50 basis point increase in residual cap rates from current market cap rates due to expected physical and functional obsolescence.

While determining residual capitalization rates is a critical part of a valuation, it is not the focus of the task in this section. The focus of this section is on the marginal change in the residual capitalization rate as a result of the deep retrofit. The actual magnitude of the base residual capitalization rate used will not affect the deep retrofit value analysis because it remains the same in all analyses. The cap rate used to determine sales price in the retrofit models where all value is incorporated (VBECS Models) will be the base rate plus/minus the marginal change in cap rate attributed to the retrofit.

The process for estimating how sustainability performance affects the determination of a residual cap rate for an sustainability performance upgrade is similar to the process for estimating residual cap rates generally, with a focus on the incremental impacts of the upgrades, as summarized below.

Evaluate Current Market Direct Evidence of Impact of Sustainability Performance on Value

Current cap rates are market derived—representing what the market is willing to pay for a particular property NOI. Current market cap rates for a typical property are generated by evaluating actual sales and NOI data from comparable properties (at least relative to property type and size) and then making qualitative adjustments to the market cap rates reflecting judgments about how the subject property differs from the comparables.

Generating knowledge about the marginal effect of an sustainability performance upgrade on market capitalization rates for high performance properties is difficult for a number of reasons. The number of sales transactions is still low, particularly when looking for properties comparable to a specific subject property. Second, the level of detail on sustainability performance features/systems and outcomes in real estate databases that would enable adjustments to be made is still limited. Finally, even if the data was better, the number and magnitude of non-energy factors influencing property values is so dominant it is hard to quantitatively estimate the marginal impact of the retrofit. As the number of sales and data improves, this type of analysis will become more important.

A second way to collect current market evidence of the effect of a retrofit on property cap rates and values is to talk directly with local experts (market analysts, appraisers, brokers, buyers). Difficulties aside, conversations with expert appraisers and market analysts in a market about potential cap rate reductions (reduced cap rates generate higher value) can be fruitful and provide the kind of knowledge and data necessary to support determination of sustainability-based adjustments. Insights about current market conditions and expected changes in the future can be obtained.

A third source of information would be to talk with the retrofit capital decision makers for the subject property—before the report is finished—to get their opinions about how cap rates might be influenced by sustainable retrofits today and in the future. It might be interesting to get their opinions before and after they review some of the preliminary value evidence and analysis.

Evaluate Most Likely Buyers

Determination of a residual cap rate requires an assessment of who the most likely buyers are today, and how those buyers, and total investor demand, might change over time. Investor demand can vary over time due to change in debt and equity cost and accessibility, changes in the relative attractiveness of the real estate asset class, and changes in the demand for the specific subject property due to its location, property type, or other more property-specific attributes.

Assessing the marginal impact of sustainability performance improvements on residual cap rates requires a similar analysis to that described above for residual cap rates, but with a focus on marginal change in the analysis due to the improvements.

Most likely buyers of buildings can be identified from comparable sales databases and through discussion with appraisers, brokers, and owners. For large properties, specific buyers may be identified, while for smaller properties it might be a type of buyer like a REIT, international investors, or institutional private limited partnerships.

Once most likely buyers or types of buyers are identified, the importance of sustainability performance to them can be evaluated, as well as their opinions on the key factors affecting future residual cap rates and relative effect of energy retrofits on future changes. They can be talked with directly in some cases or you can analyze their sectors (REITs or institutional investment managers, for example) to determine trends towards higher levels of sustainability performance. Investment managers and REITs are being measured by their providers of capital, and being pressured by major tenants, on their sustainability performance increasing the likelihood of investor demand for higher levels of sustainability performance from major sectors of the market.

Surveys suggest that many investors are developing acquisition screens and criteria to assist in evaluating the potential sustainability performance-related economic or functional obsolescence, and the cost to cure such obsolescence in new properties that they buy. These trends are quite important, because they suggest concrete investor response to increased regulator and tenant demand.

INVESTMENT COMPANY VALUE CREATION

An important factor underlying the increased demand by institutional investment managers for sustainability performance improvements is the value that a focus on these improvements can create for their companies through improved access to capital and related reductions in business risk.[xxiii] Even though we do not separately calculate the value created by deep retrofits for investment manager companies, it is part of the value creation in a property due to its positive effect on investor demand for energy efficient properties.

Many pension funds, high net worth investors, and their real estate consultants, have developed a strong interest in sustainability performance improvements resulting in increased scrutiny and focus on investment manager overall sustainability performance when making investment allocations to investment managers. Influential real estate investment manger/fund rating/monitoring systems have been developed that have enabled pension funds and their consultants to more easily evaluate the level of sustainability and energy performance of companies, funds they manage, and properties they operate. Three of these rating/performance benchmarking organizations are summarized below.

Investment managers are encouraged to talk with their existing and future capital providers to assess potential additional company value from investment in sustainability.

REAL ESTATE PORTFOLIO RATING AND BENCHMARKING ORGANIZATIONS

GRESB:

GRESB collects information and reports on the sustainability performance of 637 listed property companies and private equity funds, covering 56,000 buildings and over $2.1 trillion in assets. The GRESB Survey is aligned with international reporting frameworks such as the Global Reporting Initiative (GRI), Principles for Responsible Investment (PRI), and the Dow Jones Sustainability Index (DJSI).

ULI GREENPRINT:

ULI Greenprint provides the largest global collection of transparent, verifiable, and comprehensive data about the environmental performance of buildings. Its most recent performance report is based on 4,001 property submissions representing 95 million square meters (1 billion square feet) across 50 countries during the 2013 calendar year.

FTSE NAREIT Green Property Index:

NAREIT, the FTSE Group, and the U.S. Green Building Council have developed a Green Property Index that enables REITs to target specific green property types, and helps analysts and investors compare REITs based on objective sustainability rankings.

[xxiii] Institutional investment managers manage real estate for pension funds and other capital sources on a fee basis. Accessing capital to invest is one of the fundamental drivers of their financial success. Investment managers include private real estate companies and public companies like REITs and listed companies.

EVALUATE HOW SUSTAINABILITY PERFORMANCE AFFECTS PROPERTY RISK

The next step is to evaluate how the execution of a deep retrofit affects the overall risk of a subject property. Understanding the net impact of sustainability performance on a property's risk requires an identification and assessment of all negative and positive risks as well as an evaluation of how well risks have been mitigated. A complete assessment of how to analyze high sustainability performance property risk and risk mitigation is presented in value element three, risk analysis.

For investors, the most important risk benefit is the ability of a sustainable/energy efficient building to cost-effectively meet the changing needs of regulators, tenants, and investors. It is almost a certainty that local, state, and federal regulations regarding sustainability performance will increase, perhaps dramatically, in the coming years. Tenant and investor trends appear to be trending toward greater demand for high performance buildings. A building that cannot, at a reasonable cost, adapt to meet future regulatory requirements or capitalize on incentives, will be less valuable. This is a particularly important consideration when considering the marginal impact of sustainability performance improvements on residual cap rates.

The importance and appropriateness of evaluating risk in the setting of capitalization rates is highlighted by RICS in their October 2013 Guidance Note Sustainability and Commercial Property Valuation:

Risk premiums: from all that has been said above it is clear that buildings that do not display good sustainability characteristics may suffer from decreasing occupier and investor demand. It follows that they represent a higher investment risk, and the risk premium attached to the discount rate may need adjustment, either throughout the cash flow period or from the point where value erosion is thought likely to take place. Sensitivity analyses or other explicit risk modeling may be needed to measure the potential impacts on investment value. Where a discount rate based on a risk-adjusted rate is used, it is recommended that an explicit explanation be provided to the client. It is also important that the main sources of risk are identified.

The importance of evaluating potential obsolescence as a risk factor is particularly critical. In evaluating obsolescence, it is important to consider whether obsolescence due to not meeting the sustainability performance standard for the property class and location is curable—through a retrofit—or uncurable. An uncurable property is one whose physical and functional characteristics make it cost prohibitive to bring the building up to the standard for sustainability performance in the market. Uncureable or costly obsolescence significantly increases the risk—reducing the value of the property.

Theoretically, the value added by a retrofit in the market would be somewhat limited by the cost of competing buildings to get their buildings to similar levels of sustainability performance, all things being equal. Until this happens, value premiums for green buildings can dramatically exceed the cost to cure competitive buildings. As more buildings are retrofitted, value premiums are expected to even further differentiate by the level of sustainability performance. More importantly, as market standards rise, brown discounts—discounts for low performing buildings—are also expected.

Consider Future Trends

Once current market evidence of cap rates, retrofit related property risks, and the demand for sustainable retrofits by tenants, investors, and regulators is gathered from the work in the steps above, additional analysis of potential changes that could occur prior to the assumed future sale is needed to determine marginal impacts on residual cap rates.

Capital market conditions are perhaps the most critical to determining residual cap rates. For example, in early 2015, historically low interest rates and an abundance of debt and equity capital have contributed to nearly record low cap rates. Accordingly, in setting residual cap rates 7 to 10 years in the future, serious judgments need to be made about whether cap rates can be expected to remain so low. Fortunately, for the purposes of looking at the marginal difference in how a sustainable retrofit will affect cap rates today versus 7 to 10 years in the future, only the marginal effects of sustainability need to be addressed fully.

Key future trends for the purposes of this report relate primarily to evaluating investor, tenant, and regulator trends towards sustainability. Additionally, an assessment of potential changes in retrofit related property risk and risk mitigation practices is required. This future oriented information can be gathered as part of the evaluation of current market conditions, most likely buyers, and retrofit risks analysis discussed in the steps above.

Investor demand for sustainable properties has been increasing and is expected to continue to increase as interest among tenants and regulators grows and measurement of investor performance improves. Increased tenant 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. The relatively low levels of adoption of deep retrofits in the investment community also suggest significant room for growth of deep retrofits.

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 investment in sustainability performance upgrades, existing leases that limit the ability to pass costs to tenants, and the failure of appraisers, brokers, and lenders to capture the value of enhanced performance.

TABLE OF CONTENTS
EXECUTIVE SUMMARY
GETTING STARTED
PRELIMINARY ANALYSIS
VALUE ELEMENT ASSESSMENT 1 2 3 4 5
SAMPLE REPORT
CONCLUSION
APPENDIX A
APPENDIX B
APPENDIX C
END NOTES

Determine VBECS Cap Rate

The final step is to make a decision about potential residual cap rate adjustments due to sustainability performance based on general market evidence of sales price trends, direct cap rate market evidence, investor demand for sustainability performance improvements, property risks, and future directions in all these factors. Cap rate selection is always based on a qualitative assessment of all information collected. It is very important to carefully document the support/argument for the decision made.

Discussions with specialists in green building valuation suggest a 25 to 50 basis point reduction in office building cap rates is reasonable in light of investor demand and reduced obsolescence risk. This rate adjustment could be lower, particularly considering a property where curing obsolescence and meeting evolving minimum market standards is either not possible or costly.

STEP 4: *CALCULATE SALES PRICE PREMIUMS*

Once the capitalization rate and net operating income are determined, the calculation of a sales price premium resulting from a deep retrofit follows standard valuation practice.

Sales revenues are realized when a property is sold. For a typical valuation analysis, a 10-year holding period is assumed, with a sale assumed at the end of year 10. Sales price is calculated by dividing the net operating income from year 11 by a capitalization rate.[xxiv] Sales proceeds are equal to sales price minus cost of sales that are typically around 2 percent of sales price.[xxv] The sales price premium is the difference between the NPV of the sales proceeds for a base analysis (only including energy cost savings) and a VBECS analysis that includes all benefits created by the retrofit.

A full description and demonstration of the sales revenue model (SRM) is presented in Chapter 4: Sample DRV Report.

[xxiv] One alternative simplified approach that could be used would be to determine a sales price premium based on an analysis of available evidence, and increase by a chosen percentage until year 11 at which point an NPV at 7 percent discount rate could be used to estimate the premium.

[xxv] More detail can be found in the discussion of the discounted cash flow model to calculate the value of sustainability in Appendix A.

HOW TO CALCULATE AND PRESENT
DEEP RETROFIT VALUE

SAMPLE DEEP RETROFIT VALUE REPORT

4

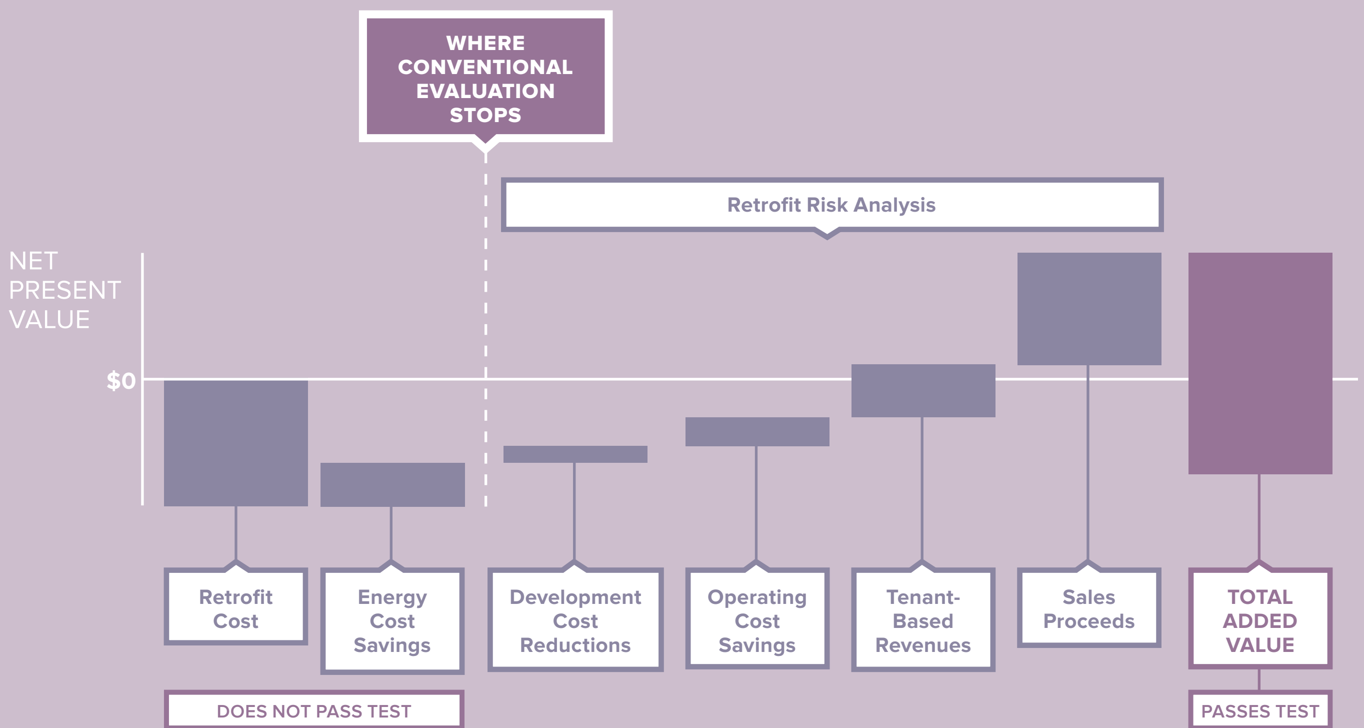
INTRODUCTION

This section presents a sample summary of a DRV report to provide an illustration of how the calculations and analyses completed for each of the five value elements come together in a document to support a specific deep retrofit investment decision.

The primary purpose of the sample report is to demonstrate that deep retrofits may not be financially feasible when relying upon energy cost savings alone, but can be highly profitable when applying well-supported value-based decision making that takes into consideration all value created by the retrofit. Accordingly, the financial analysis focuses on the difference between the net present value (NPV) of a deep retrofit where all benefits are counted compared to the same retrofit project where energy cost savings are the only benefit analyzed. Figure 5 below highlights the impact of the value elements on a 10-year NPV of the sample report's expected scenario. In sum, neglecting to consider the value elements in the NPV will lead to a more than $26 million undervaluation of the retrofit opportunity and a likely decision to not pursue what would have otherwise been a profitable investment.

FIGURE 5

10-YEAR NPV OF VALUE ELEMENTS



PRESENTATION PRINCIPLES

The format of a deep retrofit value report will vary, depending on the specific retrofit situation. In some cases, the report might be in a PowerPoint format and in others a more formal due diligence or narrative valuation report. In other cases, a brief two-page memo explaining a rationale for replacement of key pieces of equipment or software might be appropriate. In all cases, such reports should follow the seven principles of deep retrofit presentations, including knowing the audience, specificity, and comprehensive risk assessment as presented in Appendix C.

For most situations, a deep retrofit value report will be structured around the five value elements described in Chapter 3 that together influence property costs, revenues, and risk. The deep retrofit value report will typically supplement an analysis of return, payback, or net present value based on energy and other cost factors. The final presentation to decision makers must combine all analyses while avoiding double counting. In many situations it is appropriate to only present a subset, or partial analysis, of the five value elements.

PROJECT DESCRIPTION AND MODELING ASSUMPTIONS

The sample DRV report is based on an actual property, although some of the tenant and property-level assumptions are hypothetical for illustrative purposes. The descriptions and assumptions presented below form the basis for the overall financial conclusions of the retrofit project as well as the separate analyses of each value element.

Building Description

The building is a 20-story, 370,000 square foot office building in a suburban office district in the Los Angeles area. The building is a conventional (non-green) office building built in the mid-1980s.

The building is owned by pension funds through a private real estate fund sponsored by an international real estate investment manager.

Tenant Descriptions and Occupancy

The building is 85 percent occupied at the time of the retrofit and assumed to lease up over 24 months. The landlord is assumed to be paying all energy costs.[xxvi]

Tenants fall into four segments. For the government, defense industry, and service provider segments, one or two large tenants take up around half the space. The four tenant segments and key assumptions are described below:

TENANT AND LEASE ASSUMPTIONS

Tenant 1: Government: Federal, State, and Local

- Contract Rents: $32/SF
- Annual contract rental increases: 3.5%
- Square Feet Leased: 74,000 SF (20%)
- Lease Rollover Schedule: 20% of space rolls over each year in years 1–5

Tenant 2: Defense Contractor/Aeronautics

- Contract Rents: $40/SF
- Annual Contract Rental Increases: 3.5%
- Square Feet Leased: 111,000 SF (30%)
- Lease Rollover Schedule: 20% of space rolls over each year in years 1–5

Tenant 3: Architecture/Eng./Cons./Other Service Providers

- Contract Rents: $40/SF
- Annual Contract Rental Increases: 3.5%
- Square Feet Leased: 55,500 SF (15%)
- Lease Rollover Schedule: 20% of space rolls over each year in years 1–5

Tenant 4: Small to Mid-Size Firms: Diverse Mix

- Contract Rents: $32/SF
- Annual Contract Rental Increases: 3.5%
- Square Feet Leased: 74,000 SF (20%)
- Lease Rollover Schedule: 20% of space rolls over each year in years 1–5

[xxvi] If there was a more complicated split of responsibility for energy costs, as there often is, the tenant demand would likely increase due to tenant-based energy cost savings, as would the value of the retrofit.

TABLE OF CONTENTS
EXECUTIVE SUMMARY
GETTING STARTED
PRELIMINARY ANALYSIS
VALUE ELEMENT ASSESSMENT 1 2 3 4 5
SAMPLE REPORT
CONCLUSION
APPENDIX A
APPENDIX B
APPENDIX C
END NOTES

PRE-RETROFIT YEAR 1 OPERATING EXPENSES:

Janitorial	$200,000
Window Cleaning	$50,000
Repairs and Maintenance	$500,000
Utilities	
• Electricity	$600,000
• Gas	$40,000
• Chilled Water	$500,000
• Water and Sewer	$20,000
Security	$200,000
Real Estate Taxes	$2,200,000
Insurance	$180,000
Other expenses	$200,000
Total Year 1 Operating Expenses:	**$4,690,000**

Sustainability Performance Improvements

The owner is considering a substantial renovation of the property with the goals of energy costs savings of 50 percent, a superior sustainability rating of at least LEED Gold, and Energy Star Label in the top 25th percentile of market. The investment manager wants to be a sustainability leader to remain competitive for existing and future tenants, meet rising expectations from its pension fund capital sources, and satisfy other stakeholders including its employees and emerging rating services like GRESB.[xxvii] They want their property to significantly reduce energy and water use, but also increase daylighting, improve indoor air quality, use sustainable materials, and employ sustainable operating practices. To reach these goals, the proposed retrofit will include installation of window films, increasing the use of daylight in interior spaces, upgrading the HVAC systems (to increase the use of natural ventilation and heat recovery), replacing existing light fixtures with a redesigned LED lighting scheme, and incorporating many other sustainability performance features necessary to achieve a LEED Gold rating. The retrofit is projected to cost $15,000,000 ($40.50/SF) and save 50 percent of pre-retrofit energy costs, or $570,000 per year. The assumption is that the sustainability performance improvements will be completed within a year.

Finance and Tax Assumptions

While PACE and new utility on-bill financing mechanisms were considered, given timing considerations and other factors, the investment manager is proposing to fund the full retrofit cost from equity rather than seek external debt financing.

In Los Angeles County there are a number of subsidized debt finance options that could provide a portion of retrofit capital requirements for future projects, including PACE and utility on-bill financing:[xxviii]

[xxvii] Global Real Estate Sustainability Benchmark is an international rating/benchmarking organization that ranks the sustainability of real estate investment managers and individual investment funds. http://greenedgellc.com/posts/global-real-estate-sustainability-benchmark-gresb

[xxviii] Sustainable debt finance, both subsidized and private, is a rapidly evolving sector of the financing market so investors should consult local governments and advisors on the most up-to-date financing strategies in the markets where their property is located.

PROPERTY ASSESSED CLEAN ENERGY (PACE):

PACE programs allow businesses to finance energy and water efficiency projects which are repaid through a special assessment on the business's property taxes. The property must be located within Los Angeles County, and within the boundaries of a city that has adopted a resolution to join the county-wide PACE district. PACE can provide long-term low-cost financing for energy efficiency, renewable energy, and water projects that is not due upon sale and is typically deductible as an expense.

UTILITY ON-BILL FINANCING:

On-bill financing is provided and operated by Southern California Gas and allows eligible customers to make payments as part of the line item on their utility bill. This program offers zero-interest loans and other financial assistance for installation of qualified energy efficient equipment.

In addition to potential finance benefits that could be achieved on the subject property, additional tax benefits can be realized through cost segregation and accelerated depreciation. Under cost segregation, owners can choose to depreciate the whole asset or segregate the asset into different categories. The advantage of segregation is that assets that can be designated personal property can be depreciated over much shorter lives—5, 7, or 15 years instead of 39.5 years—and may qualify further for accelerated depreciation bonuses. Cost segregation can be more time consuming and require better record keeping, but the nature of deep retrofits provides the opportunity for significant savings.[xxix]

Financial Models and Project Assumptions

To take into consideration all value created by the retrofit, we calculate the incremental difference in NPV between an analysis of base energy costs only (ECO model) and an analysis of all of the benefits actually generated by the same retrofit project (VBECS model). The difference between the models will represent the additional value created by the deep retrofit that is ignored in an energy costs savings only analysis.

[xxix] Any decisions about tax and accounting matters pertaining to cost segregation should be made with appropriate legal, tax, and/or accounting advice.

TABLE OF CONTENTS
EXECUTIVE SUMMARY
GETTING STARTED
PRELIMINARY ANALYSIS
VALUE ELEMENT ASSESSMENT 1 2 3 4 5
SAMPLE REPORT
CONCLUSION
APPENDIX A
APPENDIX B
APPENDIX C
END NOTES

Accordingly, the first step in the calculation is to calculate the net present value of the subject retrofit project designed to achieve 50 percent energy cost savings and achieve superior energy performance based only on the benefits of energy cost savings:[xxx]

- **Energy Cost Savings Only (NPV-ECO):** This model calculates the NPV of the retrofit assuming a $15,000,000 initial retrofit cost and energy cost savings of $570,000 per year plus the increased sales proceeds resulting from the reduced energy costs.[xxxi]

The second step is to calculate the NPV of the same retrofit project designed to achieve 50 percent energy cost savings and achieve superior sustainability performance based upon all the benefits (and costs) created by the retrofit:

- **Value Beyond Energy Cost Savings (VBECS) NPV Model:** This model calculates the NPV of the retrofit assuming the $15,000,000 retrofit cost, the energy cost savings of $570,000 per year, and additional benefits from development cost offsets, non-energy operating cost savings, increased revenues from tenants, and higher property sales proceeds.

The VBECS analysis is conducted using three sets of assumptions or sensitivity analysis typically done as part of traditional real estate investment—VBECS-low (or worst case), VBECS-expected (base case), and VBECS-high (best case) scenarios—reflective of more conservative, most likely, and less conservative assumptions respectively. The ranges of assumptions are set based on an analysis of the specific subject property retrofit examined for this sample report.[xxxii]

Calculations of the VBECS NPV models required creation of two underlying models that calculate the revenues from enhanced tenant demand—**tenant-based revenues (TBRev)**—and revenues from enhanced sales proceeds—**sales revenue model (SRM)**. These models calculate the incremental tenant and sales-based revenues (VBECS revenues minus ECO revenues) to create cash flows that flow directly into VBECS NPV model.

The financial models described above fully take into consideration the property description and assumptions about existing tenants and leases and the full range of rent, occupancy, expense, and other assumptions as described in this section and summarized in Table 7 below.

[xxx] It is traditional real estate practice to call the specific property being analyzed the subject property.

[xxxi] All of our financial models assume a 10-year holding period with sale of the property at the end of the term. A 7 percent discount rate is used for all models in the calculation of net present value.

[xxxii] It should be noted that selection of three VBECS scenarios is meant to provide a standard sensitivity analysis, rather than reflect particularly higher risks around market versus cost assumptions.

TABLE 7

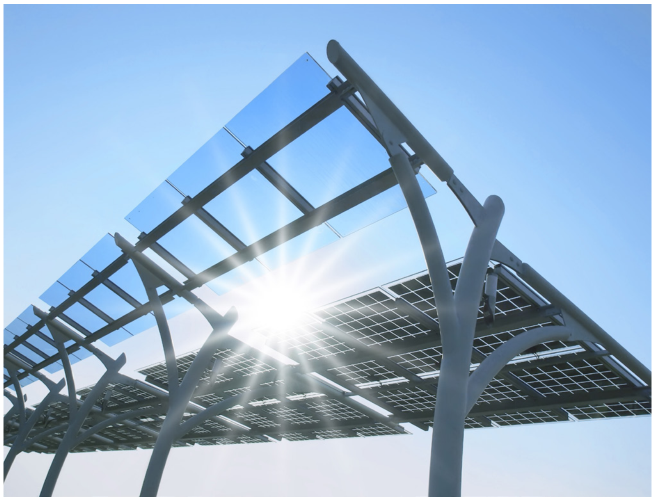
DRV SAMPLE REPORT MODEL ASSUMPTIONS

ASSUMPTIONS	ENERGY COST SAVINGS ONLY	VBECS LOW	VBECS EXPECTED	VBECS HIGH
COSTS				
Retrofit Cost	$15,000,000	$15,000,000	$15,000,000	$15,000,000
Avoided Cost	$0	$0	$831,000	$1,200,000
Energy Cost Savings (annual)	$570,000	$570,000	$570,000	$570,000
Operating Expense Ratio[xxxiii]	35%	34%	34%	34%
Non-Energy Cost Savings[xxxiv] **(annual)**	14.7%	14.7%	14.7%	14.7%
TENANT REVENUES				
Market Rent	$40	1% increase	3% increase	5% increase
Market/Lease Rent Growth Rate	3.5%	3.75%	4.0%	$4.25%
Absorption of Initial Occupancy	24 Months	16 months	12 months	9 months
Renewal Probability	65%	70%	75%	80%
New Lease Term	5	5	5	5
TENANT IMPROVEMENTS				
• **New Lease**	$20/SF	$20/SF	$20/SF	$20/SF
• **Renewal**	$10/SF	$10/SF	$10/SF	$10/SF
LEASING COMMISSIONS				
• **New**	4%	4%	4%	4%
• **Renewal**	2%	2%	2%	2%
SALES REVENUE				
Residual Cap Rate	7%	6.85%	6.75%	6.5%
Cost of Sale	2%	2%	2%	2%

[xxxiii] The operating expense ratio is calculated as the total operating expenses over the effective gross income. Based on year 1 actual operating expenses minus $570,000 in energy cost savings, the OER is approximately 35 percent. After netting out the non-energy cost savings from the operating expense for the VBECS models, the OER went down to approximately 34 percent.

[xxxiv] Potential property tax increases due to higher value of VBECS property is factored in through the use of an operating expense ratio that increases expenses for properties with higher effective gross revenues (key value determinant). Also, some cities and states—not Los Angeles—have property tax abatement laws for value increases due to energy efficiency savings, and other laws like Proposition 13 in California can also limit property tax increases.

The final step is to calculate financial metrics that describe the difference in the calculation of financial performance when all benefits are evaluated compared to the energy cost savings only analysis. The net present value is the best metric for evaluating the differences. The definition of NPV and other financial metrics applied in the DRV analysis are presented below:



DEFINITIONS OF FINANCIAL METRICS

NET PRESENT VALUE (NPV):

NPV is the present value of an investment determined by adding up the discounted sum of all cash flows received from the project. For all of the DRV financial models, a 7 percent rate is used to discount future unleveraged cash flows to the present.

INTERNAL RATE OF RETURN (IRR):

The internal rate of return on an investment is the rate of return (or discount rate) that makes the NPV of all cash flows equal to zero. The internal rate of return, or a closely related metric, is the most common financial metric used to compare real estate investments.

SIMPLE PAYBACK:

Simple payback is the number of years required to pay back total retrofit development costs—calculated in the energy costs only model (ECO) by dividing the total retrofit cost ($15,000,000 in our analysis) by the annual energy cost savings ($570,000). For the VBECS models we use a variant of simple payback that we define as the number of years required to pay back retrofit development costs from total cash flow benefits derived from the retrofit.

SIMPLE RETURN ON INVESTMENT (SIMPLE ROI):

Simple ROI is defined as 100 percent divided by the number of years required to pay back the investment.

DRV SAMPLE REPORT SUMMARY CONCLUSIONS

The DRV financial analysis demonstrates that when all reasonable value benefits are calculated (VBECS expected) typical calculations leave a lot of value on the table, which in this case is over $26 million in additional present value as shown in Table 8 below. Internal rates of return go from a negative 16 percent to a positive 20.3 percent. Even based on more conservative assumptions (VBECS low) the same retrofit generates a positive $2.2 million in present value, over $12.5 million more value than the energy cost savings only analysis. If an investor experienced the high point of the range, NPV is over $30 million and IRR is 27.6 percent.

In addition to the comparative advantage over the energy cost savings only model, the VBECS-expected analysis shows that a project planned for 50 percent energy cost savings and superior sustainability performance can be highly profitable for investors, achieving a positive NPV of $15.96 million and IRR of 20.3 percent.

Additionally, in the VBECS retrofit capital request, risks were clearly identified and mitigated through execution of many recommended deep retrofit process best practices and judicious use of traditional risk management strategies.[xxxv] Insufficient analysis and documentation of the potential accuracy of forecasts and other retrofit design, execution, and operational risks in the energy cost savings only proposal made its approval even more unlikely.

A summary of the VBECS-expected and energy cost savings only model cash flows upon which the conclusions are based are shown in Appendix D.

TABLE 8

DRV SAMPLE REPORT SUMMARY CONCLUSIONS

FINANCIAL METRICS	ENERGY COSTS ONLY	VBECS LOW	VBECS EXPECTED	VBECS HIGH
Net Present Value (NPV)	$10.29 million	+$2.24 million	+15.96 million	+$30.20 million
Simple Payback	26.3 years	14.6 years	9.7 years	8.0 years
Simple Return on Investment	3.8%	6.8%	10.3%	12.4%
Operating Expense Ratio	35%	34%	34%	34%
Internal Rate of Return (IRR)	-16%	+9.3%	+20.3%	+27.6%

[xxxv] This is a reference to a more detailed risk analysis document (not presented here) that would typically accompany a summary deep retrofit report. A summary of this document is presented later in this report.

Summary Results by Value Element

A summary of the results of the VBECS-expected analysis is presented below in Table 9. As might be expected, enhanced revenues from increased tenant demand were the dominant contributor to value—contributing 35 percent of the NPV gain through increased tenant revenues directly, and most of the NPV increase from sales revenues resulted from increased NOI. Clearly, increased revenues from the sale, even after discounting back for 10 years, represented a substantial value premium. The VBECS model resulted in a 14 percent increase in sales price, consistent with statistical and other evidence. The faster absorption of initial vacant space and space vacated by tenants at lease rollover resulted in a 3.15 percent increase in average occupancy from 93.3 percent in the energy cost savings only model to 96.47 percent in the VBECS-expected model, also consistent with results of statistical studies.

TABLE 9

DRV SAMPLE REPORT VALUE ELEMENT SUMMARY[xxxvi]

	VALUE ELEMENT	DESCRIPTION	TOTAL NPV	SUPPORTING ANALYSIS
1	Retrofit Development Costs	$831,000 development cost offset	$776,636 NPV 3% of total	Tax credits, grants, and avoided costs.
2	Non-Energy Operating Costs	$105,400 reduction in annual operating costs	$641,781 NPV 2.5% of total	Improved space utilization, insurance discount, reduced maintenance costs.
3	Risk Analysis	Best practice risk identification and mitigation implemented well.	N/A	22 of the 27 retrofit best practices implemented at acceptable level; particular strong efforts in team selection, early goal setting, energy modeling, commissioning, tenant engagement and business disruption mitigation.
4	Tenant Revenues	3% increase in initial market rent 0.5% annual rent growth increase 5 vs. 10 months vacancy at turnover and 75% vs. 60% renewal probability	$9,150,875 NPV 35% of total	4 major tenants representing 35% of building now require sustainability performance upgrades for new leases; many other existing tenants interested and interest expected to grow; tenant mix in high sustainability interest segments; broader market has one of nation's highest green building adoption rates; 60% of direct competitive buildings are green.
5	Sales Revenues	25 basis point reduction in cap rate Increased NOI	$15,683,499 NPV 60% of total NPV of sales price up 14% from current property value[xxxvi]	Local experts and analysis of comparable sales support 25 to 50 basis point cap rate reduction; many most likely buyers make public commitments to higher levels of sustainability performance; risk of functional/economic obsolescence significantly reduced.

Support for our assumptions is presented for each value element in the discussion below.

[xxxvi] The value contributions for each value element are from the *expected* VBECS model representing the most likely results.

[xxxvii] Current sales price calculated by capitalizing year 1 NOI at 7 percent for a value of $111, 769,700. Sales price premium calculated by comparing current sales price of energy cost savings only model with the NPV of future VBECS-expected sales price ($111,769,700 + $15, 962,526).

VALUE ELEMENTS

VALUE ELEMENT 1: *RETROFIT DEVELOPMENT COSTS*

Development costs for the proposed retrofit are estimated at $40 per square foot, or $15,000,000. The reasonableness of this estimate was confirmed by cost estimators and architects, and includes a reasonable contingency and $1,000,000 to address and mitigate potential tenant disruption.[xxxviii]

The reasonableness of the $40 per square foot development cost estimate is further supported by our review of a similar building retrofit that was also designed for a 50 percent energy cost savings that was retrofit for $42 per square foot. Research by cost estimator Davis Langdon global construction managers shows that light-retrofits of the most common renovation strategies—plug loads, lighting, ventilation, cooling and heating—can be completed for $10 to $20 per square foot on average, with deeper retrofits ranging from $10 to $75 per square foot.[55]

The base retrofit development cost did not consider a number of important factors that would offset $831,000 in upfront development and future capital costs:

- The deep retrofit resulted in significant mitigation of future costs (avoided costs) to replace and repair a variety of systems in the building scheduled for replacement. This avoided capital cost resulted in an NPV improvement of $431,000 for the project.
- The NPV of tax credits and subsidies employed by the investment managers resulted in development cost offsets of $400,000. Federal 179D tax credits that offer energy efficiency tax deductions of $0.30 to $1.80 per square foot as well as state business tax credits were employed. In addition, the local government and utilities both offered small grants as incentives for deep energy efficiency retrofits.

[xxviii]Tenant disruption risks were also mitigated by their sequencing plan focusing on vacant spaces first then moving floor by floor and a well-designed tenant engagement plan and other strategies.

VALUE ELEMENT 2:
NON-ENERGY OPERATING COSTS

Our analysis of non-energy operating costs identified an additional annual operating cost savings of $105,400, which resulted in an NPV contribution of $641,781, a 3 percent contribution to the total increase in NPV in the VBECS-expected analysis. An analysis of how we arrived at our annual cost reduction is presented below.

CHURN COSTS

Cost savings from reduced churn costs (cost associated with internal moves) may have been applicable to the investment manager's space in the building, but the savings would not have been material so they were not addressed here. The substantial potential benefits of churn costs accrue to the tenants of the building that would be captured by the investor through increased tenant demand.

SPACE UTILIZATION COST SAVINGS

Due to reduced space requirements of smaller HVAC and other systems as a result of deep energy efficiency savings, we estimate a 1,500 square foot increase in useable space which represents a rental cost saving of $60,000 per year based on an assumed rent of $40 per square foot.

PROPERTY AND CASUALTY INSURANCE COSTS

A 5 percent discount on property and casualty insurance was available from select reputable carriers, resulting in an annual cost savings of $9,000 ($180,000 x .05). Equally important to the cost savings in the green insurance policies are the terms that allow replacement to green standards.

MAINTENANCE COSTS

Historically, the owner spends $1.67 per square foot on basic operations and maintenance (O&M), excluding major capital expenditures. With the proposed deep energy retrofit reducing total energy demand, many systems become simpler. In particular, lighting improvements will replace T12 fluorescent lighting fixtures with LEDs that reduce the number of times bulbs need replacing. Although other improvements may also generate O&M savings, the client prefers to only include labor and material cost savings from switching to LEDs due to the uncertainty of other savings cost estimates given existing data.

LED CALCULATION:

LEDs will not need to be replaced in the lifetime of the analysis (10 years), but fluorescents will need to be replaced approximately every five years. The building has 2,800 light fixtures, and these fluorescents cost approximately $15 per replacement. With each fluorescent needing to be replaced every five years, and electricians costing $100 per hour and able to replace a bulb in 0.5 hours, the annual spend on routine lighting replacements is: 2,800 / 5 years = 560 replacements per year * ($15 + $100*.5) = $36,400. While the $15 dollar bulb savings might be categorized as avoided cost, we include it here in our assessment of maintenance cost savings.

TABLE OF CONTENTS
EXECUTIVE SUMMARY
GETTING STARTED
PRELIMINARY ANALYSIS
VALUE ELEMENT ASSESSMENT 1 2 3 4 5
SAMPLE REPORT
CONCLUSION
APPENDIX A
APPENDIX B
APPENDIX C
END NOTES

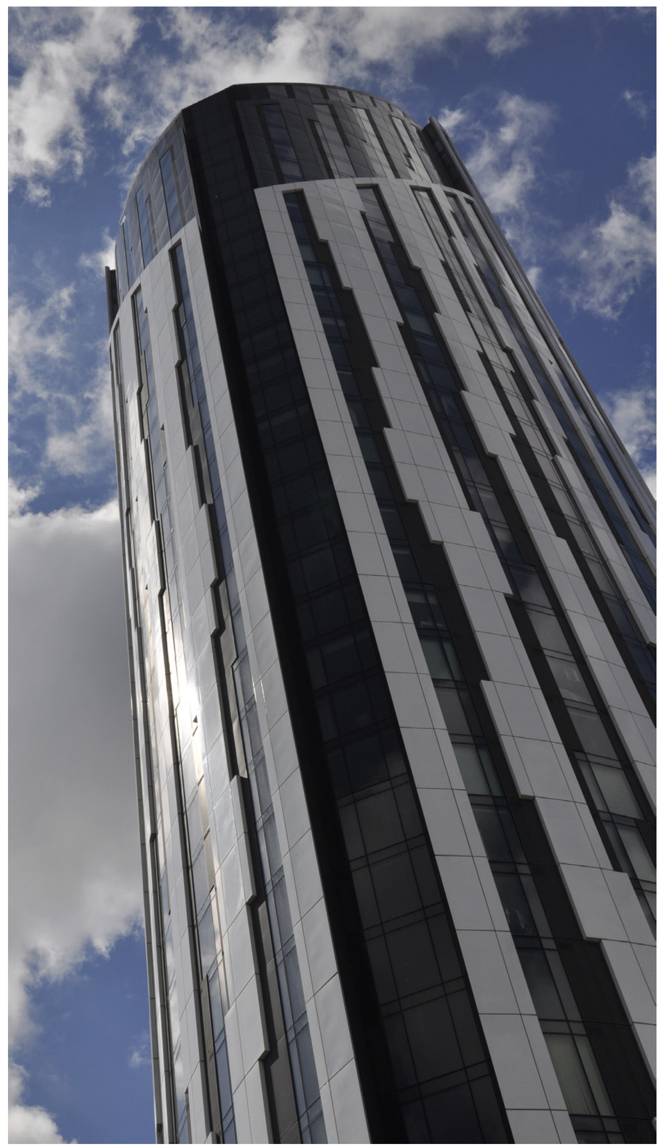
We have presented only one category of estimated maintenance cost savings. Often, a range applying sensitivity analysis is required to account for likely variability. For example, there may be no or limited cost savings, at least in year one, as the new LED systems might require non-standard commissioning, and other systems likely require some learning on the part of maintenance staff. However, other savings, due to smaller, simpler, and newer HVAC systems might accrue.

VALUE ELEMENT 3: *RISK ANALYSIS*

Risk of execution and performance as designed for the project has been well mitigated by traditional risk mitigation techniques and risk mitigating process best practices implemented during the launch and design phase, and contemplated (planned and budgeted) actions to be undertaken in the finance, construction, and operations phase of the project.

The deep retrofit employs many best practice retrofit processes, including a modified integrated design process, early multi-stakeholder goal setting, a high quality tenant engagement process, selection of a specialized and experienced team, lawyers experienced with deep retrofit project contracts and insurance, quality energy modeling, intelligent timing and sizing of system replacements, and funding for commissioning and retro-commissioning.

Additionally, traditional risk mitigation techniques were employed including insurance covering loss of business income, all risk causes of loss in construction, and performance bonds. Product and equipment warranties were fully analyzed and appear appropriate for the project. Operations risks were addressed in a comprehensive operation and maintenance plan and strategies to limit tenant business interruption appear strong.



VALUE ELEMENT 4:

TENANT REVENUES

Given the critical importance of tenant revenues to property value and financial performance, the bulk of the research for the DRV report focused on understanding the demand for sustainability performance improvements and implications for key tenant demand assumptions. The results of our research indicated current demand for sustainability performance improvements by the building tenants and the market, with trends towards greater demand in the future. Our conclusions regarding adjustments to key tenant demand assumptions are shown in Table 10:

Sustainability Performance Outcomes and Tenant Demand

As described in the description of sustainability performance improvements and outcomes, the proposed project will achieve market-leading energy cost savings of 50 percent and achieve high certification LEED and EnergyStar certification levels. A review of the key outcomes planned beyond energy cost savings and certifications suggests the focus on indoor air quality, daylighting, thermal comfort, and water savings—a particular concern in Los Angeles now—was well considered given interests of tenants in the market.

Based on our discussions with select major tenants (see tenant evaluation below), our assessment of local regulatory requirements and subsidy thresholds of local and state governments and utilities, and our experience with most likely buyers, the property's proposed level of sustainability performance and mix of attributes appears to put it in the upper tier of similar properties in the market.

TABLE 10

RECOMMENDED ADJUSTMENTS TO TENANT DEMAND ASSUMPTIONS IN DCF MODEL

ASSUMPTIONS	ENERGY COSTS ONLY	VBECS LOW	VBECS EXPECTED	VBECS HIGH
Market Rent	$40	+ 1%	+ 3%	+5%
Market/Lease Rent Growth Rate	3.5%	Up to 3.75%	Up to 4.0%	Up to $4.25%
Renewal Probability	65%	70%	75%	80%
New Lease Term	5 years	5 years	5 years	5 years
Vacancy at Turnover	10 months	8 months	5 months	4 months
Absorption of Initial Vacancy	24 months	16 months	12 months	9 months

Our analysis supporting our adjustments to key assumptions is presented below.

TABLE OF CONTENTS
EXECUTIVE SUMMARY
GETTING STARTED
PRELIMINARY ANALYSIS
VALUE ELEMENT ASSESSMENT 1 2 3 4 5
SAMPLE REPORT
CONCLUSION
APPENDIX A
APPENDIX B
APPENDIX C
END NOTES

Applicability of General Tenant Demand Research

Most of the academic and industry research on the relationship between tenant demand and high levels of sustainability performance has been conducted on investment grade office properties in the U.S. Accordingly, the general evidence from these studies can reasonably be interpreted as suggestive of a direct positive relationship between sustainability/energy certifications and value/financial performance for the subject office property.

On average, the statistical studies have found office rental price premiums for LEED or Energy Star certification of 3 to 6 percent, occupancy premiums of 10 percent, and sales price premiums of 10 to 13 percent. Expert-based studies that employ a more qualitative assessment of sustainability similar to that of appraisers and market analysts confirm generally the findings of the statistical studies, with a bit more of tenant demand for sustainability showing up as increased tenant retention (higher renewal probability), reduced vacancy at lease turnover, and improved lease terms.

There have been many surveys of corporations and non-corporate tenants regarding their perspectives on sustainability in general and energy performance in particular for the properties they own or lease. Sustainability and energy performance has become a critical factor to tenants in many sectors of the market. This research is particularly applicable to the subject property given its tenant mix of government, large defense contractors, and real estate industry service providers—typically some of the tenant sectors with the highest interest in sustainability and energy performance.[xxxix]

Demand for Superior Sustainability Performance by Existing Tenants

Demand for high levels of sustainability performance has been growing with existing building tenants, with four major tenants—representing 35 percent of the building square footage—indicating they now require high level certifications and performance. Other major tenants and many of the smaller tenants have also expressed strong and growing interest in sustainability energy performance buildings.[xl]

[xxxix] While not presented in this sample report, there are many surveys of tenants and corporations that are regularly conducted which show support for sustainability in the 80 percent to 90 percent range, and growing interest. More detail on the sources can be found in the write-up of Value Element 4: Tenant Revenues.

[xl] While not presented in this sample report, important supporting documentation would include tenant survey results, specific write-ups of major tenant discussions on this matter, and additional commentary provided by property or asset managers, or local brokers with specific comments about specific building tenants regarding sustainability.

The strong and growing demand for high levels of sustainability performance by existing tenants expressed in our online survey and discussions with major tenants is not surprising based upon an analysis of our tenants. The subject property tenant mix can roughly be segmented as follows:

1. GOVERNMENT: FEDERAL, STATE, AND LOCAL: 20 PERCENT OF BUILDING

Government tenants have been increasingly moving towards requirements for energy efficient buildings. California has been a leader in pushing energy efficiency with documented goals of achieving deep energy efficiency in both new and existing state-owned and leased buildings, with adoption of ever-increasing product and building efficiency. Los Angeles City and County have also been active with sustainability/energy requirements for owned and leased buildings. This demand for sustainability and energy performance improvements is expected to remain high.

2. DEFENSE CONTRACTOR/AERONAUTICS: 30 PERCENT OF BUILDING, GREATER PERCENT OF REVENUE

Defense contractors and aeronautics firms tend to have significant incentives to be energy efficient—and this is true for the tenants we interviewed. First, as many are large public or international companies, they are experiencing increased measurement and scrutiny of their sustainability performance from numerous company/rating certification programs like the Carbon Disclosure Project, Global Reporting Initiative, Sustainable Accounting Standards Board, and others. Second, as vendors to governments and large companies, they are subject to increasingly more aggressive procurement screening related to energy performance. Finally, they are competing for the best talent with technology companies and other firms so recruiting and retention are top concerns.

3. ARCHITECTURE/ENG./CONS./OTHER SERVICE PROVIDERS: 15 PERCENT OF BUILDING, GREATER PERCENT OF REVENUE

Many service providers, particularly architectural, engineering, and other building/construction related firms have been leaders in supporting energy performance improvements, and competence and leadership in energy performance has become a critical part of many firm brands. Since many of their clients have become more focused on energy performance, they have had to keep up and lead.

4. SMALL TO MID-SIZE FIRMS: DIVERSE MIX, 20 PERCENT OF BUILDING

Smaller firms have less pressure around the issues of energy performance, and are typically more price sensitive. That being said, many small-to-mid size firms are experiencing the same kinds of pressure by their stakeholders as larger firms. But as the firms are typically private and do not have the level of sophistication of larger firms with sustainability directors and energy managers, demand from this tenant segment—and the subject building's tenants specifically—is less than for larger tenants.

The evidence cited above is taken primarily from major tenant interviews, discussions with property and asset managers, and commercial real estate brokers familiar with tenants in the building. Additionally, 65 percent of building tenants (by square feet) make public commitments to sustainability generally and energy performance in particular on their websites or in corporate responsibility reports.

Market Evidence of Tenant Demand for Energy Performance Upgrades

Los Angeles is one of the U.S.'s greenest cities based on evidence of a green office market penetration study completed by CBRE.[56] Los Angeles had the most buildings (443) with Energy Star certifications in the country. It ranked sixth in green office building adoption rate with 49.7 percent (including LEED or Energy Star certification not counting government or medical buildings). While not direct evidence of tenant demand, it provides an indication that existing and new building owners feel sustainability certification is important to their building's competitiveness.

More importantly, based on our assessment of the five most competitive buildings to the subject property, two had LEED certifications and at least one of the others was in the process of becoming LEED certified. Discussions with brokers and property managers knowledgeable of major tenants in the peer group of five indicate similar tenant demand characteristics to existing tenants in the subject property. While not empirically derived, estimates of top commercial office brokers suggest that 25 to 40 percent of tenants in the market are now requiring LEED certification, and a growing number of other tenants are interested and moving towards higher demand. Given the relatively high level of certification adoption in the market, brokers indicate that tenants are also beginning to differentiate by the level of certification, a positive development for the subject building given the high level of sustainability performance planned.

Additional evidence of market demand for improved sustainability performance was found in an analysis of CoStar leasing data that showed that in similar office buildings in our market, 58 percent of leasing occurred in LEED certified buildings in the last two years, while the buildings only represented 45 percent of the market.

Although the overall office market is strong, and landlords and tenants have not had particular leverage in leasing negotiations, there has been an increasing trend of office space downsizing as tenants' leases rollover, which has increased the importance of building quality to attract the best tenants.

Setting Tenant Demand Assumptions

Demand for high levels of sustainability performance by our tenants in the market is substantial, with a majority of existing tenants (by square footage) expressing a requirement or interest in improved sustainability performance today, and expectation of growing interest in the future. This demand appears reasonable given our major segments of tenants and evidence from the broader market as well as the submarket and peer group of five competitors we analyzed.

Our recommended adjustments to tenant demand assumptions shown in Table 10 are a reasonable, if not conservative, assessment of potential impacts of the proposed deep retrofit. Our adjustments are well below findings from statistical studies and consistent with expert-based analyses we have reviewed. Most compelling was the direct input we received from existing major tenants, which confirm that a high level of sustainability performance is becoming more of a requirement than an extra.

While adoption of sustainability certifications is high in properties competitive to the subject, the relative high level of sustainability performance from the deep retrofit planned provides further support for our assumptions—particularly in light of growing indications from brokers and research that the level of certification becomes more of a differentiating factor in markets with growing adoption of sustainability performance improvements.

VALUE ELEMENT 5:
SALES REVENUES

Enhanced sales revenues are the dominant component of the value premium, accounting for 60 percent of the total incremental increase in value created by the planned deep retrofit under our most likely VBECS-expected scenario. The property sales price was 14 percent higher than the value of the energy cost only property in today's dollars.

The enhanced sales price forecast for the VBECS-expected scenario is derived primarily from the significant boost to net operating income as a result of increased tenant demand and the $570,000 energy cost savings reduction, which increases to $681,000 in year 11 when the property is assumed to be sold. A small percentage of the value increase is generated from our assumption of a 0.25 basis points reduction in capitalization rates reflecting both increased demand from investors and a reduction in risk.

The primary source of the boost in NOI—tenant revenues—was presented in the previous section. Support for the energy cost savings estimate was provided in the energy cost analysis that supplements this report.

The estimate of a 0.25 basis point reduction in the residual capitalization rate in the VBECS-expected scenario is based on an examination of evidence from comparable sales of properties achieving high and low levels of sustainability performance; interviews with local office property appraisers, market analysts, and brokers; an evaluation of most likely buyers; an assessment of how the deep retrofit influences property risk; and future trends in tenant and investor demand for high levels of sustainability performance.

TABLE OF CONTENTS
EXECUTIVE SUMMARY
GETTING STARTED
PRELIMINARY ANALYSIS
VALUE ELEMENT ASSESSMENT 1 2 3 4 5
SAMPLE REPORT
CONCLUSION
APPENDIX A
APPENDIX B
APPENDIX C
END NOTES

Direct market evidence from comparable sustainably certified properties versus uncertified properties provided suggestive evidence of higher sales prices and lower cap rates, but the limited number of comparable sales, dramatic price changes due to non-sustainability performance factors, and the general difficulty attributing price change to any one building attribute made the evidence hard to apply directly. More valuable was direct input from a number of local office appraisers, market analysts, and brokers who thought a cap rate reduction of 25 to 75 basis points would be reasonable, particularly in light of rapid changes in tenant and investor demand for sustainability performance upgrades and the fact that the residual cap rate is applied well into the future.

Most likely buyers of the subject property were also identified and interviewed to determine their perspectives on sustainability performance.[xli] Buyers interviewed all communicated a strong interest in sustainability performance improvements as a result of increased tenant demand and the interest of their primary capital sources: pension funds. Further research identified that 60 percent of the most likely buyers not interviewed had made public commitments to sustainability.

Based on a review of the risk analysis conducted as part of value element three, risk analysis, the net risks of the property appear to be reduced. Retrofit risk created by the retrofit due to innovative systems and materials employed, energy modeling risk, construction and start-up risk, and other factors was more than offset by the improved ability of the property to meet future increases in the demand by regulators, tenants, and investors. A building that cannot adapt to meet increasing demand for high levels of sustainability performance will lose value through economic obsolescence.

Risks for the subject property are also expected to decline as a result of reducing reliance on the energy grid (terrorism or natural disasters), limiting exposure to energy/water cost volatility, and limiting 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.

[xli] Most likely buyers are identified by talking with local commercial office brokers and evaluating sales transaction databases.

HOW TO CALCULATE AND PRESENT
DEEP RETROFIT VALUE

CONCLUSION

5

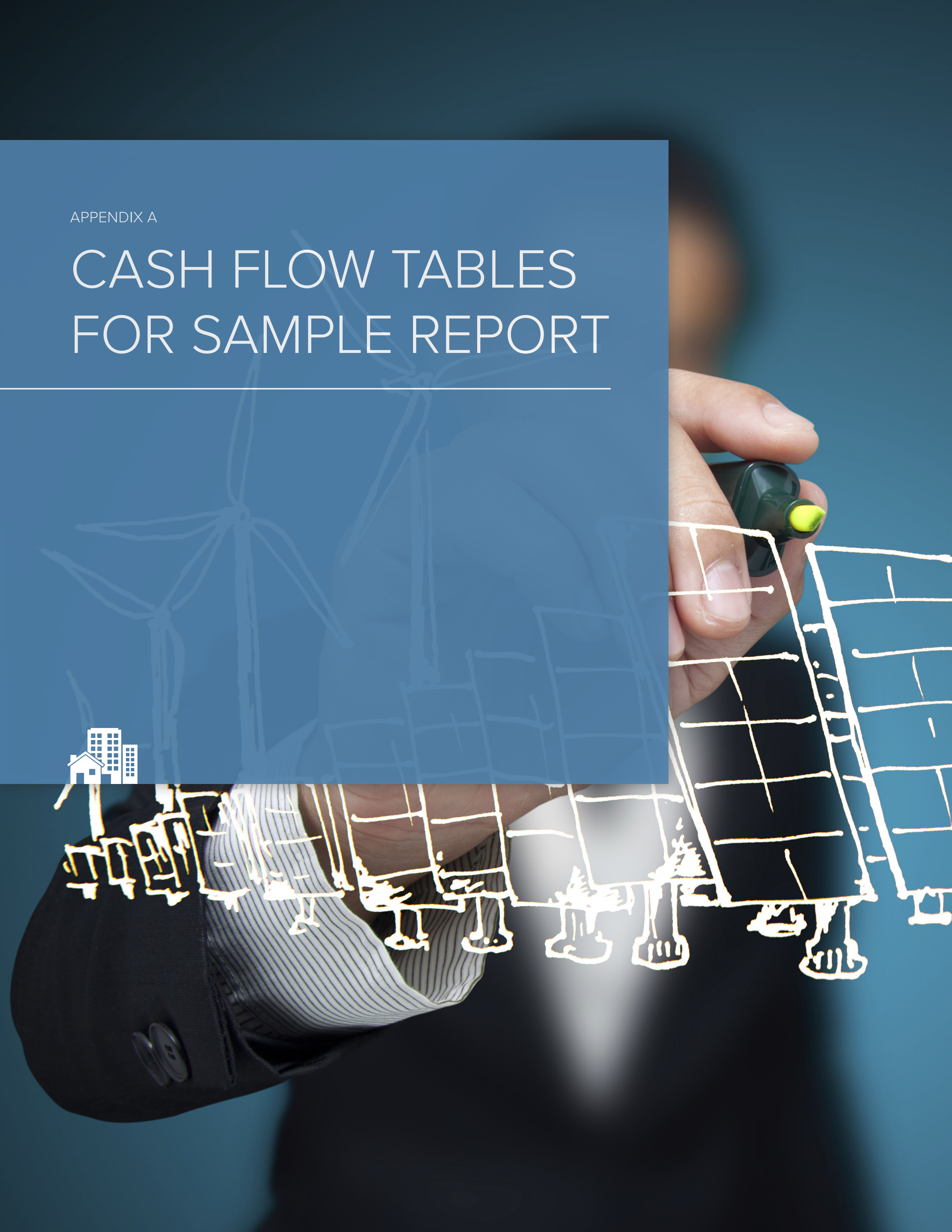
CONCLUSION

Deep retrofits generate substantial value for investors, well beyond the energy cost savings. When all the benefits of deep retrofits are included in the calculation of value, deep retrofits can compete directly for investor equity delivering rates of return, at reasonable risk, well in excess of most investor return requirements for projects of similar risk.

Institutional and other private investors own a substantial amount of existing commercial real estate. This huge reservoir of real estate represents a gold mine of potential deep retrofit-driven profitability that can deliver real bottom line results while preserving and enhancing an investor's competitive position. As with any potential profit opportunity, investors must take risks to mine potential profits. In this regard, the cost involved in deep retrofit investment, including the cost of calculating deep retrofit value, is a small price to pay to access potential profits.

APPENDIX A

CASH FLOW TABLES FOR SAMPLE REPORT



APPENDIX A

Appendix A presents VBECS Expected and Energy Cost Savings Only model cash flows that led to the conclusions described in the sample report.

Tenant-Based Revenue Model Cash Flows

Table A–1.1 shows how the VBECS Expected Scenario reveals an additional $1 million in annual tenant income by year 4. Total revenues provided in this table are derived from increased rental income (Table A–1.2) plus a reduction in leasing costs (Table A–1.3). This is significant value that would have otherwise gone unnoticed using the more conventional energy cost savings only scenario.

TABLE A-1.1:

EXPECTED MARGINAL TENANT-BASED REVENUE

	YEAR				
	1	**2**	**3**	**4**	**5**
Energy Cost Savings Only Scenario	$9,755,459	$10,055,037	$12,232,754	$13,248,527	$14,319,379
VBECS Scenario	$9,795,598	$10,816,294	$13,159,744	$14,368,520	$15,651,685
Delta	$242,813	$761,257	$926,990	$1,119,993	$1,332,305

	YEAR					
	6	**7**	**8**	**9**	**10**	**11**
Energy Cost Savings Only Scenario	$14,551,067	$14,963,188	$16,461,573	$17,219,705	$17,852,115	$17,617,954
VBECS Scenario	$16,230,885	$16,912,989	$18,450,023	$19,235,772	$20,036,653	$20,132,044
Delta	$1,679,819	$1,949,801	$1,988,449	$2,016,067	$2,184,538	$2,514,089

APPENDIX A

Table A–1.2 provides the segmentation by tenant of the additional tenant-based cash flows that the energy cost savings only scenario fails to acknowledge.

TABLE A-1.2:

EXPECTED MARGINAL RENTAL INCOME, BY TENANT

	YEAR				
	1	2	3	4	5
Tenant 1: Government Tenants	-	$143,555	$181,708	$223,893	$270,409
Tenant 2: Defense Contractor/ Aeronautics Tenants	-	$215,333	$272,563	$335,839	$405,613
Tenant 3: Architecture/Eng./ Cons./Other Service	-	$107,666	$136,281	$167,920	$202,807
Tenant 4: Small to Mid-Size Local Firms	-	$143,555	$181,708	$223,893	$270,409
Vacant Space	$6,938	$56,925	$95,067	$110,760	$127,498
Total	**$6,938**	**$667,034**	**$867,328**	**$1,062,305**	**$1,276,735**

	YEAR					
	6	7	8	9	10	11
Tenant 1: Government Tenants	$321,576	$350,991	$382,163	$415,181	$450,140	$487,140
Tenant 2: Defense Contractor/ Aeronautics Tenants	$482,364	$526,487	$573,244	$622,771	$675,210	$730,709
Tenant 3: Architecture/Eng./ Cons./Other Service	$241,182	$263,244	$286,622	$311,385	$337,605	$365,355
Tenant 4: Small to Mid-Size Local Firms	$321,576	$350,991	$382,163	$415,181	$450,140	$487,140
Vacant Space	$262,116	$411,611	$315,985	$206,054	$228,913	$388,119
Total	**$1,628,814**	**$1,903,325**	**$1,940,177**	**$1,970,572**	**$2,142,007**	**$2,458,463**

APPENDIX A

Table A–1.3 shows an expected reduction in leasing costs of $33,000–$94,000 annually in the VBECS-expected scenario due to increased rental rates and enhanced absorption of vacant space.

TABLE A-1.3:

EXPECTED MARGINAL LEASING COSTS (TIs AND LEASING COMMISSIONS), BY TENANT

	YEAR				
	1	2	3	4	5
Tenant 1: Government Tenants	-	$14,471	$14,038	$13,574	$13,075
Tenant 2: Defense Contractor/ Aeronautics Tenants	-	$21,706	$21,057	$20,360	$19,613
Tenant 3: Architecture/Eng./ Cons./Other Service	-	$10,853	$10,529	$10,180	$9,806
Tenant 4: Small to Mid-Size Local Firms	-	$14,471	$14,038	$13,574	$13,075
Vacant Space	$33,202	$32,723	-	-	-
Total	**$33,202**	**$94,224**	**$59,662**	**$57,688**	**$55,570**

	YEAR					
	6	7	8	9	10	11
Tenant 1: Government Tenants	$12,541	$11,970	$11,358	$10,705	$10,007	$9,263
Tenant 2: Defense Contractor/ Aeronautics Tenants	$18,812	$17,954	$17,037	$16,057	$15,011	$13,895
Tenant 3: Architecture/Eng./ Cons./Other Service	$9,406	$8,977	$8,519	$8,029	$7,506	$6,948
Tenant 4: Small to Mid-Size Local Firms	$12,541	$11,970	$11,358	$10,705	$10,007	$9,263
Vacant Space	-$2,295	-$4,395	-	-	-	$16,257
Total	**$51,005**	**$46,476**	**$48,272**	**$45,496**	**$42,532**	**$55,627**

APPENDIX A

Table A–1.4 shows the rental income data (by tenant) that were subtracted from the data from the VBECS-expected scenario (Table A–1.6) to produce Table A–1.2. Total rental income for the energy cost savings only scenario is expected to exceed $15 million annually starting in year 5.

TABLE A-1.4:

ENERGY COST SAVINGS ONLY SCENARIO – RENTAL INCOME, BY TENANT

	YEAR				
	1	**2**	**3**	**4**	**5**
Tenant 1: Government Tenants	$2,368,000	$2,394,714	$2,605,362	$2,827,822	$3,062,662
Tenant 2: Defense Contractor/ Aeronautics Tenants	$3,552,000	$3,592,071	$3,908,043	$4,241,733	$4,593,994
Tenant 3: Architecture/Eng./ Cons./Other Service	$1,776,000	$1,796,036	$1,954,022	$2,120,866	$2,296,997
Tenant 4: Small to Mid-Size Local Firms	$2,368,000	$2,394,714	$2,605,362	$2,827,822	$3,062,662
Vacant Space	$231,250	$1,627,538	$2,378,120	$2,461,354	$2,547,501
Total	**$10,295,250**	**$11,805,072**	**$13,450,908**	**$14,479,597**	**$15,563,816**

	YEAR					
	6	**7**	**8**	**9**	**10**	**11**
Tenant 1: Government Tenants	$3,310,478	$3,426,344	$3,546,266	$3,670,386	$3,798,849	$3,931,809
Tenant 2: Defense Contractor/ Aeronautics Tenants	$4,965,716	$5,139,517	$5,319,400	$5,505,579	$5,698,274	$5,897,713
Tenant 3: Architecture/Eng./ Cons./Other Service	$2,482,858	$2,569,758	$2,659,700	$2,752,789	$2,849,137	$2,948,857
Tenant 4: Small to Mid-Size Local Firms	$3,310,478	$3,426,344	$3,546,266	$3,670,386	$3,798,849	$3,931,809
Vacant Space	$2,389,476	$2,330,975	$2,677,353	$2,923,316	$3,025,632	$2,837,948
Total	**$16,459,006**	**$16,892,939**	**$17,748,985**	**$18,522,455**	**$19,170,741**	**$19,548,136**

APPENDIX A

Table A–1.5 shows the leasing cost data (by tenant) that were subtracted from the data from the VBECS-expected scenario (Table A–1.7) to produce Table A–1.3. Total leasing costs for the energy cost savings only scenario are expected to be between approximately $1.2 and $2 million annually after year 1.

TABLE A-1.5:

ENERGY COST SAVINGS ONLY SCENARIO – LEASING COSTS (TIs & LEASING COMMISSIONS), BY TENANT

	YEAR				
	1	2	3	4	5
Tenant 1: Government Tenants	-	-$283,688	-$286,625	-$289,663	-$292,809
Tenant 2: Defense Contractor/ Aeronautics Tenants	-	-$425,533	-$429,937	-$434,495	-$439,213
Tenant 3: Architecture/Eng./ Cons./Other Service	-	-$212,766	-$214,968	-$217,248	-$219,606
Tenant 4: Small to Mid-Size Local Firms	-	-$283,688	-$286,625	-$289,663	-$292,809
Vacant Space	-$539,791	-$544,359	-	-	-
Total	**-$539,791**	**-$1,750,035**	**-$1,218,154**	**-$1,231,070**	**-$1,244,437**

	YEAR					
	6	7	8	9	10	11
Tenant 1: Government Tenants	-$296,064	-$299,433	-$302,920	-$306,530	-$310,265	-$314,131
Tenant 2: Defense Contractor/ Aeronautics Tenants	-$444,096	-$449,150	-$454,381	-$459,794	-$465,398	-$471,197
Tenant 3: Architecture/Eng./ Cons./Other Service	-$222,048	-$224,575	-$227,190	-$229,897	-$232,699	-$235,599
Tenant 4: Small to Mid-Size Local Firms	-$296,064	-$299,433	-$302,920	-$306,530	-$310,265	-$314,131
Vacant Space	-$649,668	-$657,160	$	$	$	-$595,124
Total	**-$1,907,940**	**-$1,929,751**	**-$1,287,411**	**-$1,302,751**	**-$1,318,627**	**-$1,930,182**

APPENDIX A

Table A–1.6 shows the rental income data (by tenant) for the VBECS-expected scenario. Total rental income for the VBECS-expected scenario is expected to exceed $15 million annually starting in year 4.

TABLE A-1.6:

VBECS EXPECTED SCENARIO – RENTAL INCOME, BY TENANT

	YEAR				
	1	2	3	4	5
Tenant 1: Government Tenants	$2,368,000	$2,538,269	$2,787,070	$3,051,715	$3,333,071
Tenant 2: Defense Contractor/ Aeronautics Tenants	$3,552,000	$3,807,404	$4,180,606	$4,577,572	$4,999,607
Tenant 3: Architecture/Eng./ Cons./Other Service	$1,776,000	$1,903,702	$2,090,303	$2,288,786	$2,499,803
Tenant 4: Small to Mid-Size Local Firms	$2,368,000	$2,538,269	$2,787,070	$3,051,715	$3,333,071
Vacant Space	$238,188	$1,684,462	$2,473,187	$2,572,114	$2,674,999
Total	**$10,302,188**	**$12,472,106**	**$14,318,236**	**$15,541,902**	**$16,840,552**

	YEAR					
	6	7	8	9	10	11
Tenant 1: Government Tenants	$3,632,054	$3,777,336	$3,928,429	$4,085,566	$4,248,989	$4,418,949
Tenant 2: Defense Contractor/ Aeronautics Tenants	$5,448,080	$5,666,004	$5,892,644	$6,128,350	$6,373,484	$6,628,423
Tenant 3: Architecture/Eng./ Cons./Other Service	$2,724,040	$2,833,002	$2,946,322	$3,064,175	$3,186,742	$3,314,211
Tenant 4: Small to Mid-Size Local Firms	$3,632,054	$3,777,336	$3,928,429	$4,085,566	$4,248,989	$4,418,949
Vacant Space	$2,651,592	$2,742,587	$2,993,338	$3,129,370	$3,254,545	$3,226,068
Total	**$18,087,820**	**$18,796,264**	**$19,689,162**	**$20,493,027**	**$21,312,748**	**$22,006,599**

APPENDIX A

Table A–1.7 shows the leasing cost data (by tenant) for the VBECS-expected scenario. Total leasing costs for the VBECS-expected scenario are expected to be between approximately $1.1 and $1.9 million annually after year 1.

TABLE A-1.7:

VBECS EXPECTED SCENARIO – LEASING COSTS (TIs AND LEASING COMMISSIONS), BY TENANT

	YEAR				
	1	2	3	4	5
Tenant 1: Government Tenants	-	-$269,218	-$272,586	-$276,090	-$279,733
Tenant 2: Defense Contractor/ Aeronautics Tenants	-	-$403,826	-$408,880	-$414,135	-$419,600
Tenant 3: Architecture/Eng./ Cons./Other Service	-	-$201,913	-$204,440	-$207,067	-$209,800
Tenant 4: Small to Mid-Size Local Firms	-	-$269,218	-$272,586	-$276,090	-$279,733
Vacant Space	-$506,589	-$511,636	-	-	-
Total	**-$506,589**	**-$1,655,811**	**-$1,158,492**	**-$1,173,382**	**-$1,188,867**

	YEAR					
	6	7	8	9	10	11
Tenant 1: Government Tenants	-$283,523	-$287,464	-$291,562	-$295,825	-$300,258	-$304,868
Tenant 2: Defense Contractor/ Aeronautics Tenants	-$425,284	-$431,195	-$437,343	-$443,737	-$450,386	-$457,302
Tenant 3: Architecture/Eng./ Cons./Other Service	-$212,642	-$215,598	-$218,672	-$221,869	-$225,193	-$228,651
Tenant 4: Small to Mid-Size Local Firms	-$283,523	-$287,464	-$291,562	-$295,825	-$300,258	-$304,868
Vacant Space	-$651,963	-$661,555	-	$	-	-$578,867
Total	**-$1,856,935**	**-$1,883,275**	**-$1,239,139**	**-$1,257,255**	**-$1,276,095**	**-$1,874,555**

APPENDIX A

Sales Revenue Model Cash Flows

These tables illustrate the sales revenue model cash flows with an assumed sale at Year 10.

Table A–2.1 shows the total cash flows for the energy cost savings scenario. Net cash flows reach $10 million beginning in year 5 and reach nearly $210 million in year 10 upon the sale of the property.

TABLE A-2.1:

ENERGY COST SAVINGS ONLY SCENARIO – NPV MODEL CASH FLOWS

	YEAR				
	1	2	3	4	5
Rent	$10,295,250	$11,805,072	$13,450,908	$14,479,597	$15,563,816
Expense Reimbursements	$275,000	$283,250	$291,748	$300,500	$309,515
Parking Revenue	$2,000,000	$2,060,000	$2,121,800	$2,185,454	$2,251,018
Other Revenue	$100,000	$103,000	$106,090	$109,273	$112,551
Gross Potential Revenue	$12,670,250	$14,251,322	$15,970,546	$17,074,823	$18,236,900
V&C Loss	-$633,513	-$712,566	-$798,527	-$853,741	-$911,845
EFFECTIVE GROSS REVENUE	**$12,036,738**	**$13,538,756**	**$15,172,018**	**$16,221,082**	**$17,325,055**
Operating Expenses	-$4,212,858	-$4,738,565	-$5,310,206	-$5,677,379	-$6,063,769
NET OPERATING INCOME	**$7,823,879**	**$8,800,191**	**$9,861,812**	**$10,543,703**	**$11,261,286**
TIs and Leasing Commissions	-$539,791	-$1,750,035	-$1,218,154	-$1,231,070	-$1,244,437
Proceeds from Sale	-	-	-	-	-
Net Cash Flow	**$7,284,088**	**$7,050,156**	**$8,643,658**	**$9,312,634**	**$10,016,849**

APPENDIX A

TABLE A-2.1:

ENERGY COST SAVINGS ONLY SCENARIO – NPV MODEL CASH FLOWS

	YEAR					
	6	**7**	**8**	**9**	**10**	**11**
Rent	$16,459,006	$16,892,939	$17,748,985	$18,522,455	$19,170,741	$19,548,136
Expense Reimbursements	$318,800	$328,364	$338,215	$348,362	$358,813	$369,577
Parking Revenue	$2,318,548	$2,388,105	$2,459,748	$2,533,540	$2,609,546	$2,687,833
Other Revenue	$115,927	$119,405	$122,987	$126,677	$130,477	$134,392
Gross Potential Revenue	$19,212,282	$19,728,813	$20,669,935	$21,531,034	$22,269,578	$22,739,938
V&C Loss	-$960,614	-$986,441	-$1,033,497	-$1,076,552	-$1,113,479	-$1,136,997
EFFECTIVE GROSS REVENUE	**$18,251,668**	**$18,742,372**	**$19,636,439**	**$20,454,483**	**$21,156,099**	**$21,602,941**
Operating Expenses	-$6,388,084	-$6,559,830	-$6,872,753	-$7,159,069	-$7,404,635	-$7,561,029
NET OPERATING INCOME	**$11,863,584**	**$12,182,542**	**$12,763,685**	**$13,295,414**	**$13,751,464**	**$14,041,912**
TI's and Leasing Commissions	-$1,907,940	-$1,929,751	-$1,287,411	-$1,302,751	-$1,318,627	-
Proceeds from Sale	-	-	-	-	$196,586,762	-
Net Cash Flow	**$9,955,645**	**$10,252,791**	**$11,476,274**	**$11,992,663**	**$209,019,600**	**-**

APPENDIX A

Sales Revenue Model Cash Flows

Table A–2.2 shows the total cash flows for the VBECS-expected scenario. Net cash flows reach $10 million beginning in year 4 and surpass $240 million in year 10 upon the sale of the property.

TABLE A-2.2:

VBECS EXPECTED SCENARIO – NPV MODEL CASH FLOWS

	YEAR				
	1	**2**	**3**	**4**	**5**
Rent	$10,302,188	$12,472,106	$14,318,236	$15,541,902	$16,840,552
Expense Reimbursements	$275,000	$283,250	$291,748	$300,500	$309,515
Parking Revenue	$2,000,000	$2,060,000	$2,121,800	$2,185,454	$2,251,018
Other Revenue	$100,000	$103,000	$106,090	$109,273	$112,551
Gross Potential Revenue	$12,677,188	$14,918,356	$16,837,874	$18,137,128	$19,513,635
V&C Loss	-$633,859	-$745,918	-$841,894	-$906,856	-$975,682
EFFECTIVE GROSS REVENUE	**$12,043,328**	**$14,172,438**	**$15,995,980**	**$17,230,272**	**$18,537,953**
Operating Expenses	-$4,215,165	-$4,854,953	-$5,493,193	-$5,925,195	-$6,382,884
NET OPERATING INCOME	**$7,828,163**	**$9,317,485**	**$10,502,787**	**$11,305,077**	**$12,155,070**
TI's and Leasing Commissions	-$506,589	-$1,655,811	-$1,158,492	-$1,173,382	-$1,188,867
Proceeds from Sale	-	-	-	-	-
Net Cash Flow	**$7,321,574**	**$7,661,673**	**$9,344,295**	**$10,131,695**	**$10,966,203**

APPENDIX A

Sales Revenue Model Cash Flows (continued)

TABLE A-2.2:

VBECS EXPECTED SCENARIO – NPV MODEL CASH FLOWS

	YEAR					
	6	7	8	9	10	11
Rent	$18,087,820	$18,796,264	$19,689,162	$20,493,027	$21,312,748	$22,006,599
Expense Reimbursements	$318,800	$328,364	$338,215	$348,362	$358,813	$369,577
Parking Revenue	$2,318,548	$2,388,105	$2,459,748	$2,533,540	$2,609,546	$2,687,833
Other Revenue	$115,927	$119,405	$122,987	$126,677	$130,477	$134,392
Gross Potential Revenue	$20,841,096	$21,632,138	$22,610,112	$23,501,606	$24,411,584	$25,198,400
V&C Loss	-$1,042,055	-$1,081,607	-$1,130,506	-$1,175,080	-$1,220,579	-$1,259,920
EFFECTIVE GROSS REVENUE	**$19,799,041**	**$20,550,531**	**$21,479,607**	**$22,326,526**	**$23,191,005**	**$23,938,480**
Operating Expenses	-$6,824,264	-$7,087,286	-$7,412,462	-$7,708,884	-$8,011,452	-$8,273,068
NET OPERATING INCOME	**$12,974,777**	**$13,463,245**	**$14,067,144**	**$14,617,642**	**$15,179,553**	**$15,665,412**
TI's and Leasing Commissions	-$1,856,935	-$1,883,275	-$1,239,139	-$1,257,255	-$1,276,095	-
Proceeds from Sale	-	-	-	-	$227,438,578	-
Net Cash Flow	**$11,117,842**	**$11,579,970**	**$12,828,005**	**$13,360,387**	**$241,342,037**	**-**

APPENDIX A

Net Present Value Model Results

Table A–3.1 segments the VBECS-expected scenario cash flows into the value elements proposed in the guide, plus energy cost savings. The net present value of these cash flows are represented in Figures ES1, 1, and 4.

TABLE A-3.1:

VBECS EXPECTED SCENARIO

	YEAR				
	1	**2**	**3**	**4**	**5**
Retrofit Costs	-$15,000,000	-	-	-	-
Dev Costs/Tax	$831,000	-	-	-	-
Energy Cost Savings	$	$570,000	$581,400	$593,028	$604,889
Non Energy Opex	$	$105,400	$105,400	$105,400	$105,400
Tenant Based Revenues	$242,813	$761,257	$926,990	$1,119,993	$1,332,305
Sale Proceeds	-	-	-	-	-
VBECS	**-$13,926,188**	**$1,436,657**	**$1,613,790**	**$1,818,421**	**$2,042,594**

	YEAR					
	6	**7**	**8**	**9**	**10**	**11**
Retrofit Costs	-	-	-	-	-	-
Dev Costs/Tax	-	-	-	-	-	-
Energy Cost Savings	$616,986	$629,326	$641,913	$654,751	$667,846	$681,203
Non Energy Opex	$105,400	$105,400	$105,400	$105,400	$105,400	$105,400
Tenant-Based Revenues	$1,679,819	$1,949,801	$1,988,449	$2,016,067	$2,184,538	$2,514,089
Sale Proceeds	-	-	-	-	**$30,851,816**	-
VBECS	**$2,402,205**	**$2,684,527**	**$2,735,762**	**$2,776,218**	**$33,809,600**	-

APPENDIX B

DEEP RETROFITS & RISK MITIGATION: 27 BEST PRACTICES

DEEP RETROFITS AND RISK MITIGATION: 27 BEST PRACTICES

LAUNCH

1. ENERGY RETROFIT TRIGGERS:

Identify the situations in a building's life cycle that can trigger a deep retrofit analysis, and design a strategic plan accordingly.

2. STAKEHOLDER ENGAGEMENT:

Engage multiple stakeholders (beyond the building owner and service providers) to identify opportunities with broad perspectives.

3. TEAM SELECTION:

Select initial team members with energy retrofit expertise, who can find the full potential value of a retrofit and ensure execution cost should not be the only factor.

4. GOAL-SETTING CHARRETTE:

Determine maximum potential energy performance of the entire building while identifying constraints to shape the project's total potential efficiency savings. Also broaden goals to include qualitative value creators like LEED-related aspects and Energy Star, renewable energy, etc.

5. PERFORMANCE BENCHMARKS:

Benchmark the energy and occupant performance of the building to better design the project, set performance targets, and compare proposed approaches. This before-upgrade view is key to having a reference point to accurately prove improvement.

6. CONTRACTS, INSURANCE, AND LEGAL:

Write contracts that align the team around a shared project vision, properly designating responsibilities and compensating performance. Ensure that legal and insurance strategies are fully sensitive to the special considerations of deep retrofits. Use industry standard best practices like BOMA International's BEPC toolkit (www.boma.org).

7. EVALUATE COST OF DOING NOTHING:

Assess how delaying improvements to your building could raise costs through increased utility bills, erode occupant satisfaction, and exacerbate operational and enterprise risks.

DESIGN

8. INTEGRATIVE DESIGN:

Emphasize integrative design principles to establish team dynamics and working relationships and reveal potential energy savings.

9. REDUCE LOADS AND IMPROVE SHELL, THEN ACCURATELY SIZE EQUIPMENT:

Reduce capital expenditures and minimize future operating costs by first reducing loads, and then installing efficient, optimally sized systems.

10. OCCUPANT AND MANAGER ENGAGEMENT:

Incorporate the occupants and the building manager in the design process, and solicit their input on the design and operation of the retrofitted building.

11. TECHNICAL POTENTIAL ANALYSIS:

Analyze the technical potential of the building—the energy/resource use that would result from implementing all of the most cutting-edge efficiency measures possible, without regard to financial or other restraints.

12. DESIGN OPTIONS ASSESSMENT:

Analyze using energy modeling, life-cycle cost analysis, and preliminary deep retrofit value analysis to find which combination of energy-efficiency measures provides the greatest value to the building's owner and occupants.

13. COST ESTIMATION:

Estimate the gross and net costs of the retrofit. This is critical to determining its financial viability, and is most insightful when compared against a baseline and assessed using bundles of energy efficiency measures. Identifying factors that can undermine energy retrofits (short-term lower utility rates, contractor or equipment underperformance, warm weather, unexpected vacancies, operations staff changes, etc.) provides a complete picture of the potential cost.

14. REGULATION AND CODE COMPLIANCE:

Be aware of potential regulation and code problems stemming from an energy retrofit, and work with local and state officials to mitigate these risks.

15. PROJECT PHASING:

Intelligently phase project over multiple stages and years, depending on efficiency and expected life of existing improvements, leasing situations, and consideration of future technology/economic conditions that might make currently infeasible measures possible.

FINANCE

16. FINANCE OPTIONS ASSESSMENT:

Consider the full array of financial options available as early in the execution process as possible. Compare alternatives considering all terms and conditions including interest rates, financing amount, closing costs and timing, escrow and hold-back requirements, recourse, etc.

17. UTILIZATION OF SUBSIDIES:

Take advantage of all government and utility tax, financial, and entitlement-related subsidies in a cost-effective manner.

18. UNDERWRITING/DUE DILIGENCE SUPPORT:

Underwriters/due diligence analysts for loans and equity investments are busy and unlikely to have access to the knowledge and data necessary to properly assess the risks and value of a deep retrofit investment. Therefore, secure well-supported and argued support for deep retrofit value. This may involve third-party reporting plus expert review similar to what is used in other complex risk situations (appraisal, Phase 1 Environmental Site Assessment, Property Condition Assessment engineering report) or new types of insurance (Energy Savings Warranty).

19. DEEP RETROFIT VALUE REPORT:

Future best practice for all deep retrofit loans and equity investments will require rigorous well-supported assessment of retrofit value and risk.

20. BUSINESS INTERRUPTION STRATEGY:

Carefully consider and plan the construction phase to avoid disruption to tenants and/or employees.

CONSTRUCT

21. CONTRACTOR/SERVICE PROVIDER SELECTION:

Select contractors (ideally early in design) and other service providers with requisite experience in deep energy/sustainability retrofits.

22. CONSTRUCTION MANAGEMENT:

Utilize specialized construction management strategies to intelligently execute deep retrofit construction and sustainability certification.

OPERATE

23. OPERATIONS AND MAINTENANCE PLAN:

Involve maintenance personnel and facilities operators in any building upgrades from the beginning, so they can help form the energy reduction goals, understand them, and be more engaged to help achieve them.

24. COMMISSIONING:

Implement commissioning during the design process, the construction of the retrofit, and on an ongoing basis to ensure systems and equipment were installed and are operating according to design.

25. GREEN LEASING:

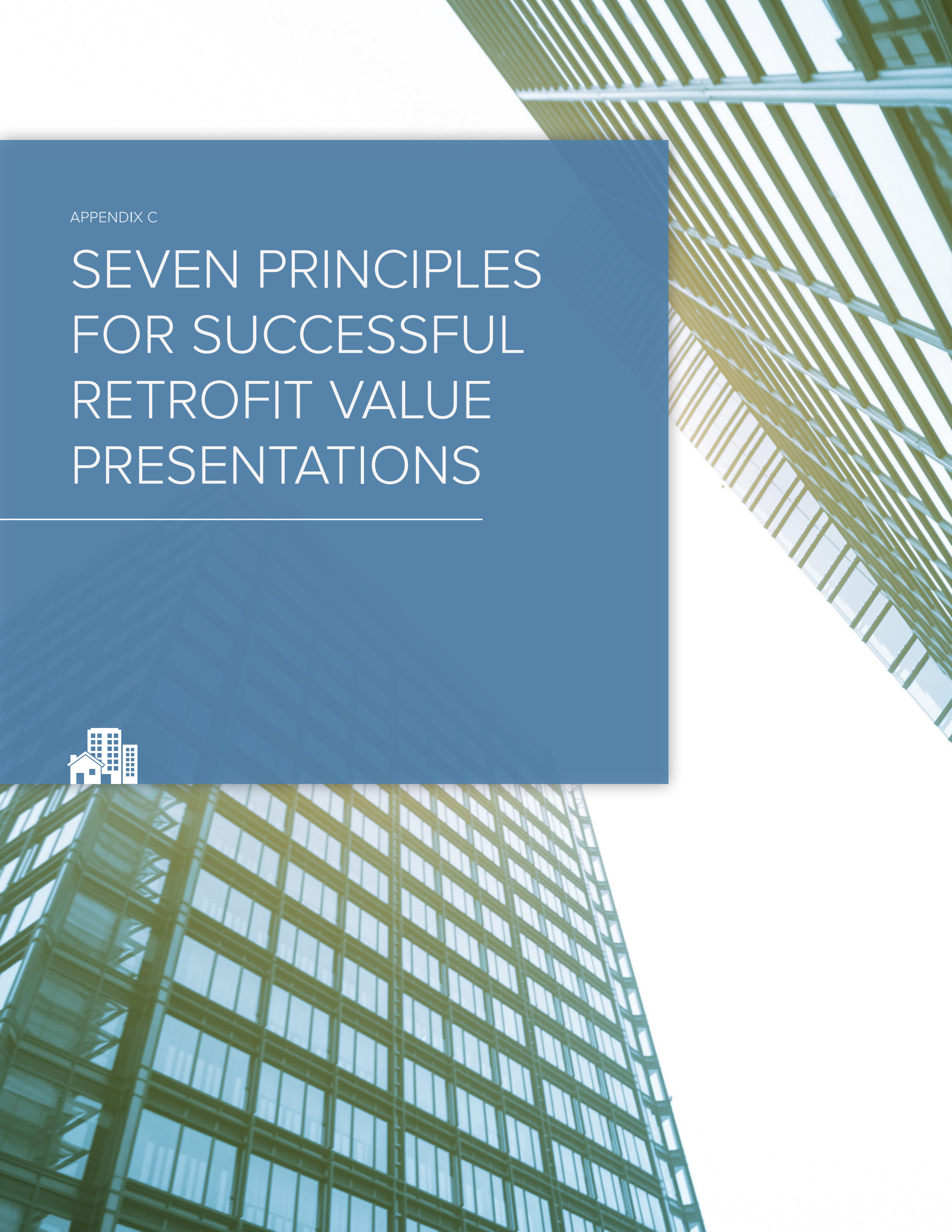
Establish a green lease with tenants to enable the sharing of costs and benefits of an energy efficiency project.[57] If properly managed, this can increase total energy savings. While primarily an investor issue, many owner-occupied buildings have significant amount of sublease space.

26. MEASUREMENT AND VERIFICATION:

Carefully think through measurement and verification (M&V) systems in advance and intelligently present them to ensure the proper quantification and ability to verify project energy savings.

27. STAKEHOLDER COMMUNICATIONS:

Fully inform stakeholders of any potential changes to their spaces during and after design and construction, and educate them about their new energy efficient building.



APPENDIX C

SEVEN PRINCIPLES FOR SUCCESSFUL RETROFIT VALUE PRESENTATIONS

All retrofit value presentations are not created equal. The format, length, and emphasis will vary based on the type of capital investment (equipment or system replacement, minor retrofit, major retrofit, etc.) and the specific energy efficiency and sustainability measures recommended.

However, regardless of the type of retrofit investment, presentations will be more successful if they follow seven basic principles:

1. **Perform Consistently Rigorous Analysis**
2. **Know Your Audience**
3. **Offer Deep Retrofit Value Report as a Supplement**
4. **Focus on Bottom Line Value and Risk Conclusions**
5. **Be Property and Company Specific**
6. **Avoid Double Counting**
7. **Present Risk Context**

These presentation principles are important to understand before starting to research and calculate deep retrofit value. It can be difficult to follow these principles unless they are specifically factored into a research and analysis plan.

1.
PERFORM CONSISTENTLY RIGOROUS ANALYSIS

Retrofit value presentations should follow a structured and logical process consistent with what capital providers are familiar with reviewing prior to allocating capital. Given the high level of subjectivity in interpreting and applying data in real estate valuation and financial analysis, the appraisal and finance industries have relied upon standards, guidelines, structure, and transparency to guide their work. Retrofit value presentations need to follow a similar approach.

2.
KNOW YOUR AUDIENCE

Knowing your audience up front and what action you want them to take after the presentation is one key to success. Multiple audiences (stakeholders) may mean more than one presentation or an approach appropriate for senior decision makers that also provides necessary detail for others. Since retrofits are real estate decisions, it is important to understand the type of analytical models, data, and presentation formats that are currently used for similar investments by property owners and occupants.

3.
OFFER DEEP RETROFIT VALUE REPORT AS A SUPPLEMENT

While different approaches can be successful, RMI's deep retrofit value (DRV) methodology focuses on value beyond energy cost savings (VBECS) and is designed to supplement traditional energy modeling, cost analysis, and life-cycle cost analysis (LCCA). While it may be possible to consider additional value benefits and provide more sophisticated sensitivity analysis within traditional simple ROI, LCCA, or cost-benefit analysis, we think a separate analysis and presentation more easily incorporates into current practices.

While a supplemental DRV report is appropriate for many situations, there are other ways to integrate the information into retrofit decision making that honor existing decision-making approaches. The key is to ensure all relevant value considerations are incorporated while avoiding double counting.

For example, many corporations employ total occupancy cost (TOC) analyses that include all costs incident to the planning, design, execution, and operation of an asset, and are beginning to apply this methodology to sustainability/retrofit decisions. In that case, some of the cost items—like the non-energy operating cost items addressed in the RMI model—would not have to be included, but some of the enterprise cost savings, risk, and other value elements may still need to be added to the TOC analysis.

4.

FOCUS ON BOTTOM LINE FINANCIAL AND RISK CONCLUSIONS

Solving a problem requires a structured approach, including asking questions, collecting data, conducting analyses, accessing findings and conclusions, and presenting recommendations. In most cases, successful presentations are not presented in the same order or way solutions were calculated. This is particularly important for DRV presentations. The decision maker is most interested in the bottom-line value and related risk analyses. These financial, value and risk conclusions should be clearly presented up front, along with key assumptions that drive the conclusions, with appropriate research and analytics provided as support. RMI's deep retrofit value model is based on this principle of capital provider value focus.

5.

BE PROPERTY AND COMPANY SPECIFIC

The successful presentation of retrofit value requires specificity. This principle is why we created separate RMI deep retrofit value models for owner-occupants and for investors. The importance of specificity also includes the evidence of value.

While much value evidence is based on studies, surveys, and analyses of owner-occupants, buildings, or portfolios of buildings, a successful value presentation must adjust and apply the evidence for the specific property and occupant. For example, there is substantial research supporting how deep retrofits (or specific components like HVAC, daylighting, etc.) influence worker productivity or health. The conclusions of these studies are derived from studies of certain types of individuals, companies, property types, and deep retrofit measures. To apply the findings from these studies to a particular deep retrofit situation, it is reasonable and appropriate to conduct a qualitative assessment of the applicability of the studies, making adjustments to research results, or averages of research results, to reflect the specific circumstances of the proposed deep retrofit project.

While it may seem subjective to adjust the results of statistically derived studies and research, this qualitative assessment of quantitative data, and appropriate documentation of analysis, is at the heart of all valuation and due diligence analysis. Even more important, value benefits derived from detailed company- and property-specific analysis carry significant weight and cannot be easily dismissed by retrofit investment decision makers.

6. AVOID DOUBLE COUNTING

Earning and retaining the trust of retrofit capital decision makers is critical to a successful capital request. Unfortunately, it is easy to double count benefits from retrofit projects, and equally easy to fail in a retrofit capital request as a result of such mistakes.

Double or fuzzy counting happens when combining the savings estimates from research on single systems such as lighting, HVAC, data analytics, daylighting, etc. It does not mean such data should not be used, as long as it is fully disclosed and integrated results properly interpreted. Citing or otherwise misusing research studies that are potentially misleading or poorly done can doom a project if a member of the investment committee asks a tough question or knows the research.

RMI's deep retrofit value model endeavors to clearly separate benefits and avoid double counting. For example, we specifically include the cost savings from reduced absenteeism as part of health cost reductions, rather than under employee cost reductions. However, the productivity benefits of improved mental and physical health are calculated and presented under employee costs. While decisions about where to account for benefits/costs might differ, the important point is to only count benefits or costs once.

7. PRESENT RISK CONTEXT

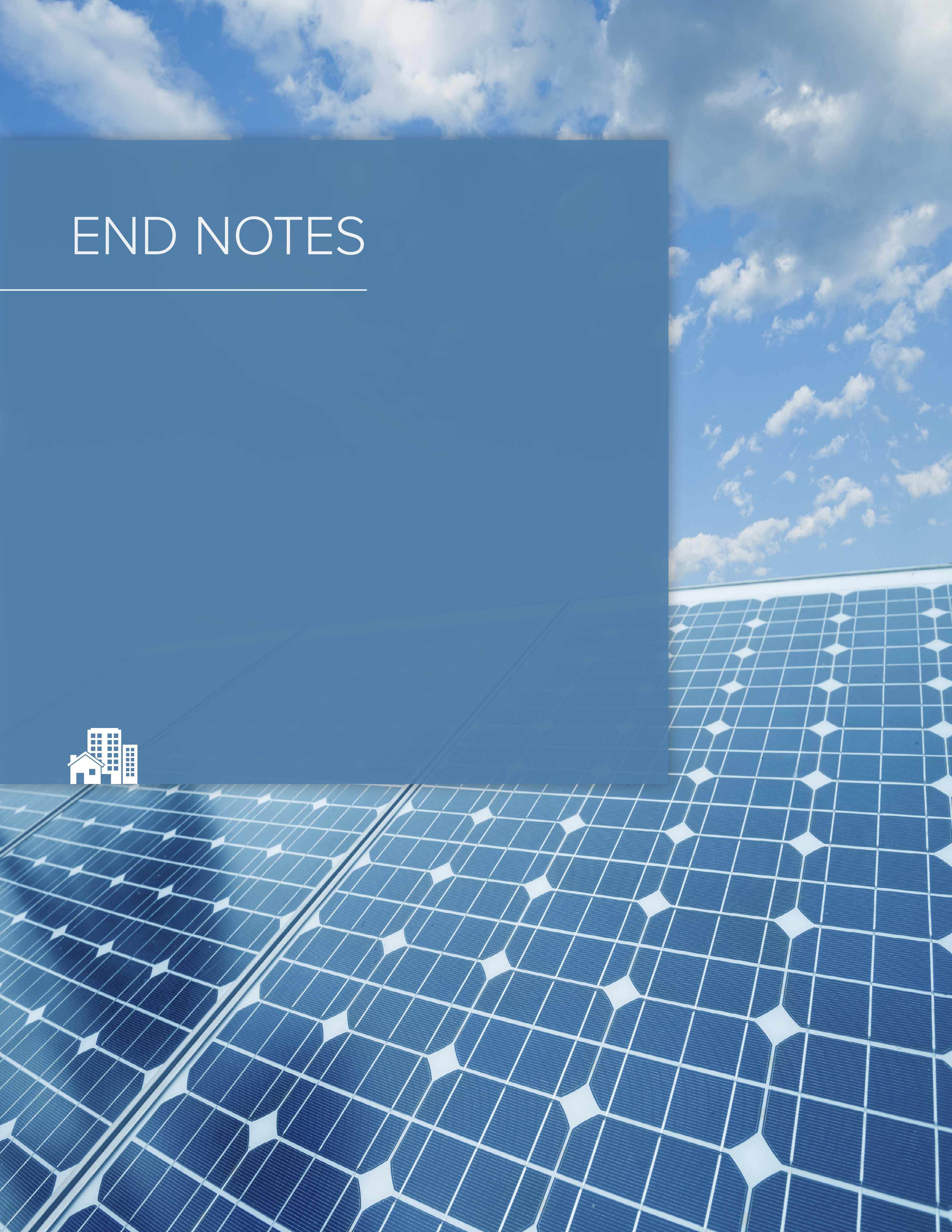
No investment decision should ignore risk. However, many retrofit decisions employing traditional LCCA or simple ROI analyses do not explicitly consider risk (or revenue impacts), but decision makers implicitly factor risk into decisions when they either turn down projects or scale them back through value engineering.[xlii]

Retrofit decisions face significant risks from new products, materials, systems, service providers, contracts, and performance uncertainty. Fortunately, retrofit risk can be managed, and in many cases mitigated, by best practices in retrofit execution and operation (see Appendix B). Retrofit projects can also generate substantial positive risk outcomes. Unfortunately, if risks are not intelligently and comprehensively addressed, capital providers make decisions assuming the maximum level of risk and uncertainty.

LEARN MORE
More information about these processes can be found on the RMI website:
www.rmi.org/retrofit_depot

[xlii] Value engineering is typically employed in the building industry when costs are determined to be too high. Value engineers attempt to cut costs while retaining the functions of the building—thus increasing value. While such an analysis might increase value, it is based on an incomplete definition and assessment of value.

END NOTES



END NOTES

1 "Unlocking the Energy Efficiency Retrofit Investment Opportunity," UNEP-FI Investor Briefing, February 2014.

2 Energy Efficiency Indicators Study, Johnson Controls Institute for Building Efficiency, 2013.

3 Muldavin, Scott. Chapter II: "Sustainable Property Investment Decisions," in *Value Beyond Cost Savings: How to Underwrite Sustainable Properties, 2010.*

4 "Energy Efficiency Toolkit for Corporate Buildings," Version 1, World Business Council for Sustainable Development, April 2014.

5 Nok, Nils, Norman Miller, and Peter Morris. *The Economics of Green Retrofits*. JOSRE Vol. 4, 2012. http://www.josre.org/wp-content/uploads/2013/01/The_Economics_of-Green_Retrofits-JOSRE_v4-11.pdf

6 *A Search for Deep Energy Savings*, Northwest Energy Efficiency Alliance. http://www.newbuildings.org/meta-report-search-deep-energy-savings and the RMI RetroFit Depot, http:// www.rmi.org/retrofit_depot_get_connected_true_retrofit_stories

7 *Advanced Energy Retrofit Guide for Office Buildings*. U.S. Dept. of Energy, October 2011. https://buildingdata.energy.gov/cbrd/resource/19

8 *Empire State Building Case Study*. http://www.rmi.org/Content/Files/ESBOverviewDeck.pdf

9 *Cost Control Strategies for Zero Energy Buildings*, National Renewable Energy Laboratory, September 2014.

10 PACENow. 2014. Largest Commercial PACE Project in the U.S.: The Hilton Los Angeles/Universal City completes $7 million upgrade. <<http://pacenow.org/wp-content/uploads/2014/03/Hilton-Case-Study1.pdf>>

11 Federal Financial Incentives, Maryland Clean Energy Center Website, December 2014.

12 Realcomm Website, April 15, 2012.

13 *Energy Smart Buildings, Demonstrating how information technology can cut energy use and the costs of real estate portfolios*, Accenture, 2011.

14 *The Economics of LEED for Existing Buildings*, Leonardo Academy Inc., April 2008.

15 *Facilities Management: Strategies to Reduce Operating Costs*, Aberdeen Group 2010.

16 Fowler, Kim M. and Emily M. Rauch, Assessing Green Building Performance, A Post-Occupancy Evaluation of Twelve GSA Buildings, Pacific Northwest National Laboratory, July 2008.

17 Mills, Evan, Going Green Reduces Losses, *Reinsurance magazine*, Volume 27, Number 12, p. 24, 1997.

18 Fireman's Fund Insurance Company; Mincer, Jilian. One advantage of cutting energy use: lower insurance premiums. *Wall Street Journal*, December 7, 2009. http://online.wsj.com/article/SB10001424052748703683804574533511285490146.html

19 U.S. General Services Administration, Workspace Utilization and Allocation Benchmark, July 2011. http://www.gsa.gov/graphics/ogp/Workspace_Utilization_Banchmark_July_2012.pdf

20 "The New Deutsche Bank Towers in Frankfurt," http://designalmic.com/the-new-deutsche-bank-towers-in-frankfurt-mario-bellini-architects-gmp-architekten/ and "Green Buildings: An important contribution to climate protection," https://www.db.com/cr/en/concrete-green-buildings.htm

21 2012 Energy Efficiency Indicator, Global Results, Institute for Building Efficiency, Johnson Controls, June 2012.

22 A detailed 74 page list of sustainable property risks (both positive and negative) is presented in Appendix V-C of: *Value Beyond Cost Savings: How to Underwrite Sustainable Properties,* Green Building Finance Consortium, 2010.

23 Holland, C. Deputy Project Director - Technical, International Monetary Fund. Personal Communication.

24 Green Building, Assessing the Risks, Feedback from the Construction Industry, 2009.

25 Understanding Green Due Diligence, What is it and how does it differ from regular investigation, *New York Law Journal*, June 18, 2012.

26 http://www.astm.org/Standards/E2797.htm

27 http://www.evo-world.org/index.php?lang=en

28 http://www.eeperformance.org/

29 See Risk Analysis and Presentation (RAP) for a full discussion of this topic, "Value Beyond Cost Savings: How to Underwrite Sustainable Properties," Expanded Chapter V, pages 79 to 93, Green Building Finance Consortium, 2010.

30 Bates, K. Personal communication.

31 RMI Retrofit Case Studies. Joseph Vance Building. http://www.rmi.org/Content/Files/The_Joseph_Vance_Building_true_stories.pdf

32 See "Three Principles for Applying Sustainable Market Performance Research" for a thorough analysis of the issues involved in interpreting statistical analysis in the application of sustainable real estate property research. *Value Beyond Cost Savings: How to Underwrite Sustainable Properties*, Expanded Chapter IV, pages 118 to 127, Scott Muldavin, 2010.

33 Kok N. and J. Quigley, "Doing Well by Doing Good; Green Office Buildings," *American Economic Review*, 2010.

34 Wiley, J., J. Benefield and K. Johnson. Green Design and the Market for Commercial Office Space. *The Journal of Real Estate Finance and Economics* 41(2): 228–243, 2010.

35 Fuerst and McAllister, Green Noise or Green Value? Measuring the Effects of Environmental Certification on Office Values, *Real Estate Economics*, March 2011.

36 Newell, MacFarlane, & Kok, *Building Better Returns, A Study of the Performance of Green Office Buildings in Australia*, September 2011.

37 Do Green Buildings Make Dollars & Sense, Green Building Study 3.0, presentation of results, Fall 2011.

38 "A Path to Achieving Higher Building Performance," Siemens and McGraw Hill Construction, 2012.

39 Chegut, A and N. Kok, "Supply, Demand, and the Value of Green Buildings," *Urban Studies*, January 22, 2013.

40 Kok, Miller and Morris, "The Economics of Green Retrofits," *Journal of Sustainable Real Estate*, 2012.

END NOTES (CONT.)

[41] *What Office Tenants Want*, Building Owners and Managers Association International, 2013.

[42] *U.S. Investor Survey*, The Ownership View of Sustainable Real Estate, November 2013.

[43] *A New ERA of Sustainability*, UN Global Compact, Accenture CEO study, UN Global Compact and Accenture, 2010.

[44] 2014 Global Survey, Strategic Worth of Sustainability, McKinsey, 2014.

[45] Eichholtz Piet, Nils Kok, and John Quigley, "Why Do Companies Rent Green? Real Property and Corporate Social Responsibility," June 4, 2009.

[46] Sustainability and Commercial Property Valuation, Second Edition, October 2013.

[47] *How to Calculate and Present Deep Retrofit Value for Owner Occupants*, Rocky Mountain Institute, January 2014. This publication identifies the specific retrofit measures and outcomes that drive the demand by tenants (occupants) for deep retrofits/ sustainable properties and presents a methodology for calculating the value of such outcomes around 9 value elements.

[48] A detailed assessment of the performance and risk characteristics for 13 of the most important sustainability features and measures is presented in: *Value Beyond Cost Savings: How to Underwrite Sustainable Properties*, Scott Muldavin, Green Building Finance Consortium, Expanded Chapter IV, pages 7 to 78, 2010.

[49] Energy Smart Buildings: Demonstrating How Information Technology Can Cut Energy Use and Costs of Real Estate Portfolios, Accenture, 2011.

[50] FM Link, "Benchmarking Your Internal Move Costs (churn)" http://www.fmlink.com/article.cgi?type=Benchmarking&title=Benchmarking%20your%20internal%20move%20costs%20%28churn%29&pub=Facility%20Issues&id=40523&mode=source

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

[52] "Sustainability Nears a Tipping Point," MIT and Boston Consulting Group, *MIT Sloan Management Review*, Winter 2012.

[53] "Unlocking the Energy Efficiency Retrofit Investment Opportunity," UNEP-FI Investor Briefing, February 2014.

[54] Newell, MacFarlane, and Kok, Building Better Returns, *A Study of the Performance of Green Office Buildings in Australia*, September 2011.

[55] Kok, Miller and Morris, "The Economics of Green Retrofits," *Journal of Sustainable Real Estate*, 2012.

[56] "Green Building Adoption Index," CBRE, June 2014.

[57] "Working Together for Sustainability: The RMI-BOMA Guide for Landlords and Tenants," Rocky Mountain Institute, Building Owners and Managers Association, 2012.


ROCKY MOUNTAIN
INSTITUTE