Can appraisers adapt to CLIMATE CHANGE?

By John Peebles, AACI, P. App

On February 2, 2007, the United Nations-sponsored Intergovernmental Panel on Climate Change (IPCC) released its fourth assessment report, concluding that c*limate change is "unequivocal" and that human activity is the main driver of this warming, asserting with near certainty – more than 90% confidence – that carbon dioxide and other heat-trapping greenhouse gases from human activities have been the main causes of warming since 1950.* Whether you agree with IPCC or not, climate change is front page news. Our political and business leaders are increasingly mirroring the public concern over climate change with 'green' economic strategies.[1]

Evidence that the valuation community is embracing the green mega-trend is the *Vancouver Accord*, signed by international industry representatives and valuation professionals on March 2, 2007, at the Vancouver Valuation Summit. *Vancouver Accord* goals are to:

- commit the industry to a review of the relationship between sustainability and standards of valuation;
- promote awareness of and competency in the appropriate methods of addressing sustainability in valuations and worth appraisals; and
- work with those inside and out of the valuation industry to educate and inform about sustainability and its relationship to value and worth.

The objective here is to focus on one of these goals, increasing appraiser awareness of the relationship between green buildings and market value. Why? Green building design is moving from the domain of institutional and special purpose properties to mainstream applications in industrial, retail and office commercial markets. Evidence of this trend can be found in recent announcements for new green design office and mixed-use projects in major Canadian centres.[2] Appraisers need to understand the design, operation and economics of green buildings to understand how markets will react to these properties.

Our continuing green education will likely centre on the following questions:

- How do we define green or sustainable buildings? What property attributes will alert us to the differences between green and similar conventional buildings?
- What are the economics of green buildings, e.g., initial construction and life-cycle costs, annual revenue-operating expenses, and vacancy and market capitalization rates?
- Is the slogan 'green value' fact or marketing hype? How are market forces responding to green buildings?
- Should the appraisal profession account for the potential intangible values of green buildings, such as increased tenant satisfaction and productivity, and social corporate responsibility?

Lower operating expenses, specifically for energy consumption, are often promoted as a benefit of green buildings. This article relies on a literature review and property case study to examine two questions about green building operating expenses.

(1) Do green buildings, on average, have lower operating expenses (e.g., energy costs)?
(2) If this expense advantage exists, is it reflected in market value?

The Regional Municipality of Niagara recently expanded its Campbell East, Niagara Region headquarters in Thorold, Ontario and incorporated such energy efficient features as high thermal resistance in the walls and roof, high performance windows, efficient condensing boilers, occupancy sensors for lighting efficiency, and low flow water fixtures, among others. (Photo: Enermodal Engineering Ltd.) Photo courtesy of the Canada Green Building Council www.cagbc.org

Defining green buildings

Before learning whether 'green is a dream,' a clear definition is needed for green or sustainable buildings.

One approach is to identify green buildings through recognized standards. The Green Building Rating System (2004), based on LEEDTM Canada NC,[1] is the Canadian standard for new construction. BOMA[2] is promoting its Green Certification Program (2003) for existing buildings. Since only 4% of new commercial construction[iii] in Canada has been LEED certified, strict reliance on this standard will likely exclude many new buildings with various degrees of green technologies. The issue is that many developers may build or rehabilitate to a level equivalent to green standards, but may not apply for certification due to the time and money required. The BOMA program has broader application, but it is also relatively new and is continuing to build a profile in Canada.[iv]

While you cannot rely exclusively on standards to identify green buildings, it is possible to identify green buildings through design, construction and operational practices that are consistent with Canadian standards and other green building definitions.[v] These practices reduce the negative impact on the environment through[vi]

- energy efficiency,
- use of natural building materials,
- conservation of water and other natural resources,
- waste avoidance, re-use and recycling, and
- flexible and adaptable spaces.

The Villa Angela Sisters building in Chatham, Ontario utilizes a variety of innovations to optimize energy cost performance by 55% more than the Model National Energy Code for Buildings and realize energy consumption savings of 51%. (Photo: Jorden and Cook Architects) Photo courtesy of the Canada Green Building Council www.cagbc.org

Green building economics

A review of published literature on green building economics reveals a weight of information on the opportunity to reduce operating costs, but little information on positive impacts for increased building rents and reduced vacancies. *Green Buildings and the Bottom Line (2006)*, by the Building Design and Construction Network, exemplifies the limited state of knowledge on green economics. Other documentary sources[vii] point to the opportunity to achieve a 30% reduction in operating costs with green building design.[viii] The US EPA (Environmental Protection Agency) has taken a bolder approach in promoting green building economics, stating that a 30% *reduction in energy use (commonly achievable in the average commercial office building) can yield the equivalent of a 5% increase in Net Operating Income (NOI) and overall asset value.*[ix]

The Canadian experience with green buildings parallels the US experience. The BC Ministry of Energy, Mines, and Petroleum Resources claims that energy efficiency upgrades can reduce annual energy costs for commercial real estate by an average of 20%.[x] The Ministry estimates that about 70% of the projected cost savings will be associated with energy costs[xi] related to heating, cooling and lighting. In a related study, the federal government (2005) confirmed that the average cost for energy represents about 30% of the total O&M budget for federal office buildings, or about $20/m^2 ($1.85 per ft^2).[xii] Applying the 20-30% rule of thumb for possible energy savings translates into a potential O&M reduction of $.37-$.55 per ft^2, or an average annual savings of roughly $15,000-$22,000 for a 40,000 ft^2 office building.

The literature review supports the notion that green buildings generally have lower energy costs in relation to conventional buildings.[3] However, no direct evidence was found of the relationship between reduced expenses and market value.

Case study details

The headquarters (HQ) of the Capital Regional District[4] (CRD) was selected for this case study, since it is one of few recently constructed office buildings in Victoria, and since the CRD intended the building to embody

sustainability practices. The CRD HQ, a multi-storey class B office building, is located in the City of Victoria downtown precinct. The building is comprised of two adjoining buildings with integrated interior space, constructed in two phases. The first phase, completed in 2004, was a re-development of the former Victoria Police Headquarters building on Fisgard Street. In the second phase, the adjoining property was acquired and a new building was completed in 2006. Both buildings share some mechanical, electrical and other building systems.

	Phase I	Phase II	Total
Storeys	4	6	
Rentable area ft^2	26,864	47,574	74,438

Table 1: CRD building rentable area
(source: Capital Regional District)

The first step in this case study was to confirm that the CRD HQ met the general requirements for a green building, focusing on the first criteria - energy efficiency.

The building energy efficient features are associated with building envelope design, HVAC, electrical systems, water supply and building controls. A brief overview of these features is provided in the following section.

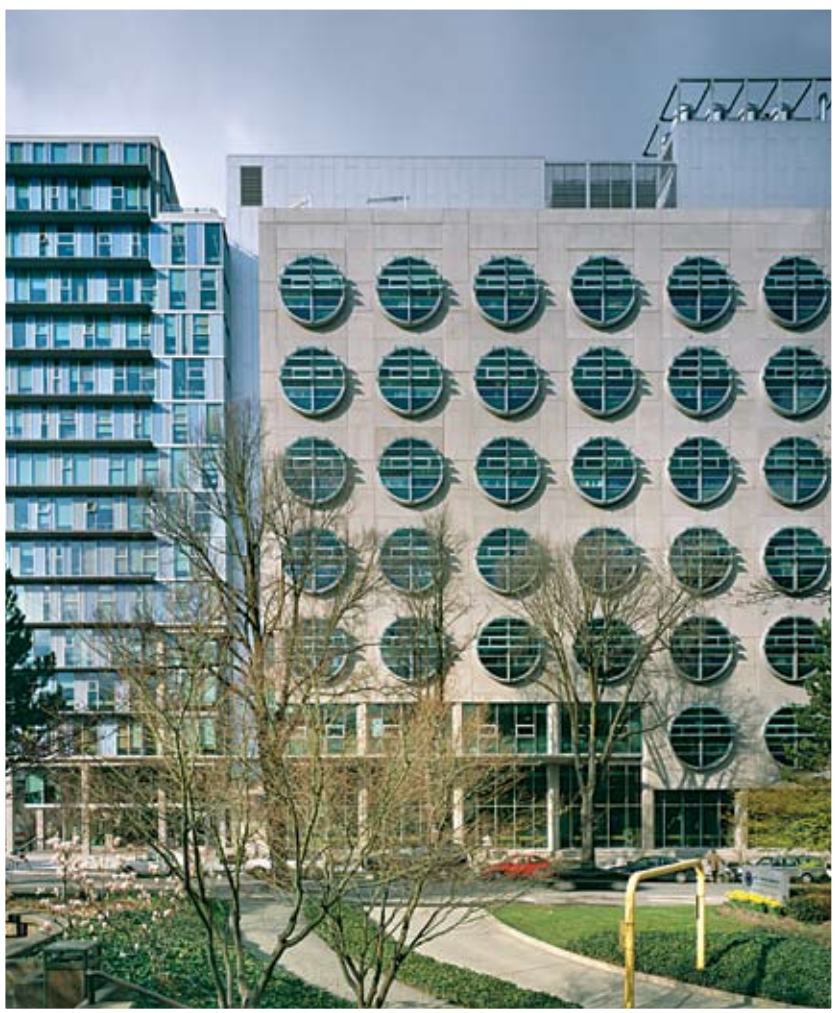
Thermal mass: In building construction, thermal mass is the use of building materials to absorb, store and later release significant amounts of heat. Buildings with thermal mass elements benefit through reduced spikes in daily energy use, since the mass slows HVAC response time, moderating indoor temperature fluctuations. Another advantage provided by thermal mass is the reduction in cost for heating in winter and cooling in summer. Thermal mass is achieved in the CRD building through exposed inside surface concrete slabs and shear walls. In this example, the additional advantage of exposing structural elements was a reduction in the cost to finish the exposed concrete (gypsum or painting not required) and an associated reduction in long-term maintenance expense for these surfaces.

Solar shading: The design goal is to maximize winter solar heat gain and minimize excess solar gain during other seasons. The CRD building achieves this performance goal through exterior solar shading panels and use of high-performance window units with 'high-e' and insulation properties.

Interior design: A characteristic of open floor plans is the concentration of enclosed spaces, such as offices, meeting rooms and mechanical-electrical rooms, in the building's core to allow unimpeded air circulation in the majority of the occupied space. Older class B buildings in the downtown core of Victoria will typically have a concentration of enclosed offices along exterior window exposures. The CRD building has an open floor plan design with relatively unobstructed access of interior space to natural light and views out. A related benefit of this day-lighting design feature is the cost savings from reduced lighting requirements.

Lighting design: The CRD building features energy efficient 'task-ambient' lighting (hanging fixtures) which reflect light to the ceiling for more even distribution. These fixtures have photocell-controlled dimming ballasts to adjust output of fixtures in response to daylight. Motion detector controls turn office and cubicle lights on and off based on occupancy, and digital systems controls manage lighting during evening and non-peak hours of use.

HVAC: Conditioned air is provided through an under-floor air distribution supply. In this system, the raised floor serves as a supply plenum system versus conventional overhead ductwork associated with Variable Air Volume systems. Use of this system reduces construction and renovation costs, since the costs of installing



The BC Cancer Agency Research Centre in Vancouver, BC is predicting annual energy savings of $381,269 as a result of many construction and mechanical innovations. (Photo: Henriquez & Partners Architects) Photo courtesy of the Canada Green Building Council www.cagbc.org

or moving duct-work are eliminated, and electrical and data services can be accommodated within the space. The energy advantage of an under-floor system is that, when supply air is introduced at the floor level and returned at the ceiling, natural convection reduces the energy required to distribute the supply air, thus reducing the size of the HVAC units and associated energy consumption.[xiii] Use of a raised floor system and largely open floor plan also reduces the 'churn' or construction and renovation costs resulting from the need to re-configure space over time. Additional energy efficiency is achieved with optimization of the ventilation systems to reduce electrical load, while keeping the building pressurized. A related design feature in the CRD building is the provision of operable windows to provide natural ventilation when outside conditions permit. The main intangible benefit of these features is the ability to better customize heating and cooling for each work unit and building zone.

The CRD building incorporates a number of additional sustainability measures related to water conservation, use of natural materials, and recycling. For example, water conservation features include low-flow shower heads and toilets, motion sensor faucets, waterless urinals, and a rainwater storage/reuse system to augment non-potable water supply requirements. An analysis of these features is beyond the scope of this article.

Energy savings with green?

To answer the first research question, there was a need to establish typical building energy costs for similar class B (BOMA standard) office buildings in downtown Victoria. Local property managers, brokers and the BC Assessment Authority[xiv] staff confirm that the typical range in O&M expense[5] for class B office buildings in Victoria is $6-$7 per ft^2. The energy component (hydro and gas) of O&M expense for conventional buildings is estimated by local experts to fall within a range of $1.75-$2.00 per ft^2. This expense range is supported by the federal government energy estimate of $1.85 per ft^2, noted earlier.

The latest available[6] CRD building operating expense statements (fiscal year 2006) reveal an energy expense of $1.26 per ft^2 versus benchmark energy expense of $1.75-$2.00 per ft^2 of rentable area, representing a difference of $.49-$.74 per ft^2. Has the cited literature demonstrated the premise that green buildings achieve significant energy savings in relation to conventional buildings of similar utility? Not conclusively, for a number of reasons:

- Only one year of performance data was available for the CRD building,[7] but, according to local property managers, a three-five year operating history is required to understand building performance, especially for green building investments.
- Extreme climatic variation in any year of data (e.g., colder than normal winter or warmer than typical summer) will skew energy consumption numbers.
- The energy consumed by office buildings will be greatly impacted by hours of use, e.g., some private sector buildings may require more daily hours of lighting, heating and cooling than institutional buildings such as the CRD HQ.
- Consistent information required to reliably benchmark performance for conventional and green buildings is scarce.
- There are many different building HVAC systems with consumption rates for gas and hydro, creating an issue for performance benchmarking.

However, since the energy performance outcomes are representative of the 30% in cited literature, it is assumed that the outcome justifies an attempt at hypothetical value analysis.

Do energy savings = green value?

The first problem to address was the appropriate method for valuation of the energy savings. Gary Wolff (2006) identified four methods to analyze the financial benefits of green buildings: simple pay back, levelized cost, relative net present value, and internal rate of return.[xv] In the interest of simplicity, there is one method which is well understood by the valuation and investment community, i.e., net present value (NPV).

The biggest difficulty faced in using NPV was the availability of reliable information on the construction cost of the CRD building, versus costs for a similar building with conventional design (e.g., cost of green construction). To overcome this limitation, the National Research Council findings were adopted. These indicate that the *capital costs for constructing a green building are comparable to that of conventional buildings of the same type.*[xvi] Additional assumptions were made for the investment horizon, yield rate, and stability of energy operating costs over time.

Assumptions were made that a conservative energy cost savings of $.45/ft^2 can be achieved with green design and construction, and the total annual savings for the CRD building would be about $33,500. A 10-year investment horizon and 6% yield rate (e.g., real estate investment trust yields) were also assumed. Capitalizing the annual expense savings over the investment horizon returns a present value of about $246,500.[8]

At this point, you may feel the case study is more of an academic exercise, given the growing uncertainty associated with the assumptions. Can the findings be considered conclusive? No - a single case study is not sufficient to draw generalized conclusions. Keep in mind that that the analysis of green value is a new area of valuation practice and the goal of this article is to illustrate how one might undertake a value analysis of the 'green' premium.

Summary

This article has provided an approach for identifying green buildings, a simple method for quantifying the relationship between operating expenses and value, and some areas for additional research. However, the main goal has been to awaken appraisers to green building trends and the need to account for the impact of 'green' on value. There are many additional potential tangible and intangible aspects to green buildings which can be investigated, such as reduced life-cycle cost, improved tenant relations and retention, reduced costs associated with churn rate for interior space, etc.

Are investors looking for this type of real estate intelligence? In Green Can be Gold, author David Kozlowski, senior editor of Building Operating Management, cites an interview with a prominent Chicago developer stating, "There is not a lot of knowledge or interest on the part of appraisers to go through all the bother of determining NOI (net operating income) based on energy savings." Kozlowski underscores the problem of appraisers falling behind the industry with additional examples of the importance brokers, landlords and developers increasingly place on NOI and energy cost. The counterpoint is that the collective industry understanding of green building economics is so limited in Canada that the market may not be ready for 'due diligence' in green building valuation, especially since much of the energy benefits accrue to tenants.

This article has pointed out a number of gaps in our knowledge of green building economics. Energizing green valuation research to the next level will require partnerships and collaboration between the appraisal and academic community, as well as real estate organizations. Whether institutional or fee, residential or commercial, appraisers should respond to the Vancouver Valuation Accord by:

- learning about new building technologies;
- staying connected with the evolution of green building trends and standards;
- monitoring market reactions to the increasing number of new green buildings and buildings rehabilitated to a green standard; and
- increasing awareness of government policies to encourage and mandate green or sustainable development.

As well, the Appraisal Institute of Canada is encouraged to support more in-depth research on green valuation methodologies.

End notes:

1 Leadership in Energy and Environmental Design Canada New Construction, Green Building Council.

2 Building Owners and Managers Association

3 A 2004 BOMA BC study funded by the Real Estate Foundation of BC, entitled *Go Green Phase II Report*, recommends that the initial focus for green building performance measurement should be energy efficiency gains due to the complexity of analysis for other factors such as water and waste reduction

4 The CRD provides a range of services for unincorporated areas, and coordinated regional and sub-regional in the Greater Victoria area, such as solid waste disposal, water distribution, regional planning, affordable housing, and health facility funding.

5 Includes utilities (hydro, gas and water), repairs and maintenance, and insurance.

6 The building is relatively new and built in two phases. Hence, operating expenses for 2005 years were not relevant.

7 CRD property management staff noted that the building systems will require further calibration to optimize performance.

8 For simplicity, it is assumed that energy costs and yield rates will be stable over the investment period.

References:

i Federal Budget 2007. *Preserving Our Environment and Modernizing Health Care.* http://www.budget.gc.ca/2007/themes/papemhe.html

ii Hume, Christopher (Feb.8, 2007). *New Towers Paint the Town Green.* Toronto Star. http://www.thestar.com/article/182962

iii White, Anne (2007). *What are the Barriers to Building Green Buildings?* Real Estate News Exchange. http://www.renx.ca/Detailed/1243.html

iv BOMA BC (2005). *Go Green Phase II Report.* http://www.greenbuildingsfoundation.org/research/data/BOMA.GGPII.Report.pdf.

v Krisandra Guidry. *How Green is Your Building? An Appraiser's Guide to Sustainable Design*, Appraisal Journal, Winter 2004, p.58-61.

vi World Commission on Environment and Development, *Our Common Future*, New York, Oxford University Press, 1987, p.4.

vii *Green Value: Green buildings, growing asset* (2005). http://www.rics.org/NR/rdonlyres/93B20864-E89E-4641-AB11-028387737058/0/GreenValueReport.pdf.

viii Kats, Gregory (2003). *Green Building Costs and Financial Benefits.* http://www.cap-e.com/ewebeditpro/items/059F3481.pdf.

ix *EPA Energy Star Newsletter* (2006 Summer). http://www.energystar.gov/ia/business/guidelines/assess _ value/off _ the _ charts _ summer _ 2006.pdf.

x *Energy Efficiency for the Commercial Construction and Management Industries* (2007).http://www.em.gov.bc.ca/AlternativeEnergy/EnergyEfficiency/energyefficiencypdfs/information _ for/Energy _ Commercial _ 07.pdf.

xii *An Architect's Guide to Sustainable Design of Office Buildings* (2005). http://www.pwgsc.gc.ca/realproperty/text/pubs _ archguide/pubs _ archguide _ 4-e.html.

xiii Spinazzola, S. (2005). *Air Distribution Turned Upside Down.* Building Operating Management. http://www.facilitiesnet.com/bomarticleemail/BOMarticle111805.html.

xiv Personal interviews conducted March 1 to March 31, 2007.

xv Wolff, G. Beyond Payback: A *Comparison of Financial Methods for Investments in Green Buildings*, Journal of Green Building. Vol 1(1).(2006). p.82.

xvi National Research Council (2005). *Green Buildings: Capital and Life-Cycle Costs.* http://irc.nrc-cnrc.gc.ca/sbe/greencapital _ e.html

John Peebles, AACI, P. App is a Valuation Consultant with D.R. Coell & Associates in Victoria, BC.