THE ENERGY CHALLENGE:
A NEW AGENDA FOR CORPORATE REAL ESTATE

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ABSTRACT

During the summer of 2006, Rocky Mountain Institute (RMI) partnered with CoreNet Global to assess the current state of energy efficiency in corporate real estate and set the agenda to encourage more robust adoption of energy efficiency in corporate real estate. The intended product of this partnership was a report combining results from a survey of corporate real estate professionals and a series of case studies detailing how leading companies were addressing energy efficiency in their building stock. As part of the RMI team during this period and continuing through 2006 and 2007, I worked on the project team and was responsible for designing and analyzing a survey of corporate real estate professionals.

The survey detailed in this report focuses on capturing the drivers of energy efficiency, the status of energy management, the energy efficiency practices taken throughout the real estate life cycle, and the barriers and enablers to incorporating energy efficiency in corporate real estate. Following the survey design, CoreNet Global sent the survey to its members, which include corporate real estate professionals serving a variety of functions throughout the real estate supply chain.

The survey results paint a picture of slow adoption of energy efficiency in corporate real estate despite plentiful opportunities for profitable investment. Nevertheless, the results also provide signs of hope that concerns about sustainability and energy costs will spur a new era of investment in energy-efficient buildings.

Companies looking to improve the energy efficiency of their building stock can embark on two paths. First, companies can choose to make a significant investment and create a comprehensive energy management system. Such a system typically includes an energy policy, quantitative and qualitative energy targets, information systems to track and communicate energy data, leadership responsibility for energy, and employee compensation linked to energy targets. Companies like Toyota and ABN AMRO have chosen to create comprehensive energy management systems.

Second, for companies unwilling or unable to make a substantial investment in energy management, low cost actions exist that will improve energy efficiency and ready the company for developing a more comprehensive system in the future. These actions include opening up lines of communication with business and functional units and facilities management about energy efficiency; inserting energy efficiency requirements into real estate programming; launching low-cost/no-cost energy efficiency measures; and cataloguing the results from all energy efficiency projects.

Given the wide array of options for incorporating energy efficiency, can the majority of the corporate real estate industry continue to sidestep incorporating energy efficiency? The evidence presented in this report suggest that the industry cannot and will not systematically overlook energy efficiency in the future.
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Introduction

The business climate is changing, and the evidence is everywhere. Concerns about corporate environmental performance and sustainability have become mainstream. Examples are ubiquitous and range from General Electric embarking on its Ecomagination effort to Interface dramatically changing its vision to embrace sustainability. Increasingly important in the context of corporate sustainability is a company’s energy footprint and its contribution to climate change.

For many companies, a major component of their energy footprint is the energy required to operate company buildings. Consequently, there is a renewed level of interest in methods that can improve the energy efficiency in company buildings. Many scholars have discussed the wide array of energy efficiency opportunities that exist. These opportunities range from designing buildings to use energy more efficiently to retrofitting existing buildings with energy-efficient technologies. Technologies range from concepts that can be implemented individually for minimal energy savings (e.g., energy star appliances) to more integrated design techniques that produce significant energy savings. For instance, by incorporating energy efficiency into new construction, energy savings that exceed 50 percent are possible. These types of gains occur when energy efficiency is integrated throughout the entire building design. For example, by optimizing daylighting in a building, the need for electric lighting is reduced. By reducing the need for electric lighting, a reduction occurs in the amount of heat gain that a space experiences due to the heat produced by electric lights--thus reducing cooling loads in a building. These types of design cascades commonly occur in buildings that utilize integrated design and consider energy efficiency at the outset of design.

In 1992, Amory Lovins, Chief Scientist at Rocky Mountain Institute (RMI), put some parameters around the typical energy reductions that could be expected by incorporating energy efficiency measures.1 “Well over half of the energy used to cool and ventilate buildings in countries like the United States (U.S.) can be saved by improvements that typically repay their cost within a few

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years. Previous analyses have found comparable potential savings in lighting, drivepower, office equipment and other end-uses.”

One would expect that profit-driven companies would move to quickly exploit these opportunities; however, despite general agreement that widespread savings are available from incorporating energy efficiency, very few companies have taken advantage of opportunities to incorporate energy efficiency into their building stock. The failure to incorporate energy efficiency measures has piqued the interest of scholars who have proposed a series of barriers that slow or prevent the incorporation of energy efficiency.

A brief discussion of these barriers follows. For a more comprehensive list of barriers to incorporating energy efficiency, see Appendix 3.

→ Investment Bias for Core Business – Although profitable energy efficiency investments are widespread, companies prefer allocating money to their core businesses.²

→ First Cost Myth – Companies believe that incorporating energy efficiency always leads to higher first costs. These companies fail to recognize that through integrated design it is possible to incorporate energy efficiency and actually reduce first costs.³

→ Failure to Incorporate Life Cycle Cost Analysis – Although it is possible that first costs may actually be reduced by incorporating energy efficiency; in many instances first costs may rise. However, only analyzing first costs fails to recognize that energy efficiency typically reduces the life cycle costs of a building. Most companies do not conduct a life cycle cost analysis when analyzing energy efficiency investments, but instead only focus on first costs; thus concealing energy efficiency investments with positive net present value.³

→ Misaligned Incentives – The structure of relationships among development, design, and construction professionals results in misaligned incentives that impede the incorporation

of energy efficiency. For instance, percentage of cost contracts with designers leads to designers specifying oversized mechanical systems, which requires additional energy to operate.⁴

→ **Added Risk** – Real estate professionals do not see the value added through energy efficiency and view the incorporation of these technologies as costly because of the added uncertainty in a building that incorporates new technology. The added uncertainty may result in higher interest rates for debt and higher required returns from equity holders.⁵

The barriers described above and discussed in Appendix 3 are certainly not insurmountable, but are often enough to squash solid energy efficiency projects. In an effort to learn more about barriers to energy efficiency and potential enablers to overcome these barriers, CoreNet Global⁶, an association of corporate real estate professionals, partnered with RMI in 2006. The partnership was established to develop a comprehensive report on the current incorporation of energy efficiency in corporate real estate, determine how leading companies were addressing this issue, and set the agenda for incorporating energy efficiency in corporate real estate.

As a member of RMI’s Built Environment Team, I worked extensively on the production of the report. I was specifically tasked with developing a survey to assess the current state of energy efficiency in corporate real estate and analyzing the survey results. The report that follows catalogues the objectives of my portion of the CoreNet Global study, the underlying methodology guiding my research and analyses, the survey results, and concluding remarks on the overall state of the market as well as recommendations for improving energy efficiency in corporate real estate.

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⁶ CoreNet Global provides leading-edge research on topics ranging from sustainability to workplace design to technology utilization in the workplace. For more information on CoreNet Global, see www.corenetglobal.org.
Study Objectives
The objective of this project is to assess attitudes and actions on energy efficiency in corporate real estate from participants across the real estate supply chain. For purposes of this survey, the real estate supply chain is composed of corporate real estate managers, corporate real estate executives, corporate facilities managers, designers/architects/engineers, developers, landlords/building managers, investors/owners (non-occupant), portfolio managers, real estate business development/sales, transaction services/leasing, and contractors/construction. The project will focus on gathering data to assess the following topics:

- Drivers of energy efficiency;
- Current state of energy management;
- Energy efficiency practices taken throughout the real estate life cycle;
- Barriers and enablers to energy efficiency.

Methodology
Initially outlined in the contract between CoreNet Global and Rocky Mountain Institute (RMI), the project required RMI to produce a survey that meets client objectives outlined in the contract and provide analysis of survey results. Given the report’s intended focus on providing information on recommendations to corporate real estate professionals, an abridged description of the survey methodology is provided below. For a more comprehensive description of the survey process and methods, see Appendix 2.

Survey Design
The survey was designed to collect information from each member of the real estate supply chain using an online survey format developed by Zoomerang. Given that each member of the supply chain approached real estate from a different perspective, the survey was split into seven different versions. A filtering question placed a respondent in the appropriate survey version based on the respondent’s identified function in the real estate supply chain (e.g., portfolio management, facilities management, etc.). Despite the use of different versions, a number of questions were kept consistent across all versions to facilitate comparisons by function. In addition, most survey versions received a set of custom questions applicable only to a version’s respondents.
SURVEY SAMPLE & IMPLEMENTATION
CoreNet Global administered the survey using a one-time email blast that included a web link to the survey. The email blast was sent to the following groups that form the survey’s sample:

★ 240 experts registered in CoreNet Global’s Expert Survey Program, which is a list of senior real estate leaders chosen based on their involvement in activities that require a high level of knowledge about corporate real estate;

★ a random sample of 3,500 CoreNet Global members;

★ 400 corporate members of the Building Owners and Managers Association (BOMA).

In addition to the sample described above, CoreNet Global also provided an option to members of the sample to enable them to forward the survey link to colleagues. Members of an Advisory Panel established for the project were also asked multiple times to forward the survey link to colleagues.

Survey Results: State of the Market and Trends on Energy Use in Corporate Real Estate
In order to assess the current state of the market and to identify trends regarding energy efficiency in corporate real estate, CoreNet Global collaborated with Rocky Mountain Institute to develop an online survey presented to respondents across the real estate supply chain. The results of this research are presented below.

It is important to note that the survey does not represent the corporate sector or real estate supply chain as a whole; this was never the intention of the survey. The views presented here reflect only the range of current practices and opinions received. Suggestions as to where the balance of opinion lay within the respondent group are provided solely for information and to stimulate debate; they should not be interpreted as definitive findings or as in any way representative of a wider body of opinion.

Following a brief description of the pool of respondents that took the survey; the report is struc-
tured into a number of distinct sections broadly reflecting the strategic importance of energy efficiency, drivers of energy efficiency, current energy management practices, the incorporation of energy efficiency in each stage of the real estate life cycle, and barriers and enablers to incorporating energy efficiency.

**Respondent Profile**
This section summarizes the composition of the survey respondents.

**Strategic Importance of Energy Efficiency**
This section describes the importance that corporate real estate executives are attaching to sustainability and energy efficiency over the next ten years.

**Drivers of Energy Efficiency**
This section describes what respondents believe are the current and future drivers of energy efficiency. Developments in the U.S. and globally that affect each driver will be discussed in the context of their effects on corporate real estate.

**State of Facilities Energy Management**
In this section, respondents provide opinions on which energy management elements they believe are most important and which elements their company’s currently employ.

**Energy Efficiency throughout the Real Estate Life Cycle**
This section describes how respondents are approaching energy efficiency in each segment of the life cycle: programming/requirements; design/engineering; acquisitions/leasing; operations/facilities management; retrofit; and valuation.

**Barriers to Incorporating Energy Efficiency**
Common barriers exist that limit the incorporation of energy efficiency. This section will elaborate on the barriers that respondents believe are most significant in limiting the incorporation of energy efficiency.

**Enablers to Incorporating Energy Efficiency**
Many strategies exist to overcome barriers to energy efficiency. This section will outline effective enablers identified by the respondents.
RESPONDENT PROFILE

The survey was designed to provide a customized set of questions for seven different members of the supply chain. Table 1 shows the number of responses as well as the percentage of total responses received from each functional category. Given the strong representation of corporate real estate executives and facilities managers in the sample, it is not surprising that just under half of the total responses received are from these two categories. Moreover, contractors, designers, and developers are weakly represented in CoreNet Global’s membership base. Consequently these functions represented only 27 percent of total responses. The analysis that follows provides little information on the perspective of contractors because there were too few responses to produce an adequate analysis.

Table 1: Respondent Profile by Function.

<table>
<thead>
<tr>
<th>CRE Exec.</th>
<th>CRE MGMT.</th>
<th>FACILITIES MGMT.</th>
<th>DESIGN / ARCHITECT / ENGINEER</th>
<th>CONTRACTOR</th>
<th>REAL ESTATE SERVICE PROVIDER</th>
<th>DEVELOPER / LANDLORD / INVESTOR / OWNER (NON-OCCUPANT)</th>
</tr>
</thead>
<tbody>
<tr>
<td>48 responses</td>
<td>27 responses</td>
<td>64 responses</td>
<td>32 responses</td>
<td>8 responses</td>
<td>39 responses</td>
<td>26 responses</td>
</tr>
<tr>
<td>20%</td>
<td>11%</td>
<td>26%</td>
<td>13%</td>
<td>3%</td>
<td>16%</td>
<td>11%</td>
</tr>
</tbody>
</table>

The two major components of the sample, BOMA and CoreNet Global members, are employees at public, private, government, institutional, and educational organizations. Moreover, this group of individuals is distributed globally. As displayed in Figures 1 and 2, the majority of respondents is from the U.S. and is employed within a public company. However, 18 percent of respondents are stationed overseas and 27 percent of respondents work for a private company. The unknown category represents the group of respondents who did not supply their organization or their phone number.
S T R A T E G I C I M P O R T A N C E O F E N E R G Y E F F I C I E N C Y

Over the next ten years, corporate real estate professionals will see the emergence of a suite of new high-priority issues. CoreNet Global has attempted to define what these issues may be and how corporate real estate professionals can respond to them in its series of CoRE 2010 research reports. One of the issues covered under the CoRE 2010 research agenda includes sustainability and corporate social responsibility.

As part of the survey for this project, corporate real estate executives were asked to rate the importance of energy efficiency and sustainability relative to other initiatives impacting corporate real estate during the next ten years. Approximately 83 percent of executives ranked sustainability as important to most important and 94 percent of executives ranked energy efficiency as important to most important relative to other issues impacting real estate over the next ten years. Moreover, over the next five years, 75 percent of executives believed that money allocated to energy efficiency in the capital budget would increase, and 66 percent of executives believed that money allocated to energy efficiency in the operating budget would increase.
These results indicate that sustainability and energy efficiency are at or near the top of the agenda for corporate real estate executives. However, evidence gathered as part of this report and discussed in the following sections suggests that many companies have taken little action on these issues. Significant opportunities exist to address issues of energy use and sustainability profitably. The survey results discussed below begin to address some of these opportunities, and the mini case studies included in this report provide examples of how leaders in energy efficiency and sustainability are exploiting these opportunities.

**Drivers of Energy Efficiency**

Respondents were asked the current importance of a series of drivers of energy efficiency and their importance by 2015. As Figure 3 demonstrates, on average, no driver is currently considered unimportant, and the importance of all drivers grew by 2015. Respondents generally agree that energy costs and sustainability concerns are the primary drivers of energy efficiency within their companies, both currently and by 2015. Sustainability concerns, government regulation, and shareholder pressure showed the largest gains from the driver’s current importance to its importance by 2015.

*Figure 3: Average Importance of Drivers of Energy Efficiency*

![Bar chart showing the average importance of drivers of energy efficiency current and by 2015.](chart)

*Figure 3 provides the average rank of importance respondents attached to each driver of energy efficiency. Respondents ranked each driver’s current importance and its importance by 2015 from 1 (very unimportant) to 7 (very important).*

The Energy Challenge: A new agenda for corporate real estate
Shareholder Pressure
Respondents reported that shareholder pressure is not currently a major driver of energy efficiency. While it is believed that the importance of shareholder pressure will grow significantly, it is still believed that it will be the least important driver of energy efficiency in the future.

This result is not surprising because shareholders have not historically targeted the energy efficiency of a company’s office space; however, as shareholders become more active on climate change issues, this may change.

Shareholders can exert pressure on a company, a process often referred to as shareholder activism, in many different forms including proposing shareholder resolutions, voting on shareholder resolutions and/or for the board of directors, requesting corporate performance data, actively engaging in dialogue with a company’s management, and divesting. Shareholder activism has occurred for decades, and, more specifically, shareholders have found that the shareholder resolution is a unique and powerful tool that can be used to advocate that a corporation consider certain social or environmental issues. Recently many investors have begun using their ability to write and vote on shareholder resolutions to affect how companies manage their social and environmental performance. Under this umbrella, the issue of energy use and climate change has garnered significant attention from shareholders submitting resolutions.

In the 2006 proxy season, shareholders submitted 32 resolutions to U.S. companies concerning climate change. Most of these resolutions demanded action by oil and gas, energy, and home building companies; however, several resolutions asked retail companies to report on energy efficiency performance. For instance, Whole Foods was asked to, “assess its response to rising regulatory, competitive, and public pressure to increase energy efficiency and report to share-
holders (at reasonable cost and omitting proprietary information) by July 1, 2007.”

Moreover, Boston Properties, a Real Estate Investment Trust (REIT) that manages a large portfolio of office properties, was asked to provide similar information to its shareholders in its recent proxy statement. Even when resolutions such as those described above garner a majority vote, a situation which is very rare for resolutions concerning sustainability issues, companies are not required to take the action(s) specified in the resolution. Nevertheless many companies do take the actions specified in a resolution. The power of the shareholder resolution may put increasing pressure on companies to assess and improve energy efficiency. Some companies are already responding to the pressure. Costco Wholesale and Starwood Hotels and Resorts both recently agreed to “disclose their strategies and performance on energy efficiency and climate change-related topics.”

Government Incentives
Respondents placed little relative importance for driving energy efficiency on government incentives.

In the U.S., financial incentives (e.g., rebates, grants, and low interest loans) exist at the state and federal levels and are also offered by local utilities. This patchwork of incentives leads many to assume the time involved in finding applicable incentives, implementing projects, and applying for incentives overrides the financial benefits derived from receiving the incentives. However, tools exist to simplify the process. In the U.S., all federal, state, and local utility financial incentive programs can be found on the website of the Database for State Incentives for Renewable Energy (DSIRE), www.dsireusa.org.

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Government Regulation
Respondents placed moderate importance on government regulation as a driver of energy efficiency. Additionally, respondents foresaw the growing importance of regulation in the future, but still attached relatively little importance to regulation.

For many companies waiting to take action on climate change, this view may not be consistent with current and future political realities. National, regional, and local governments around the world are taking steps to mitigate climate change. Buildings use a significant amount of energy and may be responsible for a large portion of a region’s total carbon emissions. Figure 4 shows that in the U.S., according to data from the U.S. Energy Information Administration (U.S. EIA), commercial and residential buildings are responsible for more carbon emissions than either industrial operations or transportation.\textsuperscript{12}

\begin{figure}[h!]
\centering
\includegraphics[width=\textwidth]{figure4.png}
\caption{Figure 4: Carbon Emissions by Sector in the U.S.}
\end{figure}

In Europe, governments are engaged in complying with the Kyoto Protocol, which has created binding reduction targets of between 5 and 8 percent below 1990 emissions levels. The European community is also considering more aggressive targets for the period after the period covered by the Kyoto Protocol.

In the U.S., a bill that would have created a carbon emissions cap, the McCain-Lieberman Climate Stewardship Act, failed to garner the majority required for passage in the Senate. However, with a new Democratic majority in Congress and uncertainty over who will win the 2008 Presidency, carbon regulation may not be far away.

At the local level, the city of London is leading a collective charge to fight climate change. In 2005, the Mayor of London organized C20: The World Cities Leadership Climate Change Summit,¹³ which brought together mayors from 20 of the world’s largest cities to discuss best practices and set an agenda for future collaboration on climate change mitigation. The summit prompted the formation of the Large Cities Climate Leadership Group (LCCLG) to further col-

¹³ For more information on the World Cities Leadership Climate Change Summit, see www.london.gov.uk/mayor/environment/climate-summit/docs/climate-summit-agenda.pdf.
laboration between large cities. The LCCLG has also partnered with former U.S. President William Jefferson Clinton’s Clinton Climate Initiative.

London, like a growing number of cities, has set ambitious targets to reduce its carbon footprint (see Table 2 – City Emissions Targets). London’s energy strategy calls for a 20 percent reduction in carbon dioxide emissions by 2010 from a 1990 baseline, and a 60 percent reduction by 2050. The majority of the city’s emissions, approximately 70 percent, are a consequence of heating, cooling, and powering the city’s immense building stock. Consequently, London is focusing its strategy on energy efficiency improvements in buildings while also developing a cleaner, more efficient, and decentralized utility grid.

Table 2: Carbon Emissions Targets by City

<table>
<thead>
<tr>
<th>City</th>
<th>Emissions Target</th>
</tr>
</thead>
<tbody>
<tr>
<td>San Francisco, U.S.</td>
<td>Reduce GHG emissions by 20% below 1990 levels by 2012</td>
</tr>
<tr>
<td>Seattle, U.S.</td>
<td>7% reduction in GHG emissions on 1990 levels by 2010</td>
</tr>
<tr>
<td>Mexico City, Mexico</td>
<td>4% reduction in emissions by 2005, average 1998 - 2001 baseline</td>
</tr>
<tr>
<td>Chicago, U.S.</td>
<td>4% reduction in emissions by 2006, average 1998 - 2001 baseline</td>
</tr>
<tr>
<td>Toronto, Canada</td>
<td>20% GHG reduction by 2015 on 1990 levels</td>
</tr>
<tr>
<td>New York City, U.S.</td>
<td>Reduce CO2 levels 20% below a 1995 baseline by 2010</td>
</tr>
<tr>
<td>London, England</td>
<td>Reduce CO2 emissions by 20% by 2010 on 1990 levels</td>
</tr>
<tr>
<td>Barcelona, Spain</td>
<td>Reduce GHG emissions 20% between 2002 - 2012</td>
</tr>
<tr>
<td>Berlin, German</td>
<td>Reduce GHG emissions 25% by 2010 on 1990 levels</td>
</tr>
<tr>
<td>Cape Town, South Africa</td>
<td>Reduce CO2 emissions 10% by 2010</td>
</tr>
<tr>
<td>Beijing, China</td>
<td>Reduce total coal consumption in the city to less than 15.2 million tonnes by 2007, from over 26.4 million tonnes in 2001</td>
</tr>
<tr>
<td>Tokyo, Japan</td>
<td>Reduce GHG emissions below 1992 levels by 2010</td>
</tr>
<tr>
<td>Melbourne, Australia</td>
<td>20% reduction in corporate GHG emissions by 2010 on 1996 levels</td>
</tr>
</tbody>
</table>

14 For more information on London’s Climate program, see www.lcca.co.uk.
Many U.S. and European cities that attempt to reduce their carbon footprint will face similar challenges. As economies have shifted from an industrial to a service base and early action on carbon reductions have fallen on the shoulders of the transportation and industrial sectors, the building stock will likely become a primary target for reductions in the future.

**Reputational Value**

Respondents viewed reputational value as a moderately important driver of energy efficiency, and saw relatively little growth in its importance by 2015.

Reputational value is important to the overall success of an organization. Dr. Arlo Brady, a researcher at Cambridge University’s Judge Institute of Management, articulates the value of corporate reputation, “…reputation is a resource, albeit intangible, leading to competitive advantage.” Dr. Brady believes reputational value is composed of seven different elements, and he notes that companies will compete for reputational value in each of the following elements: (1) knowledge and skills; (2) emotional connections; (3) leadership, vision, and desire; (4) quality; (5) financial credibility; (6) social credibility; and (7) environmental credibility.

Charles Fombrun, the Executive Director of Reputation Institute and Professor Emeritus of New York University’s Stern School of Business, holds sentiments similar to Brady’s. Fombrun notes that, “Company survival and profitability depend on the ability to attract support from four holders of resources: employees, customers, investors, and communities. Having a good reputation among these resource providers is therefore crucial if a company is to build and sustain a competitive advantage.” Fombrun discusses five principles to reputation management, one of which is company identity. A company’s building stock is an important physical symbol of the values that a company represents and it can affect corporate identity.

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Martha O’Mara, author of *Strategy and Place: Managing Corporate Real Estate and Facilities for Competitive Advantage*, elaborates on the link between real estate and corporate identity, “…real estate and facilities are not just simple logistical tools, although that remains a critical role. They also greatly affect behavior and attitudes both within and outside the organization’s boundaries.” Consequently, incorporating energy efficiency within a company’s building stock may play an important role in establishing the “environmental credibility” that Brady refers to and legitimizing an environmentally friendly identity—thus creating more value than just operating cost savings.

**Aging Infrastructure**

Aging infrastructure is ranked as a moderately important driver of energy efficiency. Respondents believe that its importance will grow in the future; however, it is still not considered to be a “very important” driver of energy efficiency.

Aging infrastructure affords an opportunity to incorporate energy efficiency into a company’s replacement cycle decisions. Moreover, by taking advantage of integrated design solutions, the coordination of equipment replacement decisions can create significant cost savings (e.g., replacing the HVAC system and upgrading lighting at the same time). Developing corporate policies that require consideration of energy efficiency in purchasing decisions can stimulate ongoing efficiency improvements and help incorporate energy efficiency and sustainability into regular business practices.

For example, JohnsonDiversey addresses aging infrastructure from two directions. First, JohnsonDiversey utilizes preventative maintenance programs to extend the useful life and efficiency of equipment. This practice creates a roadmap for replacement cycle decisions and upgrades. Second, the company reviews the available incentives from the state of Wisconsin and consults with the local utility and its energy consultants to change the way it looks at what have historically

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cally been considered simple replacements to consider energy efficiency upgrades (e.g., cooling tower).

**Sustainability Concerns**
At present respondents believe that sustainability is a moderately important driver of energy efficiency. Respondents also believe that by 2015 sustainability will be elevated to a very important driver of energy efficiency. On average, sustainability experienced the largest rise in importance between the present and the future of any drivers the respondents were asked about.

Although defined in a variety of ways, in a corporate context, sustainability most commonly refers to the triple bottom line—social, environmental, and economic performance. As corporate stakeholders continue to push companies on their social and environmental performance, sustainability is becoming an issue that must be dealt with at all levels of the company, including in terms of corporate real estate.

A company’s building stock is one of its most visible assets, and the failure to incorporate sustainability into the design and operation of a company’s buildings may form a clear signal to stakeholders that sustainability is not being implemented. Additionally, stakeholders are demanding increased transparency on sustainability issues, and this may include reporting on policies, strategies, and outcomes in managing a company’s building stock.

For a more thorough discussion on the impact of sustainability on corporate real estate, see the CoreNet Global report, Corporate Real Estate 2010 – Sustainability and Corporate Social Responsibility.

**Energy Costs**
Respondents cite energy costs as the most important driver of energy efficiency, both currently and in the future.

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20 For Corporate Real Estate 2010 – Sustainability and Corporate Social Responsibility, see www2.corenetglobal.org/learning/core2010/index.vsp.
The U.S. Energy Information Administration (EIA) projects that total commercial energy demand in Organisation for Economic Co-operation and Development (OECD) countries will grow by 1.1 percent per year from 2003 to 2030 and electricity demand is expected to grow by 1.8 percent per year. In non-OECD countries, total energy consumption is projected to double by 2030, growing at an annual rate of 3.2 percent, and electricity demand is estimated to grow by 4.3 percent annually. In order to meet increasing demand without incorporating significant demand side efficiency measures, increases in generating capacity will be required.

If additional climate change regulations are passed, the premium placed on carbon will lead to higher energy prices, which may be further exacerbated if demand continues to rise. In an analysis performed by the U.S. EIA in 2003, commercial electricity expenditures in the U.S. were projected to be 25 percent more, or $46 billion more, by 2025 if the McCain-Lieberman Climate Stewardship Act was passed into law. In a more recent analysis performed in January 2007, the EIA forecasts that under an even less stringent climate change law that would only attempt to reduce carbon intensity, U.S. commercial sector electricity users would be spending $6 billion more by 2020.

**Will Drivers Go Away?**
The drivers presented to survey respondents, although not an exhaustive list, represent many of the reasons companies are beginning to act to mitigate climate change and improve energy efficiency in their buildings. From a strategic perspective, a company must ask itself if the evidence suggests that any or all of these drivers will disappear or abate in the future. The answer to this question may shape a company’s approach to energy management and the urgency of actions taken to address climate change and energy use within a company’s building stock.

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STATE OF FACILITIES ENERGY MANAGEMENT

Internal Support for Energy Efficiency
Prior to embarking on the development of an effective energy management program or the implementation of major energy efficiency measures, it is important to assess the internal support for such measures within a company. As Table 3 demonstrates, respondents, including corporate real estate managers and facilities managers, indicated that most functions within their companies are supportive of energy efficiency. Although real estate and facilities management functions tended to be ranked most supportive, finance and C-Level (i.e., CEO, CFO, COO, etc.) functions are not far behind. The business-unit leadership and board of directors were most often considered neutral or unsupportive of energy efficiency.

These results indicate a significant amount of support in many companies for improved energy efficiency. Additionally, between 14 and 38 percent of respondents for each internal function assessed support for energy efficiency as moderate or neutral (rating of 4 or 5). This suggests that in many companies there is a significant opportunity for corporate real estate professionals who are knowledgeable about energy issues to shift internal support so that it is more favorable toward energy efficiency—helping to set their organization’s energy efficiency agenda.

Table 3: Percentage of Internal Functions Supporting Energy Efficiency

<table>
<thead>
<tr>
<th>FUNCTION</th>
<th>% 6 OR 7 (VERY SUPPORTIVE)</th>
<th>% 1-4 (NEUTRAL OR UNSUPPORTIVE)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Facilities Management Leadership</td>
<td>85%</td>
<td>5%</td>
</tr>
<tr>
<td>Corporate Real Estate Leadership</td>
<td>74%</td>
<td>6%</td>
</tr>
<tr>
<td>Finance Leadership</td>
<td>59%</td>
<td>12%</td>
</tr>
<tr>
<td>C-Level Officers</td>
<td>58%</td>
<td>12%</td>
</tr>
<tr>
<td>Business-unit Leadership</td>
<td>48%</td>
<td>22%</td>
</tr>
<tr>
<td>Board of Directors</td>
<td>40%</td>
<td>27%</td>
</tr>
</tbody>
</table>

For each internal function, Table 3 compares the percentage of respondents that ranked the level of support for energy efficiency within their companies as very supportive (6 or 7) to the percentage that ranked it as neutral or unsupportive (1-4). Respondents ranked the level of support of each internal function from 1 (very unsupportive) to 7 (very supportive).
Elements of Successful Energy Management Programs
As is evident from RMI’s research conducted for the case studies section of the CoreNet Global report, successful energy efficiency programs typically start with the adoption of effective energy management policies, systems, and leadership. Corporate real estate executives were asked the importance of a number of energy management elements to driving successful energy management. Figure 5 shows the average importance that executives assigned to each management element. Although, on average, no single management element was ranked very important, four out of five elements were perceived as moderately important. This may be a reflection of the interdependence of each management element—effective energy management is dependent on all management elements working together.

Executives tended to believe energy policies and targets were most important, while assigning senior responsibility to energy management was slightly less important. Additionally, it is interesting to note that respondents were indifferent (neutral) to linking employee compensation to energy targets.

A wider audience, including corporate real estate managers and executives, facilities managers, and real estate service providers, were asked which elements their companies currently utilize; these results are shown in the right hand column of Figure 5. Approximately half of the surveyed companies had qualitative energy targets, while about 40 percent of companies had an energy policy and quantitative energy targets. Only about a quarter of companies had a senior level executive responsible for energy management or quantitative financial targets. As suggested by the importance (or lack thereof) attributed to linking employee compensation to energy targets, only 5 percent of companies utilize this incentive.
Figure 5: Average Importance and Percentage Adoption of Energy Management Elements

<table>
<thead>
<tr>
<th>Element</th>
<th>Average Score</th>
<th>% with Element</th>
</tr>
</thead>
<tbody>
<tr>
<td>Quantitative Energy Targets</td>
<td>5.5</td>
<td>40%</td>
</tr>
<tr>
<td>Quantitative Financial Targets</td>
<td>5</td>
<td>25%</td>
</tr>
<tr>
<td>Qualitative Energy Targets</td>
<td>5.4</td>
<td>53%</td>
</tr>
<tr>
<td>Company-wide Energy Policy</td>
<td>5.3</td>
<td>42%</td>
</tr>
<tr>
<td>Senior Level Exec. Responsible for Energy Mgmt.</td>
<td>4.8</td>
<td>31%</td>
</tr>
<tr>
<td>Employee Compensation Linked Targets</td>
<td>4.1</td>
<td>5%</td>
</tr>
</tbody>
</table>

Figure 5 displays the average importance that corporate real estate executives attached to a list of energy management elements. Executives were asked to rank each element from 1 (very unimportant) to 7 (very important). A wider audience of respondents including corporate real estate managers and executives, facilities managers, and real estate service providers were asked if their company or the typical company they work for employs each of these management elements. The “% with Element” column shows the percentage of these respondents that worked for or with a company/companies that employ each element.

Interestingly, there is a fundamental difference between the 5 percent of companies with employee compensation linked to energy targets and the rest of the companies. The 5 percent are much farther along the path to developing comprehensive energy management systems. Most of these companies have already incorporated all of the other management elements included in Figure 5 (i.e., energy and financial targets, energy policy, leadership, compensation linked to targets). These companies tend to believe that sustainability is the primary driver of energy efficiency, whereas the remaining companies see energy costs as the primary driver. Moreover, these companies attach a significant level of importance to the linking of employee compensation to energy targets. In comparison, the rest of the companies, on average, rate this element of an en-

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energy management program as “neutral.” Lastly, the firms in this select group have much higher levels of internal support for energy efficiency than the rest of the respondents.

These differences may indicate a trend in the evolution of energy management in corporate real estate. First, internal support for energy efficiency and energy management grows stronger. Second, companies build comprehensive energy management systems that incorporate vision and strategy (policy and targets), leadership (senior executive), and performance compensation (employee compensation linked to targets). Third, as environmental, social, and economic concerns are woven into operations, sustainability emerges as the prime driver of action on energy efficiency.

**Tracking Energy Data**
Together with the energy management elements discussed above, a successful energy management program also requires the capture and use of energy data. As the adage goes, you cannot manage what you do not measure.

Capturing both energy use and cost data allows flexibility in assessing energy performance and creating energy targets. Approximately, 69 percent of companies surveyed track at least one type of energy use metric. Respondents identified kilowatt-hours as the most popular metric for tracking energy use data. Sixty percent of companies reported tracking energy cost data.
Tracking energy use and cost data are important components of an energy management program. In order to assess the quality and usability of the data being tracked, four important questions should be considered:

- What data are being tracked?
- How complete are the data?
- How timely are the data?
- How accessible are the data?
Although the survey does not directly address each of these questions, evidence from case study data suggests that the leaders in energy management have only recently adopted tracking methodologies that allow them to remotely access a range of real-time, dependable data. Most companies, including some companies that have made significant progress on energy efficiency, have yet to develop a comprehensive energy data monitoring system and a portfolio-wide management program tied to the monitoring efforts.

For instance, JohnsonDiversey, which built a highly efficient headquarters building and routinely incorporates energy efficiency throughout the real estate life cycle, collects and analyzes data centrally on only a small number of its buildings. However, this year the company is attempting to gain a better picture of how it can track company-wide energy data, assess completeness of the data, and analyze the data with regard to set targets. At JohnsonDiversey, this initiative is part of a wider effort to establish a company-wide carbon emissions baseline.

**Utilizing Energy Data**

Although comprehensive and accessible energy data are rare, many companies are still using the data that they do have. Respondents identified several common uses for energy data, including creating operating budgets, diagnosing which facilities needed energy efficiency improvements,
and performing internal benchmarking. None of the potential uses for energy data were being used by more than 64 percent of the companies surveyed, as displayed in Figure 7. This is not surprising given the state of energy tracking in most companies. Without understanding the answers to the data tracking questions presented in the previous section, it is difficult to effectively utilize data.

Figure 7: Percentage of Companies Utilizing Energy Data, by data use

It is also informative to look at who is using energy data within an organization. Figure 8 presents the percentage of corporate real estate managers and facilities managers that are using data to develop energy goals and establish energy use baselines. In both instances, the facilities managers are more commonly using energy data. Given traditional job descriptions, it is not surprising that facilities managers more commonly use these data. Moreover, the patchwork nature of the data means that facilities managers are most likely using these data on a facility-by-facility basis to develop energy baselines and goals.
Given increasing energy costs and the importance of sustainability initiatives, energy usage is becoming a strategic issue that corporate real estate managers need to be aware of. The nature of the corporate real estate professional’s job of evaluating a company’s entire building stock and making strategic decisions on real estate that facilitate corporate competitiveness mean this person/s is typically in the best position to influence company-wide energy management.

In this role, the corporate real estate manager will become a more frequent user of energy data—utilizing these data to make informed decisions on appropriate energy goals, which will inform future real estate decisions. Given the expertise of facilities management with analyzing energy data, a close partnership between facilities management and real estate management could facilitate the establishment of company-wide targets and policies.

Figure 8: Percentage of Companies Using Energy Data for Strategic Energy Assessments, by function.

Figure 8 compares the percentage of corporate real estate managers who use energy data to develop energy goals and establish energy baselines to the percentage of facilities managers who use energy data for these purposes.
ENERGY EFFICIENCY THROUGHOUT THE REAL ESTATE LIFE CYCLE

CoreNet Global defines the real estate life cycle using the sequential components displayed in Figure 9.23

![Figure 9: Real Estate Life Cycle](image)

**Programming/Requirements** – Corporate real estate programming involves establishing the types of space a company demands and understanding the demands that will be placed on the space. A company can then set goals and objectives about particular features it demands and identify strategies that can be employed to meet the company’s stated goals and objectives. In the context of energy efficiency, this may mean setting a quantitative target that all new space the company acquires, builds or leases must meet (e.g., all space must be designed to achieve energy performance rated in the top 25 percent using a U.S. EPA target finder analysis).24

**Design/Engineering** – The design/engineering stage of the life cycle involves the design of new buildings. This process includes designing the façade, the structural profile, and the mechanical systems of a building.

**Acquisition/Leasing** – The acquisition/leasing stage involves a company leasing or acquiring new or existing workspace.

**Operations/Facilities Management** – The operations/facilities management stage involves the ongoing operation of a company’s building stock. This stage of the life cycle typically involves

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performing maintenance to fix or prevent problems and overseeing a building’s heating, ventilating, and air conditioning (HVAC) systems. Moreover, the operations/facilities management stage is the longest component of the life cycle.

Retrofits – This stage of the life cycle involves replacing or upgrading major building components.

Valuation – This stage of the life cycle involves working with an appraiser to derive the market value for company-owned workspace. Appraisal often occurs when a company is acquiring or disposing of property or for tax purposes.

Programming/Requirements
Incorporating energy efficiency into planning and property selection requirements sets the tone for altering the nature of a company’s building stock. However, incorporating energy efficiency at this stage in the life cycle is uncommon. Only 30 percent of respondents in corporate real estate management and facilities management claimed to have included energy efficiency requirements into requests for proposals (RFPs).

Although relatively few companies include energy efficiency in the programming/requirements stage of the life cycle, this practice will likely become more common in the future. More than a quarter of survey respondents—real estate service providers, corporate real estate managers, and facilities managers—believe that moving into energy-efficient buildings is a “very important” strategy to reduce energy costs in the short term. In the long term, 42 percent of respondents believe that moving into energy-efficient buildings is a very important strategy.

Members of the development and investment communities had similar responses, confirming the growing demand for energy-efficient properties. If, as suggested, approximately 40 percent of companies surveyed purchased or leased properties with energy-efficient design, developers and landlords building and managing properties that failed to incorporate energy efficiency would experience considerable market pressure.
Mini Case II: Toyota Puts Green Lease Provisions into Practice

When Toyota searched for 25,000 square feet of office space in Washington DC, the company included an environmental impact qualification attached to its RFP. The qualification, based on the LEED Commercial Interiors rating system, placed emphasis on indoor air quality and energy efficiency. Additionally, Toyota included provisions within the lease for the right to sub-meter the space, purchase green power, use low-VOC-emitting material during tenant improvement (TI) buildout, and implement a recycling program. (Information for this case supplied by Jim Cooke, Toyota, 2006)

Design/Engineering

When a company decides to construct new office space, smart building design and engineering can optimize energy efficiency within a specified budget. Figure 10 shows the distribution of respondents’ answers for required payback periods from energy efficiency investments financed through a new facility capital budget. Of the respondents who provided a payback period, most respondents noted a payback of greater than three years was acceptable.

Figure 10: Required Payback Period for New Facility Capital Budget

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While higher payback periods may mean that greater levels of energy efficiency can be incorporated in new construction projects, it is important to consider the types of analyses a company is using to assess energy efficiency investments in new facilities. Typically, energy efficiency investments are evaluated during a “value engineering” process, which is, in most cases, a misnomer for simple cost-cutting. Individual investments that do not make the payback cutoff are typically value engineered out of the process. However, evaluating energy efficiency measures in isolation fails to recognize how these investments integrate with other design elements. Evaluating these interrelated investments together makes more sense and produces far different operating and maintenance returns. Aalok Deshmukh, Senior Consultant in RMI’s Built Environment Team, provides an example of how the value engineering process should work, “when a design team considers value engineering a light shelf out of a design, the team should probably also consider the increased electrical lighting needed (rather than just the cost of the light shelf), as well as the increase in lighting energy use over the life of the building. This will, in turn, necessitate an increase in the cooling capacity of the HVAC equipment on account of the increased internal heat gains. The net effect of all of these considerations will, in most cases, justify keeping the light shelves.”

**ViewPoint: Financing Energy Efficient Buildings**

Commercial lenders’ aversion to the novelty of energy-efficient design is often cited as a barrier to incorporating energy efficiency in new construction (see Introduction). But when corporate real estate managers, real estate service providers, and developers were asked about how the borrowing costs for new construction that incorporated energy efficiency compared to the borrowing costs for conventional new construction, the survey results painted a different picture. 30 percent of respondents had experienced no difference in borrowing cost, 26 percent had experienced higher costs for energy-efficient designs, and 18 percent had experienced lower costs for energy-efficient designs (the remainder of respondents, 16 percent, answered “don’t know”, 10 percent did not provide an answer).

Scott Muldavin, President of the Muldavin Group and Executive Director of the Green Building Finance Consortium,3 elaborates on current and future trends in commercial lending for energy-efficient buildings.

“Volatile and increasing energy costs have reduced lender aversion to energy-efficient design in recent years, but as the number and complexity of energy saving techniques/products has increased, the modeling of forecasted benefits, and ability of money sources to interpret such forecasts, has lagged. At the Consortium, we are working to improve the ability of lenders/investors to assess the reliability/accuracy of energy performance forecasts to ensure the lowest cost financing possible. If lenders are unsure of the benefits, or can’t reasonably assess the reliability of estimates, cost can increase, but more often the amount of loan will be reduced, or the reserve requirements increased, or other lender terms will be negatively adjusted. As forecasting models, and the procedures to evaluate them, improve, and borrowers learn to incorporate the growing availability of grants, rebates, and subsidies available to energy-efficient design, the 18 percent figure for respondents who experienced lower costs should increase dramatically.”

(Muldavin, personal communication, 2007)

**Acquisitions/Leasing**

Acting on the energy efficiency policies and requirements established during the programming/requirements stage occurs by carrying out pre-purchase/lease due diligence. Typical forms of pre-purchase/lease due diligence include analysis of utility bills, benchmarking energy costs, performing an energy audit, talking to prior users about the energy performance of a facility, identifying and testing energy-efficient equipment, and reviewing previous energy modeling analyses. Figure 11 provides a list of these due diligence practices and the percentage of corporate real estate managers, real estate service providers, and facilities managers that utilize these practices.
A significant percentage of respondents verified that their companies were not incorporating any of these due diligence strategies or they were unsure if these practices were being used. The most common due diligence practices involved identifying and verifying the working condition of energy-efficient features and benchmarking energy costs. However, all due diligence strategies have low adoption rates, and corporate real estate managers and facilities managers seem to be less aware of energy efficiency due diligence than real estate service providers.

It is also interesting to note that facilities managers are least likely to perform any of these due diligence measures. In most companies, facilities managers have a wealth of knowledge concerning energy efficiency and building operation. Performing these due diligence measures provides an opportunity for real estate managers to utilize the knowledge that facilities managers have concerning energy efficiency.

Figure 11: Percentage of Companies Performing Pre-Lease Energy Efficiency Due-diligence

![Figure 11: Percentage of Companies Performing Pre-Lease Energy Efficiency Due-diligence](image)

Figure 11 compares the percentage of corporate real estate managers, real estate service providers, and facilities managers that perform each type of action listed before leasing a property for their company or typical corporate client.
Operations/Facilities Management
Optimizing building systems and equipment for energy efficiency can result in significant operational savings. Respondents believe that strategies to improve energy efficiency through operations and facilities management offer the greatest opportunities for reduced energy costs when compared to a number of other cost reduction strategies.

Table 4 shows that approximately two thirds of respondents believe the tune-up of control systems and equipment represents a very important short- and long-term strategy for energy cost reductions. Similarly, improved housekeeping measures were also seen as very important by a large percentage of respondents.

Table 4: Percentage Rating Facilities Management Strategies as Very Important for Energy Cost Reduction.

<table>
<thead>
<tr>
<th>Strategy</th>
<th>Short Term % 6 or 7 (Very Important)</th>
<th>Long Term % 6 or 7 (Very Important)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Tune-up of control systems / equipment (e.g., simple tweaks in bldg. mgmt. systems)</td>
<td>67%</td>
<td>72%</td>
</tr>
<tr>
<td>Improve housekeeping measures (e.g., switch off lights after hours)</td>
<td>62%</td>
<td>70%</td>
</tr>
</tbody>
</table>

Table 4 compares the percentage of respondents that ranked each facilities management strategy as very important (6 or 7) for reducing energy costs in the short-term to the percentage ranking each strategy as very important for reducing energy costs in the long-term. Respondents were asked to rank each strategy from 1 (very unimportant) to 7 (very important).

Working with facilities management or real estate service providers can often produce a laundry list of low-cost/no-cost measures that result in significant improvements in building operation and energy cost savings. For many years, Oracle has been focusing on finding low-cost/no-cost measures that can be implemented in its facilities. The result has been buildings that operate much more efficiently and produce significant cost savings with little or no capital investment.

The Energy Challenge: A new agenda for corporate real estate
In one facility Oracle identified the following opportunities for improved operation:

- Morning startup/evening shutdown optimization – eliminate outside air during warm up;
- HVAC schedule fix – building was operating on a 24/7 schedule; and
- Lighting adjustments through de-lamping, schedule fix, and adjustment to motion sensors.

With no capital investment, the implementation of these practices lead to $51,000 in energy savings, and this total only represents savings from the first eight months of 2006.\(^{26}\)

Typically, funding for finding and implementing low-cost/no-cost energy efficiency measures will come out of the operating budget. Respondents noted that these types of measures needed to have fairly short payback periods, with 25 percent of respondents requiring paybacks of one year or less and 42 percent of respondents requiring a payback of between one and three years. However, as the Oracle example demonstrates, there is no dearth of high return energy efficiency measures that can be financed out of the operating budget.

Although low-cost/no-cost opportunities may exist and many respondents noted the importance of finding these opportunities, budgeting structures may not allow these opportunities to be fully embraced. When respondents were asked what percentage of their company’s energy cost budget was allocated to identifying and implementing low-cost/no-cost energy efficiency measures, more than a quarter of the respondents did not know. As Figure 12 shows, of the remaining respondents who did know, most said their companies allocated a relatively small amount of the budget to identify and implement low-cost/no-cost energy efficiency measures. Increasing the amount of time that can be spent finding these opportunities through budget allocations offers a significant opportunity.

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\(^{26}\) Kattar, M., personal communication, 8/2006.
Figure 12: Percentage of Energy Cost Budget Allocated to Identifying and Implementing Low-cost/No-cost Energy Efficiency Measures

Figure 12 displays the percentage of respondents that selected each percentage range of energy costs that is devoted to identifying and implementing low cost/no cost energy efficiency measures.

**Retrofits**

Incorporating energy efficiency into renovations, upgrades, and equipment replacement can result in ongoing improvements across the building stock. Although only about a third of respondents believed that retrofits represented a very important short-term strategy for energy cost reduction, 64 percent of respondents saw retrofits as a very important long-term strategy. As Table 5 shows, relative to other energy cost reduction strategies, retrofits experienced the greatest growth in importance from short to long term.
Table 5: Change in Percentage of Respondents Selecting each Energy Cost Reduction Strategy as Very Important, from short-term to long-term.

<table>
<thead>
<tr>
<th>Strategy</th>
<th>Long Term - Short Term</th>
</tr>
</thead>
<tbody>
<tr>
<td>Retrofit building systems</td>
<td>+28%</td>
</tr>
<tr>
<td>Move from high to lower energy use rated buildings</td>
<td>+16%</td>
</tr>
<tr>
<td>Improve housekeeping measures (e.g., switch off lights after hours)</td>
<td>+8%</td>
</tr>
<tr>
<td>Switch rate plans (short term) and locate facilities in places with lower electricity rates (long term)</td>
<td>+7%</td>
</tr>
<tr>
<td>Tune-up of control systems / equipment (e.g., simple tweaks in bldg. mgmt. systems)</td>
<td>+5%</td>
</tr>
</tbody>
</table>

Respondents were asked to rank the importance of a series of strategies for reducing energy costs in the short-term and over the long-term from 1 (very unimportant) to 7 (very important). Table 5 highlights and compares how much greater the percentage of respondents ranking each strategy as very important (6 or 7) over the long-term is than the percentage ranking each strategy as very important in the short-term.

Respondents also noted that their companies accept longer average payback periods for retrofits than for energy efficiency measures financed out of the operating budget. This provides more flexibility in selecting equipment that offers greater benefits in the future, but may require a significant capital investment.

When Adobe Systems entered discussions with Cushman & Wakefield about improving energy efficiency in Adobe Towers, the discussion initially focused on finding low-cost/no-cost energy efficiency measures. However, after earning the confidence of Adobe Systems through several highly successful efficiency measures, Cushman & Wakefield turned its attention to finding profitable retrofit opportunities to maximize cost savings. Table 6 presents several of these retrofits.27

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27 Caroline Fluhrer, personal communication, 8/2006.
Table 6: Retrofits in Adobe Towers

<table>
<thead>
<tr>
<th>Energy Efficiency Measure</th>
<th>Capital Cost</th>
<th>Annual Energy Savings</th>
<th>Payback Period</th>
<th>ROI</th>
</tr>
</thead>
<tbody>
<tr>
<td>Motion sensors for HVAC in all conference rooms</td>
<td>$37,500</td>
<td>310,483 kBtu</td>
<td>8 months</td>
<td>140%</td>
</tr>
<tr>
<td>Reprogrammed garage lighting</td>
<td>$55,267</td>
<td>76,713 kBtu</td>
<td>11 months</td>
<td>115%</td>
</tr>
<tr>
<td>Installed VFD on chiller</td>
<td>$65,000</td>
<td>87,265 kBtu</td>
<td>7 months</td>
<td>163%</td>
</tr>
<tr>
<td>Surge protectors on motion sensors for each office</td>
<td>$104,750</td>
<td>148,498 kBtu</td>
<td>5 months</td>
<td>253%</td>
</tr>
<tr>
<td>Retrofitted garage lighting</td>
<td>$157,775</td>
<td>312,254 kBtu</td>
<td>10 months</td>
<td>118%</td>
</tr>
</tbody>
</table>

Table 6 displays the characteristics of numerous energy efficiency retrofits that Adobe Systems carried out in Adobe Towers. Located in San Jose, California, Adobe Towers is the 989,358 square foot (91,911 square meter) headquarters building of Adobe Systems.

Valuation
For proper valuation of energy-efficient buildings to occur, building owners must provide appraisers with the requisite information. And appraisers need to be familiar with energy-efficient designs, the operational savings that can result from energy savings, and the demand for energy-efficient buildings.

Figure 13 indicates that energy efficiency information is sporadically supplied to appraisers. Additionally, a quarter of the respondents didn’t know if each piece of energy efficiency information described in Figure 13 was being supplied to appraisers. This suggests that respondents are often not involved in the appraisal process and that few have thought about how an appraisal might be affected by the energy efficiency of a building.

When respondents were asked a follow up question on the effectiveness of appraisers at including energy efficiency information, a similar trend was found; no less than a third of the respondents answered “don’t know” or were indifferent (answered “neutral”).
Respondents were asked to rank how frequently, from 1 (never) to 7 (always), they supplied an appraiser with each piece of information listed. Figure 13 displays the average ranking of the frequency that respondents supplied information on energy efficiency to their appraisers. The don’t know/N/A column shows the percentage of respondents that selected don’t know or N/A instead of providing a rank for this question.
Study results aptly reflect the overall state of the appraisal profession today relative to energy efficiency. While there is general recognition that energy efficiency practices and products are becoming more prevalent in the marketplace, there are limited empirical data on how these factors impact property value. Research completed independently by the author and with the Green Building Finance Consortium indicates that owners and developers often do not provide appraisers with data sufficient to facilitate a thorough and objective assessment of both the costs and benefits of energy efficiency strategies. Too much reliance is placed upon "first costs" and payback periods, when the more relevant analyses that should be completed include life cycle cost assessments and return on investment calculations.

Identifying the precise costs of energy-efficient components and the longer-term potential benefits is a major challenge for appraisers—again due to the limited amount of factual data readily available on this topic. Owners and developers need to take a much more proactive role in providing appraisers with in-depth descriptions of the overall goals and objectives of a building's energy plan. Appraisers need to educate themselves on the importance of early design and systems integration, "right-sizing," building commissioning, and other issues unique to "high-performance" buildings.

At the recent Vancouver Valuation Summit in Vancouver, British Columbia, appraisers gathered from around the globe to discuss the challenges facing the valuation profession and its capabilities to appropriately assess and value sustainable properties. Leaders of the largest international valuation groups formally agreed to collaborate and share information on this topic to ensure their members are educated and brought quickly up to speed on the best approaches to incorporate environmental considerations into the appraisal process.

Presentations reflected a need to more appropriately incorporate objective assessments of the valuation implications of energy efficiency practices, particularly relevant to climate change issues. The case studies presented reflected the need to identify and evaluate the level of market recognition of, and demand for, strategies and building programs addressing various sustainability issues. A strong focus on risk mitigation was apparent—particularly regarding the potential for regulatory change and the perception of early obsolescence in buildings that are perceived as less efficient in systems and design.

Ultimately the discussion will revolve around the topic of risk and the role it plays in the valuation process. Risk being a primary determinant in the selection of discount and capitalization rates, the correlation between energy efficiency and risk mitigation will need to be established. If high-performance, energy-efficient buildings are perceived as "less risky" investments, this perception could manifest itself in a variety of ways—improved marketability, quicker absorption, better tenant retention, less rollover—all of which are property characteristics that would typically enhance value. Both the survey results and current market activity indicate the move toward high-performance energy-efficient buildings is no longer an "if." It is now a "when?" and "how much?"

(Chappell, personal communication, 2007)
BAR RI ERS TO I NCORPORATING E NERGY E FFICIENCY
Opportunities to incorporate energy efficiency into building design, operation, and retrofits have existed for decades. Scholars and practitioners alike have often been puzzled as to why these high-dollar return opportunities have not been exploited by profit-driven entities. However, barriers often stand in the way of organizations attempting to incorporate energy efficiency. In 1992, Amory Lovins, Chief Scientist at RMI, published a comprehensive account of some of the most important barriers to energy efficiency.28 The CoreNet Global study, a follow-up to Lovins’ 1992 account, utilized a focus group of corporate real industry professionals as well as a survey to update knowledge on barriers to energy efficiency. Many of the barriers initially identified in 1992 remain important today; however, new barriers have also emerged since the publication of the Lovins article. A comprehensive list of barriers discussed by the focus group can be found in Appendix 3. The survey asked respondents about a subset of the most common barriers discussed by the focus group. Respondents confirmed that each barrier is moderately significant in blocking energy efficiency improvements. These barriers included:

★ Difficulty of quantifying the value of energy efficiency investments;
★ Lack of integrated design and whole-system thinking;
★ No data to verify building systems have been sized appropriately;
★ Inadequate commissioning, operating, and maintenance documentation;
★ Lack of training and retraining of building operators;
★ Appraisal of the building does not include energy efficiency;
★ Split incentives between owner and tenant; and
★ Short-term leases discourage energy efficiency investments.

It is worth noting that all barriers received an average score of “moderate importance” and no single barrier stood out as most or least important. This suggests that there are many small barriers that need to be overcome to achieve energy efficiency, but none of these barriers is insurmountable.


The Energy Challenge: A new agenda for corporate real estate
**ENABLERS TO INCORPORATING ENERGY EFFICIENCY**

In the previous section, numerous barriers to incorporating energy efficiency were identified. When asked how effectively a subset of enablers would be at overcoming barriers to energy efficiency, respondents asserted that all enablers could be moderately effective. Similar to the barriers to incorporating energy efficiency, there doesn’t appear to be one all-powerful enabler—rather, just a variety of effective strategies that can be employed when needed. The enablers listed in the survey included:

- ★ Involve entire company in mission-oriented energy program;
- ★ Develop internal environmental metrics (e.g., energy use, CO₂ emissions);
- ★ Insert energy efficiency demands into company’s RFPs;
- ★ User-friendly and inexpensive life-cycle cost tools;
- ★ Identify keys to integrated design process early on (e.g., conduct goal-setting meeting with all participants);
- ★ Monitor and verify building systems over time as building approaches full occupancy;
- ★ Provide comprehensive occupancy and maintenance training for building staff;
- ★ Specify energy efficiency in lease agreements;
- ★ Require visibility for energy costs in lease agreements; and
- ★ Create building energy ratings (e.g., AAA rating for highly energy-efficient buildings).

Although there is no single solution for overcoming barriers to energy efficiency, many different enablers exist to help your company achieve greater energy efficiency.
Conclusion
Corporations are under increasing pressure to address their sustainability performance. Moreover, bottom lines are being squeezed by energy prices, and climate change threatens the viability of a critical input—energy. These issues could drastically alter the way companies operate in the 21st century, and they have profound relevance for the corporate real estate industry. A company’s building stock is often responsible for a significant amount of its energy use. Consequently, corporate real estate professionals are presented with a significant opportunity to address corporate sustainability, energy costs, and climate change risk by incorporating energy efficiency into corporate building portfolios.

While energy efficiency opportunities have been present for many years, the survey results presented in this report indicate that few companies have taken advantage of these vast opportunities. However, the survey results also demonstrated that corporate real estate executives recognize the importance of energy efficiency going into the future. The momentum behind issues like sustainability and climate change are enough to drive interest in energy efficiency. Furthermore, as energy prices continue to rise, the financial incentive to incorporate energy efficiency becomes even stronger. Inaction on energy efficiency is not an option. Once companies recognize the need for improved energy efficiency, the next question becomes how a company can act to achieve greater energy efficiency.

One course of action, which is currently being employed by the likes of ABN AMRO and Toyota, involves developing a comprehensive energy management system. Typically these systems include an energy policy, systems to track and access energy data, internal corporate leadership on energy issues, quantitative and qualitative energy targets, and the linkage of employee incentives to the achievement of energy targets. In addition to these elements, a comprehensive energy management system incorporates energy efficiency in each stage of the life cycle from programming to appraisal.
While the greatest benefits in terms of carbon reductions and energy and financial savings are derived from a comprehensive program, many companies do not have the resources to create a comprehensive energy management system. For these companies, opportunities still exist to begin incorporating energy efficiency into company practices and laying the groundwork for the eventual transition to a more comprehensive energy management system.

The analysis of data from the survey and information collected from talking to leading companies helped produce a list of items that could be utilized by companies who are not ready or willing to make a major commitment to energy management and efficiency at present. These items will produce significant results at little cost, they include:

★ Talking to functional and business unit managers to gauge the level of awareness about energy efficiency, climate change and sustainability issues. Opening up lines of communication will also allow corporate real estate professionals to begin to build support at the functional and business unit level for action on energy efficiency. Gaining broad support for energy efficiency will enable more significant action to be taken. Moving a company to more energy efficient practices is an exercise in managing change. As discussed in Harvard Business School Professor John Kotter’s *Leading Change*29, the first two steps in a successful change management process include establishing a sense of urgency and creating a guiding coalition. Both of these steps require internal support.

★ Starting with small projects. By focusing limited resources on finding and implementing low cost/no cost energy efficiency measures, a company can establish a record of success that will garner attention from management and may help acquire additional resources for more capital-intensive measures. As discussed in the Retrofits section of this report, Adobe Systems was able to build strong support for energy efficiency by starting small and showing how successful energy efficiency measures could be.

★ Opening up a dialogue with personnel responsible for facilities management. The facilities managers generally possess the most knowledge about energy efficiency, and their knowledge can be utilized in a wide array of functions including analyzing data, setting

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targets, and performing pre-lease/acquisition energy efficiency due-diligence. The simple act of discussing energy efficiency with facilities management may create new and innovative partnerships for collaboration to improve energy efficiency in the company’s building stock.

★ Inserting energy efficiency in the programming/requirements stage of the life cycle. The easiest way to improve energy efficiency involves specifying that the new workspace a company leases or acquires should meet certain energy efficiency requirements.

★ Cataloguing the successes and failures of each energy efficiency measure. By collecting and analyzing data from each measure, a company can begin to understand and learn from its efforts. Moreover, the ability to show the track record of a company’s energy efficiency measures will generally help establish management support.

Given the wide array of options for incorporating energy efficiency into a company’s building stock, there is no excuse for ignoring energy efficiency opportunities. Moreover, exploiting these opportunities can set a company apart from its peers—providing benefits that stretch from reduced energy costs to improved reputation. Can the majority of the corporate real estate industry continue to sidestep incorporating energy efficiency? The evidence presented in this report suggests the industry cannot and will not systematically overlook energy efficiency in the future.
Appendices

APPENDIX I - SURVEY INSTRUMENT
CoreNet Global / RMI Energy Efficiency Survey

The CoreNet Global/RMI survey on energy efficiency in corporate real estate targeted respondents from across the real estate supply chain. The survey used filter logic to direct participants from different parts of the real estate supply chain to different sections of the survey so each participant receives a set of tailored questions. The bolded real estate functions below represent the different survey versions and the number of questions contained in each version. The survey administered to the corporate real estate – general management function is the most comprehensive survey and provides a good representation of what each additional version looks like; thus it is presented below.

Corporate Real Estate – General Management (includes public sector)
38 Questions
Estimated Time to Complete: 20 minutes

Contractor / Construction / Design / Architect / Engineer
18 Questions
Estimated Time to Complete: 10 minutes

Portfolio Management, Transactions Services / Leasing, Real Estate Business
Development / Sales
29 Questions
Estimated Time to Complete: 20 minutes

Facilities Management
33 Questions
Estimated Time to Complete: 20 minutes

Developer, Landlord / Building Manager, Investor / Owner (non-occupant)
24 Questions
Estimated Time to Complete: 15 minutes

Corporate Real Estate – executive level

The Energy Challenge: A new agenda for corporate real estate
14 Questions
Estimated Time to Complete: 7 minutes

Survey Administered to Corporate Real Estate – General Management (survey below excludes 3 wrap-up questions that are non-content based and a general open-ended venting question)

1 Please provide the following information.
   Name
   Job Title
   Company or Organization
   E-mail address
   Phone Number

2 Please indicate the term that best describes your role in real estate:
   ○ Service provider - single client
   ○ Service provider - multiple client
   ○ Corporate end user
   ○ Public sector end user
   ○ Consultant
   ○ Other, please specify

3 To be sure you receive an appropriate set of tailored questions, please indicate the functional area that best describes your role in real estate:
   ○ Design/Architect/Engineer
   ○ Facilities management
   ○ Portfolio management
   ○ Corporate real estate - general management level (includes public sector)
   ○ Corporate real estate - executive level
   ○ Transaction services / Leasing
   ○ Real estate business Development / Sales
   ○ Contractor/Construction
   ○ Developer
   ○ Landlord / Building Manager

Corporate Strategy & Implementation

4 Which of the following elements of an energy management program does your company have? Please select all that apply.
   ○ Company-wide energy policy (e.g., energy use discussed in environmental policy)
Senior-level executive responsible for the centralized management of energy use
Quantitative energy targets (e.g., reduce energy use by 9%)
Quantitative financial targets (e.g., reduce energy cost by $ or %)
Qualitative energy targets (e.g., commitment to lower energy use/cost)
Employee compensation (e.g., bonus) linked to energy targets
None of the above
Don't know / N/A
Other, please specify

5 In what units (before energy use/cost is normalized by sq.ft., etc.) does your company measure its energy use? Please select all that apply.
- British Thermal Units (Btu)
- Kilowatt-Hours (kWh)
- Joules
- Therms
- Cost ($)
- Do not track energy use/cost
- Don’t know

6 Does your company track energy usage at the corporate level?
- Yes
- No
- Don't know

7 How does your company utilize its energy use/cost data? Please select all that apply.
- Develop energy use/cost goals
- Diagnose which facilities need energy efficiency improvements
- Identify building systems and equipment that are malfunctioning
- Create future operating budget
- Establish energy use/cost baseline
- Benchmark building energy use/cost internally
- Report to public on energy use in annual report, sustainability report, etc.
- Don’t know
- Other, please specify

The following two questions compare the importance of energy efficiency drivers now and in the future.

8 Rate each issue's current importance as a driver of energy efficiency within your company. (Likert Scale: 1 - Very Unimportant; 4 – Neutral; 7 – Very Important; No Opinion)
Sustainability concerns
Government regulation
Energy costs

The Energy Challenge: A new agenda for corporate real estate
Aging infrastructure
Government incentives
Reputational value/Publicity
Shareholder pressure

9 Rate each issue's future importance by 2015 as a driver of energy efficiency within your company.
(Likert Scale: 1- Very Unimportant; 4 – Neutral; 7 – Very Important; No Opinion)
Sustainability concerns
Government regulation
Energy costs
Aging infrastructure
Government incentives
Reputational value/Publicity
Shareholder pressure

10 Please provide any additional comments about drivers to energy efficiency below.

The following two questions compare the importance of energy cost saving initiatives in the short and long-term.

11 How important are each of the following initiatives as part of your company's strategy to reduce energy costs over the short-term?
(Likert Scale: 1- Very Unimportant; 4 – Neutral; 7 – Very Important; No Opinion)
Improve “housekeeping” measures (e.g., switching off lights after hours)
Tune-up of control systems and equipment (e.g., simple tweaks in building management systems)
Retrofit building systems
Move from high to lower energy use rated buildings
Switch rate plans

12 How important are each of the following initiatives as part of your company's strategy to reduce energy costs over the long-term?
(Likert Scale: 1- Very Unimportant; 4 – Neutral; 7 – Very Important; No Opinion)
Improve “housekeeping” measures (e.g., switching off lights after hours)
Tune-up of control systems and equipment (e.g., simple tweaks in building management systems)
Retrofit building systems
Move from high to lower energy use rated buildings
Locate facilities in places with lower electricity rates

Evaluating and Financing Energy Efficiency Investments
13 For each of the following corporate stakeholders, indicate the extent to which they are supportive or unsupportive of initiatives to improve energy utilization:
(Likert Scale: 1- Very Unsupportive; 4 – Neutral; 7 – Very Supportive; No Opinion)
C-level officers (e.g., CEO, CFO, etc.)
Finance leadership
Board of directors
Business-unit leadership
Facilities management leadership
Corporate real estate leadership

14 Approximately what percentage of your company’s facilities management operating budget consists of energy costs?
- Less than 10%
- 10% and under 20%
- 20% and under 30%
- 30% and under 40%
- 40% and under 50%
- More than 50%
- Don’t know

15 Approximately what percentage of the energy costs described in the previous question is devoted to identifying and implementing low cost/no cost energy efficiency measures?
- 0%
- More than 0% and under 2.5%
- 2.5% and under 5%
- 5% and under 10%
- 10% and under 15%
- 15% and under 20%
- More than 20%
- Don’t know

16-19 For the following four questions, what is the typical payback period required for energy efficiency investments for each type of budget? Select from the dropdown menu.
(Drop Down Answer Choices: Less than 1 year; 1 year and under 3 years; 3 years and under 5 years; 5 years and under 10 years; 10 years or more; Don’t know; NA)

16 Operating budget

17 Capital budget

18 New facility capital budget

19 Existing facility renovation capital budget
20 How often do you believe energy efficiency investments result in the following benefits? (Likert Scale: 1- Never; 4 – Sometimes; 7 – Always; No Opinion)
- Increased employee productivity
- Enhanced occupant comfort
- Environmental benefits (e.g., reduced CO2 emissions)
- Improved reputational value/positive publicity
- Better indoor air quality
- Improved employee retention/attraction

21 When your company orders an appraisal, how frequently is the appraiser provided with each of the following? (Likert Scale: 1- Very Unsupportive; 4 – Neutral; 7 – Very Supportive; Don’t know/NA)
- List of specific energy efficient systems in place (e.g., low wattage lights)
- Costs of energy efficient systems
- Predicted or realized savings from energy efficient systems
- LEED and/or BREEAM certification
- Energy Star rating

22 Indicate the extent to which you agree or disagree with the following statements concerning appraisers and property valuation: (Likert Scale: 1- Strongly Disagree; 4 – Undecided; 7 – Strongly Agree; No Opinion/N/A)
- Valuation includes the benefit of lower energy costs
- Valuation includes a premium for improved marketability when there is a LEED / BREEAM / Energy Star rating
- Valuation does not include benefit of reduced energy costs because of uncertainty in energy modeling results
- Valuation is discounted based on the use of atypical design and/or construction techniques
- Valuation does not include benefit of reduced energy costs because the tenant pays all energy costs
- Appraisers are generally familiar with LEED/BREEAM and Energy Star programs
- Appraisers lack suitable comparables on energy efficiency and LEED/BREEAM/Energy Star buildings

23 Before leasing a property, does your company perform any of the following actions? Please select all that apply.
- Analyze energy bills
- Benchmark energy costs against cost in similar buildings
- Perform an energy audit
- Specify energy efficient features in Request for Proposal (RFP)
- Talk to prior users
- Identify energy efficient features and verify their working condition
- Review previous energy modeling analysis
- None of the above
24 In your experience, how does the borrowing cost for new construction that incorporates energy efficiency compare to the costs for conventional new construction?
- No difference
- Higher than conventional construction
- Between 1 and under 10 basis points lower than conventional construction
- Between 10 and under 25 basis points lower than conventional construction
- 25 and above basis points lower than conventional construction
- Don't know

Energy Use Profile

25 Does your company currently participate in Building Owners and Manager's (BOMA) Experience Exchange Report or the Occupiers Property Database (OPD)?
- Yes
- No

If this information is supplied to an organization other than BOMA or OPD please list it.

26 Assuming the confidentiality of your building data was assured and the data was only reported in aggregate, would your company be willing to provide BOMA or OPD with energy utilization data in addition to the existing energy cost data?
- Yes
- No
- Don't collect this data
- Don't know

27 Provide any additional comments you have about the material covered on this page below.

Barriers & Enablers to Energy Efficiency

28 Real Estate Supply Chain Participants
For each of the following real estate supply chain participants, indicate the extent to which they are responsive/reactive to ideas about energy efficiency or proactively generate ideas concerning energy efficiency:
(Likert Scale: 1- Responsive/Reactive; 4 – Neither; 7 – Proactive; No Opinion/N/A)
Developer
Contractor
Architect
29 Barriers to Energy Efficiency
Please rate how important each barrier is at limiting the incorporation of energy efficiency in buildings.
(Likert Scale: 1- Very Unimportant; 4 – Neutral; 7 – Very Important; No Opinion/N/A)
Lack of clearly stated energy goals by corporate leadership
Emphasis placed predominately on first costs ($/square foot)
Difficulty of quantifying value of energy efficiency investments
Lack of integrated design and whole systems thinking
No data to verify building systems have been sized appropriately
Inadequate commissioning, operating, and maintenance documentation
Lack of training and retraining of building operators
Appraisal of buildings does not include energy efficiency

30 Rate how important each barrier is at limiting the incorporation of energy efficiency in leased buildings/spaces.
(Likert Scale: 1- Very Unimportant; 4 – Neutral; 7 – Very Important; No Opinion/N/A)
Split incentives between owner and tenant
Short-term leases discourage energy efficiency investments
Preference for flat rate energy costs per square foot

31 Please provide comments about additional barriers or describe why specific barriers are particularly important.

32 Enablers to Overcome Barriers to Energy Efficiency
Rate the effectiveness of each enabler at overcoming barriers to incorporating energy efficiency.
(Likert Scale: 1- Very Ineffective; 4 – Neutral; 7 – Very Effective; No Opinion/N/A)
Involve entire company in mission-oriented energy program
Develop internal environmental metrics (e.g., energy use, CO2 emissions)
Insert energy efficiency demands into company’s Request for Proposals (RFPs)
User-friendly and inexpensive life-cycle cost tools
Identify keys to integrated design process early on (e.g., conduct goal setting meeting with all participants)
Monitor and verification of building systems overtime as building approaches full occupancy
Provide comprehensive operations and maintenance training for building staff
33 Rate the effectiveness of each enabler at overcoming barriers to incorporating energy efficiency in *leased* buildings/spaces.

(Likert Scale: 1 - Very Ineffective; 4 – Neutral; 7 – Very Effective; No Opinion/N/A)

Specify energy efficiency in lease agreements

Require visibility for energy costs in lease agreements

Create building energy ratings (e.g., AAA rating for highly energy efficient buildings)

34 Please provide comments about additional enablers or describe why specific enablers are most effective.

**APPENDIX 2 - DETAILED METHODOLOGY**

The methods underlying survey creation and analysis are described below.

The survey process consists of ten stages:

1. Identification of the focus of study and method of research;
2. Research schedule and budget;
3. Establishment of information base;
4. Sampling frame;
5. Determination of sample size and sample selection process;
6. Design of the survey instrument;
7. Pretest of the survey instrument;
8. Implementation of the survey;
9. Codification of the completed surveys and computerized data entry;
10. Data analysis and composition of the final report.

**Identification of the Focus of Study and Method of Research**

The focus of the study and the methods of research were determined through contract negotiations between Rocky Mountain Institute (RMI) and CoreNet Global. The project focus is on determining current approaches to energy efficiency in corporate real estate and providing recommendations for further progress on energy efficiency in the corporate real estate industry. The contract between CoreNet Global and RMI designates survey creation, implementation and analysis as one of the research methods that will be used in the study.
Research Schedule and Budget
The budget for the survey portion of the project is confidential. The timeline for each major survey milestone is outlined below:

<table>
<thead>
<tr>
<th>Activity</th>
<th>Date</th>
</tr>
</thead>
<tbody>
<tr>
<td>Initial Research</td>
<td>July 2006</td>
</tr>
<tr>
<td>Survey Focus Group</td>
<td>August 2006</td>
</tr>
<tr>
<td>Draft Survey Content</td>
<td>September 2006</td>
</tr>
<tr>
<td>Final Survey Content</td>
<td>October 2006</td>
</tr>
<tr>
<td>Pretest Survey</td>
<td>November 2006</td>
</tr>
<tr>
<td>Survey Launch</td>
<td>November 2006</td>
</tr>
<tr>
<td>Survey Analysis</td>
<td>December 2006</td>
</tr>
<tr>
<td>Survey Report</td>
<td>January 2007</td>
</tr>
</tbody>
</table>

Establishment of Information Base
Prior to creating a survey, it is important to gather research on or related to the proposed topic. Moreover, it can be helpful to find surveys conducted on the topic or on similar topics to help guide survey creation. In July, I conducted secondary research with another intern at RMI to find any pertinent research on energy efficiency. A literature review revealed that very few researchers had focused on energy efficiency in corporate real estate. Several informal surveys about the topic were discovered, but none of these surveys proved very helpful.

In addition to secondary research, CoreNet Global assembled an advisory panel of individuals from various segments of the real estate supply chain that were knowledgeable about energy efficiency. In August 2006, RMI convened a focus group with several of the advisory team members. The focus group helped condense the scope of the survey project by focusing on the most important barriers and enablers to incorporating energy efficiency in corporate real estate. The members present at the meeting were also able to provide insights on successful corporate energy management strategies. Members of the panel also served in a variety of other functions including the reviewing of survey content, pretesting the survey, and distributing the survey to colleagues in the industry. The individuals composing the advisory panel include:
★ Bill Frain, Staubach;
★ Jim Cooke, Toyota;
★ Tim Frank, Toyota;
★ Kelly Speakes, United Technologies;
★ Mary Ann Lazarus, HOK;
★ Mike Harris, Johnson Controls;
★ Brenna Walraven, USAA Realty Company;
★ Mukesh Kattar, Oracle;
★ John Schinter, Jones Lang LaSalle;
★ Chris Owens, Microsoft;
★ Stephen Smith, ABN AMRO;
★ Timo Salonen, Nokia;
★ Mia Ranta-Aho, Nokia;
★ Joe Wick, Cushman & Wakefield;
★ Pat Crumley, Staubach.

Figure 14: Advisory Panel Meeting - August 2006, Atlanta, GA

The Energy Challenge: A new agenda for corporate real estate
**Sampling Frame**
The research project is focused on energy efficiency opportunities throughout the real estate life cycle. Consequently the sampling frame is defined as the population of individuals that work in corporate real estate serving the following functions:

- Design/Architect/Engineers;
- Developers;
- Investor/Owner (Non-occupant);
- Landlord/Building Manager;
- Corporate Real Estate Executives and Managers;
- Facilities Managers;
- Transaction Services/Leasing;
- Real Estate Business Development/Sales;
- Contractor/Construction;
- Portfolio Management.

The working population, or list of respondents that a sample will be drawn from, includes the following:

*CoreNet Global Membership Base:* This population includes individuals that serve various functions within the corporate real estate industry. Additionally, CoreNet Global also includes individuals on this list that are not members, but have attended a CoreNet Global event (e.g., corporate real estate conference). The population includes approximately 10,000 individuals.

*Building Owners and Managers Association (BOMA) Membership Base:* The BOMA population includes BOMA members that are corporate facilities managers. This population includes approximately 400 individuals.
Advisory Panel Contacts: This population includes the colleagues of advisory panel members, both within and outside their own company, that are involved in corporate real estate. The size of this population is indeterminable.

**Determination of Sample Size and Sample Selection Process**
CoreNet Global launches approximately 30 surveys per year in a variety of topics related to corporate real estate. CoreNet Global’s unique experience launching these surveys allowed it to make an assessment of the sample size needed to obtain a desired number of survey responses. CoreNet Global targeted a response of 200 to 300 corporate real estate professionals. To obtain this number of responses, CoreNet Global decided to launch the survey to the following groups of respondents:

- 240 experts registered in CoreNet Global’s Expert Survey Program, which is a list of senior real estate leaders chosen based on their involvement in activities that require a high level of knowledge about corporate real estate;
- a random sample of 3,500 CoreNet Global members;
- 400 corporate members of BOMA; and
- respondents also were given the option to forward the survey link to colleagues. Advisory panel members were asked multiple times to forward the survey to colleagues.

**Design of Survey Instrument**
At the outset of survey design, CoreNet Global identified a web survey as the vehicle of choice for the project. The survey design process illustrated some of the difficulties surrounding survey design for an external client. The initial attempt to compose a survey focused on creating a survey for corporate real estate executives and managers. Additionally, the survey asked many questions on the importance of barriers and enablers to energy efficiency in corporate real estate, and it paid little attention to corporate energy management strategy. A discussion with the client revealed that both the scope of survey participants and content needed to be extended.

A discussion with the client produced a new outline of both survey content and survey participation that is detailed in Figure 15. The figure represents a shift to a survey that is administered to seven different functions in corporate real estate (note, the corporate real estate-executive function is not included in this figure). Moreover, the survey provides equal emphasis on corporate energy management strategy.
energy management strategy and barriers and enablers to energy efficiency. As the graphic illustrates, each function is asked questions that are both similar and different to questions asked of participants from different functions. This format provides enough similar questions across each function to allow for comparisons across the functions while maintaining the flexibility to ask different questions to each function.

**Figure 15: Survey Outline**

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**Pretest of the Survey Instrument**

The pretest of the survey took two forms. First, the online survey was administered to the advisory panel. Nineteen members of the advisory panel took the survey and provided real data. In addition to taking the survey, these respondents were asked to provide comments about the survey content. Following the initial pretest, the data was reviewed to look for any wording problems in the survey. Moreover, a conference call was convened with the advisory panel to discuss content and presentation of the survey. Following the data review and conference call, the survey
underwent a significant content change where the barriers and enablers section, a likert scale rating of barriers and enablers of energy efficiency, was drastically scaled back. Additional content was added and more space for open-ended answers was also included in response to feedback from the advisory panel and CoreNet Global.

After significant revision, the final survey content was agreed upon by representatives from CoreNet Global and RMI. The final stage of the pretest occurred when two members from CoreNet Global and one member from RMI conducted extensive online testing of the survey using the web link that would be inserted into an email sent out to the survey sample.

Implementation of the Survey Instrument
CoreNet Global implemented the survey. The implementation was very basic and included a blast email sent out by CoreNet Global to each of the sample groups discussed in the Sample Size section of this report. During the implementation stage, members of the advisory panel were also reminded to forward the survey to colleagues. Follow-up reminders about the survey were not sent to respondents.

Codification of the Completed Surveys and Survey Data Entry
The use of the online survey tool Zoomerang eliminated the data entry process because the data entered through the online survey was automatically numerically coded and exported into an Excel spreadsheet. Due to time constraints, minimal time was spent cleaning the data. Instead time was spent during the analysis phase looking at the data and assessing the validity of any odd looking data. Additionally, in accord with directions from CoreNet Global, all answers from partially or fully completed surveys were included in the final data set that was analyzed.

Data Analysis and Composition of the Final Report
The methods selected for data analysis reflects the nature of the sample, the size of the respondent pool, and the project objectives. In many survey settings sophisticated statistical techniques like regression can be used to tease out trends in the data; however, the analysis for this project uses simple techniques including evaluating basic averages, data ranges, frequency distributions, and a method suggested by CoreNet Global called the top 2 box. The top 2 box method is utilized for likert scale questions. The percentage of respondents selecting the top two and bottom two numbers in the likert scale range are compared across answer choices. The top two box
methodology is essentially a more structured way of looking at answer distributions. These four basic techniques are applied where appropriate across survey questions using judgement to decide when one or all analytical strategies should be employed.

The ability to identify respondents by function within corporate real estate (e.g., designer/architect or corporate real estate executive, etc.) and identify respondents by geographic region allowed the exploration of differences in answers based on these identifications. Time was spent before the analysis process with Eric Bowles of CoreNet Global to go through each question and think about what analytical methods and what comparisons would be appropriate. This process was primarily informed by an intuition about the questions where regional or functional differences might have an impact in the answers and reveal something interesting. For instance, in a question about the importance of drivers of energy efficiency (i.e., energy costs, sustainability, etc.), the differences among functions and regions was assessed. In contrast a question about the frequency of adoption of specific energy management elements was evaluated in aggregate because the goal was not to assess differences but to understand how many companies actually employed each management element.

**Methodological Critique**
The development of the survey that is the basis of this project was strongly influenced by client feedback. CoreNet Global, the client, provided invaluable assistance and also brought a general vision for the project that directed survey development. Moreover, CoreNet Global implemented the survey.

CoreNet Global’s involvement and influence lead to the development of an expansive survey that was customized for seven different real estate functions. This approach to survey development permitted the surveying of a wide audience and the comparison of their responses across similar questions. However, it also limited the number of responses for each variant of the survey; thus limiting the types of analyses that could be performed.
The implementation of the survey involved a mix of random and non-random sampling techniques. Moreover, follow up communications were not provided to those in the sample that had not taken the survey during the survey period. Dillman’s Tailored Design Method, a widely utilized process for creating and implementing a survey, specifies the importance of follow-up communication.\(^{30}\) The failure to follow an implementation strategy like that outlined by Dillman, produced a very low response rate. The non-random nature of the sampling and the relatively low response rate, which was approximately 5.9 percent\(^ {31}\), also limited the types of analyses that could be performed and the level of extrapolation that could occur. Nevertheless, in structuring the survey and implementation as described above, CoreNet Global was able to meet the needs of the research project it had outlined in the initial contract it signed with RMI.

These points are meant to illustrate the tension between producing and implementing an academically sound survey and working under client constraints. Without the resources and member base that CoreNet Global brought to RMI, this survey would not be possible. Similarly, given CoreNet Global’s frequent launch of surveys (CoreNet Global launches 30 surveys per year), pester its member base about one survey would not be advisable. The confluence of these and other factors produced the survey described in this report. Although the survey design and implementation does have its methodological weaknesses, including an overly expansive scope and ineffective implementation, the survey was still able to deliver the data initially sought at project inception. In retrospect, I think a reasonable level of balance was struck between client constraint and academic soundness.

**Appendix 3 - Barriers to Energy Efficiency**

The barriers are separated into six categories: 1) financial barriers, 2) tenant/occupant barriers, 3) design barriers, 4) construction/o&m barriers, 5) metrics/other barriers, and 6) attitudinal barriers. The Advisory Panel identified these barriers during a meeting held in August 2006. After brainstorming barriers to energy efficiency, each advisory panel member was given a fixed num-

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\(^{31}\) This is a rough approximation of the response rate using the known quantity of respondents (244, see Section 4.1) and the known quantity in the sample (4,140, see Section 6.2.5). The calculation does not account for the snowball sampling that took place using references from advisory panel members.
number of votes he/she could attach to the barriers that he/she believed were most important. The priority numbers to the left of each barrier represent the number of votes each barrier received.

Table 7: Financial Barriers

<table>
<thead>
<tr>
<th>Priority</th>
<th>Barrier</th>
</tr>
</thead>
<tbody>
<tr>
<td>9</td>
<td>Focus exclusively on $/s.f.</td>
</tr>
<tr>
<td>5</td>
<td>Cannot quantify value of energy efficiency measures</td>
</tr>
<tr>
<td>5</td>
<td>Appraisal / market value of buildings does not include energy efficiency</td>
</tr>
<tr>
<td>4</td>
<td>Short term leases discourage energy investments</td>
</tr>
<tr>
<td>4</td>
<td>Split incentives between owner and tenant</td>
</tr>
<tr>
<td>4</td>
<td>Pass-through expenses</td>
</tr>
<tr>
<td>3</td>
<td>Short term flexibility vs. long term financing</td>
</tr>
<tr>
<td>2</td>
<td>Capital budgets vs. operating budgets</td>
</tr>
<tr>
<td>2</td>
<td>Life-cycle analysis takes time and money</td>
</tr>
<tr>
<td>1</td>
<td>Component by component cost analysis</td>
</tr>
<tr>
<td>1</td>
<td>Pays flat rate per s.f. for energy (predictability of costs valued)</td>
</tr>
<tr>
<td>0</td>
<td>Difficult to figure out/analyze benefits of tax credits</td>
</tr>
<tr>
<td>0</td>
<td>Gross leases give no incentive for energy management</td>
</tr>
<tr>
<td>0</td>
<td>Capital availability - choosing other investment over energy efficiency</td>
</tr>
<tr>
<td>0</td>
<td>Premium cost for renovations</td>
</tr>
<tr>
<td>0</td>
<td>Lack of insurance / tax incentives</td>
</tr>
<tr>
<td>0</td>
<td>Lack of utility incentives</td>
</tr>
</tbody>
</table>

Table 8: Tenant/Occipant Barriers

<table>
<thead>
<tr>
<th>Priority</th>
<th>Barrier</th>
</tr>
</thead>
<tbody>
<tr>
<td>2</td>
<td>Takes low bids for design/construction work</td>
</tr>
<tr>
<td>1</td>
<td>Too much emphasis on rates rather than on energy use</td>
</tr>
<tr>
<td>1</td>
<td>Little in-house energy expertise</td>
</tr>
<tr>
<td>0</td>
<td>Occupants not given instructions on how to improve performance</td>
</tr>
</tbody>
</table>
**Table 9: Design Barriers**

<table>
<thead>
<tr>
<th>Priority</th>
<th>Barrier</th>
</tr>
</thead>
<tbody>
<tr>
<td>0</td>
<td>Neighbors benefit equally from energy measures you implement</td>
</tr>
<tr>
<td>0</td>
<td>No incentive/difficult to obtain internal energy data</td>
</tr>
<tr>
<td>0</td>
<td>Knows of few examples of energy-efficient design</td>
</tr>
<tr>
<td>0</td>
<td>Lack of corporate knowledge - “will is work for us?”</td>
</tr>
<tr>
<td>0</td>
<td>Assumption that “this doesn’t apply to me”</td>
</tr>
<tr>
<td>0</td>
<td>Multiple workstations and increased mobility</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Priority</th>
<th>Barrier</th>
</tr>
</thead>
<tbody>
<tr>
<td>8</td>
<td>Lack of integrated design</td>
</tr>
<tr>
<td>3</td>
<td>Excessive safety margins instead of better systems monitoring</td>
</tr>
<tr>
<td>2</td>
<td>Lack of incentives and performance-based contracts</td>
</tr>
<tr>
<td>2</td>
<td>Compressed project schedules</td>
</tr>
<tr>
<td>2</td>
<td>Experience level of design team</td>
</tr>
<tr>
<td>2</td>
<td>Does not emphasize whole-systems thinking</td>
</tr>
<tr>
<td>1</td>
<td>Percentage or flat-fee contract does not incentivize extra effort</td>
</tr>
<tr>
<td>1</td>
<td>Pushes budget and schedule not goal setting or communication</td>
</tr>
<tr>
<td>1</td>
<td>Involves key players too late in the game</td>
</tr>
<tr>
<td>1</td>
<td>Paid based on value of deal, not long term financial performance</td>
</tr>
<tr>
<td>1</td>
<td>Oversizes equipment to avoid liability</td>
</tr>
<tr>
<td>1</td>
<td>Doesn’t build energy model for project</td>
</tr>
<tr>
<td>0</td>
<td>Need to customize energy package for each client</td>
</tr>
<tr>
<td>0</td>
<td>Leaves sizing of equipment to manufacturer</td>
</tr>
<tr>
<td>0</td>
<td>Delegates work to outside consultants</td>
</tr>
<tr>
<td>0</td>
<td>Isolating metering is difficult</td>
</tr>
<tr>
<td>0</td>
<td>Uses rule-of-thumb design</td>
</tr>
</tbody>
</table>

**Table 10: Construction/Operations & Maintenance Barriers**

<table>
<thead>
<tr>
<th>Priority</th>
<th>Barrier</th>
</tr>
</thead>
<tbody>
<tr>
<td>8</td>
<td>Lack of integrated design</td>
</tr>
<tr>
<td>3</td>
<td>Excessive safety margins instead of better systems monitoring</td>
</tr>
<tr>
<td>2</td>
<td>Lack of incentives and performance-based contracts</td>
</tr>
<tr>
<td>2</td>
<td>Compressed project schedules</td>
</tr>
<tr>
<td>2</td>
<td>Experience level of design team</td>
</tr>
<tr>
<td>2</td>
<td>Does not emphasize whole-systems thinking</td>
</tr>
<tr>
<td>1</td>
<td>Percentage or flat-fee contract does not incentivize extra effort</td>
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<td>1</td>
<td>Pushes budget and schedule not goal setting or communication</td>
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</tr>
<tr>
<td>0</td>
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<td>0</td>
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</tr>
<tr>
<td>0</td>
<td>Delegates work to outside consultants</td>
</tr>
<tr>
<td>0</td>
<td>Isolating metering is difficult</td>
</tr>
<tr>
<td>0</td>
<td>Uses rule-of-thumb design</td>
</tr>
</tbody>
</table>
### Table 11: Metrics/Other Barriers

<table>
<thead>
<tr>
<th>Priority</th>
<th>Barrier</th>
</tr>
</thead>
<tbody>
<tr>
<td>3</td>
<td>Lack of training/retraining for building operators</td>
</tr>
<tr>
<td>3</td>
<td>Doesn’t receive enough training on building systems</td>
</tr>
<tr>
<td>3</td>
<td>Paid to make things work, not to make them work effectively</td>
</tr>
<tr>
<td>0</td>
<td>Sunk costs - when should equipment be replaced?</td>
</tr>
<tr>
<td>0</td>
<td>Difficult to order/purchase energy-efficient products</td>
</tr>
<tr>
<td>0</td>
<td>Availability often dictates equipment or material selection</td>
</tr>
<tr>
<td>0</td>
<td>Has inadequate systems monitoring or interfaces</td>
</tr>
</tbody>
</table>

### Table 12: Attitudinal Barriers

<table>
<thead>
<tr>
<th>Priority</th>
<th>Barrier</th>
</tr>
</thead>
<tbody>
<tr>
<td>5</td>
<td>No stats showing after-the-fact energy use vs. design capacity</td>
</tr>
<tr>
<td>2</td>
<td>Lack of corporate (or industry) best practices for efficiency</td>
</tr>
<tr>
<td>2</td>
<td>Timing of information (access to)</td>
</tr>
<tr>
<td>1</td>
<td>Few metrics against which to compare energy costs</td>
</tr>
<tr>
<td>1</td>
<td>Prescriptive contracts as a result of too few best practices</td>
</tr>
<tr>
<td>1</td>
<td>Legislation doesn’t push U.S. companies on environmental issues</td>
</tr>
<tr>
<td>1</td>
<td>Lack of general knowledge base</td>
</tr>
<tr>
<td>0</td>
<td>Building standards - “this is the way we’ve always done it”</td>
</tr>
<tr>
<td>0</td>
<td>Disconnect amongst technical languages</td>
</tr>
<tr>
<td>0</td>
<td>Little demand for green buildings</td>
</tr>
<tr>
<td>0</td>
<td>Energy is a profit center</td>
</tr>
<tr>
<td>0</td>
<td>Technologies change fast</td>
</tr>
</tbody>
</table>

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## Priority | Barrier
---|---
I | Risk at all steps/fear of failure
I | Risk perception
I | Not strong enough architect/engineer partnerships
O | Single investments vs. culture of change (annual energy budget)
O | Complexity and compromises dominate design
O | Value location and aesthetics not energy efficiency
O | Unfamiliar with project goals and sensitivities

During the group’s discussion, several other comments were mentioned that did not make their way into the above matrices. These include:

- ★ Suppliers of energy efficiency equipment are not experiencing pull in the marketplace;
- ★ Energy investments in the US are driven by financial consideration, whereas investments in Europe are driven by sustainability considerations;
- ★ Information systems restrictions may make it difficult to install energy monitoring or other related software on computer systems;
- ★ Information technology (IT) personnel create data rooms that are energy intensive, and they are not interested in incorporating energy-efficiency for fear of IT interruptions or data loss;
- ★ Complexity of market (many different vendors supplying different information) and rapid technological change create an incentive to wait before making energy efficiency investments.
Bibliography


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