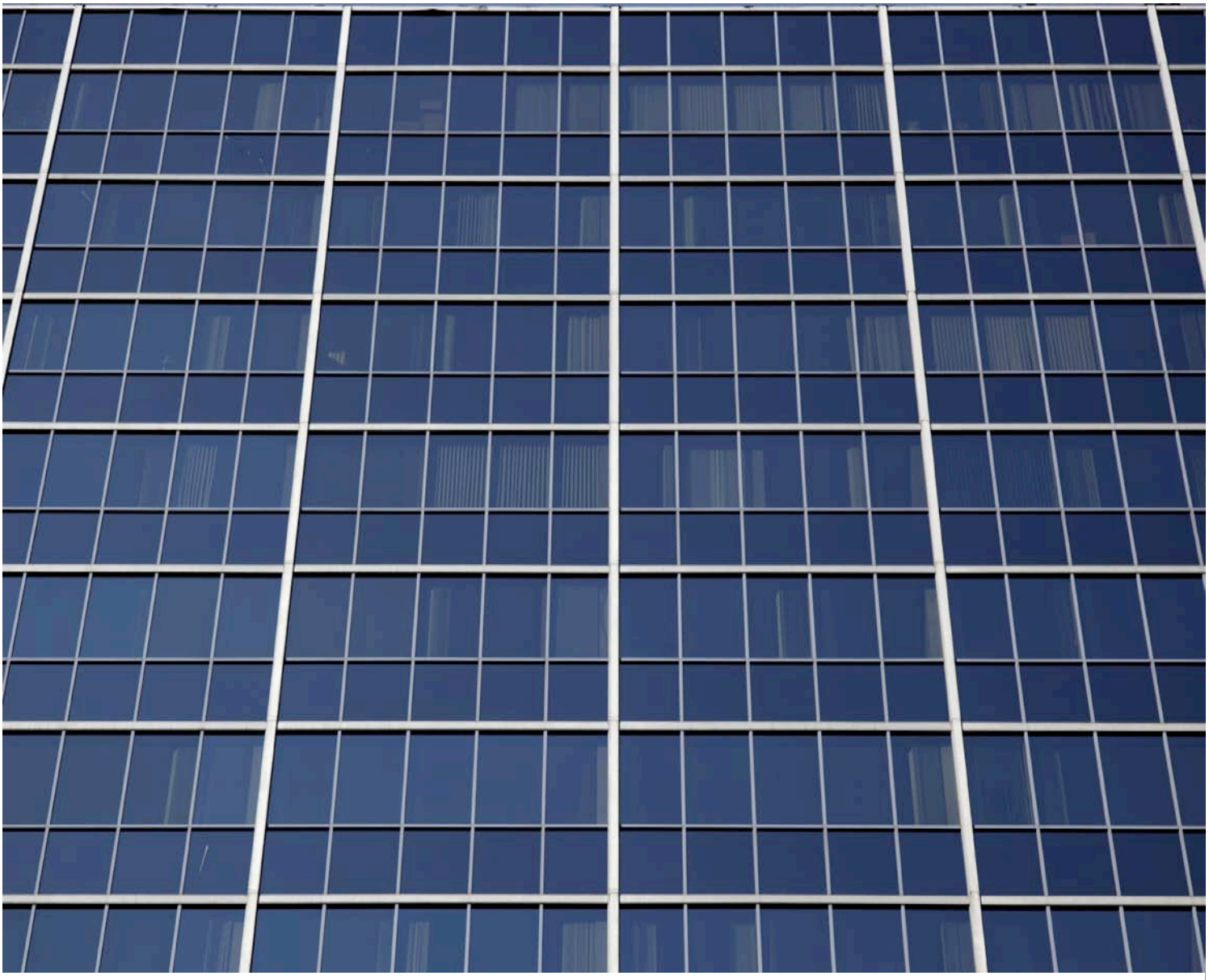

Green Commercial Real Estate: Office Assets

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Table of Contents

Executive Summary

With the current state of the Canadian commercial office asset portfolio lagging behind its international competitors there is a significant opportunity for building owners to assume a leadership role in increasing the green building stock, thereby differentiating them from the balance of the industry. This benchmarking analysis of sustainable best-practices in the office space sector of the commercial real estate industry assessed current and future building retrofit projects for the most common, the most innovative, and the most advantageous opportunities available to building owners interested in pursuing a more strategic approach to Corporate Social Responsibility (CSR).

There are multiple drivers in the commercial real estate sector for pursuing comprehensive CSR strategies. Building owners are realizing that they are afforded many advantages in assuming a sustainable approach to building management and operations. Over-and-above the operational cost savings that accompany retrofitting existing building assets, owners are recognizing that CSR programs create considerable market differentiation by appealing to tenants who are similarly differentiating from their own competitors based on environmental stewardship. To achieve this, building owners are subscribing to standards set forth by certifying bodies such as The United States' LEED program and the United Kingdom's BREEAM program. These organizations facilitate the communication of environmental technologies and initiatives in the building sector to the general public.

Building owners are focusing on several key areas when considering potential opportunities for cost-saving initiatives and market differentiation through building retrofits. The cost-saving efficiencies that come from addressing energy consumption are the most common means for building owners to driving down their operating costs. The upgrading and/or automating of these systems, such as lighting and HVAC, are improving energy efficiency within buildings by removing the variability brought about by human intervention in the system's normal operation.

Water conservation is a common and practical means for building owners to minimize their variable costs. By addressing external and internal water consumption patterns building owners are realizing the previously lost opportunities for minimizing costs associated with water use. Automating external systems, whether by incorporating soil moisture sensors into landscape irrigation designs, or internal systems, by using automated water faucets, aerators, and low/dual-

flush toilets, are some strategies. These technologies are being supplemented by aggressive water recycling and rainfall collection programs that rehabilitate and reuse water, thereby minimizing the amount of water drawn from municipal sources.

Building owners are also achieving great successes by catering to the needs of tenants and employees. By assisting in the ongoing health and well-being of building occupants, building owners have increased the value of their office space to clients, whether it is through office design and increased natural lighting, or through enabling alternative transportation by locating office space near to mass transit or the provision of bicycle lockers and shower facilities. These programs and decisions increase the desirability of office space to both tenants and employees alike.

The practice of benchmarking these projects reveals interesting and replicable trends and strategies in the greening of an office asset portfolio. Involving stakeholders from design through implementation will expedite the process and maximize the return on a building owner's investment. Further, a CSR program must be methodical and strategic in its implementation to be truly effective; a haphazard approach to project implementation will diminish the return on investments. A CSR program for office assets must also be comprehensive, not merely focusing on energy efficiency and water conservation but also on tenant and employee engagement. These stakeholders realize the greatest impact of the CSR program and have a tremendous role in the success of the projects. Most importantly, market differentiation can only be accomplished through the communication of successes in sustainable building retrofits.

Background Information

As the impact of buildings and building operation on the natural environment comes under increasing scrutiny, owners of commercial real estate property are investing capital and time in retrofitting their existing portfolio of assets. While still in its infancy, the greening of office buildings is gaining momentum globally from owners as they realize the value that redeveloping their property along sustainable lines can bring to their assets. That being said, there is a general apathy on the part of building owners within the Canadian marketplace, which lags behind other developed nations in the push toward responsible building ownership[1], despite the fact that empirical evidence exists which suggests that green office space can demand rental premiums of upwards of 5% versus conventionally-built office buildings[2]. When tenant demand and willingness to pay are taken into consideration, the value of retrofitting a building is compounded.

Market Analysis

The current market for 'Green' buildings in the commercial sector is expanding rapidly, with projections that commercial real estate will represent roughly 80% of buildings by 2020[3], totaling roughly 53 billion square feet[4]. Several interesting factors become relevant here:

1) LEED-NC projects outnumber LEED-EB buildings by roughly 5 to 1[5], meaning that new construction is being targeted by building owners rather than upgrading existing building structure and operational efficiencies.
2) The existing building stock increases at roughly 2 to 3% per year[6], indicating that new construction does little in the way of increasing the total amount of green office space.

When considered together, these two facts suggest that many corporations are constructing new office space for their own use, attempting to take advantage of new building efficiencies and the new marketing opportunities they bring, without considering retrofitting their existing office space.

This compounds the difficulty for the growing segment of the tenant market seeking out green office space to rent. Therefore, the value of bringing a building's operational efficiency in line with tenant demand outweighs the amount of green office space currently available. This is the result of a sustained general interest by a considerable segment of the public in corporations being held accountable for their business practices. As such, there is ample opportunity for a building owner to

take advantage of these disparities by retrofitting its existing office buildings to lessen its environmental footprint. Within the commercial real estate market there are many ways for companies to establish their commitment toward environmental responsibility to society at large while still keeping in mind their fiscal responsibility to either their shareholders and/or company employees.

The ability to take advantage of this market differentiation rests on a building owner's ability to communicate its efforts to the public. Increasingly, this is being done through independent certifying bodies, which legitimize the process. There are many organizations that assess green building design; the value of each to their client rests largely on regional brand recognition. In North America the most prominent organization is the United States Green Building Council's (USGBC) Leadership in Energy and Environmental Design (LEED) (Appendix 1: Certifying Bodies), while in the United Kingdom the most relevant certifying body is the Building Research Establishment's Environmental Assessment Method (BREEAM) (Appendix 1: Certifying Bodies). Each of these organizations certify buildings according to the minimization of their environmental footprint as accomplished through thoughtful, innovative and circumspect design processes that consider green technology as an extension of the natural environment and, as such, build it into the heart of the construction and operations and management of the facility. With certification comes both increased transparency and objectivity[7], which helps to satisfy and fuel the market demand for green buildings.

Prominent Certifying Bodies

1) Leadership in Energy and Environmental Design (LEED)
2) Building Owner and Manager Association (BOMA BESt - GO GREEN PLUS)
3) Building Research Establishment's Environmental Assessment Method (BREEAM)
4) Green Star

Company Performance and Opportunities

There is considerable evidence supporting the strength of companies that take a strong stance on CSR[8]. An assumption may be made, therefore, that a company's CSR program is an intrinsic part of its corporate strategy. It may be difficult to separate whether the strength of a company's stock is linked directly to its financial performance or to public perception of its environmental and social performance on its operations. Regardless, financial performance is affected by operational

efficiencies, which is a central consideration in the movement toward a greener global building inventory. The overall strategy behind developing CSR programs in commercial office space is seen as an important differentiator in an increasingly competitive marketplace[9].

In a press release on the CB Richard Ellis website (CB Richard Ellis, November 12, 2009), the company cites a study conducted in partnership with the University of San Diego that outlined some of the benefits to tenants of green office space, resulting in 2.88 fewer sick days and an increase in productivity of 55%[10]. This contributed to lower vacancy rates (by 3.5%) and rental rates, which were 13% higher than the market average[11]. Leveraging these marketing opportunities, therefore, appear to be the driving force behind a great number of companies' decision to undertake CSR initiatives[12].

Three Primary Motivations for Office Building Retrofits

1. Increase desirability to tenants interested in 'Green' office space
2. Reduce operational expenses through energy efficiency
3. More stringent building regulations as dictated by various levels of government

https://www.pikeresearch.com/wordpress/wp-content/uploads/2010/05/GBCP-10-Executive-Summary.pdf (Q2 2010)

Regardless of the motivation for undertaking CSR initiatives, the inherent benefits can be seen in the declining green house gas emissions that retrofitted buildings are demonstrating (please refer to the Case Study: Empire State Building, page 26)[13]. Whether it be in terms of energy efficiency, water conservation, or waste reduction, the sum of the initiatives is greater than the individual projects. Each of these works to lessen the environmental impact of building operations and management and, as such the value to society is immeasurable. The Intergovernmental Panel on Climate Change (IPCC), in its Fourth Assessment Report, stated that there is an opportunity to cost-effectively reduce the global emissions of residential and commercial buildings by up to 29% of the projected baseline emissions by 2020[14]. This, the report further states, is best accomplished through increased use of best-available technologies in areas such as lighting, heating, HVAC, and the building envelope[15].

Industry Best Green Practices in Commercial Real Estate

Within the commercial real estate market there are many ways for companies to establish their commitment to environmental responsibility to the public while maintaining fiscal responsibility. There are several key areas that office-building owners are focusing on when developing their CSR programs. Because of the benefits of aligning with certifying bodies, such as LEED, the initiatives undertaken by a corporation typically subscribe to the requisite criteria set forth by those bodies. All certifying bodies have the same basic tenets from which they make recommendations, focusing predominantly on energy efficiency, water use, and indoor environmental quality. In instances where the property management company is operating in a contractual capacity and does not own the building, and based on the aforementioned tendency of the property management companies to be a catalyst for building retrofits, it is logical to assume that retrofits are approached strategically, with the certifying body dictating which areas the building owner focuses on in order to garner the most qualifying points.

Energy Efficiency

Certifying bodies such as LEED pay particular attention to the energy efficiency of a building and reward initiatives aimed at reducing energy consumption[16]. As a result, energy efficiency is a primary area of focus for owners in evaluating opportunities for building retrofits. Practically speaking, increased energy efficiency translates directly into decreased operational expenses; competent building owners recognize the value in addressing and rectifying these inefficiencies. Retrofits that are designed to increase energy efficiency subsequently translate into positive changes in other aspects of building operations.

Energy Management Systems

Building owners are placing a great emphasis on automating their building systems when developing their CSR programs, particularly when gross leases are in use. Gross leases include operating costs in a tenant's rental rates, meaning the impetus for said tenants to curb their consumption is greatly reduced[17]. By investing in automated systems, building owners are accomplishing several things. They are affirming their commitment to energy and water conservation by reducing their consumption practices. In doing so, though, they are also tacitly removing the tenants from the operations equation. HVAC systems, lighting and water consumption are all key areas that building owners are focusing on in their retrofit plans. Not

coincidently, these systems, when left to the tenants, will be abused. By automating the building systems to respond to ambient conditions, tenants have less of an impact on operational costs, consequently increasing the profit margins.

Sub-metering

By changing the lease arrangement from a gross lease to a net one, in which the tenant is responsible for certain specified operating costs, the burden of energy efficiency can fall to the tenant. The process of sub-metering re-allocates operational costs from the building owners to their tenants. In its retrofit program, The Toronto-Dominion Centre (Toronto, Canada) installed sub-meters on each floor of the 77 King Street West office tower.[18]In doing so, the property management company (Cadillac Fairview) made each tenant responsible for its energy consumption. The tenants are able to log in to the energy management system, view and manage individual and/or specific energy consumption[19]. Electricity sub-metering has proven itself to be a very efficient means to reducing overall energy consumption in multi-tenant facilities; in residential units in Ohio, newly installed sub-metering resulted in on-average savings of 17% with a payback period of just 10 months[20]. The value of sub-metering increases when the volatility of energy markets is considered; sub-metering allows building owners to mitigate the risks that stem from fluctuating energy prices[21]. This fact emphasizes the need to monitor energy consumption and efficiency to the tenant. The value of sub-metering to the individual tenant is further enhanced given that different tenants use different amounts of energy based upon the processes they employ in their day-to-day operations[22]; sub-metering is a more attractive option than other forms of cost allocation for companies that are not energy intensive by nature.

Sub-metering could also theoretically tell building owners if there is a breach in the building envelope based on drastic disparities between tenant bills. This would require communication with the tenant, however if the tenant is responsible for their own consumption then they would be wise to cooperate with the building owner on a matter such as this. A recent release by Greening Greater Toronto revealed that a retrofit, that included sub-metering by the law firm Stikeman Elliott LLP, led to combined annual cost savings of roughly $50,000[23]. While it is true that sub-metering cannot take sole credit for the increased energy efficiency, it should be noted that by simply having an engaged workforce coupled to a clear message of accountability, sub-metering can have a substantial impact on the operating costs of building, be they those of the building owner or tenant.

Heating / Venting / Air Conditioning (HVAC) System Upgrades

HVAC systems present a dramatic opportunity for building owners to reduce their environmental impact, given North America's climate. The longevity of these systems, coupled with the fact age of the existing building stock[24], means that many systems are older and less efficient compared to the new systems being developed. As such, a considerable amount of energy (and therefore cost) can be saved by upgrading HVAC systems during a retrofit. These systems work together to create an optimal working environment for the tenants of the building, making the systems a central aspect of tenant comfort and therefore productivity. One way that HVAC systems are being upgraded is through the inclusion of variable speed drives, which engage at different speeds based on the level of demand for the particular system being called upon. This means that systems run on the minimal amount of energy necessary except when needed. Adobe Systems reprogrammed its parking lot ventilation fans to respond to ambient CO_2 levels[25], which were highest for 15-minute intervals during the arrival and departure of its employees. A $200 investment in the labour required to reprogram the system resulted in annual savings of roughly $99,000[26], proving that intuitive thought, coupled with technological improvements, can have dramatic consequences on operating costs when properly applied.

Heating

At roughly 25%, space heating in North America accounts for the majority of a building's energy consumption[27]. With this in mind, building owners can work to reduce the cost associated with heating their buildings by approaching it in several ways. The primary one, of course, is through the upgrading of an older system to a more energy efficient one. This is the strategy that the owners of the Empire State Building have taken[28].

Alternatively, increasing the insulating capacity of the building envelope is a viable and valuable option. While boiler upgrades represent an active approach to improving the heating efficiency of a building, there are more passive systems that can be incorporated into a retrofit. Window glazing is one area that is being addressed. Double-paned, low-emissivity windows filled with inert gas (mostly argon) are common practice in building design. Armstrong World Industries, at their world headquarters in Lancaster, Pennsylvania, made use of these on over 80% of its physical structure[29].

Another passive strategy that is becoming more common is the creation of a dead space between the original building and a new glass façade. The Telus-William Farrell Building, in Vancouver, incorporated a second skin into its retrofit design (please refer to the Case Study: Telus-William Farrell, page 23)[30]. This empty space acts as an insulating buffer; the façade blocks solar heat gains in the summer and captures solar heat gains in the winter[31], maintaining a more consistent temperature, which contributes to reduced energy consumption over the course of the year. A similar technique was used in the construction of the Genzyme Centre in Cambridge, Massachusetts, which covers over 30% of the new building (Please refer to the Case Study: Genzyme Centre, page 29)[32]. This is an example of how similar techniques can be replicated in both new and retrofit construction projects.

Cooling

Chiller plant upgrades are an opportunity for building owners to reduce the amount of energy consumed in the cooling of the building, given that the cooling of office space comprises 23% of the amount of energy used in commercial building operations[33]. This is important in urban areas, where island heat gain during the warmer months increases the temperature in the immediate vicinity of a building; the chiller system is not only responding to the heat energy created by its occupants, internal operations, and the direct thermal heat gain from solar incidence on the building's surface but also the heat absorbed and subsequently released from surrounding roads, etc. The Empire State Building will undergo a chiller upgrade as part of its retrofit design[34]. The Toronto-Dominion Centre in Toronto, Ontario substituted the traditional chiller system configuration for a more innovative approach by linking its chiller capacity to an existing system tied directly to the waters of Lake Ontario[35]. This system has reduced the capacity of the Centre's chilling system by 13,000 tonnes, resulting in a reduction in electricity consumption of 90% relative to the previous system[36]. Another technique that has been put into practice at the Genzyme Centre to increase energy efficiency is fan coil units that pump cold water throughout the building rather than cool air[37], which absorbs heat energy more readily than water. This translates into higher efficiency in the cooling process.

Ventilation

HVAC systems rely on ventilation to distribute the conditioned air from the central chiller or boiler throughout the physical structure. The use of natural ventilation is gaining increasing popularity in

office buildings as building owners use the natural outdoor environment to moderate the interior temperature conditions as needed. The Alberici Corporate Headquarters has both automatic and manually operable windows[38], the combination of which serves several purposes. The automatic windows are linked to interior CO_2 sensors, opening when the internal concentration of the gas reaches a predetermined level[39]. The manually operable windows allow tenants to manipulate the temperature in their immediate vicinity, allowing the building to operate at a consistent temperature (thereby lowering the total load on the heating and cooling systems) while affording the employee the means to control their own personal working area[40]. This not only improves the tenant's comfort with regard to temperature but also increases their access to fresh air, which can impact employee health and productivity[41].

Air ducts fed through the subfloor of office spaces are giving tenants other options in managing their personal comfort; these below-floor ducts allow vented air to be delivered to individual work stations, providing an additional means to moderate localized air temperatures. In addition to increased energy efficiency and tenant comfort, these subfloor systems also contribute points toward LEED certification as they provide increased flexibility in office design[42]. Fan coil units are also being employed to service smaller areas within an office building[43], giving inhabitants of these areas personalized control over their immediate environment while allowing building temperatures to remain consistent throughout the balance of the building.

Lighting

Lighting represents roughly 17% of energy costs in commercial buildings[44]; a major area of focus for building owners in their pursuit of greater energy efficiency is in the way in which their lighting systems operate. Major lighting retrofits that transition a building to more energy efficient lighting systems have been recognized as having a dramatic impact on operational costs, as in Adobe Systems' 2004 lighting retrofit that contributed to their LEED-EB Platinum rating for their office complex in San Jose, California (please refer to the Case Study: Adobe Systems, Inc., page 25)[45]. Another tactic that building owners are taking to reduce operating costs associated with lighting the interior of buildings is by increasing the amount of natural light that penetrates the building interior.

One such technique is with light shelves, which, when combined with appropriately coloured ceilings, reflect natural light deeper into the building's interior[46]. This, when complemented by

open-concept office space with low or glass dividers, results in a reduction in the amount of artificial light necessary to light the office space, and therefore reduced energy costs; Genzyme has reduced energy demands from lighting by up to 48% (please refer to the Case Study: Genzyme Centre, page 29)[47]. Ancillary benefits to increasing natural light within the building (over and above the associated cost savings) are an increased point tally on the LEED scorecard[48].

Simple techniques such as motion sensors are becoming increasingly common; Alberici World Headquarters in Overland, Missouri, is equipped throughout the building to respond to the presence or absence of a person in a particular area of the office[49], turning lights on or off as needed. The Environmental Protection Agency's Joe Serna Building in Sacramento, California, has modified its after-hours lighting controls to reduce consumption when fewer tenants are present in the facility.

Annual cost savings, when coupled with heating system upgrades, total roughly $100,000[50]. There are also innovative ways to reduce an office building's dependence on artificial light by using automated lighting systems, such as at the Genzyme Centre in Cambridge, Massachusetts, which installed a system of mirrors that tracks the sun's daily progress through the sky and reflects light rays down into the building via its central atrium[51]. There are many other examples of automated systems that respond to natural external light levels and, in conjunction with interior light dimmers, adjust the internal light levels to maintain a consistent ambient environment. These systems can incorporate blinds and/or louvers, which also lead to reduced thermal heat gain from solar energy and consequently reduced the energy used to maintain the internal air temperature[52].

Water Conservation

Minimizing water usage in buildings has several implications on operating costs. Water consumption affects operating costs and affects the bottom line. Beyond that, the use of water has implications on energy costs, given that cold water must be heated and distributed throughout the building. Any initiative, therefore, that reduces water consumption can influence multiple layers of operating costs. Over and above these factors is the value of water conservation for environmental preservation. The Toronto-Dominion Centre is supporting its internal initiatives with regular water audits[53], put in place to establish water use patterns with the goal of identifying additional opportunities for reductions in water consumption. The value of such ongoing audits and/or

commissioning is immense, as justified by the discovery of a leak at Armstrong World Headquarters that, when fixed, revealed 105,000 litres of water wastage annually[54].

Internal Initiatives: Water faucet, toilets, and urinals

Water faucets in buildings are a very common focus of attention when addressing water conservation. Motion-activated faucets that reduce water usage have long been incorporated into office buildings. They are now being fitted with aerators, which compound the reduction in water consumption by limiting flow while the faucets are on. Building owners are turning to low-flush toilets and waterless urinals to reduce the amount of water consumed in these processes. Such strategies have contributed to Adobe's 22% reduction in water consumption at its San Jose campus[55].

External Initiatives: Rainwater Harvesting

Rainwater harvesting is a useful tool to reduce the amount of water drawn from municipal sources. Buildings located in geographic regions with high levels of precipitation have a considerable opportunity to minimize the operating costs associated with water consumption. Not only does rainwater harvesting reduce reliance on the municipal network but it also reduces storm water runoff. Storm water management is an important consideration in urban areas because impervious surfaces such as concrete and asphalt prevent natural absorption into the ground; instead the water accumulates in sewers, etc., where sudden increases in volume can have negative implications on municipal systems[56]. The Alberici building in Overland, Missouri, will save 550,000 litres annually for sewage conveyance purposes due to a storm/rainwater catchment system collecting runoff from its garage facilities[57].

External Initiatives: Landscape Irrigation

Landscape irrigation is being approached with considerable practicality. Landscape design is now incorporating native plants into the building's exterior aesthetic, which is of particular importance in regions with little or irregular rainfall. These plants are better-suited for growth in a particular area as they are acclimated to these rainfall patterns more so than non-native plants. These plants automatically lower the baseline level of water required to ensure their upkeep and survival. The EPA's Joe Serna Jr. building in Sacramento, California, realized a 50% reduction in water used for irrigation[58]. The benefits of this strategy are being augmented with the inclusion of automated drip

irrigation systems, such as the one at the Adobe Systems complex in San Jose, California, which responds to soil moisture sensors, triggering watering at predetermined soil moisture content[59]. Adobe saw a 76% percent reduction in its irrigation water consumption as a result of its landscape design strategy[60].

Grey water and Black Water Recycling

Water recycling programs and initiatives are gaining in popularity as much of the water consumed in building operations can be treated and reused in future applications. Grey water and black water are terms used for water that has been previously used and reconditioned for successive uses through a series of physical and chemical treatments. Chanan *et al.* use the term 'water cascade' to describe the matching of water end use relative to the quality of water necessary for that use (please see table)[61]. Grey water is the term given to water used in activities such as showering and washing one's hands. Black water refers to the water discharged from the toilet. Because of microbial contamination black water must undergo additional treatment, and even then it is non-potable, its uses restricted to landscape irrigation[62]. As part of a developmental initiative a commercial office building in Melbourne, Australia, belonging to the Industry Superannuation Property Trust was outfitted with a combination of water saving devices and a black water treatment system. Initial predictions for this 34 story office tower estimated water conservation from this retrofit at roughly 97,000 litres per day, or 36 million litres per year[63]. Operating costs of the treatment plant were projected at between $13,000 and $27,000 over the first 10 years compared with first-year savings of between roughly $20,000 and $22,000, respectively[64].

Water Quality Cascade with End Uses

Source	End Use
Municipal Water OR Treated/disinfected water	Drinking Kitchen Showers Basin
Treated and disinfected greywater	Cleaning Cooling tower make up Toilet flushing
Treated and disinfected cooling tower blowdown	Cleaning Toilet flushing
Black water blowdown	Roof garden irrigation

http://www.isf.uts.edu.au/publications/chananetal2003sustainableofficebuildings.pdf

Tenant and Employee Comfort / Engagement

On a macro level, systems automation is being used but there is still some tenant control over their personal comfort on a micro level, for instance with operable windows or personal workstation venting control (please refer to the Case Study: Genzyme Centre, page 29)[65]. The individual tenant has some control but while some people will need more airflow others will need less, which mitigates the overall impact of the personal control. By offering some flexibility at the personal level there is a reduction in the overall demand due to varying employee needs. Various cost-saving and tenant engagement activities often demonstrate an interdependence between tenant comfort and operational costs, further supporting the role of the tenant in minimizing both costs and environmental impacts.

Similarly, companies are developing comprehensive public relations materials to clearly communicate their corporate objectives in the sustainability realm to tenants and employees. In clearly stating their environmental platform to stakeholders building owners are substantiating their strategic goals while fostering participation, which increases the success of their CSR initiatives. Property owner Cadillac Fairview used the retrofit of the Toronto-Dominion Centre as an opportunity to implement its Occupant Engagement Program (OEP), an operational review that actively encourages its tenants to practice 'progressive consumption and meet eco-friendly standards'[66]. Oxford Properties implements a similar program, Sustainable Intelligence, in its office buildings[67]. The results of these programs and materials, while not empirically measurable, do support and reinforce other initiatives, making them invaluable to the success of CSR programs in general and building retrofits in particular.

Tenant / Employee Engagement: Natural Lighting

In a 2002 literature review, Edwards and Torcellini, of the National Renewable Energy Laboratory, cite a variety of sources on the effects of natural light on building occupants, all of which substantiate the contribution of natural light to increased worker health and productivity and decreased absenteeism[68]. Maximizing natural light levels within an office space can have a tremendous impact on the productivity of the occupants. Certifying organizations such as LEED place an emphasis on providing workers with access to natural light[69]. As a result of this, building owners such as the Environmental Protection Agency have created office space in which 80% of the area receives natural light[70]. Roughly 90% of Alberici's employees receive some natural light[71].

Each of these examples pay respect to the impact that natural light can have on tenants and employees.

Tenant / Employee Engagement: Alternative Transportation

Transportation in Canada contributes roughly 26% to national greenhouse gas (GHG) emissions, with commuter transportation reaching a high of roughly 81% in the colder months[72]. An annual average of roughly 20% of Canadian commuters used public transit, bicycles or walked to work, meaning the vast majority of these commuters travelled by light vehicle[73]. Organizations such as LEED and BREEAM award points to companies for encouraging their employees and/or tenants to use mass transit or other alternative transportation means[74]. While being located near mass transit is a source of these points, it is not always possible for building owners to alter the physical location of their asset, short of working with the city to redesign transit routes, which is not a likely option when considering a sole building. As such, companies are recognizing the value in providing both passive and active encouragement to their tenants and employees. Providing secure bicycle storage facilities, together with shower facilities, is a common way of attaining LEED points, as Adobe Systems did at their San Jose, California, complex. The result of their initiative is that 2,600 employees from the building now cycle to work (an average of 20% of building occupants ride bicycle to work compared to the city's average of 4%)[75]. In addition to 400 bicycle spaces currently available to its employees, the owners of the Toronto-Dominion Centre in Toronto, Ontario, have partnered with Zipcar, a community car-sharing company, to locate parking spaces within its parking facilities[76]. Additionally, Adobe Systems[77] offers pay incentives to employees who use public transportation. Genzyme has further enabled its employees by offering a guaranteed-ride-home program and facilitating a carpool database that connects employees offering commuter transportation with employees seeking it[78].

Tenant / Employee Engagement: Recycling and Composting Programs

Buildings with comprehensive recycling and composting programs have realized incredible cost savings, despite (and as a result of) the initial labour that went into creating them. Recycling programs have been designed that target both hazardous (batteries, toner cartridges, light bulbs, etc.) and non-hazardous materials, targeting items like paper[79]. By establishing these programs office buildings like the EPA's Joe Serna Building in Sacramento, California, have reduced the operating costs associated with waste disposal dramatically; It diverts roughly 56% (or more than

200 tonnes) of occupant waste from landfill annually, which has translated into savings on landfill disposal costs of $10,000[80]. Additional annual savings are seen through occupant recycling ($29,000 in savings) and the collection and storage of recyclables ($48,000 in savings)[81]. Other buildings are seeing greater waste diversion rates through their recycling programs: One Boston Place, in Boston, Massachusetts, has achieved a 70% waste diversion rate from landfill[82]. Adobe Systems, through a comprehensive recycling and composting program that provides receptacles at individual employee workstations, has seen a diversion rate of roughly 91%[83].

Materials Sourcing / Waste Management

Materials Sourcing: Construction Material

Materials used in the construction phase of building retrofits, and building in general, are coming under increasing analysis as the lifecycle analysis of materials and inputs gains credence in the public's eye, whether it be in simple municipal recycling programs or more intensive assessment of consumer goods. This movement is carrying over into areas of the economy, such as construction, that have formerly been free of scrutiny. Inclusions of lifecycle considerations by building certification organizations such as LEED[84] have only increased the attention that the responsible sourcing and disposal of construction materials and office materials has garnered. This has implications for building owners on materials recycling and sourcing.

Materials Sourcing: Recycled Construction Materials

All things being equal, unless recycled materials are priced lower than their first-use alternatives, it is difficult to justify the added expense of using recycled content. As a one-time expense with no discernable, tangible payback period recycled materials can be perceived as less attractive, particularly when a building owner only considers the straight financial implications rather than taking a more holistic view of the value to company's brand that accompanies investment in green initiatives. With some exceptions, the real value in recycling construction materials stems from the increased publicity and a building owner can generate with their use, both through affiliation with building certification programs and by independent marketing of their initiative.

Materials Sourcing: Certified / Local Sources

One aspect of the cost to society of construction is the point of origin of materials, both in terms of the manner in which they are sourced and also the distance they must travel to the construction

site. Lifecycle analysis of construction materials requires that each input be vetted for the manner in which it was developed, so that the finished product is shown to have been produced in an ethically and environmentally responsible manner. Building owners are partnering with standards organizations such as the International Standard Organization (ISO) and the Forestry Stewardship Council (FSC) to validate that the materials being used are from ethically responsible sources.

These partnerships function in much the same way as those with LEED or BREEAM; their presence lends legitimacy to the construction process, but over and above that given by the presence of green technology; it demonstrates industry leadership and commitment to the idea of sustainability and strengthens the message being sent to the public. Horizon House in the United Kingdom sourced materials from ISO 14001 accredited sources, with 80% of its major building elements rated and responsibly sourced[85]. The NRDC building sourced all wood used in construction from FSC certified sources[86], while Alberici sourced over 50% certified wood for its building[87].

Drawing materials from local sources is also an aspect of construction that many building owners are stipulating. In doing so, GHG emissions from transportation are minimized. A beneficial side impact of local sourcing is that the local economy is supported, strengthening the building owner's ties to the community. The IHS building in Calgary, Alberta, certified at the Gold level for LEED-Commercial Interiors, sourced much of its materials locally[88] while Alberici had a similar policy, sourcing 20% (by cost) of its building materials from within 800 kilometers of the building site[89].

Waste Management during the Retrofit Process

Materials used in retrofit and ongoing construction are also being recycled. By reducing consumption of new construction material building owners are alleviating some of the burden placed on the environment by the commercial real estate industry. Again, LEED and other organizations like it are proponents of recycled construction materials[90]. Building owners taking the initiative to recycle, or make use of recycled construction materials, are having substantial success in using recycled content, be it from their own sites or from other sites. In each instance, the development of a construction waste management plan was essential to the success of the endeavour. Cadillac Fairview set forth a clear strategy for purchasing sustainable construction materials at the outset of the TD Centre retrofit[91], as did Genzyme in building its Cambridge,

Massachusetts, building, achieving a 93% waste diversion rate during construction[92]. Additionally, the Alberici building attained a 30% recycled-content by cost[93].

Materials Sourcing / Waste Management: Recycling Interior Fixtures, etc

When committed to the recycling of materials during a retrofit it is possible for building owners to achieve considerable success in minimizing their construction waste. In retrofitting the William Farrell office building in Vancouver, British Columbia, Telus avoided the production of 16,000 tonnes of construction waste, re-using approximately 30% of construction material[94]. Stone and granite were cut to fit new window openings, existing windows, handrails, and stairs were all refurbished, and existing fluorescent light fixtures, doors, and fittings were relocated to other parts of the building[95].

Other companies are stipulating that furniture and finishings must be made of a minimum of, if not exclusively recycled content. The Natural Resources Defense Council, at their Robert Redford office building in Santa Monica, sourced bamboo and fast-growing poplar for its flooring, recycled rubber floor mats and tiles, and recycled glass for its countertops[96]. Both they[97] and the Genzyme[98] Centre required materials chosen for low VOC content and formaldehyde emissivity for the construction process. These requirements not only benefit the building inhabitants but also society at large.

Energy and Sourcing

Sourcing energy from renewable sources has become very common among building owners wishing to increase their commitment to environmental responsibility. Whether it is by installing their own renewable energy generation facilities or by paying a premium for the energy that they do consume, building owners are demonstrating their commitment to reducing their environmental footprint. What tactic a building owner undertakes is entirely dependent on the capital they have at their disposal to invest in what can be an intensive initiative. The ability to absorb additional operating costs through ethical energy sourcing is often greater than the capital costs associated with the infrastructure necessary for photovoltaic solar or wind turbine energy generation, making the marketing opportunity more attractive, despite the price premium paid for clean energy. This is particularly true of building owners who have just invested capital in making their asset more energy efficient. The owners of the IHS building in Calgary, Alberta, made a four year pledge to

source 50% of their energy from renewable wind energy generation[99]. Armstrong World Industries purchases roughly 75% of its energy consumption (2 million kWh) from wind power annually[100], while the NRDC's Robert Redford building in Santa Monica, California, supplements the 20% of energy that it generates from its PV farm with purchases of renewable energy credits for wind generation, making 100% of its power sourced from renewable sources[101]. Other, more industrious building owners have discovered more unique ways of sourcing energy for their properties: Genzyme sources the heating and cooling for its Cambridge, Massachusetts, office building from the steam from a nearby power plant[102]. Similarly, the Telus-William Farrell building in Vancouver, British Columbia, uses excess steam generated elsewhere in the complex for its heating and cooling[103]. The ancillary benefit to creativity in finding alternative energy sources, besides the reduction in operating costs brought about by using what is ostensibly free energy, is that it garners additional points in the building certification process[104].

Partnerships

Property Management Companies

An aspect of the office asset greening that is crystallizing is the role that property management companies have assumed in the push toward reducing the real estate sector's environmental footprint. Case studies suggest that property management companies are the primary instigators of building retrofits, as in the case of the Empire State retrofit project (please refer to the Case Study: Empire State Building, page 26), which was initiated by its property management company, Jones Lang LaSalle[105]. The operation and management of a building give property management companies an intimate knowledge of potential opportunities for process refinement. Because of this, they are in the strongest position to initiate viable cost-saving strategies to their client, the building owner. Further, it is essential that property management companies be actively engaged in any projects and/or initiatives for them to be effective. Without an active role, the impetus to subscribe to and participate in conservation is less effective and the ultimate potential of the program will not be achieved. When building owners retain the role of property management the power of the relationship between the building owner and the management company is potentially strengthened or diminished. In situations where the property management company and the building owner are one and the same the successes of any retrofit ultimately depends on the level of commitment that the owner has to the process. This, in fact, offers an opportunity to see the true

motivations behind building owners addressing the energy and water efficiency of their asset, as well as its environmental impact.

Third-Party Auditors

In identifying building retrofit strategies it is important to keep in mind the importance of third-party auditors. From our survey of retrofit case studies, the trend seems to point to the actual evaluation of pre-retrofit buildings being carried out by independent auditors such as Johnson Controls[106] (Empire State Building) and Duke Solutions Canada, Inc.[107] (Toronto-Dominion Centre). These companies provide an impartial perspective and are therefore best able to identify the most glaring deficiencies. Not only will this give the building owner an unbiased assessment of what is most cost-effective in the retrofit, but it also lends legitimacy to the process, which is essential if marketing a building's sustainable status is a desired outcome of the overhaul.

Case Studies

Due to its prominence in the North American market, the LEED rating system for existing buildings was used as a benchmark in the development of these Case Studies.

Telus William Farrell, Vancouver, BC (LEED-EB Gold)

The Telus William Farrell Building dates back to 1947[108]. As a company that is staunchly considerate of its environmental impact, Telus decided that retrofitting its existing office space to make it more energy efficient was an opportunity to balance operational efficiencies with sustainable business practices[109]. The retrofit was comprehensive in its scope, addressing multiple levels of Telus' operations, including energy efficiency, water conservation, and employee engagement.

Photo Credit: http://oikos.com/library/showcase/telus

Telus used an innovative design to tie the form and the function of the building together. The building was fitted with a 'second skin'; a glass exterior set almost 1 meter from the existing building[110]. In addition to putting a modern face on the building, while simultaneously preserving its historical features, the glass façade also creates a manageable insulating air space that acts as a thermal buffer and facilitates natural ventilation[111]. Exhaust fans powered by photovoltaic cells automatically adjust in response to electronic sensors to moderate the building's internal temperature[112] along specified parameters (as determined by building management). To offer employees additional comfort, the windows are manually operable[113], meaning that individuals are given increased flexibility in managing their own personal work environment.

Most remarkable about the projects undertaken by Telus during the retrofit is the energy savings that accompany the initiatives. In addition to the glass façade and accompanying ventilation systems, Telus sources 85% of its heating requirements from excess heat generated by a chiller unit in an ancillary part of the building complex[114]. These innovative systems designs result in

energy use that currently sits 39% below municipal efficiency standards, leading to an overall energy use reduction of three times the anticipated level[115].

Telus was considerate of material lifecycle in carrying out its retrofit of the William Farrell building. Materials within the building were deconstructed to ensure that they could be used elsewhere, such as the Andersite stone and Granite[116]. Similarly, Marble toilet partitions were reused, as were fluorescent lighting fixtures[117]. Two chiller units were relocated to other facilities to prolong their useful life[118]. An ongoing reclamation program ensures that previously used materials and objects are re-circulated back into use where appropriate, which minimizes both consumption and expenses. In all, almost 16,000 tonnes of materials were diverted from landfill[119], something that is, at present, a key component in many building retrofits. Whenever possible new construction materials were sourced to maximize recycled content, with 25% of new concrete being made up of recycled fly ash and recycled steel rebar as well as any clear glass and aluminum roof screen[120]. This, along with the selection of recyclable interior materials, ensures that Telus has the opportunity to mitigate its environmental impact.

The internal environment was carefully considered in the retrofit, with projects targeted to increase health and productivity while simultaneously addressing operational efficiencies. In addition to the operable windows, light-shelves coupled with whitewashed concrete ceilings increase daylight penetration into the building core[121], which both increases natural light levels and decreases the electricity necessary to light the building interior. Telus also determined the internal air quality of the building to be of primary importance, specifying low-VOC latex paint, no-VOC linoleum, water-based adhesives, etc., to ensure that employees were not subject to excessive exposure to chemicals[122]. This was of particular importance given that one floor was retrofitted at a time, meaning that occupants were still present in the building during the construction phase of the retrofit[123]. To promote employee activity, alternate transportation is encouraged through the use of secure bicycle storage, shower and change room facilities[124]. This is supported by the building's convenient location next to city mass transit[125]. The entire process showcases the role that creativity can have in the redevelopment of existing office space. Financial commitment, together with realistic expectations, can optimize building performance while creating a valuable tool in demonstrating sustainable initiative in the office asset category of commercial real estate.

Adobe Systems Inc., San Jose, CA (LEED-EB Platinum)

The initial impetus for Adobe Systems to retrofit their three-building corporate complex was the California energy crisis of 2001[126]. At that time, Adobe, in partnership with their facilities manager Cushman & Wakefield, began to identify which areas of the building and its operations could be made more efficient and therefore sustainable[127].

Originally achieving an Energy Star rating with relative ease, in 2005 Adobe identified LEED-EB Platinum as the next desirable accreditation to pursue[128]. With a relatively small investment of USD$1.4 million dollars, Adobe has implemented 64 operational and management changes that today yield annual savings of roughly USD$1.2 million, resulting in a payback period of just 9.5 months and an accompanying return on investment of 121%[129]. Based on Adobe's investment in the LEED certification of the complex, the actual cost of obtaining the designation was just 10% of its annual savings[130].

Adobe Systems, along with a third-party auditor[131] were able to identify a myriad of specific projects that have contributed to their overall goal of reducing their environmental impact. Beginning with a complete lighting retrofit, in which all existing light bulbs were replaced with more energy efficient ones[132], Adobe set about redesigning the way it managed its buildings. Systems were scrutinized and deficiencies were eliminated. Fans were refitted with variable frequency drives that responded to internal sensors that modulated the speed at which and frequency with which they operated[133]. Parking garage fans were reprogrammed to operate only during the peak traffic times or when CO_2 sensors within the structure indicated the need for them, ultimately saving the company USD$99,000 annually in energy costs on only $200 of labour[134]. Most recently, Adobe has added six wind turbines to its San Jose campus, which will contribute a portion of their energy from a renewable source[135].

Adobe Systems Inc: Building Retrofit Achievements

1) Reduced energy consumption by 35%
2) Reduced natural gas consumption by 45%
3) Reduced water consumption by 22%
4) Reduced total pollution by 26%
5) Reduced CO_2 emissions by 36%

http://www.tradelineinc.com/reports/EAB5E3A6-2B3B-B525-8D330EE0D9E6A531

Water conservation is also a major strategic goal for Adobe, with both its internal and external consumption being taken into consideration[136]. Internally, the company has switched to motion-activated faucets, low-flush toilets and waterless urinals[137]. Externally, Adobe has landscaped its property with native, drought-resistant plants and coupled this with an automated drip irrigation system that is tied to soil moisture sensors, thereby minimizing the amount and frequency with which water is used[138]. This external strategy has led to a 76% reduction in the amount of water used annually for landscape irrigation[139].

Adobe is also engaging its employees in its goal to reduce its environmental impact. Programs have been developed that encourage individuals to actively participate in the company's efforts. Alternate transportation is encouraged through the provision of secure bicycle storage facilities and showers for employees, which has contributed to 2,600 employees riding to work, or roughly 20% of the workforce, compared to the San Jose community's average of 4%[140]. In addition, Adobe has created an extensive recycling and composting program that sees individual workstations equipped with containers to facilitate the separation of the two forms of refuse; this has contributed to 91% of Adobe's annual waste being diverted from landfills[141].

Adobe has demonstrated that the careful evaluation of retrofit opportunities coupled with a creative thought process can yield incredibly successful results when optimizing building performance. Further, it has shown that small retrofit projects can have a substantial influence on the operating costs of a building and that projects that have a lasting impact on both building operations and environmental stewardship are not cost prohibitive.

The Empire State Building, New York City, NY (LEED-EB Gold)

One of the most recognized building landmarks in the Western world is scheduled to undergo an extensive retrofit over the next several years. At the urging of their property management company (Jones Lang LaSalle), the building owners partnered with The Rocky Mountain Institute and the

Clinton Climate Initiative to develop a comprehensive retrofit program that will address building operations on multiple levels[142]. A tactical approach led the consortium to identify eight overarching projects that will address building operations and employee comfort[143]. These projects were identified based on balancing environmental returns on the initiatives with the capital cost of implementing the project. The entire scheduled retrofit, with an incremental capital cost of $13.2 million, will result in annual savings of $4.4 million, yielding payback in just three years[144]. More importantly, the improvements will result in a 38% reduction in energy consumption and a GHG emission reduction of roughly 100,000 tonnes of CO_2 over fifteen years[145].

The Empire State Building: Eight Areas of Focus

1. Window light retrofit
2. Radiator insulation retrofit
3. Tenant lighting, daylighting, and plug upgrades
4. Air handler replacements
5. Chiller plant retrofit
6. Whole building control system upgrade
7. Ventilation control upgrade
8. Tenant energy management systems

A stated goal of the retrofit of the Empire State Building is increased transparency that will convey the learning process of the participants to building owners, property management companies, and other stakeholders[146]. In doing so, the project has been positioned as both an educational and a marketing tool that will increase the value of the rental space and the Empire State Building as a brand. The website profiling the retrofit process from development to implementation is an incredibly important aspect of this marketing strategy, communicating to relevant parties the financial and human capital that went into the retrofit and the commitment necessary to achieve these successes. Market differentiation, therefore, is an implicit motivation.

As the proposed building retrofit for the Empire State Building suggests, careful and strategic marketing can be used to communicate a building owner's commitment to environmental responsibility. With increased presence in the green building sector of commercial real estate the value of the project can lead to an increased competitive advantage and should be leveraged whenever possible to ensure that the greatest return on investment is realized.

The Toronto-Dominion Centre, Toronto, ON (LEED-EB:OM Gold)

The Toronto-Dominion (TD) Centre, owned and operated by Cadillac Fairview Limited, was the first property in Canada to receive the Canadian Green Building Council's (CaGBC) LEED-EB:OM Gold

accreditation in 2010.[147] As part of the project, the building located at 77 King Street West underwent retrofit initiatives that focused on a variety of different operational aspects, with a total cost of roughly $33 million[148]. These modifications will result in annual savings of $5 million, translating to a payback period of just 6.5 years.

Cadillac Fairview realized that its historical attention to operational improvements could be coupled with additional retrofit projects to attain LEED accreditation, thereby achieving market differentiation from its competitors through environmental stewardship. The retrofit focused on a myriad of initiatives that addressed energy and water consumption, energy sourcing, and tenant control upgrades[149]. When initially determining the best course of action, Cadillac Fairview first established the LEED level that it wished to attain for the building[150]. Duke Solutions Canada was enlisted to help identify the areas to focus on in order to achieve that level[151].

Energy and energy efficiency are key areas that Cadillac Fairview addressed in the retrofit program, the success of which has led to a decrease of 6% in energy consumption over 2008 levels[152]. Electricity sub-metering was introduced on each floor to give tenants the opportunity to access, evaluate and manipulate their own personal energy consumption[153]. This makes each tenant directly aware of their own consumption patterns, which necessarily implies more responsible consumption patterns if owners are not one and the same. Additionally, real-time energy management systems were included that monitor energy use throughout the building accompanied by automatic lighting and state-of-the-art building automation controls[154]. One of the most innovative projects to be undertaken was in the way that the TD Centre sourced a portion of its energy. In upgrading the chiller system, the building was linked through Enwave Deep Lake Water Cooling to the waters of Lake Ontario[155]. By effectively outsourcing 13,000 tonnes of the building's chiller capacity annually the company was able to reduce its energy consumption in this area by 90%[156].

The tower also uses 8% less water than the 2008 baseline due to several water-saving projects that were implemented as part of the retrofit[157]. Old washroom fixtures were replaced with automatic units designed for low-consumption[158]. Further reductions were made possible through the use of aerators on the water faucets[159]. All of these initiatives are reinforced through ongoing and regular water audits[160].

Tenant and employee engagement programs were also central to the successful application for LEED-EB:OM status. Alternate transport is passively encouraged in the TD Centre, with 400 bicycle racks being added in the retrofit. This is supplemented by several parking spots in the building's parking garage dedicated to a prominent car-sharing company. To actively engage tenants and employees Cadillac Fairview has developed the Occupant Employment Program (OEP), which engages tenants in the company's buildings nationwide to help meet progressive consumption and meet eco-friendly standards[161].

Genzyme Centre- Cambridge, Massachusetts (LEED-NC Gold)

While new construction falls outside of the purview of this report, the Genzyme Centre possesses many technologies that can be implemented in existing buildings. Further, its focus on tenant-occupied spaces provides key insights into one of the primary drivers of the green building movement, that being the value of green office space to existing and perspective tenants. The architect's initial conception of 'from-the-inside-out' approach was ultimately what led to the firm being selected over its competitors' bids[162].

Tenant comfort pervades the building, both passively and actively. The airflow system that the building employs monitors and manipulates the internal air quality to ensure it conforms to predetermined standards. Operable windows provide tenants with the opportunity to modulate their own personal comfort, which also reduces energy consumption due to heating and cooling[163]. Computer controlled perforated blinds raise and lower according to the suns path through the sky, maximizing daylight while simultaneously preventing excessive solar thermal heat gain. Additionally, natural light penetrates deep into the interior of the building through a complex

system of skylights, heliostats, reflective ceiling panels, and a polished aluminum light wall[164]. The central atrium augments these systems by housing a reflecting pool and reflective chandelier, which diffuses light further into the interior of the building[165]. While an existing building's structure does limit or prevent some of these techniques from being implemented in a building retrofit program others are still very viable. More importantly, they highlight the opportunity that exists to place tenant comfort at the forefront in a building retrofit project, increasing the value of the workspace to those tenants, which leads to increased rent premiums.

Water conservation was also a significant aspect of Genzyme's strategy in attaining their LEED-NC certification. The company used a combination of interior and exterior conservation designs and systems to minimize the amount of water used[166]. Soil moisture sensors control the irrigation system to ensure that only a minimum of watering is done[167]. A vegetative roof was incorporated in the building design to reduce the amount of storm water runoff[168], a stipulated requirement in the LEED-NC scoring system[169]. Internally, a 'smart' plumbing system, complete with low-flow fixtures, automatic water faucets, waterless urinals and dual-flush toilets works to limit water consumption[170].

Given the need for space heating and cooling in commercial office real estate, particularly in the north-eastern part of the continent, energy efficiency was carefully considered to minimize the operational costs of the building. Environmental temperature fluctuations are mitigated through a series of initiatives. The aforementioned vegetative roof provides thermal insulation for the building[171], as does the double façade of glass the envelopes 32 percent of the building exterior[172]. In addition, the temperature of the atrium is moderated at the point of light entry into the building by prismatic louvers, which diffuses direct sunlight, thereby preventing thermal heat gain[173]. Photovoltaic cells capture solar power to supply the building with a source of renewable energy, while steam from a nearby power plant is harnessed to heat and cool the building[174]. Collectively, these initiatives have reduced the operational energy costs by 41% relative to conventionally built buildings of a similar size[175].

Genzyme has focused on its tenants in designing its new office building, carefully considering aspects of daily life that often go overlooked in favour of cost efficiency and expediency. The company integrated tenant comfort into its building design, resulting in a structure that encourages employee health and productivity without sacrificing architectural creativity.

Interface Global, Atlanta Showroom, Atlanta, Georgia (LEED-CI Platinum)

Interface Global, a carpet manufacturer that exemplifies sustainability in all aspects of its business model, achieved the first Platinum-level certification for LEED-Commercial Interiors in the world in 2004[176]. Its well-publicized commitment to sustainability has shifted the very way that it approaches office space development, beginning at the pre-design phase and carrying through to the post-occupancy phase of tenant occupancy. The comprehensive process ensures that its tenants are afforded the best opportunity to work in an environment designed to encourage productivity while minimizing its environmental impact. The fact that the tenant in question was, in fact, the retail arm of Interface should be duly noted; however, this fact does not undermine its accomplishments.

Interface had very clear objectives when creating its office space and showroom, all of which contributed to its decision to refurbish an existing building in a major urban area. Its commitment to the LEED system helped to further define its goals and its strategies developing the site[177]. This aligned its need to be close to its customers in an urban setting with its overarching goal of environmental stewardship[178].

The process that Interface followed in creating its office space required that careful attention be paid to design and tenant requirements throughout. The company established a goal of achieving LEED-CI Platinum certification in the project's pre-design phase, which required the team to actively assess which LEED credits were most desirable. The team necessarily involved employees of the chosen construction company so that the goals, opportunities and challenges in achieving the accreditation were clearly delineated[179]. This carried over into the construction phase, with the superintendent and subcontractors educated in the LEED process through a variety of reference materials and learning labs[180]. Prior to Interface taking up occupancy in the showroom the entire portfolio of systems was commissioned to ensure that they were operating optimally[181].

The project addressed a host of critical features in the LEED-CI accreditation, including land use, site selection, energy efficiency, materials, and the indoor environment. Each of these, while important independently, collectively create an environment that truly maximizes tenant health and comfort while also considering the environmental impact of its operation. Natural light was maximized to increase lower electricity costs while simultaneously increasing tenant comfort[182]. Low-VOC materials were used in the decoration of office, which was subsequently filled with furnishing from recycled materials[183].

While this case study addresses a LEED-CI space designed and built by the building owner, it is important to recognize this as a way in which the building owner can possibly work with a tenant to redesign its office interior in congruence with the building owner's strategic goals. These tactics can effectively creating another layer of differentiation for building owners (in addition to market differentiation for the tenant in its industry). Encouraging this sort of investment, whether it is financially or by other means, will reduce long-term tenant turnover because of the investment the incumbent tenant has already made in the office space. Further, should the tenant desire to move, the space becomes more attractive to incoming tenants because of its structural and operational financial advantage.

Recommendations

Involve stakeholders

It is important for the success of any building retrofit that each stakeholder is both considered and approached in the development or furthering of CSR objectives. Involving property management companies and third-party energy auditors in the early stages will assist in identifying which areas should receive the greatest financial attention, facilitating the initiative selection process and therefore shortening the duration of the project. Similarly, remaining cognizant of tenant and employee needs and desires will increase the value of the retrofits undertaken. The health and well being of the individuals working within the building can be greatly improved by building alterations, concomitantly increasing their productivity and reducing their absenteeism, two considerations that should not be overlooked.

Be Methodical and Strategic

Building owners should approach any retrofit process strategically and methodically to identify and target the most economical areas to address. Once stakeholders are involved the process for selecting the most viable areas will begin to emerge. The initial scope should be exhaustive, with all possibilities under consideration until a proper audit can be performed. Inefficiencies can then be identified and solutions developed.

The retrofit process is an ongoing one, in which constant attention must be paid to operational efficiency in order for any sustained competitive advantage to be realized. Not surprisingly, building owners tackle the lowest-hanging fruit at the outset of a retrofit process, or those initiatives that will have the fastest impact on the bottom line of the company. Reinvesting a portion or all of these savings in additional retrofit projects will further their long-term viability, effectively using ‘free’ money, or money they would not otherwise have at their disposal had the initial projects not been undertaken.

Given the market for green office space in Canada, combined with its relatively small prevalence, it is wise for building owners to remain aware of popular public opinion on salient environmental issues and build them into their CSR programs. Using the public as a barometer for future opportunities will enable the building owner to remain at the forefront of the CSR movement,

resulting in increased brand awareness, strength, and longevity. Therefore, marrying economic viability with public perception will provide the greatest return on investment for building owners.

Be Comprehensive

Building owners should not limit the scope of their office asset CSR program strictly to energy efficiency and water conservation. While it is true that decreasing energy and water consumption lower operating costs and improve margins, there are significant gains to be realized in addressing less obvious financial investments. Tenant engagement is an area that can contribute significantly to the effectiveness of the retrofit process. By including engagement in the scope of the project building owners will increase the value of their office space, both to their own employees and to their tenants (if they are not one and the same). Retrofit projects that encourage tenants to take an active role in the day-to-day conservation activities create ownership of these programs; invested tenants will increase the effectiveness of programs, such as recycling and composting, and ultimately increase the success of the CSR program as a whole.

Communicate Successes

Above all else, it is imperative for building owners to communicate their successes. The value of a CSR program grows exponentially if the public is aware of the work, time, and financial investment. A competitive advantage cannot be established if the relevant parties are not aware of it. Building owners should align with certifying bodies such as LEED and BREEAM because of their growing public profile, which will allow building owners to communicate these successes more effectively. These organizations lend both legitimacy and their marketability to the retrofit process, meaning the return on any investments is will be greater in the long run.

Appendix 1: Certifying Bodies

Building Owners and Managers Association - Building Environmental Standards:

The Building Owners and Managers Association oversees its Building Environmental Standards (BOMA BESt) Go Green Best Practices program, which represents the energy and environmental performance of existing commercial real estate. Originally intended for identifying best practices, BOMA BESt now provides a comprehensive framework for certifying, auditing, and educating members on their assets' environmental footprint[184].

BOMA BESt has a graduated system of four levels of achievement ranging from a simple but comprehensive compliance to more advantageous initiatives that demonstrate innovation in technology and management[185]. The purpose of increasing levels of status is to encourage an increasing level of commitment to efficiency[186].

Leadership in Energy and Environmental Design (LEED) - North America:

The LEED system of green building certification was developed by the United States Green Building Council to address the need for a standardized method of evaluating buildings on their environmental impact. The LEED system originally focused on whether buildings are newly-constructed or existing, with minimal attention given to a project's purpose, however the scope of the designations has increased since its original incarnation and is constantly evolving.

8 Areas of focus for LEED Accreditation

1. Location and Planning
2. Sustainable Sites
3. Water Efficiency
4. Energy and Atmosphere
5. Materials and Resources
6. Indoor Environmental Quality
7. Innovation and Design Process
8. Regional Priority

The primary focus of the LEED system as a whole addresses eight major areas, the thrust of each given different weighting depending on the designation being pursued[187]. Summaries of the salient designations pertaining to this report are included below.

LEED for existing buildings: operations and maintenance (LEED-EB:OM)[188]

The LEED-EB designation offers consistency across building owners and operators while giving them an opportunity to bridge the gap between current operations and maintenance and practices that minimize environmental impacts, leading to

increased operational efficiencies. Recycling programs, systems upgrades, exterior maintenance programs, whole-building cleaning and maintenance issues are all taken into consideration.

LEED for commercial interiors (LEED-CI)[189]

The LEED-CI system allows tenants and designers to take control over their office environment in instances when building operations are not under their control. It therefore offers an additional level of transparency and legitimacy to office spaces that would not normally have the opportunity to be so designated.

The focus of the LEED-CI rating system takes into consideration sustainable site selection, water efficiency, energy and atmosphere, materials and resources, and indoor environmental quality[190], all areas that are malleable to a tenant's needs.

Building Research Establishment's Environmental Assessment Method (BREEAM) - UK:

The Building Research Establishment created their BREEAM accreditation for sustainable building development in order to differentiate sustainable building practices from their conventional counterparts. BREEAM is a malleable certification, meaning that it is both constantly changing to ensure that its dictates exceed the regulations set forth in public policy and that it can be applied to local conditions around the World. It is has grown into the mostly widely used certifying body currently available, with more than 100,000 accredited projects and over 500,000 awaiting certification[191].

The 3 Parts of BREEAM

1) Asset Performance- addresses the physical building
2) Building management performance- addresses the operational policies, procedures and practices set forth by building management
3) Organizational Effectiveness- addresses the implementation of Part 2 AND includes staff engagement and key output delivery

http://www.breeam.org/page.jsp?id=122

Of particular interest for the purposes of this paper is the BREEAM In-Use designation. Much like the LEED-EB, the In-Use designation focuses on existing buildings and their operations by bringing them in line with rigorous yet acceptable environmental standards. The In-Use designation is comprised of three phases, each of which speaks to a different aspect of the building and/or its operations[192].

Green Star – Australia:

The Green Building Council of Australia administers its Green Star program as part of a national initiative to minimize the environmental impact across the breadth of the country's building stock. At present, the Green Star program addresses sustainability in the industrial, mixed use development, office design/interiors, health care and education sectors[193]. As with other certifying bodies, the Green Star program is constantly evolving in response to new market demand opportunities and new technologies. The Office Existing Building, Custom, and Convention Centre designations are currently in the pilot stages. Originally launched in 2003[194], the Green Star program also administers a comprehensive portfolio of product offerings, including building certification, educational tools and services, and advocacy.

Endnotes

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