

The Current Trend of Green Buildings in the U.S. —
From The Perspective of The Rating System and Social Responsible
Investment

Development Bank of Japan
Representative Office in Los Angeles Office
March 2005

米国で普及する「グリーン（環境）ビル」
～格付け評価システムと社会的責任投資の観点から～

要旨

1. 同時多発テロで破壊されたワールドトレードセンタービルの再生には米国民の様々な思いが込められることになろう。その一つの要素として最新の環境技術を駆使したビルのグリーン化がある。この環境に配慮したビル、通称「グリーンビル」（英語では“Green Building”）の建設が、米国において近年ブームになりつつある。「グリーンビル」はエネルギー消費や水資源、室内環境にとどまらず、周辺環境への配慮など広範な要素を持っており、環境問題がますます重要な課題となっている現在において非常に重要なコンセプトとして注目されている。
2. そのブームの背景には、行政および環境 NGO による様々な取り組みがあることはもちろんであるが、民間において「グリーンビル」に対する取り組みが始まり、一定の条件付きで市場メカニズムが働き始めたことがあるものと思われる。本レポートでは、環境対策を推進する行政や環境 NGO、「グリーンビル」の施主、そして環境に配慮する立場からの投資家、という異なった立場からの「グリーンビル」に対する評価を検証することにより、そのブームの背景および今後の日本への示唆を探った。
3. 1993 年ワシントン DC において、環境に配慮したビルの建設促進を目的として、米国グリーンビル協議会（U.S. Green Building Council、USGBC）が発足し、当協議会では翌 1994 年に LEED（Leadership in Energy and Environmental Design）という格付けシステムを導入した。その後政府機関によっては公共施設を建設する際にこの格付けの取得を義務付けることはあったが、あくまでボランティアな制度として運用されてきている。そのボランティアな制度が 10 年ののちの今日、全米で約 1,500 の登録実績をあげ、まだ数としてはそれほど多くはないが、UC（カリフォルニア大学）や米国トヨタ自動車販売などの話題となる施設が格付けを取得したことにより、注目を集めるようになっている。
4. LEED の格付けシステムは、(1)立地、(2)水資源、(3)エネルギー、(4)建築資材、(5)居住環境、(6)建築デザインプロセス、の 6 分野 34 項目に関して評価を行い、合計点数でプラチナ、ゴールド、シルバー、（一般）認証、の 4 段階の表彰を行っている。この格付けシステムの課題としては、(1)全ての項目が平等に配点されているため、最も高い点数を獲得したビルが必ずしも環境にとって最も望ましいビルになっていない、(2)コストに関する項目が含まれておらず定量的な評価が不足している、という点が指摘されている。
5. LEED の格付けを取得するビルに対する行政サイドの促進策としては、カリフォルニアや

ニューヨークなど州政府による税額控除、ニューヨーク州エネルギー研究開発公社による低利融資（市場金利より 4%優遇）などのインセンティブがある。更に「グリーンビル」全般に関しては、カリフォルニア州の「20/20 Rebate Program」その他の省エネルギー促進策の活用も可能である。なお、DOE（米国エネルギー省）が再生可能エネルギー促進策について実例を検証した結果、インセンティブを単独で活用するよりも複数のインセンティブを組み合わせることで活用した時に最も効果的である、としている。

6. 実例をもとに「グリーンビル」の投資採算を検証した資料によれば、「グリーンビル」化により建築コストは平均で 2%程度（\$3~5/ft²）増加しているのに対して、20 年間にわたるエネルギーコストおよび水資源コストの削減額を現在価値に直すと約\$5.5/ft²の費用削減効果があり、ビルのライフサイクルコストとしては十分に回収できるとしている。
7. ニューヨークに本拠がある天然資源保護協議会（Natural Resource Defense Council、NRDC）は科学的根拠に基づいて地球環境保護のための活動を展開している自然保護団体である。NRDC では 2003 年 11 月に、ロサンゼルス観光・ビジネス地区であるサンタモニカにある建物を買い取り、その 98%の資材を再利用しつつ改築したオフィス（NRDC の支援者の名前をとって「ロバート レッドフォード ビル」と名付けられている）をオープンし、LEED の最上格付けであるプラチナ格付けを取得した。
8. NRDC オフィスの改築に際しては、同様のビルに比べて 15%の建設コストアップとなったが、そのコストアップ分は運営費用の削減とオフィス環境改善に伴う生産性の向上により 15~20 年で投資回収できるとしている。コストアップの要因としては、水洗が不要なトイレなど「グリーンビル」化に必要な新技術や新たなリサイクル資材の採用に関して行政当局からの許可を得るために時間を要した（通常であれば 9 ヶ月の工事期間が 3 割程度延びた）ことが最大の要因であり、NRDC は自らこれらの新技術の市場を開拓することにより、「グリーンビル」の今後の市場を広げることにも彼らにとっての重要な役割であるとしている。
9. 米国トヨタ自動車販売は 2003 年 4 月、ロサンゼルス郊外にあるトーランスの南キャンパス施設をオープンし、LEED のゴールド格付けを取得した。これは民間施設のゴールド格付けとしては最大規模の施設である。同社は、同施設の建築設計の段階から「原則として建築費を増加させない前提(Cost Neutral)」で「グリーンビル」化を検討した。その結果、「グリーンビル」化により実際にコストが増加したのは、太陽光発電設備と水のリサイクル設備のみであり、それらの投資は運営費の削減効果により、それぞれ 7 年、12 年程度で回収できると試算している。
10. これらの取り組みにより「グリーンビル」化を進めるための新たな技術やリサイクル資材が一般化して「グリーンビル」の建設コストが低減し、今後ますます市場が広がる可

能性がでてきている。また米国トヨタ自動車販売のように、「グリーンビル」化を進めるに当たって「Cost Neutral」など自ら明確な目標を設定しておくことも、民間事業者にとっては重要なことであろう。このように「グリーンビル」が市場において、必ずしも「採算に合わない」ものではないもの、として受け入れられ始めていることが「グリーンビル」ブームの背景にあるものと考えられる。

- 1 1 . 2002年3月に発行された「社会資本ライフ・サイクル・マネジメント研究会」報告書では、建築物などを社会資本として捉え、環境負荷と財政負荷を極小化しつつ建築物などの施設整備をすることの重要性と、その方策としてのライフ・サイクル・マネジメントの有効性が提唱されている。米国における「グリーンビル」も、投資に際して長期的な観点に立つことにより、環境負荷と財政負荷を極小化しつつ施設整備を行おうという取り組みとして捉えることが出来る。
- 1 2 . さらに、米国において社会的責任投資（Social Responsibility Investment、SRI）の分野で活発に活動している投資家からは、投資に際して「環境」というファクターを「環境破壊」などの減点要因としてのみとらえるのではなく、環境に対する配慮を行っている企業を積極的に評価するようになってきているという声が聞かれた。但し、「グリーンビル」に関しては、LEEDの格付けそれ自体を評価するというよりも、環境への取り組みの一環として捉えようという姿勢が見られる。また、今後の投資判断において「環境」をより積極的な要素として考えるためには、定量的な指標を作成することが望ましく、「グリーンビル」の場合にはコストデータが鍵となる、との意見もあった。
- 1 3 . これまで、行政、NGO、民間がそれぞれの立場で様々な取り組みを推進してきた結果、漸く一定の助成制度のもとで市場として確立されつつあり、また様々な立場から認知されつつある。環境という「市場の失敗」がある分野においては、行政やNGOの取り組みにより先導的に補完しつつも、本格的に普及を促進するためには確固とした市場を確立することが重要である。今後もこれらの取り組みを継続することにより、更に新たな技術やリサイクル資材の開発を促し、ますます環境に優しいビルの建設が促進されていくという良いサイクルを確立することが望まれる。

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**Environment and Market Mechanism —
Implications From The Current Trend of Green Buildings in the United States**

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1. Introduction

The practice of “green” or “sustainable” building design and construction is a movement that began two decades ago as a niche market. Today, with 1,500 LEED-registered building projects, green building is receiving increasing attention. As of September 2004, the annual market for green building in products and services was \$5.8 billion, representing 34% growth over 2003 figures¹ according to the U.S. Green Building Council. As the term implies, green buildings use healthier and more resource-efficient models of construction, renovation, operation, maintenance, and demolition. Green buildings use key resources like energy, water, materials, and land far more efficiently than do traditional buildings. All aspects are taken into consideration in constructing a sustainable architecture to minimize a building’s resource consumption and environmental impact over its life cycle while improving the comfort, health and productivity of its occupants. Buildings have a surprisingly profound impact on the environment considering the amount of materials and resources used for their construction. According to the U.S. Department of Energy’s Center for Sustainable Development, buildings consume over 40% of the world’s energy, 25% of its forests and 16% of its water.² In the U.S., buildings generally account for 36% of total energy use, 30% of greenhouse emissions, 30% of raw materials use, 30% of waste output and 12% of potable water consumption.³

Among the government agencies involved in green building projects are the U.S. General Services Administration (GSA), U.S. Department of Defense, U.S. Department of Energy (DOE), the National Park Service and U.S. Environmental Protection Agency (EPA). Having experienced rolling blackouts in California, officials in San Francisco consider energy a major reason to encourage green development. The city was among the first in the nation to adopt green building ordinances for all public buildings. Pennsylvania was the first state to mandate green construction and operation for its facilities⁴ and has more green certified buildings than any other state. In April 2002, UC Santa Barbara's Bren Hall was awarded a platinum certification for its sustainable laboratory building. It is being used as a model for other campuses in California and across the nation. In July 2003, the UC Board of Regents adopted a

¹ U.S. Green Building Council. Press Release. “Green Building Fact Sheet: September 2004”.

² Paul Rogers. Mar. 30, 2004. “‘Green’ buildings: Energy Efficiency, Thoughtful Design Pay Off”. Mercury News. listed at <http://www.mercurynews.com/mld/mercurynews/living/health/8305678.htm?1c>

³ U.S. Green Building Council. listed at <http://www.usgbc.org/AboutUs/whybuildgreen.asp>

⁴ Kozlowski, David. Building Operating Management, a GreenBiz News Affiliate. “Urban Green”. December 2001. listed at http://www.greenbiz.com/news/reviews_third.cfm?NewsID=18812

university-wide policy for the design of green buildings and a standard for the use of clean energy.⁵ This new policy is the first step toward the development of a larger comprehensive sustainability policy for the University of California system.

Traditionally, the public sector and higher education markets have led the way in the green building movement. However, green building is becoming more prevalent among commercial, industrial, healthcare, R&D and other sectors as well. According to Rob Watson, NRDC director of International Energy Project, while green building activity in the public sector is 55%, the private sector or speculative market has 45% activity.⁶ Harley-Davidson Motor Company, a manufacturer of heavyweight motorcycles, Raytheon Company, a developer of defense technologies, Nestlè Waters North America, a bottled water company and PNC Firstside Center, a financial services corporation, are among the many corporations in the U.S. that have constructed green buildings. In New York, the Solaire is the first environmentally sustainable luxury residential high-rise in the U.S. with its own wastewater recycling plant, green garden roof, and photovoltaic (PV) panels.

The recent green building boom is attracting a growing number of speculators who are discovering that environmentally-conscious design can yield significant cost savings over the long haul while also protecting the environment. Many benefits of employing green building practices are measurable and well documented, such as water and energy savings, reduction of waste, lower operating and maintenance costs and improved indoor air quality. According to experts, green buildings are less costly to maintain and operate than traditional buildings and overall net costs are generally recouped through operational savings. And in terms of the life-cycle cost of a building, the general consensus is that green building can be a cost-effective strategy.

Clearly, changes in building design and construction are underway in the market. As more government and private entities launch various initiatives to encourage green building in public and private sectors

⁵ Sustainable Building Task Force and the State and Consumer Services Agency. "Building Better Buildings: An Update on State Sustainable Building Initiatives". October 2003. listed at <http://www.ciwmb.ca.gov/GreenBuilding/Blueprint/2003/FullReport.pdf>

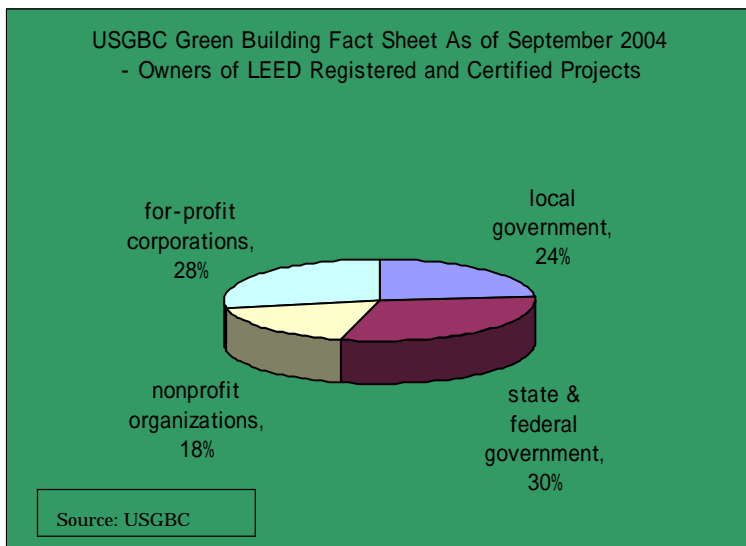
⁶ Interview with Mr. Robert K. Watson, Director, International Energy Project at Natural Resources Defense Council. Santa Monica, California. August 20, 2004.

such as educational, tax credit, rebate programs and requirements of utilities to offer energy efficiency programs, sustainable techniques and principles will become standard. And concepts once considered innovative will eventually be more commonly incorporated in standard design, creating a more competitive market.

A recent growing trend in relation to green building is socially responsible investing, or SRI – an investment approach that integrates social and environmental concerns into investment decisions based on financial analysis. In this report, excerpts from interviews with two camps of SRI proponents – Amy Domini, founder and CEO of Domini Social Investments, and Paul Hilton, portfolio manager of Dreyfus Corporation – illustrate how the green building factor plays a role in SRI.

This report briefly explores how the public and private sectors are currently embracing the green building trend. In addition, it provides an overview of two cutting-edge examples of environmentally-friendly industrial design: Natural Resources Defense Council's (NRDC) Santa Monica regional headquarters, housed in the Robert Redford Building, and Toyota Motor Sales, USA, South Campus in Torrance, California.

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2. U.S. Green Building Council (USGBC)

The 4,820 member U.S. Green Building Council (USGBC) based in Washington D.C. was formed in 1993 and is an organization of architectural and engineering firms, interior designers, manufacturers, real estate managers, financial institutions and representatives from state and local government all working to promote

environmentally-friendly buildings that also offer tangible bottom line results in terms of profit and benefits resulting from enhanced indoor environmental quality. In 1994, USGBC developed a green building rating system, LEED (Leadership in Energy and Environmental Design) – a widely accepted voluntary standard that defines high performance green buildings. With 1,500 registered buildings in the U.S., LEED is recognized nationally by public and private sectors alike as a market-friendly rating system that lays out a specific set of principles and practices for green building, some mandatory but the majority discretionary.

At the present, there is not an across-the-board requirement to be LEED-certified on local, state and national levels - some government buildings are required to be LEED-certified while others are not. Some of those government departments that have adopted LEED standards include the U.S. government Defense Department, which has adopted certain LEED criteria for all its new Navy, Army and Air Force buildings. The U.S. EPA, GSA and NASA have instituted LEED rating goals for their major new facilities.⁷ Other agencies such as the Department of Energy, State Department and Department of Health and Human Services have set green building objectives. In addition, LEED has received financial support from the U.S. Dept of Energy and endorsement by the U.S. EPA and government agencies.

Similarly, Mayor of Chicago Richard Daley adopted the Chicago Standard, a set of construction standards

⁷ Amanda Griscom. November 25, 2003. "Who's the Greenest of Them All? NRDC's new Santa Monica building may be the most eco-friendly in the U.S.". Grist Magazine. listed at <http://www.grist.org/news/powers/2003/11/25/of/>

for public buildings based on LEED as part of his goal for Chicago to be the greenest city in the country.⁸ In 2001, New York Governor George Pataki issued an executive order encouraging state projects to seek LEED certification. In December of 2003, the city of Atlanta made a commitment to finance its facilities and buildings to be sustainable by using LEED as a guide and measuring tool for

LEED USERS in the U.S.		
Federal	State	Local
Department of Energy (DOE)	CA	Alameda County, CA
Department of the Interior (DOI)	CO	Arlington, MA
Environmental Protection Agency (EPA)	IL	Arlington, VA
General Services Administration (GSA)	MD	Atlanta, GA
Department of State (State)	MA	Austin, TX
Air Force	MI	Berkeley, CA
Army	NJ	Boulder, CO
Navy	NY	Bowie, MD
	OR	Chicago, IL
	PA	Dallas, TX
	WA	Kansas City, MO
		Los Angeles, San Francisco, CA
		New York, NY
		Omaha, NE
		Phoenix, AZ
		Portland, OR
		Seattle, WA

Source: USGBC

design. And Connecticut requires schools to meet LEED standards in order to receive a construction grant for a new school or renovation of an existing school.⁹

California is currently analyzing LEED for adoption at various levels. The State of California Department of General Services adopted LEED certification for major capital projects. In San Jose, municipal buildings over 10,000 square feet are required to obtain LEED certification. Massachusetts is considering LEED adoption for all state projects as well as a green building tax credit program. Michigan requires all state-funded capital projects over \$1 million including state agencies, universities, and community colleges, be constructed at a LEED-certified level.¹⁰

Although more members and registered projects are located in California than in any other state, Pennsylvania, Massachusetts, Washington and Oregon have the most documented experience with green building and LEED.¹¹ At the local and state levels, the cities of Santa Monica, San Diego, San

⁸ email from Michelle Moore, Vice President of Operations and Strategic Planning for U.S. Green Building Council. November 30, 2004

⁹ CEO Roundtable. "LEED: Governmental Adoptions". August 2004 listed at www.usgbc.org

¹⁰ U.S. Green Building Council. State and Local Government Toolkit. "LEED Users Summary". Peter Templeton. August 13, 2004.

¹¹ Greg Kats et al.. "The Costs and Financial Benefits of Green Buildings". A Report to California's Sustainable Building Task Force. October 2003. listed at <http://www.usgbc.org/Docs/News/News477.pdf>

Francisco, Seattle and Portland have adopted green building policies and clean energy standards. The states of Oregon, New York and Maryland have all adopted similar policies.

In the private sector, corporations that have built LEED-certified green buildings include auto manufacturers American Honda Corporation and Ford Motor Company, IBM/Tivoli Systems, a provider of products for computer networks, InterGen, an independent global producer of electricity and PNC Bank, a diversified financial services company.

The Mark Twain House & Museum Center, the William and Flora Hewlett Foundation, the Audubon Society and the Carnegie Mellon University are among the many nonprofit or nongovernmental organizations that have constructed LEED-certified green buildings.

LEED Rating System

The rating system is based on 34 criteria or credits as well as seven prerequisites grouped into six categories: site selection, water efficiency, energy and atmosphere, materials and resources, indoor environment quality, and innovation and design process. The “greenness” of a project is recognized with certification levels of: platinum (52+ points), gold (39-51 points), silver (33-38 points) and certification (26-32 points). LEED is tailored to different markets including commercial, institutional and residential building industries through various rating systems. The following list of rating systems is based on information obtained from the USGBC:

- **LEED for New Construction and Major Renovations (LEED-NC)** is designed to guide new construction and major renovation projects. Structures include office buildings, government centers, schools and universities, health care facilities and sports arenas. Examples: Toyota Motor Sales, USA, Inc., South Campus Headquarters and PFPC, Inc., a member of the PNC Financial Services Group, Inc.
- **LEED for Existing Buildings (LEED-EB)** serves building owners and service providers by addressing the operations and maintenance phase of the building’s life cycle, including facility upgrades, improvements and maintenance. Example: National Geographic Society.
- **LEED for Commercial Interiors (LEED-CI)** offers building owners, tenants, designers and contractors a guideline for creating more efficient, healthier interior spaces that promote comfort and productivity. Projects include office, retail and institutional buildings. Example: Harvard School of Public Health.
- **LEED for Core and Shell (LEED-CS)** is designed for use by commercial real estate and

speculative developers. It addresses areas of the building that the owner controls and provides incentives to educate tenants. **Currently in pilot. Launch date: 2005.**

- **LEED for Homes (LEED-H)** is being developed with input from local and national stakeholder groups. It is expected to become a green building standard for single-family and low-rise multifamily residences. **Launch date: 2005.**
- **LEED for Neighborhood Developments (LEED ND)** is a collaborative effort by the USGBC, Congress for the New Urbanism (CNU) and NRDC to develop a national standard for neighborhood design that integrates the principles of green building and smart growth. **Launch date: 2005.**

Although it is a popular benchmark and an industry standard for green building, LEED has been criticized for its points system. For example, experts point out that all credits that score one point are considered equal. An objective based on an “all points are created equal” structure is a concern, because the rating system defines a project as “greener” simply if it earns more points.¹² As Sanford Smith, corporate manager of real estate and facilities, of Toyota Motor Sales USA noted: “If the system is taken incorrectly by chasing points and credits [aiming for the least expensive points to maximize scores, for instance], then it begins to blur the objective from a business standpoint and an environmental standpoint. It becomes about chasing points and designing to hit the certification level as opposed to strictly being a measurement tool.”¹³ To overcome these challenges some agencies have modified the use of LEED in order to meet their own specific policy objectives such as requiring new buildings to earn at least eight credits in the area of energy and atmosphere in addition to achieving a LEED silver rating.¹⁴ Another concern is that USGBC does not consider the cost of green buildings as part of its LEED certification process, which adds to the lack of published LEED data on the cost of green buildings.

¹² Carlisle, N. et al. National Renewable Energy Laboratory. “Transforming the Market for Sustainable Design: Effective Public Policies and Strategies”. May 2004. listed at <http://www.nrel.gov/docs/fy04osti/36263.pdf>

¹³ Interview with Mr. Sandford L. Smith, A.I.A., Corporate Manager of Real Estate at Toyota Motor Sales, U.S.A., Inc. Torrance, California. August 17, 2004.

¹⁴ Carlisle, N. et al. “Transforming the Market for Sustainable Design: Effective Public Policies and Strategies”.

3. Financial Costs of Green Buildings

With financial considerations generally at the forefront of decision-making, it is often the construction cost implications that drive decisions in green building. While green buildings can be constructed at comparable or lower costs than conventional buildings, incorporation of innovative sustainable technologies as well as other factors can increase initial costs. However, experts assert that these upfront costs can be recouped in the long run.

In *The Costs and Financial Benefits of Green Buildings*,¹⁵ a report compiled for California's Sustainable Building Task Force, a group of over 40 California state government agencies, research indicated that upfront building costs are about 2%¹⁶ (or \$3-5/ft²) higher than those of buildings built to code. Studies showed that increased architectural and engineering design time required in integrating higher performance building solutions and technologies into projects account for the majority of the cost. However, the report found that green buildings generate about 20% in savings of initial construction costs over time. For example, an upfront investment of \$100,000 in green building features into a \$5 million dollar project would result in about \$1 million in savings in today's dollars over the average 20-year life of the building.¹⁷ Experts also advised that financial benefits such as savings generated from lower energy and water bills should be examined using a life cycle cost analysis approach (the assessment of costs and benefits over the life of a particular product, technology or system), not just evaluated in terms of upfront costs. A review of LEED rated buildings demonstrates that green buildings provide an average 30% reduction in energy use, as compared with buildings that only meet minimum energy code requirements. For example, the financial benefits of 30% reduced consumption at an electricity price of \$0.11/kWh¹⁸ or \$1.47/ft²/yr; this indicates savings of about \$0.44/ft²/yr, with a 20-year present value of \$5.48/ft².¹⁹ To sum up, from a life cycle savings perspective, savings resulting from investment in sustainable design and construction could exceed any additional upfront costs.

¹⁵ Unless otherwise indicated, this report makes the assumption that costs (including energy and labor) as well as benefits rise at the rate of inflation – and so present value calculations are made on the basis of a conservative real 5% discount rate absent any inflation effects. The report also assumes that the benefits of more efficient/sustainable energy, water, and waste components in green buildings will last 20 years. See Appendix A.

¹⁶ See Appendix A.

¹⁷ Greg Kats et al. "The Costs and Financial Benefits of Green Buildings".

¹⁸ In 2002, electricity cost was \$0.12//Wh. However, in December 2002, the California Energy Commission released the conservative figure of \$0.11/k/Wh as the future estimate. See Appendix B.

¹⁹ Greg Kats et al. "The Costs and Financial Benefits of Green Buildings".

In addition, the report discusses the impact of three green building features in terms of cost: commissioning, underfloor air distribution systems (raised floor heating, ventilation and air conditioning systems), and cool roofs. Commissioning, a prerequisite of LEED certification, is a process that ensures proper system design and installation and reduces costs by eliminating errors. A recent report found that costs for commissioning, including travel expenses, range from 2% to 4% of the total cost for buildings costing less than \$5 million, down to 0.5% to 1% for buildings costing over \$50 million.²⁰ Underfloor air systems have been adopted less rapidly in the U.S. than in Japan and Europe due to the newness of the technology, limited applicability to retrofit construction and perceived higher costs. Based on studies undertaken by Carnegie Mellon's Center for Building Performance and Diagnostics and the Oak Ridge National Laboratory, project costs range from \$0 to \$3/ft² and higher.²¹ Also, data showed that underfloor air systems provide energy savings in the range of 5% to 30% below conventional overhead systems. Similarly, data provided by Lawrence Berkeley National Laboratory indicate that combined with benefits of direct reduction in air conditioning and longer roof life value of \$0.75/ft²;²² this translates into an estimated 20-year PV savings from cool roofs of \$1.10/ft² of roof surface. Also, lower cooling demands can provide additional savings of about \$0.10/ft² in capital costs. This is roughly offset by the additional cost of a cool roof, which is approximately between \$0 and \$0.20/ft² with an average marginal cost below \$0.10/ft². This means that the \$1.10/ft² value can be considered a true 20-year NPV value, where additional cost is subtracted from overall benefits.²³

Based on this report, the average construction cost premium for green buildings in California is almost 2%, or about \$4/ft². However, some experts argue that although it is feasible to determine conservative estimates of financial benefits and costs for a range of green building attributes, the study of green buildings is still in its early stages with little published data. Perhaps if USGBC begins to require cost information with submissions for LEED certification, then others will follow. Although benchmarking with other comparable projects may not be predictive due to each building's circumstances and goals,

²⁰ Chad Dorgan, Robert Cox and Charles Dorgan. "The Value of the Commissioning Process: Costs and Benefits".

Farnsworth Group, Madison WI, paper presented at the 2002 US Green Building Council Conference, Austin Texas. "The Costs and Financial Benefits of Green Buildings". 2003.

²¹ Greg Kats et al. "The Costs and Financial Benefits of Green Buildings". See Appendix C.

²² Typically, cool roofs last 20% longer than conventional roofs. Lawrence Berkeley National Laboratory calculated that financial benefits of longer roof life are roughly equal to the value of energy savings. Combining the benefits of direct reduction in air conditioning with the value of a longer roof life provides an estimated 20-year PV of \$0.75/ft².

²³ Hashem Akbari. Lawrence Berkeley National Laboratory. October 2002. "The Costs and Financial Benefits of Green Buildings". 2003.

studies indicate that projects that were able to remain within their budgets were those that had established goals from the start, and which integrated sustainable elements into the project at an early stage. Furthermore, green building construction in Pennsylvania, Portland and Seattle shows a trend of declining costs associated with increased experience in green building. At the present, further research and analysis is needed on the financial and economic aspects of green buildings

Partial List of Government Incentives for LEED Public Sector Projects	
LEED Certified Government-Financed Public Sector	Incentive Packages
Connecticut	Funding
Connecticut	Funding
King County, WA	Funding
Maryland	Tax credit program
Massachusetts	Tax credit program
Michigan	Funding
New York	Energy R&D Incentive for design teams, NYSERDA low interest loans, Green Building Tax Credit
Oregon	Funding and 35% Business Energy Tax Credit
San Mateo County	Funding
Seattle	Seattle City Light Energy Smart Design Incentives, Seattle City Light Built Smart Incentives and Seattle Public Utilities Water Smart Technology Incentives
Washington State	Funding
Atlanta, Georgia	Funding
Los Angeles, CA	Funding
San Diego, CA	Sustainable Building Expedite Program (construction incentives)
Chicago, IL	Funding
Source: USGBC	

4. Public and Private Incentives

Many public and private entities offer financial and regulatory incentives to promote green building. States such as California, Maryland, New Jersey, New York, Oregon, and Pennsylvania have adopted green building policies, incentives and requirements. The states of Maryland, Massachusetts, New York, and Oregon even offer tax credits for LEED-certified buildings.

New York State Energy Research and Development Authority (NYSERDA)

offers a financial incentive for design teams of any New York State building that achieves a LEED rating.²⁴ Another incentive is NYSERDA’s New Construction Program, which offers direct technical assistance design incentives and capital cost incentives based on improved building energy efficiency performance. NYSERDA also provides low interest loans (4% below market rate) for those who use energy-efficient measures and building materials that meet LEED or other generally accepted green building standards.²⁵

Other initiatives include grant programs for costs related to energy modeling and commissioning instituted by the cities of Portland, Oregon and Seattle, Washington. The private Green Building Loan Fund in Pittsburgh, Pennsylvania, underwritten by the Heinz Endowments, offers similar benefits on a

²⁴ Templeton. “LEED Users Summary”.

²⁵ *ibid.*

loan basis. Washington offers tax-exemptions for wind generators, PV panels and fuel cells. Cities such as Santa Monica and Santa Barbara, California and Scottsdale, Arizona offer fast-track permitting (expedited permit reviews) for buildings with certain high-performance features. Arlington County, Virginia, provides preferred zoning considerations for LEED projects.²⁶

To prevent an energy crisis similar to the one that occurred during 2000-2002, California introduced a number of incentive programs, including the 20/20 Rebate Program for the commercial sector. Under this program a 20 percent reduction on electric bills is provided if customers reduce their usage by greater than 20 percent. The California Energy Commission's Renewable Energy Program provides market-based incentives for new and existing utility-scale facilities powered by renewable energy. In addition, California and several other states offer programs often referred to as "rebates and buy-downs"²⁷ that will pay facility executives a certain percentage of the cost of a specific technology, such as energy efficient windows, lighting and occupancy sensors.²⁸ In many cases, the rebates are 20 % to 30% of the cost.

The state of New York offers a number of programs including green building tax credits that support energy efficiency and green building construction strategies.²⁹ To qualify for energy efficiency credits, the building has to achieve a minimum amount of energy savings. Maryland now offers similar green building credits. Massachusetts, Pennsylvania, Montana, Vermont, Minnesota are among other states offering tax credit programs similar to those of New York.³⁰

The City of Portland Office of Sustainable Development offers the private sector its G/Rated Program with incentives including neighborhood housing program loans, tax credits for LEED-certified buildings, business energy tax credits, energy loan programs and so on.³¹

²⁶ U.S. Green Building Council. "Building Momentum: National Trends and Prospects for High-Performance Green Buildings".

²⁷ The term "buy-down" refers to reducing initial equipment costs. It is most often used for reductions in the bottom-line cost to purchasers, while "rebate" is used for a payment issued to the purchaser after the system has been installed.

²⁸ Kozlowski, Daivid. Building Operating Management. "Energy Incentives Reborn". 2001. listed at http://www.greenbiz.com/news/reviews_third.cfm?NewsID=17552

²⁹ *ibid.*

³⁰ *ibid.*

³¹ Portland's Green Building Resource. listed at <http://www.sustainableportland.org/>

In Pennsylvania, proposals for a High Performance Green Building Tax Credit and financial incentives for school buildings achieving LEED certification are currently under committee review. In addition, four state funds including the \$20 million Sustainable Energy Fund provide grants, loans and “near-equity” investments in energy efficiency and renewable energy projects.³²

The Effectiveness of State Financial Incentives for Renewable Energy

The following information is based on a report³³ funded by the U.S. Department of Energy’s Office of Energy Efficiency and Renewable Energy. Observations and lessons learned are discussed briefly from the experience of 10 incentive programs in six states regarding the effectiveness of state financial incentives for renewable energy.

The experience of low-interest loan programs in Iowa, New York and Oregon found that loans are most effective when coordinated with other incentives that reduce up-front costs. However, studies revealed that loan programs “that partner with private lending institutions benefit by leveraging funds from private sources, but lenders are often reluctant to issue small loans, limiting the program’s effectiveness in encouraging small-scale renewables deployment.”³⁴ New York’s and Iowa’s programs require applicants to secure financing from private lenders. Although the programs leverage about \$10 in loans for every \$1 in funding and \$6 for every \$1, respectively, applicants are often faced with lack of access to financing from private lenders. The development and marketing of these programs can be improved by targeting banks, renewable energy equipment vendors and contractors. A brief table on case study on loan programs can be found in Appendix F.

Buy-down programs can play a significant role in increasing the number of installations of PV systems when accompanied by complementary incentives and policies, including “a streamlined interconnection process³⁵, product marketing and consumer education, installer training, and low-cost financing

³² Templeton. “LEED Users Summary”.

³³ V. Everette, S. Gouchoe and R. Haynes. North Carolina State University. National Renewable Energy Laboratory. “Case Studies on the Effectiveness of State Financial Incentives for Renewable Energy”. September 2002. listed at <http://www.nrel.gov/docs/fy02osti/32819.pdf>

³⁴ V. Everette, S. Gouchoe and R. Haynes. “Case Studies on the Effectiveness of State Financial Incentives for Renewable Energy”.

³⁵ A conductor within a module or other means of connection that provides an electrical interconnection between the solar cells.

options.”³⁶ A favorable aspect of New York’s PV Program is that it is administered through the dealer networks of two PV distributors. Partnerships with distributors are important as they are able to market the program, train installers, and educate customers. A brief table on case study buy-down programs can be found in Appendix G.

Tax credits were found most effective when combined with outreach and education efforts and complemented with other incentives such as net metering³⁷ to help drive the market for renewables. However, tax credits present several challenges. For example, North Carolina’s tax credit “limits to 50% the amount of credit that applicants can claim from the taxpayer’s tax liability for the year.”³⁸ Recipients without a high tax liability are allowed to take advantage of a small portion of this credit during the year of installation. Although the remaining credit amount can be carried over up to five years, it reduces the overall benefit of the incentive. Experts suggest a more immediate or direct incentive may improve the effectiveness of the program. Second, entities such as government agencies and nonprofit organizations that have no state tax liability are unable to benefit from the incentive. To compensate for this drawback, Oregon offers a “pass-through” option where “non-taxed organizations can receive the net present value of a tax credit they transfer to a third party, such as their energy services company, equipment vendor, or other business.”³⁹ Finally, two federal incentives – the production tax credit⁴⁰ for wind and closed-loop biomass⁴¹ and the 10% business investment tax credit for solar and geothermal property (energy produced by the internal heat of the earth) – are reduced if recipients receive any other

³⁶ *ibid.*

³⁷ Net metering is a method of accounting for electricity produced and consumed by a grid-connected consumer who has installed their own renewable generator (e.g. wind turbine, solar panels). Besides benefiting the customer, renewable generation capacity is, in effect, added to the grid. Net metering allows the consumer to use the grid for “storage” and avoid the need to also install storage equipment, which has significant cost and maintenance implications. When the customer’s generation exceeds their requirements, the excess goes into the grid. The excess electricity that the customer generates and supplies to the grid is used by other consumers. When the consumer’s requirements exceed their generation, they take power from the grid. They are billed the “net” difference between their total generation and total consumption.

³⁸ Everette, S. Gouchoe and R. Haynes. “Case Studies on the Effectiveness of State Financial Incentives for Renewable Energy”.

³⁹ *ibid.*

⁴⁰ The production tax credit is an example of a performance-based incentive that provides the investor or owner of a renewable energy system with an annual tax credit based on the amount of electricity generated by the system.

⁴¹ Any organic matter from a plant which is planted for the exclusive purpose of being used to produce energy. This does not include wood or agricultural wastes or standing timber.

government grants, financing or any other credits. A brief table on case study tax-credit programs can be found in Appendix H.

Clearly, financial incentives can be more effective when considered as one element in a comprehensive approach in fostering a sustainable market. Providing funding stability and duration, educating the public about the availability of incentives and developing partnerships and alliances with the government, businesses, institutions, electric utilities, lending institutions, and other stakeholders are other critical components that can help to improve the performance of these programs.

5. An Overview of 2 Models of Green Buildings

Considering California's insufficient water resources and its dependence on the Colorado River, water-saving strategies are particularly crucial. And with the energy crisis of 2000-2002, featuring rolling blackouts and soaring wholesale power prices, investing in energy-efficient technologies is another initiative for California, whose energy code is 10% more stringent than any similar code in the U.S.

NRDC's Santa Monica regional headquarters and Toyota Motor Sales, USA, South Campus represent two state-of-the-art green building facilities in California that demonstrate the latest green building technologies and practices and address environmental concerns in the nonprofit and private sectors.

5.1 Natural Resources Defense Council's Santa Monica Office, the Robert Redford Building

PROJECT SUMMARY Natural Resources Defense Council, Santa Monica, Calif.
Building Team Owner: Natural Resources Defense Council (NRDC) Architect: Moule & Polyzoides Architects and Urbanists LEED consultant: Constructive Technologies Group, Inc. (CTG) General contractor: TG Construction Inc. Construction manager: Tishman Construction Corporation of California Structural engineer: Nabih Youssef and Associates Mechanical, Electrical and Plumbing: Syska Hennessy Group
General information Area: 15,000 sq. ft. Number of floors: 3 Construction time: Approximately 11-13 months. Completed in November 2003.
Source: NRDC

The Natural Resources Defense Council (NRDC), a national nonprofit organization of scientists, lawyers, environmental specialists and public policy experts, employs green building techniques in each of its four offices – New York, San Francisco, Santa Monica and Washington. However, its Santa Monica office demonstrates that it is indeed one of the greenest buildings in America.

In November 2003, NRDC opened the Robert Redford Building (named in honor of the actor, director, trustee and founding member of NRDC), its Southern California regional headquarters in the urban heart of Santa Monica. It achieved the highest level of LEED certification possible – platinum. Based on smart growth principles, NRDC converted an existing structure, a former acupuncture school, and recycled 98% of the material left over from the renovation. This 1920s-era structure, a three-story, 15,000 square-foot building, was redesigned as a green building to conserve water and energy and showcase environmentally sound materials. NRDC and the architect team were committed to locating the building in a high-density urban environment close to public transportation and within walking

Facade of NRDC's Santa Monica Office



Source: NRDC

distance of other office, residential, and shopping areas. They chose an accessible oceanside downtown location, a pedestrian-friendly area providing convenience for bicyclists and wheelchair users as well. NRDC director Watson described the location as a new urbanist development that creates diverse walkable neighborhoods and communities ensuring easy access to the necessities of life. New urbanism is a movement that is all about walkability – another objective of NRDC and an important aspect of greening. New urbanist locations accommodate cars and utilize existing services like public transit to decrease transportation costs.

Traditionally, NRDC has interacted with the public through mailings and membership only, according to Evelyne Slavin, NRDC Environmental Action Center Associate. However, due to Santa Monica's local requirement to use public space to promote pedestrian traffic, NRDC built a museum and a gift store called the David Family Environmental Action Center that houses the Leonardo DiCaprio e-Activism Zone, named in honor of the actor and environmentalist. To raise environmental awareness among the younger generation, NRDC collaborated with DiCaprio to create the Zone - an interactive area equipped with "four high-speed Internet terminals linked

Interactive Green Building Exhibit



Source: NRDC



to NRDC’s activist network”⁴² where the public can research environmental issues and e-mail public and corporate officials.

In addition, to offer visitors an educational public exhibit with real-time visual information on the building’s performance efficiency, Southern California Edison (SCE), the electric utility, with assistance from California-based ASW Engineering Management Consultants, contributed the Green Building Exhibit. It houses a kiosk with educational features such as an interactive system showing up-to-date energy and water savings statistics and cutting-edge information

on the components of the building.⁴³

Information retrieved from the kiosk is submitted to comply with LEED certification, which requires a constant measurement of the building’s performance. While NRDC collects and reviews the data on a monthly basis to make sure everything is working properly, it also plans to file a report with SCE, which will document the measured energy and water savings.⁴⁴

Challenges and minor setbacks

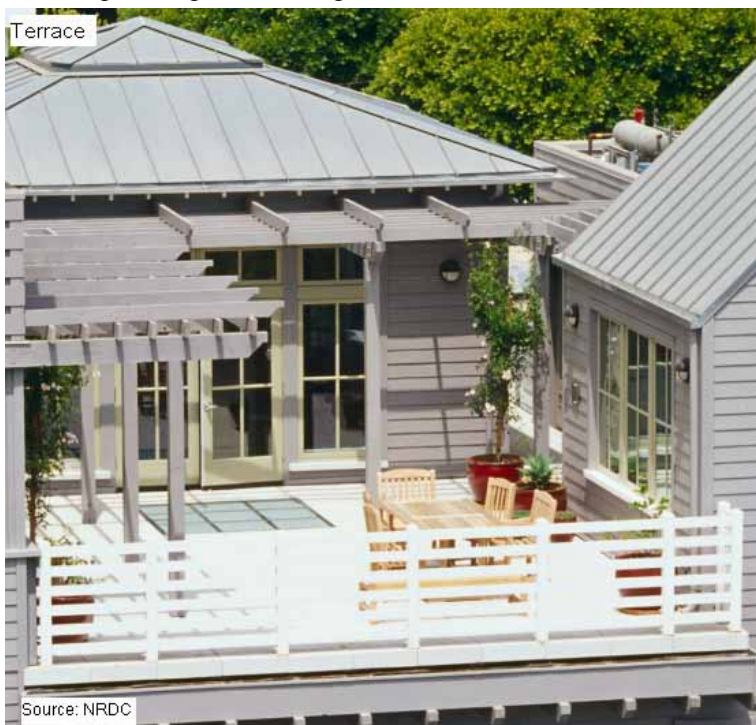
According to Watson, for a construction project of this size that generally has a timeline of 9 months, the construction period of the NRDC building took approximately 11 to 13 months, adding to the cost of the

⁴² Ally Dawson. “The Greenest of Them All: A Tour of the NRDC’s Beacon of Light”. Workspace. July/August 2004.

⁴³ Joanna Turpin. July 29, 2004. “Green By The Sea”. Engineered Systems. listed at <http://www.esmagazine.com/CDA/ArticleInformation/coverstory/BNPCoverStoryItem/0,2500,129923,00.html>

⁴⁴ *ibid.*

project. Several reasons included unfortunate timing due to a nearby construction project occurring during the same period and compliance with Santa Monica's stringent ordinance that addresses noise mitigation regulations for construction projects. A more universal and common challenge that existed then and continues to be a challenge today is the slow pace of incorporating emerging environmental technologies for green buildings into standard local, state and national building codes and industry



regulations. For instance, the use of waterless urinals, a relatively new technology is generally prohibited in certain geographic areas. However, waterless urinals are quickly becoming a mainstream trend with their substantial water and cost savings. Each urinal conserves roughly 40,000 gallons of water per year, and cuts down significantly on plumbing bills as well – a major point of contention with the plumbers' union. Yet, NRDC eventually managed to receive

approval from Santa Monica to install the waterless urinals. Similarly, while Santa Monica's city council claims to favor green buildings, the city's planning department and various industry regulations did not reflect green building guidelines, contributing to long waiting periods for approval. In addition, coordinating with the city health and energy departments on issues related to compliance with city codes and dealing with other issues with consultants, architects and other parties further prolonged the completion of the project. Other minor setbacks involved PV panels running at 25-30% less than full capacity due to shadows from nearby guard railings and gas burners operating constantly.

Financial costs and savings

In our interview with Watson, he admits that in hindsight, environmental technologies such as the PV panels, the commissioning process, materials and the renovation of an existing building added approximately 15% to the cost of the project. This 15% represents a higher-than-average cost per square

foot in this particular area of Santa Monica. However, according to Watson, the cost will be recouped in approximately three years through resource savings and productivity gains. NRDC paid half of the cost of the PV panels or 30% for the total solar panel system cost. According to the California Energy Commission price forecast, the lifecycle cost effect is a 15-20 year payback period for the solar panel system.

Highlights of Environmental-friendly features

Photovoltaics on Rooftop



NRDC's Santa Monica headquarters' green building construction boasts sustainable attributes ranging from conference chairs made from recycled seatbelts and hardwood floors made from pressed bamboo – fast-rejuvenating building material used to combat forest depletion – to rooftop solar panels that make up 20% of its electrical needs. The rest of the building's electricity is supplemented by wind power – the purchase of renewable energy generation credits, or wind certificates, generated by off-site windmills. To sum up, 100% of the energy is provided by renewable sources, meaning the office adds no carbon dioxide to the atmosphere. The building's lighthouse atria-style design features skylights that help to maximize and distribute sunlight throughout the building. Local electric companies lent their expertise to the angling of the windows to direct sunlight where it is most needed. In addition, windows are designed to block out the sun's short-wave radiation and reduce the amount of solar heat gain in the building. Architects incorporated a smart rooftop approach using shading from plants and overhangs as well as light-colored roofing to absorb and deflect the sunlight – another method applied to decrease heat gain. Two gas-fired Takagi heaters, operated by a control algorithm that regulates the heating water supply temperature based on the outdoor temperature, generate hot water and move it via a circulating pump – all located on the roof. NRDC's investment in green building not only addresses

environmental issues but also offers soft features, such as access to pleasant views, fresh air and increased daylight, which could lead to tangible bottom-line benefits such as boosting employee productivity. Additional high-performance green principles can be found in Appendix D.

In our interview, Watson summed up by saying, “LEED only penetrates the top 25% market.”⁴⁵ LEED is rigorously designed to reflect a standard that the top 25 percent of the market can achieve. He also mentioned that compared to Japan’s CASBEE and the United Kingdom’s BREEAM, LEED is the most market friendly and user-friendly rating system. With 15,000 professionals accredited by LEED, the rating system will continue to evolve through regular revisions and will require re-training and continuing education.

5.2 Toyota Motor Sales USA – South Campus Project

As part of Earth Day celebrations in April 2003, Toyota Motor Sales U.S.A. opened its South Campus facility in the city of Torrance, California. It is currently the largest privately developed office building to earn a gold rating by the USGBC. The project consisted of the construction of five three-story concrete tilt-up⁴⁶ steel structure interior frame buildings totaling 624,000 square feet on a 38-acre site. The South Campus headquarters houses administrative offices for Toyota's Financial Group and customer service department, and includes a 30,000 square-foot cafeteria with dining room and service area, two central plants, and a two-story glass atrium connecting the buildings.

Toyota’s mission for the South Campus project was not originally to create “an architectural environmental statement,”⁴⁷ but to comply with its own Earth Charter, a set of guidelines used by the company to mitigate its impact on the environment in every aspect of its business. To reinforce the

PROJECT SUMMARY Toyota Motor Sales U.S.A. South Campus Torrance, Calif.
Building Team Owner: Toyota Motor Sales, U.S.A. Architect: LPA Inc. LEED consultant: Constructive Technologies Group, Inc. (CTG) General contractor: Turner Construction Co. Construction manager: HB&A Construction Management Structural engineer: Culp & Tanner Inc. Mechanical: Key Air Conditioning & Heating Electrical: Sasco Electrical Construction & Data Systems
General information Area: 627,000 sq. ft. Number of floors: 3 Construction time: September 2001 - March 2003
<small>Source: Building Design & Construction</small>

⁴⁵ Watson.

⁴⁶ The process of pouring concrete into forms on the ground, allowing the forms to harden and then raising the material to a vertical position to form walls.

⁴⁷ Toyota Motor Sales, U.S.A., Inc. Press Release. “South Campus Facts for Publication”. October 13, 2003.

company's commitment, Toyota's real estate and facilities department created the Process Green initiative – a set of goals incorporating sustainable design, development and operations while simultaneously improving the company's bottom line. The first objective of the project was designed to consolidate all of the employees at the campus instead of housing them at various leased buildings in Torrance. However, this had to be done cost-effectively without increasing occupancy expenses. In essence, the project had to be cost neutral. "Then we challenged the design and the construction team to do that as sustainably as possible," says Smith, corporate manager of real estate and facilities and an architect by training.⁴⁸ When Smith is invited to speak at public events, his advice to the attendees is: "The most sustainable building you can possibly build is not building one at all. If you want to minimize the impact, don't build anything else. So, if



Source: Toyota

you're going to build something, you're building it to serve a specific business purpose. Then use the sustainable filters to make decisions about – What kind of glass do I use? What kind of ceiling do I use? And then you can make those decisions in context."⁴⁹ This decision-making process toward building a simple functional project and recognizing sustainable methods at the same time contributed to

⁴⁸ Smith.

⁴⁹ *ibid.*

Toyota's gold certification.

Financial Costs and Savings

An eco-charrette approach – in which builders, owners, architects, engineers and consultants get together and brainstorm – is what helped Toyota construct a cost-neutral building that cost no more than a traditional building. In terms of the financial cost of the project, Toyota asked Turner Construction Company of Irvine, California, the project's general contractor, to look at the facility from a shell (exterior of the building) and core (tenant improvement) standpoint. Turner benchmarked those two main components and Toyota factored out the related soft costs and developmental costs. The building shell was built for \$63 per square foot – within the lower half of the \$54-\$76 local market range for most Southern California office parks. The interior costs, or tenant improvements, were \$26 per square foot – at the lower end of the traditional \$22-\$40 range. Mark Yamauchi, facilities operations manager at the Toyota unit, emphasizes, "It's very competitive or comparable to market development cost – we fell on the low end of the range in terms of shell and core cost."⁵⁰

There were two components that added to the cost of the project. The PV panels were a \$3 million capital project with a net cost of \$1.5 million after the California Public Utilities Commission's Self-Generation Incentive Program that covered 50% of the installation costs. Self-Generation is one of several state-sponsored initiatives intended to assist customers and the state in managing the effects of today's energy market and addressing on-going air quality concerns. An accelerated depreciation allowance (the installation costs of the solar energy system less any and all cash incentives and tax credits) were additional incentives for the PV panels. Toyota estimates a 7-year payback period depending on future utility rates as it has a significant impact on payback analysis.

The other component that added to the initial upfront costs was reclaimed or recycled water, which goes through the central water treatment plant and is piped back to the campus. A pipeline leading from the West Basin Municipal Water District in Carson, California was installed on the campus to supply recycled water to the complex for the mechanical system servicing the cooling towers, landscape irrigation and flushing cycles for the restrooms. Using this pipeline was another financial cost-saving opportunity as it is 30% less expensive than the cost of potable water. The expected payback period on the water used at the South Campus is 12 years.

⁵⁰ Interview with Mr. Mark Yamauchi, Facilities Operations Manager at Toyota Motor Sales, U.S.A., Inc. Torrance, California. August 17, 2004.

Toyota was able to significantly lower its capital costs for the project by tapping into other financial incentive programs such as the Savings By Design Program, a statewide energy-efficiency program sponsored by Southern California Edison, Pacific Gas & Electric Company, and San Diego Gas & Electric, under the auspices of the Public Utilities Commission.⁵¹ The program provided Toyota with cash incentives and contributed by lowering the design cost of energy efficient systems. This program offers commercial, industrial and agricultural customers with project assistance⁵² and if the energy efficiency of a building exceeds California Title 24 standards, financial incentives are available.

Based on its first year of operation, the South Campus reported total annual energy cost savings of approximately \$1.1 million attributed to combined savings from efficiencies and from the PV system.⁵³ The total annual water cost savings of approximately \$22,000 attributed to potable water savings from efficiencies and savings from recycled water.⁵⁴ As Smith summed up: “So, on an annualized basis this building will pay for itself. It gives us a competitive advantage in our cost structure.”⁵⁵

Toyota and the planners and designers at LPA, Inc., of Irvine, California assert that building green on a budget does not necessarily have to cost more than conventional buildings. The South Campus is a case for green building that was designed to make good business sense and fall within the budget guidelines.

Building Codes

Just as there are building code agencies (non-government organizations) for buildings built to code, the same agencies exist for green buildings. Established in 1994, the International Code Council (ICC), a building code nonprofit organization, was founded by Building Officials and Code Administrators International, Inc. (BOCA), International Conference Building Officials (ICBO), and Southern Building Code Congress International, Inc. (SBCCI). In 2002, ICC became a member of USGBC creating a strategic alliance to foster technical cooperation and resource exchange and giving the green building community a stronger voice in the building regulatory community. This collaboration will accelerate the integration of sustainability factors into national building codes.

⁵¹ Savings By Design. listed at <http://www.savingsbydesign.com/index.htm>

⁵² *ibid.*

⁵³ Toyota Motor Sales, U.S.A., Inc. Press Release. “South Campus Efficiencies Cost Savings”.

⁵⁴ *ibid.*

⁵⁵ Smith.

The challenge for constructing the South Campus was focused on materials. Although there is a rapidly growing number of sources of building materials and products that meet sustainable criteria, manufacturers are required to have their materials certified by the appropriate agencies such as the ICC and Underwriter Laboratories (UL), an independent, not-for-profit product safety testing and certification organization. “One of the roles government should take is to make sure the building codes keep in step with the environmental technologies,” said Smith.⁵⁶

Challenges and minor setbacks

Achieving LEED certification has proven difficult due to several obstacles. While Torrance approved waterless urinals, despite vehement opposition from the plumbers union, the city of Los Angeles objected to the installation of waterless urinals. Although the city of Los Angeles and the state of California have rejected proposals to switch to the new urinals, saying they would wait for more research on their long-term maintenance needs, the California Division of the State Architect (DSA) approved the use of these urinals in schools, community colleges and state buildings under its jurisdiction. In *Urban Land*'s 2002 issue, Charles Lockwood also mentioned, “Major Southern California Edison (SCE) electrical transmission lines had to be relocated. Design and exterior material choices had to minimize the impact of soot from oil refineries west of the South Campus site. Railroad tracks had to be removed and oil pipelines moved to make room for a regional storm drain. Landscape construction had to be adapted to the site’s shallow storm drain. The site’s soil has very high clay content, making the site drainage difficult and requiring extensive soil amendments to support the use of drought-tolerant plants.”⁵⁷

From a user’s perspective, Smith says, “The architectural and design community aren’t being given filters to make the right decisions. So, the danger is they will design these beautiful buildings, but the cost will be very high, because they’ve lost sight of the original intent. It runs the risk of creating a stigma on the private sector that green building is very expensive. So, from my perspective, that is the danger. Promoting green building design should be measured on the life cycle of the building as opposed to certification of the building. Because then you’re just chasing the points.”⁵⁸

⁵⁶ *ibid.*

⁵⁷ Charles Lockwood. “Going for the Green.” *UrbanLand*. November/December 2002.

⁵⁸ Smith.

Highlights of Environmental-friendly features

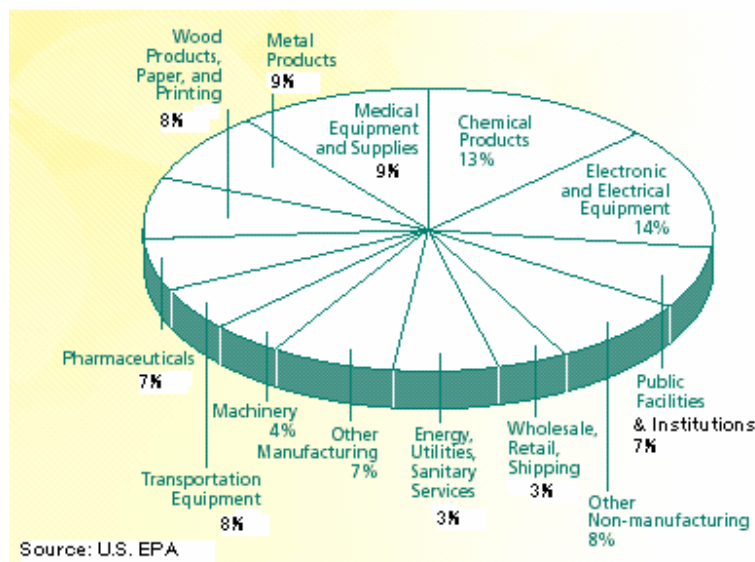
The new complex showcases an eco-friendly building design boasting innovative solutions and technologies that range from light motion sensors and ceiling tiles that disperse light and sound to the extensive PV panels on the building's rooftop. Toyota's 536kW solar panel system covers more than 53,000 square feet, making it one of the largest commercial solar rooftop installations in the nation. The solar panels generate enough electricity during the day to power more than 500 homes each year of its 25-year lifespan. The system reduces local demand and power plant emissions during peak hours to generate 20% of the base building electricity load, or 20% of the facility's electricity. Specifically in California, the primary energy demand in standard commercial buildings is associated with cooling the building and lighting. The building's PV system, developed by PowerLight Corporation, a Berkeley, California-based designer, manufacturer and installer of grid-connected solar electric systems and energy efficiency services, is connected to SCE, which provides the majority of Toyota's energy. If more electricity is produced from the PV system than the building requires, the extra kilowatts are fed into the utility grid. Utility companies can then purchase any excess electricity generated by the PV system. The grid-connected system reduces Toyota's electrical load, especially during times of peak demand when the utility grid is the most strained and electricity is most expensive. This and other energy-efficient efforts help the complex to achieve 24% greater efficiency than the State of California Energy Code requires and help reduce the company's operating costs. A host of other environmental-friendly features can be found in Appendix E.

Toyota also incorporated sustainable features into the renovation of its Lexus Building, but without going through the LEED certification process. Smith explained, "We've just finished remodeling our Lexus building across the street. Why is this a sustainable building? The things we had done are very similar to the things we did at the South Campus facility. So, if it's about sustainability then it's not about certification. Because the more it becomes about certification, then it changes the focus."⁵⁹ Guided by the Japanese philosophy of "kaizen," meaning continuous improvement, Toyota will continue to apply the lessons learned from its experiences in green building. Toyota's next project that will be LEED-certified is its port facility now under construction in Portland, Oregon, which is currently \$2 million under budget. Under its corporate objective, Toyota hopes to show that even a very industrial facility, on a cost-neutral basis, can achieve a high level of environmental performance at a no cost premium.

⁵⁹ *ibid.*

6.0 EPA National Environmental Performance Track Program

Distribution of Performance Track Members across Sectors



With today's heightened awareness of environmental concerns, investment research and advisory firms are increasingly considering environmental and social performance as an indicator to evaluate and rate companies. Launched in June 2000, the National Environment Performance Track, a public/private partnership with 344

members from 43 states and Puerto Rico, consists of U.S. facilities of all types - large and small, public and private. Facilities in the public sector and all major industries are represented, with nearly 40% of the members representing manufacturers of chemical, electronic and medical equipment. Major companies include Pfizer Inc., a research-based global pharmaceutical company, Ricoh Electronics' Office Machine Group and Baxter Healthcare Corporation. Performance Track recognizes and rewards facilities that voluntarily and consistently exceed regulatory requirements, implement environmental management systems (EMS), and work closely with their communities and set 3-year goals to protect the environment and public health.⁶⁰ For example, facilities with top environmental performance are rewarded with regulatory flexibility, such as receiving low priority for routine inspections by EPA. EPA is currently exploring incentives that would encourage conservation of water such as expediting the renewal process of water permits and reducing monitoring and reporting procedures.

The program is based on the premise that government should complement existing programs with new tools and strategies that not only adopt environmentally positive measures, but also find opportunities

⁶⁰ U.S. Environmental Protection Agency. National News. "Green Investing: A Growing Trend". March 26, 2004. listed at <http://yosemite.epa.gov/opa/admpress.nsf/0/a40598efbc1cd96885256e6300541de5?OpenDocument>

for reducing cost and encouraging technological innovation. EPA plans to continue to expand the program by increasing the environmental and business aspects of the program and seeking support and endorsement from various stakeholders, including states, trade associations, environmental groups, non-governmental and professional organizations, federal agencies, and other EPA program offices and corporations.

Program Structure and Criteria of Performance Track

An applicant is expected to meet PT's criteria in four key areas based on information obtained from EPA:

1. Establishing and maintaining a comprehensive environmental management system (EMS)
2. Going beyond legal requirements as a way to show its commitment to continuous environmental improvement
3. Informing and seeking input from its local community about the facility's environmental performance
4. Maintaining a record of sustained compliance with environmental requirements

To meet the second criterion, applicants commit from two to four quantitative goals from among categories such as water use, energy use and materials use. Facilities are accepted for a 3-year period and can renew their membership by committing to a specific number of new goals depending on the size of the facility. Each year, members submit an annual performance report documenting progress toward meeting their goals as part of their EMS. EPA reviews each report and monitors continued performance of each facility.

Two social investment advisory firms use Performance Track data as a screening criterion, or positive indicator, in developing their investment ratings of companies. Calvert Group, a provider of investment products and information on socially responsible investing to shareholders, financial advisors, institutional investors and individuals, uses the data as an indicator of a company's environmental performance and quality of management. The environment is one of seven factors that Calvert uses to determine if a company is eligible for investment in a Calvert mutual fund.⁶¹ It gives credit to those companies that have enrolled two or more facilities in Performance Track. Innovest Strategic Value Advisors, an internationally recognized investment research and advisory firm specializing in analyzing companies' performance on environmental, social and strategic governance issues with a particular focus

⁶¹ U.S. Environmental Protection Agency. National Environmental Performance Track. Green Investment Firms Recognize Performance Track. listed at <http://www.epa.gov/performancetrack/benefits/investing.htm>

on their impact on competitiveness, profitability, and share price performance, “evaluates companies using a Wall Street approach and uses benchmarking to compare companies with their peers.”⁶² It evaluates a company’s management performance by identifying positive or negative management trends. KLD Research & Analytics, Inc., a provider of corporate social research products and services for institutional investors worldwide, also reviews Performance Track data for use in its environmental ratings of companies. For instance, it uses the data to research how a company reduces waste and pollution.

⁶² *ibid.*

7.0 Socially Responsible Investing (SRI)

The growing number of participants in programs such as Performance Track as well as the increasing number of investment advisors who assess the environmental performance of a company is evidence of the growing trend toward socially responsible investing, or SRI. SRI is a catch-all-phrase describing the practice where investment and money management decisions are based on the financial analysis of environmental and social data to provide a more comprehensive understanding of a company's overall performance. SRI investors include individuals, businesses, universities, hospitals, foundations, pension funds, corporations, religious institutions and other nonprofit organizations. *The 2003 Report on Socially Responsible Investing Trends in the United States*, a report compiled by the Social Investment Forum, a national nonprofit membership organization promoting SRI, indicates a total of \$2.16 trillion in assets in 2003.⁶³

A number of socially screened investment funds attracted interest during the 1990s when they outperformed the rest of the market. Historically, most socially screened mutual funds in the U.S. have used a negative indicator that weeds out securities linked to tobacco, alcohol, gambling, weapons manufacture, nuclear energy and most recently, questionable accounting or ethics. Today, while avoidance screening continues to play an important role, social investors also employ positive screening to select companies with positive attributes such as green building for investment. The U.S. in particular incorporates three core SRI strategies – screening, shareholder advocacy and community investing. In its report, the Social Investment Forum established definitions for the three strategies.

- **Screening** is the practice of including, excluding, or evaluating publicly traded securities from investment portfolios or mutual funds based on social and or environmental criteria. “Buy” lists include enterprises with above average to ‘best in class’ employer-employee relations, strong environmental practices, safe and useful products and operations that respect human rights.⁶⁴
- **Shareholder Advocacy** is a term that describes the actions many socially aware investors take in their role as owners of corporate America. These efforts include dialoguing with companies on issues of concern, as well as filing, co-filing, and voting on proxy resolutions. Proxy resolutions on social issues and corporate governance issues are generally aimed at influencing corporate behavior toward a more responsible level of corporate citizenship, steering management toward action that

⁶³ Social Investment Forum. SIF Industry Research Program. “2003 Report on Socially Responsible Investing Trends in the United States.” Updated December 2003. Listed at

http://www.socialinvest.org/areas/research/trends/SRI_Trends_Report_2003.pdf

⁶⁴ *ibid.*

enhances the well-being of all the company's stakeholders in alignment with improving financial performance over time.⁶⁵

- **Community Investing** is the giving of capital from investors to communities that are underserved by traditional financial services. It provides access to credit, equity, capital, and basic banking products that these communities would otherwise not have. In the U.S. and around the world, community investing makes it possible for local organizations to provide financial services to low-income individuals, as well as to supply capital for small businesses and community services, such as child care, affordable housing and healthcare.⁶⁶

As corporate America incorporates SRI into mainstream security analysis, efforts to encourage corporate reform by means of more transparency and disclosure will be addressed by pension funds, institutional investors, SRI fund managers and brokers and regulatory agencies such as the Securities Exchange Commission (SEC) to name a few. For example, *Green Money Journal* reported that with approval from the SEC in 2003, activists such as Domini Social Investments and California State Treasurer Philip Angelides spearheaded a proposal to enforce mutual funds to disclose their proxy votes. Furthermore, experts predict that as major pension funds begin incorporating environmental assessment to guide their investments, Wall Street brokerage and other private firms will be sure to follow.

The following is a summary based on excerpts from interviews with two camps of SRI proponents: Amy Domini, founder and CEO of Domini Social Investments, a Rhode Island-based investment firm that manages more than \$1.8 billion in assets, specializing exclusively in socially responsible investing and Paul Hilton, portfolio manager of Dreyfus Corporation, a New York-based mutual fund company with a SRI program that has about \$1 billion dollars in assets under management. While Domini offers the Social Equity Fund and Social Bond Fund, Dreyfus offers the Premier Third Century Fund and Socially Responsible Growth Fund.

During the screening process, Domini assesses about a hundred criteria when evaluating a company's performance. A company's commitment to green building is considered one indicator when selecting a company for its portfolio. While Domini relies on specific types of certification, a primary one is the Energy Star⁶⁷ Certification. For reports, Domini reviews the Global Reporting Initiative, a relatively

65 *ibid.*

66 *ibid.*

67 Energy Star, a national energy performance rating program established in 1992, is a government/industry partnership

new standard that grew out of an environmental standard, the Coalition for Environmentally Responsible Economies, a coalition of investment funds, environmental organizations and public interest groups working together for a sustainable future. Other resources include company press releases, rewards or certifications from credible third parties, and other information that is publicly available. Domini has also studied Pulte Homes, an energy industry leader of energy-certified homes committed to building green buildings. Research is also conducted on sustainable products such as those of Whirlpool, a manufacturer of major home appliances that have a number of energy-efficient and less polluting products. Another area that Domini researches is how companies finance green buildings. There are banks and services, but utilities have also played a role in a company like equitable resources that Domini owns in its portfolio. To sum up, Ms. Domini notes that social investors in the U.S. ask the following: “Who’s financing the project? Who’s building the project? Who’s the company that built the green building? What kind of products go into the green building?”

What Ms. Domini would like to see go forward is a better measurement of the impact of SRI. In addition to a Citizenship of Sustainability Report, the next step is to “somehow unitize or even monetize the value of that.” She stresses that improving the assessment of the impact of SRI requires creating measurement tools that achieve “a qualitative input leading to a quantitative result.”

Dreyfus focuses on four areas for its SRI program: environment, employee safety or employee well-being, consumer protection and diversity. Most of the research is obtained from U.S.-based firms. In particular, four resource vendors are used to help with the analysis including Innovest, which covers mostly environmental information, but some social indicators as well. Information is also collected from KLD Research and Analytics, Institutional Shareholder Services (ISS), a provider of proxy voting and corporate governance services and their Trust Simon product, an online portfolio screening tool and Investor Research Responsibility Center (IRRC), a provider of investor and corporate responsibility research and services. Occasionally, Hilton does buy profiles from international research providers in the event a company is not getting good coverage from U.S. providers.

managed by the U.S. EPA and DOE. Buildings that perform in the top 25% and conform to industry standards in categories including temperature and humidity, illumination, outside-air ventilation, and the control of indoor-air pollutants are eligible to earn the Energy Star Label. According to its 2003 Annual Report, EPA’s rating system has been used to evaluate almost 19,000 buildings; 17% of office buildings, 11% of schools, 17% of supermarkets, 28% of hospitals, and 6% of hotels have been benchmarked. Since 1999, the EPA has provided both education and incentives for green building by offering the Energy Star Label for commercial buildings and homes.

Dreyfus has been fairly active in partnering with the U.S. EPA's Energy Star Program. Hilton said, "I have looked at LEED and it seems to be gaining in popularity, but I would say for right now we do more work on Energy Star just because the folks at Energy Star have been active in reaching out to the social investors in the U.S. and have come up with some easy-to-use questions of companies in our portfolio."

While both are currently the most prominent initiatives targeting energy efficiency use, LEED defines what constitutes a green building and Energy Star primarily focuses on energy performance. LEED incorporates elements of Energy Star into its rating systems. For instance, compliance with EPA rules and regulations is required to satisfy one LEED prerequisite and achieve five LEED credits in the Sustainable Sites and Indoor Environmental Quality categories. Another fundamental difference between the two initiatives is that Energy Star is performance-based, using statistical analysis to compare energy-use intensities relative to the national population of buildings. Conversely, LEED-NC, uses a points-based system that assigns a rating according to building characteristics.

Dreyfus does not examine building-by-building performance but rather the overall energy management goals of a company – how a company involves Energy Star. Specifically, as Hilton states, "How are they implementing Energy Star programs? How many buildings have they looked at including Energy Star programs? What kind of efficiencies are they getting at? Who's running the program? What kind of performance improvements have they made?" Having a good energy management program is considered an indicator of a company's strong leadership in the environmental area. However, it is one factor out of many.

When assessing companies, Dreyfus applies the same approach to domestic and foreign securities. From time to time, Dreyfus does hold international securities, but it wouldn't be more than 10% of the overall portfolio. Most of its foreign holdings are European. Others include Israeli companies and some companies that are U.S.-based but domicile in Bermuda, which are counted as foreign holdings. Specifically, Dreyfus looks for overall environmental management programs. Hilton often employs the domestic class analysis by Innovest. Hilton says, "I'm not always looking at environmental management but looking at specific performance metrics in areas like toxin releases or hazardous waste spills. The categories and the things we look for are environmental programs that are in place and reports on environmental issues."

In areas concerning performance of corporate governance practices, specifically, diversity information

on the U.S. – Dreyfus studies women and minorities and top management across the board. For environmental information, they use the ‘best in class’ in industry approach. For instance, instead of screening out all oil companies, the oil company with the best relative performance in the industry is selected. For consumer protection, Dreyfus considers product safety issues in the healthcare area, for example. Areas that are evaluated for employee welfare are employee programs, safety care, or safety programs. “So some of it is very quantitative and a bit subjective and other parts of it are more quantitative and less subjective,” says Hilton.

From an investment perspective, Hilton noted that in many cases, environmental issues are considered negative if they involve historical or legacy issues like major lawsuits on environmental issues and penalties such as government penalties. While it may be viewed as a negative factor from a SRI perspective, it can also be viewed as something positive. If a company has good environmental management, chances are it has good overall management, in Dreyfus’ opinion. If a company is focused on energy management, it can cut costs significantly, especially if energy costs rise. If a company is focused on reducing waste, it can cut waste disposal costs. If a company is focused on reducing inputs it can cut resource costs. Hilton noted that a good company will look at ways in which their environmental programs can promote financial performance.

Hilton expressed the trickiness is that some programs have environmental expenditures that can be immediately justified based on short-term returns and there are other investments that might take a little bit longer to realize its full potential. And those are harder judgments to make. Especially with issues like climate change, it is challenging to predict the legislative impact on companies. Sometimes a short-term penalty could materialize into the long-term interest of the company.

According to Hilton, although the U.S. government has not really had an effect on SRI, there are two areas that could have an impact. One issue concerns a socially responsible option in the retirement accounts of government employees. Although there has been no such provision in the past, this option is currently under consideration. The other issue relates to a mandatory disclosure of social environmental information by companies. Presently, there is pending legislation. In comparison, Europe, or specifically, the U.K. has laws that require pension funds to disclose how they evaluate environmental information. Hilton looks favorably at this sort of an approach and welcomes a similar requirement in the U.S. He added that it would be effective by forcing more investors to consider using a self-investing option.

On the subject of strengths and weaknesses of the U.S.-based model of SRI, Hilton commented, “I think that because of the unique history of the social investing field in the U.S., we’re left with the legacy of being very tightly related to banking and social screens. In particular, religious social screens like alcohol, gaming and tobacco. I think we’re all striving to move towards ‘best in class’ investing in more core sustainability issues like environmental issues and employee well-being concerns.” Hilton expressed a challenge with U.S. investors, especially retail investors, who have judged social products by the quality of their top holdings. He noted that U.S. investors have “some sort of social conflicts with the names that are listed in the top share holdings” despite analysts’ advice on the best companies in a particular sector. In comparison, Hilton noted that the Europeans’ products are “more sophisticated with a more robust staff focusing on doing ‘best in class’ analysis.” He also said that Europeans generally make judgments that are not necessarily just looking for approval by clients. For example, the Dow Jones Sustainability Index may hold a company like General Electric (GE). According to Hilton, many companies and products in the U.S. would be a little hesitant to put GE into a portfolio due to the company’s outstanding legacy issues. As Hilton summed up: “It’s just a different approach that we’re a little more reactive and I’d say the Europeans are a bit more proactive in how they apply their research.” When asked, “How can the model be improved?” Hilton replied, “I’d say having more researchers dedicated to social investment and to really move to a sustainability model as opposed to a negative social screening model based on moral issues.”

8. Ending Comments

Expected for completion in 2008 is a high-profile green building called the Freedom Tower, the first office tower to rise on the World Trade Center in New York. It will feature 30 windmills, supplying 20% of the building's electricity, among an array of other sustainable features. Another anticipated green building, the Los Angeles Police Department's Hollenbeck Division, is slated to open in 2007 and is expected to achieve a LEED rating. In London, the Swiss Re tower, which was completed in 2004, is expected to consume up to 50% less energy than a comparable conventional office building. These examples of the sustainable architecture movement exemplify a forward-thinking trend in the construction of intelligent buildings that is at the forefront of a sustainable global marketplace.

Clearly, the "greening" of the financial sector has impacted many global entities. 2004 witnessed significant gains in SRI and corporate social responsibility (CSR), specifically, corporate-shareholder relations. In an unprecedented move in Canadian history, the Bank of Montreal became the first company to recommend voting for a social or environmental resolution, which in this case asked the company to disclose how it evaluates and manages environmental risks to its business. Tyco and Coca-Cola endorsed similar shareholder resolutions, which also received near-unanimous support.

While environmental groups and SRI funds have turned their attention to commercial banks and funding of controversial projects avoided by public institutions such as the World Bank, a growing number of major international financial institutions including Citigroup have adopted the Equator Principles, an industry approach spearheaded by the World Bank's private sector arm, the International Finance Corporation. It is a framework that promotes responsible environmental stewardship and socially responsible development in project financing that has become a compulsory consideration in the financial sector. Clearly, as sustainability issues continue to gain acceptance, the role of financial institutions, corporations and other entities will transform to align with more transparent policies on environmental and social performance.

As the market for green buildings matures, the next revolution will be its impact on growing niche sectors involved in the many aspects of sustainability. Cleantech or "sustainable tech" industries – including nanotech, renewable energy, energy efficiency, water systems, agriculture, manufacturing and transportation – is an emerging sector that comes amid a host of local, national and global concerns, including record-setting oil prices, a fluctuating electricity infrastructure, growing concerns over global warming and so on. As regulators, citizens and the marketplace worldwide direct more importance

toward environmental and social considerations, it will contribute to building a more sustainable society, raising the bar for the rest of the world on all levels – political, social and economic.

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