

Green Building

California and the Bay Area's Leadership Role

In 1895, a Swedish 37-year-old and future Nobel Prize recipient, Svante Arrhenius, predicted that the next century would experience an accelerated warming trend as the result of human activities. Over the next one hundred plus years, the concept of global warming moved from theory to reality, accelerating a modern environmental movement that demanded harmony between man-made and natural environments. From all appearances, the construction industry embraced this environmental movement on a greater scale than any other major commercial industry. Not surprisingly, California enacted the country's first state-wide green building code, while on the local level California cities and municipalities have led the charge in enacting green building ordinances. In so doing, California – and in particular the Bay Area – transformed the social and legal landscape of green building in the United States.

What is green building and how is it affecting modern construction in the Bay Area? This article offers an historical perspective on the green building movement and its effect on the modern construction industry approach to projects, reviews and evaluates the three most popular green building rating systems today, highlights key governmental regulations, and reviews various issues facing the emerging green building industry.

Historical Foundation of Green Building

Many individuals contributed to the modern environmental movement in the twentieth century. However, historians on the subject cite Rachael Carson's seminal 1962 book *Silent Spring* as the primary catalyst. In that book, Carson exposed the devastating impact of pesticides on the viability of song birds, awakening in its readers the stark realization that human actions directly impact mankind's own viability within the environment. Credit for the modern environmental movement must also be given to United States Senator Gaylord Nelson, who in 1970 established Earth

Day, an annual event which continues to ignite the passions of individuals to demand environmental protection and preservation. Many believe that Earth Day paved the way to creation of the United States Environmental Protection Agency and National Oceanic and Atmospheric Administration, as well as passage of the federal Clean Air Act, Clean Water Act, and Endangered Species Act. For his environmental achievements, Senator Nelson received the Presidential Medal of Freedom in 1995 by then President Clinton.

With regard to the design of environmentally sensitive buildings, architects Victor Olgay (*Design with Climate* - 1963) and Ralph Knowles (*Form and Stability* - 1968) were early pioneers, advocating architectural design that takes into account climate and environmental conditions and minimizes the reliance on energy and mechanical systems. In that regard, many mid-twentieth century buildings contributed significantly to the detrimental impacts on the environment including, without limitation, excessive energy and water consumption as well as greenhouse gas emissions. In the

United States today and unbeknownst to many, buildings account for 70% of electricity consumption, 39% of energy use, 39% of all CO2 emissions, 40% of raw materials usage, 30% of waste output (136 million tons annually), and 12% of potable water consumption.

To address the environmental impact of buildings, dozens of non-profit organizations around the world developed voluntary standards and rating systems for green and sustainable construction. In the United States, federal, state and local governments enacted legislative mandates requiring the incorporation of green building standards in the design, construction and operation of buildings, the purpose of which is to promote environmentally responsible construction in all major sectors of industry including education, government, institutional, office, healthcare, hospitality and retail.

Green Building Rating Systems

The universal purpose of "green building" is to increase a structure's efficiency and conservation of energy, water and materials, minimizing its impact on the

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environment. “Sustainable construction,” on the other hand, is the integration of green building design, resource conservation and occupant use in an effort to minimize a building’s impact on human health and the environment throughout a building’s life cycle (from design, material production and construction, through operation, renovation and destruction). Both green building and sustainable construction have the same ultimate purpose in mind – to minimize the impact of buildings on the environment.

Green building rating systems provide project participants (typically the owner, architect, developer and contractor) with an objective standard for a building’s green features and sustainability associated with its design, construction and operation, utilizing checklists to determine whether buildings meet objective benchmarks for escalating green status levels. Points under a green building rating system may be design based (e.g. on-site renewable energy) or construction-based (e.g. construction waste management). This format provides some flexibility for architects, developers and builders in the design and construction of green features necessary to achieve their desired objectives (e.g. lower operating costs, consumer and employee satisfaction, marketing and green status level).

The world’s first green building rating system was developed in 1990 by the United Kingdom’s Building Research Establishment called the Environmental Assessment Method. Subsequently, more than two dozen green building rating systems were created. Today, three of the most popular green building rating systems used in California

are the United States Green Building Council’s “Leadership in Energy and Environmental Design” (commonly referred to as “LEED”), Green Building Initiative’s “Green Globes,” and Build it Green’s “GreenPoint Rated.” All three rating systems use a checklist of green building features which is subject to third-party verification. Under each rating system, project participants accumulate points to achieve a certification rating. A brief discussion of the unique highlights of these three popular rating systems follows.

LEED

Introduced in the United States in 1998, LEED is the most widely used rating system with LEED certified projects throughout the United States and in 69 other countries. LEED offers nine project-specific rating programs tailored to the type of building project, the largest offering of any rating system. LEED rating programs include new commercial construction, existing building upgrades, residential buildings and schools. One need not look any further than the estimated value of construction projects registering with LEED around the world every business day – estimated to be over \$400,000,000 – to understand the enormous popularity of the LEED green building rating system.

All LEED rating programs utilize six evaluation categories: Sustainable Sites; Water Efficiency; Energy & Atmosphere; Materials & Resources; Indoor Environmental Quality; and Innovation in Design. Under LEED, there exists four certification levels, namely Certified, Silver, Gold, and Platinum. These escalating LEED certification levels are based on a 69-point scale and manda-

tory prerequisites, including minimum energy performance above the baseline of a conventional building, which is demonstrated by performing a computer simulation that measures expected energy use for the entire building. Other prerequisites include implementing a quality control process to ensure that the building’s energy related systems are installed, calibrated and performing according to design, implementing a pollution and erosion reduction plan occurring as the result of construction activities, and establishing minimum indoor air quality for occupants.

LEED’s third-party review is based solely on the documentation submitted by the project team at the end of the project, without any on-site inspection. However, project teams may seek a pre-construction design review in order to ascertain the likelihood of achieving points in any given category. LEED’s registration fees are the most expensive of the three popular rating systems, and LEED certification involves the most extensive documentation process in order to obtain certification status.

In sum, LEED is the most recognized green building rating system in the marketplace today, and in terms of marketing a project’s green rating to prospective users and purchasers of the building, the most advantageous.

Green Globes

The Green Globes green building rating system was introduced in the United States in 2005. Unlike LEED, Green Globes offers only two rating systems for construction of new and existing commercial buildings. Similar to LEED, Green Globes offers four certi-

fication levels (1-4 Globes) based on a 1000-point scale within seven categories: Project Management; Site; Energy; Water; Resources; Emissions and Effluents; and Indoor Environment. Scoring for the Green Globes rating system is based on the applicant's response to approximately 150 questions contained in an online questionnaire. Green Globes' third-party certification includes a conditional verification at the construction documentation stage and final verification after an on-site inspection following project completion. Although Green Globes historically has not required prerequisites or minimum levels of performance for each of the seven categories, the future Green Globes rating system for new commercial buildings is expected to implement those requirements.

Green Globes is a competitive alternative given its relative ease of use, lower cost and reduced overall time commitment to the certification process. As a benefit to its users, the Green Globes rating process provides recommendations for best design practices as well as strategies to achieve a desired rating and performance. Accordingly, Green Globes has developed a popular following, particularly in the construction of lower priced commercial buildings. To that end, one of Green Building Initiative's stated goals is to ensure that its green building rating system remains affordable for smaller projects that cannot justify a more expensive and time consuming certification process.

GreenPoint Rated

The GreenPoint Rated green building rating system focuses on new and existing single and multi-family residential

construction in California. The GreenPoint Rated system consists of five categories evaluated on a 450-point scale: Energy Efficiency; Resource Conservation; Indoor Air Quality; Water Conservation; and Livable Community. As an example, new single- and multi-family buildings obtain points for meeting the minimum energy efficiency guidelines set by the United States Environmental Protection Agency within its ENERGY STAR program, which items include rated insulation, high performance windows, and efficient heating and cooling equipment. The GreenPoint Rated system requires, as a condition of certification, that all single- and multi-family dwellings exceed by 15 percent California's minimum energy building code requirements and that at least 50 percent of construction waste be recycled or salvaged, reducing landfill deposits.

Unlike other rating systems, third-party verification under GreenPoint Rated begins in the building design phase and continues up to and through building completion. The largest benefit of GreenPoint Rated's "hands-on" approach is to maximize the homebuilder's chance of achieving its green building objectives during the design and construction process, rather than waiting until project completion for the green building review and certification process.

Government Initiatives, Ordinances and Laws

Starting in 1990 and continuing through today, there has been an unprecedented number of initiatives as well as government ordinances and laws enacted at the federal, state and local levels aimed at promoting green and sustainable construction.

On the international stage, global climate change protocols were thrust into the spotlight in 1997 when over 169 nations signed the Kyoto Protocol Treaty. The Kyoto Protocol, commonly regarded as the first instrumental step in achieving a comprehensive global emission reduction regime, establishes mandatory greenhouse gas emission targets for developed nations. In seeking to further the goals of the Kyoto Protocol by incorporation of its objectives, the U.S. Conference of Mayor's Climate Protection Agreement was executed in 2005 by over 600 cities (123 California cities alone). That same year, the United Nations Green Cities Declaration committed cities worldwide to achieving sustainable local development in energy, waste, design, environment, transportation, health and water, in addition to lowering greenhouse gas emissions 25% by 2030. Thirteen cities in California signed the Green Cities Declaration, including Bay Area leaders San Francisco, Oakland and San Jose.

On the national domestic level, the Energy Policy Act of 2005 constituted one of the most comprehensive pieces of energy legislation in the preceding decade, wherein among other things economic demand for green residential and commercial construction is encouraged primarily through tax incentives. Amid the recent financial turmoil of the financial markets, the Energy Policy Act of 2005 was renewed as part of the 2008 Emergency Economic Stabilization Act.

Without question, California leads the nation – and by many accounts the world – in promoting and adopting environmental regulation in the construction arena, particularly over the last 50 years. For example, in 2004 California

became one of the first states to mandate energy reduction in all existing state buildings and LEED Silver certification in new state buildings. California was also first to adopt global warming legislation, requiring significant reduction in greenhouse gas emissions by 2020 and adopting a green building code covering new commercial and residential construction in the public and private sectors.

Between 2003 and 2008, at least 30 local governments in California implemented green building legislation including Bay Area cities Alameda, Albany, Berkeley, Los Altos, Oakland, Palo Alto, Pleasanton, San Rafael, San Francisco, San Jose, San Mateo, Santa Clara and Sunnyvale. Many of these jurisdictions added green building incentives such as the fast-tracking of building permits, tax credits, and permit variances. Enforcement of green building ordinances is accomplished by withholding issuance of a building's final certificate of occupancy.

In 2008, San Francisco enacted what many believe to be the most comprehensive green building ordinance in the country, requiring that all new large private commercial building (25,000 square feet or more) commencing in 2009 meet LEED Silver certification and escalating the certification by requiring that all new large commercial construction in 2012 and beyond meet LEED Gold certification. Further, the San Francisco legislation requires that all new residential construction in 2009 and beyond meet GreenPoint Rated green building rating status. Importantly, while San Francisco's green building ordinance uses LEED and GreenPoint Rated's green building rating systems to determine compliance with the green build-

ing ordinance, it does not require actual certification under either rating system. Furthermore, the San Francisco legislation permits the building department to approve a comparable but equivalent rating system or method to determine whether construction meets minimum energy performance requirements.

Future Considerations for Green Building Design and Construction

The direct and indirect benefits of green construction are innumerable, from operating cost savings and increased property values to greater employee and customer satisfaction and retention. Specifically, green buildings enjoy energy and water savings, reduced waste, and lower operating and maintenance costs, as well as improved indoor environmental quality, greater employee comfort and productivity, and reduced employee health costs. It is these measurable "bottom-line" economic benefits that continue to drive the demand for green building, and the various green building rating systems provide the roadmap and framework to capture these economic benefits. While the future for green building is bright, just as in every emerging industry, participants in green building need to recognize and mitigate potentially adverse issues to assure that successful green building projects match expectations.

Legislative Conflicts

As different levels of governmental entities (federal, state, local) continue to enact various forms of green building legislation, conflicts between regulations may exist. For example, a local jurisdiction's green building ordinance that

mandates minimum energy requirements for mechanical equipment may be preempted by state or federal regulations for the same equipment, thus circumventing the local ordinance's intent. While most states, including California, allow local building regulation to be more restrictive than state building code, many local building ordinances allow for hardship exceptions to state building code requirements where enforcement thereof would adversely impact other local objectives, like preservation of historical resources. As the green building movement matures, one can expect more uniformity and consistency in green building legislation on all government levels. For now, however, understanding the applicable governmental legislative mandates and incentives at the time of project entitlement and design is important to avoid disruption of the construction process and achieve the objectives of green and sustainable construction.

Performance Objectives

In large part, all green building rating systems attempt to measure the future performance of completed projects, both in terms of energy use and other environmental metrics. By way of example, LEED allows computer modeling of energy use as a way to gain certification points. But modeling data is only as good as the information and design it depends upon. As buildings become more sophisticated, the coordination of design and construction elements and systems within a building will have a greater impact on a building's performance. To that end, variances between actual and model data can arise from a variety of factors, but most often are caused by changes in design or con-

struction, or simply failing to maintain the operation of the building in accordance with design intent. Accordingly, not only is it important to articulate clear and unambiguous performance objectives and criteria at the very beginning of a project, performance objectives must be in place to maintain the integrity of a building's design and construction in its actual operation. Thus, it is crucial to the integrity of the green building process to ensure that designed performance meets actual performance. Implementing a quality control process to ensure that the building's energy related systems are installed, calibrated and perform according to design as confirmed under any green building certification is a fundamental way to ensure that design meets expectations.

Contracts

Contracts govern the duties and obligations of project participants on a construction project. Form contracts have recently incorporated green building terms that address some, but not all, of

the evolving responsibilities unique to green building. In 2004, the American Institute of Architects ("AIA") issued its LEED Addendum for Green Construction to accompany its standard Owner-Architect agreement. Under that addendum, the architect is required to prepare a LEED certification plan, identify targeted LEED points, monitor the LEED certification process, prepare and provide LEED specifications, and prepare a final LEED certification report. However, the AIA addendum does not address other key issues, including for example, coordination obligations between the architect and contractor tailored to hybrid points (requiring the services of both architect and contractor). In 2007, the AIA issued its new Owner-Architect Agreement which in the context of green building merely requires the architect to evaluate the feasibility of incorporating environmentally responsible design approaches and alternatives for the project. To the extent that a LEED certified building is contemplated, the addendum is still necessary. However, both forms are inadequate, highlighting the need to tailor

form and existing contracts in order to define the architect, owner, and contractor's responsibilities in the construction of a green building, including risks pertaining to design, construction and achieving a green building rating status.

Concluding Observation

Where will the next one hundred years take us? Expect to see a refinement of the way buildings are designed, constructed, and operated that achieves harmony with the natural environment. As the green building industry continues to mature through advanced green building technology, evolving governmental policy incentives and mandates, and positive economic drivers, green communities across the country will flourish for generations to come. California and the Bay Area will continue to lead the effort to achieve maximum potential benefits of green and sustainable construction.

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