An Economic Feasibility Study of Green Buildings in Vancouver

Ian Saxon
Noam Goldenberg
Dan Kawai

January 22, 2006

TABLE OF CONTENTS

The purpose of this report is to examine the current business case for green buildings in Canada and to analyze the opportunities and risks facing developers, purchasers, and tenants. The first section gives a detailed explanation of the concept of green buildings, their benefits, and the various techniques and systems implemented to create green buildings. The second section will present a financial analysis that calculates the viability of a hypothetical 100,000 square foot green building under various scenarios. The third section provides an analysis of the risks involved and suggests reasons for the slow adoption to date, as well as how these difficulties can be overcome.

1.0 Introduction

1.1 Green Buildings: A Definition[1]

According to the Associated General Contractors of America, sustainably designed, high performance buildings are those that through their siting, orientation, design, construction, and operation are highly energy efficient, have lower operating costs, are better for the environment in broad and specific terms, and promote whole health for their users and occupants with ***measurable*** results.

1.2 Rating Systems

The criteria for the level of sustainability or "greenness" of a building are somewhat ambiguous as individual organizations often set their own criteria. The most popular indicator in Canada is the Leadership in Energy & Environmental Design (LEED) Canada, which is overseen by the Canada Green Building Council. The concept is based on the LEED system developed by the United States Green Building Council in 1999. The LEED rating system assigns points for criteria that are met according to the standard. From the points earned, one of four certifications is awarded (Platinum, Gold, Silver, or Certified). Although other ratings systems exist such as Green Globes and the iiSBE GBTool Ratings systems, this report will be based on LEED Canada, as it is the most widely used rating system in policy analysis and business decision-making. The key criteria in the LEED Canada point system are the 1) sustainability of the site, 2) water efficiency, 3) energy use and atmosphere, 4) material and resource use, 5) indoor environment quality, and 6) innovation and design process.[2]

[1] This report treats "sustainable" and "green" as interchangeable terms
[2] Canada Green Building Council. LEED Canada.

1.3 LEED Compliance[3]

1) Sustainability of the site

a. Select a site well suited to take advantage of mass transit.

b. Protect and retain existing landscaping and natural features. Select plants that have low water and pesticide needs, and generate minimum plant trimmings. Use compost and mulches.

2) Water Efficiency

a. Minimize wastewater by using ultra low-flush toilets, low-flow shower heads, and other water conserving fixtures.

b. Use re-circulating systems for centralized hot water distribution.

3) Energy Efficiency

a) Passive design strategies can dramatically affect building energy performance. These measures include building shape and orientation, passive solar design, and the use of natural lighting.

b) Develop strategies to provide natural lighting. Studies have shown that it has a positive impact on productivity and well-being.

4) Material Efficiency

a) Select sustainable construction materials and products by evaluating several characteristics such as reused and recycled content, zero or low off gassing of harmful air emissions, zero or low toxicity, sustainably harvested materials, high recyclability, durability, longevity, and local production. Such products promote resource conservation and efficiency.

b) Use dimensional planning and other material efficiency strategies. These strategies reduce the amount of building materials needed and cut construction costs. For example, design rooms on 4-foot multiples to conform to standard-sized wallboard and plywood sheets.

2.0 Benefits of Green Buildings

2.1 Environmental Benefits

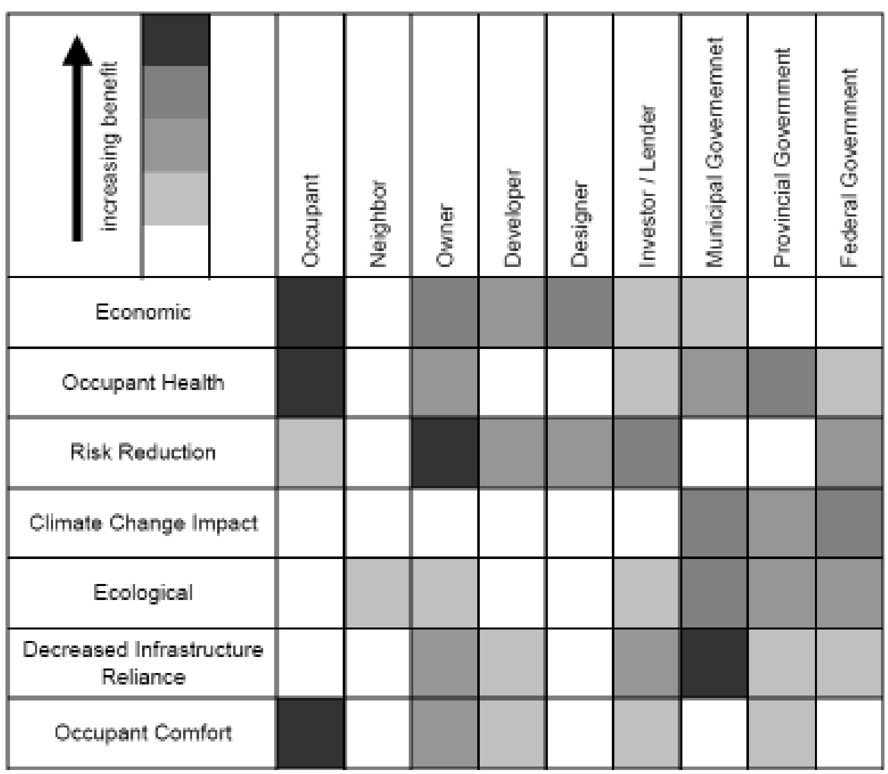
If one were to ask Canadians about the top source of pollution and waste in Canada, most people would not answer “my house,” or “my workplace.” However, commercial and residential buildings combined make up approximately one third of Canada’s energy consumption. They also account for half of Canada’s extracted resources, 25% of the landfill waste, 10% of airborne particulates, and 35% of greenhouse gases. However, these estimates do not include the transportation and industrial energy related to the

[3] California Integrated Waste Management Board. “Sustainable (Green) Building.”

production and movement of building products. Development of commercial and residential buildings can also disrupt or destroy ecological systems.[4]

A green building's architecture can significantly reduce the impact of development and maintenance of a building on its surrounding environment. This is done by 1) protecting existing natural spaces, as green buildings tend not to be constructed on environmentally sensitive areas, and when they are, measures are taken to limit ecological impacts, 2) enhancing existing ecology through the restoration of plant life, 3) reducing water use, 4) reducing material use, and using low impact materials in concert with efficient design and the elimination of unnecessary materials, and 4) reducing emissions to air by decreasing energy use and using appropriate refrigerants.[5]

Supporters of green architecture have argued there are many benefits to the stakeholders, including developers, owners, occupants, neighborhoods, and societies as a whole in developing green buildings. In the case of a large office, for example, the combination of green design techniques and clever technology can not only reduce energy consumption and environmental impact, but also reduce running costs, create a more pleasant working environment, improve employees' health and productivity, reduce legal liability, and boost property values and rental returns. A matrix of green building stakeholder benefits created by Morrison Hershfield Ltd. Consulting Engineers is provided below.



[4] Morrison Hershfield (2005) "A Business Case for Green Buildings."
[5] Ibid

3.0 Key Social Trends

3.1 Kyoto Protocol

Ratified by Canada in 1998, the Kyoto Protocol establishes a fundamental shift in terms of energy costs to the Canadian government and corporations. Meeting the requirements of Kyoto will be particularly difficult for Canada, as the economic activity and investments associated with the Alberta oil sands and the off shore reserves in the Maritime provinces create large economic incentives for the Canadian economy. However, as domestic and international pressure to meet the Kyoto requirements heightens, the Canadian government will increase the energy efficiency requirements of Canadian commercial buildings, while also offering grants such as the CBIP grant, which gives a maximum of $60,000 to support the development of buildings that are at least 25% more energy efficient than the MNEBC code.[6] We can expect in the near future that further tax incentives and regulatory requirements will give developers and clients further incentives to build sustainable buildings. The development of an emissions permits system in Canada, while less certain, would also push companies to build green buildings, as decreases in carbon dioxide emissions resulting from the increased energy efficiency would boost cash flows.

3.2 Increased demand

As Canadians in the generation X and Y group grow older and become influential, environmental awareness will grow. As noted in the survey on the following page, youth in Canada in the age category 18-34 in 1995 (28-45 in 2005) rate international environmental problems as the top global issue. As corporate managers and developers make decisions about building development and purchases in the near future, we believe there will be increased pressure to build green buildings, even by those who, at first blush, seem least likely to do so. Take, for example, Wal Mart's proposal in early 2005 to build its first green retail store in Vancouver. Acceptance of green building technology appears to be growing, and this process will likely be self-reinforcing.

[6] Natural Resources Canada. Commercial Building Incentive Program (CBIP) for New Buildings.

3.3 Vancouver Green Building Strategy

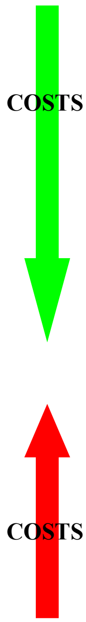
The 2010 Vancouver Olympics has created a unique opportunity for Vancouver to become a leader in sustainable development. The Vancouver Organizing Committee for the 2010 Olympic and Paralympic Games has fully committed itself to sustainable development, and City Council has mandated LEED Gold for the future construction of Olympic Athlete's Village in Southeast False Creek.[7] In addition, City Council is reviewing a proposal to implement the *Vancouver Green Building Strategy,* which would require most buildings four stories and above to become the equivalent of LEED Certified.[8]

Business Case Introduction

Sustainable building technology, although in its early development stage, is significantly undervalued, largely due to the lack of lifecycle costing in real estate investment decision-making. There is unrecognized profit potential in real estate investment that developers and investors have not realized. Sustainable commercial development is a growth industry, where, provided its stakeholders adapt their decision–making to more accurately account for the direct and indirect financial benefits of sustainable building practices, a net benefit will accrue to all stakeholders.

[7] See http://vancouver.ca/commsvcs/southeast/greenbuildings/background.htm for more details
[8] See http://www.city.vancouver.bc.ca/commsvcs/southeast/greenbuildings/strategy.htm for more details

Economic Impacts over the Building Life-cycle



Element	Economic Impact	Rationale
Property Rental Income	POSITIVE	Less turnover, some tenants pay more for green space
Sales Price	POSITIVE	Higher NOI, reduced risk
Operating Cost	POSITIVE	Reduced in Long-term
Environmental Cost	POSITIVE*	*Where government incentives exist; reduced emissions rebate
Public Infrastructure Cost	POSITIVE*	*Where government incentives exist; reduced DCC's
Financing Cost	?	Reduced environmental risk vs. Increased long-term cash flow risk
Building Cost	NEGATIVE	Higher initial cost
Development Cost	NEGATIVE	Higher environmental standards; site treatment
Design Cost	NEGATIVE	Premium for Green Design; increased consulting costs

Adapted from Resource Guide for Sustainable Development, *Urban Environmental Institute, Seattle, WA*

The construction of a sustainable building involves additional considerations in the design process, and material selection is necessarily a long-term investment decision with lasting economic impacts over the building life-cycle.[9] Currently, developers will consider investing in sustainable technologies – such as more expensive materials that reduce operating costs in the long-term – if the future benefits provide an acceptable return over a reasonable period of time. Most developers would not find fault with the results of the above table, for example, noting that a more sustainable building that incurred higher building and design costs will attract higher-paying tenants, which will likely reduce turnover. However, the following sections in this paper attempt to illustrate that many developers currently lack the incentive to fully value the benefits of long-term sustainable investments due to the high risk that end-users and purchasers will undervalue the benefits. Accordingly, developers often choose to forgo the added investment in green features.

[9] Note that the economic impact of sustainable buildings on financing costs is relatively unknown. Due to the limited number of private sustainable buildings, it is unclear whether sustainable buildings receive a reduction in insurance premium for reducing environmental risk.

1.0 Methodology

To estimate the benefits of a green building, this paper uses a Silver certified LEED level to represent an average green building. Because there are many combinations of checklist items that can warrant a LEED certification, this assumption helps to simplify our comparison between typical buildings and green buildings.

This paper calculates the cost savings that can be expected from the average green building according to a study based on California state buildings[10], which is perhaps the most comprehensive study on the topic to date. The researchers found that a typical green building is about 28% more energy efficient than a standard building, and will achieve savings in water usage, toxic emissions (such as CO_2, SO_2, NO_x, and PM-10), waste diversion, materials, and employee productivity.

The techniques builders use to capture these benefits vary greatly. Some buildings are designed to capture energy savings through the elimination of oil, natural gas, or electricity use by switching to earth-energy heating (geothermal) or cooling; some buildings might simply have more efficient insulation, air flow, or space layout that allows them to use less energy. In order to deliver a simple comparison between buildings, we did not take into account the many ways in which LEED standards could be met.

Our building is an imaginary building of 100,000 square feet that achieves benefits by using less energy, using fewer resources, emitting fewer pollutants, and providing a healthier environment for the people within it. Some of these benefits are more transparent and available for builders and owners to capture today, while others are more difficult to monetize and quantify. We have chosen to estimate the benefits of each of these items and deal with the large variability in what stakeholders actually realize through a sensitivity analysis.

To monetize these benefits, all potential savings from the hypothetical building were calculated on a per square foot basis. The savings were then discounted over 10, 20, and 30 years to determine the IRR that would result, given the higher initial capital cost required. The following chart summarizes our estimates for cost-savings:[11]

Energy saving	$	0.13	psf
Water	$	0.05	psf
Emissions			
CO2	$	0.05	psf
SO2	$	0.06	psf
NOx	$	0.20	psf
PM-10	$	0.15	psf
Employee Productivity	$	0.69	psf

[10] Kats, Greg (2003) "The Costs and Financial Benefits of Green Buildings."
[11] See more detailed calculations in the appendix.

2.0 Current Business Case

The average green building costs approximately 2.1% more than a standard building.[12] This can vary tremendously, and when a developer analyzes a development proposal, the specific costs for his project are more important than this average price premium. However, for comparison purposes, this is the benchmark that helps to identify the point at which the benefits for our hypothetical building exceed the costs.

The price premium is largely a result of learning costs associated with new building processes, as well as more expensive building materials. Since a thorough catalogue of existing green buildings that developers can use to estimate costs is unavailable, developers perceive that there is considerable uncertainty involved in constructing a green building. There is some evidence that this risk is often exaggerated, but until the methods for building green buildings becomes well known and commonplace, the perceived risk will likely remain.

The price of specialty building materials, such as highly efficient HVAC systems, earth-energy heating, or non-glare windows, also contributes to the cost increase required. The price premium on these items is due, in part, to higher quality, but is also a function of demand. When relatively few developers are choosing to use these materials in their buildings, these items will remain expensive. When these items (and others that contribute to sustainable buildings) become more widely used, prices will likely fall.

So, are green buildings immediately practical from a business perspective? To answer this question, we compare the extra cost required for our 100,000 square foot building to the benefits that would accrue to a potential owner. The benefits of lower energy costs, fewer pollutants, higher employee productivity, and waste diversion accrue to owners of the building over time. If the present value of these future benefits is greater than the increased initial cost to build the project, all else equal, a potential purchaser should be willing to pay a developer to implement the upgrade. Potentially confounding factors in this analysis include the perceived or actual risk associated with the future benefits, the willingness of the developer to take the time to explain the benefits to purchasers, the rate of return that developers would find acceptable, and the level of financial sophistication and understanding of the benefits of the purchaser.

[12] The 2.1% 'green cost premium' for the average LEED certified building has been confirmed by the majority of reputable LEED studies, including Kats, Greg (2003) "The Costs and Financial Benefits of Green Buildings,."and A Report to California's Sustainable Building Task Force (2003) "The Costs and Financial Benefits of Green Buildings."

Typical construction costs for an office building range from $90 per square foot to $117 per square foot.[13] For our 100,000 square foot building, we considered an average of these two numbers ($103.50), then calculated the green premium given a 2.1% cost increase:

Sustainable Building

size (psf)	100,000
cost	$ 10,567,350

Regular Building

size (psf)	100,000
cost	$ 10,350,000

Cost Difference:		**$ 217,350.00**	
	-	**$ 26,862.26**	gov't grant
	-	**$ 3,569.85**	waste diversion
		$ 186,917.89	

The initial capital cost increase of $217,000 can be reduced somewhat by one-off gains from a CBIP government grant for reducing energy requirements by 25%[14] and a $3,500 benefit for diverting waste from landfills. However, the remaining $187,000 needs to be recaptured in future years from the ongoing benefits of green buildings.

In this report, the costs and benefits have been compared using a simple IRR metric. In this way, we find the discount rate that would make the future benefits exactly equal to the present costs.

This value can vary significantly depending on two characteristics of the purchaser:

1. How much time the purchaser considers reasonable to recoup his costs
2. The probability the purchaser places on capturing less tangible benefits

The chart that follows summarizes the results that a purchaser might expect depending on how he values these points.[15]

		10 years	20 years	30 years
	Energy	1 -5.60%	2 3.73%	5.90%
+	**Water**	-0.38%	7.48%	9.07%
+	**CO2 @$5**	3 1.99%	9.22%	10.58%
+	**Employee Benefits**	47.03%	48.03%	48.05%
+	**SO2, NOx, PM-10**	69.89%	70.24%	70.24%

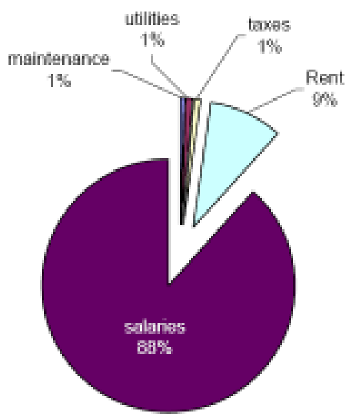
[13] Government of Ontario (2004) "Land and Building Costs." (Building costs in Ontario indicated to be similar to the rest of Canada).
[14] 25% less energy use compared to the MNEBC code.
[15] Based on raw data collected from:
Kats, Greg (2003) "The Costs and Financial Benefits of Green Buildings."
Lucuik, Mark (2005) "A Business Case for Green Buildings in Canada."

From the table, a purchaser who accounts only for energy cost savings in his or her analysis and requires a positive return within 10 years would not be willing to spend the money necessary to build a green building (1). However, if he were willing to wait 20 years, his return begins to look favourable, although only slightly (2). Alternatively, if the same purchaser took into account water cost savings and assessed a high probability to stricter government regulations requiring purchasing CO2 emissions permits, he would see a moderately positive IRR within 10 years (3).

Employee productivity is difficult to quantify, but has potentially very large gains. Consider a study by Lawrence Berkeley National Laboratory that found:

> "…commonly recommended improvements to indoor environments could reduce health care costs and work losses from communicable respiratory diseases by 9 to 20 percent; from reduced allergies and asthma by 18 to 25 percent; and from other non-specific health and discomfort effects by 20 to 50 percent."[16]

The chart that follows shows how large the proportion of salary expenses are compared to other office building expenses, suggesting that small gains in employee productivity could overwhelm other benefits from green buildings.



Annual Commercial Expenses
Source: A Business Case for Green Buildings in Canada

A purchaser evaluating the benefits of reducing energy use, water consumption, emissions, and boosting his employee's productivity could see a return of 47% within 10 years. While this may seem high, a simple calculation shows that this may actually be conservative. Consider a building of 100,000 square feet, containing about 300 employees, where each employee earns $30,000. If a more pleasant working environment, in terms of lighting and air quality prevents 2 sick days per year, per

[16] Fisk, William J. (2000) "The Business Case for Sustainable Design in Federal Facilities."

employee, an employer would save almost $50,000 per year. Given an increased capital cost of, say, $200,000 (or 2% of $10 million), a return of 47% is entirely reasonable over this time period.

However, a conservative or short-term purchaser that is not as forward looking, may not recognize the larger, and sometimes more difficult to quantify or confirm, benefits of sustainable buildings. If some buildings are not being designed to realize these benefits, as is currently the case, it must be that developers and purchasers are not convinced that they will actually accrue. This would suggest that the current perceived economic benefits are fewer than the potential benefits, which is lowering the number of green building projects undertaken.

Thus, without a significant shift in the way developers and owners assess the risks or perceive the results, green buildings will remain somewhat obscure in the marketplace, or continue to be relegated to government or university projects. The business case is not clear. The next section will discuss the pieces that must fall in place before the business case becomes obvious.

2.1 Lifecycle Costing

Lifecycle costing is a methodology that discounts long term (ranging from 20-50 years) costs and benefits through net present value analysis. When applied to new buildings, it accounts for the initial capital investment required, as well as the future positive and negative cash flows resulting from the capital investment. This methodology differs from the typical developer’s proforma in that a longer timeframe is analyzed, which favors a higher capital investment. Accordingly, under this framework, the benefits of greener investments are better realized – under the assumption that higher annual cash flows are the outcome of an increased capital investment.

This methodology makes intuitive sense and its merits are well-accepted throughout the sustainability community. While the authors of this paper recognize the importance of lifecycle costing, we question its practicality and acceptance by business for short-term investment decisions. Current quantitative valuation methods *are in fact* adequate to account for long term benefits, but only after an initial project valuation under lifecycle costing is performed, where reversion[17] is fully accounted for. A simplified illustration of this is included below, where equivalent NPV’s are derived by adjusting reversion to account for long term cash flows. Through public education and stakeholder partnerships, the optimal reversion amount is capable of being realized.

[17] The value of an investment at the time of its resale

	NPV	Year 0	Year 1	…	Year 10	…	Year 50
Life-cycle valuation method	$89,360	-$100,000	$20,000	…	$20,000	…	$20,000
Developer valuation adjusted for Life-cycle valuation method	$89,360	-$100,000	$20,000	…	$215,580		

Includes $20,000 annual operating cost + $195,580 Reversion

Sensitivity Analysis

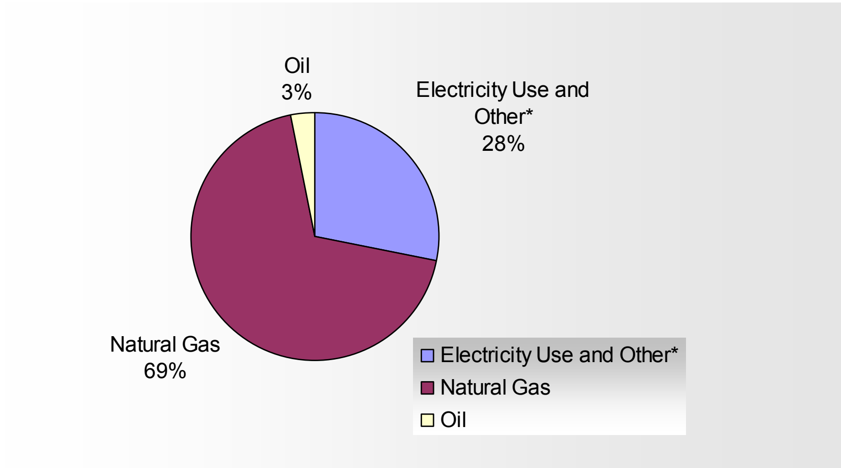
At present, the current business case is untenable for most profit maximizing firms.[18] A purchaser of a new property typically will not want to wait longer than 10 or 15 years to recoup upfront costs, and without full life-cycle costing, which takes into account the full life of a building (typically between 40-50 years), the benefits of green buildings are not realized.

Three things are likely to impact this outcome. First, the greater the number of potential owners who believe green buildings have benefits, the more these purchasers will be willing to pay developers to build them. Unfortunately, the majority of purchasers do not intend to occupy the space they buy for the life of the building. Thus, when a purchaser wants to sell the building, he needs to be reasonably sure that the buyer will be willing to pay a premium for green features before he pays for them originally. So the probability of acceptance of green benefits in the future affects purchasing decisions today.

As more projects are built, and as green benefits are more accurately quantified, growth in green building construction will increase non-linearly. There is a positive feedback mechanism that occurs when agents increasingly see that their fellow purchasers are accepting green features. Next to realizing employee productivity gains, this may be the single biggest issue for purchasers. If purchasers are able to look beyond a ten year return, perhaps to a 30 year return, the yield on the investment can change dramatically. Even if energy and water savings are the only benefits perceived, a purchaser's return could change from a dismal -0.38% to a healthy 9.07%, given this more appropriate timeframe.

Second, energy prices will have an important role. While oil prices have recently increased substantially, the average building in Canada gets only 3% of its energy from oil. Electricity and natural gas are more important sources of energy.

[18] This excludes "instant payback" sustainability practices such as designing and constructing a building with more windows on its south side to capture more sunlight (heat)



From 1990 to 2000, the average price of natural gas was $3 per MMBtu.[19] As of 29 November 2005, prices per MMBtu are $11.78, according to Bloomberg. If prices were to rise to $15 per MMBtu, all else constant, an investor would increase his return by 3.49% over 10 years if he incorporated key energy saving features available for buildings, assuming a 100,000 square foot space.

Alternatively, electricity in British Columbia, which is currently priced at about $0.0486 per kWh, will likely rise over time to equal the marginal cost of supplying power. Based on BC Hydro's tiered pricing scheme, this amount may be nearer to $0.06 or $0.08 per kWh. Consider prices elsewhere in Canada (with one American example):

Price per kWh for Electricity

Winnipeg	$	0.04
B.C.	**$**	**0.05**
Montréal	$	0.06
Halifax	$	0.07
Regina	$	0.07
Seattle	$	0.08
Toronto	$	0.09

A marginal cost of $0.07 is not unreasonable, given this data. All else equal, if electricity prices in BC were to rise to this amount, the 10 year IRR in our building would increase by 2.23%.

The third element that could precipitate a more compelling business case is stricter government regulation on emissions or the adoption of emissions trading programs. Carbon dioxide trading is the most likely candidate, so we consider a scenario with this pollutant.

[19] Bolinger, Mark. Comparison of AEO 2005 Natural Gas Price Forecast to NYMEX Futures Prices.

Consider these comments about the range of potential CO_2 trading prices:

> "Determining a value for CO2 reduction is a difficult proposition. For example, a recent Intergovernmental Panel on Climate Change (IPCC) report cites a range of values between $5 and $125 per ton of CO2. CO2 trading programs in the US are emerging, with the value of trades typically ranging from under $1 up to $16 per ton, with most trades at under $5 per ton, but with a general trend of prices rising. The World Bank has participated in 26 emissions reduction projects, with CO2 trading at $3 to $4 per ton. BP has used a price of $10 per ton for internal trading of CO2. [20]"

Our analysis has conservatively used a price of $5 per ton if a carbon trading program is implemented in Canada. It is unclear if or when Canada may see a carbon trading program, but, if not, it is likely that government regulation will force commercial buildings to emit less CO2. Whether carbon is traded or mandated out of the environment, it will be costly to remove it. The cost of this could vary a great deal. Using British Petroleum's estimate for the direction of CO2 markets, if the cost of CO2 emissions went to $10, this would increase the 10 year return on our hypothetical building by 1.36%.

Alone, each sensitivity item (probability of market acceptance, energy prices, and emissions trading) comprises an example of the potential risks and rewards available to forward thinking developers and tenants. These numbers are not meant to be exact blueprints for developer or purchaser returns, but can act as signals indicating that changes to the way important resources are priced will have considerable consequences.

[20] Kats, Greg (2003) "The Costs and Financial Benefits of Green Buildings."

Risk Analysis

1.0 Real Estate Project Risk

There are 7 important risks associated with Real Estate Development, which are further increased or decreased with sustainable development practices.

Real Estate Project Risk	Expected Risk Variation with Sustainable Practices
Economic Risk	↑ with higher upfront costs and higher future benefits expected
Liquidity Risk	↑ with higher building cost; 'green premium'
Inflation Risk	unaffected
Interest Rate Risk	unaffected
Operation Risk	↓ with less maintenance and replacement costs
Legislative Risk	↓ with building practices preceding or exceeding regulatory requirements
Environmental Risk	↓ with higher degrees of sustainability

Adapted from Resource Guide for Sustainable Development, *Urban Environmental Institute, Seattle, WA*

Any change to an existing practice contains a degree of risk. The largest risk the developer faces in designing, building and investing in sustainable buildings is the required upfront capital investment (realized by the developer or the external investor) in the infrastructure that provides for long term economic benefits through environmentally mindful practices.

Legislative risk and environmental risk are the most undervalued risks in the context of Vancouver. The City of Vancouver is developing sustainable development strategies – both in the short-term and long-term – that will directly affect the development of buildings. Thus, there is an increasing risk of more stringent government regulation aimed at internalizing the many negative externalities associated with development. It is to the benefit of developers to reduce both legislative and environmental risk with moderate investments in sustainable buildings because it is less costly to comply with government regulation when its consequences are foreseen.

2.0 Stakeholder Misinformation

Misinformation between stakeholders in a real estate transaction has been and continues to be a stubborn barrier that prevents the implementation of sustainability in the private commercial real estate market. The diagram below illustrates the asymmetry between the stakeholders' life-cycle costs.

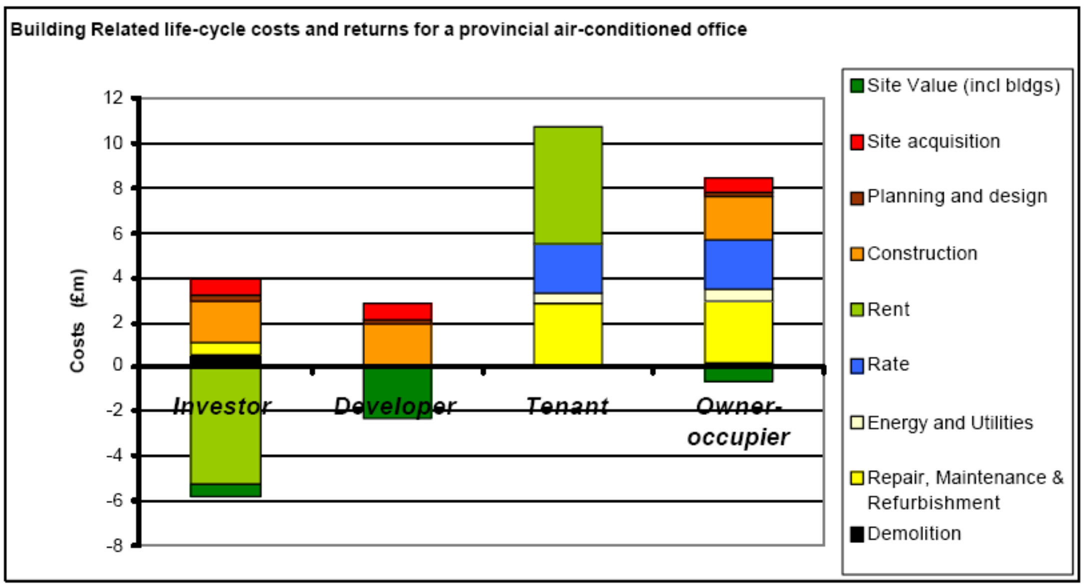


figure 4 – stakeholder burdens, BRECSU

When a private developer decides to construct a new building, he assumes that the future stream of rents will exceed the future stream of operating costs by an amount that provides an acceptable return for the project's risk – as reflected in the expected market sale price. The acceptance by the market of sustainable building practices depends on both the end-user (who demands green space) and the investor (supplier of the funds).

In the case of a long-term triple net lease, where the tenant pays operating costs and taxes, the tenant will have a purely economic incentive to demand green space, provided that reduced operating costs and other long term benefits are perceived. However, the investor has little incentive to provide the developer the necessary funds to provide the tenant with long-term benefits, as the investor incurs a risk that the market will not accept a higher price for the product. This risk is highest when the developer intends to sell the building in the short term to an undetermined client – as a "spec" development.

The Developer & Buyer Decision Matrix below illustrates the inherent risk in a developer-buyer transaction.[21] Under current market conditions, a developer can invest in a sustainable building and receive a higher payoff, under the condition that the buyer recognizes the future efficiency gains. These gains can vary significantly between prospective purchasers, as they are based on reduced operating costs and indirect benefits. If a prospective buyer does not recognize these efficiencies, the developer's profit is reduced as the investment in sustainable technologies is not recouped, as shown in the "Lowest Developer Profit" scenario. Accordingly, the most likely investment under current market conditions does not include high degrees of sustainable investment, as it bears a high risk of not being realized by the market.

Investment Matrix: Developer & Buyer Decision Matrix

Key Assumption: the developer requires an equivalent rate of return on sustainable investment as total project

		Prospective Buyer #1	**Prospective Buyer #2**
		Correctly Values Sustainable Economic Benefits	**Undervalues Sustainable Economic Benefits**
Developer	**Invests in Sustainable Building**	HIGHEST DEVELOPER PROFIT	LOWEST DEVELOPER PROFIT
	Doesn't Invest in Sustainable Building	REDUCED DEVELOPER PROFIT	REDUCED DEVELOPER PROFIT

Current private market outcome

Developer Investment Recovered	Developer Investment NOT Recovered

For the matrix equilibrium to move from the current private market outcome to the "Highest Developer Profit" outcome would require fundamental change within the real estate industry. In order to align the interests of stakeholders and incorporate long-term building benefits in the capital-investment decision-making of the developer, increased transparency between stakeholders is required. This will involve innovative partnerships where investors are accountable for investments that affect the building's life-cycle. For example, the developer could realize a portion of the cash flow savings resulting from an investment in a more efficient HVAC system over the life of the asset; the annual cost savings would be determined by an independent audit of energy use.

[21] Note that this simple model assumes the developer is also the investor

As the end-user becomes more involved in development decisions, sustainability will play an increasing role in private real estate markets. Indeed, the current (and growing) development trend toward "build-to-suit" units in building construction is indicative of the profitable opportunities available to all stakeholders involved in real estate transactions – ranging from the initial investor to the end-user.

Recommendations

Quantifying the value added by the implementation of green building technologies varies significantly with different features and practices. For example, an owner can calculate to a high degree of certainty the value of waste diversion, energy and water savings, and government grants, but potentially significant benefits such as employee productivity and emission savings are difficult to calculate. Employee productivity benefits have been documented in several green building projects, but the numbers vary a great deal, and are difficult or impossible to predict on a per project basis. In other words, a developer would be hard pressed to describe to a purchaser the exact monetary value of better lighting and cleaner air in terms of sick days or productivity.

Given these uncertainties, it is clear that more thorough research is required, the most convincing of which will come from examples that developers and buyers learn about as green buildings become more common. Government initiatives and grants, effective regulation, and public-private partnerships will be essential in creating the momentum required for sustainability to become commonplace in private commercial real estate development.

At present, investors, developers, purchasers, and tenants should work toward sharing the risks associated with the higher up-front costs required to build sustainable buildings. If the various players fail to do so, even the most certain benefits that would accrue over the lifetime of a building will undoubtedly be abandoned because of behavioral uncertainty. The business case exists for green buildings today under the condition that a longer time frame is considered for capital investments (between 20 and 40 years), and its benefits are unlikely to decrease; if anything, it will become increasingly costly to avoid saving energy, conserving resources, limiting emissions, and improving employee health.