

Clean Tech Opportunities in Green Building Legislation

By Gabriel Schnitzler[†]

Introduction

In the past eight years, the threat of climate change has become increasingly clear. While oil prices have retreated recently, the untenability of continued U.S. dependence on dwindling fossil fuels controlled by unfriendly governments is now a common talking point of politicians and pundits. At the same time, interest in clean tech businesses has grown in the investment community. In the face of these challenges and opportunities, however, the federal response has, with some minor exceptions, been wanting. All that may change with the incoming administration.

But, even if the federal government continues to lag behind, there will still be a steady drumbeat of climate, energy efficiency, and green building legislation at the state and local level. Except where federal lands are concerned, real estate development has historically been regulated by cities and counties, with state governments setting minimum planning and subdivision standards. Consequently, local governments have been largely free to experiment with legislation requiring and encouraging greater energy efficiency and reduced environmental impacts in real estate projects.

This article describes some recent developments in green building legislation and suggests possible implications for the clean tech industry. Part I briefly describes why land use and building policies are critical for addressing energy and climate impacts, presenting a big opportunity for clean tech innovation. Part II reviews recent green building legislation, including: (1) ordinances tied to the Leadership in Energy and Environmental Design (LEED) standards issued by the U.S. Green Building Council (USGBC), with a focus on green building legislation in Boston, Chicago, Dallas, Los Angeles, San Diego, San Francisco, Seattle, and Washington D.C., (2) New York City's Climate Protection Act, (3) Berkeley's renewable energy and efficiency

financing initiative, (4) California's recently adopted Green Building Code, and (5) California's AB 1881, which updates the state's model landscape water efficiency ordinance. Part III concludes by observing that most green building legislation does not force developers to incorporate specific technologies (for example, on-site photovoltaic panels or geothermal heat pumps). Rather, the benefits to clean tech from green building legislation flow from increased awareness, comfort, and fluency with green building requirements and technologies among real estate developers, architects, investors, attorneys, government officials, and policymakers.



I. WHY BUILDINGS MATTER

The built environment presents an important opportunity for clean tech and environmental policy innovation for four reasons: (A) buildings account for a large chunk of energy use and environmental impacts; (B) half of the buildings existing in 2030 will have been constructed after the year 2000; (C) consequently, there is potentially a big market and good prospects for improvement through investments in efficiency

and on-site alternative energy; and (D) development patterns and land use policy have spillover impacts on transportation and efforts to improve energy efficiency in automobiles.

Building Impacts

Bank robbers rob banks because that is where the money is. To make an equally obvious point, the built environment matters from an environmental and clean tech perspective because, according to the USGBC, buildings consume 70% of the electricity used in the United States, 39% of all primary energy use, and 12.2% of potable water use, and account for 39% of all carbon emissions.¹

Building Turnover and New Construction

Arthur C. Nelson, in a paper presented for the Brookings Institution Metropolitan Policy Program, concludes that: “The nation had about 300 billion square feet of built space in 2000. By 2030, the nation will need about 427 billion square feet of built space to accommodate growth projections. About 82 billion of that will be from replacement of existing space and 131 will be new space. Thus, 50 percent of that 427 billion will have to be constructed between now and then.”² Needless to say, this huge wave of new construction provides a large potential market for green building innovation.

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Gains from Building Efficiency

Further improvements in building design and construction can generate substantial “negawatts,” a term coined by Amory Lovins of the Rocky Mountain Institute to describe power availability created by efficiency measures rather than new power plants.³ Efficiency has a proven track record of success. A recent study by David Roland-Holst at UC Berkeley noted that, as a result of utility company efficiency incentives and tougher building and appliance standards, California per capita electricity use has remained flat over the last 30 years while nationwide electricity use has increased by almost 50%. “The results included saving more than 12,000 MW of peak demand (equivalent to avoiding 24 giant power plants), and about 40,000 GWh each year (equivalent to 15 percent of California’s energy consumption).”⁴ Appliance and building standards accounted for about half of these savings. The study notes that California building and appliance efficiency standards have saved more than \$56 billion in electricity and natural gas costs and predicts further savings and job creation from additional efficiency measures.⁵

As discussed below, further improvements in California building design and efficiency will be implemented through the state’s Green Building Code.

Spillover Effects of Land Use Policy

In addition to impacts from power consumed in the construction and operation of buildings, the built environment has additional spillover impacts on energy use and climate by affecting traffic patterns. Twentieth century land use policies that subsidized highways, privileged single family residences, discouraged mixed use, set maximum densities, mandated off-street parking, and set minimum lot sizes conspired to increase dependence on

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cars and make suburban sprawl the dominant form of modern U.S. development.⁶ The Urban Land Institute has argued forcefully that unless land use policies change to promote compact development, increases in vehicle miles traveled (VMT) will wipe out any gains in efficiency and reduced carbon emissions from tougher vehicle efficiency standards.⁷

II. A REVIEW OF RECENT GREEN BUILDING LEGISLATION

This Part reviews (A) the recent LEED-based green building ordinances adopted by select municipalities⁸, (B) New York City’s Climate Protection Act, (C) Berkeley’s Sustainable Energy Financing Districts, and (D) California’s Green Building Code and recent landscape water efficiency statute.

A. LEED-Based Zoning Ordinances

The USGBC is a non-profit private organization that publishes voluntary green building design standards and certifies projects which meet those standards through its LEED Green Building Rating System.

LEED certification programs are tailored to different types of development and different stages of planning, specifically: New Construction (for new commercial development), Commercial Interiors (for tenant improvements to existing buildings), Core and Shell (for construction of the core and shell of new buildings, i.e., building envelopes, structure and HVAC), Retail, Homes, Schools, Healthcare, Existing Buildings: Operation and Maintenance (provides standards for ongoing operation of existing buildings not undergoing major renovation), and Neighborhood Development (this certification standard is in its pilot phase and will provide standards for sustainable neighborhoods and multi-building developments; LEED ND focuses primarily on project siting and infrastructure rather than specific building construction).

LEED awards points to projects that meet certain siting, design, and performance criteria. The LEED New Construction standard, for example, awards points for projects in the following areas: 1) “Sustainable Sites,” 2) “Water Efficiency,” 3) “Energy and Atmosphere,” 4) “Materials and Resources,” 5) “Indoor Environmental Quality,” and 5) “Innovation and Design Process.” Projects receive varying levels of LEED certification depending on the total number of points received. For example,

a LEED New Construction project must receive 26 out of 69 points to be “Certified,” 33 out of 69 points to qualify for “Silver” status, 39 out of 69 to reach “Gold” status, and 52 out of 69 to achieve “Platinum” status.⁹ LEED contains certain minimal requirements in a few areas, but otherwise does not generally require that any specific measure be adopted. Again, continuing with the LEED New Construction example, this standard requires 1) an erosion and sedimentation control plan for construction activities, 2) energy-related systems that are installed and verified to perform consistent with owner project requirements, 3) projects that meet minimum energy efficiency standards, 4) no use of chlorofluorocarbons (“CFC’s”) in HVAC systems, 5) space dedicated for collection and storage of recyclables, 6) minimum indoor air quality standards, and 7) steps to minimize occupant exposure to tobacco smoke.¹⁰ Aside from these requirements, an applicant for LEED New Construction certification is free to choose from a menu of options in order to earn points for LEED certification.



The most common LEED legislation requires state and local governments to meet LEED standards when constructing or renovating government-owned property. For example, Governor Deval Patrick’s Executive Order No. 484 requires, among other things, that all new construction and major renovation projects, over 20,000 square feet, by the Commonwealth of Massachusetts meet LEED standards, have energy performance 20%

better than required by the Massachusetts Energy Code, and reduce outdoor water consumption by 50% and indoor water consumption by 20% over standard baseline assumptions.¹⁴

Of more interest for the broader real estate and clean tech market are LEED regulations that apply to private development. These regulations generally take one of the following approaches: 1) a requirement that private development over a certain size be LEED certified (this is Boston’s approach, as described below), 2) expedited permitting for LEED certified projects (Chicago, discussed below, is an example), 3) tax credits for LEED projects, 4) favorable tax assessments, and 5) “density bonuses” that allow a LEED certified project to be developed at a greater density than would otherwise be allowed by the underlying zoning ordinance (Seattle is an example of this approach).

The following is a snapshot of some of the green building ordinances now in effect for private development in some large U.S. cities.

Boston¹⁵

Adopted on January 10, 2007, Boston’s green building ordinance requires that projects over 50,000 square feet be “LEED certifiable,” meaning that project applicants must submit to the city a LEED checklist showing that the project would receive enough points under LEED to reach “Certified” status, although actual certification by the USGBC is not required. It is possible that some time and money may be saved by not requiring actual LEED certification, though Boston’s ordinance requires that much of the documentation required for certification be prepared in any case (completing the LEED checklist and obtaining certification from a LEED Accredited Professional “and/or other expert recognized by the Boston Redevelopment Authority”).¹⁶ Given the recent adoption of the ordinance, it is too soon to tell whether project applicants will voluntarily seek certification from the USGBC with any regularity; and, whether applicants, in light of the new minimum requirements, will find it worthwhile to voluntarily exceed LEED “Certified” level.

Although LEED does not require that specific technologies be incorporated into a project, preliminary evidence indicates that LEED projects tend to be more efficient than conventional buildings. A recent U.S. Green Building Council Study concluded that LEED certified buildings have, on average, 25–30% lower energy use than the national average for similar buildings.¹¹

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While LEED standards are voluntary, they are quickly becoming the most widely accepted standard for green development. The number of LEED-certified projects has grown rapidly since LEED-NC standards were first issued in 2000.¹²

The spread of LEED standards for green buildings in the marketplace will be accelerated by the growing number of state and local governments that are requiring new projects to meet LEED standards. As of December 1, 2008, 31 state governments, 112 cities, 32 counties, and 28 towns have green building legislation, incentives, executive orders, or policies.¹³

Boston's green building ordinance supplements LEED standards by awarding up to four points for "Boston Green Building Credits." Notably, for the clean tech world, one of these points may be obtained by including a "Distributed Generation/Combined Heat and Power (DG/CHP) project that provides useful 'congestion relief' in locations where the Boston Redevelopment Authority and Boston Environment and Energy Services determine that electricity distribution load constraints exist. In order to earn this point the Proposed Project must include an on-site combined electrical power and heat generation system that provides for ten percent (10%) or more of the total building energy use. Eligible systems include combustion engine driven generators, fuel cells and micro turbines that utilize clean fuels including natural gas and biodiesel."¹⁷

A project that incorporates on-site electric charging stations for plug in vehicles may also use this feature in meeting requirements for the "Modern Mobility" Boston Green Building Credit.¹⁸

Chicago

Unlike Boston, Chicago does not mandate that private projects be built to LEED standards. Rather, Chicago's Department of Construction and Permits (DCAP) provides expedited project approval for commercial projects that meet LEED standards (and, in some cases, incorporate certain other project features, described below). For residential construction, expedited permitting is available for affordable multifamily projects that meet Chicago's Green Homes program requirements. Waivers of application fees are also available for commercial and residential projects that meet specified LEED (or, as applicable, Green Homes) standards and incorporate additional Chicago-specific project features. As with Boston, Chicago supplements its LEED requirements by giving projects credit towards obtaining expedited permitting or fee waivers if specific policies are implemented. Chicago-specific project features include, without limitation: green roofs, on-site renewable energy, on-site combined heat and power generation, and affordable housing. By way of example, an office project over eighty feet tall would receive (1) expedited permitting if it achieved LEED Certified status, has at least 50% green roof coverage, and incorporates one Chicago-specific feature; (2) expedited permitting and a waiver of the first \$25,000 in DCAP consultant fees if the project attains LEED Silver status, has at least 75% green roof coverage, and incorporates at least one additional Chicago-specific feature; and (3) expedited permitting and a waiver of all DCAP consultant

review fees if the project achieves LEED Gold or Platinum status, has at least 75% green roof coverage, and incorporates at least two additional Chicago-specific features.¹⁹

Chicago's green building efforts are not limited to LEED requirements. Mayor Daley also headed a task force to create the Chicago Climate Action Plan, which aims to reduce Chicago's greenhouse gas emissions to 25% below 1990 levels by 2020 and 80% below 1990 levels by 2050.²⁰ The Climate Action Plan does not adopt specific legislation. Instead, the Chicago Climate Action Plan provides a roadmap for future policy in Chicago. Energy efficient buildings and clean and renewable energy constitute two of the five

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policy areas targeted by the Climate Action Plan. Two policies targeted for immediate action are (1) a "Green Office Challenge" to encourage high rise office buildings to save energy, increase recycling and water efficiency and reduce paper use, and (2) an updated Chicago Energy Efficiency Building Code. In the long run, the City envisions among other things: (1) retrofitting hundreds of thousands of residential buildings and thousands of commercial buildings²¹, (2) supporting transit-oriented development, and (3) providing a Chicago carbon offset fund, through which private companies and individuals would purchase carbon offsets, the proceeds of which would be used to fund offset projects in the Chicago area to meet the emissions reduction targets of the Climate Action Plan.²²

Dallas

Dallas has adopted a green building ordinance which implements green building regulations in two phases, with the first phase beginning on October 1, 2009 and the second on October 1, 2011. During phase one, the ordinance provides for expedited plan review of projects achieving LEED certified, Green Built North Texas or equivalent standards. Expedited plan review is available in phase two for projects achieving LEED Silver or equivalent status.²³

For projects less than 50,000 square feet built during phase one, certain energy efficiency, water use, and cool roof standards must be met. Projects over 50,000 square feet in phase one are required to achieve minimum points under LEED, which vary depending on the LEED program (i.e., twenty-two points are required for New Construction; twenty points are required for Core and Shell projects).²⁴

In phase two, all construction projects must be LEED certifiable, Green Built North Texas certifiable, or certifiable under an equivalent green building standard, though certification is not actually required.²⁵

Los Angeles

The Climate Action Plan, passed in May 2007 by the City of Los Angeles, seeks to reduce carbon emissions to 35% below 1990 levels by 2030.²⁶ To help implement the Plan, Los Angeles adopted green building legislation that requires the following projects to be designed at a LEED Certified level: non-residential projects exceeding 50,000 square feet in floor area, high-rise (above six stories) residential projects²⁷ exceeding 50,000 square feet in floor area, and, after May 1, 2009, low-rise residential projects of 50 or more dwelling units within buildings exceeding 50,000 square feet in floor area.²⁸ The city also provides expedited permitting for projects that voluntarily achieve LEED Silver certification.²⁹

San Diego

San Diego provides expedited use permit processing for projects achieving LEED Silver certification as well as for projects including generation of on-site renewable energy equal to at least 30% of building energy use. The city also provides expedited building permit processing for (1) residential projects that provide at least 50% of energy use through renewable resources, (2) commercial and industrial projects that provide at least 30% of energy use through renewable resources, (3) residential projects that exceed California Title 24 energy requirements by at least 15%, and (4) commercial and industrial projects that exceed Title 24 energy requirements by at least 10%.³⁰

San Francisco

Adopted on September 4, 2008, San Francisco's green building ordinance imposes steadily increasing mandatory green building standards. The standards are generally tied to LEED for commercial projects, tenant fitouts, and larger residential projects, and tied to Build It Green's Green Points rating system for smaller residential projects.³¹ San Francisco modifies LEED's standards by mandating certain items on the LEED checklist. For an example of how the regulations increase LEED compliance requirements over time, a timeline for new commercial projects can be helpful: New large commercial buildings (i.e., high rise commercial buildings or commercial buildings exceeding 25,000 gross square feet), must attain at least LEED Certified status. After January 1, 2009, new large commercial projects must attain at least LEED Silver status. After January 1, 2012, new large commercial projects must attain at least LEED Gold status.³² In addition to meeting these general LEED certification standards, San Francisco requires that the following specific items on the LEED checklist be attained for large commercial projects: 1) water efficient landscaping showing a 50% reduction in use of potable water (LEED WE 1.1),³³ 2) 20% overall reduction in potable water use (LEED WE 3.1), increasing to 30% by January 1, 2011 (LEED WE 3.1), 3) construction debris management (LEED MR 2.2), 4) enhanced commissioning, effective Janu-

ary 1, 2010 (LEED EA 3.0), and 5) renewable on-site energy or purchase of renewable energy credits pursuant to LEED EA2 or EA6, effective January 1, 2012.³⁴

San Francisco also provides expedited processing for projects designed to achieve LEED Gold certification.³⁵

Seattle

Seattle grants density bonuses to projects in its downtown commercial and mixed commercial zones which attain LEED Silver status. Further, in order to receive additional non-density LEED bonuses in these districts (for example, for residential housing), the project must attain LEED Silver status.³⁶

Washington, D.C.

Washington, D.C.'s Green Building Act of 2006 phases in mandatory requirements that LEED Certified status be attained for 1) new commercial projects in excess of 50,000 square feet³⁷ and 2) tenant improvements of District-owned commercial space of 30,000 square feet or more. The Act also imposes requirements for District-owned property used for government or residential purposes.³⁸ Requirements for private projects will be fully-phased in by 2012.³⁹ Section seven of the Act also creates expedited permitting and grant incentives for projects that are early adopters of green building practices.⁴⁰ Section thirteen of the Act further directs the Mayor to develop construction code revisions that shall "incorporate as many green building practices as practicable for the Washington, D.C. urban environment."⁴¹ A draft of the construction code is currently being formulated.⁴²

B. New York

In 2007, the City of New York unanimously passed the Climate Protection Act, which requires a 30% reduction in citywide carbon emissions below 2007 levels by 2030.⁴³ While the City has not yet imposed mandatory green building requirements for private construction, it is likely that higher efficiency standards will be imposed in the future to meet the carbon reduction targets set by the Climate Protection Act. The City's 2007 overhaul of its building code includes fee rebates for projects that (i) produce on-site renewable power of 5% or more of a site's annual energy demand, (ii) provide greater efficiency than required by the state energy code, (iii) implement water conservation, (iv) remediate or redevelop brownfields, (v) recycle construction and demolition waste, (vi) provide on-site bicycle storage, or (vii) receive LEED "or other environmental design certification."⁴⁴

C. Berkeley's Sustainable Energy Financing Districts

Both the state of California and the city of San Francisco subsidize installation of solar panels.⁴⁵ Berkeley has gone one step further with an innovative program to finance the installation of renewable energy production and efficiency measures in the private sector through the formation of "Sustainable Energy Financ-

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ing Districts,” under which private property owners voluntarily form assessment districts empowered to levy assessments on participating owners.⁴⁶ Proceeds from bonds issued by the city and repaid through assessments would be used for “the acquisition, installation and improvement of energy efficiency and renewable energy improvements to or on real property and in buildings, whether such real property or buildings are privately or publicly owned.”⁴⁷ Although Berkeley’s financing initiative is commonly thought to be focused primarily on solar power, Chapter 7.98 of the Berkeley Municipal Code, which provides for establishment of the special assessment districts, is not directed to any particular technology. The Berkeley City Council first approved the financing initiative in November 2007, and implemented changes to the Municipal Code in May 2008. Berkeley is currently setting up a pilot program for solar power installations on forty homes in the assessment districts will initially seek \$1.5 million in financing to be repaid by assessment levies over twenty years.⁴⁸

Berkeley’s Sustainable Energy Financing Districts offer a hopeful blueprint for action by other municipalities. Palm Desert, California and San Diego, California have recently adopted similar initiatives.⁴⁹ According to Berkeley city staff, San Francisco, Santa Cruz County,, and Galt, California, as well as Boulder, Colorado and the State of Colorado count among the public entities monitoring Berkeley’s program with hopes of establishing their own financing districts. If successful, this form of financing would remove the obstacle of high up-front costs to energy efficiency improvements and solar power installations by providing long term financing at below market interest rates. This program would also be superior to other forms of financing since the unpaid balance of the loan would not need to be repaid out of a property owner’s equity when the property is sold. Assessments would instead continue to be levied against the new property owner until repayment.

D. California’s Green Building Code and Water Efficiency Standards

California is pursuing policies on multiple fronts to reduce its carbon footprint over coming decades, which, taken together, will have a striking effect on the built environment. I have already mentioned the California Solar Initiative. AB 32, also known as

the California Global Warming Solutions Act, requires reducing California’s carbon emissions to 1990 levels by 2020.⁵⁰ Executive Order S-3-05 establishes an emissions goal of 80% below 1990 levels by 2050.⁵¹ The California Air Resources Board (“CARB”) is currently formulating regulations for achieving AB 32’s targets. The Proposed Scoping Plan prepared by CARB, in preparation for implementing regulations for AB 32, recognizes the role that green buildings and energy efficiency measures will play in meeting the emissions reductions targets.⁵² The recently passed SB 375 will provide for regional greenhouse gas targets and regional land use and transportation planning to meet AB 32’s targets.⁵³ This is a significant step since development planning previously occurred almost entirely at the city and county level. SB 97, passed in 2007, requires the state Office of Planning and Research (OPR) to draft guidelines for mitigating greenhouse gas emissions under the California Environmental Quality Act (CEQA) by July 1, 2009, with final guidelines to be adopted by January 1, 2010.⁵⁴ CEQA applies to most major real estate projects, and the final OPR guidelines could require that greenhouse gas emissions be addressed in the environmental disclosure documents for these projects.

California Green Building Code

The Green Building Code adopted by the state is just another California policy that will require greener real estate development. Except for a few items that are already required under existing law compliance is voluntary through 2010 to allow local building inspectors and the industry to adapt to code requirements. The current voluntary code will be replaced by a final, mandatory green building code in 2010.⁵⁵ The Code provides for a 15–30% improvement in building energy efficiency over what would be required by the 2007 California Energy Code, a 20% reduction in indoor potable water use below the baseline adopted by the Code, and a 50% reduction in outdoor potable water use beyond initial requirements for plant installation and establishment.⁵⁶ Some notable Code features for the clean tech world:

- HVAC and lighting systems preprogrammed with demand response controls and software (Section 504.3);⁵⁷
- Use of on-site renewable energy for at least 1% of building electrical power needs (Section 511.1);⁵⁸
- Dual plumbing for potable and recycled water systems, graywater and rainwater collection, and irrigation systems (Sections 603.5, 604.4, and 604.5).⁵⁹

Clean tech investors and real estate developers should view the current Green Building Code as a first step only. The California Public Utility Commission’s Long Term Energy Efficiency Strategic Plan (the “Plan”), released in September 2008, sets goals of (i) all new residential construction being net zero energy⁶⁰ by 2020, (ii) all new commercial construction being net zero energy by 2030, and (iii) 50% of existing buildings achieving

the equivalent of net zero energy by 2030. The Plan acknowledges that the net zero energy goal for residential construction is “extremely aggressive” and is a “reach.” The Public Utilities Commission envisions a combination of steadily increasing building and appliance energy efficiency and design requirements, incentive programs, fees, technical assistance, and coordination with the state Building Standards Commission (which oversees state building codes) and local governments to meet these goals.

California Assembly Bill 1881

In 2006, the California Legislature passed AB 1881, which dovetails with the water efficiency requirements set forth in California’s Green Building Code.⁶¹ AB 1881 directs the California Department of Water Resources to prepare an updated model water efficient landscaping ordinance to replace the current model ordinance prepared in the early 1990s.

A draft of the ordinance has been prepared, and a final version should be issued

by January 2009. By January 1, 2010, municipalities must either adopt the new model ordinance or adopt a substitute ordinance at least as efficient as the updated model ordinance.⁶² The updated model ordinance must, among other things, promote the use of recycled rainwater, the capture and retention of stormwater, and the inclusion of “provisions for the use of automatic irrigation systems and irrigation schedules based on climatic conditions, specific terrains and soil types, and other environmental conditions.”⁶³

III. CONCLUSION: IMPLICATIONS OF GREEN BUILDING LEGISLATION ON CLEAN TECH

We have seen in this article that over 112 cities, 32 counties, and 28 towns have adopted legislation mandating or incentivizing construction to LEED standards, including some of the country’s largest cities.⁶⁴ California, the most populous state in the union, is moving aggressively towards a lower carbon economy, which will require greener buildings and across the board increases in energy and water efficiency. Elsewhere, cities like Chicago and New York have plans in place to reduce carbon emissions.

For the most part, neither the green building nor the climate legislation mandates that specific technology be used. For example, if a city adopts LEED as a green building ordinance, there would be no absolute requirement that on-site renewable power be provided, though LEED would award points to projects that did.

[T]he widespread adoption of green building legislation will assist in enlarging markets, building economies of scale, and creating a class of developers . . . and policymakers who are comfortable with green building standards and technologies.

In general, the benefits of green building legislation for clean tech innovation will not flow from hard technological requirements. Instead, the widespread adoption of green building legislation will assist in enlarging markets, building economies of

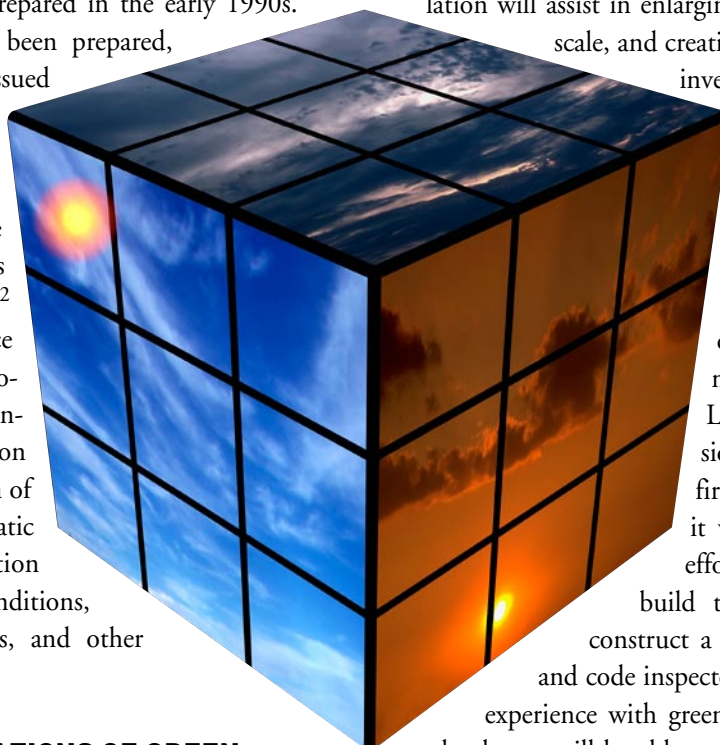
scale, and creating a class of developers, architects, investors, attorneys, government officials, and policymakers who are comfortable with green building standards and technologies.

Using LEED-based green building ordinances as an example, as LEED emerges as the standard for larger developments in major U.S. cities, the number of LEED certified accredited professionals among architecture and law firms will grow. Just a few years ago, it would have required considerable effort for a real estate developer to

build the professional team needed to construct a green building, and city planners and code inspectors would have rarely had previous experience with green building projects. In the future,

developers will be able to select from an array of competing architects, engineers, contractors and attorneys in building a green project, all of whom will be able to use LEED as common language for evaluating projects. The successful developer, operating in a large U.S. city and unable to avoid the need to navigate green building incentive programs and mandates, will quickly develop in-house expertise in selecting green materials, building systems, and contractors. These developments should reduce the obstacles to building green projects and adopting new technologies. For the investor faced with steadily increasing adoption of green building requirements by municipalities, there will be pressure to privilege green buildings in investment decisions to avoid the risk of an obsolete real estate portfolio,⁶⁵ thus expanding the market further.

These benefits should not be underestimated, as there are obstacles to technology adoption beyond price and performance



including, among other things, lack of knowledge in the marketplace, higher up front costs (even if the technology creates long term savings), additional time and effort to choose appropriate new technologies, and conflicting incentives between property owners, developers, and end users,⁶⁶ so that existing technologies may benefit from “lock in” effects notwithstanding how well they perform relative to newer technologies.⁶⁷ Consider, for example, the home owner or small business owner who is purchasing electrical service. It takes little more than a phone call to continue with the business-as-usual option and obtain a hookup from the local utility, which, more likely than not, will deliver energy from a non-renewable source. In contrast, to install an on-site solar system, a property owner must obtain and negotiate bids from installers, figure out the utility’s net metering requirements, and arrange financing or pay up front costs out of pocket. It should come as no surprise that financing innovations from companies such as Sun Run and Solar City (which try to reduce up front

solar installation costs by making sales to consumers via power purchase agreements and equipment leases, respectively) have appeared in the San Francisco Bay Area, a region with strong state and local support for solar energy which has enlarged the market for solar installations. During the early stages of green building technology adoption companies with a similar focus on removing non-technical barriers to delivering green building products may enjoy greater success than companies making a play based purely on technology or price.

As is the case for real estate generally, given the credit crunch short term prospects for new green building construction may be uncertain. However, over the long term, the volume of new construction needed to meet forecasts for future demand, coupled with the spread of green building legislation, should create a favorable environment for clean tech investment in real estate. **BLB**

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¹ U.S. GREEN BLDG. COUNCIL, GREEN BUILDING FACTS: GREEN BUILDING BY THE NUMBERS (2008), <http://www.usgbc.org/DisplayPage.aspx?CMSPageID=1718>.

² ARTHUR C. NELSON, TOWARD A NEW METROPOLIS: THE OPPORTUNITY TO REBUILD AMERICA v (Dec. 2004), http://www.brookings.edu/-/media/Files/rc/reports/2004/12metropolitanpolicy_nelson/20041213_RebuildAmerica.pdf.

³ Amory Lovins, Chief Scientist, Rocky Mountain Inst., Keynote Address at the Green Energy Conference: The Negawatt Revolution: Solving the CO₂ Problem (1989), available at <http://www.ccnr.org/amory.html>.

⁴ DAVID ROLAND-HOLST, ENERGY EFFICIENCY, INNOVATION, AND JOB CREATION IN CALIFORNIA 12 (University of California, Berkeley Center for Energy, Resources, and Economic Sustainability 2008), available at http://are.berkeley.edu/~dwrh/CERES_Web/Docs/ (follow UCB Energy Innovation and Job Creation 10-20-08.pdf link).

⁵ *Id.* at 20, 29-40.

⁶ See generally DOLORES HAYDEN, BUILDING SUBURBIA: GREEN FIELDS AND URBAN GROWTH, 1820-2000 (Knopf Publishing Group 2003) (providing an enlightening American history of suburban development).

⁷ See REID EWING, KEITH BARTHOLOMEW, STEVE WINKELMAN, JERRY WALTERS & DON CHEN, GROWING COOLER: THE EVIDENCE ON URBAN DEVELOPMENT AND CLIMATE CHANGE (The Urban Land Institute 2008). State governments are now beginning to reverse twentieth century sprawl zoning through policies that promote more compact, mixed use development near existing transit. For example, the recently adopted Chapters 40R and 40S of the Massachusetts zoning law provide financial incentives to cities that adopt “smart growth” zoning districts which provide for higher density housing near existing transportation, infrastructure, or downtown areas. MASS GEN. LAWS ch. 40R and 40S (2004). California recently adopted SB 375, which provides for regional greenhouse gas targets, regional transportation and land use planning to meet those targets, and limited relief from review under the California Environmental Quality Act for certain projects that are consistent with regional plans. S. 375, 2007–2008 Leg. (Ca. 2008).

⁸ LEED is not the only private green building certification regime. (The Green Building Initiative offers certification through its Green Globes program, for example). Nor is LEED perfect. One common criticism of LEED is that the point-based system for certification invites developers to seek the most easily-earned points by implementing measures that may not necessarily improve environmental performance in the context of the specific site. However, this article focuses on LEED-based ordinances since, at this time they are the basis for most cities’ green building initiatives.

⁹ LEED FOR NEW CONSTRUCTION: REGISTERED PROJECT CHECKLIST v. 2.2 (2008), available at <http://www.usgbc.org/ShowFile.aspx?DocumentID=3998>.

¹⁰ LEED FOR NEW CONSTRUCTION AND MAJOR RENOVATIONS v. 2.2 (2005), available at <http://www.usgbc.org/ShowFile.aspx?DocumentID=1095>.

¹¹ CATHY TURNER & MARK FRANKEL, ENERGY PERFORMANCE OF LEED FOR NEW CONSTRUCTION BUILDINGS 5 (New Buildings Institute & U.S. Green Building Council 2008), available at http://www.newbuildings.org/downloads/Energy_Performance_of_LEED-NC_Buildings-Final_3-4-08.pdf. The energy efficiency advantage of LEED buildings over conventional buildings will vary depending on state building codes. This advantage may not be as great in California, for example.

¹² 57 ANDREW J. NELSON, THE GREENING OF U.S. INVESTMENT REAL ESTATE-TARGET FUNDAMENTALS, PROSPECTS AND OPPORTUNITIES 8-9 (RREEF 2007), available at https://www.rreef.com/GLO_en/bin/SO_57_Greening_of_US_Investment_RE.pdf.

¹³ U.S. GREEN BLDG. COUNCIL, LEED INITIATIVES IN GOVERNMENT AND SCHOOLS (2008), <http://www.usgbc.org/DisplayPage.aspx?CMSPageID=1852>.

¹⁴ Exec. Order No. 484 (Mass. 2007).

¹⁵ *But see* The Dep’t. of Cambridge Cmty. Dev., Green Building/Zoning Task Force, <http://www.cambridgema.gov/cdd/cp/zng/gmbldg/index.html> (last visited Oct. 31, 2008) (stating that, while neighboring Cambridge has not yet adopted a green building ordinance, a task force has been formed to study the issue).

¹⁶ BOSTON, MASS., ZONING CODE AND ENABLING ACT § 37-5 (2007). LEED certification costs may in some instances be considerable: “Many bemoan the cost and difficulty of securing LEED certifications. While application fees are relatively nominal, particularly in the context of overall project costs, compiling the information required for the application can impose extraordinary burdens on applicants, such as hiring specialized LEED consultants. Firms can spend over \$100,000 just to obtain a LEED certification. This expense may be justified for larger projects, but viewed as unreasonable for smaller projects” NELSON, *supra* note 11 at 38.

- ¹⁷ BOSTON, MASS., ZONING CODE AND ENABLING ACT art. 27 appendix A (2007).
- ¹⁸ *Id.*
- ¹⁹ Chicago Dep't. of Constr. and Permits, Green Permit Program Brochure, http://www.iccsafe.org/news/green/pdf/Chicago_GreenPermitBrochure.pdf (last visited Nov. 6, 2008).
- ²⁰ KATHARINE HAYHOE & DONALD WUEBBLES, CHICAGO CLIMATE ACTION PLAN 10-11, <http://www.chicagoclimateaction.org> (last visited Nov. 6, 2008). Chicago is one of a number of municipalities that aspire to reduce greenhouse gas emissions. As of this writing, 884 mayors from 50 states, the District of Columbia, and Puerto Rico have signed the U.S. Conference of Mayors Climate Protection Agreement. Participating cities "strive to meet or exceed Kyoto Protocol targets for reducing global warming pollution", and urge federal action to reduce greenhouse gas emissions. <http://www.usmayors.org/climateprotection/agreement.htm>.
- ²¹ Chicago Climate Action Plan, Where We Are Going, http://www.chicago-climateaction.org/pages/where_we_are_going/62.php (last visited Nov. 6, 2008) ("The City is embarking on an ambitious building retrofit program, which, when brought to scale, will help retrofit 65,000 residential units every year. The program plans to retrofit 400,000 residential dwelling units achieving 30 percent efficiency, which will save 863 gigawatt-hours of electricity and 235 million therms of natural gas for an estimated cost savings of \$269 million per year. The program will retrofit 9,000 commercial and institutional and 200 industrial retrofits achieving 30 percent efficiency, which will save 1,525 gigawatt-hours of electricity and 69 million therms of natural gas for an estimated cost savings of \$219 million per year.")
- ²² *Id.*
- ²³ Dallas, Tex., Ordinance 27131 § 3 (Apr. 9, 2008).
- ²⁴ *Id.* § 6.
- ²⁵ *Id.* For one and two family residential projects, a minimum number of LEED points is not required in phase one, though certain energy efficiency and water use standards must be met. In phase two, one and two family residential projects must be certifiable under LEED, Green Built North Texas, or equivalent standards. *Id.* § 8.
- ²⁶ LOS ANGELES DEP'T. OF CITY PLANNING, BUILDING A GREEN LOS ANGELES (2008), available at http://cityplanning.lacity.org/code_studies/GreenLa/Brochure.pdf.
- ²⁷ *Id.* (Including new construction and existing buildings where renovations exceed certain thresholds).
- ²⁸ Los Angeles, Cal., Ordinance 179820 (Apr. 22, 2008) (adding new Section 16.10 and 16.11 to the Los Angeles Municipal Code).
- ²⁹ *Id.*
- ³⁰ San Diego, Cal., Sustainable Building Policy, No. 900-14 (May 20, 2003). The County of San Diego, which has jurisdiction over land use in unincorporated areas, also has incentives for green buildings. See generally DEP'T. OF PLANNING AND LAND USE OF SAN DIEGO TECHNICAL GUIDELINES FOR GREEN BUILDING INCENTIVE PROGRAM (2003), available at http://docs.sandiego.gov/council_policies/cpd_900-14.pdf.
- ³¹ S.F., CAL., BUILDING INSPECTION COMMISSION CODE ch. 13C (2008).
- ³² *Id.* § 1304C.2.2.1.
- ³³ The LEED standards referenced in the above sentence (ie. LEED WE 3.1) refer to specific items on the LEED checklist.
- ³⁴ *Id.* § 1304C.2.2.
- ³⁵ S.F., Cal., Planning Department Director's Bulletin No. 2006-2 (Sept. 28, 2006).
- ³⁶ SEATTLE, WASH., CODE § 23.49.011, 23.49.015, 23.49.020 (2008).
- ³⁷ Green Building Act, WASH., D.C. CITY COUNCIL, § 4(a) (West 2001 & Supp. 2007).
- ³⁸ *Id.* § 3.
- ³⁹ *Id.* § 4(b).
- ⁴⁰ *Id.* § 7.
- ⁴¹ *Id.* § 13.
- ⁴² Green DC, Green Buildings, <http://www.green.dc.gov/green/cwp/view,a,1231,q,460953.asp> (last visited Oct. 29, 2008).
- ⁴³ N.Y. CITY, N.Y., LOCAL LAW No. 55 Int. No. 20-A § 24-803 (2007).
- ⁴⁴ Title 28 of the New York City Administrative Code, Section 112.6.3. http://www.nyc.gov/html/dob/downloads/pdf/title28_chapter1.pdf
- ⁴⁵ See CAL. PUB. UTILITIES COMM'N., CALIFORNIA SOLAR INITIATIVE: STAFF PROGRESS REPORT 10-11 (2008), <http://www.environmentalcalifornia.org/uploads/bX/S3/bXS3EVtWtjkN1JJYyuzg/July-2008-Solar-Program-Progress-Report.pdf> (explaining how the California Solar Initiative provides subsidies to homeowners and business owners to install rooftop solar electric panels); Lindsay Riddell, *S.F. Supervisors OK City Solar Incentive Program*, SAN FRANCISCO BUS. TIMES (2008), available at <http://sanfrancisco.bizjournals.com/sanfrancisco/stories/2008/06/02/daily18.html> (highlighting San Francisco's additional subsidies for solar installations).
- ⁴⁶ BERKELEY, CAL., CODE § 7.98 (2008) (implementing Berkeley's obligations under Measure G, which targets an 80% reduction in Berkeley's greenhouse gas emissions by 2050).
- ⁴⁷ *Id.* § 7.98.140.
- ⁴⁸ See CITY OF BERKELEY, UPDATE ON BERKELEY FIRST: FINANCING INITIATIVE FOR SOLAR AND RENEWABLE TECHNOLOGY (2008), <http://www.ci.berkeley.ca.us/ContentPrint.aspx?id=19378>; City of Berkeley, Berkeley FIRST (Financing Initiative for Renewable and Solar Technology), <http://www.cityofberkeley.info/ContentDisplay.aspx?id=26580> (last visited December 3, 2008); Posting of Craig Rubens to <http://earth2tech.com/2008/09/17/berkeley-oks-city-backed-solar-loans> (Sept. 17, 2008, 03:00:00 EST).
- ⁴⁹ <http://www.cityofpalmdesert.org/Index.aspx?page=484>; http://www.signon-sandiego.com/uniontrib/20081205/news_1n5solar.html.
- ⁵⁰ California Global Warming Solutions Act of 2006, Assemb. B. 32, 2005-2006 Leg. (Cal. 2006).
- ⁵¹ Exec. Order No. S-3-05 (Cal. 2005).
- ⁵² See CAL. AIR RESOURCES BD. FOR THE STATE OF CAL., CLIMATE CHANGE PROPOSED SCOPING PLAN 41-44 (2008), available at <http://www.arb.ca.gov/cc/scopingplan/document/psp.pdf>. At the time this article was submitted for publication, the final scoping plan was not available.
- ⁵³ S.B. 375, 2007-2008 Leg. (Cal. 2008).
- ⁵⁴ S.B. 97, 2007-2008 Leg. (Cal. 2008).
- ⁵⁵ Bldg. Standards Comm'n., Green Building Standards, http://www.bsc.ca.gov/prpsd_std/default.htm (last visited Nov. 10, 2008).
- ⁵⁶ CAL. CODE REGS. tit. 24, part 11, § 503, 602, 604 (2007).
- ⁵⁷ *Id.* § 504.3.
- ⁵⁸ *Id.* § 511.1.
- ⁵⁹ *Id.* § 603.5, 604.4, 604.5.
- ⁶⁰ In a net zero energy building the amount of energy provided by on-site renewable energy resources would be equal to the amount of energy used by the building on an annual basis.
- ⁶¹ Water efficiency measures are an important part of the climate change solution for two reasons. First, water transport and water use consumes considerable energy. CAL. ENERGY COMM'N., CALIFORNIA'S WATER-ENERGY RELATIONSHIP 8 (2005), available at <http://www.energy.ca.gov/2005publications/CEC-700-2005-011/CEC-700-2005-011-SF.PDF> (estimating that water-related energy use consumes 19% of the state's electricity). Second, climate change is expected to increase the occurrence of drought and reduce snowpack, so reduced water use will be a key adaptation.
- ⁶² Assemb. B. 1881, 2005-2006 Leg. (Cal. 2006).
- ⁶³ CAL. GOV'T CODE § 65596 (West 2008).
- ⁶⁴ U.S. GREEN BLDG. COUNCIL, LEED INITIATIVES, *supra* note 12.
- ⁶⁵ ANDREW J. NELSON, *supra* note 11, at 34-35.
- ⁶⁶ For example, a commercial tenant may have little incentive to invest in efficiency measures in its space if its utilities are not separately metered and it instead pays for building utilities based on the percentage of space it occupies in a building. In the residential context, a homebuilder may be disinclined to incorporate efficiency measures (such as tankless water heaters) that may raise the construction costs for the home but which would yield long term savings to the buyer.
- ⁶⁷ See, e.g. R. MARGOLIS & J. ZUBOY, Nontechnical Barriers to Solar Energy Use: Review of Recent Literature 12 (2006), available at <http://www.nrel.gov/docs/fy07osti/40116.pdf>; *The Elusive Negawatt*, THE ECONOMIST, May 8, 2008, available at http://www.economist.com/displaystory.cfm?story_id=11326549.