

The Skyscraper, Green Design, & the LEED Green Building Rating System: The Creation of Uniform Sustainable Standards for the 21st Century or the Perpetuation of an Architectural Fiction?

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INTRODUCTION

We shape our buildings; thereafter they shape us.¹

— Winston Churchill

On March 28, 2000, one hundred commercial office buildings throughout the United States received an Energy Star Label, “the federal government’s highest symbol of excellence for energy efficiency and environmental conservation.”² To qualify for Star status, which certifies buildings in the top quarter of comparable buildings in terms of energy efficiency, a building must meet certain energy performance criteria; it must also satisfy minimum standards for healthy indoor air quality.³ The Environmental Protection Agency (EPA) and the United States Department of Energy (USDOE) created the designation in 1998 “as an incentive for the [real estate] industry to reduce demand for electrical energy use and, thereby, help lower greenhouse gas emissions.”⁴

Four Times Square, a forty-eight story post modern office tower in the heart of Manhattan’s Times Square, was one of the recipients of an Energy Star Label.⁵ The Durst Organization, its developer, chose a site that at the time seemed highly incongruous to the stringent, globally conscious, environmental construction standards it required of the entire project team.⁶ Completed in 1998, the building was America’s first environment-friendly, large-scale green construction project, and it quickly became an important focal point of the

¹ Winston Churchill, 393 Parl. Deb., H.C. (5th ser.) (1943) 403.

² See *Real Estate Roundtable Members Receive Government's First Energy Star Building Award*, PR NEWSWIRE, Mar. 28, 2000 (on file with Audra S. Capas of Real Estate Roundtable at acapas@rer.org) [hereinafter *Real Estate Roundtable*]. Energy Star is a government-backed program that seeks to protect the environment by promoting superior energy efficiency. In 2003, Energy Star saved Americans enough energy to power 20 million homes, greenhouse emission from 18 million cars and over 9 billion dollars. *What is Energy Star?*, Energy Star Website, at http://www.energystar.gov/index.cfm?c=about.ab_index (last visited Nov. 1, 2004) [hereinafter *What is Energy Star?*].

³ See *Real Estate Roundtable*, *supra* note 2.

⁴ *Id.*

⁵ See *What is Energy Star?*, *supra* note 2 (“For us and our tenants, high-performance buildings make both economic and ecological sense.”) (statement of Douglas Durst, President of The Durst Organization).

⁶ “[I]t’s not easy to imagine the high-gloss world of Conde Nast Publications [the anchor tenant at Four Times Square] fitting seamlessly into the raffish milieu of Times Square. Can Gourmet Magazine flourish on a site once occupied by Nathan’s hot dogs?” Herbert Muschamp, *Smaller Is Better: Conde Nast in Times Square*, N.Y. TIMES, May 18, 1996, at 21; see also *4 Times Square-The Conde Nast Building*, The Durst Organization, at http://www.durst.org/prop/prop_4.htm (last visited Mar. 17, 2004) (describing The Durst Organization’s environment-friendly construction guidelines in detail).

ongoing controversy over the purported benefits of sustainable design.⁷ Notably, the tower's success as America's first green high-rise indirectly led to the creation of the United States Green Building Council's (USGBC) Leadership in Energy and Environmental Design (LEED) Green Building Rating System for high performance buildings.⁸ The critical acclaim that the building's innovative sustainable design concepts received, in both architectural and academic circles, encouraged developers across the street at Three Times Square to adopt similar green standards for their new high-rise office building.⁹ Boston Properties, the developer of the final two office towers in the Times Square redevelopment scheme, chose not to incorporate green elements into either of its structures despite the acclaim Four Times Square had received.¹⁰

The overwhelming lack of uniform green design elements in America's most important modern high-rise buildings, in spite of substantial guidance for developers and contractors provided through programs like LEED,¹¹ has led some to suggest that the purported economic and environmental benefits of such construction are illusory. This suggestion is erroneous. The necessity for green design in responsible twenty-first century architecture becomes frighteningly clear upon an examination of the impact high-rise construction has on the natural environment; the construction, maintenance, and operation of residential and commercial buildings in the United States produces numerous negative externalities which wreak havoc on the natural ecosystems in which those structures are erected.¹² Moreover, many universally accepted global

⁷ A green, sustainable, or high performance building is "a building that minimizes impact on the environment through conservation of resources (energy, water, etc.) and contributes to the health of its occupants. Green buildings are characterized by comfortable and aesthetically pleasing environments." DAVID GISSEN, *BIG & GREEN: TOWARD SUSTAINABLE ARCHITECTURE IN THE 21ST CENTURY* 184 (2002).

⁸ See John Holusha, *New Technology Enhances Marketing and Design*, N.Y. TIMES, June 7, 1998, at RE7 (stating that "new technology is changing the way office buildings are designed and the way they are offered to customers.").

⁹ See GISSEN, *supra* note 7, at 24 (stating that Three Times Square is "one of the two largest environmentally sensitive buildings in the United States, along with [Four Times Square]."); see also John Holusha, *A Corporate Headquarters Next to Bugs and Mickey*, N.Y. TIMES, Sept. 6, 1998, at RE 9 (providing a broad overview of green design elements featured at Three Times Square).

¹⁰ See Boston Properties, at <http://www.bostonproperties.com> (last visited Nov. 1, 2004), for a description of the developer's Five Times Square and Times Square Tower projects.

¹¹ See discussion *infra* Part II.B, for a detailed explanation, examination, and discussion of USGBC's LEED rating system.

¹² Charles J. Kibert, *Listen to Your Mother: Environment Friendly Construction Techniques*, ALTERNATIVES JOURNAL, Jan. 1, 2000, at 38 [hereinafter Kibert, *Listen to Your Mother*]; see also Charles J. Kibert, *Policy Instruments for a Sustainable Built Environment*, 17 J. LAND USE & ENVT'L. L. 379, 384 (2002) [hereinafter Kibert, *Policy Instruments*] (stating that "[i]n the U.S., the construction industry clearly has disproportionate impacts on the environment compared to other sectors of the economy. . . . Although it represents just 8% of the U.S. GDP, [it] is responsible for over 40% of total materials extracted to produce and alter buildings and infrastructure . . .").

environmental problems have been directly or indirectly associated with the built environment.¹³ Buildings occupy significant amounts of land, modify natural hydrologic cycles, contribute to global climate change, affect biodiversity, contribute to soil erosion, have major impacts on water and air quality, and are sources of major quantities of solid waste.¹⁴ It follows that promoting green buildings is essential to the ecological future of both our country and our planet.

The green building movement promotes design and construction practices that significantly reduce or eliminate a building's negative impact on its occupants and surrounding natural environment.¹⁵ The movement attempts to accomplish this through sustainable site planning, use of energy efficient systems and renewable energy sources to power building systems, conservation of materials and natural resources used during construction, and creation of higher levels of indoor environmental quality.¹⁶ USGBC's LEED Green Building Rating System, created in 1998, is a "voluntary, consensus-based national standard for developing high-performance, sustainable buildings. Members of the USGBC[,] representing all segments of the building industry[,] developed LEED and continue to contribute to its evolution."¹⁷ LEED was created to bring uniformity to the American green building movement by establishing a common standard of measurement for green building elements, promoting integrated, whole-building design practices, recognizing environmental leadership in the building industry, stimulating green competition, raising consumer awareness of green building benefits, and transforming the building market.¹⁸ Developers seeking

Moreover, "a great civilizational and cultural challenge is involved in pointing the way towards sustainable future. Our current affluence is deceptive since it is based on consumption of resources at the expense of ecological stability, global justice, and generations to come." WOLFGANG SACHS ET AL., *GREENING THE NORTH: A POST-INDUSTRIAL BLUEPRINT FOR ECOLOGY AND EQUITY* 4 (1998).

¹³ The term "built environment" generally refers to all man-made structures that sit in the natural environment. KENNETH FRAMPTON, *MODERN ARCHITECTURE: A CRITICAL HISTORY* 211 (3d ed. 1992).

¹⁴ Kibert, *Listen to Your Mother*, *supra* note 12, at 38.

¹⁵ See GISEN, *supra* note 7, at 10-17, for a broad overview of the development of the green building movement.

¹⁶ U.S. GREEN BLDG. COUNCIL, *AN INTRODUCTION TO THE U.S. GREEN BUILDING COUNCIL AND THE LEED GREEN BUILDING RATING SYSTEM* (2004), available at http://www.usgbc.org/docs/about/usgbc_intro.ppt (last visited Nov. 18, 2004) [hereinafter USGBC INTRODUCTION].

¹⁷ See *LEED: Leadership in Energy & Environmental Design*, U.S. Green Bldg. Council, at http://www.usgbc.org/LEED/LEED_main.asp (last visited Nov. 18, 2004). "LEED is divided into five categories related to siting; water conservation, energy, material, and indoor environmental quality, plus an innovation and design category. Each category contains a specific number of credits; each credit carries one or more possible points . . . [a] project that earns enough points (26) can become 'LEED Certified' on up the ladder to Silver (33), Gold (39), and Platinum (52)" *Id.*

¹⁸ *Id.* ("LEED recognizes achievements and promotes expertise in green building through a comprehensive system offering project certification, professional accreditation, training, and

LEED certification for their buildings earn points by "meeting or exceeding each credit's technical requirements."¹⁹ The LEED guidelines, available for free at USGBC's website for project teams, provide a brief description of technologies and strategies for each credit to inform developers and contractors who might be unfamiliar with that particular credit category.²⁰ They do not, however, provide developers with financial incentives for incorporating green elements into their projects or refer to any of the numerous state and local green building programs currently in existence.²¹ Resolving this shortcoming in LEED remains USGBC's greatest challenge for the future.

One developer on the cusp of the green building movement is The Hines Company, one of the World's largest private developers, investors, and managers of commercial real estate.²² It has engaged such prominent architects as Philip Johnson, Cesar Pelli, I.M. Pei, and Frank Gehry to design its signature projects and currently manages over eighty million square feet of office space in thirteen different countries, valued at \$14 billion.²³ Acknowledging its massive global presence and the corresponding impact of its buildings on the natural environment, Hines has championed green design in the commercial buildings it has developed in Boston, Seattle, Houston, Detroit, and Atlanta.²⁴ Other well-known developers, such as The Durst Organization, have also invested heavily in high performance buildings despite the premium costs they implicate. The extra forty-five cents to \$1.30 per square foot over standard construction costs that green design requires is justified, they hope, through the realization of other types of savings throughout the building's lifespan.²⁵

To date, however, real estate industry experts are sharply divided over whether those savings will ever materialize; some have even stated that claims of beneficial returns remain unsubstantiated or have been greatly exaggerated.²⁶ According to Hines partner Kenneth W. Hubbard, green design has failed to

practical resources.").

¹⁹ U.S. GREEN BLDG. COUNCIL, LEED GREEN BUILDING RATING SYSTEM FOR NEW CONSTRUCTION & MAJOR RENOVATIONS: VERSION 2.1, at i (2003), available at http://www.usgbc.org/Docs/LEEDdocs/LEED_RS_v2-1.pdf (last visited Nov. 18, 2004) [hereinafter LEED 2.1].

²⁰ *Id.*

²¹ See generally *id.*; see also discussion *infra* Part II.C, for a description of various state and local green building programs.

²² See The Hines Company, at <http://www.hines.com> (last visited Mar. 17, 2004).

²³ *Id.*

²⁴ Michael Brick, *Not Going Green Is Called a Matter of Economics*, N.Y. TIMES, Jan. 15, 2003, at C5.

²⁵ *Id.*

²⁶ Daniel R. Tishman, executive vice president of Tishman Realty Corporation stated that "[t]his is a concept that has sputtered along for twenty or thirty years . . . it's an economic thing." *Id.*

catch on with developers at large, particularly in commercial buildings.²⁷ He maintains that in order for green design to become popular among developers, proponents must present substantial empirical evidence of its economic benefits to owners.²⁸ Edward W. Caulkins, a senior director of global property manager Cushman & Wakefield and a sitting member of USGBC, has publicly drawn attention to the prohibitively high cost of green design for developers. He once derisively noted that, "at the end of the day, you [as a developer] get a [LEED certification] plaque."²⁹ *Building Design & Construction* magazine has said that "[m]any speculative office developers consider sustainable design an expensive and troublesome luxury that offers little return on their investment dollar."³⁰ The magazine's November, 2003 *White Paper on Sustainability* suggested that it is not possible to sell sustainable design at Class A³¹ rates based on energy savings alone.³² Other developers have echoed those sentiments, arguing that "[t]he biggest benefit in environmentally sensitive design is the probability that you [are] going to get increased productivity from the people who work there.... You [are not] going to sell [sustainable design] on energy savings alone."³³ Still others such as Robert C. Larson, chairman of Lazard Freres Real Estate Investors, have called some of the methods introduced by USDOE and EPA to measure a building's application of energy-efficient systems "helpful to investors in valuing and differentiating real estate portfolios and asset

²⁷ *Id.* As of Aug. 11, 2003, however, eighteen percent of all LEED registered projects were commercial buildings, second only to multi-use structures at twenty percent. UCGBC INTRODUCTION, *supra* note 16.

²⁸ Brick, *supra* note 24, at C5.

²⁹ "[T]he Green Building Council's certifications, created as a marketing tool for developers and building owners, have even in their infancy become less than compelling to their intended audience, corporate tenants, according to [real estate] brokers and developers across the country." Brick, *supra* note 24, at C5.

³⁰ Larry Flynn, *Where Passion Prevails*, BUILDING DESIGN & CONSTRUCTION, Nov. 2003, at 32.

³¹ Class A office space is that found in the most "prestigious buildings, competing for premier office users with above[-]average rental rates for the area along with high-quality standard finishes, state of the art systems, exceptional accessibility and a definite market presence." *Glossary of Real Estate Terms*, OfficeFinder: Information and Referral Network, at <http://www.officefinder.com/glossary.html> (last visited Mar. 17 2004).

³² BUILDING DESIGN & CONSTRUCTION, WHITE PAPER ON SUSTAINABILITY 33 (Nov. 2003), available at <http://www.bdcmag.com/newstrends/BDCWhitePaperR2.pdf> (last visited Nov. 19, 2004) [hereinafter WHITE PAPER]. "Whether the rental market will pay a premium for sustainable design is another issue . . . except in cases where tenants pay their own utilities. Then . . . it may be possible to charge a rental premium on the basis of lower utility bills, but this is rare." *Id.*

³³ See Flynn, *supra* note 30, at 32 (statement of Hugh J. Zimmer, CEO of the Zimmer Companies, a Kansas City-based commercial real estate developer which in 2002 completed a 130,000 square foot office complex in Lenexa, Kansas that earned the state its first ever LEED certification). See also discussion *infra* Part III A-B, where the purported financial benefits of green design, including those from energy savings are examined in detail.

management strategies.”³⁴ Clearly, the real estate community is not united in its appraisal of green design.

California’s Sustainable Building Task Force’s October, 2003, report was the first comprehensive empirical study on the costs and financial benefits of green buildings.³⁵ The report decisively concluded that green building is indeed cost-effective.³⁶ So who is the developer to believe, and why? Is following the LEED guidelines an exercise in futility for developers, or will it result in substantial financial and environmental benefits? This article will answer these questions by first arguing that green design is essential to the long-term viability of large-scale, twenty-first century construction projects in both the commercial and residential sectors of the industry. Part I of the article demonstrates that the green building movement has the potential to provide enormous unrecognized economic, environmental, and health benefits. Many of these benefits have not yet been analyzed or even contemplated by LEED. For the movement to succeed, the government and USGBC must do more to create awareness of green design and encourage its further use in heavy construction projects.

Part II of this article discusses the massive environmental impact of buildings and argues that sustainable design standards are imperative for responsible twenty-first century architecture. Part III examines the purported benefits, both financial and environmental, of green design and concludes that such benefits do exist, though LEED does not sufficiently emphasize those of greatest importance to developers. In Part IV, the current LEED rating system is analyzed through a case study of the green design features at Four Times Square, and recommendations are made about how USGBC can better encourage green design through revising LEED. Part V advances broader social and policy arguments in support of green design, which USGBC should consider incorporating into future versions of LEED.

³⁴ See *Real Estate Roundtable*, *supra* note 2. Richard Ziman, chairman and CEO of Arden Realty, the 2000 winner of EPA’s Commercial Real Estate Owner of the Year award for owning the most energy efficient buildings in the United States, said “[w]e worked hard to achieve the top position nationally in the Energy Star program because we recognize that meeting the EPA’s benchmark not only benefits the environment, it creates value for our shareholders.” *Id.*

³⁵ GREG KATS, THE COSTS AND FINANCIAL BENEFITS OF GREEN BUILDINGS, A REPORT TO CALIFORNIA’S SUSTAINABLE BUILDING TASK FORCE, at i (2003), *available at* <http://www.ciwm.ca.gov/greenbuilding/Design/CostBenefit/Report.pdf> (last visited Nov. 19, 2004).

³⁶ *Id.* at ix. “Despite data limitations and the need for additional research in various areas, the findings of this report point to a clear conclusion: building green is cost-effective and makes financial sense today.” *Id.*

I. SUSTAINABLE DESIGN STANDARDS: A 21ST CENTURY NECESSITY*A. The Environmental Impact of Buildings*

Before examining the benefits of green design, it is first necessary to appreciate the massive local and global impact buildings have on natural environments, which green building programs like LEED were designed to ameliorate. To operate a building, coal, oil, natural gas, and uranium must be extracted, processed, and then transported via train, truck, barge, or ship to power plants for conversion into electricity. Further, transmission lines must be constructed to distribute the electricity.³⁷ Forty percent of the raw materials extracted in the United States each year are used in the construction of residential and commercial buildings, industrial infrastructure, or otherwise incorporated into the built environment, including natural resources such as wood and cork, and minerals such as iron and aggregates.³⁸ Beyond that, it has been estimated that over ninety percent of the materials ever extracted in the United States still exist today as part of its built environment.³⁹

Importantly in the post-9/11 world, the built environment consumes vast amounts of energy. In the United States, buildings are responsible for approximately sixty-two percent of electricity consumption, over thirty-six percent of total primary energy use, as well as thirty percent of greenhouse gas emissions.⁴⁰ Measured in dollars, the energy required to power buildings in the United States costs owners over \$228 billion every year, a quarter of which is wasted by building systems that are designed or operated poorly.⁴¹

Buildings also contribute to the United States' waste problem. The United States produces 145 million metric tons (MMT) of construction and demolition waste every year, compared with 280 MMT of municipal solid waste, meaning that approximately one third of the total waste sent to landfills each year is a

³⁷ Kibert, *Policy Instruments*, *supra* note 12, at 379; *see* GISSEN, *supra* note 7, at 115 (2002).

An architect's choice of materials in Manhattan, for example, triggers a series of events halfway around the globe in Madagascar or Brazil. Depending on the material- it might be raw gravel for cheap concrete, a rare, precious cabinet wood, or iron ore for steel beams - an architect's uninformed choices might contribute in some small way to deforestation, an increase in toxic mine tailings, or the loss of biological and cultural diversity. A preponderance of uninformed choices has led to the slow unraveling of the web of life. *Id.* (emphasis removed).

³⁸ I.K. Wernick & J.H. Ausubel, *National Materials Flow and the Environment*, 20 ANN. REV. ENERGY & ENV'T 463, 473 (2000); Kibert, *Listen to Your Mother*, *supra* note 12, at 38.

³⁹ Kibert, *Policy Instruments*, *supra* note 12, at 379.

⁴⁰ USGBC INTRODUCTION, *supra* note 16, at 5.

⁴¹ *See Energy Efficiency in Green Design*, BetterBricks, at <http://www.betterbricks.com> (last visited Mar. 17, 2004).

direct byproduct of building construction.⁴² Buildings contribute 136 million tons of construction and demolition waste each year, or approximately 2.8 pounds per person in the United States per day, and consume twelve percent of the nation's potable water supply.⁴³ Commercial buildings can consume millions of gallons of water daily and shed the same amount during a storm as runoff, which can absorb toxic construction materials before entering sewers or the site's groundwater.⁴⁴

The United States has only five percent of the world's population, but accounts for nearly twenty-five percent of annual global energy use.⁴⁵ American buildings have a huge global energy and environmental impact, which is largely un-remarked upon in comparison to that of automobiles, power plants, and factories. USGBC and LEED were purportedly designed to help minimize this staggering impact.⁴⁶

Perhaps most importantly, however, are the subtle yet striking impacts that buildings have on their tenants' environmental awareness. Modern buildings inherently divorce their occupants from nature, providing them with an insulated space in which to conduct their business and lives. In numerous ways, these spaces prevent tenants, many of whom spend most of their waking lives within the artificial confines of the building's systems,⁴⁷ from appreciating the fact that they belong to the much larger, natural global ecosystem; consequently, tenants often believe that their personal health is independent from the health of our planet as a whole.⁴⁸ Moreover, recent studies argue that most types of cancer are caused by environmental factors;⁴⁹ given how much time people spend

⁴² See Kibert, *Policy Instruments*, *supra* note 12, at 381. "[P]olicy must address this enormous, burgeoning stock of materials to ensure that it becomes, to the greatest degree possible, a resource for future generations rather than an enormous waste disposal problem." *Id.*

⁴³ USGBC INTRODUCTION, *supra* note 16, at 5.

⁴⁴ GISSEN, *supra* note 7, at 89.

⁴⁵ THE PRESIDENT'S COUNCIL ON SUSTAINABLE DEVELOPMENT, SUSTAINABLE AMERICA, A NEW CONSENSUS FOR PROSPERITY, OPPORTUNITY, AND A HEALTHY ENVIRONMENT FOR THE FUTURE 142 (1996) ("There is greater opportunity for improvements in energy efficiency in the United States than in other industrialized nations; U.S. energy use per unit of GDP is approximately 36% greater than in Germany and 79% greater than in Japan.").

⁴⁶ See generally, USGBC INTRODUCTION, *supra* note 16.

⁴⁷ See Laurent Belsie, *Step Aside Yuppies, Here Come "Dewks"*, CHRISTIAN SCI. MONITOR, USA 1, Oct. 24, 2000 ("Americans devote nearly 2000 years to their jobs, more than any other industrial nation . . .").

⁴⁸ See *supra* notes 199-205 and accompanying text; see also Kibert, *supra* note 12, at 38; see also Charles J. Kibert et al., *Defining an Ecology of Construction*, in CONSTRUCTION ECOLOGY: NATURE AS THE BASIS FOR GREEN BUILDING 7 (Jan Sendzimir et al. eds., 2002).

⁴⁹ See Judith Heerwagen, *Sustainable Design Can Be an Asset to the Bottom Line*, ENVIRONMENTAL DESIGN & CONSTRUCTION, Jul. 15, 2002, at 16, available at http://www.edcmag.com/edc/cda/articleinformation/features/bnp_features__item/0,,80724,00+en-uss_01dbc.html (last visited Nov. 1, 2004).

performing their jobs inside structures it is hardly surprising that many are calling for the construction of healthier buildings.⁵⁰ Part V of this article continues to develop these arguments and calls upon USGBC to further include them in later versions of LEED.

B. Historical Overview of Green Building in the United States

The first use of the term "green" in American architectural circles can be traced to *Architecture* magazine in the mid-1990s.⁵¹ It seems likely, from the numerous programs already in place and the growing list of LEED certified projects, that the nascent green building movement is poised to flourish as a legitimate arm of the architecture discipline.⁵² Although USGBC, and its attempt to create a comprehensive, uniform standard for sustainable design through LEED, has existed for only a short period of time, architects and engineers have struggled for over a century to minimize the profound effects that structures have on their surrounding natural environment.⁵³ For example, Milan's famous Galleria Vittorio Emanuele II, built in the late nineteenth century, used passive systems such as roof ventilators and underground air-cooling chambers to moderate indoor temperatures.⁵⁴ The early 20th century Flatiron Building and New York Times Building in Manhattan used deep-set windows⁵⁵ to shade workers from the effects of the sun.⁵⁶

Prior to World War II, the United States had little need for the modern skyscraper, as compared to today, for a variety of reasons. Blue-collar workers accounted for almost ninety percent of America's workforce at that time and widespread demand for large amounts of office space across all sectors of the economy was not very strong.⁵⁷ By the end of the century, however, forty

⁵⁰ See generally Ross A. Leventhal, "Greening" a Profession, *ARCHITECTURE WEEK*, Aug. 23, 2000, at C2.1; see also Alex Tynberg, *The Natural Step and Its Implication for a Sustainable Future*, *HASTINGS W.-NW. J. ENVTL. L. & POL'Y* 73 (2000) ("The current economic and legal system in the United States fails to guide society towards a sustainable future The key to achieving sustainability is to change the practices of commerce, which presently exist unencumbered by real connections to the environment.").

⁵¹ Nathan Engstrom, *The Rise of Environmental Awareness in American Architecture: From the Bruntland Commission to LEED*, in KATS, *supra* note 35, at 2 n.19.

⁵² See KATS, *supra* note 35, at 2 ("It is therefore unimpressive that there is already an emerging national consensus on the definition of a green building and a rapidly increasing number of green projects in both the public and private sectors.").

⁵³ See generally FRAMPTON, *supra* note 13, at 178-85.

⁵⁴ WHITE PAPER, *supra* note 32, at 4.

⁵⁵ Deep-set windows are generally placed shallower in the building's wall with greater sill area, thus shielding the interior from penetrating light. FRAMPTON, *supra* note 13, at 55.

⁵⁶ See WHITE PAPER, *supra* note 32, at 4.

⁵⁷ See Georgette C. Poindexter, *Light, Air, or Manhattanization?: Communal Aesthetics in Zoning Central Real Estate Development*, 78 B.U. L. Rev. 445, 452 (1998).

percent of the workforce was employed in the office sector.⁵⁸ This fundamental shift in the American economy from manufacturing to services increased demand for highly concentrated office spaces and consequently led to the construction of high-rise buildings in new urban commercial and residential centers.⁵⁹ After World War II, in particular, many of those new urban centers were designed in a "profoundly anti-urban way; instead of building whole places, the new system produced an endless series of isolated fragments which pull[ed] apart and isolate[d] the city.... Mixed-use, mixed income neighborhoods turned into single-use, single-income enclaves connected by roads for vehicles, not pedestrians."⁶⁰

As building technologies improved, the urban landscape changed dramatically. Architects like Mies Van der Rohe, Le Corbusier, and other champions of the International Style⁶¹ used new air-conditioning, fluorescent lighting, structural steel, and reflective glass technologies to introduce the "glass box" skyscraper into architectural studios as the *de facto* structure of choice for both commercial and residential projects.⁶² Jane Jacobs' famous 1961 book, *The Death and Life of Great American Cities*, was read widely in both academic and professional circles and spawned the birth of the New Urbanism movement, which tried to move the discipline away from the austerity and artificiality of the International Style.⁶³ Similarly, in the 1970s and 1980s, influential thinkers

⁵⁸ *Id.*

⁵⁹ *See id.*

⁶⁰ Ray Gindroz, *New Urbanism and Smart Growth: City Life and New Urbanism*, 29 FORDHAM URB. L.J. 1419, 1420 (2002). But see JANE JACOBS, *THE DEATH AND LIFE OF GREAT AMERICAN CITIES* 7 (1961). Jacobs points out that although "[a]utomobiles are often conveniently tagged as the villains responsible for the ills of cities and the disappointment and futilities of city planning," their "destructive effects . . . are much less a cause than a symptom of our incompetence at city building." *Id.* Sustainable architecture rebukes that incompetence and, in part, attempts to "make automobiles and cities compatible with one another." *Id.*

⁶¹ See FRAMPTON, *supra* note 13, at 248, for Henry-Russell Hitchcock and Philip Johnson's introduction to their famous 1932 exhibit on the International Style at the Museum of Modern Art in New York City. For Hitchcock and Johnson, "[t]he prime architectural style [was] no longer the dense brick, but the open box." *Id.*

⁶² See *id.* at 248-62, for a broad overview of the International Style architectural movement during the period 1925-1965.

⁶³ The New Urbanism movement:

[V]iews the divestment in central cities; the spread of placeless sprawl; increasing separation by race and income; environmental deterioration; loss of agricultural lands and wilderness; and the erosion of society's built heritage as one interrelated community-building challenge. It stands for . . . the reconfiguration of sprawling suburbs into communities of real neighborhoods and diverse districts . . . [s]treets and squares . . . encourag[ing] and enable[ing] neighbors to know each other and protect their communities.

Gindroz, *supra* note 60, at 1427; see also JACOBS, *supra* note 60, at 3 ("[T]his book is an attack on

encouraged architects and engineers to begin experimenting with different materials and building systems, which ultimately led to the June, 1993 World Congress of Architects in Chicago.⁶⁴ Six thousand architects signed the *Declaration of Interdependence for a Sustainable Future*, and the conference is now "recognized as a turning point in the history of the green building movement."⁶⁵ Over the next seven years, President Clinton signed executive orders relating to sustainability and became a vocal proponent of the newly created USGBC and its LEED sustainability rating system.⁶⁶

USGBC was established in 1993 to promote green design in new construction projects by emphasizing the benefits green design confers on owners.⁶⁷ Such benefits may include: higher building system performance at lower cost through synergies between disparate technologies due to integrated designs; lower overall operating costs due to lower utility costs; decreased vacancy rates through improved retention of tenants, leading to substantial marketing advantages for developers looking to obtain leases from other potential tenants; reduced liability and insurance premiums because of an improved risk management strategy; higher levels of overall employee satisfaction because of a healthier workplace; greater volumes of retail sales (studies have shown a forty percent improvement in retail spaces with more natural light⁶⁸); and an increased overall valuation of the building.⁶⁹

USGBC's green building pilot program, LEED 1.0, was unveiled in late-1998, a year in which over one million square feet of building space was registered.⁷⁰ Problems with the pilot program were quickly exposed. For example, credits were "either too prescriptive or already standard practice" in the industry, while energy-related credits were not "sufficiently related to performance."⁷¹ The result of this criticism was the creation of LEED 2.0 in 2000, with further refinements in 2003 under LEED 2.1. As of September,

current city planning and rebuilding. It is also, and mostly, an attempt to introduce new principles of city planning and rebuilding, different and even opposite from those now taught in everything from schools of architecture and planning to the Sunday's supplements and women's magazine."). The modern green building movement is part of Jacob's attack. *Id.*

⁶⁴ See WHITE PAPER, *supra* note 32, at 5.

⁶⁵ *Id.*

⁶⁶ See WHITE PAPER, *supra* note 32, at 7; see also Exec. Order No. 13,123, 64 C.F.R. 30,851 (1999).

⁶⁷ See generally U.S. Green Bldg. Council, at <http://www.usgbc.org> (last visited Nov. 1, 2004) [hereinafter USGBC Website]. USGBC was initially comprised of professionals from the construction industry as well as representatives from various agencies. *Id.*; see also WHITE PAPER, *supra* note 32, at 7.

⁶⁸ See WHITE PAPER, *supra* note 32, at 34.

⁶⁹ See *supra* notes 211-14 and accompanying text; see also USGBC Website, *supra* note 67.

⁷⁰ See WHITE PAPER, *supra* note 32, at 7.

⁷¹ *Id.*

2003, 948 projects totaling 148 million square feet of space have been registered with the program.⁷² Unfortunately, many of the same problems exist under this latest update. Further, numerous pre-existing state and local programs provide developers with financial incentives for going green.⁷³ LEED's failure to provide similar incentives remains its most glaring weakness.

II. PRE-LEED GREEN BUILDING PROGRAMS AT THE STATE AND LOCAL LEVEL

The first local green building program in the United States was established in Austin, Texas in 1991.⁷⁴ Today, over two-dozen similar programs exist across the United States.⁷⁵ Cities such as Portland, Seattle, and Pittsburgh give grants to developers exploring energy modeling, commissioning, and other related cost options in their buildings.⁷⁶ Some cities offer expedited permit review processes and preferred zoning considerations for buildings with sufficient levels of sustainable features.⁷⁷ Santa Barbara, California, Scottsdale, Arizona, and Arlington County, Virginia are among the jurisdictions pioneering these types of incentive programs.⁷⁸ The Santa Barbara Innovative Building Design Review Committee was the first, and provides "fast track" permit approvals for projects with "superior environmental performance," which are awarded by a voluntary panel of local environmental construction specialists.⁷⁹ As part of its Green Points Building Program, Boulder, Colorado became the first municipality in the country to require green design elements in all new residential construction and remodeling projects greater than 500 square feet.⁸⁰ In 2001, Frisco, Texas enacted the first green building city ordinance in the United States, incorporating

⁷² *Id.*; see also USGBC Introduction, *supra* note 16, at 14-15 (stating that LEED certifies projects can now be found in forty-nine states, as well as nine different countries. California, Pennsylvania, Washington, Oregon, and New York lead United States with 141, 66, 52, 45, and 41 registered projects, respectively, as of August 11, 2003).

⁷³ See discussion *infra* Part II.C, for a discussion of various state and local programs which future versions of LEED should refer to and incorporate.

⁷⁴ See WHITE PAPER, *supra* note 32, at 7.

⁷⁵ See KATS, *supra* note 35, at 2.

⁷⁶ See U.S. GREEN BLDG. COUNCIL, MAKING THE BUSINESS CASE FOR HIGH PERFORMANCE GREEN BUILDINGS 11 (2002), available at <http://www.southernlinkllc.com/articles/makingcase-grnbldgs.pdf> (last visited Nov. 20, 2004) [hereinafter BUSINESS CASE].

⁷⁷ *Id.* at 8; see also PETER YOST, GREEN BUILDING PROGRAMS – AN OVERVIEW, available at http://www.buildingscience.com/resources/misc/green_building_programs_article.pdf (last visited Nov. 1, 2004).

⁷⁸ See BUSINESS CASE, *supra* note 76, at 9.

⁷⁹ See generally YOST, *supra* note 77.

⁸⁰ *Id.* at 14; see also *Green Points Building Program*, City of Boulder Office of Env. Affairs, at http://www.ci.boulder.co.us/environmentalaffairs/green_points/overview.html (last visited Nov. 1, 2004).

EPA's Energy Star program.⁸¹

Several states, including New York, Maryland, Massachusetts, and Oregon now provide developers with tax credits for constructing LEED-certified buildings.⁸² New York's credit was the first of its kind in the United States and was passed as part of the state budget in 2000.⁸³ It became effective on January 1, 2001 and the state's Department of Environmental Conservation began accepting credit applications from developers on September 30, 2002.⁸⁴

Local governments have also sought to advance green building by addressing the solid waste problem that buildings create. Massachusetts, for example, will soon become the first state to ban the disposal of demolition and construction waste in landfills.⁸⁵ General contractors who have already volunteered to participate in the program separate prohibited materials, which include asphalt, concrete, wood, gypsum wall board (drywall), and various metals, from other non-recyclable materials at the project site to avoid commingling in dumpsters.⁸⁶ Massachusetts officials anticipate that other Northeastern states will adopt similar programs once it becomes apparent that such bans do not create any additional costs for general contractors.⁸⁷

One of the persistent problems plaguing these existing green building programs, including LEED, is establishing a concrete, precise, and uniform definition of what it means to build green across the variety of different construction disciplines.⁸⁸ Although the solution to this overarching problem is beyond the scope of this article, there are obvious ways in which both LEED, America's most important green building program, and local programs can be improved, particularly with regard to high-rise construction. Part III of this Article examines the benefits that green design purportedly confers on developers and makes recommendations on which benefits LEED should place

⁸¹ See YOST, *supra* note 77, at 16. The Program was developed to insure that the town's housing supply remained at a sufficiently high level of quality as the town experienced growth. *Id.* ("The City Council felt that a program mandating high performance housing was a good way of keeping real estate and community values high as the more or less uniform housing stock mature[d].").

⁸² BUSINESS CASE, *supra* note 76, at 8.

⁸³ See Juliette Fairley, *A 'Green' High-Rise*, N.Y. NEWSDAY, Jan. 17, 2003, at C08.

⁸⁴ See *id.*

⁸⁵ Gordon Wright, *Disposal Discipline*, BUILDING DESIGN & CONSTRUCTION, Nov. 2003, at 44 ("Federal agencies will undoubtedly start moving in that direction, and the growing sustainability movement is adding to the pressure to dispose of waste properly.").

⁸⁶ *Id.*

⁸⁷ *Id.*

⁸⁸ See Yost, *supra* note 77, at 12 ("Something as fundamental as a standard definition of green building is still hard to come by, even then years after the first green building is still hard to come by, even then years after the first green building program appeared."). To complicate matters further, "the definition of a sustainable building is innately subjective. There is no universally accepted way to compare such diverse green attributes as, for example, improved human health, reduced water pollution and reduced forest cutting." KATS, *supra* note 35, at 2.

greater emphasis when encouraging developers to incorporate green elements into their buildings.

III. THE DEBATE OVER GREEN BUILDING: ARE PURPORTED BENEFITS FACT OR FICTION?

A. Does Green Cost More to Build?

The starting point for an analysis of LEED is an examination of the purported financial benefits of green design. There are few comprehensive empirical studies analyzing the costs and returns from incorporating green elements into a building's design to earn LEED credits.⁸⁹ The first, an October, 2003 study prepared for the California Sustainable Task Force, entitled *The Costs and Financial Benefits of Green Buildings*, found that:

[T]he average premium for... green buildings is slightly less than 2% (\$3-5 per square foot), substantially lower than is commonly perceived. The majority of this cost is due to the increased architectural and engineering design time necessary to integrate sustainable building practices into projects. Generally, the earlier green building gets incorporated into the design process, the lower the cost.⁹⁰

Another California study, performed in 2001, found that California developers estimated green buildings to cost ten to fifteen percent more than conventional buildings.⁹¹ Moreover, the October, 2002 issue of *Consulting-Specifying Engineer* stated that "the perception that green design is more expensive is pervasive among developers and will take time to overcome."⁹² It also noted "inhibiting green design is the perception that 'green' costs more and does not have an economically attractive payback."⁹³ Further, "[d]evelopers typically presume a ten to fifteen percent cost premium for building green," but "[a]ccording to those who actually build LEED certified buildings... this figure

⁸⁹ A major problem with the LEED rating system is that "[v]irtually no data has been collected on conventional buildings to determine what the building would cost as a green building. And, surprisingly, most green buildings do not have data on what the building would have cost as a conventional building." KATS, *supra* note 35, at 2.

⁹⁰ *Id.*

⁹¹ KATS, *supra* note 35, at 12; see also Adam Berman, Green Buildings: Sustainable Profits from Sustainable Development (2001) (unpublished report, Tilden Consulting, on file with author at adam@isabellafreedman.org).

⁹² KATS, *supra* note 35, at 12 ("There has been widespread perception in the real-estate industry that building green is significantly more expensive than traditional methods of development"); see also Scott Siddens, *Verdant Horizon*, CONSULTING-SPECIFYING ENGINEER, Oct. 2002, at 30-34, available at <http://www.syska.com/sustainable/news/index.asp> (last visited Nov. 20, 2004).

⁹³ KATS, *supra* note 35, at 12; see also Siddens, *supra* note 92, at 30-34.

is substantially lower.”⁹⁴ In essence, the more experience a developer has using the LEED system, the lower his or her initial construction costs will be.⁹⁵

The question for the developer then becomes whether higher initial investment costs become justified through substantial future savings.⁹⁶ *Building Design & Construction*’s November, 2003, *White Paper on Sustainability*, concluded that:

There may in some cases be a slight premium for taking a conventional design to the equivalent of LEED certified, but not always. A well-executed design that reduces infrastructure and building volume can produce a sustainable building at a premium of 1-2% at most. Going up in class to the equivalent of [a] Silver or Gold [Star] may push up the premium, but at considerable additional savings over the life of the building.⁹⁷

For example, in 2000, Seattle, Washington became the first municipality in the United States to adopt LEED as the standard for public construction.⁹⁸ An analysis of Seattle’s 11 LEED-certified public buildings found that LEED certification does not add to the cost of a project, provided that certain measures are taken before breaking ground.⁹⁹

The payback periods for initial green construction costs may also not be as long as many developers think. Houston-based architect Kirksey, an active proponent of the green building movement, made the business case for a client’s 22,000 square foot green office building it designed in early 2002 by creating a “payback table” which illustrated the premium cost for each of the project’s green elements along with the corresponding time periods required for the developer to pay it back.¹⁰⁰ One of the most expensive elements, insulated glazing on the building’s exterior curtain wall, required a payback period of only

⁹⁴ Berman, *supra* note 91, at 5.

⁹⁵ *See id.*

⁹⁶ *See generally* WHITE PAPER, *supra* note 32; *see also* Berman, *supra* note 91, at 5.

⁹⁷ WHITE PAPER, *supra* note 32, at 33.

⁹⁸ *See* LUCIA ATHENS AND GALE FULTON, DEVELOPING A PUBLIC PORTFOLIO OF LEED PROJECTS: THE CITY OF SEATTLE EXPERIENCE (2002) at http://www.usgbc.org/expo2002/schedule/documents/ds509_athens_p126.pdf (last visited Nov. 1, 2004).

⁹⁹ Among these measures are including LEED requirements as part of the construction documents, building construction, and building commissioning requirements, selecting a design team that has sustainable design “embedded within the firm’s design culture,” including contractors, property managers, real estate analysts, budget analysis, crew chiefs, and custodians as part of the project team, selecting green design strategies that are “whole system in nature, and pursuing integrated design solutions that cannot be peeled off from the base project as “add alternates.” *Id.*

¹⁰⁰ *Contractor Sets an Example with Green HQ*, BUILDING DESIGN & CONSTRUCTION, Nov. 2003, at 45 [hereinafter *Green HQ*]. The payback table includes periods varying from 3.2 to 11.2 years. *Id.*

5.9 years at a premium cost of \$22,950.¹⁰¹ The client, Spawglass Construction Corp., agreed to the green elements because “the building would give [it] a marketing advantage by demonstrating its commitment to sustainable design.”¹⁰² The relatively small periods over which the premiums were to be paid back made its decision to go green a process that “was not lengthy.”¹⁰³

Prior to the seminal *Costs and Financial Benefits of Green Buildings* study, several other less comprehensive studies were performed. These studies attempted to empirically analyze the actual costs and financial benefits of green buildings. In October of 2002, the David and Lucile Packard Foundation¹⁰⁴ released a *Sustainability Matrix and Sustainability Report* designed to analyze environmental goals for a 90,000 square foot office building.¹⁰⁵ It found that with each increasing level of LEED rated sustainability, short-term costs increased, but long-term costs decreased substantially.¹⁰⁶ An earlier study, performed by Xenergy for the city of Portland, Oregon, found a fifteen percent lifecycle savings upon bringing three standard buildings up to LEED certification standards.¹⁰⁷

With respect to high-rise construction, a 2002 EPA report found Energy Star-labeled office buildings to generate utility bills forty percent less than the average office building.¹⁰⁸ Some critics have argued that high-rises can never be considered green because their construction alone consumes too much energy. William Browning, a senior associate at the Rocky Mountain Institute who collaborated with Fox & Fowle at Four Times Square, has addressed these concerns:

Tall buildings... contain dense concentrations of material, and a large amount of energy is used to make those materials. However, over the life of a building, the embodied energy—the amount of energy it takes to make

¹⁰¹ *Id.*

¹⁰² *Id.* (statement of John English, Spawglass Senior Vice President).

¹⁰³ *Id.*

¹⁰⁴ See The David and Lucile Packard Foundation, at <http://www.packard.org> (“The David and Lucile Packard Foundation was created in 1964 by David Packard (1912-1996) and Lucile Salter Packard (1914-1987). David and Lucile Packard shared a deep and abiding interest in philanthropy.”) (last visited Mar. 18, 2004).

¹⁰⁵ See KATS, *supra* note 35, at 3, n.24. This comprehensive study evaluates the life cycle cost of six increasingly green designs, each built to a different standard of sustainability. Increases in initial capital costs are weighed against decreases in operating costs to determine net present value (NPV) for each building type over a 30, 60 and 100 year period. The study concludes that life cycle cost for a green building is considerably lower than for a conventional one. *Id.*

¹⁰⁶ *Id.*

¹⁰⁷ *Id.* at vii.

¹⁰⁸ See BUSINESS CASE, *supra* note 76, at 3 (“For international developer and investor Hines, efficiencies gained from its Energy Star buildings are generating \$13 million in annual savings based on 2000 evaluation.”).

the materials and construct the building—is a small fraction of the energy consumed in operations. In a suburban setting, the individual cars commuting to and from a building can cause a significant amount of energy as well. A tall, energy-efficient building in an urban setting where most workers use mass transit may be less energy-intensive than a low, large-floor-plate building in a suburban setting.¹⁰⁹ Moreover, both commercial and residential buildings maintain high values by sustaining high occupancy rates, and green building systems provide for easier building maintenance; this makes such buildings easier to sell to tenants, and also command higher rental or sales values for owners.¹¹⁰

Residential buildings, however, present developers seeking LEED certification with greater challenges than do commercial buildings because they demand higher energy and water use. The Solaire, a twenty-seven story structure ironically located just a few short blocks from Ground Zero in lower Manhattan's Battery Park City, is America's first green residential high-rise.¹¹¹ High resource demands in residential buildings caused developer Albanese Corp. to estimate that the structure will cost 13% more than a traditional residential high-rise building.¹¹²

USGBC must address the initial cost discrepancies between commercial, residential, and public buildings in subsequent versions of LEED. It must "change the content and rigor [of LEED]... so as to address the need for 'raising the bar' in response to improvements in technologies, knowledge, data, and market advancement."¹¹³ If incorporated into future versions of LEED, the empirical data presented by the types of studies presented above, as well as documented testimonials from the developers of America's newest green buildings, could go a long way towards dispelling green movement fictions. The studies presented in this section are but a small fraction of the growing body of empirical data that suggests the truth: green buildings make financial sense and are worthy of every developer's attention.

¹⁰⁹ GISSEN, *supra* note 7, at 180.

¹¹⁰ See BUSINESS CASE, *supra* note 76, at 7 ("Features designed to cut energy and water bills help attract tenants to the property and increase the likelihood of continued occupancy.")

¹¹¹ Fairley, *supra* note 83 ("[Y]ou get more redundancy and resiliency in case of disruption, power outage or a terrible attack like 9/11.") (discussing benefits of energy and water efficient building systems).

¹¹² Berman, *supra* note 91, at 6. Interestingly, however, Albanese "admits that the project's photovoltaic panels and black-water treatment system, two very expensive green technologies, account for the majority of the premium. Without these items, the cost to green would be just under 1% of the total cost" *Id.*

¹¹³ Macolm Lewis and Nigel Howard, *The Future of LEED*, ENVIRONMENTAL DESIGN & CONSTRUCTION, Jul. 11, 2003, at 16, available at http://www.edcmag.com/edc/cda/articleinformation/features/bnp_features_item/0,,103633,00+en-uss_01dbc.html (last visited Nov. 1, 2004).

B. Beyond the Bottom Line

While USGBC, other local green building programs, and the bulk of think tank research projects have largely emphasized the financial benefits of green design, its benefits are not strictly found at the bottom of a developer's balance sheet.¹¹⁴ According to William S. Becker, the former director of the Center of Excellence for Sustainable Development at the United States Department of Energy, "[i]n the not too distant future, all development will be green. Developers, builders, and buyers will discover that green not only enhances their pocketbooks, but also their health and the quality of their lives. The developers who grasp this first will have an edge in a massive, emerging market."¹¹⁵ For instance, numerous studies of sustainable design have concluded that a structure's interior thermal environment, which includes temperature, humidity levels, and ventilation control, influences worker productivity and performance, the building's overall air quality, and acoustics.¹¹⁶ Studies have also shown that personal control over environmental conditions such as temperature and ventilation leads to better work performance.¹¹⁷ In addition, connecting employees with the natural environment by providing views and importing outdoor amenities such as fountains and trees reduces worker stress and improves overall psychological and emotional functioning.¹¹⁸

Not all developers, however, are convinced. Some have stated they would like to see more empirical research on whether green buildings do in fact improve the productivity of occupant workers before drawing any conclusions about the viability of this particular arm of the green building movement.¹¹⁹ USGBC must more proactively procure data about these benefits and alert the industry to them by including them in later versions of LEED.

C. Conclusions about the Benefits of Green Design

Building Design & Construction's White Paper performed a September, 2003 survey of the 76,001 architects, contractors, engineers, and owners who receive the magazine. The survey asked what readers thought of green design, as well as how invested their firms were in pursuing sustainable design and construction techniques.¹²⁰ 44% responded that green design added significantly to first costs,

¹¹⁴ See generally WHITE PAPER, *supra* note 32.

¹¹⁵ Berman, *supra* note 91, at title page.

¹¹⁶ See Heerwagen, *supra* note 49, at 16.

¹¹⁷ *Id.*

¹¹⁸ *Id.*

¹¹⁹ See Flynn, *supra* note 30, at 33.

¹²⁰ WHITE PAPER, *supra* note 32, at 14. The data was obtained using, "[a] scientifically drawn sample of 10,000 recipients of *Building Design & Construction* was invited to take the survey on the Internet. In total, 498 respondents completed the survey." *Id.* "One respondent summed up the

42% said that the real estate market was neither interested nor willing to pay a premium for green elements, 35% felt green design was hard to justify even in light of studies which revealed the movement's potential for long-term savings, 19% were simply uncomfortable with new green ideas and technologies, 16% thought LEED was too complicated and requires too much paperwork, and 24% had no comment.¹²¹

The real estate industry continues to be conflicted over the benefits of green design. To date, the benefits emphasized by USGBC have been entirely financial and little reference has been made to either worker productivity or architectural choices that destroy both immediate and distant natural environments. Green building programs must change their emphasis, or at least put other benefits on the same solid empirical footing as bottom line economics, before developers at large will see the movement as having the mass appeal it deserves.

IV. LEED: A SUFFICIENT STANDARD FOR SUSTAINABLE 21ST CENTURY HIGH-RISE ARCHITECTURE?

Four Times Square's unique status as America's greenest high-rise building, despite pre-dating LEED or any other state or local green building program, positions a case study analyzing its green features to help advance numerous arguments in support of the long-term viability of green design in American high-rise buildings. Part IV of this article examines Four Times Square's green elements through the prism of the most recent version of the LEED Green Building Rating System to show that, while LEED can be a beneficial incentive to developers of high-rise properties, it remains far from perfect. This is largely true because LEED fails to link its various provisions to the numerous other green building programs in existence at the state and local levels, which provide various financial incentives to participating developers.¹²² Moreover, the LEED guidelines, particularly with regard to their most financially beneficial and environment-friendly categories, are not detailed enough for a project team's unsophisticated contractors. It is telling that no skyscraper built in the United States since Four Times Square has sought LEED certification, though it should be noted that several developers in New York City have recently announced that they intend to do so.¹²³

feelings of many who completed the survey: 'Green building is the right direction for construction but also should be used with common sense. Spending millions extra with insufficient payback will only hurt the green building movement.'" *Id.* at 17.

¹²¹ *Id.* at 14-17.

¹²² See WHITE PAPER, *supra* note 32, at 22-23, for a comprehensive list of incentives provided at the state and local levels.

¹²³ The new Hearst Corporation headquarters building at Eighth Avenue and 56th Street in

A. Four Times Square: America's First Green Skyscraper

Although it still reigns supreme as the United States' only green high-rise building, Four Times Square was completed prior to even the pilot phase of LEED 1.0.¹²⁴ Durst and the rest of its project team chose to go green because each member had a long history of environmental awareness:¹²⁵ "it was the synergy and common interest of the three firms [contractor, architect, and developer] that really made Four Times Square work."¹²⁶ Most large scale construction project teams, however, do not work with such a level of familiarity with the green building effort.¹²⁷ LEED attempts to bridge the gap between such green-novice project teams and the high learning curve, which has damaged the movement's perception among developers.¹²⁸

The construction guidelines at Four Times Square announced that the building was to offer tenants "an office tower bristling with the latest technologies that will be demanded by sophisticated tenants as they enter the 21st Century."¹²⁹ Prospective tenants were encouraged to tie into the building's pre-existing green infrastructure when fitting out their respective floor space by taking advantage of Four Times Square's "high-performance windows and higher than normal ceilings," keeping "sections of the perimeter free of private offices to let more natural light penetrate the interior of the space," and "consolidating rooms with similar uses and schedules."¹³⁰ Durst's primary goal in erecting the structure, though, was "to set a new standard in environmentally responsible

Manhattan is "being designed and equipped to be energy efficient, to minimize waste, an to provide a bright, attractive interior environment for the 1,800 employees who will work there." John Holusha, *A Tower Designed to be Environmentally Friendly*, N.Y. TIMES, Dec. 21, 2003, at RE4. The building's steel will be "20 percent lighter than that in typical Manhattan office building because of the structural design and will contain at least 90 percent recycled content." *Id.* In addition, for the first time in the United States, a green European cooling technique will be used to regulate the temperature in the building's lobby without the use of conventional air-conditioning systems. *Id.*

¹²⁴ See discussion *supra* Part II.B, for a description of LEED's historical development.

¹²⁵ See GISEN, *supra* note 7, at 179, for a detailed description of the environmental backgrounds of the project team.

¹²⁶ *Id.* (statement of Bruce S. Fowle, principal of Four Times Square architect Fox & Fowle).

¹²⁷ See WHITE PAPER, *supra* note 32, at 2-5.

¹²⁸ See generally LEED 2.1, *supra* note 19.

¹²⁹ The Durst Organization Website, at http://www.durst.org/prop/prop_4.htm (last visited Mar. 17, 2004) (statement of Douglas Durst, Durst Organization President) [hereinafter Durst Website].

¹³⁰ *Id.* The bulk of the guidelines that Durst used in creating its comprehensive green design for Four Times Square emphasized the use of energy efficient, gas-fired heating, ventilation, and air conditioning ("HVAC") systems; fresh air circulation at four times the then-current code requirements; high-performance windows that let in light while at the same time retaining the inside air temperature; extra-large windows designed to maximize permitted daylight, thus lowering the overall need for electric lighting; digital monitoring systems for HVAC; extra levels of insulation to minimize the use of HVAC; variable speed drives on fans and pumps for improved energy efficiency; recycled and recyclable materials used during the various construction phases; and recycling chutes on each floor that tenants were asked to plug into. *Id.*

construction.”¹³¹ To that end, the subsequent creation of LEED seems to indicate that the developer was successful.

B. LEED Credit Category 1 Analysis: Sustainable Sites (“SS”)

LEED’s first credit category gives developers up to fourteen possible points for wisely choosing building locations.¹³² Credits are earned for selecting sites that “do not include sensitive site elements and restrictive land types.”¹³³ This channels development towards urban areas with existing infrastructure, rehabilitates damaged sites such as brownfields,¹³⁴ provides access to public transportation, accommodates alternative means of transportation, and conserves natural areas by sharing building facilities such as parking decks. LEED’s building location credit system thus encourages development with as small a footprint as possible to minimize site disruption.¹³⁵

The difference between low-rise building footprints and their high-rise counterparts illustrates the importance of high-rise buildings to the green building movement. If a space comparable to Four Times Square’s 1.6 million square feet of office space were to be divided up into individual buildings in a less dense suburban or rural location, it would require a site of 140 acres, excluding the additional space necessary for utilities and access infrastructure.¹³⁶ Standing forty-eight stories tall, Four Times Square sits upon only one acre of land in Manhattan’s Time Square, adjacent to nine of New York City’s twenty-three subway lines, and just a few short blocks away from the regional transportation hubs of Grand Central and Penn Stations.¹³⁷ Minimizing a building’s footprint by building a skyscraper thus has the potential to drastically reduce its impact on the natural environment.¹³⁸

The guidelines provided by USGBC for SS, however, are decidedly

¹³¹ *Id.* Durst is a “committed environmentalist” who is part-owner of the largest organic farm in the state of New York. See *Real Estate Roundtable*, *supra* note 2. This might explain his enthusiasm for fronting substantial, above-average costs for his building to incorporate holistic green design. *Id.*

¹³² LEED 2.1, *supra* note 19, at 2.

¹³³ *Id.*

¹³⁴ A brownfield is an abandoned or underused location that is typically the site of a former industrial complex, gas station, oil storage facility, or other building that required chemicals which may have polluted the soil or water table. The regeneration of a brownfield is a sustainable activity because it involves the cleanup of a polluted site and subsequent efficient use of the formerly unusable land. GISSEN, *supra* note 7, at 183.

¹³⁵ See generally LEED 2.1, *supra* note 19, at 1-15.

¹³⁶ See GISSEN, *supra* note 7, at 180 (“The incredible concentration on a small piece of land, which 95 percent of the workers--of whom there are 6,000--get to work by public transportation in itself makes it sustainable.”) (statement of Bruce Fowle, principal of Fox & Fowle).

¹³⁷ See Durst Website, *supra* note 129.

¹³⁸ Kibert, *Listen to Your Mother*, *supra* note 12, at 38.

simplistic.¹³⁹ By nature, the category encourages high-rise construction, but it provides little real incentive or guidance for developers who choose to build in urban locations where almost all buildings are high-rises with small footprints and are easily accessible to mass transit. LEED should consider offering financial incentives to developers similar to those provided by the city of Austin, Texas, which helps developers offset the higher costs of building in urban areas through the use of its Smart Growth Matrix credits.¹⁴⁰ LEED should also make reference to how much land area a skyscraper saves and link itself to tax credits for developers purchasing plots for high-rise development.¹⁴¹

C. LEED Credit Category 2 Analysis: Water Efficiency (WE)

WE is the smallest of the LEED 2.1 credit categories, awarding developers up to five credits for taking measures to improve water efficiency. Durst did not provide standards for water efficiency at Four Times Square; LEED nevertheless awards points to developers who limit or eliminate the use of potable water for landscape irrigation,¹⁴² incorporate innovative wastewater technology into the building's sewer systems, or achieve a substantial reduction in the overall amount of water that the building consumes.¹⁴³

WE illustrates one of the most pervasive problems with the LEED rating system. Some LEED credits, or performance requirements, can be met with ease; others are more complicated and, from the outset, require a project team to think in a much more integrative fashion than merely ordering more efficient building materials off of a checklist.¹⁴⁴ Guidance from USGBC in this category is generally superficial. Using low-flow faucets or waterless urinals, for

¹³⁹ See LEED 2.1, *supra* note 19, at 1-15. The Potential Technologies and Strategies for the Development Density credit, for example, are "[d]uring the site selection process, give preference to urban sites." *Id.* at 3.

¹⁴⁰ Smart growth is "characterized by mixed-use, compact, walkable communities, built onto existing towns and cities, where open space is protected." Timothy Beatley & Richard C. Collins, *Americanizing Sustainability: Place-Based Approaches to the Global Challenge*, 27 WM. & MARY ENVTL. L. & POL'Y REV. 193, 198 (2002); see also Smart Growth Online, at <http://www.smartgrowth.org> (last visited Mar. 18, 2004); see also WHITE PAPER, *supra* note 32, at 22; see also City of Austin Green Building Program, at <http://www.ci.austin.tx.us/greenbuilder> (noting that Austin offers waivers of development fees and public investment in new or improved infrastructure) (last visited Nov. 1 2004).

¹⁴¹ See Fairley, *supra* note 83, for a description of the state of New York's green building tax credit program.

¹⁴² Potable (drinking) water is generally not used in landscape irrigation techniques. See generally LEED 2.1, *supra* note 19.

¹⁴³ *Id.* at 16-20.

¹⁴⁴ See WHITE PAPER, *supra* note 32, at 29-30 ("[S]ome LEED points . . . can be met quite simply, while with others 'it's a lot more complex and [the project team] ha[s] to be thinking in a lot more integrative fashion.'").

example, can satisfy the LEED requirements at little to no additional cost, but no mention of this is made in the guidelines.¹⁴⁵ Further, the Potential Technologies and Strategies section, accompanying the description of each WE credit, merely suggests that “high-efficiency fixtures and dry fixtures such as composting toilets and waterless urinals”¹⁴⁶ be provided to reduce wastewater amounts,¹⁴⁷ and no explicit instructions are given as to how a 30% reduction in overall water use is to be achieved.¹⁴⁸

There are many ways in which WE can be improved. The relative ease with which the requirements of this category can be met should be clearly pronounced in the guidelines. For high-rise buildings, the impact on water consumption that urinals and faucets have is substantial; hard facts in writing would provide the unsophisticated developer with reasons to choose low- or no-flow water systems, which generally cost the same amount as other higher water consumption appliances.¹⁴⁹ Local programs also exist which give developers cash rebates for installing systems that conserve water.¹⁵⁰ LEED must provide similar incentives to make the WE guidelines more credible and of greater practical significance to the developer.

D. LEED Credit Category 3 Analysis: Energy & Atmosphere (EA)

The solid body of empirical data slowly emerging about the financial benefits of green buildings rests largely upon the shoulders of EA.¹⁵¹ The largest of LEED’s five credit categories, EA lists three prerequisites to earning any of the seventeen points available under its various sub-headings.¹⁵² The largest of those sub-headings, “optimizing energy performance,” gives a project team up to ten points for reducing design energy costs compared to the energy cost

¹⁴⁵ *Id.* at 30. However, “earning a point for reducing the use of potable water for irrigation by 50% (WE 1.1) cannot be met simply by installing sophisticated controls” *Id.*

¹⁴⁶ LEED 2.1, *supra* note 19, at 18.

¹⁴⁷ *Id.*

¹⁴⁸ *Id.* at 20.

¹⁴⁹ WHITE PAPER, *supra* note 32, at 29-30.

¹⁵⁰ Austin’s Green Building Program awards developers up to \$40,000. Austin Green Building Program, *supra* note 140, at <http://www.ci.austin.tx.us/watercon/mfspecialrebate.htm> (last visited Nov. 1, 2004).

¹⁵¹ See generally KATS, *supra* note 35; see also WHITE PAPER, *supra* note 32, at 40 (“[T]he data on the bottom-line benefits of sustainable design, such as dollar savings from reduced energy . . . consumption, is much more reliable than that related to many of the less-tangible economic, social, health and well-being benefits of green buildings . . .”).

¹⁵² See LEED 2.1, *supra* note 19, at v. Building elements and systems must be designed and calibrated to insure that they operate as contemplated, a minimum level of energy efficiency for the base building systems must be established, and zero CFC-based refrigerants may be used in new or retrofitted base building HVAC&R systems. *Id.* at 21-23.

budget for energy systems regulated by ASHRAE/IESNA¹⁵³ Standard 90.1-1999.¹⁵⁴ The LEED guidelines distinguish between regulated and non-regulated energy systems, and introduce two methods for architects to separate the energy consumption of regulated systems.¹⁵⁵ They also encourage project teams to apply for innovation credits if the energy consumption of any non-regulated system is also reduced.¹⁵⁶

Efficient lighting systems have tremendous potential for conserving energy, thereby saving high-rise owners substantial amounts of money.¹⁵⁷ As environmentally conscious as the Four Times Square project team was, its decision to go green would not have been made unless Durst, a highly sophisticated developer, knew with some certainty that its initial investment would be returned to it at some point in the future.¹⁵⁸ Durst required a level of 1.0 watt per square foot average connected load, including task lighting,¹⁵⁹ and the project team accomplished this goal by incorporating a variety of energy-efficient lighting systems.¹⁶⁰

Heating and cooling a high-rise building typically takes a toll on the environment. To reduce the impact, Four Times Square has natural gas-powered absorption chillers and heaters installed on the roof to circulate chilled and heated water to cool and heat the building. Most chillers and heaters that supply heating, ventilation, and air conditioning (HVAC) to buildings of comparable size use ozone-depleting chlorofluorocarbons (CFCs)¹⁶¹; those at

¹⁵³ LEED 2.1, *supra* note 19, at 24. ASHRAE/IESNA Standard 90.1-1999, Energy Standard for Buildings Except Low-Rise Residential Buildings, has been established by the DOE as the commercial building reference standard for state building energy codes under the federal Energy Conservation and Production Act. The Act requires all states to certify that they have state energy codes in place that are at least as stringent as 90.1-1999, or justify why they cannot comply with this. National Fire Protection Association, at http://www.nfpa.org/BuildingCode/News/_ASHRAE_NR_1/_ashrae_nr_1.asp (last visited Mar. 17, 2004).

¹⁵⁴ *Id.*

¹⁵⁵ See LEED 2.1, *supra* note 19, at 24 ("Regulated systems include HVAC (heating, cooling, fans and pumps), service hot water, and interior lighting. Non-regulated systems include plug loads, exterior lighting, garage ventilation, and elevators.").

¹⁵⁶ *Id.*

¹⁵⁷ See Durst Website, *supra* note 129.

¹⁵⁸ *Id.*

¹⁵⁹ *Id.*

¹⁶⁰ Engineers "incorporated energy-efficient lighting, including high performance fixtures with central controls in public spaces, exit signs that use light emitting diodes (LED), and occupancy sensors in unoccupied areas, including stairwells. Window glazing was designed to provide excellent daylight to areas near the building's perimeter. The low e-glass curtain wall allows light in, keeps solar heat and ultraviolet rays out, and decreases heat loss in the winter." 4 TIMES SQUARE, HIGHLIGHTING HIGH PERFORMANCE, available at <http://www.rebuild.org/attachments/SolutionCenter/HPB4TimesSquare.pdf> (last visited Nov. 1, 2004); see also Durst Website, *supra* note 129 [hereinafter HIGHLIGHTING HIGH PERFORMANCE].

¹⁶¹ CFS are composed of atoms of chlorine, fluorine, and carbon arranged in a stable chemical

Four Times Square were designed to use an absorber, a generator, a pump, and a recuperative heat exchanger, which eliminated the need for CFCs.

To further decrease energy usage, Four Times Square incorporated an innovative, state-of-the-art, thin-film photovoltaic (PV) panel system to replace mirror glass spandrels¹⁶² from the 37th to the 43rd floors on the south and east faces of the building. A relatively small area for PV, the system still produces enough output to power five to seven houses.¹⁶³ PV systems are generally referred to as solar cells and “are semiconductor devices that convert sunlight into direct current (DC) electricity.”¹⁶⁴ Groups of these cells are “electrically configured into modules and arrays, which can be used to charge batteries, operate motors, and to power any number of electrical loads. With the appropriate power conversion equipment, PV systems can produce alternating current (AC) compatible with conventional appliances and operate in parallel with, and interconnected to, the utility grid.”¹⁶⁵ PV systems were developed in the mid-1950s and are cost-effective in situations where it may be difficult to run conventional power lines, such as in extremely dense urban locations.¹⁶⁶

PV at Four Times Square was the first major commercial application of such a building-integrated system in the United States, and its successful use at Four Time Square established that it is a viable option for high-rise construction projects.¹⁶⁷ The system demonstrates that the “large-scale production of clean, silent solar electricity is possible at the point[s] where it is needed most: at the point of greatest use.”¹⁶⁸ Moreover, the system was integrated into the building’s curtain wall and thus fit in with the rest of the building’s aesthetic, structural, and electrical standards.¹⁶⁹ In fact, the success of PV at Four Times Square led Durst to announce in early 2004 that it would also seek to use wind power to

structure. Invented in the 1920s, they have widely been used as refrigerants because of their non-reactivity and stability in the lower atmosphere. However, CFCs find their way into the higher atmosphere where their chemical properties become different, and they become destructive to Earth’s protective ozone layers. See *What are Chlorofluorocarbons (CFCs)?*, Our Changing Planet, at <http://www.umac.org/ocp/ozone/cfcs.htm> (last visited Mar. 17, 2004).

¹⁶² See HIGHLIGHTING HIGH PERFORMANCE, *supra* note 160, for a description of mirror glass spandrels.

¹⁶³ KISS & CATHCART, 4 TIMES SQUARE, BUILDING-INTEGRATED PHOTOVOLTAIC SYSTEM, available at <http://www.kisscathcart.com/pdfs/tmsq.pdf> (last visited Nov. 1, 2004).

¹⁶⁴ *Photovoltaic Fundamentals*, Florida Solar Energy Center, at <http://www.fsec.ucf.edu/pvt/pvbasics/index.htm> (last visited Mar. 18, 2004).

¹⁶⁵ *Id.*

¹⁶⁶ See GISSEN, *supra* note 7, at 185 (“PV cells are often used for motorist call aid boxes, irrigation systems, and navigational lights.”).

¹⁶⁷ See KISS & CATHCART, *supra* note 163.

¹⁶⁸ *Id.*

¹⁶⁹ *Id.* Working in collaboration with the base building architect, Kiss & Cathcart designed the PV system to function as an integral part of the tower’s curtain wall. This dual purpose makes it one of the most economical solar arrays ever installed in an urban area. *Id.*

generate electricity for the building.¹⁷⁰

EA category credits provide an exciting glimpse at just how effective LEED can be in the future. Because of the generally reliable body of data about the financial benefits for developers using these types of energy-efficient systems, it is imperative that USGBC create more incentives for project teams to incorporate them in large-scale construction. Moreover, Four Times Square proves that such systems are viable options for Class A real estate projects. Local programs have found ways to provide both commercial and residential developers with cash rebates for qualified energy systems; LEED must do the same by aligning itself with government subsidies to qualified projects and developers.¹⁷¹ PV's success at Four Times Square, in particular, shows that holistic, building-integrated systems are possible in high-rise construction. Future versions of LEED must refer to these successes, thereby encouraging their further use in high-rise construction.

E. LEED Credit Category 4 Analysis: Materials & Resources (MR)

As a prerequisite to earning any of the category's thirteen possible certification points, MR requires that an accessible area serving the entire building be provided to separate, collect, and store materials for recycling paper, corrugated cardboard, glass, plastics, and metals.¹⁷² Durst's Four Times Square guidelines are similar to Credit MR 3.1, "Resource Reuse," which is awarded where salvaged, refurbished, or reused materials, products, and furnishings compose at least five percent of building materials.¹⁷³ Another credit can be earned if that figure increases to ten percent.¹⁷⁴ In the same vein, credits MR 4.1 and 4.2 award points for the use of materials with recycled content that constitute five and ten percent of the total project materials, respectively.¹⁷⁵ Credit MR 5.1 provides an additional point when twenty percent of building materials and products are manufactured within a radius of 500 miles of the project site.¹⁷⁶

¹⁷⁰ See Lew Sichelman, *This Home is Where the Green Is*, N.Y. NEWSDAY, Jan. 23, 2004, at C03.

¹⁷¹ See City of Austin Green Building Program, *supra* note 140; see also WHITE PAPER, *supra* note 32, at 22.

¹⁷² See LEED 2.1, *supra* note 19, at 33.

¹⁷³ *Id.* at 39 (stating intent of Credit MR 3.1 is to "[r]euse building materials and products in order to reduce demand for virgin materials and to reduce waste, thereby reducing impacts associated with the extraction and processing of virgin resources"); see also Durst Website, *supra* note 129.

¹⁷⁴ *Id.* at 39 (describing MR Credit 3.2).

¹⁷⁵ *Id.* at 34-36.

¹⁷⁶ *Id.* at 43. MR Credit 5.2 again provides an additional point if the percentage of regional materials used in the project reaches fifty. *Id.* at 44. However, BUILDING DESIGN &

Credits MR 1.1-1.3, "Building Reuse," purport to "extend the life cycle of existing building stock, conserve resources,... reduce waste[,] and reduce environmental impacts of new buildings as they relate to materials manufacturing and transport."¹⁷⁷ Credits are earned for maintaining a minimum of either seventy-five percent or all one hundred percent of existing wall, floor, or roof systems of the structure that stands on the new building's site.¹⁷⁸ Strategies the USGBC suggests for receiving these points include reusing the structure, shell, and non-shell elements of the existing building, removing elements that pose contamination risk to building occupants, and upgrading outdated existing building components such as windows, mechanical, and plumbing systems.¹⁷⁹

Environmental criteria for building materials and construction methods at Four Times Square were included in the drawings and specifications sent out to individual subcontractors. The general contractor, Tishman Construction, administered the criteria and all tenants were encouraged to adopt the same environment-friendly construction standards for their interior fit-out construction.¹⁸⁰ Durst also provided Tishman with a comprehensive set of guidelines for managing the over fifty subcontractors who worked on the building.¹⁸¹ These guidelines mandated that building materials could not be toxic or hazardous to the building's construction workers or its future tenants, recommended the use of products containing a "high percentage of recycled content," required a waste management plan for excess construction materials, recommended "modular, prefabricated, or pre-assembled systems to minimize construction waste," and required all suppliers to be qualified "in terms of environmentally responsible manufacturing."¹⁸²

The interior of the building was also designed to be resource sensitive. For instance, Fox & Fowle equipped each floor of the building with two recycling chutes (one for paper and one for "wet" trash) located in the building core.¹⁸³ Each was connected to a corresponding container in the building's loading dock area.¹⁸⁴ Tenants were encouraged to set up their own recycling systems and

CONSTRUCTION'S WHITE PAPER recommends that MR Credits 5.1 and 5.2 for Regional Materials be rethought, and that LEED should "[c]onsider a credit based on the use of building materials and products that meet local and regional climatic, geographical, and environmental conditions, regardless of where those products are made." WHITE PAPER, *supra* note 32, at 44.

¹⁷⁷ See LEED 2.1, *supra* note 19, at 34.

¹⁷⁸ *Id.* at 34.

¹⁷⁹ *Id.* at 34-36.

¹⁸⁰ See Durst Website, *supra* note 129.

¹⁸¹ *Id.*

¹⁸² *Id.*

¹⁸³ *Id.*

¹⁸⁴ *Id.*

programs on their floors to take advantage of the building system.¹⁸⁵ Moreover, the building's interior finishes were composed of materials with a relatively high proportion of recycled materials, and tenants were encouraged to build their spaces out with similar materials; such materials were to include carpeting, ceramic tile, and gypsum wall board.¹⁸⁶

Durst's use of comprehensive materials and resources guidelines at Four Times Square illustrates LEED's viability in this particular category. Because MR is one of the simplest and least integrative of the credit categories, USGBC's guidelines are clear and easy to understand, even for an unsophisticated contractor or developer. However, USGBC ought to follow local programs, such as those in Berkeley and Los Angeles, which have created partnerships with city agencies and departments to provide further information about advanced materials and technologies that can be incorporated into a green building to save the developer substantial amounts of money.¹⁸⁷ It would also be practical for LEED to include data about precisely how MR is an environment-friendly category.

F. LEED Credit Category 5 Analysis: Indoor Environmental Quality (EQ)

The goal of the EQ credit category is to "prevent the development of indoor air quality problems in buildings, thus contributing to the comfort and well-being of the occupants."¹⁸⁸ The category's prerequisites require developers to prohibit tobacco smoking in the building unless in a specially designed smoking room and place any exterior designated smoking areas at a distance from entrances and windows.¹⁸⁹ Up to fifteen credits are earned for a variety of preventive measures: installing carbon dioxide monitoring systems; incorporating ventilation systems in accordance with federal standards; maintaining an air quality program during the construction and pre-occupancy phases of the project to prevent any future air quality problems; reducing the quantity of indoor air contaminants from adhesives, sealants, paints, coatings, carpets, and wood composites; taking measures to prevent building occupants from exposure to hazardous chemicals affecting air quality; giving building occupants control over thermal and lighting systems; designing the building to maintain temperature and humidity comfort ranges; installing a permanent temperature and humidity monitoring system "supporting the productivity and well-being of building occupants;" and providing for a connection between

¹⁸⁵ *Id.*

¹⁸⁶ *Id.*

¹⁸⁷ See WHITE PAPER, *supra* note 32, at 22.

¹⁸⁸ See LEED 2.1, *supra* note 19, at 47.

¹⁸⁹ *Id.* at 48.

indoor spaces and the outdoors “through the introduction of daylight and views into the regularly occupied areas of the building.”¹⁹⁰ Durst’s guidelines maintained that improving indoor air quality “improves productivity and reduces absenteeism.”¹⁹¹ Four Times Square’s mechanical systems were designed to bring four times more fresh air into the building than the building code required at the time.¹⁹² Tenants were “encouraged to complement this high standard and use materials, finishes, and systems which maintain the quality of this fresh air.”¹⁹³

EQ, the final credit category in LEED 2.1, presents an interesting dichotomy. It provides by far the most substantial guidelines of all the Credit Categories by both making reference to existing federal standards and giving project teams concrete benchmarks with which to work.¹⁹⁴ Future versions of LEED should revise the other categories to include similar references, and should also refer to state and local programs. One problem with EQ, however, is that little of the research about the benefits of improved indoor air quality has been performed on the most recent green buildings, many of which have been high-rises.¹⁹⁵ Moreover, data on the financial benefits from reduced energy and water consumption systems, in the eyes of the real estate industry, is more reliable.¹⁹⁶ USGBC must take steps to change that perception.

G. Conclusions about LEED: A Step in the Right Direction, But More is Necessary

As discussed in Part II, *supra*, the effect a building has on the natural environment through the use of natural construction materials is profound. That impact can be softened if the building is designed to incorporate less material. At Four Times Square, modern design elements were used in the “support structure of the building itself, specifically in the use of over-arching hat trusses at the top of the tower. These strengthen the building by tying together the vertical structural members and increasing the [overall] strength of the building, while at the same time reducing the tonnage of structural steel needed.”¹⁹⁷ Concrete was also used as a structural element to further reduce the amount of

¹⁹⁰ *Id.* at 60-65.

¹⁹¹ Durst Website, *supra* note 129.

¹⁹² *See id.*

¹⁹³ *Id.*

¹⁹⁴ *See* LEED 2.1, *supra* note 19, at 60-65.

¹⁹⁵ *See* WHITE PAPER, *supra* note 32, at 40.

¹⁹⁶ *See id.*

¹⁹⁷ TRANE COMFORT SYSTEMS, A HIGH-PERFORMANCE BUILDING AT 4 TIMES SQUARE (2003), available at <http://www.trane.com/commercial/library/CASE-SLX079.pdf>.

steel required. In addition, the existing foundation footings at the corner of 42nd Street and Broadway were reused and over 65% of the construction debris was recycled.¹⁹⁸ The lack of any credits for innovative engineering and architecture that substantially decreases the overall volume of material required to erect a high-rise is an obvious flaw in the LEED rating system. USGBC should include a credit category, which encourages architects to design buildings with less material as compared to a predetermined industry standard.¹⁹⁹

The largest obstacles to the development of uniform standards for green buildings are the incomplete integration of systems within projects,²⁰⁰ the lack of lifecycle costing, and insufficient technical information.²⁰¹ The current LEED guidelines serve only to perpetuate those problems. By merely serving as a laundry list of green elements which do not refer to each other or provide substantial guidance as to how the proven empirical benefits are to be achieved, LEED falls short of being a desperately needed, twenty-first century sustainable standard.

There are, however, many simple ways LEED could be made more effective. Existing state and local programs, as presented in Part II.A., *supra*, should include the LEED guidelines as the standard for awarding incentives such as expedited permit reviews, tax credits, and preferred loans.²⁰² This would further establish LEED as the American standard for green design. Future versions of LEED should be redrawn to incorporate broader policy justifications for green design, discussed *infra* in Part V. Finally, USGBC should follow the White Paper Action Plan presented by the editors of *Building Design & Construction* in the conclusion of their November, 2003 *White Paper on Sustainability*.²⁰³

V. THE SOLUTION: BETTER AND BROADER ARGUMENTS FOR GREEN BUILDING

The creation of LEED and USGBC was a critical step in the right direction

¹⁹⁸ *Id.*

¹⁹⁹ This article joins BUILDING DESIGN & CONSTRUCTION's WHITE PAPER in calling upon the real estate industry to devote more resources towards developing a larger body of empirical data across a wider range of green building.

²⁰⁰ Integrated building systems are created through a design process where green elements of the building are not "add-ons to the rest of the project" but are instead "integrat[ed] . . . into the base budget. Establishing an integrated design can lead to capital savings: investing 3% of total project costs during design can yield at least 10% savings in construction through design simplifications and fewer change orders . . ." WHITE PAPER, *supra* note 32, at 32.

²⁰¹ See *id.* at 9-10, for a description of the "substantive and complex issues that are [currently] being addressed by the LEED committee and USGBC staff."

²⁰² See *id.* at 23-24, for a list of cities and states which have adopted LEED-based regulations for both public and private projects.

²⁰³ See *id.* at 40-44. The White Paper Action Plan "strive[s] to present recommendations that would be seen as both practical and economically feasible." *Id.*

towards ensuring a sustainable future for America, but much more must be done to eliminate the catastrophic effects buildings have upon the natural environment.²⁰⁴ The impetus for encouraging developers to incorporate green features into their buildings through the LEED rating system and USGBC documentation rests decidedly on economic incentives.²⁰⁵ Congress must propose more programs and incentives for developers to incorporate green design elements into their structures. It should also rethink how to design policies that encourage green building developments. The policies must provide more empirical evidence establishing green building benefits relating to occupant health, performance, and well-being.²⁰⁶ Part V of this Article serves to demonstrate that, while a solid body of empirical evidence does exist about such benefits, more comprehensive studies must be performed about the latest crop of green buildings before any data is built into next-generation LEED rating systems.

A. Lessons from September 11th and the World Trade Center: Why the Modern Skyscraper Must Be Rethought

The sensitivity to high-rise building construction in the aftermath of September 11th and the destruction of New York City's World Trade Center cannot be ignored.²⁰⁷ Numerous calls have been made in both popular and academic circles for a halt to skyscraper construction, particularly in light of the sharp downturn in the American economy and corporate decisions to house workers in disparate locations.²⁰⁸ Moreover, the public's general distaste for sterile, suburban corporate office centers and isolated subdivision housing complexes, and its continued fascination with urban places has manifested itself in the New Urbanism movement.²⁰⁹ The public's desire to return to the urban fabric demands sustainable standards for construction in line with our twenty-first century perspective on our role in the global ecosystem.²¹⁰ Those sentiments are entirely at odds with the reality of how modern American business is increasingly conducted: through the home-office media center, which ostensibly allows workers to never leave their homes as they perform

²⁰⁴ See discussion *supra* Part II, for a detailed discussion of those effects.

²⁰⁵ See discussion *supra* Part III, for further examination of those incentives.

²⁰⁶ See WHITE PAPER, *supra* note 32, at 40. In fact, the editors of BUILDING DESIGN & CONSTRUCTION list this as their first recommendation to the "North American commercial, institutional, industrial, and multifamily residential construction market." *Id.*

²⁰⁷ See generally GISSEN, *supra* note 7, at 78.

²⁰⁸ *Id.*

²⁰⁹ See *supra* notes 60-63 and accompanying text.

²¹⁰ *Id.*

increasingly technology-oriented jobs.²¹¹

America's suburbs, where the bulk of the United States' 296 million citizens reside, grew increasingly more sterile and isolated through the end of the 20th century.²¹² A lack of street trees, no sidewalks, and large home-to-lot ratios leaving little room for landscaping became commonplace.²¹³ Garages attached to homes soon became ubiquitous elements of subdivision life, and it was soon possible for residents to go from house, to garage, to car, to work without setting foot outside, in the natural environment.²¹⁴ This trend supports the theory that by spending so much time in artificial environments, people become detached from the larger natural ecosystem of which they are an integral part.²¹⁵ Accordingly, they no longer view themselves as essential to the Earth's long-term ecological future.²¹⁶

In response to global indifference to the environment, the World Conservation Strategy has for over a decade called upon people to take responsibility for their impacts on nature by conserving ecological processes through frugal, efficient, and sustainable resource use.²¹⁷ "The ability of a country to follow sustainable development paths is determined to a large extent by the capacity of its people and institutions, as well as by its ecological and geographical conditions. Specifically, capacity-building encompasses the country's human, scientific, technological, organizational, institutional, and resource capabilities."²¹⁸ People

²¹¹ See GISSEN, *supra* note 7, at 78.

Computers now provide the convenience of reliable communication with corporate headquarters anywhere in the world and the luxurious advantage, for information-based employees, of living in sylvan surroundings, with only occasional trips to the city for office conferences As commuter traffic becomes increasingly unbearable, the statistical consequence of more than ten thousand American business executives converting to this digitally-connected suburban lifestyle each year seems destined to negatively affect the future of high-rise construction. And, of course, the development industry is now faced with the discomfoting reality that terrorists view such structures as symbolic targets, which is certain to adversely affect developers' desire for trophy buildings.

Id.

²¹² See JANE SILBERSTEIN & CHRIS MASER, *LAND USE PLANNING FOR SUSTAINABLE DEVELOPMENT* at introduction (2000), for a vivid description of the common suburban neighborhood.

²¹³ *Id.*

²¹⁴ *Id.*

²¹⁵ *Id.*

²¹⁶ This article proposes that this is the best, though as of yet least advanced, argument in support of the green building movement. By harmonizing New Urbanism and green building principles, USGBC would position LEED to apply universally across modern American society.

²¹⁷ DAVID A. MUNRO, *CARING FOR THE EARTH: A STRATEGY FOR SUSTAINABLE LIVING* 14 (1991).

²¹⁸ *Agenda 21: Programme of Action for Sustainable Development*, U.N. Sustainable

will choose sustainable living when they are persuaded that it is necessary to do so, when they have sufficient incentives for doing so, and when they are empowered with the required knowledge and skill.²¹⁹ Therein lies a much stronger foundation for the green design movement, and the grounds upon which Congress, state, and local governments must be petitioned to increase awareness of USGBC, LEED, and other green design programs.

Currently, LEED's SS category is in the best position to address these concerns. The category should be rethought in light of September 11th and the increasing threat of terrorism within the borders of the United States. People who commute to work in post-9/11 America are naturally more apprehensive about being apart from their families, and given the opportunity, would choose to live in greener communities which allow them a shorter commute.²²⁰ By stressing those sentiments to developers, particularly by emphasizing the benefits of higher occupancy rates and, in turn, higher property valuations those rates earn, future revised SS categories would carry increased practical significance and be better able to advance the current goals for the category as professed by USGBC.²²¹

B. The Human and Social Benefits of Green Building

The green building movement, in general, can be attributed to the "sick building syndrome" scare of the 1960s and 70s.²²² The syndrome describes various health- and discomfort-related symptoms that a building's occupants experience from exposure to indoor air pollutants.²²³ The green building movement helped to ameliorate some of the problems at the root of the syndrome, both physical and psychological.²²⁴ A 1993 study performed at the Rensselaer Polytechnic Institute attempted to assess the impact of giving

Development Programme, 26th Sess., Agenda Item 21, at 37.1, U.N. Doc. A/CONF.151/26 (1992), available at <http://www.un.org/esa/sustdev/documents/agenda21chapter37.htm> (last visited Nov. 20, 2004).

²¹⁹ See MUNRO, *supra* note 217, at 52.

²²⁰ See BEATLEY & COLLINS, *supra* note 140, at 228. The authors also point out that "concerns about community security strongly support further moves in the direction of ecological technologies and communities." *Id.*

²²¹ See LEED 2.1, *supra* note 19, at 1-15, for a description of the intent behind the award of each credit.

²²² WHITE PAPER, *supra* note 32, at 33.

²²³ See Arnold W. Reitz, Jr. & Sheryl-Lynn Carof, *The Legal Control of Indoor Air Pollution*, 25 B.C. ENVTL. AFF. L. REV. 247, 339 (1998) (stating that symptoms include "irritation of the eyes, nose, throat and skin; neurotoxic symptoms including mental fatigue and headaches; runny nose; dry cough; bronchial asthma; odor and taste complaints; and rashes and itches").

²²⁴ See *id.* at 252 ("Direct medical costs include the expenses related to doctor visits, increased hospital visits, hospital care, surgery, medication, psychological counseling[,] and employee sick days.").

workers personal control over environmental conditions at their workstations.²²⁵ It found that productivity, measured by actual work output, increased when weighed against worker performance in an otherwise standard office space.²²⁶ Two other studies, which observed over 11,000 workers in 107 different European buildings, found that giving workers personal control over temperature and ventilation conditions resulted in increased productivity, fewer illness symptoms, and less truancy.²²⁷ A 1999 study, "*Skylighting and Retail Sales, An Investigation Into the Relationship Between Daylighting and Human Performance*," found with 99% statistical certainty that stores without skylights stood to realize a 40% gain in total sales upon their addition.²²⁸ Marketing benefits of going green are similarly important. Green projects generally receive higher than average media attention, giving buildings and those who develop them greater exposure and increased access to potential tenants.²²⁹

The majority of the studies performed to analyze the human benefits of green buildings were performed prior to the 2000 enactment of LEED.²³⁰ USGBC must remedy this by sponsoring comprehensive studies across all areas of the industry. *Building Design & Construction's White Paper*, for example, suggests that the national academies²³¹ undertake comprehensive studies of these less tangible benefits of green design across the public, commercial, and residential sectors of the construction industry and provide test cases from the latest green

²²⁵ Heerwagen, *supra* note 49.

In this study, actual work output (total number of forms completed each week per employee) was measured. The study tracked worker performance in a baseline building, where workers did not have personal control, and in a new building with individually controlled ambient systems. Productivity in the new building increased by 16%, of which 3% was attributed to the personal controls. The environmental "upgrades" in the new building included daylighting, better access to windows and to an attractive outdoor view of a prairie landscape area with a pond. These features appear to have played a role in productivity improvements, possibly due to psychological factors and improved quality of work life overall.

Id.

²²⁶ *Id.*

²²⁷ *Id.*

²²⁸ *Id.*

²²⁹ See BUSINESS CASE, *supra* note 76, at 10. One developer has said that "(t)he impact of building green and the LEED Gold-level certification has created local and national press in newspapers, trade magazines, and TV that has truly distinguished us in the marketplace and provided us with free advertising and market exposure that we could not have afforded." *Id.*

²³⁰ See WHITE PAPER, *supra* note 32, at 35.

²³¹ See *id.* at 40. These include the National Academy of Sciences (the National Research Council, the National Academy of Engineering, and the Institute of Medicine), the National Institutes of Health, the National Science Foundation, as well as nongovernmental foundations and the private sector. *Id.*

buildings.²³² The results of the existing, less-than-comprehensive studies are highly encouraging, and should give USGBC further reason to pursue more modern studies to incorporate as empirical data in future versions LEED.²³³ This body of data should be included as part of an incentive credit category, where developers are invited to achieve levels similar to these potential USGBC case studies.

CONCLUSION

The USGBC and its LEED rating system are two steps in the right direction towards reducing the effects modern high-rise buildings have on the natural environment. However, stronger arguments exist for justifying the inclusion of more green elements in modern construction projects than are included in LEED. Currently, there are no real financial incentives compelling owners to attempt LEED certification. LEED itself remains more of a checklist than a comprehensive set of green building guidelines. Next-generation LEED systems must help developers create far more integrated green building systems. Green design comports with the New Urbanism movement, encourages people to use alternate means of transportation, and most importantly, helps to leave the natural environment intact. More research must be done, however, to empirically determine the financial savings green design provides for large construction projects. It is imperative that USGBC link LEED with the numerous state and local green building programs already in existence. Further, the next generation LEED rating systems must become the standard by which incentive programs evaluate green buildings. Finally, more financial incentives and information must be provided to owners to dispel the various fictions that permeate the real estate industry about the green building movement.

The connection between the environment and a building's occupants seems tenuous at first but is in fact quite profound. Increasing green features in the workplace, residential buildings, and residential sub-development will translate into more environmentally sensitive and active Americans. Research must be performed to determine the viability of this potentially sweeping argument. As

²³² *Id.*

²³³ See Heerwagen, *supra* note 49 ("[M]any people believe sustainable building design will become a more common practice once the human benefits are identified, primarily the productivity gains associated with the provision of high quality interior environments. The argument behind this belief is that [s]ince salaries of building occupants exceed by far the construction or operation costs of a building, any sustainable design features that positively impact productivity, however modestly, will pay back the investment over time."). But see WHITE PAPER, *supra* note 32, at 35 ("[T]he larger concern is that the real estate community is not convinced by these studies. While a growing number of developers and owners may be getting more comfortable with the energy and water savings of green buildings, they still have trouble pinning down the dollar value of the human and social benefits of sustainable development.").

Churchill said, we do indeed have the power to shape our buildings. We also have the power to make sure they shape us into a more environmentally aware people, in tune with the desperate need for a sustainable future for our planet.