GOING GREEN (Newsletters Summer 2006, Spring 2006, Winter 2005/2006)

Nova Scotia Community College, Dartmouth

Marital conflict looms! Concerns about Iran have caused February Brent crude futures for April delivery to hit $61.48 USD per barrel: perhaps it wasn't such a great idea to buy that SUV! Oil prices used to be a pretty tame affair, jogging along between $12 and $17 per barrel in the post war period until 1973, when the Yom Kippur War and the resultant Arab Oil Embargo triggered oils' wild ride. (All prices are quoted in 2004 USD). During the following twelve months they surged to $39/barrel. By 1978 oil prices had dropped back to $31/barrel before those fractious fellows propelled it to $63/barrel in 1981 with the Iranian Revolution and then the Iran/Iraq war. During the 1970s and 1980s Atlantic Canadians shivered, insulated their homes, turned down their thermostats, adopted solar systems and wind power, shied away from electric heat, purchased smaller cars … and became decidedly grumpy. Then oil prices plummeted; by 1986 they were down to $19/barrel, and after a couple of hiccups caused by the Gulf War and the economic crisis in Asia, fell again to $12/barrel in 1998. Consumers meanwhile happily abandoning their parsimonious past, purchased large cars and even larger houses. Oh tut! Those who forget their past are doomed to re-live it. OPEC cut production, terrorists crashed the New York World Trade Centre, the West (well some if it) took on the Taliban in Afghanistan, and Saddam Hussein in Iraq. Oil prices have been increasing ever since. No end is in sight. Concerns about Iran's nuclear ambitions and the Israeli response, rebel attacks on oil installations in Nigeria, the rise of left wing governments in Latin America propagating anti-U.S. sentiment, Russia's attempt to flex its natural gas supply muscle against emerging democracies such as the Ukraine, the economic expansion in China … all propel prices higher as supply is threatened and demand increases. Atlantic Canadians will again shiver, insulate their homes, turn down their thermostats, adopt solar systems, heat pumps and wind power, shy away from electric heat, copulate, kick the cat, purchase smaller cars … and become decidedly grumpy. It's time to go green!

Going Green

In April 2005 the Federal Government launched "Project Green", an ambitious program to cut their energy consumption by 50% in any new office building or space held on a long term lease. Henceforth this type of office space has to meet the Leadership in Energy and Environmental Design (LEED) Gold Standard. Wow! Quite a commitment. What does it mean? We thought you would like to know, and since we have experience of "green buildings", solar power, heat pumps, wind farms, things woody and environmental; prepare to be led to LEED.

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LEED is a set of standards developed by the U.S. Green Building Council, a national non-profit agency (www.usgbc.org). Its Canadian counterpart, the Canada Green Building Council (www.cagbc.org) publishes standards which are very similar in content and application. The two organisations' raison d'etre is to encourage the design and construction of buildings which are environmentally economical, in their respective countries. These Green Building Councils act as certification agencies and award "Certified", "Silver", "Gold" and "Platinum" status based on a points system which rates the environmental efficiency of the project. The program is relatively new in Canada, and was launched nationally on December 1st 2004. It has a seven year history in the United States: 300 buildings have been certified there, 3,000 more are in the pipeline. Commercial building certification is available for existing buildings and interiors as well as for new construction. The program was launched nationally in Canada on December 1st 2004: 19 buildings have been certified, another 155 are in the pipeline. No buildings have yet received LEED certification in Atlantic Canada but there are 12 in the pipeline: 6 in New Brunswick (located at Bathurst, St. Andrews, Waterville, Havelock, Florenceville, Oromocto); 5 in Nova Scotia (located at Iona, Dartmouth, Tantallon, Halifax); 1 in Prince Edward Island (Charlottetown). They include such high visibility projects as the Upper River Valley Hospital now being constructed in Waterville, N.B.; the Nova Scotia Community College now well advanced on a prominent Dartmouth site overlooking Halifax Harbour; the proposed QEH/St. Pats High School shortly to be erected near the Halifax commons, and the proposed Government of Canada Building at University Avenue/Euston/Fitroy Streets, Charlottetown, PEI. All projects currently registered in Atlantic Canada are being built by government agencies. However we are aware of privately initiated "green" projects in the region which have not registered for LEED certification, and which may not do so because of the cost and paperwork involved. U.S. experience puts the cost of registration between $33,000 and $153,000 USD for the administration and paperwork. There are real economic benefits, some obvious, others subtle but significant, to Green Buildings, and LEED certification; so resist the temptation to stop reading now. Although most of the projects have been government initiatives which focus on operating expenses, there is anecdotal data from private projects showing improvements in occupier work productivity which transcend the more obvious savings in building operating expenses. Furthermore as Green Buildings establish a track record, these improvements are being translated by the marketplace into higher rents and shorter lease up periods.

LEED Certification

Upper River Valley Hospital, Waterville, N.B.

The LEED Standard for New Buildings does not just focus on the building's operating efficiency: it employs a holistic approach which considers the location of the site, re-use of building materials, site remediation, public transportation, site development, light and heat pollution, use of environmentally friendly construction materials … as well as the operating efficiency of the building itself. *The fundamental principle behind LEED Certification is the necessity to minimise the environmental impact of the new construction across the entire time spectrum; past, present and future.* The Standard employs a points system; the higher the number of points the development can capture, the higher the Standard, viz.:

Standard	Points Required	
	USA	Canada
Certified	26-32	26-32
Silver	33-38	33-38
Gold	39-51	39-51
Platinum	52-69	52-70

Points are awarded at each stage of the site selection, site, and building development process. For example, one point is awarded if the site avoids the re-use of prime farmland, floodplains, endangered species habitat, wetlands or parkland. It encourages development of two storeys or higher, located in urban areas with access to public transportation, especially if the site is contaminated (brownfield) and will be remediated. Similarly, anything which discourages the use of automobiles by placing emphasis on walking or cycling, garners brownie points. For example, choosing a site which is proximate to facilities such as a bank, drycleaner, medical/dental, park, post office, supermarket … even a fire station, is rewarded as is the provision of a secure bike rack and facilities for low-emitting or fuel efficient vehicles, on site. Automobile use is discouraged too by limiting the amount of parking: something that runs contrary to the efforts of most municipalities in Atlantic Canada; they currently subsidise parking in their downtown areas and encourage greenfield development with large parking areas on the periphery of their urban areas sometimes giving the land away in a desperate attempt to snatch realty tax revenue from "competing" municipalities or additionally, as in the case of Halifax's Bayers Lake Retail Park, to salvage an ill advised investment in what was supposed to be an industrial park. On greenfield sites, LEED Certification is directed to conserving natural areas and restoring damaged areas to provide habitat and promote biodiversity by limiting the building's footprint and encouraging development vertically, rather than horizontally. Site development is directed to proactively promoting biodiversity by providing a high ratio of open space (at least 20% of the lot area) to the development footprint whilst limiting the impact of site run-off through restricting paving, increasing on-site infiltration and re-using storm water for landscape irrigation, toilet and urinal flushing. Once the site has been developed, the focus on storm water run-off continues with the objective of minimising disruption and pollution of adjacent streams and rivers, by capturing 90% of the average annual rainfall on the site and removing 80% of the suspended solids through the use of vegetation, on the roof as well as the site, vegetated swales, avoidance of paved and other impervious surfaces, and rainwater recycling. Impervious non-reflective surfaces such as asphalt parking areas and roofs act as "heat islands" and distort the microclimate, thus disrupting human and wildlife habitat. Thus the Standard promotes the use of landscaping to provide shade to 50% of the paved areas, or by placing them below ground or utilizing materials with the ability to reflect solar heat rather than absorb it … dark colours are out, white is preferred, vegetated roofs are even better.

Flying eastwards at night across America's Midwest into Chicago offers a salutary lesson in light pollution. The aircraft floats on a carpet of light from the communities below. The LEED Standard attempts to minimise light trespass from the site and building by preventing it exiting the windows, promoting non-use outside business hours, and encouraging downward projecting site illumination. Water efficiency is encouraged by the elimination of potable water for landscape irrigation and the use of indigenous plants, as well as the recycling of water for toilets and urinals, together with conservation measures such as low-flow shower heads and flushing toilets, and occupancy sensors. Energy efficiency is a great concern. It is a pre-requisite that all heating, ventilating, air-conditioning, lighting, hot water and renewable energy systems (wind, solar, etc.) are properly calibrated. The Standard requires minimum energy savings of 10.5% and contemplates maximum savings of 42% for a new building, (3.5% to 35% for a renovated structure) compared to a conventional "baseline" building. CFC based refrigerants are not allowed for new buildings and must be phased out in existing structures because they deplete the Earth's ozone layer. On-site renewable energy systems such as solar (for heating, hot water and electricity), wind (electricity), geothermal (heating and cooling), low impact hydro (electricity), biomass and bio-gas strategies, contemplate energy savings of between 2.5% to 12.5%. Since performance will degrade as the equipment ages or is not properly maintained and utilised, the Standard requires on-going measurement of energy use through metering. Purchase of at least 35% of the building's electricity from renewable sources such as grid based power derived from wind farms, solar, hydro, geothermal or biomass is encouraged. The reduction of landfill waste by collecting, sorting and storing recyclables from processes within the building are required by the Standard. (Municipalities within Atlantic Canada have implemented this type of program with some success: Halifax Regional Municipality claims to divert 55% of materials that formerly went to its landfill, into recycling and composting instead, under a program which officially commenced in December 1998).

The LEED Standard promotes building reuse, rather than complete demolition, and awards points based on maintaining the exterior walls, floor and roof structures (75% to 95%) and interior non-structural items (50%) such as interior walls, doors, floor coverings, and ceiling systems. Recycling materials recovered during the renovation (50% to 75%), reusing materials (5% to 10%) in the project itself, and utilizing materials recycled from elsewhere (10% to 20%) are recognised objectives. They can also make good business sense to an occupier. Outdoorsman Yvon Chouinard (his father was a Quebecer) founded and built Patagonia, Inc. into a $250 million USD company selling climbing, fishing and outdoor equipment. In addition to pledging 1% of its annual sales to grassroots environmental organisations, Patagonia houses its operations, where possible, in "green" buildings. Its Portland, Oregon store is housed in a 1895 warehouse and provides 8,000 ft.² of spectacular selling space in a building remodelled in 1998 with an estimated 97% reclaimed or recycled material. The Standard also rewards the use of regionally sourced building materials within 800 km of the project site, provided that they comprise at least 10% of the total cost, since this reduces the environmental impact of transportation. In addition building materials drawn from plants with a short growing cycle (≤ 10 years) are encouraged, particularly if they are wood based and are grown in an environmentally responsible, managed forest.

As might be expected, green buildings prohibit smoking, establish minimum indoor air quality standards, require on-going monitoring of air quality during and after construction, and limit materials, paints and floor coverings which "gas off". Pollutant entry into the buildings has to be controlled through air filtration and negative pressure in spaces such as garages, housekeeping/laundry and copying/printing rooms. 90% of lighting has to capable of being controlled by the individual occupants. Heating too has to be responsive to individual or work group control. Thermal comfort is measured by occupant survey within 6 to 18 months of building occupancy: a "thumbs down" by more than 20% of occupants mandates immediate corrective action. Visual connection with the outdoors is deemed important and is achieved through glazing, adequate to confer

a glimpse of freedom to at least 75% of the floor space (90% is better). The Standard encourages "innovation in design" (not defined) and the use of a LEED accredited professional as part of the design process.

What Does It Cost?

Most of the LEED "Green" buildings have been erected by or for government institutions and this may limit the validity of the data. However an Urban Land Institute study of buildings developed by the private and public sectors (Green Office Buildings. A Practical Guide to Development 2005. ISBN 978-0-87420-937-2) pegs the incremental cost over a conventional building at just 2%. This was based on an analysis of 40 green buildings, most of them offices but which also included 8 schools. The distribution of the cost premium was as follows:

Standard	Points Required	
	Range	Average
Certified	0% to 1.6%	0.7%
Silver	0% to 7.10%	1.9%
Gold	0.10% to 6.41%	2.2%
Platinum	6.50% to 7.10%	6.8%
Total	0% to 7.10%	2.0%

Source: Urban Land Institute, 1995 to 2004.

A study by the Royal Institution of Chartered Surveyors of buildings in Canada and the USA (Green Value. Green Buildings, Growing Assets 2005) determined that their incremental cost over a conventional building ranged between 0.6% to 5% for office, warehouse and paramedic buildings. The cost differential can be much greater, as high as 20% to 25% if emerging technologies such as photovoltaic arrays are utilised. Presumably the energy savings will be considerably higher too.

What Do They Save?

It is not possible to quantify with any degree of accuracy the cost savings to society as a whole since the calculations would have to embrace, for example, the cost of steadily increasing cancer rates and the desegregation of pollution from among its various sources, of which buildings are but one culprit. Far easier then to calculate the monetary cost savings to the property owner/tenant. Even these cost savings are location and building type dependant. The 3 buildings in the RICS study for which detailed utility costs (HVAC, water, heating, receptacle loads, lighting, pumps/fans, water/sewer) were

available, indicated cost savings of 58% to 66% compared to a conventional building. The ULI study found cost savings of 30% for electricity; and 30% (indoor water) plus 50% (outdoor watering of landscaping).

Hidden Benefits

An underlying benefit disclosed by studies of green buildings is that they are more occupier friendly than their conventional peers. The better air quality, natural lighting, improved heating and ambience of the green buildings, is reflected in improved worker productivity. Landlords report shorter lease up periods, reduced tenant turnover, and increasingly, higher rent. The SAS Institute (Canada) Inc.'s building located on King Street East, Toronto was 96% pre-leased for the remaining 48% of the building not occupied by the owner. The space rented at "Class A rates" even though the building was located in a "Class B to C neighbourhood", about 66% above the local market, according to the owner.

It is the occupiers who benefit most from green buildings. The RICS study uncovered empirical data suggesting dramatic improvements in employee productivity and lower absenteeism, which far overshadowed the annual savings in energy use and maintenance and, in the case of one $0.5 million renovation, resulted in a one year payback!

Some companies have leveraged their green buildings even further, using them to buttress their environmentally friendly image: in effect making them part of their marketing program. Patagonia, a U.S. maker of climbing equipment and outdoor clothing *"defines the quality of our company by the degree to which we can reduce our impact on the environment"*. Its 171,000 ft.² Reno Service Centre, was designed to be energy efficient and incorporated a large component of recycled material. Its 87 solar mirrors track the Nevada sun to reflect light to the work floor below. The Company's "reincarnated" Firehouse in Ventura, California is built largely of recycled materials and the building that originally stood on the site was carefully dismantled, shipped and re-assembled in South Dakota. Another outdoor equipment company, the Mountain Equipment Co-op, has also constructed a green building, in the Marche Central Shopping complex in Montreal, congruent with their goal to *"reduce the ecological impact of running our business while increasing the positive impact we have on people and communities".*

Are They Financial Feasible?

Improvements in employee productivity, though impressive, will not benefit property owners unless they are also occupiers, until the market recognises and prices the productivity gains appropriately. The lower operating costs, tenant stability, quicker lease up and the higher rents so far achieved, are value enhancing features that can be measured. The Urban Land Institute study referred to earlier in this article attempted to compare the incremental cost of a typical green building with its incremental value (using the savings in operating costs and productivity and health benefits, discounted to present value over a 20 year life cycle). The study indicated a value increment of $50/ft.² (Certified and Silver buildings) and $65/ft.² (Gold and Platinum buildings). However until the market recognises the Productivity and Health gains and reflects them in the rent, landlords are more interested in the cost/benefit excluding these items. The ULI study therefore also models a hypothetical green building in Portland, Oregon in 2004, and calculates the incremental value at $20.88/ft.² when factors such as a higher rent, faster lease-up, lower tenant turnover and utility costs are included. Given that the green buildings in the Study have an average $4.00/ft.² incremental cost over conventional buildings, "going green" adds value. However the proof of the pudding is in the eating and until hard data is available from sales of green buildings this "value increment" remains for the moment, somewhat conjectural.