GREEN VALUE

Green buildings, growing assets

REPORT

A major collaboration into the study of building value by building green

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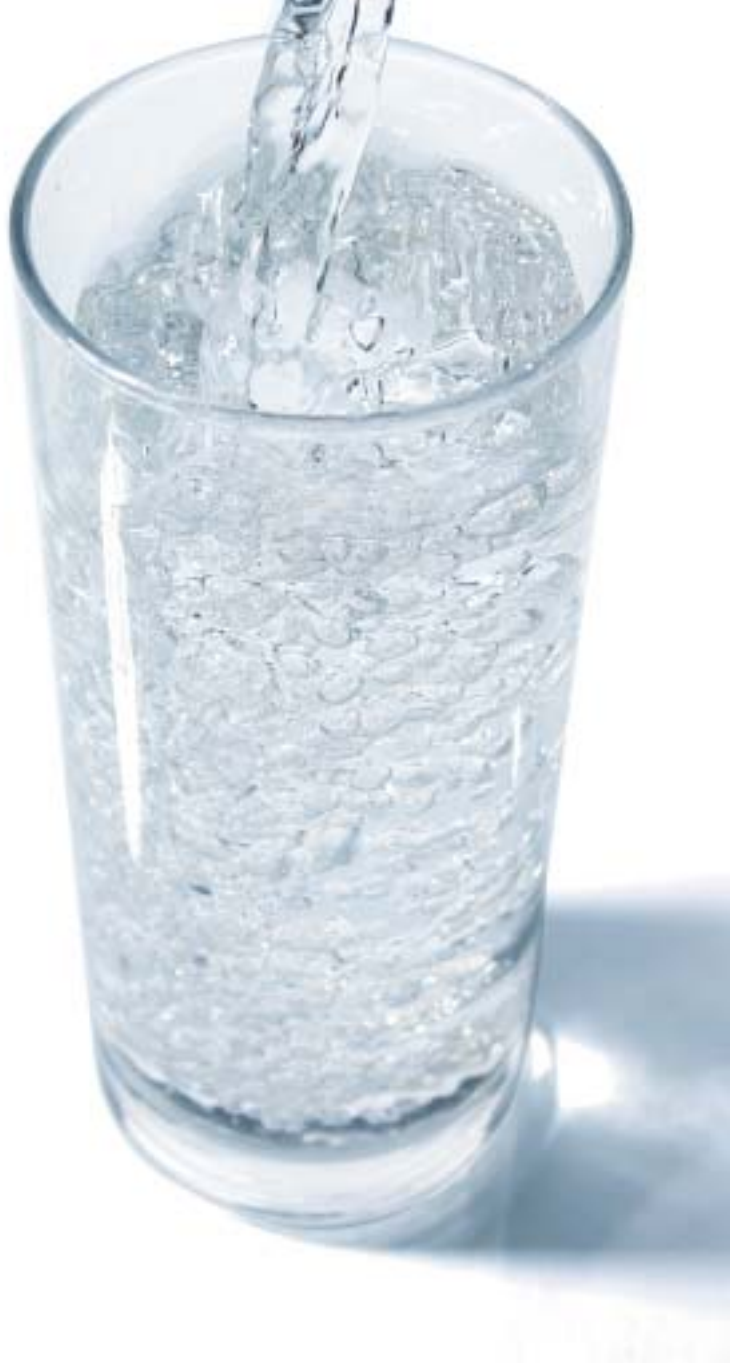


Edited by Dr. Ross Davies

FORWORD

Buildings have a profound impact on the quality of our lives and the world around us. They can enrich our communities, health and well being, as well as support and enable business. They are a visible stamp of our culture on the environment.

Environmental sustainability matters to British Columbia. As an example, in 2010, we are hosting the world's first sustainable Winter Olympics and we plan to encourage sustainable green building practices, all based on strong business principles.

Green Value is part of the journey towards sustainability. It looks at the financial value of green buildings and how they contribute to a sustainable community, balancing economics with the environment.

It's my hope that this report spurs discussion on what our future sustainable communities should look like, and how we can get there.

Hon. Barry Penner
Minister of Environment
Province of British Columbia, Canada

INTRODUCTION

Worldwide, it was the public sector that largely led the move towards green buildings. But as sustainable practices gradually move to the general marketplace, they increasingly have to meet the challenge of viability. The green movement must thus address the targets of the real estate and financial sectors who buy, sell, finance, audit and create saleable real estate value.

This means that green buildings must satisfy independent scrutiny, or the business sector may not accept them. Green Value was thus crafted to assess whether sustainable practices make money or not.

In total it has taken two years for this study, from concept to completion. It concludes that while evidence is as yet thin, sufficient exists to say that green buildings do indeed make money.

Change is not easy. But to all the developers, investors, owners, lenders, appraisers, valuers, agents and especially, occupiers, the conclusion is that you ignore green buildings at your cost. Green buildings can provide financial benefit.

I want to thank RICS' partners in agreeing to the need for, sponsoring and supporting this study. Stakeholders and input covered the government and private sectors in three countries and two continents. It would also have been impossible without the those with completed green buildings who answered our research team's persistent questions. I especially thank the team, and the Boards that backed this. More work will sensibly follow.

Green Value shows that sustainability is not simply an ethic, it's good business.

Chris Corps BSc MRICS
Victoria, Canada

EXECUTIVE SUMMARY

A link is beginning to emerge between the market value of a building and its green features and related performance. This is the picture presented by new research in Canada, the United States and the United Kingdom based on case-study interviews, supported by a review of best practice and existing publications. Our findings are contrary to a widely held view that green buildings provide a questionable advantage to builders, developers, investors and landlords. Yet a link between market value and green practices is now evident, the nature of which will become clearer as the industry works to quantify the financial and non-financial benefits of green buildings.

TOWARDS TRUER VALUE: THE MARKET VALUE OF A REAL ESTATE ASSET, ITS GREEN FEATURES AND RELATED PERFORMANCE

Green is good for asset value.
This, contrary to a view frequently held by many builders, developers, lenders and some valuers/appraisers, is the picture that emerges from new research.

These conclusions came through interviews with developers, owners and occupiers at green office, industrial, retail, residential and educational buildings across Canada, the United Kingdom and the United States. The findings are also borne out by an extensive review of academic and industry literature.

That green buildings are healthier places in which to live and work is widely accepted. So, too, are the environmental benefits, because green buildings consume fewer non-renewable resources, produce less waste and air emissions, and cause less disturbance to site ecology.

With this new research, however, green buildings are also shown to improve asset value. Green buildings can:

- Be quicker to secure tenants
- Command higher rents or prices
- Enjoy lower tenant turnover
- Cost less to operate and maintain in most cases
- Attract grants, subsidies and other inducements to do with stewardship of the environment, increasing energy efficiency and lessening greenhouse gas emissions
- Improve business productivity for occupants, affecting churn, renewals, inducements and fitting out costs amongst others
- Resulting from business productivity benefits, benefit occupants more than the underlying asset cost or value.

Because comparatively few green buildings have been completed, however, the extent of value benefit is still hard to quantify. So, too, is the effect on market value of green building rating systems, as well as the degree to which the benefits of green buildings go to the occupier rather than the owner or developer.

Several studies show that the extra cost of building green is fairly small. These go a long way to allay concern that green means higher cost, but generally do not show whether the increased cost is offset by improvements in value. This will no doubt stimulate a further and more holistic review of the overall business case for green buildings.

While there is evidence to show that value exists, the business case can be improved. Many green developments have been completed too recently to provide conclusive evidence, or to have had detailed post-occupancy analysis. A lack of comparative data is compounded by the secrecy surrounding financial data.

Nonetheless, the number of green buildings is increasing exponentially, which is good for the environment, and good for the encouragement of further green building by adding to the industry's knowledge-pool and helping to bring down any incremental cost.

In Canada, the number of members of the Canada Green Buildings Council (CaGBC) has gone from zero in January 2003 to 800 in April 2005. Projects registered for CaGBC's Leadership in Energy and Environmental Design (LEED®) green building rating system double or triple each year.

In 2000 there were none, but by 2004, 74.

Member organizations registered with the United States Green Building Council (USGBC) rose from 264 in 1999 to 5,516 in 2005. The number of buildings registering for USGBC LEED® certification rose from 624 in 2002 to 2,080 in 2005, while the number achieving certification in that time has gone up six fold, from 38 to 237. Total construction in progress exceeds these numbers considerably: the impetus is undeniable.

Dramatic though these figures may be, this report shows that they serve only as an indicator of an even greater growth in the number of green buildings. Some developers and owners do not seek certification with official green rating schemes, and many developments were built before the ratings scheme was established. Others 'shadow' LEED® by using it as an aid to design and development, thereby avoiding the certification cost, perhaps not recognizing the value certification offers.

The cost of green buildings is one of the challenges to the wider adoption of green rating systems that has to be surmounted. Certain rating systems are more efficient than others, but despite recent papers assessing the low incremental costs of LEED®, discussion continues as to whether some rating systems are burdened less by physical cost than by process. Yet while cost remains a matter of debate, the more the enhanced value exceeds the increased cost, the higher the incentive to go green. That is the focus of Green Value.

The spread of green buildings, already exponential, would be even greater were more builders and developers to offer and to promote green alternatives to conventional homes, offices and other places of work. In England, this study found evidence that some buyers will pay a premium for a green residence. Adoption of green buildings in the residential sector, however, appears slower than in the commercial sector. That both real estate brokers and developers are missing a considerable commercial opportunity now seems clear. Equally clear is that the home-buying public is not always informed about the benefits of green buildings.

The extent of that commercial opportunity is much greater than the demand for new green buildings suggests. There is even more potential in the renovation and retrofit of existing, conventional buildings to benefit from green design, building and operational systems. This market is thought to be as much as eight times greater than the size of the new construction market.

Many barriers hinder the further spread of green building, and of the 12 North American projects investigated for this report, five did not seek designation. Yet all five have won several green awards, generating publicity that brought commercial benefits. This suggests further scope for simplified green rating systems.

Some governments now require that new buildings constructed for them must be green, and that suppliers adhere to green principles. In many cases, however, outdated local and national building codes are a big obstacle to sustainable development.

At the heart of the debate over the linkage between green buildings and asset value itself are the different notions of what constitutes 'value'. There is a substantial but, we suggest, surmountable hurdle to be overcome. This is the gap in understanding and knowledge that exists between the green industry and the financial industry, in particular the valuers/appraisers who advise companies, pension funds, banks, insurers and others on the investment side of real estate.

Both the green and the financial industries, have their own definitions of value, and neither may be entirely appropriate in quantifying the impact on asset value. Many on the green side refer to the value of green buildings but are actually referring to cost savings. These are not necessarily the same as value, nor can savings be certain to add directly to building value as some have claimed.

As a result, the financial side remains sceptical and largely unengaged. However, some on the financial side are beginning to recognize the superior performance of green buildings within their product offerings including: Examples include Fannie Mae and Freddie Mac in the US, VanCity in Canada, and Norwich and Peterborough Building Society in the UK.

Until the green and the financial industries work together and start seeing each other's point of view, the benefits of green buildings, financial and non-financial, will be neither fully understood nor quantified.

Each industry needs to meet the other halfway. The green industry needs a better grasp of the financial methodology used by valuers/appraisers to analyse property investments. Accounting and valuation bodies need to catch up on green building benefits as well as costs. Green and financial interests need to reach a common understanding in the pursuit of consistent valuation measures that will require a wider base of financial and other comparative information than is currently available.

There are already a number of alternative approaches to valuation, among them the Triple Bottom Line, Full-Cost Accounting and Multiple Accounts Evaluation. All seek to model value more holistically by integrating environmental, societal, and community as well as strictly 'financial' concepts, and all have yet to achieve universal acceptance. Each, however, points towards a possible path valuation can take in quantifying the effect on the market value of real-estate and its green features and related performance. The valuation industry would do well to embrace the developing green momentum, and start adapting valuation standards to better evaluate green building value. The same can be said of the accounting professions.

Valuers and appraisers are client-led, and will be open to broader interpretations of the impact on the value of green building features as more clients understand and demand green developments.

Whatever country they may work in, valuers/appraisers are often asked to value in accordance with accounting standards, yet some green building benefits are difficult to fit within standard accounting methods. One example of such a benefit is that a green building may last longer than a conventional one. This may lead to lower operating costs, reduced replacement, better lifespan, higher capital value and so on. But these are examples of benefits that may be difficult to express (and may even be totally ignored) where accounting methods use only depreciation of the original cost.

Cost approaches can skew how sustainable practices are treated. Such approaches account for the often-higher capital investment of green buildings, but in effect ignore the resulting benefits to occupiers and on market value. This can slant accounts against green buildings, deter green investment, and prove unhelpful to companies for whom sustainability is central to their corporate ethic.

Perhaps the largest single area of value from green buildings lies in the 'soft' gains that can be difficult to value with conventional accounting methods. A company may win kudos from a green building that translates into sales or image gains. Better lighting and air quality may make for healthier employees, fewer absences, better retail sales and greater productivity. Such a building may provide a company with a competitive or cost advantage, help it meet its corporate responsibility targets and improve its standing with investors and customers.

It is not that the financial and real estate businesses are hostile or resistant to green building, although some may know little about it, and many remain to be convinced. Accounting standards are not necessarily set in stone and can be varied.

The distinction between good design and green buildings is blurred, but it can be said that if good design is helpful to business, green buildings are often found to be at the leading edge of excellence in benefits to occupiers. The literature review found impartially-evaluated evidence of savings from good design, in one instance documenting a 21% improvement in the operating efficiency of health-care delivery: far more than the average 10% or less spent by business on all real estate expenditures.

What business can ignore the potential for improving its efficiency by 21%? Where is the executive who would not move in a heartbeat if he or she could out-compete by 21%? Which economy or government would ignore the possibility of a 21% reduction in health-care costs or similar reduction in waiting lists.

If there is one major area in which green buildings can add value, it is in this benefit to business: if this can be realised, the benefit could even exceed the value of the real estate.

This study has found examples of where such operating efficiencies do indeed draw demand and add value not just to businesses and the economy, but to investment and development.

The benefit to business is thus the largest single value of going green. It is a benefit that perhaps goes beyond the core aim of this study, which is to assess the impact of green practices and related features and performance on asset value. A 21% benefit to a business becomes more than a saving that affects property and one that is of wider, more direct and substantial benefit.

As businesses become aware of the productivity benefits of green buildings, demand for them will rise. This may be the most valuable aspect that will drive green buildings to success, yet it may only be found in reduced demand for non-green buildings: as they fail to compete for tenants, vacancy will increase and inducements to keep tenants will rise. The asset value impact of green buildings may thus be experienced first by those buildings that are not green rather than those that are.

The green building industry has been led by architects, engineers and others, with the result, it can be argued, that much of the financial/valuation industry has yet to catch up. That is why the argument that there is no relation between the market value of a real estate asset and its green features and related performance is so often heard.

That there is such a link, this report makes clear. The nature and extent of that link will become clearer as the green building industry matures, as mature it must. Demand for green building is too high and the business opportunity too great for it to be otherwise.

CONCLUSION

This study sets out to test the sceptical 'null hypothesis', that 'There is no relationship between the market value of a real estate asset and its green features and related performance'.

The evidence gathered through literature review and case studies, leads us to conclude that the sustainable features of green buildings can add value to real estate.

BARRIERS TO A BETTER UNDERSTANDING OF GREEN BUILDINGS

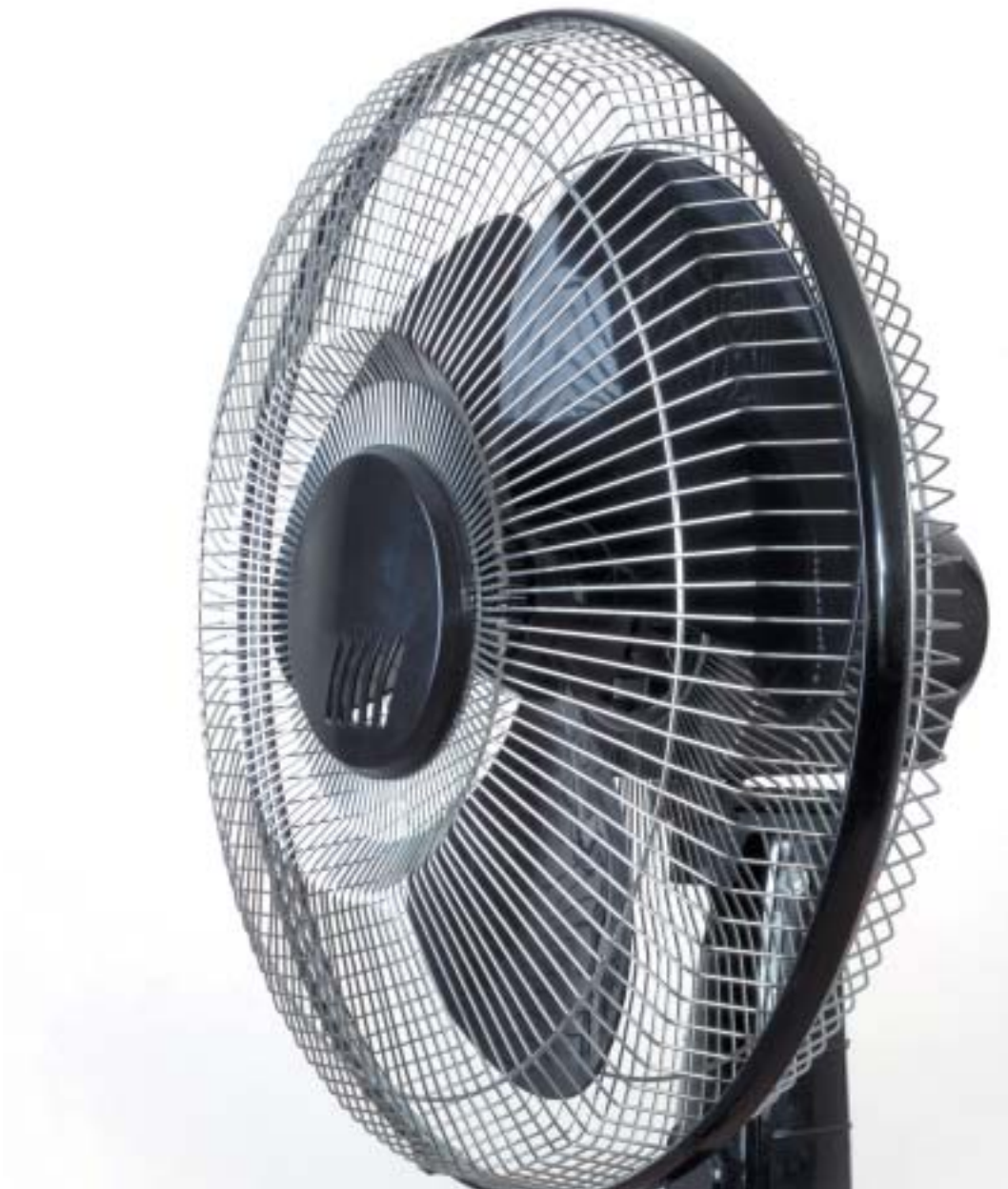
- The assumption that it costs more to build green
- Lack of awareness of the market
- Knowledge, research and resources
- Green strategies are not widely understood
- Steep learning curve for developers and consultants
- Construction companies lack experience
- Shortage of engineers with experience of operating green building systems
- Lack of incentives for owner-investors as opposed to owner-occupants
- Insufficient correlation between lower energy costs and benefit to the landlord
- Leases don't take account of green issues
- Outdated planning and building codes.

METHODOLOGY

This study sought to test a widespread perception that there is no relationship between the market value of a real estate asset and its green features and related performance, and comes at a time when changes to accounting standards will affect both valuation and the market value of real estate assets[1].

The research team began by reviewing existing research on the links between green features/ performance and asset value, and then moved on to examine a number of green buildings to assess the impact of their green features/performance on market value. Direct measures considered included rental rates, investment yields, and net operating income. So, too, were indirect measures such as leasing/absorption rates, tenant inducements, tenant turnover rates, and tenant workplace productivity and marketing.

Following the pattern of questions put to developers, owners, users and tenants in interviews, the report's conclusions and recommendations are divided into the following categories: general, financial, social/environmental, and those aimed at the building industry.



[1] Valuation for Financial Reporting, now largely implemented in Europe and pending in North America

RECOMMENDATIONS: GENERAL

1. **Strengthen the link**
   Buildings with green (or 'sustainable') features, whether residential or commercial, do bring developers faster absorption (the rate at which vacant space is leased or sold), higher rent/yield and lower tenant turnover.

   Green building being in its relative infancy, the industry should collect information to enable better evaluation of how buildings operate and perform and the impact on value. Building rating systems should consider the integration of financial reporting. Valuation and accounting standards need to be reviewed so that they encompass green buildings.

2. **Speak the language**
   Better communication and information distribution between the green building industry and the financial sector will benefit both.

   Green builders need to learn more about valuation, underwriting and other tools the financial sector uses to analyse property investments. The financial and accounting sectors need a better understanding of green buildings. Both green and financial sectors need more and better information about each other in their own 'language'.

3. **Bank knowledge to everyone's benefit**
   The level of interest in their projects overwhelms developers, builders and occupants of green buildings. Yet few tenants or landlords budget for the time and staff needed to collect the post-occupancy data to satisfy this interest. Rating systems already are felt to burden green development; adding further occupancy evaluation while desirable, is thus a significant challenge.

   Incentives for developers, owners and occupiers to prepare detailed post-occupancy performance analysis are needed if the green building industry is to bring home to the financial sector the benefits of green buildings. This data could be captured as part of the certification of green building rating systems. Governments should consider incentivising projects so good audit is undertaken.

4. **Valuers should become more involved**
   If green buildings are to be valued more effectively and their benefits distinguished from non-green buildings, valuers must learn to differentiate between green and more traditional buildings.

   As the green building industry matures, so progressive valuers/appraisers will develop a more rigorous analysis of the value impact of green building features. Valuers and appraisers' present reliance upon capital and operating costs is no longer enough. Valuers/appraisers must better understand and distinguish green features, adjusting comparables accordingly.

5. **Learn more about existing buildings**
   Promising though the new-build green market is for investors, developers and tenants, there is huge scope for adopting and applying green building practices to existing buildings, a sector whose size is considerably greater than that of new construction.

   The potential for applying green building practices to existing buildings, like the impact on asset values, will repay further detailed research.

6. **Communicate to the beneficiary**
   Beneficiaries commonly do not understand that green buildings add value to building occupiers. Much communication is instead directed internally towards the green industry.

   If the industry can convince occupiers of the benefits of green buildings, it will make green buildings more desirable and so boost market demand. Developers, owners, investors and lenders will have to respond to this increased demand if they are to retain investment value. Valuers, appraisers and real estate brokers/agents are important to securing this success, and the green building sector would do well to communicate through these professionals to the public. Communicate the benefits of green building in terms the consumer can understand.

7. **Make the case, make the money**
   Some developers and their advisors, including green building professionals, understand the benefits of green building but do not communicate them clearly to the occupant. Others think there is little market interest in green buildings when what has happened is that green options have often been badly 'sold'. The way to ensure value is secured is not only to communicate effectively with occupants; it is also essential to align communications to the occupants' benefit:

   - Developers develop what they think the market wants, and don't offer green buildings because customers don't know enough about them. This includes customers who could and would pay for green if offered the chance.
   - Contributors to this study appear to suggest that customers have a lot of 'guilt money' that they would spend on better, green choices if the choices were offered.
   - Contributors indicate that ignorance of green value distorts market pricing, especially among developers and real estate brokers/agents. Customers can buy only what is on offer. In the absence of knowledge and choice, people will continue to make do with conventional buildings, a choice based upon the current and inaccurate system of pricing.

   Just because the market does not offer green options or if offered, they are not taken up does not means that green options are not in demand. Where possible, stress the financial benefits as well as the health and other benefits to occupiers.

8. **Improve the process**
   Interviews suggested there would be wider use of rating systems if the process and resultant impacts on development continue to be improved. Greater understanding of the value and financial impacts of the certification process are areas where benefits can be obtained,

   Green certification processes will benefit from the ongoing improvements and evolution that are continuing. Evidence suggests that rating systems will benefit and be best accepted where they minimize cost and time impact.

RECOMMENDATIONS: FINANCIAL

9. **Share green secrets**
   The quality of financial data collected for case studies of green building projects was limited by the reluctance of building owners or developers to share financial information because they perceive a need for confidentiality. None of the green building-certifiers (the Canada Green Building Council, the US Green Building Council, or the British Research Environmental Assessment Method Consultancy, for example) appears to collect such data. This is a very significant omission, given that financiers' approval is necessary for development to proceed. Failing to appeal to those whose imperative is value, will continue to hold back green building.

   The gathering and sharing of financial information on green building performance is crucial to the development of the business case. RICS, the valuation/appraisal industry and rating system certifiers would do well to work together to bring this about.

10. **Make valuation measures consistent**
    Markets need good, consistent information to evaluate the performance and value of green buildings.

    Consistent definitions, measures and methods should be developed to gauge the costs and benefits of green buildings. This consistency should be applied by reference to valuation and accounting standards. The green building industry will benefit from improved integration of valuation/appraisal audit in its processes since this will more clearly demonstrate the value of green buildings.

11. **Accountancy could go greener**
    By concentrating on cost, traditional accounting practices may not always capture many benefits of green building. Accounting standards and financial regulations could be better linked to market value concepts. Governments were the first to turn to green buildings, and the application of cost-valuation methods by governments remains an impediment to properly accounting for the value of green buildings.

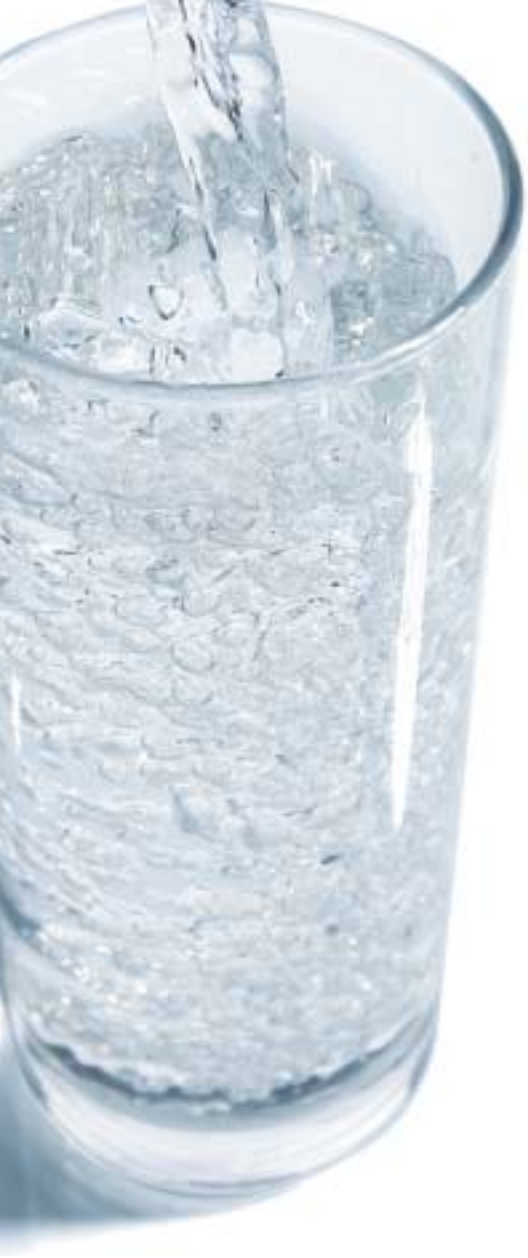
    Accounting standards and financial regulations can be better linked to market value since cost approaches will usually fail to reflect properly the benefits of green features and sustainable practices. Cost approaches remain optional for government and corporate reporting, creating the potential for inconsistency and/or uncertainty. Accounting and valuation standards could address this by moving more strongly towards market value if there is to be proper accounting for green buildings.

12. **Find out who gets what**
    It may not be popular to say so, but some commentators do not seem to understand how costs and benefits are split between the developer, owner, user and tenant. Many financial and other benefits of a green building, for example, flow to the tenant or occupier rather than the developer or owner and may not add asset value, so limiting the growth of green building. In the USA especially, many leases are gross, resulting in well-documented instances of tenants being discouraged from conserving energy. By contrast, much of the rest of the world uses net leases that often deter green investment because it is not the beneficiaries who are burdened with the initial investment cost. Many disincentives are thus embedded in lease structures, encouraging wasteful construction, ownership and occupation.

    Much greater rigour is essential in the analysis of the relative impact on asset values of green building features. This analysis should progress beyond capital and construction costs. The creation of 'Green Lease' terms that cover and reward green practices is overdue, and is fundamental to, for example, energy conservation by occupiers.

13. **Convince the sceptics**
    Throughout the English-speaking world, valuers/appraisers have only just begun to understand green buildings and how to value them appropriately. The valuation industry was not the leader in establishing the green building movement. Only now are they and other financial professionals beginning to understand the opportunity that green buildings present.

    If the green building industry is to attract capital from investors who are sceptical of the financial benefits, it is vital that the industry does more to educate valuers/appraisers as to the relative impacts of green building features on asset values. Occupiers and the public have to be drawn into the green buildings issue, one way being to demonstrate the value of green buildings to tenants. Agents and valuers/appraisers will be key to progress on this issue; the green industry would be well-advised to shift communications to those who, like real estate brokers/agents and valuers/appraisers, are able to demonstrate the financial benefits of green buildings.



RECOMMENDATIONS: SOCIAL AND ENVIRONMENTAL

14. Chart the unknown

Many social and environmental benefits spring from green building design but, as things stand, these benefits are hard to quantify and are therefore unknown to or ignored by the financial professionals whose job it is to value or appraise real estate.

It would be to the mutual benefit of the green building and the financial sectors to quantify social and environmental benefits in such a way that financial professionals can integrate these benefits with their financial reporting and project analysis. Translation of social and environmental factors to a financial context will encourage the growth of green building.

15. Tell it like it is

The more post-occupancy feedback on building design, performance and quality there is, the better the green building industry as well as other industrial, commercial and financial interests can communicate, understand and measure the potential of green buildings. Groups such as The Usable Buildings Trust in Great Britain and, in the USA, the Centre for the Built Environment at Berkeley, California, are now studying the impact on human health of building design, tracing the relationship between operational performance and occupants' comfort. Studies like these, often carried out between one and five years from the completion of a building, are illuminating the life-cycle benefits of green design features and strategies.

A building pre- and post-occupancy evaluation should be required after every green building completion. These evaluations should be focussed firmly on the holistic business case. Equally, tracking pre- and post-occupancy gains over time will benefit occupiers. To help the financial evaluation of occupancy benefits, evaluation should quantify, ideally in monetary terms, every available indicator such as reduced absenteeism or improved productivity. Wherever possible, evaluations should benchmark the impact on such factors as staff productivity, sickness, and absenteeism – not just the physical attributes of the building.

16. Make more of the marketing advantage

In nearly every case study covered by this report, landlords and developers cited shorter lease-up periods as a substantial benefit of green building. Similarly, owners/occupiers and tenants said green building brought them positive media/marketing gains.

Marketing advantage emerges from the present study as one of the most significant and easily-understood benefits of green building, and should be better quantified and publicized.

17. Modernize building codes, reduce bureaucracy

The green building market is growing exponentially. This growth, however, is despite rather than because of regulatory systems. The biggest hurdle faced by the green building industry is often outdated local and national building codes, as well as other regulatory barriers.

Building codes, local and national, need to be updated to support green building while continuing to meet their objectives of protecting life, health, and property. Governments can and should explore how they might encourage green development by reducing regulation and accelerating approvals.

18. Certification: better demonstrate the value

Some building projects that otherwise could be rated 'green' do not seek or complete independent certification because of the perceived cost in time and money, relative to the benefits of independent review.

If the rate of certification is to be increased, certification bodies need to present industry with the business case for certification, part of which entails demonstrating green value. That case will be the more easily made if certification efficiency continues to improve, at the same time as the benefits of independent certification are clearly demonstrated.

RECOMMENDATIONS: THE BUILDING INDUSTRY

19. Training: encourage small green shoots

The pool of green design leaders that industry can draw upon is still small. Operations and maintenance staffs have little experience with sophisticated green building technologies. Contractors and building trades require training to build green buildings without compromising certification. Lenders, developers and valuers/appraisers have much to learn about how green buildings affect value.

Financial professionals commonly do not understand the holistic nature of green buildings and the potential for benefits such as better operating performance combined with higher employee morale and productivity. Even the case studies for this research project were often the first green buildings on which many project team members had worked.

The green building industry needs to be a better trainer of everyone connected with the industry, actually or potentially. In particular, developers, valuers, appraisers and other financial professionals need more financial information and training in how green buildings affect asset value. Information should be shared, so smoothing out the steep learning curve that many green building projects entail. Incentives may be required to encourage developers and others to share this information.

20. Don't go it alone

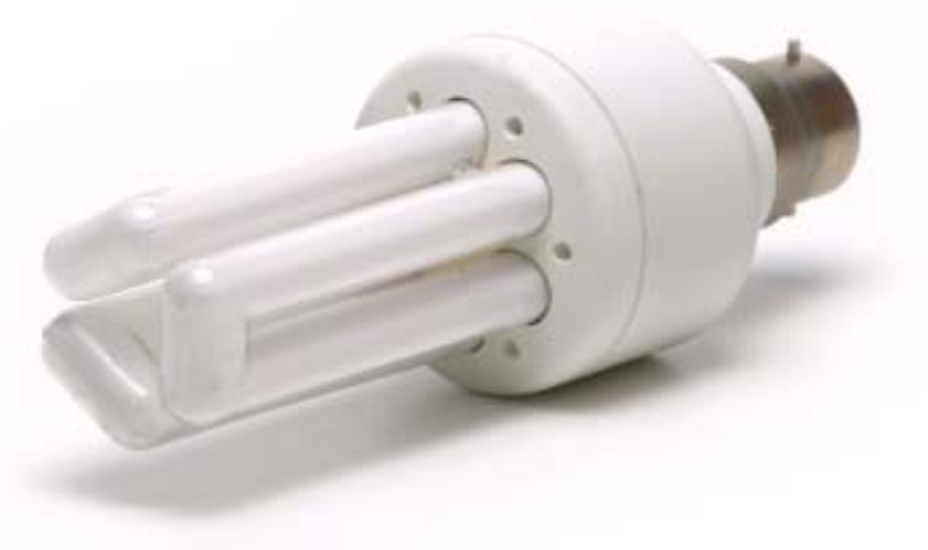
Green projects work better and deliver more where operations and maintenance staff are brought in early in the design stage, for the design team benefits from operations and maintenance experience.

Since the integrated design process is central to the ability to capitalize on the synergies and tradeoffs between architectural design strategies and mechanical system choices, all consultants and stakeholders should be involved in a project from the beginning. Track and compare all options financially, and this will ease risk management and financial acceptance, as well as contributing to the best-achievable financial success.

21. Recognize economic gains

Green building developments are good for their surrounding communities because they encourage wider initiatives such as green policy or regulatory developments, other green case studies, and a wider ecognition of the community regionally, nationally or internationally.

Green buildings should be considered as part of an economic and community renewal strategy because of the benefits they bring locally, through using local employment and materials.



WHAT IS A GREEN BUILDING?

For the purposes of this study, a 'green building' (sometimes called a 'sustainable building') is one that has been rated 'green' by a green building rating system, or, in the absence of such a rating, a building that is recognized as 'green' in the media or in the surrounding community. In a broader context, sustainable development is sometimes discussed in relation to the 'Brundtland Definition', that '...development that meets the needs of the present without compromising the ability of future generations to meet their own needs'.

The problem of definition is one that dogs the property and construction industries. Many argue that 'green' is nothing new, and that green buildings have been built and green materials used and reused for centuries. That is true, but as populations explode, there are no longer enough such buildings or materials to re-use.

Put simply, there is increasing agreement that the earth cannot sustain the current consumption of its non-renewable resources and the damage being done to its atmosphere. Unless changes are made, it is further agreed, life upon earth will become even more difficult, if not impossible, for many more human beings.

As ever, opinions vary, but it seems generally accepted (Roodman and Lenssen, *World Watch Institute Paper* 124, 1995) that, globally, buildings and construction activity consume:

- Three billion tons of raw materials, or 40% of total global use
- Buildings use 40% of the world's materials and energy
- 55% of the wood cut for uses other then fuel is for construction
- 30% of newly-built or renovated buildings suffer from 'sick building syndrome', their occupants exposed to stale, or mould- or chemical-laden air
- Buildings and construction materials production account for at least 30% of greenhouse gas emissions.

Since green buildings have a smaller 'environmental footprint' than more traditional developments, it makes sense to have more of them. This is especially so, since according to Dr David Orr, Chair of the Environmental Studies Program at Oberlin College, as many buildings will be constructed worldwide in the next 50 years as over the last 5,000.

Although economic benefits flow from green buildings and green building practices, the environmental and social benefits tend to be discussed in the light of how they reduce costs. There is room for a wider consideration when assessing value, one example being the 'Triple Bottom Line' approach to social, environmental and financial accounts.

Construction and operation of buildings are interdisciplinary. Buildings are places where a number of environmental, social and economic systems converge. In valuing green buildings, therefore, it is helpful to acknowledge that in addition to economic impacts in business operations there are also inherent social and environmental impacts.

In general, a green building reduces the impact on the environmental and social systems that surround it. Green buildings enlarge our economic, social and environmental capital. Compared to conventional buildings, green structures use less water and energy, as well as fewer raw materials and other resources. They are also better places in which to live and work, for green buildings improve human wellbeing as measured by health and productivity.

Reducing a building's negative social and environmental impacts can also bring financial benefits. Because the three aspects are connected, a change in one will ultimately have an impact upon the other two.

Time is not on the side of those who seek to further an understanding of the relationship between asset value and green features. Green buildings have achieved prominence in the market relatively recently. The US Green Building Council (USGBC) has seen an exponential rise in its membership as well as in the number of green buildings registered under its LEED® programme since 1998 when USGBC unveiled its Leadership in Energy and Environmental Green Building Rating System (LEED®). This rise, especially marked over the last three years, is one indicator of a rapidly-growing interest in green building.

USGBC MEMBER NUMBERS*

Year	Number of USGBC Members
2005	5516
2004	5438
2003	3773
2002	2397
2001	1137
2000	573
1999	264

*As of July 5th 2005

USGBC LEED® METRICS

LEED® METRICS*	2002	2003	2004	2005
NC Registrations	624	1,095	1,792	2,080
NC Certified Projects	38	82	167	237
NC Total SF	>80m	>144m	>217m	>243m
EB Registrations	6	45	88	96
EB Certified Projects		1	13	20
EB Total SF	>10m	>14.5m	>29m	>31.5m
CI Registrations	4	52	106	137
CI Certified Projects			21	26
CI Total SF	8k	3.7m	>9m	>11m
Total Workshop Attendees	7,905	14,606	22,495	25,615
NC Accredited Professionals	2,443	5,978	19,200	20,250

* Cumulative; includes previous years' data, e.g. 2002 totals include data from 2000 through 2002. Registration data includes pilot projects.

NC, New Construction
SC, Square Feet
EB, Existing Buildings
CI, Commercial Interiors.
The LEED® Rating System now covers existing buildings and commercial interiors as well as new construction.

Registrations: projects in the pipeline for certification but not yet built or finished

Source: USGBC

In Canada, the momentum benefits from the progress made by the USGBC. The number of member-organisations of the Canada Green Buildings Council (CaGBC) has gone from zero in January 2003 to 800 in April 2005. LEED®-registered projects in Canada double or triple each year: in 2000 there were none, in 2001 five, 19 in 2002, 36 in 2003, and in 2004, 74.

Many studies now seek to establish 'the business case' for green buildings, in an attempt to promote them and encourage developers and designers to build them. In practice, however, much of this research is to do with providing information on design strategies and environmental benefits, or on establishing a base-line for capital costs.

Construction costs being what concerns the building industry most, studies focus on such costs for building green. Research involving LEED® (Matthiessen and Morris, *Costing Green*, 2004; Kats, ***The Costs and Financial Benefits of Green Building***, 2003) has found that there need be negligible additional construction costs: the cost-premium ranges from 0-8%, depending upon the level of rating, with an average of around 2% (pp.32, 48, LePage).

Green buildings, however, are widely perceived as more expensive than conventional buildings. Whatever the perception, however, if green building was once a side issue, this is no longer the case. Since the main focus of green buildings is to improve building efficiency and economics, it is entirely practical for green buildings to become more accepted and eventually the standard for the building industry. Indeed, the most likely scenario is for the gradual absorption into everyday construction practices of the component aspects of green building.

For green buildings to further increase their market share, more building professionals will need to familiarize themselves with green building practices and how they can be integrated into design, construction, and development viability.

The building market is generally risk-averse, which hinders acceptance of green buildings because of an understandable reluctance to accept new methods without proof that they work. Documenting the financial benefits of green buildings will reassure the building market and encourage acceptance.

Examples of green building are either few in number or inadequately-documented to present a persuasive case to developers, lenders and others, helping to understand green viability. However, the increasing number of owners and developers who are developing green buildings suggests that they foresee value in building green.

While interest in green buildings is on the increase, the literature on the relationship between asset value and green building is largely anecdotal or theoretical. One reason is that many green buildings are government – or owner-occupied, and are thus not treated as an investment and are rarely assessed on a value basis. Those that have more traditional investment characteristics may either be insufficiently-tracked to allow analysis, or the value is kept confidential. Others have yet to be occupied or market-tested long enough to have demonstrated value, or otherwise have yet to be the subject of a full appraisal.

Whatever the reason, the fact remains that the relationship between green building and asset value has yet to be fully explored. This report attempts to throw fresh light on that link.

Current green building rating systems include:

1. British Research Establishment Environmental Assessment Method (BREEAM, products.bre.co.uk/breeam/index.html)
2. Green Globes™ Online Auditing Tool (www.2.energyefficiency.org/default.asp)
3. Australia's Green Star (www.gbcaus.org/greenstar/)
4. Hong Kong Building Environmental Assessment Method (HK-BEAM; www.hk-beam.org/general/home.php)
5. US Green Building Council's Leadership in Energy and Environmental Design Green Building Rating System (LEED®; www.usgbc.org/leed/)
6. Japan Sustainable Building Consortium's Comprehensive Assessment System for Building Environmental Efficiency (CASBEE), (www.ibec.or.jp/CASBEE).

Key findings

Marketing Green

- Developers develop what they think the market wants, and too often don't offer green buildings because customers don't know enough about their benefits to demand them. These include customers who could and would pay for green if they were offered the choice.
- Market pricing is distorted by ignorance of green values, especially among developers. Customers can buy only what is offered. In the absence of knowledge and choice, people will continue to make do with conventional buildings.
- The more people know about green buildings, the more they want them.

Managing Green

- Financially speaking, use of the Integrated Design Process to achieve the higher performance of green buildings keeps down construction costs. Moreover, green-building professionals should be brought in early in the design stage before key decisions are made, maximizing the benefits of green design while minimizing costs.
- Having an informed professional valuer on the Integrated Design Team will help understand how green aspects will be valued and decide what choices will improve value. These choices support marketing the green aspects' value to consumers and help improve valuation of the building for financing.

Valuing Green

- Lifecycle cost analysis is needed to make the link between green building and asset value because much of a green building's asset value may lie in its long-term lifecycle benefits. Better and more formalised life-cycle valuation will help to demonstrate the advantages of green buildings.
- There's a need for assessment of how green buildings perform in the market, and the degree to which their capital value rises. The sample size for green buildings is still small, and operational data on them smaller still, making professional documentation and tracking a must.
- Valuation is increasingly used to assess green assets by developers, renovators, investors and owners.
- Valuation lags in accounting for green features within accepted standards, although knowledgeable practitioners can apply valuation methods to green assets.
- Financial indicators of value are increasingly incomplete unless they take account of other green indicators in order to satisfy Corporate Social Responsibility.
- Clients and governments have to be drivers of valuers/appraisers' adaptation to green values. Valuation is largely a service business, and therefore client-, regulation- and profession-led. Valuation professions must advise their members on absorbing green buildings' value into valuations.
- Valuation can support green building, as the literature indicates direct benefit to asset value from green design and building practices.
- The literature concentrates more upon the benefits, financial and non-beneficial, to occupiers than on the benefits, primarily financial, to owners, investors and financiers. Documentation largely focuses upon cost-savings and frequently makes the link to value haphazardly or incorrectly. A stronger case for the benefits of green building needs to be made to the investment and financial community.
- Governments and other advocates of green building such as developers, lenders, owners and others who wish to see more green building will benefit from encouraging valuation to play a greater part.
- Valuation professions will profit from a greater understanding of how to deal with the impacts of green features on asset values, and by developing appropriate methodologies.
- There are many misconceptions about the impact of green design and building systems on asset value. As an understanding of green issues is both a business imperative as well as a social trend, the valuation profession should try to counter these misconceptions.

Theoretical linkages to value

Although valuation has been an indispensable tool of commerce for many centuries, valuation texts have yet to cover extensively green building features/performance and their impact upon value. Valuation practitioners are therefore left largely left to their own devices when it comes to incorporating green considerations into valuation theory and principles.

The table on the following page summarizes the theoretical links to value.

GREEN OBJECTIVES	GREEN STRATEGIES/FEATURES	GREEN IMPACT	THEORETICAL LINKAGE TO VALUE
Sustainable site development	• Reduce site disturbance and soil erosion during construction • Use of natural drainage systems (e.g., swales) • Preserve or restore natural site features.	• Improved site aesthetics • Greater public support for the development and accelerated local approval process, hence lower carrying costs.	• Reduced development costs, improved marketability, reduced ongoing maintenance costs, improved natural appearance, higher sales/rents, absorption and re-tenanting, NOI*/ROI** benefits.
	• Landscape and orient building to capitalize on passive heating and cooling.	• Lower energy costs.	• For gross leases, higher NOI. May have impact for net leases*** if benefit can be demonstrated to tenants.
Water efficiency	• Use captured rainwater for landscaping, toilet flushing, etc • Treat and re-use greywater, excess groundwater, and steam condensate • Use low-flow fixtures and fittings (pressure-assisted or composting toilets, waterless urinals, etc.) and ozonation for laundry • Use closed-loop systems and other water reduction technologies for processes	• Lower water consumption/costs.	• Lower tenant CAM**** charges. Direct NOI benefit for gross leases, potential for net leases requires communicating benefit to tenants.
Energy efficiency	• Use passive solar heating/cooling and natural ventilation • Enhance penetration of daylight to interior spaces to reduce need for artificial lighting • Use thermally efficient envelope to reduce perimeter heating and size of HVAC.	• Lower capital costs • Occupant benefits • Lower energy costs.	• Reduced operating costs, longer life cycle, lower development costs • Improved occupant productivity, lower churn, turnover, tenant inducements, etc • Higher net income for gross leased buildings, improved yield.
	• Use energy management systems, monitoring, and controls to continuously calibrate, adjust, and maintain energy-related systems.	• Operational savings (can offset higher capital costs) • Reduced capital cost of mechanical systems because control systems reduce the need for oversizing.	• Lower operating costs. On gross leases, higher ROI/NOI. On net leases, potential for improved ROI/NOI.
	• Use third-party commissioning agent to ensure that the installed systems work as designed • Develop O&M manuals and train staff.	• Lower operating costs • Lower maintenance costs.	• Marginally higher initial soft costs should be offset by long term operating cost benefits, higher ROI.
Indoor environmental quality	• Control pollutant sources • Use low-emission materials • Ventilate before occupancy • Enhance penetration of daylight and reduce glare • Provide outdoor views • Provide individual occupant controls when possible.	• Superior indoor air quality, quality lighting and thermal quality • Fewer occupant complaints • Higher occupant productivity.	• Risk reduction • Greater marketability • Faster sales and lets • Improved churn/turnover • Higher ROI/NOI.
Reduced consumption of building materials	• Select products for durability • Eliminate unnecessary finishes and other products • Reuse building shell from existing buildings and fixtures from demolished buildings • Use salvaged/refurbished materials • Design for adaptability.	• Longer building lifecycle • Lower maintenance costs.	• Lower depreciation typically after higher investment costs. • Lower construction costs, probable lower operating/maintenance costs, higher ROI/NOI.

KEY

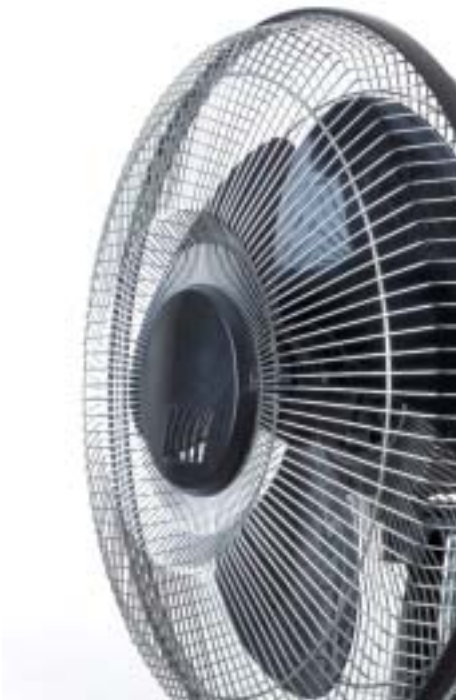
* **NOI:** net operating income

** **ROI:** return on investment

*** **Net lease:** a lease that requires a leasee to pay all their operating costs resulting from their occupation of the premises.

**** **CAM:** common area maintenance

Note:
To view a larger version of this table, please go to www.rics.org/greenvalue



THE ROLE OF VALUATION

The link between green building and asset value has remained in large part untested because, although the number of green buildings has increased in recent years, many are owner-occupied by government, few have yet to change hands and their value has not been well-documented. Yet valuation is indispensable.

Valuations have been undertaken for centuries, and are deeply embedded in everyday business within and beyond real estate. A valuation helps a company to understand whether it is making a wise decision. A company may agree to buy or build a property, and if that company knows little or nothing about real estate, it may pay a grossly-inflated price. Investors and shareholders want to know that the company is handling their investment well: the impartial appraisal a valuation offers is indispensable in determining whether or not funds are being properly applied.

It is rare for a company to invest in real estate without borrowing, and banks have a fiduciary responsibility to show their customers and shareholders that their deposits are secure. An independent valuation, completed by a professionally-qualified valuer, helps to assure shareholders, investors and creditors that investment in the company's business is wise. Such a valuation acts as a safeguard to executives, justifying a decision or indicating how to improve one.

Investment and developments can involve the use of large capital sums from both shareholders and lenders. Management and shareholders need to know whether a decision is wise, and a valuation makes such knowledge possible. Valuation helps all those involved to plan and make decisions that maximise value.

Valuations are also a useful audit tool. They help to prevent or detect fraud, and to protect companies and their investors against the financial risks of ignorance. A green example of the latter would be in evaluating the choices in managing risk while optimizing utility and value in a case where a property is contaminated.

Applied valuations are undertaken every day as a guide to the best course of action in business. For developers, valuation helps to identify the most-promising development or investment, and thus whether green features make financial sense. Since lenders require a valuation audit, valuation helps the developer by simply applying the same basic techniques that will later help to secure finding.

Valuations help to make a comparison between possible investments, and pave the way for making a sound choice that balances risk against return. Although this is not always understood, valuations are made to standards of practice, which are both internationally-accepted and allow for adjustments to take into account local circumstances.

Perhaps least understood is the difference between cost and value. Cost is something that many try to minimise. But a focus on value helps understanding of whether cost is justified. An accounting, cost or cost-saving focus can overlook where increased cost will be more than offset by extra value. Hence a focus on value, not cost savings, is essential to business and thus, green buildings.

But the question remains: how does valuation benefit green buildings? Valuers themselves have no choice but to assess a building's green features and related performance from the point of view of asset value. In other words, it is the valuer's job to establish whether the green features' performance of a building cause it to have a value that is higher or lower than a conventional building, and whether the estimated operating costs should be adjusted to reflect any differential performance.

Furthermore, since the life of a green building may be longer than that of a conventional structure, valuers have to consider what adjustments need to be made to investment capitalization, and whether rents should be higher or lower than the norm. Tenant fit-out costs and incentives (such as rent-free periods) and absorption periods are among the other issues that may be affected, and may require adjustment on the basis of comparable evidence or through investment cash-flow adjustment.

Whether they want to or not, valuers and appraisers are required to estimate how green features/performance affect development, investment and lending risk which materially impact value or if comparables need adjustment. Valuers must evaluate their impact on absorption, tenant inducements, and, in the longer term, on tenant churn. For many aspects of green building, the challenge is whether and how the longer lifecycle will affect capitalization rate, yield and years' purchase.

Until green building features and related performance are integrated into valuations, it is hard to see how green building features/performance can be integrated into the construction, financial and development industries. Unless the financial sector understands the benefits of green to the net value of an asset, financial professionals will not be motivated to account for green in their financing decisions. Awareness of the value of green buildings on the part of the real estate and financial sectors is therefore pivotal. However, some within this industry are beginning to recognize the superior performance of green buildings within their product offerings including: Fannie Mae and Freddie Mac in the US, VanCity in Canada, and Norwich and Peterborough Building Society in the UK.

Texts offering direct and indirect links between green features/performance and valuation include:

- International Valuation Standards: International Valuation Standards Committee
- Uniform Standards of Professional Appraisal Practice: Appraisal Institute of Canada
- Uniform Standards of Professional Appraisal Practice: Appraisal Foundation
- Red Book (Manual of Valuation): Royal Institution of Chartered Surveyors
- Green Book: UK government's guidelines on incorporating green practices in business
- Multiple Account Evaluation Guidelines: Province of British Columbia.
- Contemporary Environmental Accounting – Issues, Concepts and Practice: Schaltegger and Burritt, Greenleaf Publishing
- Green Development – Integrating Ecology and Real Estate: Wilson and others, Rocky Mountain Institute
- The Income Approach to Property Valuation: Baum and Mackmin, Thomson Learning
- Modern Methods of Valuation: Britton, Davies and Johnson, Estates Gazette
- Various papers on the benefits of green building: UK Building Research Institute.

The economics of valuation

There is a gap between green and economic practice that helps neither. Green rating systems go some way to bridging that gap, and are likely to remain the principal way until the industrialized economies start to rebalance economic models by integrating the broad range of benefits offered by building green.

Historically, construction in emerging economies has been green. Where people are poor, they tend to build with locally – available materials because these are cheaper than those imported or from further afield. Local materials are easier and quicker to obtain. Furthermore, jobs and money stay local, reinvested directly back into the local economy.

Industrialized economies, however, are able to spread their net further in obtaining materials, aided by the relative affordability of transportation. By increasing the use of non–local materials, however, environmental sustainability to suffer. This is because the price of fuel does not include a charge to compensate for the resultant pollution.

Rating systems such as LEED® provide an incentive for buying local materials, thus re-establishing the balance. There is, however, another major benefit of using local materials. This is the indirect economic benefit to local economies of spending on local materials.

In most economies, construction creates jobs and wealth locally through local employment. Contractors then re-spend their income locally, in effect re-investing right back into other local jobs.

Whatever their level of commitment to free trade, governments arguably therefore have a built-in economic justification for encouraging their citizens to 'go green'.

The economic pricing models of industrialized societies are imbalanced, it can be argued, in that they have yet to adapt to the higher value their citizens place on green practices. Damage to the environment, for example, can be seen as an unpriced economic benefit if the polluter avoids the cost of damage. LEED® and similar rating systems try to internalize such 'external benefits' by making available credits; pricing models make no such allowance.

To summarise, therefore, developing buildings provides jobs – usually local jobs. The people and business they house are sources of wealth, as are the buildings themselves. But buildings can impact the environment. It has thus been widely argued they have three main dimensions – societal, financial and environmental. The following section looks at the benefits of green buildings from these three perspectives.

Environmental benefits

It is still comparatively uncommon for environmental benefits to show up in a balance sheet or income statement. As a result they have yet to figure widely in financial decisions. Although environmental benefits do have links to value, especially if properly marketed, these benefits are often seen to accrue to the community and society rather than to a company balance sheet. As the real estate industry largely exists to make profits, the environmental benefits of green buildings are best expressed in economic terms.

Land/site

How a building is sited, its use, latitude, exposure to sun and wind and so on, can profoundly affect a building's reliance on mechanical heating/cooling and artificial lighting, and hence, its energy costs. Green buildings that are carefully planned reduce sprawl, lessen expenditure on new community infrastructure or extend the life of existing infrastructure. A carefully designed and managed site can yield construction cost savings, as well as restrict stormwater runoff and erosion, so reducing water consumption. These are features that can also improve a property's 'curb appeal' or site aesthetics and potentially support higher rental rates (Laverne and Winson-Geideman; ***The Influence Of Trees And Landscaping On Rental Rates At Office Buildings***, 2003) or sale prices (Henry, *The Contribution Of Landscaping To The Price Of Single Family Houses*, 1994).

Indoor air quality

This is the benefit most easily 'sold' to occupants. Green buildings offer healthier air because they are better ventilated, and reduce or eliminate the use of chemicals in building materials that give off gases. Some green features are also cheaper if integrated at the design stage; underfloor air systems have been shown to cost less than overhead systems. While some of this is a direct benefit in reducing capital cost, there is ample evidence that there is an even larger, more tangible and direct benefit in improved productivity due to the healthier and more pleasant working conditions.

Atmosphere

Over their lifecycle, buildings are responsible for about 40% of greenhouse gas (GHG) emissions, and green buildings are designed to have operating efficiencies that reduce these emissions. Many buildings use heating, ventilation and air-conditioning systems which do not use chlorofluorocarbons (CFCs), hydrochlorofluorocarbons (HCHCs), or halons, and so do less harm to the ozone layer. Many atmospheric emissions go largely unpriced because governments hesitate to tax atmospheric pollution or prefer regulation to rewarding good practice. Of course there are exceptions. In the US, for example, New Jersey is one of six states that offers emission credits to building owners who invest in systems reducing air pollution associated with electricity. Owners can sell these credits to power plants and others for prices ranging from $90 to $272 per ton of emissions: they have tradable market value.

Energy

According to Rick Nevin and Gregory Watson (*The Appraisal Journal*, October 1998) real estate markets assign to energy-efficient homes an incremental value that reflects the discounted value of annual fuel savings. Their analysis suggests an incremental home value of $10 – $20 for every $1 reduction in annual fuel bills.

Green buildings save on energy costs by reducing total consumption as well as peak energy demand. Green buildings use about 36% less energy than conventional structures through a combination of artificial and natural lighting strategies, controls, natural ventilation, energy – efficient fixtures and the use of renewable energy resources.

Arguably, energy savings are one of the most obvious benefits of green building movement and one of the easiest to 'sell'. Unfortunately, however, it is a benefit frequently presented as a 'value' of green buildings, which is to confuse value with what energy savings really provide, which is cost reduction. As discussed in the section on 'Interpreting the benefits of green building', operating savings do not necessarily offer value from a valuation perspective.

Materials and waste

Benefits include use and re-use of local, renewable and recycled materials, helping the local economy and reducing the extraction and processing of virgin resources. The use of more benign materials improves indoor air quality. Large amounts of construction and other waste is put to use and diverted from landfill, thereby reducing construction costs by saving on tipping fees.

Water

Low-flow fixtures, efficient appliances, rainwater capture and wastewater treatment lessen use of potable water and related operating costs. Once again, and as discussed in the section on 'Interpreting the benefits of green building', operating savings do not necessarily offer value from a valuation perspective.

Replenishment of the water table through storm water management, which includes permeable pavements and landscape technology, can lower development cost charges by limiting the need for storm water infrastructure.

Social benefits

Enormous cost savings are being made in 'soft benefits' such as increased productivity, better health and wellbeing, higher academic performance, improved morale and lower absenteeism. These have a financial benefit, which is becoming a cornerstone of the benefits of green building. In commercial buildings, employee overhead is the highest cost, so improving their productivity and reducing their turnover and absenteeism may be a green building's most significant economic contributions to a business.

In a 2004 survey of over 800 green building owners, developers, architects, engineers and consultants, Turner Construction showed green buildings outperforming conventional buildings in seven categories, of which the top three were social benefits:

- Greater health and wellbeing of occupants (86%)
- Higher building value (79%)
- Higher worker productivity (76%)
- Higher return on investment (63%)
- Higher asking rents (62%)
- Higher occupancy rates (52%)
- Higher retail sales (40%).

It is difficult to establish social benefits in new construction, for tracking and documentation over time is required. There is promising research to be done in retrofits and renovations, which in Europe are often preferred to tearing down a building. In 1996, a green building was constructed north of London for Longmans House Publishing: the company has since been sold twice, and on each occasion the new owner has decided against selling the building because it was so good to work in.

Productivity

Productivity gains from better lighting, daylighting and air quality in green buildings can be enormous, and have the potential to be a powerful reason to integrate green features and practices.

Research into this and other 'soft' benefits, however, is hampered (Kozlowski, *Building Operating Management*, July 2003) by 'the belief that additional studies are unnecessary or the fear that building owners may be sued based on evidence of poor building performance'. According to the USGBC Building Report (2002) 'an increase of 1% in productivity (measured by production rate, production quality or absenteeism) can provide savings to a facility that exceeds its entire energy bill'.

The Heschong Mahone Group (*Skylighting and Retail Sales*, 1999) found that 'adding skylighting to the average non-skylit retail store would be likely to improve its performance by 40%'. Pennsylvania Power and Light (Romm & Browning, *Greening the Building and the Bottom Line*, 1998) found that conversion from general to high-efficiency task lighting reduced lighting costs by 69% and annual operating costs by 73%, attributed to reduced absenteeism and higher productivity. The payback for electricity changes alone amounted to 4.1 years, a 24% return on investment, while total payback amounted to 540%, amounting a simple payback of just 69 days.

At Wal-Mart's Lawrence, Kansas, 'Eco-Mart' skylights were installed to reduce lighting costs, and employees asked for their departments to be moved to the daylit part because sales per square foot were higher there. Reno Post Office (Gottfried, in *Sustainable Building Technical Manual*, 1996) improved lighting, acoustics and 'thermal comfort': productivity gains that 'paid for the entire renovation, to the value of $400,000-$500,000, in less than a year. The annual savings in energy use and maintenance were a free bonus'. Hyde Tools (Romm & Browning) found that new lighting enabled workers to improve quality control equivalent by the equivalent of $25,000 a year. Since every dollar saved on the shop floor was worth $10 in direct sales, this retrofit was the equivalent of $250,000 extra sales annually to Hyde.

The Value of Good Design and other studies by CABE have shown the substantial productivity benefits of good design, which in essence is a subset of green buildings. In one example quoted by CABE, a 21% improvement in hospital discharge rate was found by the auditors, Sheffield University, after part of the hospital had been renovated. This may explain why the British government is committing billions of pounds to revitalize the health system, to retain nurses and to improve productivity.

Image

Although a developer or client (Guidry, *The Appraisal Journal*, Winter 2004) 'may specify a low-energy building, the consequences may be more profound than a mere saving in annual fuel bills'. One consequence that benefits the bottom line is that the company may find it has a strong marketing advantage it can exploit. The owner of a green building or the company it houses can find that its image is seen much more positively. This helps to attract and retain tenants, employees, clients and suppliers, and thus, arguably, to make it more attractive to owners, occupiers and shareholders. A building's 'distinctive character can be a symbolic message to visitors, community officials, and the public... including technological advancement'. (*The Business case for Sustainable Design in Federal Facilities*, US Department of Federal Energy Management, 2003).

Green economic benefits

Final costs and payback

The largest obstacles to green construction, according to Turner Construction (2004) are 'perceived higher construction costs (by 70% of all executives), a general lack of awareness [of] the benefits (by 63%) and short-term budget horizons (53%)'. Decisions on whether or not to invest in a green building are most often based upon capital costs (Kats, G., *Green Building Costs and Financial Benefits*, 2003), although lower energy and water bills are sometimes taken into account. In other words, the *net* value of green buildings could be better proven and more persuasively told: the focus on cost without understanding the resultant value is an impediment.

Since green building is still relatively new however, design budgets may under-or overestimate costs, so fuelling the assumption that green buildings cost more than conventional structures. Kats, on the other hand, estimates the average payback (or return on investment) of a green building at about ten times the average cost of building it.

A second assumption is that green buildings last longer than conventional ones. Guidry suggests green buildings may be 'built with more durable and low-maintenance materials may be more adaptable to wide range of tenants and purposes [and] designed with flexible opens spaces that can significantly reduce construction cost and waste'.

While a longer-lasting building might seem a benefit, entailing lower depreciation rates, the benefit is rendered invisible if it cannot be factored into accounting or tax rules. If green buildings are more durable, the fact has to be established and factored into analyses of asset value.

Experienced green building executives estimate construction cost premiums at between nil and 14%, inexperienced executives at up to 20% (Turner Study): Katz says premiums on LEED®-rated green buildings may average 2% and other studies generally support this (for example Morris/Matthiesson's '*Costing Green*', David + Langdon 2004).

Such uncertainty over the cost increment may amount to the entire development profit, could wipe out equity and deter risk-averse lenders who see the potential for cost overruns in new construction methods (green roofs, for example). Little wonder, then, that the real estate and financial sectors remain sceptical. And all the more unfortunate that such cost studies have yet to be consistently paired with an understanding of the *benefit* of the additional construction cost; if, for instance, an extra cost of 20% were to result in 40% increase in value, would not the cost be worth it?

Rapid payback resulting from lower operations and maintenance costs is increasingly recognized as the most marketable benefit of building green. Three-quarters of executives in green building, Turner continues, say that such buildings generate a higher return on investment. Advocates of green building have to make the case that cost premiums are negligible, low or quickly recoverable, especially as not all developers can profit from the benefits accruing to occupants.

USDOE puts construction costs at less then10% of the money that has to be spent over a building's life, but between 60 and 85% (Morton, *Building Operating Management*, November 2002) of the real cost to business is staffing. Some green building features can increase costs, but USDOE reports that it is usually possible to lower lifecycle costs significantly, recovering them even in the case of high-value green features within three to five years.

Considering that salaries and employee well-being are the biggest item in a company's overhead (Kozlowski), a green building is cheaper if an owner-occupier considers the building's life-cycle cost in relation to the employee and thus, productivity benefits.

Construction cost bias will persist where short-term perspectives rule (USGBC, 2002), for in that case, the interrelationship between a building, its features, occupants and surroundings is immaterial. Where green features are part of the design programme, the cost premium can be nil (Syphers, G and others, *Managing the Cost of Green Building*, 2003) as it avoids inexperienced budgeters creating contingencies to cover their expectation of cost increases. Syphers identifies the top five barriers to controlling costs as:

- Lack of a clear design goal
- Midstream attempts to incorporate green
- Decentralized management of green building
- Lack of experience or knowledge
- Not enough time or funding.

Interpreting the benefits of green building

The benefits of green building have to be translated and quantified from a valuation standpoint. There are International Valuation Standards (IVS) to which national or local valuation standards relate in one way or another. In the US, for example, individual states provide a local tier of practice and standards through the licensing of real estate agents and appraisers. There are also national appraisal standards established by the Appraisal Foundation. Canada has provincial licensing of real estate agents but the Appraisal Institute of Canada produces national standards of appraisal although some provinces are edging towards provincial standards. Valuation can thus be affected by government intervention that harms having single, international standards.

Cost savings

Valuers and others sometimes mean different things by the same word. Take the word 'value' itself. High-efficiency light fixtures, for example, are often said to 'add value' when, to a valuer, they merely reduce costs. To an occupier, the fixtures can impact productivity positively or negatively – more related to the impact on the workspace than the type of light. Since cost reduction flows over a period of time however, it affects 'value' as lower operating cost payments resulting from a higher capital investment. In other words, cost reduction may be of 'value' to a tenant, affecting investment value only indirectly.

The incentive for a landlord in a net lease will be to make tenants aware that green features reduce tenants' operating costs and potenially more importantly, can improve productivity. If so, tenants may be prepared to pay some of the benefit back as more rent, and to renew the lease, which is both a cost saving and an investment risk mitigation factor. In a gross lease, green cost reductions – and the investment cost to obtain them – may directly benefit the landlord: but may be more than offset by the tenant having no incentive to switch off the lights. Where a landlord sees no benefit or it is too negligible to figure in an appraisal, there is no effect on asset value.

Sadly, some literature chose to criticise the failure of valuers/appraisers to reflect cost savings in asset value. But none reviewed were written by professional valuers/appraisers or considered that lease structures affect whether cost reductions benefit value. None mentioned that gross leases effectively incentivise tenants to be wasteful in their energy consumption, thus harming value, or that this might considerably exceed the cost savings.

A fundamental problem of valuation is that while advocates of green buildings see 'value' in the longer life cycle of some developments, valuers may not. The payback periods sought by investors vary from country to country, but a survey by BT (2003) notes perceptions of 'long-term' as five years or less in the UK. US markets focus on initial yield and see cost-reduction benefits over longer periods as additional risk. These are comparatively short investment horizons from a valuation perspective.

A green building component's life cycle may not match a five-year cash flow projection, and this causes a problem in valuation. The remainder life should be valued at the end of the projection, yet those other than valuers/appraisers may not account for the longer remainder life in the payback calculation, causing the valuation and comparison to be incomplete or inaccurate.

In general, from a valuation point of view, the green building industry might benefit from differentiating better between cost saving and value. Cost and value are not the same.

Value to occupier

From the literature, it appears that the greatest value of green features/performance is to be found in the value to the occupant. Green practices can benefit tenants substantially, yet valuers have yet to account fully for this. One reason is that the benefit could be kept entirely by the occupant, and not flow through to increase the asset's value.

Much of property valuation is to do with the market value of a building, although the market increasingly sees buildings as a service, with the result that the concept of 'value to occupier' is gaining ground. Building occupancy costs are commonly 10% or less of the costs of operating a business. If so, productivity benefits and savings on business operations are of greater worth to occupants than savings on real estate, which makes a building with green design features of considerable potential value to its occupants.

Rating systems such as LEED® can add to value for occupants, for such systems discourage the use of volatile organic compounds (VOCs) and inadequately – maintained or faulty ventilation systems, whose cost to employers in sickness, absenteeism and productivity can exceed the cost of using low – VOC materials. Studies of over 11,000 workers in 107 buildings (Kats) showed 'a 1% increase in productivity (equal to five minutes per working day) is equal to $600 to $700 per a year, or $3 per sq. ft. per year... over 20 years and at a 5% real discount rate, the present value of the productivity benefit is about $35 per sq. ft. for (LEED®) Certified and Silver level buildings, and $55 per sq. ft. for Gold and Platinum buildings'.

With studies starting to show such benefits, the question now is whether owners and investors are pressing real estate brokers to market these benefits to potential tenants, using studies that demonstrate the added value. If energy savings, like better internal air quality accrue to the occupier, why should these not represent added value?

IF ENERGY SAVINGS, LIKE BETTER INTERNAL AIR QUALITY ACCRUE TO THE OCCUPIER, WHY SHOULD THESE NOT REPRESENT ADDED VALUE?

How valuers and appraisers value

Cost should never be confused with value, but in valuation terms the former is easier to define than the latter. Here are the main approaches to valuing a real estate asset:

Direct Comparison

The Direct Comparison Approach to Value compares one property with another, adjusting for dissimilarities, to arrive at a value. A problem with Direct Comparison is that adjustments can be made too sweepingly for the smaller differences between the subject and comparable property to be accounted for. Benefits from improvements in energy efficiency, for example, could reduce operating costs but unless the difference is fairly large, an adjustment may not be made for the capitalized benefit.

Many appraisers working on a valuation have yet to ask for sufficient detail about the differences in comparables to enable them to identify the differential in values. Since valuation is a client-led discipline, it is up to valuers/appraisers' clients – developers, investors and lenders – to require appraisers to include green considerations in adjusting comparables. It is hardly the valuer's fault if the market is slow to differentiate between green and conventional buildings, leading to the conclusion that green building features and practices have little or no impact on value.

Investment Approach

Sometimes called the 'Income Approach', the Investment Approach, for example, is defined by the Canadian Uniform Standards of Professional Appraisal Practice as 'a study which reflects the relationship between acquisition price and anticipated future benefits of a real estate investment'. This approach dominantly uses projected income rather than comparables to arrive at value, and tries to model how a possible investment purchaser might assess the benefits of the asset's income flow.

The Investment Approach adjusts for both the time and size of each aspect of an asset's operating costs, and so adjusts more easily and fully for the operating costs of a green building than under Direct Comparison. Adjustments for life cycle and replacement costs may also be more accurate.

The Investment Approach has its pitfalls. There are technical differences in the way valuers in North America and the UK define and apply this method. Many features of a green building may cost more to begin with, but the building may last longer and be cheaper to operate. The discounted cash flow 'Investment Horizon', a predominantly North American way of calculating value with the Investment Approach, needs careful adjustment if the improved lifecycle and longer income stream are not to be overlooked. 'Term and Reversion', a method more frequently applied in the UK, can adjust better for the different lifecycle of a green building.

Cost Approach

One definition of the Cost Approach to valuation is that of the Appraisal Foundation, which calls it 'the cost to replace or reproduce the property being appraised'.

The problem with cost approaches is that they may ignore the benefits of green building features and performance and their effect on asset value. To compound this problem, and because green building aspects often have higher construction costs, corporate accounts may reflect cost disproportionately, impacting debt without offsetting recognition of value benefit. What is more, depending on the amount by which cost is depreciated, it is unlikely that the original cost will depreciate or end at the same life cycle rate as that of a green building. Put simply, cost approaches are less accountable to the benefits obtained from green building.

Alternative approaches

Other approaches to valuation are available, often from outside the valuation profession, in an attempt to integrate environmental, societal, community, economic and financial aspects:

Triple Bottom Line: (TBL): an approach that tries to weigh economic, social and environmental performance. Although broad agreement has yet to be reached on methods of valuing and auditing natural capital (air, water, soil, for example), TBL is catching on, although it is often used in tandem with, rather than instead of, other valuation methods.

Full-Cost Accounting: this approach presents the full cost of implementing decisions, and therefore includes environmental, social and economic implications of decisions. While a useful way of evaluating green components' lifecycle, operating cost/benefit and capital cost/benefit, Full-Cost Accounting does not detail how to include the broader aspects in a full analysis and is criticized for lacking strongly-developed standards.

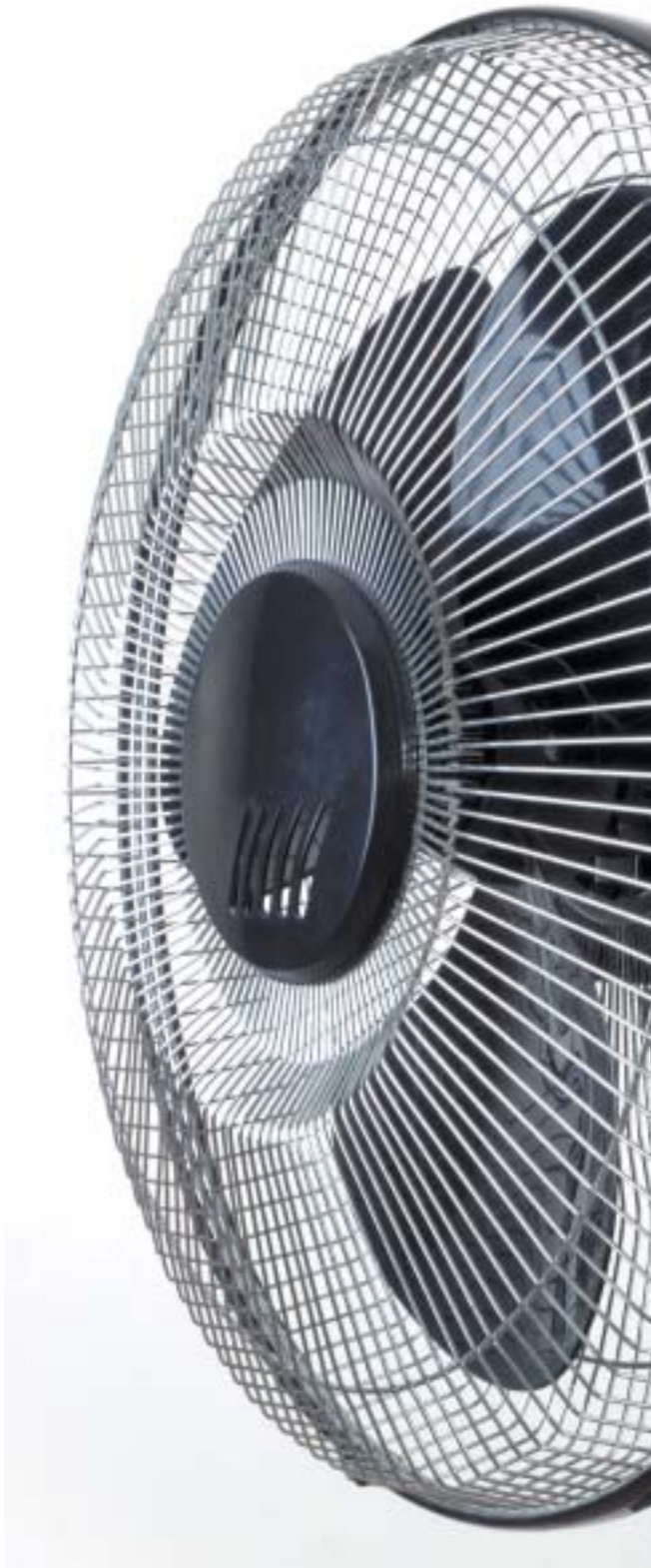
These and other alternative approaches to valuation are gaining acceptance, as many companies assess and report their environmental and social as well as their financial performance. Investors, according to the City of London's 2003 report *Investing in the Future*, are beginning to recognize green issues as a factor in business success. Increasingly, investors identify key environmental and social risks to short-and long-term business value, and take them into account in investment and corporate governance. With the financial sector moving or being edged towards green-consciousness, it can be argued that if accountants, appraisers and valuers do not adapt to TBL and other alternatives, they risk falling out of step with the needs of their clients. When a government of the status of the Corporation of the City of London is covering more holistic approaches to value, it is time the valuation and accounting professions embraced such an approach in valuation and accounting standards.

Accounting treatments

Much has been noted of the link between accounting and valuation. Both professions are made up of not one but a number of organizations, sometimes even within one country. Accounting standards in general, however, are becoming more stringent in the wake of financial problems such as those of Enron and Nortel. They are also shifting towards market valuation: away from cost approaches and towards fair value, which embeds the option of using market value.

Use of cost approaches for corporate accounts may fail to benefit companies with green buildings because the value is not properly reflected. Governments are especially vulnerable to this: government accounting standards deem many assets 'Special Purpose' and require a cost approach. Accounting standards may thus perhaps be holding back the green building industry, unless market value is adopted for corporate reporting. International Financial Reporting Standards have moved towards market value; however take-up seems inconsistent and slow to take effect in North America.

These changes are likely to favour green buildings, for if such buildings have benefits in value exceeding the cost of making the building green, then a value-based approach will more accurately reflect that benefit. Although accounting is moving in the direction of International Financial Reporting Standards, both valuation and accounting standards have yet to adapt fully to cover companies' wish to report adequately on social, community and environmental as well as purely-financial performance.



CASE STUDIES AND INTERVIEWS

In an ideal world, the way to assess the relationship between the market value of a real estate asset and its green features and related performance is to compile detailed financial information on each green building, using case studies. Each green case study would then be matched with a comparable conventional building.

But while this may be a greener world, it is still less than ideal. Detailed financial information has yet to be widely shared on conventional buildings or collected on green buildings to the extent that research can be conducted. Nonetheless, an alternative comparative approach yielded valuable results.

The research team developed a survey and interviewed stakeholders who included tenants, developers, owners, architects and project engineers and occupiers, depending upon the type of property. The survey had to be sufficiently detailed to cover the questions raised by this study, but still broad enough, given the different property types and geographic locations, to provide a useful cross-section of opinion supported by factual data.

In this way, proxy financial information was collected, which includes:

- Initial construction costs
- Operating costs
- Operating performance
- Occupant satisfaction levels
- Occupant health
- Marketing and absorption periods
- Vacancies
- Rent levels
- Tenant inducements.

Detailed interviews were held at 12 buildings of five different kinds, across Canada and the United States.

Office buildings

1. Green on the Grand, Kitchener, Ontario, Canada
2. SAS Building, Toronto, Ontario, Canada (under construction)
3. Ottawa Paramedics Building, 2465 Don Reid Drive, Ottawa, Canada (under construction)
4. Vancouver Island Technology Park, Victoria, British Columbia, Canada
5. 260 Townsend Street, San Francisco, California, USA (renovation)

Industrial

6. Phillips Eco-Enterprise Centre, Minneapolis, Minnesota, USA (office and industrial)

Retail

7. Mountain Equipment Co-op Store, Montreal, Québec, Canada

Residential

8. The Solaire, New York City, New York, USA (apartment building)
9. Cranberry Commons, Burnaby, British Columbia, Canada (co-housing)

Educational

10. Adam Joseph Lewis Centre for Environmental Studies, Oberlin College, Ohio, USA
11. The C.K. Choi Building for the Institute of Asian Research, Vancouver, British Columbia
12. The Liu Centre for the Study of Global Issues, Vancouver, British Columbia.

Summary of property information

Index	Property Name/Location	Property Type	Status	Ownership Type	Single/ Multi-Tenant	Completed	Building area (sq.ft.)	Green Designation
A	Green on the Grand, Kitchener, Onatrio, Canada	Office	New construction	Investment	Multi-tenant	1996	23,573	C-2000 (Natural resources Canada)
B	SAS Building, Toronto, Ontario, Canada	Office	Under construction	Owner occupied (52%)	Multi-tenant	Late 2005	115,000	Applied for LEED® certified
C	Ottawa Paramedics Building, Ottawa, Ontario, Canada	Office	Under construction	Investment	Single tenant	Dec. 2005	100,000	Applied for LEED® certified
D	Vancouver Island Technology Park, Victoria, B, Canada	Office	New construction	Investment	Multi-tenant	2001	184,000	LEED® gold
E	260 Townsend, San Francisco, California, USA	Office	Renovation	Owner occupied (100%)	Single tenant	2002	66,947	LEED®-EB gold
F	Phillips Eco-Enterprise Centre, Minneapolis, Minnesota, USA	Office/ industrial	New construction	Investment	Multi-tenant	1999	64,000	None (several green awards received)
G	Mountain Equipment Co-op Store, Montreal, Quebec, Canada	Retail	New construction	Owner occupied (100%)	Single tenant	2003	48,438	C-2000 (Natural resources Canada)
H	The Solaire, New York City, New York, USA	Residential	New construction	Investment	Multi-tenant	2003	357,000	LEED® gold
I	Cranberry Commons, North Burnaby, BC, Canada	Residential	New construction	Owner occupied (100%)	Multi-tenant	2001	26,662	None (several green awards received)
J	Oberlin College, Oberlin, Ohio, USA	Educational	New construction	Owner occupied (100%)	Single tenant	1998	13,600	None (several green awards received)
K(i)	CK Choi Building, Vancouver, BC, Canada	Educational	New construction	Owner occupied (100%)	Single tenant	1996	30,000	None (several green awards received)
K (ii)	Liu Centre, Vancouver, BC, Canada	Educational	New construction	Owner occupied (100%)	Single tenant	2000	18,800	None (several green awards received)

Why they went green

Of the 12 American and Canadian developments where interviews were held, five have a designation from a green rating body, two have applied for designation and five have no plans for designation but each has received several green awards.

The Green on the Grand, Kitchener: the developer, Ian Cook Construction, acquired the site at a time of downturn in the housing market and needed to offer something special. Enermodal Engineering, the lead tenant and project engineer, shared Ian Cook's interest in a green building, and the project won a C-2000 award of $400,000 to assist with the design and construction.

SAS Building, Toronto, Ontario: the SAS corporate philosophy is to be socially-responsible and a leader in innovation. While there was no conscious decision to go 'green', during construction it became clear that green-building features would be better for staff and for the surrounding district.

Ottawa Paramedics Building, Ottawa: the occupant requested a LEED®-certified building.

Vancouver Island Technology Park, Victoria: British Columbia Buildings Corporation, the developer and former owner, is committed to green building practices. The project was developed recognizing that technology parks need to be pleasant and healthy places of work if high-calibre employees are to be attracted and retained. The University of Victoria Properties Investment Inc on behalf of the Vancouver Island Park Trust is the new owner.

260 Townsend Street, San Francisco: green building is a core belief of the owner/occupant and builder, Swinerton Family of Companies. Such a building was thought the best way both of accommodating Swinerton employees and of demonstrating to clients how green-building practices can be incorporated into an existing building.

Phillips Eco-Enterprise Centre, Minneapolis: the owner, the Green Institute, is a non-profit organization, which had moved from re-using building materials and into property development. A green building was seen as a way of attracting companies in the energy and environmental businesses to a rundown area where they would create jobs.

Mountain Equipment Co-Op Store, Montreal: the Mountain Equipment Co-Op has established a policy of building green, and in particular of eliminating ozone-depleting substances from its developments.

The Solaire, New York City: the owner of the site, Battery Park City Authority, is mandated to promote green building practices, while the developer, Albanese Organization, wished to market an extra-healthy building which offered tenants materials and systems of even higher quality than BPCA's environmental guidelines.

Cranberry Commons, Burnaby: the resident co-owners wanted a building whose green features included a higher-than-usual amount of amenity space.

Adam Joseph Lewis Centre for Environmental Studies, Oberlin College: Oberlin's Environmental Studies Program had outgrown the basement of a campus building which, being cramped, having asbestos insulation and coal-fired electricity and no natural light, was 'fundamentally contradictory' to the department's teachings.

This larger, purpose-built centre elsewhere in the college grounds houses current activities appropriately and provides for expansion. Green building features figure prominently in the Oberlin curriculum, and many are incorporated in the new development.

The C.K. Choi Building for the Institute of Asian Research, and The Liu Centre for the Study of Global Issues, Vancouver: the C.K. Choi Building was part of a university expansion scheme which included a demonstration green building, built for the same budget as a conventional structure. The success of the C.K. Choi development and the favourable media coverage paved the way for the Liu Centre.

The General Expectations of Going Green

We asked whether project met the original general expectations for a variety of aspects.

Interestingly, it was absorption and lower turnover that exceeded more expectations than other factors.

CASE STUDY

	A	B	C	D	E	F	G	H	I	J	K	AVERAGE
Rent	4	–	3	4	–	3	–	5	3	–	–	**3.7**
Yield (rate of return)	5	–	3	4	–	4	1	5	5	–	–	**3.9**
Marketing success	5	–	3	5	–	4	1	3	5	–	–	**3.7**
Level of absorption of space/units	5	–	–	4	–	4	–	4	3	–	–	**4.0**
Operating cost	1	–	–	4	4	3	3	3	5	4	3	**3.3**
Initial construction costs	2	–	3	3	3	2	1	3	1	3	4	**2.5**
Ongoing maintenance costs	1	–	–	4	4	2	3	3	–	3	3	**2.9**
Tenant allowances	3	–	–	2	–	3	–	–	–	–	–	**2.7**
Turnover of space (vacancy)	3	–	–	5	–	4	–	4	4	–	–	**4.0**
Reduction in internal fit-out costs (churn)	5	–	–	5	4	2	–	3	–	–	1	**3.3**
Average score	**3.4**	**–**	**3**	**4**	**3.8**	**3.1**	**1.8**	**3.7**	**3.7**	**3.3**	**3.3**	
	3.5					**3.1**	**1.8**	**3.7**		**3.3**		

A Green on the Grand, Kitchener, Ontario, Canada – Office building
B SAS building, Toronto, Ontario, Canada – Office building (UC) – Office building
C Ottawa Paramedics building, Ottawa, Ontario, Canada – Office building
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J Oberlin College, Oberlin, Ohio, United States – Educational facility
K CK Choi building and Lui Centre, Vancouver, British Columbia, Canada – Educational Facilities

UC Under construction

KEY

1 Not met
2 Partially met
3 Met
4 Partially exceeded
5 Exceeded

The financial benefits of going green
We tested the extent to which financials were quantifiably met, and contrasts with more general expectations shown in the previous table. The results were different with some contributors offering no opinion on the financials.

Overall, the most impressive financial benefits of green features reported were the competitive advantage offered by the positive impact on the marketing of a property and the speed with which space or units were leased/sold. Rent and yield were also impressive.

CASE STUDY

	A	B	C	D	E	F	G	H	I	J	K	AVERAGE
Rent	4	–	1	3	–	3	–	2	–	–	–	**2.6**
Yield (rate of return)	5	–	1	2	–	5	–	2	2	–	–	**2.8**
Marketing success	1	–	1	5	–	4	–	–	4	–	–	**3.0**
Level of absorption of space/units	1	–	–	5	–	4	–	–	4	–	–	**3.5**
Operating cost	-1	–	–	3	4	1	–	–	3	2	1	**1.9**
Initial construction costs	-4	–	1	1	1	-2	–	–	-4	-1	-1	**-1.1**
Ongoing maintenance costs	-4	–	–	3	4	3	–	–	4	-2	-2	**0.9**
Tenant allowances	1	–	–	-2	–	-1	–	–	–	–	–	**0.0**
Turnover of space (vacancy)	1	–	–	3	–	1	–	–	4	–	–	**2.3**
Reduction in internal fit-out costs (churn)	1	–	–	4	–	-4	–	–	–	–	-1	**0.0**
Level of occupancy	1	–	–	–	1	–	–	–	√–	–	–	**1.0**
Average score	**0.5**	**–**	**0.4**	**2.4**	**0.9**	**1.5**	**–**	**0.4**	**1.5**	**-0.1**	**-0.3**	
			1.1			**1.45**	**–**	**1.0**		**-0.2**		

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UC Under construction

KEY

Exceeded
1 0 - 2%
2 3 - 5%
3 6 - 10%
4 11 - 20%
5 21 - 50%
6 51 - 100%
7 Over 100%

Fell below
-1 0 - 2%
-2 3 - 5%
-3 6 - 20%
-4 21 - 50%
-5 51 - 100%
-6 Over 100%

Who knows what?

Architects have been central to the green building movement, and unsurprisingly nine out of eleven interviewees rated architects as having a good or excellent understanding of the field, giving them an average 4.2 out of five. Planners ranked second with an average score of 3.6, six of the eleven interviewees ranking them as good or excellent. Appraisers scored lowest, at 1.8, below real estate brokers at two and lenders at 2.1. Three of the projects, however, had no involvement with third-party lenders, appraisers or real estate brokers.

CASE STUDY

	A	B	C	D	E	F	G	H	I	J	K	AVERAGE
Lenders	4	1	2	2	2	1	–	3	2	–	–	**2.1**
Architects	4	5	5	4	4	3	5	4	2	5	5	**4.2**
Appraisers	3	1	–	2	2	1	–	–	2	–	–	**1.8**
Planners	3	4	4	3	3	3	5	4	2	4	5	**3.6**
Developers	2	1	4	5	2	4	1	4	2	4	2	**2.8**
Tenants	2	2	3	3	3	2	–	3	2	5	2	**2.7**
Brokers	2	1	–	2	2	1	–	4	–	–	–	**2.0**
Average score	**2.86**	**2.14**	**3.6**	**3**	**2.57**	**2.14**	**3.67**	**3.67**	**2**	**4.5**	**3.5**	
			2.8			**2.14**	**3.67**	**2.8**		**4**		

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UC Under construction

KEY

1 No understanding
2 Limited understanding
3 Understanding
4 Good understanding
5 Excellent understanding

Making professionals more green-conscious

Respondents suggested a number of ways to make it easier for appraisers, brokers developers, lenders, planners and tenants/purchasers to understand green practices. These include:

- Educating consumers to demand better buildings
- Providing more, simpler, and better information on the consumer's benefit from green practices
- Get the project team together to understand the impacts of green features throughout the life cycle of the project. This team should include architect, developer, occupant and others
- Understand the project's impact on the productivity of its occupants
- Do more to identify the benefits for tenants of investment properties, and not just for owner-occupied developments
- Visit completed green buildings to see how they work
- Carry out more post-completion follow-up studies
- Provide an occupant's manual on your building's green features
- Launch an awareness/information campaign to educate tenants and users.

What occupants like best about green

Health and productivity are the two most popular direct and indirect financial benefits of green buildings, while lower occupancy costs – perhaps the most tangible direct financial benefit of the five categories – came last, after marketing/promotion and energy consumption.

Although two of the twelve properties had yet to be completed, and some interviewees spoke only for occupants, the interview responses suggest occupants are more interested in indirect benefits which are more difficult to quantify but which may yield the most significant financial, operational and wellbeing benefits.

CASE STUDY

	A	B	C	D	E	F	G	H	I	J	K	AVERAGE
Energy consumption	1	–	–	5	1	4	–	2	2	2	3	**2.5**
Operating costs	5	–	–	4	5	5	–	3	2	5	4	**4.1**
Health	3	–	–	2	3	1	–	1	–	3	2	**2.1**
Productivity	4	–	–	1	2	1	–	–	–	3	–	**2.2**
Marketing and promotion	2	–	–	3	4	3	–	4	4	1	1	**2.8**
Other (i.e. overall environment)	–	–	–	–	–	–	–	–	1	–	–	**1.0**

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UC Under construction

Appraisers, lenders and insurers

In one case, that of Minneapolis' Phillips Eco-Enterprise Centre, the developer was able to convince the appraiser that higher rents were achieved by the building's green features and the appraiser reflected this in the analysis. Otherwise, where an appraiser was involved, green features were rated as lowering operating costs only where the information was both available and verifiable. Some projects, however, were self-financed and did not involve an appraiser. In other cases, the impact on insurance could not be quantified because the developer/owner or user had a blanket insurance policy covering more than one location, only one of which might be a green building.

Environmental costs and benefits

Green v. non-green features

In the few cases where detailed payback analysis had been done, the returns on green features were significant and paybacks short, although items such as photovoltaic panels are expensive and slow to pay for themselves. Green on the Grand, 260 Townsend Street and the Phillips Eco-Enterprise Centre had tracked the comparative initial cost of green features compared to conventional construction, but there were no directly comparable non-green projects. Overall construction costs seem to be higher in most cases, although this difference will lessen with the increase in industry experience, availability of technologies /materials and demand.

Financial and non-financial benefits

Perceptions vary widely with project and occupant, although savings in energy consumption were popular. Financially, the easiest features to quantify are energy consumption and operating cost savings. From occupants' point of view, however, less-quantifiable benefits such as air quality, absence of noise, and natural light were all prized.

CASE STUDY

	A	B	C	D	E	F	G	H	I	J	K	AVERAGE
Overall	5	–	–	5	5	5	–	4	–	5	5	**4.9**

A Green on the Grand, Kitchener, Ontario, Canada – Office building
B SAS building, Toronto, Ontario, Canada – Office building (UC)
C Ottawa Paramedics building, Ottawa, Ontario, Canada – Office building
D Vancouver Island Technology Park, Victoria, British Columbia, Canada – Office building
E 260 Townsend, San Francisco, California, United States – Office building
F Philips Eco-Enterprise Centre, Minneapolis, Minnesota, United States – Office/Industrial building
G Mountain Equipment, Co-op Store, Montreal, Quebec, Canada – Retail store
H The Solaire, New York City, New York, United States – Residential apartment building
I Cranberry Commons, New Westminister, British Columbia, Canada Co-housing project – Residential apartment building
J Oberlin College, Oberlin, Ohio, United States – Educational facility
K CK Choi building and Lui Centre, Vancouver, British Columbia, Canada – Educational Facilities

UC Under construction

KEY

1 No understanding
2 Limited understanding
3 Understanding
4 Good understanding
5 Excellent understanding

A question of attraction

Of the seven interviewees who answered the question 'To what extent did green features attract tenants or the user?', all but one ranked green features as 'extremely important'. Lighting, low-VOC building materials, good indoor air quality, ventilation and building systems (such as ground-source heat pumps) were other draws. Energy consumption and energy efficiency, however, were not considered very important. Energy consumption and associated operating cost savings were frequently cited as financially-advantageous features. This suggests that energy consumption tends to be a primary measure by which the financial benefits of green buildings are demonstrated, because it is easier to quantify, although not valued by the end user as much as health and productivity gains. The findings seem to underscore the relative importance of cost saving measures versus the benefits to occupiers and to productivity.

Green goes to market

Higher rents and reduced lease-up periods were achieved as a result of green features in at least three developments, Green on the Grand, The Phillips Eco-Enterprise Centre and The Solaire. In addition, half the sample buildings had market comparables, albeit with limited data. Where cited, green features were thought to have had a positive effect on marketing by providing a competitive advantage. Most projects were seen to be market-leaders because of the technologies employed and the publicity they attracted.

What's the most important environmental feature?

Using less energy is ranked as the most important factor in developing a project, scoring 4.8 out of five, rating as extremely important in all but one project. Using sustainable materials and improved air quality comes a close second, while green roofs were seen as least important.

CASE STUDY

	A	B	C	D	E	F	G	H	I	J	K	AVERAGE
Using less energy	5	5	4	5	5	5	5	5	4	5	5	**4.8**
Using sustainable materials	5	5	4	5	4	5	5	5	4	4	5	**4.6**
Using recycled or salvaged material	5	3	3	4	4	5	5	5	2	4	5	**4.1**
Using less water	5	4	3	4	3	4	5	5	4	4	5	**4.2**
Green roofs	1	2	1	–	1	5	3	5	1	–	1	**2.2**
Indoor air quality	5	5	4	5	5	5	4	5	3	5	5	**4.6**
Average score	**4.33**	**4**	**3.17**	**4.6**	**3.67**	**4.83**	**4.5**	**5**	**3**	**4.4**	**4.33**	
			4.0			**4.83**	**4.5**	**4**		**4.4**		

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UC Under construction

KEY

1 Not important
2 Somewhat unimportant
3 Neutral
4 Somewhat important
5 Extremely important

Rankings on the green social register
The reputations of professionals involved in surveyed green buildings rose as a result of the wide and favourable publicity inspired by the coverage in the media, in business and the community, and through accreditation bodies.

About half the projects found measurable benefits to the bottom line, sales or service, whether through productivity or exposure. If not measurable, the impacts were thought positive.

Some projects had such a great effect on the community, to the extent of converting municipalities to green buildings, or of persuading students or organizations to change their own environments. Higher expectations were created in the community, the SAS Building and the Phillips Eco-Enterprise Centre being two projects that proved the catalyst for transforming local economies.

Asked 'Which social issues were factors in developing your project?', most respondents cited better corporate or civic image, leadership in social/environmental responsibility and improving indoor air quality. Reducing absenteeism was seen as least important.

CASE STUDY

	A	B	C	D	E	F	G	H	I	J	K	AVERAGE
Reducing absenteeism rates	2	4	–	–	4	4	1	–	–	3	3	**3.0**
Increasing productivity	2	5	–	4	5	5	1	–	–	3	3	**3.5**
Improving employee health	2	5	–	5	5	5	–	–	–	3	5	**4.3**
Improving indoor air quality	2	5	–	5	5	4	–	5	–	5	5	**4.5**
Increasing employee morale	4	5	–	4	4	4	3	–	–	5	5	**4.3**
Increasing corporate or civic image	5	4	–	5	4	5	5	5	–	5	3	**4.6**
Increasing corporate or civic leadership in social/ environmental responsibilty	5	4	–	4	4	4	5	5	–	5	5	**4.6**
Average score	**3.14**	**4.57**	**–**	**4.5**	**4.43**	**4.43**	**3**	**3**	**–**	**4.14**	**4.14**	
				4.2		**4.43**	**2.1**	**2.1**		**4.1**		

A Green on the Grand, Kitchener, Ontario, Canada – Office building
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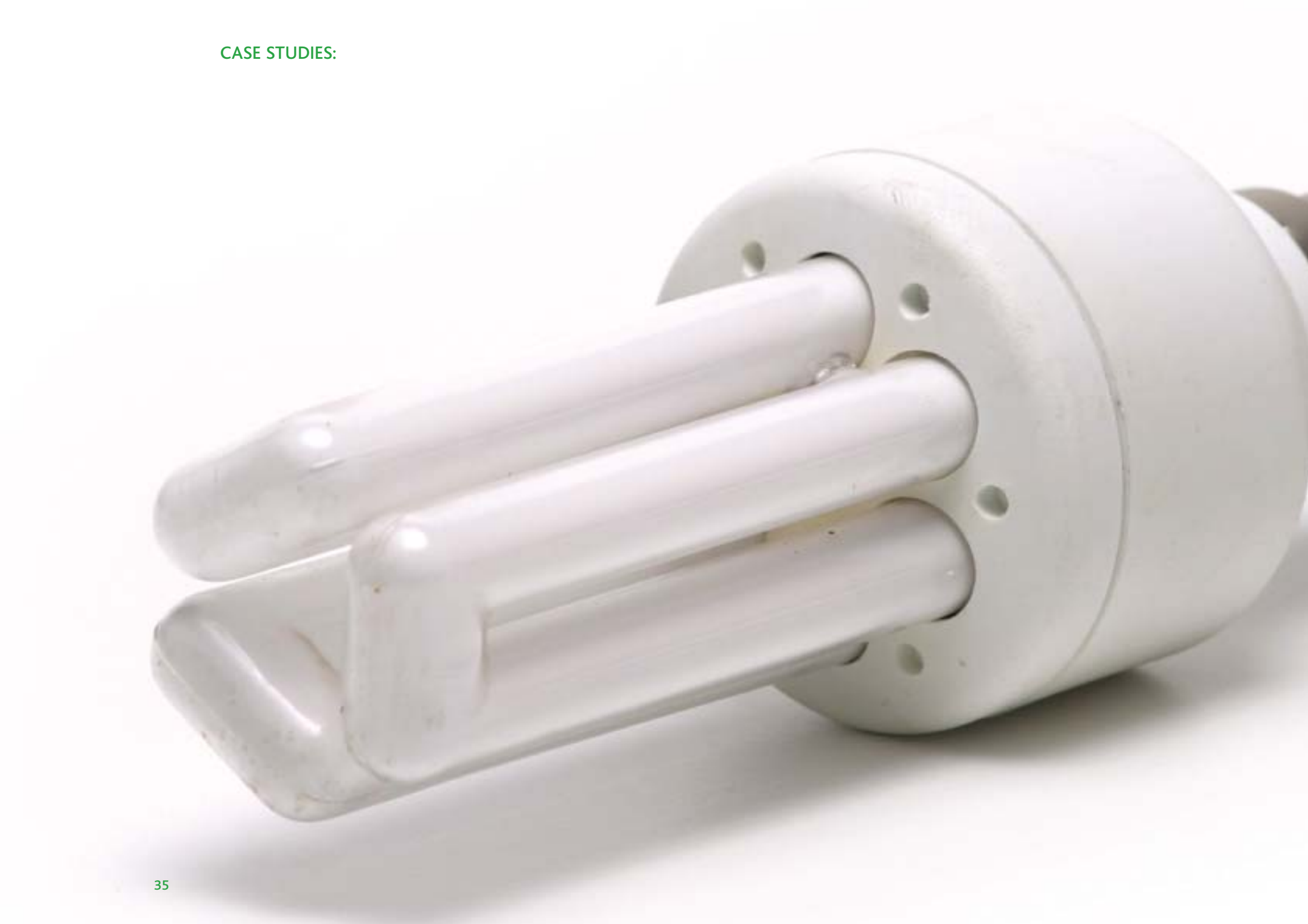


GREEN ON THE GRAND, KITCHENER, ONTARIO, CANADA

Grand on the green, good for business too

Green on the Grand, on Kitchener's east side, is a two-floor office building of 20,452 square feet completed in 1996 overlooking the Grand River. The property has always enjoyed high occupancy levels and is fully leased. Having carried out a post-occupancy audit and tenant survey, both landlord and tenant regard Green on the Grand as a success from the environmental, investment, occupancy, social and marketing points of view.

The landlord is Ian Cook Construction (ICC), a home builder, and the building's lead tenant/project engineer is Enermodal Engineering (EE), a provider of innovative solutions to reduce the energy, water consumption and environmental impact of building designs.

Green on the Grand was built at a time when it was hard to lease office space. On the other hand, the developer had acquired the land relatively cheaply. Encouraged by the possibility of grants for a green building, ICC and EE agreed on an environmentally state-of-the-art facility. This would employ the latest in energy-saving and environmentally-friendly features, and so attract tenants who, spoiled for choice, otherwise might not commit to taking space.

The quality of the proposals won the project $400,000* from Canada's C-2000 program to help with design and construction. C-2000 was a demonstration programme sponsored by the CANMET Energy Technology Centre of Natural Resources Canada to encourage high standards of energy performance, water conservation, site ecology maintenance and indoor environment.

Green on the Grand stands on a rise overlooking the Grand River, and was built as two off-set rectangles, facing south to catch the sun, make best use of daylight, and to offer most offices in the five suites a river view.

Appropriately for a waterside building, Green on the Grand is thrifty in its water use. The building requires about 30% less water than conventional office buildings, a saving achieved by the harnessing of rainwater for landscape irrigation, the installation of water-conserving bathroom fixtures, and a specially-built pond as an alternative to a cooling tower. Green on the Grand has also achieved a 72% reduction in drinking water consumption.

Ian Cook, President of Cook Homes and Steve Carpenter, President of Enermodal Engineering, lists in descending order of financial benefit to landlord or tenant the following green features of Green on the Grand:

Building envelope: operating cost benefit from the use of wood as the main material, a renewable material that costs much the same as other materials, but made possible a structure that is airtight and has insulation three times better than standard.

Lighting: natural daylight pleases workers and electricity consumption for lighting is half that typical of other offices.

Ventilation: natural and mechanical, independent of the heating and cooling system, the ventilation system supplies outdoor air to all offices. Cheap to run, yet makes for good working atmosphere.

Lack of ambient noise: noise does carry through the floor, although in general sound quality in offices is good.

Operable windows: tenants like the windows that can be opened, and wish that fewer were fixed shut.

Pond: cooling and heating at Green on the Grand are by the most environmentally benign fuel available, natural gas. Both rely on radiant heating and cooling rather than forced air systems. Waste heat is sent not to a rooftop cooling -tower but to a landscaped pond and waterfall for loss through evaporation.

Although popular with tenants, the pond is reported to have created maintenance headaches for the landlord that impact mechanical systems.

Mechanical systems: with hindsight, the system would be piped differently: using a modular system rather than a centrally-controlled system allowing for the variation of loads required in a multi-tenanted building.

The tenant ranked the principal gains as in energy consumption, marketing and promotion, employee health, productivity, and operating costs.

Developer and major tenant found that architects, lenders, appraisers and planners understand green building more than developers, tenants and real estate brokers do.

Enermodal, says President Steve Carpenter, measurably profits from its connection with Green on the Grand. The publicity, national and international, has generated a rapid expansion of the company's business requiring Enermodal to double the office space it occupies. Similarly, Ian Cook, President of Ian Cook Construction reports that the good publicity has helped to boost awareness of his company and sales of its homes.

The developer sees Green on the Grand as an investment, based upon the rents achievable at the time of completion. Lower mortgage financing was not available because of the building's green features, and their impact was not reflected in the lender's appraisal. Insurance was actually higher than otherwise, on account of the wooden construction. In the developer's opinion, the building's green features have yet to make higher rents achievable. On the other hand, the development was undertaken at a time when the office rental market was weak: it was the green features that got Green on the Grand noticed, so much so that the project was fully leased at completion.

The example set by Green on the Grand will be easier to follow once there is more incentive for an owner/investor to 'build green', in the shape of a greater correlation between savings in energy costs and benefit to the landlord. At present, the advantage is to the owner-occupant. Under a conventional net lease, it is the tenant who benefits from energy efficiency and operating cost savings, while the owner is stuck with the initial capital and continuing maintenance costs.

* Unless otherwise stated, dollar values are those of the relevant country: in this case, 400,000 Canadian dollars.

Green on the Grand's comment:

CREATE A DEMAND FOR THE PRODUCT, AND THEREBY, ACHIEVE ECONOMIES OF SCALE.

SAS BUILDING TORONTO ONTARIO, CANADA

Green is as green does

SAS Institute Inc. did not plan to develop a green building as its new Canadian headquarters, but having incorporated one practical measure after another, SAS found that the project within sight of meeting the requirements of Canada's Leadership in Energy and Environmental Design green building rating system (LEED®). These practical measures included energy-saving features, abundant natural light, nearness to public transport and the use of resource-efficient building materials.

SAS Institute Inc., of Cary, North Carolina, USA, is the world's largest privately-owned software company, and regards itself as socially-responsible as well as a leader in innovative technologies. SAS's prime motive in building a new national HQ for SAS Institute (Canada), however, was financial. It would have been prohibitively expensive to extend the lease on its current Toronto HQ, and there seemed to be nowhere else in the Canadian financial capital to meet the company's requirements. SAS's solution was to develop its own HQ, the SAS Building, which is on the north side of King Street, on the edge of the financial district.

The SAS Building, built on the site of an open-air car park, has eight floors above ground, and a further three below for underground parking. The developer will occupy 52% of the structure's 115,000 square feet rentable area and lease the rest. Having decided that development was the best financial option, SAS decided that the way to get the most out of the investment was to build the best-possible place in which to work, while availing itself of the economies in operating costs offered by green features.

Raised floor air conditioning: saves on energy costs, and allows each occupant the highest level of individual control.

Daylighting: operating costs reduced by full-height low-emission glazing on the south and west sides which allows the sun's heat and light to pass through the glass into the building, yet blocks heat from leaving the room, so reducing heat loss considerably. A sky-lit atrium extends through the top three of the eight above-ground floors, admits natural light, saving on lighting costs and solar heat gain.

Reduced energy consumption: overall energy consumption is projected to between 30% and 50% that of a conventional office building, much of this saving related to lighting features.

Water consumption: all rainwater is collected in tanks, treated and re-used in the washrooms.

In assessing the relative benefit of such features, impact on workspace quality and on the bottom line was regarded as equally important.

Jerry McDermott, Manager Real Estate Development, SAS Institute (Canada), lists two additional environmental benefits of the SAS Building:

Reducing 'heat island effect': the roof is covered with a white membrane to reduce the tendency of buildings and roads to act like giant storage heaters. The large amounts of concrete, asphalt and bricks used 'soak up' heat in the daytime, store it, and then release the energy at night. The site was previously a paved parking lot.

Improving the neighbourhood: replacing a parking lot with eight storeys of office space helps to regenerate the district, and the underground parking space removes polluting vehicles from the street as well as the paved surface which contributed to the heat island effect.

As the developer will not occupy the SAS Building before late 2005, it is too early to quantify all costs and benefits. Building costs, however, were 'marginally' higher than those of conventional construction. As a consequence, SAS seeks higher rents than otherwise, and current firmed-up offers show tenants willing to pay more for the SAS Building's combination of convenient location and the green-feature financial benefits of lower operating and energy costs, plus staff benefits such as superior indoor air quality and lighting.

Although it is too early to quantify the impact on the bottom line, the developer reports that the SAS Building's green features generate positive publicity in the national daily press, in journals and in industry presentations, thus increasing knowledge of the SAS Institute (Canada) and strengthening the brand.

SAS comment:

LOOK AT THE BOTTOM LINE, AND CONSIDER ONLY THE DIRECT INCREMENTAL COSTS OF SUSTAINABILITY VERSUS THE ENERGY COST REDUCTION IT YIELDS.

OTTAWA PARAMEDICS BUILDING OTTAWA ONTARIO, CANADA

Driving a green bargain

When the City of Ottawa decided that its Ottawa Paramedic Services needed a purpose-built headquarters, it is hardly surprising that the city also decided that the building should embody features that made life as healthy as possible for the people working in or living around it. The building, moreover, would have to be LEED®-certified.

This, then, was the brief that Ottawa gave to its private-sector co-developer, Forum Leasehold Partners who, with Aecon-Westeinde Alliance, designed and built the new Ottawa Paramedic Service HQ, 2465 Don Reid Drive, scheduled for completion in December 2005. Forum financed the $20 million construction costs, and will lease this 100,000 square foot project for 30 years, at the end of which the building reverts to the city. Meanwhile, the property manager, Trammel Crow Company Canada, has committed to 'green housekeeping practices'.

Health-conscious requirements include an indoor air quality plan to protect construction workers as well as the future occupants. The ventilation system has carbon dioxide monitoring to keep air fresh, and materials used in adhesives, carpets, paints and sealants are required to be low on volatile organic compounds. Nine-tenths of 'normally occupied' interior spaces have windows. A target of at least 25% better energy performance than Canada's Model National Model Energy Code for Buildings is to be met by measures such as high-efficiency condensing boilers for space and water heating, high-efficiency windows and lighting. CO2 demand control sensors will also reduce ventilation when offices are not being used.

Recycled and locally sourced building materials were used as far as possible, much of which would otherwise have gone into landfills. Native plants requiring no irrigation have been chosen for landscaping.

In all, estimates the general contractor, Aecon-Westeinde Alliance, there was a 'green premium' of about 1.2 %, or $230,000, to pay for the green features necessary for the LEED® certification Ottawa sought. To offset against this extra cost, there was the prospect of a $60,000 grant to reward energy savings. According to Michael Sullivan of Forum and Robert Vaillancourt of the City of Ottawa, LEED® certification is 'onerous and expensive', yet the city thought it important to show environmental leadership at a time when the city was preparing to make LEED® certification a requirement for new municipal building. The 25% energy savings, however, would pay back incremental costs within five years.

Ottawa Paramedics Building's comment:

IMPROVE DATA ON SAVINGS ACHIEVED: FOR THIS PROJECT, 40% ENERGY SAVINGS ARE ANTICIPATED ON ELECTRICAL AND MECHANICAL SYSTEMS.

VANCOUVER ISLAND TECHNOLOGY PARK VICTORIA BRITISH COLUMBIA, CANADA

Even the salmon like it

Vancouver Island Technology Park (VITP) is a 35-acre site on the southern tip of Vancouver Island, a campus-like countryside setting containing a salmon-spawning creek and criss-crossed by pathways and trails. Persuading the municipality in which VITP is situated that a green development would be better for local salmon habitat was one challenge the developer faced. The approved strategy included developing parking lots with car-pooling spaces and plug-ins for hybrid vehicles, and an innovative grass/gravel system to reduce runoff and vehicle-related site contaminants that might harm fish. There are no storm drains, water filters or separators: the unpaved surfaces and microbes in the soil do their work.

Other green features help to attract and retain tenants in the high-technology industry, whose employees often work long hours. Media attention and the LEED® Gold certification gave free publicity to VITP and its tenants. What has really impressed tenants, however, is the quality of the lighting, heating, ventilating and air conditioning systems in the buildings. One tenant, E-traffic Solutions, said in less than a year after moving into VITP, their productivity rose 30%.

Completed in 2001, at a time when the technology boom was about to bust, the 184,000-square-foot Phase One of VITP is now 98% leased to 25 companies. In March 2005, VITP's developer and former owner, the British Columbia Buildings Corporation (BCBC), also the Crown agency responsible for British Columbia's property assets, sold VITP to the University of Victoria Properties Investment Inc. (UVPI) for $20,200,000.

While it is difficult to quantify the incremental value green features brought to the sale, they did improve its marketability. BCBC says it was able to lease up more quickly than otherwise, thus reducing development costs, and the green features made the project more marketable to prospective purchasers, improving liquidity.

Dale Gann, General Manager of VITP, says that VITP was conceived as an investment property. The investment is achieving market rents and operating cost savings, raising awareness of LEED® and green practices. Local economic development gains are also noted by BCBC as the result of VITP attracting high-technology companies, and the creation of high-paying jobs and a well-educated workforce.

Two other green developments are now under way locally: the University of Victoria Medical Sciences Building for doctor training; and an 18-building Dockside Development initiated by the City of Victoria, which was chosen over a conventional development. Green building is now integral to many BC government developments, and BC government suppliers and contractors are changing their business products and services to better align them with this change in market demand.

Overall, BCBC reports that rents exceed expectation, as do absorption, operating and maintenance savings, all attributed to green features, although tenant allowances have been higher than expected.

Vancouver Island Technology Park's comments:

PLAN WELL FROM THE START – GET THE PROJECT TEAM TOGETHER TO UNDERSTAND THE EFFECTS OF GREEN FEATURES OVER A BUILDING'S LIFECYCLE AND THE INTERDEPENDENCIES BETWEEN BUILDING COMPONENTS.

PLAN FOR AND CONDUCT MORE AND BETTER POST-OCCUPANCY AUDITS TO MEASURE HOW GREEN BUILDINGS IMPROVE OCCUPANTS' PRODUCTIVITY.

260 TOWNSEND STREET SAN FRANCISO CALIFORNIA, USA

Don't tell the clients, show them
Swinerton Family of Companies is a large contractor and construction manager that sees in 260 Townsend a multiple opportunity to create value, accommodate its employees, and to provide an educational centre to show its clients and suppliers how to build green. Swinerton acquired the seven-storey building in 2002, when it was nine-tenths empty after 16 years' occupancy by a previous tenant, during which time maintenance problems, including ductwork contamination, had been allowed to build up. 260 Townsend has since been renovated and upgraded to a standard that has won the property LEED® – EB (Existing Buildings) Gold certification.

This is an owner-occupied property, and since no third party was involved in the financing, there has been no lender's appraisal that took into account 260 Townsend's green features. However, William Krill, Operations Manager and Green Building Chairman, Swinerton Builders, said the company's aims in this development were direct return from energy savings, improved productivity and the business development and marketing benefits of building green.

The company has received a number of direct referrals as well as a number of project opportunities through hosting meetings of the US Green Buildings Council Big Users Group. In the two years since acquiring and redeveloping 260 Townsend, Swinerton has also signed contracts for about $500 million of new LEED® projects, five times more than in the equivalent preceding period.

Productivity is also up. One factor is the move from a 25-storey high rise with very little space in which employees could gather, to a building which, besides better lighting and air quality, has open-air rooftop terraces. One of these can accommodate up to 200 people. Staff get-togethers, the company says, have improved communication and the flow of ideas. 260 Townsend's terraces are landscaped with native plants, which reduce storm runoff and heat island, effect.

Temperature, CO2 and humidity are monitored by state-of-the-art Emcor fully-digital building management system (BMS) with dedicated Internet access. The BMS also maximizes use of outside air, the building is totally non-smoking, and air quality is further maintained by an insistence upon low-impact fertilizers, cleaning and pest-control chemicals. The BMS also runs the HVAC system to meet actual rather than estimated demand, thus saving over 30% on utility bills. High-efficiency light fixtures with motion sensors complement best use of daylight, direct and indirect. It is too early for the developer/occupier to quantify the savings on operating costs due to the building's green features, but one indication is available. Premium and savings were tracked for each green item during construction. The total additional cost was estimated at $107,547 or $1.13 per sq. ft. (including 28,179 sq. ft. of indoor parking), 2.01% over the entire project cost.

The annual operating cost savings are estimated at $28,535, or a payback of less than four years. One useful comparable with three conventional buildings of a similar size in San Francisco shows them to have combined gas and electricity consumption of 87.9, 70.5 and 63.0 kBtu per sq. ft. a year, compared with the 51.1 kBtu of 260 Townsend.

260 Townsend Street's comments:

VISIT 260 TOWNSEND TO SEE FOR YOURSELF.

SEEK OUT CONFERENCES ON HOW TO UNDERSTAND AND IMPLEMENT GREEN PRACTICES.

INVOLVE LOCAL UTILITY COMPANIES TO TRAIN THE PROJECT TEAM AND BUILDING – USERS IN ENERGY-SAVING TECHNOLOGIES.

ESTABLISH CONTINUING EDUCATION AND TRAINING IN GREEN PRACTICES FOR EVERYBODY INVOLVED.

PHILLIPS ECO-ENTERPRISE CENTRE MINNEAPOLIS MINNESOTA, USA

From solid waste to solid gain

Minneapolis's Phillips Eco-Enterprise Centre is an industrial office property development in a high-crime, low-employment neighbourhood on a site that had been earmarked for a solid waste transfer station. The centre's owner is the non-profit Green Institute which, having started in the business of re-using building materials, had then moved on to property development. With what is now the Phillips Eco-Enterprise Centre, the Green Institute wanted to show that this downtown site could be put to more productive use than solid waste transfer. The result is a 64,000 sq. ft. development, one-third offices and two-thirds industrial space. It is a development, which has created over 100 jobs in a rundown district, while meeting the proprietor's strict financial criteria.

Developed as an investment property on the Green Institute's behalf by Corey Brinkema, now Principal of Trillium Planning & Development, the Phillips Eco-Enterprise Centre is the first speculatively-built green business centre in the US. The State of Minnesota provided $1,500,000 in equity funding, and Welsh Companies undertook third-party leasing. Requirements included a minimum 50% pre-leasing and the rents that could be achieved at the time in the market to secure debt financing coverage and third-party financing.

By completion in 1999, 40% pre-leasing had been achieved, but there was 75% absorption within the first year and full occupancy within two years. Net lease rates achieved were between 5% and 10% above market rate for conventional buildings, developer Corey Brinkema concluding that green features contributed to higher rents, shorter lease-up period and the ability to target a specific group of tenants.

The Centre now has 18 tenants, many in the energy and environmental industry, more in the non-profit sector than the Green Institute would like. Construction costs were about 3% higher than with a conventional building, although rates of return are similar, thanks to the higher rents the green features command. Had more been known about green building practices in the 1990s, the Centre could have been completed more quickly and for less than its $5,800,000 cost.

Much of the building's steel and brick is salvaged or locally sourced, and water capture allows all storm water runoff to be used onsite. In the warehouse section, sunlight is reflected by skylights and sun-tracking mirrors which reflect up to ten times more lumens in the morning and later afternoon than 'passive' skylights. A 30-kilowatt photovoltaic array on the warehouse roof is the region's biggest single solar energy installation. There was additional expense in building wells, due to the shallowness of the surrounding bedrock, with payback estimated at seven years. In fact, payback was within four years due the heat pump system's running entirely on low-cost electricity, when other projects rely upon increasingly expensive natural gas.

An appraisal conducted to secure low-interest government financing resulted in the lender concluding that there was incremental value in the project's greater energy efficiency. Only after evidence had been presented did the appraiser accept that higher-than-average rents were being achieved.

Projected operating costs were lower because of the building's energy-efficient characteristics, and contributed to a 5% to 10% net rental premium. A post-occupancy survey concluded that the building systems resulted in a development 35% more energy-efficient than one with a typical high-energy furnace, and that the building's energy exchanges and the use of natural light resulted in a total energy usage 40% lower.

Lower mortgage financing charges were not available because of the green building features, and the requirement for substantial pre-leasing involved the developer in 'significant' marketing efforts. According to the developer, however, the Centre poses less risk for the lender than an equivalent conventional building. Its green features extend the building's useful life and result in higher occupancy, thus improving the quality of the income stream, residual value and overall security of the financing.

The Phillips Eco-Enterprise Centre has won professional, city, state, national and international awards, but The Green Institute has decided against LEED® certification as being too expensive in time and money.

Phillips Eco-Enterprise Centre's comments:

BETTER QUANTIFICATION OF POST-OCCUPANCY BENEFITS OF GREEN FEATURES.

MORE FOLLOW-UP ANALYSIS (THE DEVELOPER AND FUNDER ON THIS PROJECT HAD NO FUNDING LEFT TO COMPLETE THIS ANALYSIS).

MORE PEOPLE NEED TO BE SHOWN THE BENEFITS OF GREEN PRACTICE IN INVESTMENT PROPERTIES AS WELL AS IN OWNER-OCCUPIED PROPERTIES, BECAUSE MANY OF THE GREEN PROJECTS COMPLETED IN THE USA AND CANADA SO FAR ARE OWNER-OCCUPIED.

MOUNTAIN EQUIPMENT CO-OP STORE MONTREAL QUEBEC, CANADA

All the news that's fit to build

The Mountain Equipment Co-op (MEC) store in Montréal made the newspapers, and to some extent newspapers have helped to make the store. This green development made news, and the walls of the structure are insulated with shredded newspapers. MEC is a consumer co-operative and Canada's leading supplier of good-quality outdoor clothing and gear, with over 1.8 million members worldwide. The co-op's approach to building is conditioned by corporate goals, one of which is to 'reduce the ecological impact of running our business while increasing the positive impact we have on people and communities'. Acting upon this principle, the Montréal store is the third in MEC (the other two are at Ottawa and Winnipeg) to meet the environmental and energy performance objectives of Natural Resources Canada's C2000 standard, and is the first in Québec.

MEC, the tenant, also acted as developer, thus reducing its lease rate. MEC's Montréal store opened in May 2003, at a cost of $6 million, or $123.87 per sq. ft., which was above budget but not because of its green features.

One unusual aspect of the MEC store is that materials and waste management is designed so that, subject to local by-laws, parts of the structure and façade can be taken down and reused somewhere else in the future. Interior space design limits waste through design with walls that can easily be taken down, moved and reassembled. Air is not drawn into the building from ground level, where it might be polluted by highway traffic.

According to MEC's Marie-Eve Allaire and Corin Flood, the co-operative regards the Montréal store as an investment property as well as an embodiment of the group's green philosophy. In deciding to act as its own developer, MEC reasoned that it could achieve three things: avoid paying the developer's profit, build the store the way it wanted, and benefit from lower operating costs. MEC, however, does not measure rate of return on the investment in real estate, preferring the rate of return on the business.

The energy efficiency of Montréal's Mountain Equipment Co-op store outperforms Canada's Model National Energy Code by 69.2%, a calculation based upon the first year of operation. Two PV panels power the solar domestic water and irrigation systems, helping to limit costs to an estimated at $50,000 a year, a third that of a conventional building. Although LEED® was used as a guide to the design of the development, MEC has not applied for certification, because of the time it takes and because some of the design requirements are thought to be overly-elaborate.

Mountain Equipment Co-op's comments:

DEVELOPERS DEVELOP WHAT THEY THINK THE MARKET WANTS, AND DON'T OFFER GREEN BUILDINGS BECAUSE CUSTOMERS DON'T KNOW ENOUGH ABOUT THEM, INCLUDING CUSTOMERS WHO COULD AND WOULD PAY FOR GREEN IF THEY WERE OFFERED THE CHOICE. MEC SAYS THERE IS A LOT OF 'GUILT MONEY' THAT CUSTOMERS WOULD SPEND ON BETTER CHOICES IF CHOICE WAS OFFERED.

MARKET PRICING IS DISTORTED BY IGNORANCE OF GREEN VALUES, ESPECIALLY AMONG DEVELOPERS, AND CUSTOMERS CAN BUY ONLY WHAT IS OFFERED. IN THE ABSENCE OF KNOWLEDGE AND CHOICE, PEOPLE WILL CONTINUE TO MAKE DO WITH CONVENTIONAL BUILDINGS, BASED UPON THE CURRENT, INACCURATE, SYSTEM OF PRICING.

EDUCATE THE CONSUMER. THERE ARE ALREADY MANY DESIGNERS WHO CARE ABOUT ENVIRONMENTAL DESIGN, AND ARE EXCITED ABOUT WORKING FOR A CLIENT WHO IS OPEN TO GREEN CONCEPTS.

THE SOLAIRE NEW YORK NEW YORK, USA

Green ice at cocktail time

Among the health-conscious green features of the Manhattan's The Solaire is a central water filtration system, backed by refrigerators, which double-filter drinking water and ice. The Solaire, a 27-storey residential apartment development of 293 units and 357,000-sq. ft. with onsite parking, is in Battery Park City on the west side of New York's financial district. It adjoins the site of the former World Trade Centre, and was completed in August 2003 after a nine-month delay because of the terrorist attacks of 11 September.

The Solaire cost $116 million to build, $76 million in hard costs, and $40 million soft costs, a total equating to $325 per sq. ft. or $395,904 per unit. Extra costs due to green features were not quantified, as most of the features were a requirement of the tender. A joint venture by developers The Albanese Organization, Inc. and Northwestern Mutual Life Company, The Solaire is the first building designed to meet environmental guidelines set in the year 2000 by the Battery Park City Authority (BPCA). The project received LEED®-NC (new construction) Gold certification, and grants include $3,200,000 over five years from a New York State Green Building tax credit and $560,000 from the New York State Energy Research Development Authority.

Among The Solaire's Green features are 35% lower energy and drinking water consumption, and 65% reduction in peak demand for electricity. BPCA's requirements, however, account for only 75% of The Solaire's green features, for the developer wanted a better building that incorporates higher-quality materials, as well as systems which are healthier for the occupants.

Martin Dettling, Vice-President of The Albanese Organization, says energy efficiency features provided the best payback, because they both attracted grants and reduced energy costs. Indoor air quality, however, was almost as significant, for this proved to be a big marketing gain for the project. One family reported that on moving to The Solaire their daughter, an asthma sufferer, began sleeping soundly for the first time. The Solaire was leased up within six months, lower water and electricity charges proving a particular draw. The development's popularity brought with it a 5% rent premium, one that was not envisaged when the project was first proposed.

Once the Solaire was completed, the developer successfully lobbied the local water board to reduce its charges, having demonstrated a saving of over 25% in water usage. Air quality is maintained by an advanced central air-filtration system, with 24-hour monitoring, including carbon monoxide levels in the garage, and every bath and kitchen has 24-hour exhaust. This energy-conserving development also has PV panels that generate 5% of The Solaire's energy at peak loading.

The Solaire's comments:

MAKE THE COMMITMENT TO BUILD GREEN FIRST, AND THEN DECIDE HOW TO IMPLEMENT IT COST-EFFECTIVELY.

GIVE TENANTS OPTIONS BECAUSE THE MARKET IS NOT STATIC AND DEVELOPERS NEED TO BE ABLE TO RESPOND TO CHANGING PERCEPTIONS.

CRANBERRY COMMONS BURNABY BRITISH COLUMBIA, CANADA

Green from go

Cranberry Commons is a housing co-op of green-minded people who range from young couples in their 20s to a woman in her 80s. The co-op aspect of the development was taken into account by the lender's appraisal, but not the many other green features. On a busy commercial street, half an hour's bus ride from downtown Vancouver, the 26,662 sq. ft. co-op has 22 apartments and townhouses, and was completed in 2001 at a cost of $5,317,750, or $239 per sq. ft., $241,698 per unit. The developer, Cranberry Commons Co-housing Development Consulting, is a company created by the future owners of the homes: the same company also financed the project and directed design and development.

Members have tried to build in sustainability features at every stage, from site selection, through in-floor radiant heat (less noise, dust), to the installation of solar roof-panels, which halve domestic hot-water load. High-volume fly-ash concrete was used in the offstreet parking and other flooring, putting to constructive use this waste product of burning coal, while halving the greenhouse gas emitted in making cement. The production of cement around Vancouver, the developer points out, produces half as much CO2 as all personal automobiles combined.

One feature of note in this courtyard development is the unusual amount and high finish of common amenity spaces, which are seen as a shared asset. Design and construction of such spaces to balance privacy and community is expensive, says Cranberry Commons resident and developer's representative Ronaye Matthew, who adds that the appraiser understood this concept and how to value 'common asset spaces'.

Cranberry Commons is owner-occupied, and homes rarely change hands but values are claimed to between 15% and 20% per cent higher than for similar footage in conventional properties, although construction costs were higher. Yield, marketing success, operating and maintenance savings are all considered to have exceeded expectations, while sale prices and absorption met expectations, and initial construction costs were higher than expected. Even at Cranberry Commons, however, green features take second place in financial performance to higher sale price, lower operating costs and rate of resale.

To realise their plans for sustainable co-operative living, the Cranberry Commons residents had to overcome a number of hurdles. The first was that the project took shape during a slow building market, when risk was out of fashion and it was difficult to assemble sufficient members. That done, to find and acquire the site, co-op members had to compete with conventional developers who are sophisticated land purchasers.

Although the street was a city development area, the key site was privately owned. Once the co-op had bought this site, however, the city was willing to sell neighbouring lots, until the present 0.46-acre site had been assembled. Site acquisition led to the next hurdle: the city had zoned the area for townhouses, and at first the floor space ratio (FSR) of common spaces was included in the total. Had the City of Burnaby not agreed to take common amenity spaces out of FSR, the project would have been more expensive to build. Lastly, the city required there to be 38 parking spaces at Cranberry Commons when the co-owners see a need for only 21, and the city refused their offer to trade some additional environmental features in exchange for releasing the 17 redundant spaces for other use.

Cranberry Commons comments:

MAKE MORE INFORMATION ON GREEN BUILDING PRACTICES AND MANAGEMENT AVAILABLE. CRANBERRY COMMONS CO-OP MEMBERS WANTED TO ADOPT SUSTAINABLE PRACTICES, BUT FINDING THAT CONSULTANTS 'DIDN'T HAVE TOO MUCH TO OFFER', HAD TO OBTAIN ADVICE ELSEWHERE. MANY GREEN BUILDING DECISIONS WERE 'INTUITION-BASED' RATHER THAN FORMED WITH HARD DATA.

ADAM JOSEPH LEWIS CENTRE, FOR ENVIRONMENTAL STUDIES, OBERLIN COLLEGE OBERLIN OHIO, USA

Those who teach can also do

Oberlin's Environmental Studies Program was fast outgrowing its own environment, the basement of a campus building. This was not only cramped, but the pipes were insulated with asbestos, the electricity was coal-fired and there was no natural light. In short, says Cheryl Wolfe-Cragin of Oberlin's Environmental Studies Program, it was an environment 'fundamentally contradictory' to the department's teachings.

The answer was to move to a larger, purpose-built centre elsewhere in the college grounds. This would not only house current activities in an appropriate environment, but also provide for expansion as well as livening up an underused section of the campus. Green building features figuring prominently in the Oberlin curriculum, many are incorporated in the new development, Adam Joseph Lewis Centre for Environmental Studies, which was completed in 1998. The centre is now a focal point of the academic programme, practising what it preaches, attracting students and staff, as well as providing an example to its surrounding community. Energy savings of 63% are being achieved, making a 'living laboratory' of the building both for students and the thousands of visitors who tour and study it. Electricity usage is a third less than other campus buildings, while usage of the space by other departments means that it is twice as busy as originally envisaged, placing greater demands upon building systems and management.

The Environmental Studies Program not only chose to develop a sustainable building: the program was also obliged to be self-sustaining, in that it also had to find the money. With Oberlin as the developer, the centre was funded through the contributions of The Lewis Family Foundation of Cleveland and of the Progressive Insurance Company.

Construction costs for the 13,600 sq. ft. centre, at $4,800,000 ($353 per sq. ft.), include outlay on two items not normally found in a conventional development, $400,000 for wastewater treatment, known as the 'Living Machine', and $500,000 for a PV system. These two features added 19% to building costs, but total operating costs are lower than expected, and such is the media interest generated that, with an article in Time and a television profile on ABC News, inquiries are now handled by a full-time staff member. One story generated is that of a student who, though badly affected by the gases emitted by materials in conventional buildings, was able to work in the Oberlin development. Off-campus, Wal-Mart has now agreed to changes in its plans and building practices for a store opening outside Oberlin.

The 'Living Machine' is a sunlight-powered natural wastewater treatment system, which eliminates the need for off-site treatment, and significantly reduces the building's water consumption. Heating and cooling throughout the development is by closed-loop geothermal wells. The Adam Joseph Lewis Centre has also taught the developer a thing or two. Were the project being started today, the developer would have chosen simpler systems. Secondly, provide ventilation by a mixture of fresh and re-circulated air, and not 100% fresh air, which existing systems find difficult to recycle. It was also difficult to find an engineer who understands the systems and knows how to operate and maintain the closed–loop groundwater system.

The developer foresees two main problems for people considering a similar development, one being the shortage of qualified engineers, and the other being the limited knowledge of the necessary computer control systems. The Adam Joseph Lewis Centre is a high-performance building, requiring very specialized knowledge to operate, and the lack of suitably qualified engineers is seen as a barrier to wider adoption of its sophisticated technologies. Secondly, the computer controls require a level of programming knowledge and a grasp of the systems logic and capabilities that is hard to find.

Adam Joseph Lewis Centre's comments:

CREATE A WEBSITE WITH REAL-TIME DATA ON THE BENEFITS OF BUILDING GREEN.

ENABLE INTERESTED PARTIES TO EXPERIENCE A GREEN BUILDING, ESPECIALLY, AS IN THE CASE OF THE ADAM JOSEPH LEWIS CENTRE, NATURAL DAYLIGHT AND INDOOR AIR QUALITY.

CREATE AWARENESS THAT A GREEN BUILDING CAN GENERATE ITS OWN ELECTRICITY: THIS PROJECT GENERATES 58% OF ITS NEEDS.

LAUNCH A MEDIA 'BLITZ' PROMOTING THE BENEFITS OF SUSTAINABILITY.

C.K. CHOI BUILDING FOR THE INSTITUTE OF ASIAN RESEARCH, LIU CENTRE FOR THE STUDY OF GLOBAL ISSUES UNIVERSITY OF BRITISH COLUMBIA VANCOUVER, CANADA

East, west, payback's best

The C.K. Choi Building, a research centre, and the Liu Centre, a policy and conference facility, are neighbouring green buildings amid trees on a university campus, itself on a promontory.

Finance is as much a part of the relationship between these two buildings as shared commitment to green features. Both were developed and are owned by the University of British Columbia (UBC). The 30,000 sq. ft. C.K. Choi Building came first, and was completed in 1996, the 18,800 sq. ft. Liu Centre four years later. The C.K. Choi Building cost $4,400,000, or $150 per sq. ft., and was financed 50:50 by UBC and private donations. It was planned as part of a university expansion programme, with provision for it to be a green building, provided it could be demonstrated that construction would cost no more than a conventional design. In this, the C.K. Choi succeeded, while also meeting targets for resource and energy use. Operating energy savings are 50% greater than those achieved by Vancouver's Energy By-Law.

Along the way, the centre overcame a popular misconception that the building would prove to be substandard because so many building materials were re-used: 60% of primary wood structure, and 100% of exterior brick cladding for example. One user was discovered to have an allergic reaction to the building, but it was found that a joint had not been caulked. Once this had been put right, the allergy subsided: had this been a conventional building, the problem would probably have been neither discovered nor dealt with.

Among its many honours, the C.K. Choi Building numbers the BC Hydro Smart Energy Award, and listing as one of American Society of Architects' top ten buildings. According to Jorge Marques, UBC Energy Manager and Freda Pagani, Director, Sustainability, the public acclaim with which the development has been greeted, nationally and internationally, has boosted UBC's reputation, and paved the way for the development of the Liu Centre, a second green building.

Completed in 2000, the Liu Centre cost $3,100,000 or $165 per sq. ft., $15 per sq. ft. more than the C. K. Choi, the Liu Centre having a more generous budget, the earlier development having demonstrated the operational savings possible with green building.

As befits the spectacular setting, care for the site was the developer's first green consideration in both cases.

The C.K. Choi building replaced a parking lot, and existing trees were preserved to benefit from their shade and the removal of CO2 from the air. The Liu Centre also preserved trees, restricted the use of heavy machinery to protect tree roots and to limit soil compaction, and used native ferns and wild grasses to restore the forest floor and reduce irrigation.

Three things would have been done differently were the projects being started today. First, renewable energy sources would be used: previously they were too expensive. Secondly, the buildings rely upon natural ventilation, the acoustics of which are difficult to manage. Lastly, a geothermal/geoexchange ground source heat pump system would have been installed, offering still more energy savings. With no third-party lender involved, there was no appraisal required, and the question of achieving lower financing costs did not arise. UBC reports, however, that one donor was a Buddhist who 'appreciated' the green features. In common with most green developments, there was no ability to achieve lower insurance premia, in this case because there is a blanket policy for the entire campus. Building insurance costs may even have increased due to the higher replacement costs for the two buildings: replacement is higher than for conventional structures and does not depreciate as quickly.

C.K. Choi Building and the Liu Centre comments:

DISPEL IGNORANCE. MANY PEOPLE BELIEVE, MISTAKENLY, THAT GREEN COSTS MORE TO BUILD THAN CONVENTIONAL; THERE IS LITTLE UNDERSTANDING OF THE VALUE A GREEN BUILDING CAN CONTRIBUTE, AND IT'S ALSO HARD FOR PEOPLE TO UNDERSTAND HOW THEY CAN CONTRIBUTE TO SOLVING GLOBAL PROBLEMS SUCH AS GREENHOUSE GASES AND NATURAL RESOURCE DEPLETION. YET DEVELOPING, LIVING AND WORKING IN GREEN BUILDINGS CAN MAKE A DIFFERENCE.

LAUNCH AN AWARENESS CAMPAIGN TO INFORM STAKEHOLDERS OF THE FINANCIAL AND NON-FINANCIAL BENEFITS OF SUSTAINABILITY.

THE LIU CENTRE, IN A MOVE THAT COULD BE USEFUL ELSEWHERE, HAS PREPARED A MANUAL THAT IS DISTRIBUTED TO ALL OCCUPANTS TO HEIGHTEN AWARENESS OF GREEN FEATURES AND TECHNOLOGIES.

ECOHOMES SCHEME WARRINGTON CHESHIRE, ENGLAND

People will pay for green features
As part of this study, English Partnerships sponsored research into six residential developments throughout England, three designed and built to British Research Establishment EcoHomes 'Very Good' building standards and three developed to current conventional building regulations. It proved impossible to compare the green and non-green house prices on a like-for-like basis because access to key financial data was severely limited. Nevertheless, one housing development in Warrington in the north-west of England bears out the contention that customers are interested in green features and, if necessary, will pay more for them. We were asked to respect the confidentiality of the information provided.

According to an online survey of 912 potential home buyers in the UK carried out in June 2004, 82% of people would be prepared to pay an extra 2% for an 'environmentally-friendly' new home, and 17% as much as 5%. This research, for the Council for Architecture and the Built Environment, the World Wildlife Fund, and mortgage provider HBOS, shows the most valued green features to be higher energy efficiency, lower operating costs, better air quality and daylight, use of low-allergy and environmentally-friendly materials, and water efficiency.

Research for the present study by English Partnerships found residential property developers citing lack of customer interest in green homes. Several developers claimed that occupiers remove green features from a new home or subsequently install ecologically unfriendly appliances such as tumble-dryers or power showers. Public ignorance of the benefits of green features perpetuates the pursuit of the conventional.

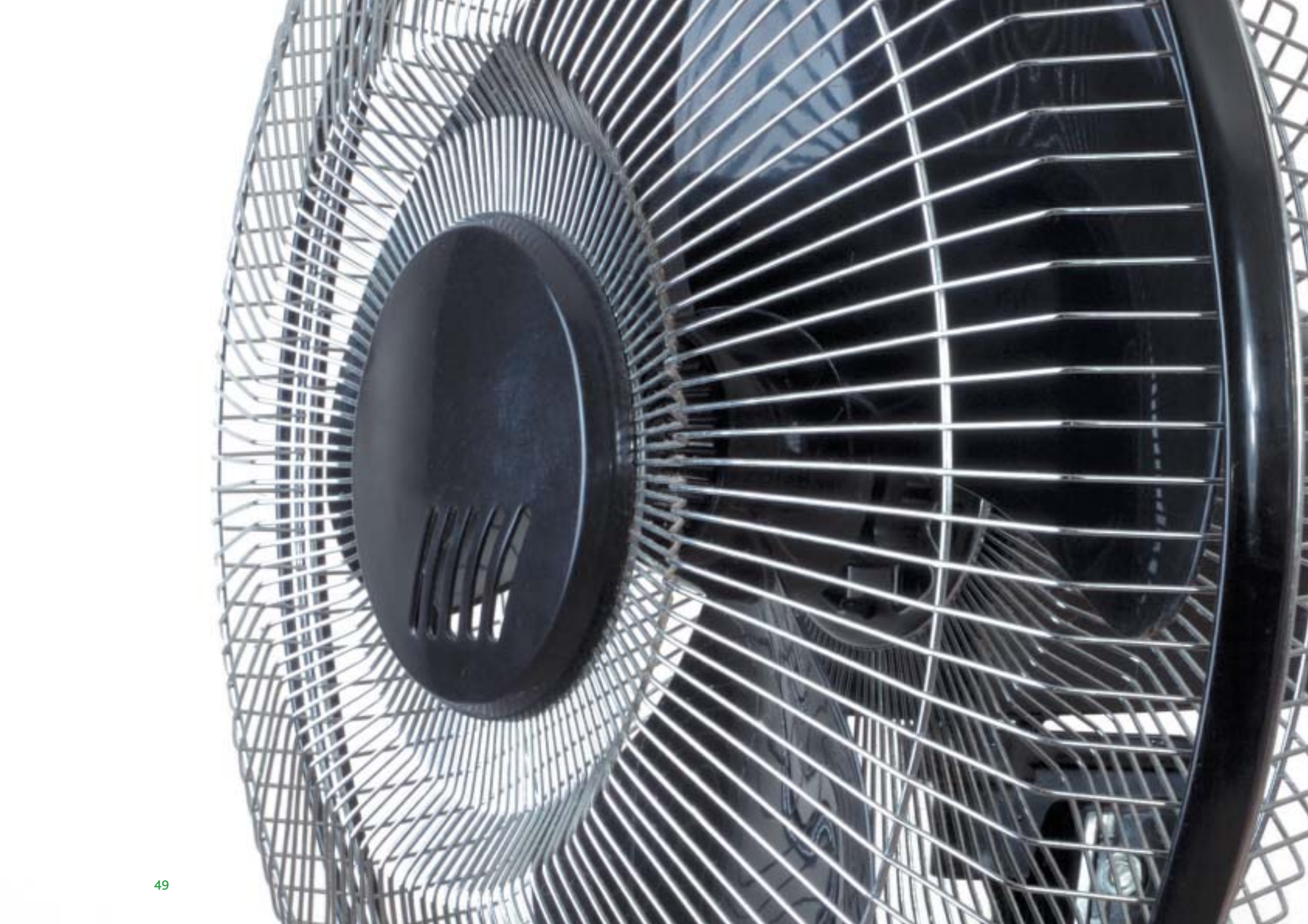
The Warrington project, however, may suggest a latent customer interest and commercial opportunity is being overlooked. To date, 15% of Warrington buyers have signified willingness to pay over 6% more for a green home. This is a development of 116 houses being built to no formal ecological standard, averaging 1,252 sq. ft., and costing £216,198 (£173 per sq. ft.). The developer, however, created and actively promotes a package of green features, marketing them as a separate product. The features,
Photo Voltaics, wind turbine (to produce electricity) and rainwater recycling (for toilets), cost a total of £13,700, the developer estimating that energy savings offer payback within 3.8 years, with the possibility of selling excess energy to the National Grid. The offer required take-up by at least seven houses to cover the cost of the wind turbine (£49,000, £7000 per house).

Developer's comments:

DEVELOPERS SHOULD ORIENT BUILDINGS ON A SITE TO MAKE THE BEST USE OF ITS NATURAL LIGHT AND PREVAILING WINDS.

BETTER UNDERSTANDING OF THE FACT THAT ARCHITECTS' AND LANDSCAPING ARCHITECTS' FEES ARE NO HIGHER FOR ECOLOGICAL THAN NON-ECOLOGICAL DEVELOPMENTS. IT IS WHEN THE DEVELOPER HAS A CHANGE OF MIND ALONG THE WAY THAT COSTS MOUNT.

MANY GREEN FEATURES ARE COST-EFFECTIVE, AND DEVELOPING TO A REASONABLE ECOLOGICAL STANDARD DOES NOT COST MORE THAN FOR CONVENTIONAL BUILDINGS.



GLOSSARY

Some terms used in the report
The definitions offered are condensed from *The Environment Dictionary* by David D. Kemp (Routledge, 1998), and Dictionary of Architecture and Construction, edited by Cyril M. Harris (McGraw-Hill, 2000).

Absorption, the number of units of property that will be leased or sold in a given period of time; the time taken for a given number of units to be let or sold in a given market.

Appraisal, an expert opinion on the value of a property; the act or process of estimating value.

Appraiser, a professionally skilled, trained, and experienced person who provides an estimate or opinion on the quality, worth or value of real of personal property; someone appointed to carry out an appraisal.

Capital costs, include the purchase price of buildings, construction costs such as labour and materials, and the related architectural, engineering, legal, tax and pre-occupancy interest costs.

Capitalization rate, a rate of discount or percentage selected as appropriate for the conversion if income into capital. A rate sufficient to provide a return to an investor for accepting the risk of capital investment as well as a return, or recapture, of the capital invested.

Chlorofluorocarbons (CFCs), a group of chemicals containing carbon, chlorine, and fluorine, whose stability and low toxicity make them ideal for refrigeration and air conditioning, as well as propellants in aerosol spray cans. Inert at surface temperature and pressure, they become unstable in the stratosphere where chlorine is released as they break down. Chlorine in turn initiates a catalytic chain reaction that leads to the destruction of ozone.

Churn, moving the tenants or occupiers of a building for financial advantage, for example moving tenants between floors to improve the appearance of leasing activity or generate extra commissions for a broker.

Discounted Cash Flow (DCF), the present value of the estimated future cash flow to be derived from an investment in a capital asset, over a given period of time. DCF can also mean the technique for analyzing the viability of a capital investment project by discounting all budgeted, or projected, income and expenditure flowing from or into a project, including the initial outlay and any residual value.

Envelope, the imaginary shape of a building, indicating its maximum volume; used to check the plan with respect to zoning regulations.

Face rate, the nominal interest rate payable for a period of one year assuming the entire principal remains outstanding during the year, and interest is accrued only once a year, as compared to the effective annual interest rate which is the true rate payable when interest is compounded at intervals of less than a year.

Also the basic annual interest rate uoted on a promissory note or on a loan agreement and levied throughout the term of the loan on the initial amount of principal, not withstanding that the interest is compounded other than annually or repayments of principal are made by instalments during the term of a loan.

First costs, in North America, the costs of physical construction, although in the chronological sense other capital costs precede them.

Grey water, waste water which does not contain the products of bodily functions, such as that produced by bathing, showering, dishwashing, and so on. Often used for lawn and garden irrigation.

Halons, synthetic organic compounds that contain bromine and commonly used in fire extinguishers. Halons are more destructive of the ozone layer than CFCs of the ozone layer

Heat Island, Urban Heat Island, the name given to the situation in which at certain times the temperatures within a built-up area are higher than those in surrounding countryside. Heat islands occur at night when wind speeds are low and skies clear, usually in summer. Vegetation and soil are replaced by brick, concrete and asphalt, which have a greater heat capacity, and release that heat overnight. HVAC, heating, ventilating, and air - conditioning system.

Net lease, a lease that require the lessee to pay the operating expenses resulting from his or her occupation of the premises, including real estate taxes and assessments, repairs, maintenance, insurance premiums, and utility costs.

Net Useable Area, the area that a tenant or occupier may actually use for the purpose for which he or she is occupying the building.

Net Operating Income, net income receivable from a property after all operating expenses have been paid and an allowance made for bad debts and defaulting tenants, but before payment of capital or interest on any loans and before income taxes.

Payback Analysis, a method of investment analysis that measures the time required for the total net income or cash flow, generated by an investment, to equal the initial capital cost of that investment. Also a method of comparing investments that takes no account of the stage at which income is received over the payback period.

Remainder, a residual interest or estate in land. An estate in land that comes into effect as a right to possession upon the natural determination of an immediately preceding estate.

Residual value, the value of an interest in property for the remaining, or residual terms of a lease. The present value of the right to receive the rent and profits reserved under a lease for the rest of its term.

Retrofit, retrofitting, the adaptation of an existing structure or appliance to meet needs that did not exist when the structure or appliance was first built. One example is the addition of extra insulation to homes to save energy and cut costs as energy prices rise.

ROI, return on investment.

Swale, tract of low, usually wet land; depression in a tract of otherwise flat land.

Term and reversion valuation, the conventional method of assessing the capital value of a property that will generate a variable income.

Turnover, the rate at which properties are sold; the rate at which tenants move in and out of a leased property.

Valuation, the act or process of determining the value or worth, an assessment of the market value of a property at a given time.

Years' purchase, a sum of money which if invested now will produce an annual return of one unit of value for a given number of years; the present capital value of the right to receive one unit of value per annum over an appropriate term at a required rate of return.

Yield, the net income of profit from an investment expressed as a percentage of its cost or the capital invested, usually calculated at an annual rate; the actual rate of return on capital.

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The Appraisal Institute of Canada's Uniform Standards of Professional Appraisal Practice;

The Appraisal Foundation's Uniform Standards of Professional Appraisal Practice;

The Royal Institution of Chartered Surveyors Red Book (Manual of Valuation);

UK Government's Green Book – which sets out guidelines on incorporating sustainable practices in business cases;

The province of British Columbia's Multiple Account Evaluation Guidelines (1993 – now discontinued but remain valid);

Contemporary Environmental Accounting – Issues, Concepts and Practice (Schaltegger & Burritt: Greenleaf Publishing);

Green Development – Integrating Ecology and Real Estate (Wilson, Uncapher, McManigal, Lovins, Cureton & Browning: Rocky Mountain Institute);

The Income Approach to Property Valuation (Baum & Mackmin: Thomson Learning);

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Several papers on the benefits of sustainability published by the UK Building Research Establishment – as previously noted.

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