

ASPIRATIONS OF CERTIFIABLE CITY PLANNING:
EXPLORING THE TRAJECTORY OF SUSTAINABILITY ASSESSMENT TOOLS FROM
BUILDING TO BUILT ENVIRONMENT

By

LAUREN BISHOP WOODLIFF

(Under the Direction of Umit Yilmaz)

ABSTRACT

The transformation of the rating and certification systems that have come to characterize the green building movement, inundate the real estate market, and promote sustainable development across the globe, is demonstrative of a scaling up, indicating “the paradigm of sustainability assessment tools is changing from the building scale to the built environment scale” (Castanheira, 2013) This thesis examines the emergence and evolution of the alternative systems in their agenda to expand in scope and scale beyond the building, beyond the site, and on to planning operatives. There has been a recent outpour of capability building to leverage these tools as planning assets. But there are still many barriers and bottlenecks. Bridging those gaps could benefit from increased collaboration with planners and vice versa.

INDEX WORDS: Green Building, Sustainability Assessment, Neighborhood, New Urbanism, Smart Growth, Walkability, City Planning, LEED, BREEAM, CASBEE

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CHAPTER 1

INTRODUCTION

In the US, environmentalism gained mass public attention in the 1960s. Rachel Carson's landmark book, "Silent Spring" was published in 1962. Air pollution from traffic and industry had many American urbanites' health and well-being at risk. In 1969, the shores of Santa Barbara were covered in oil and the Cleveland's Cuyahoga River was so polluted from industrial waste it caught fire and burned for what is said to be "at least the tenth time" (Dykstra, 2008).

The term impact assessment is generally recognized in association with the Environmental Impact Assessment (EIA) process, first implemented by Council on Environmental Quality as a requirement of the National Environmental Policy Act (NEPA) in 1969 that federal agencies prepare a detailed environmental impact statement (EIS) for any proposed actions "significantly affecting the quality of the human environment" (Council on Environmental Quality [CEQ], 1997, Sec. 102 [1][c]) (Cox, 2010).

That same year Gaylord Nelson, a Democratic Senator from Wisconsin who had been pushing environmental issues for years, gave a speech in Seattle calling for awareness and environmental education. In his speech he stated, "I am convinced that the same concern the youth of this nation took in changing this nation's priorities on the war in Vietnam and on civil rights can be shown for the problem of the environment. That is why I plan to see to it that a national teach-in is held". The "teach-in" he proposed was held seven months later on April 22, 1970, an event dubbed 'Earth Day' that is said to have spawned America's first "green generation" (Lemann, 2013).

During the Republican Administrations of Nixon and Ford, Congress seemed to pass environmental bills one after the other. In the first half of the 1970s, The Clean Air Act, The Clean Water Act, The Endangered Species Act and the creation of the Environmental Protection Agency were all landmark federal measures for established national controls on pollution and environmental degradation. The growing recognition of the “energy crisis” at this time led to an interest in renewable energy. Towards the end of the decade reported health related issues similarly shared by tenants in newly constructed offices, homes and nurseries raised public concern for poor indoor environments.

What the media called “office illness”, was formally termed sick building syndrome (SBS) by the WHO in 1986 to describe the health related symptoms experienced by building occupants in correlation to time spent indoors. The symptoms of SBS were attributed to poor indoor air quality due to flawed HVAC systems, air filtration, outgassing from materials and chemicals in newly constructed building (Abdul Wahap, 2011).

In 1990 the UK’s Building Research Establishment’s Environmental Assessment Method (BREEAM) was the first to introduce the process of assessing sustainability performance of buildings and third-party certification to award sustainability achievements. Industry quickly followed suite, the Sustainable Building Tool (SBTool) was developed Internationally through collaborative work with representatives from more than 20 different countries, and in the U.S. with the US Green Building Council’s launch of their Leadership in Energy and Environmental Design (LEED) pilot version 1.0 in 1998. Today, there are over 90 national green building councils across the globe (McGraw-Hill Construction, 2013). The green building industry has successfully created a fleet of buildings that are considered certifiably green, sustainable high-performance, eco-efficient, environmentally friendly and/or socially responsible.

The recent surge in the green building marketplace is not an isolated incident. Similar patterns in the global green building market place are being observed worldwide in both developed and developing

countries. Many argue that the reason for this surge is all about business imperative and market opportunity, some proponents maintain its environmental awareness driven by the common interest of ‘doing the right thing’. Whatever the reason, big business or environmental activism, the green building industry seems to be successfully promoting sustainable development around the world.

Third-party sustainability performance assessment and rating system alternatives, domestic and international, that emerged as key industry players in the green building industry market are collectively making the case for green building to a global market. State and local governments across the U.S. are promoting the green building movement by mandating increasingly stringent building codes, design standards and incentivizing sustainability measures in support of these rating systems, many have mandated that state buildings and state-funded buildings achieve some form of green building certification (Kipert & Kipert, 2008). Municipalities are incentivizing green building in the form of tax credits, fast track permitting, ‘green’ loan programs and rebates to developers certifying their project as sustainable developments (Kipert and Kipert, 2008). Non-Government agencies are collaborating to promote interdisciplinary cooperation with and promotion of these rating systems. The market supply chain is following suite with materials and products encouraged by these rating systems, and the list goes on and on. The public enthusiasm for green building is evident and is only projected to grow.

When asked in a 2013 interview to give her expert opinion for the future of the green building movement, Jane Henley, Chief Executive Office of the World Green Building Council, responded with this, “Our motto has been one building at a time, and this philosophy has provided a good foundation.” (McGraw-Hill, 2013) The WorldGBC is a network of over ninety national green building councils from countries across the globe, the largest and most influential international organization driving the green building marketplace in the world. “We proved the business case for green building, developed new products and processes, and built capacity and knowledge all over the world” however, Henley explained,

“We recognize that the building-by-building approach to sustainability must be scaled up.” (McGraw-Hill, 2013)

And scale up they have. Over the last decade, existing rating and certification systems developers that emerged during the green building movement have since release various tools for application to projects of greater and greater scales. From college campuses to medical complexes to entire neighborhoods, sustainability assessment is quickly becoming a new tool for physical planning of the built environment.

Statement of Purpose and Methodologies:

This thesis chronicles the evolution of the alternative frameworks that emerged from the green building movement, as well as those that signify a transition of the movement itself, through two lenses. The objective was not to tediously examine the minute details embedded within the complex frameworks of the alternative systems and present an analysis of the trajectory of these tools with concern for the conditions from which they emerged. Investigating the research in this way reveals how consumer demand and public influence are the primary factors for the constant modification and expansion of these rating systems, and where these rating systems may be in the future.

Through an investigation of existing work, current research and case study analyses, this thesis examines the emergence and evolution of the alternative sustainability assessment and rating systems in their agenda to expand in scope and scale, highlighting the transformation of the green building industry's key market players in constant efforts to reinvent themselves with increasing concern for connection beyond the building, to beyond the site, and ultimately large scale planning and urban design issues. The evolution of the rating and certification system alternatives that have come to characterize the green building movement, inundate the real estate market, and promote sustainable development across the globe is demonstrative of a collective scaling up. Across the globe, developers of the leading building

sustainability assessment and rating systems have recently released versions specifically concerned for matters far beyond the building envelope scale.

What this is a paradigm shift in of sustainability assessment, rating and certification, from the building envelope to the built environment.

The research focus narrows to a list of sustainability assessment and rating system alternatives currently in use by public agencies, private stakeholders and planning authorities to approach planning through the lens of sustainability.

The majority of the rating systems examined in this research emerged as key players in the global green building market place. As far as the global market place goes, LEED and BREEAM are the two dominating system alternatives leading the green building movement, both launched in the 1990's, the two frameworks are largely credited for their influence on the emergence of sustainability assessment tools worldwide.

In 2002, CASBEE emerged as a building sustainability assessment and rating system based on the concept of Built Environmental Efficiency, or BEE, and in 2006 the CASBEE for Urban Development specific purpose tool became one of the first nationally accepted frameworks to apply sustainability assessment at the urban scale in the world, followed closely by BREEAM Communities in 2008, and LEED for Neighborhood Development in 2009.

As technologies allow, aspirations for “net-zero” buildings and landscapes are becoming increasingly feasible and alternative sustainability assessment tools are having to tighten down on the stringency of criteria to keep from becoming mainstream. Cascadia's Living Building Challenge, which emerged from a stance that existing sustainability assessment systems were too lax, is an example of an alternative assessment framework considered to be the highest standard for sustainable buildings in the US. The Living Building Challenge is included in this analysis because for one, it too promotes

connections beyond the site by employing a ‘scale jumping’ overlay, but it also may be a system to watch for other reasons. As “living” becomes the new “green” and “net-zero” becomes the new “sustainable”, the LBC’s head start may leave it well situated for competition in the green building market place

People want more than just to live and work in a green building with sustainable landscaping. People want to live, work and ‘play’ in a healthy, livable built environment. Public demand for livable spaces and places has clearly grown in concern that surpasses the building scale.

Today, there is a general consensus that “walkability” is one of the best indicators of a vibrant community and it is in high demand (Speck,2012). City officials, planners and the real estate industry are increasingly becoming aware of, and motivated by this fact. Demonstrative of this is the blast off of Walk Score. Released in 2007, Walk Score assesses and rates the walkability of neighborhoods and has been rapidly adopted by local governments, planners, developers and the real estate industry as a tool for guiding and communicating neighborhood walkability.

It has been well documented that there is massive population returning urbanized areas. The question at the forefront of the minds of local governments is now, how to get those people to come to their city. Across scales, government agencies, planning authorities, as well as the public are creating a demand for viable communities and the recent trend in practice has been to approach community planning through the sustainability lens. Given that consumer demand for green buildings and walkable communities is only projected to increase, and the global urgency for meaningful sustainability achievements will only continue to become more pressing, the combination of key components of alternative assessment tools, along with increased government and non-government, multi-organizational planning support could serve as a holistic and landmark solution. Given the increasing global urgency for addressing the current rate of scarce resource consumption and stemming degradation to the natural environment, focusing attention, resources and multi-disciplinary collaborative efforts towards the matter, may be tantamount to holistic and effective measure.

There is notable collaboration between third-party voluntary certification system developers, public agencies, and non-government advocacy organizations, in the US and abroad, and global competition is bringing alternative assessment and rating systems head-to-head.

What frameworks are dominating the market place and why? How are they meeting the needs of the growing consumer demand? How are they working to address criticism? What is in the works for the next generation? Chronicling this morphology through an extensive literature review, data and case study analysis, this work examines a culmination of external forces that influenced the progression of the green building movement, the market and how aspirations of creating a comprehensive sustainability assessment framework that can be universally accepted and cross-regionally applied at the city scale could mean a future for certifiably sustainable cities.

CHAPTER 2

SUSTAINABILITY ASSESSMENT TOOLS: CONCEPTS AND ALTERNATIVE METHODOLOGIES

The combination of heightening concern for both the indoor environmental quality of buildings and degradation to the natural environment led to what is known as the green building movement. The words “sustainability” and “green”, increasingly used interchangeably, have been adopted by industry sectors across the board and the “greening” of the architecture, engineering and construction industries has come to be collectively support what is known as the green building industry. (Korkmaz et al., 2009)

Green Building

The US EPA defines green building as a practice of “creating and using healthier and more resource-efficient models of construction, renovation, operation, maintenance and demolition.” According to the ASHRAE Green Guide, green/sustainable building design is that which “achieves high performance, over the full life-cycle” (ASHRAE, 2010). The difference between green and sustainable design, (though commonly used interchangeably and without specified distinctions in practice and in research on the topic), refers to the degree in which the design addresses the “full spectrum” of sustainability. Most generally, the term green as it refers to the greenery of nature is generally associated with environmental concerns and a design can be considered green if it minimizes impact to the environment. Sustainability is used to describe a more holistic approach to design as concerned with social, economic as well as environmental dimensions of design performance, an approach referred to as the Triple Bottom Line.

Alternative definitions differ very slightly and primarily as a matter of omission or emphasis, with slight to negligible confliction or contradiction between the core concepts of green building as described by different and diverse entities. Because the differences that do exist in alternative perspectives on green building are a reflection of various specializations, it is possible to accurately attach principles and techniques set forth by varying groups to the general concept, and create a unified and less politicized basis for green building theory. Components include water and energy efficiency, renewable energy alternatives, material specifications and toxic pollutant reduction, recycling and waste reduction, indoor air quality and sustainable site development. (EPA, 2013 Green Buildings)

Building Sustainability Assessment

Building Sustainability Assessment (BSA) tools are generally defined as either criteria-based tools (CBTs) or life-cycle assessment (LCA) tools (Sev, Aysin. 2011). The LCA methodology is concerned with quantitative input and output materials and energy flow data, and tools based on this methodology are primarily used in the design process to guide decision-making on materials, utility and energy and waste management (Sev, Aysin. 2011). The life-cycle approach considers the building *process*, rather than the *product*, and presents a model for sustainable buildings as a closed-loop of material and energy flows. (Sev, Aysin. 2011).

Green building rating systems refer to BSA tools developed by ‘third-party’ that have been developed and implemented by reputable ‘third’-party’ organizations, both in the US and internationally, to evaluate and measure a buildings performance against specified benchmarks, parameters or prescribed criteria. These rating systems incorporate a coordinated framework for determining level of “greenness”. Certification refers to the validation and recognition for being green/sustainable (ASHRAE GreenGuide, 2010). The majority of third-party building sustainability performance assessment and rating systems in place today are representative of the criteria-based tools (CBT) group, though many are increasingly reflecting of a combination of both CBT and LCA tools.

In order to determine the initial state of a system and measure changes, specific indicators must be defined. The most important functions of indicators are “quantification, simplification, and communication” (Sev, Aysin. 2011). The purpose of environmental performance indicators is to provide information for both quantitative and qualitative criteria, considering complex ecological, social, cultural and economic issues at every level of the decision-making process. Quantitative data includes energy use, water consumption, emissions, etc. and can criteria are evaluated based on performance and points can be awarded respectively in clear and objective results (Sev, Aysin. 2011). The evaluation of qualitative criteria has the tendency to be more subjective in that evaluation is based on site impact and often reflect local conditions and priorities.

Performance benchmarks are set by rating systems as a basis for comparison. These benchmarks are primarily country specific and performance thresholds are linked to national standards and regulatory limits (Sev, Aysin. 2011). The degree to which the life-cycle phases are covered, what indicators are used and how criteria is weighted in the overall score varies amongst the alternatives. Currently, none of the existing rating systems are comprehensively LCA-based, though they arguably needn’t be, as their primary role has been to transform the marketplace, “their strength lies in bringing a broader range of consideration to the assessment process while being respectful of simplicity and practicality to make them widely accessible” (Cole, Raymond J., Nigel Howard, Toshiharu Ikaga, and Sylviane Nibel, 2005)

Alternative Building Sustainability Assessment Systems

The UK’s BREEAM

The UK’s Building Research Establishment Assessment Method (BREEAM) is recognized internationally as the first third-party, consensus based, market driven assessment program and rating system for buildings. Launched in 1990 as a credit award system for office buildings, the scheme is used in more than 50 countries, with over 250,000 buildings are now BREEAM Certified and over 40,000

projects equating to over 1,000,000 individual buildings are currently registered for certification. According to the 2013 RICS Germany Survey, BREEAM accounts for more than three quarters of sustainable building certification in Europe (BRE, 2013c). BRE's intention for BREEAM is to "be the barometer of sustainable construction within the UK by measuring, evaluating and recording a building's performance during construction and operational life-cycle stages against best practice sustainability benchmarks." (BRE Global, 2013c).

The BREEAM system developed a fixed weighting through the national consultative process. The percentage of credits achieved under each category is calculated and environmental weightings are applied to produce an overall score." (Sev, Aysin. 2011) The framework consists of a mandatory assessment area for the potential impact of the building, and two optional areas in the design process and operations/maintenance (ASHRAE, 2010). The assessment is carried out in two stages, first in the design stage where an "interim" rating is determined. The second assessment for post-construction was introduced as part of the BREEAM 2008 Scheme, which extended the stages of a building's life cycle covered in the auditing process before the final BREEAM certificate is issued (BRE Global, 2013a).

The Building Services Research and Information Association (BSRIA) is the licensed third-party assessment provider. The BSRIA also provides consulting services to aide project teams to set targets and achieve the desired rating. Building certification is based on a rating scale of Pass, Good, Very Good, Excellent and Outstanding.

The USGBC's LEED Rating System

The USGBC was founded in 1993 and introduced their LEED rating system Version 1.0 in 1998. The LEED rating system was inspired in part by desire to in the US create a domestic version of the U.K's Building Research Establishment Environmental Assessment Method (BREEAM), and Canada's Building Environmental Performance Assessment Criteria (BEPAC). The pilot program was sponsored

by the Federal Energy Management Program and consisted of eighteen projects that totaled over 1 million square feet (IEE, 2012). The LEED Version 2.0 was released in 2000, providing a ratings scale and points system to rate high-performing building and four levels of building certification: platinum, gold, silver, or bronze. Bronze was later designated as “Certified” in version LEED 2.1 (Kipert & Kipert, 2009). In 2005 USGBC pilots their LEED-certification program for homes and officially launched their rating systems for existing buildings. That same year, the USGBC responded to a growing demand for a streamlined approach for the application of the LEED rating system for individual buildings to multiple building scenarios with the release of the LEED Application Guide for Multiple Buildings and On-Campus Building Projects, AGMBC (IEE, 2012).

The USGBC describes LEED as a voluntary, consensus-based, market-driven green building certification system to promote their mission to raise awareness of the benefits of building green, “and it has transformed the marketplace”. (ASHRAE, 2010)

The level of LEED certification is based on the total number of points the project earns. The main credit categories are; sustainable sites, water efficiency, energy and atmosphere, materials and resources, and indoor environmental quality (USGBC, 2012a). The additional credit categories in place for LEED Homes include location and linkage, and awareness and education. There are also two bonus credit categories for innovation in design or innovation in operations, and regional priority credits. The additional LEED-ND credit categories, neighborhood pattern and design, and green infrastructure and buildings will be discussed in more detail in a later chapter.

CASBEE Japan

The Japan Sustainable Building Consortium established The Comprehensive Assessment System for Built Environmental Efficiency (CASBEE) Research Committee in 2001 under the support of the

Japanese ministry of Land, Infrastructure, Transport, and Tourism to develop a voluntary tool to evaluate the environmental performance of buildings in an effort to provide recognition for sustainable building practices. The CASBEE Certification System for buildings in was developed in 2004 (Reed, R., Bilos, A., Wilkinson, S., & Schulte, K. W., 2009). The CASBEE method is used by construction companies, design offices, real-estate developers, etc. and is being widely adopted by many major local governments in across Japan to promote sustainable practices. For example, many municipal governments use CASBEE to promote sustainable development by requiring it in environmental performance assessments as part of development permitting processes

The Building Environmental Efficiency (BEE) model is founded on a tailor made version of the “Eco-Efficiency” equation, specifically for assessment of the built environment. The assessment items for CASBEE are based on the Triple Bottom Line (TBL) concept that entails evaluation of performance in a holistic manner. The assessment methodology is comprised of two categories, Quality and Load, developed to evaluate internal and external space respectively. Quality refers specifically to Built Environment Quality and evaluates “improvement in living amenity for the building users, within the hypothetical enclosed space (the private property)” (Poveda, C. A., & Lipsett, M. G., 2011).

Load refers to the Built Environment Load and evaluates “negative aspects of environmental impact which go beyond the hypothetical enclosed space to the outside (the public property)” (Poveda, C. A., & Lipsett, M. G., 2011). Quality, Q, is evaluated based on an assessment of three major categories; Q1 Environmental Aspects, Q2 Social Aspects and Q3 Economic Aspects, each comprised of multiple minor and sub-categories. The Evaluation of Environmental Load, L, is ultimately focused on Carbon emissions, with the Load Reduction, value based on reduction of emissions from fuel combustion and other process as separate and distinct emission sources.

Evaluation of performance within the hypothetical boundary is structured in two sections at each stage of the design process. Results are given for individual assessment items as scores for Quality, Q,

and Load Reduction, LR, which serves as the indicator of the level of performance in mitigation, or in minimizing the ‘Load’ as is imposed outside of the defined hypothetical boundary.

Considered a ‘pro’ of the CASBEE rating system framework is its ability to suit local conditions. The weighting coefficients are determined by feedback from a wide range of users such as designers, owners, operators and public officials. These coefficients can be modified based on regional characteristics and the priorities local policy objectives. (Sev, Aysin. 2011)

The CASBEE imperative criteria are reviewed via a process of the CASBEE system composed of four basic assessment tools, CASBEE for pre-design, CASBEE for New Construction, CASBEE for Existing Building and CASBEE for Renovation, corresponding to the lifecycle of a building, pre-design to post-design processes, as well as tools for specific purposes, together collectively known as the CASBEE Family.

The specific purpose tools represent a transition of agenda to expand the markets ability to utilize the CASBEE framework and gain recognition for achieving imperatives. These tools were development based on the growing recognition of the importance of sustainable development practices on a greater scale. The basic CASBEE tools are designed to evaluate performance at the individual building level, the specific purpose tools have been tailored to allow for the comprehensive evaluation outside of such a set boundary.

Among these specific purpose imperatives the two that stand out with respect to evaluation of performance outside of one particular and defined project boundary are CASBEE for Urban Development and CASBEE for Cities, the latter of which will be discussed in greater detail in chapter.

Chapter Summary

Green and Sustainability are both concepts that have become so freely used for various descriptive purposes that the consistency of their meaning is becoming questionable. Cleaning supplies

can be green if they reduce the use of toxic chemicals; toilet paper can be sustainable if there is a fraction of recycled paper content in its composition, etc. The developers of the ASHRAE GreenGuide have suggested simply, that the concepts of green design and sustainable design have “no absolutes—that is, they cannot be defined in black-and-white terms”, suggesting that the terms are perhaps most useful “when thought of as a mindset: a goal to be sought and a process to follow” (ASHRAE , 2010).

Sustainability assessment tools serve to guide and prioritize minimal resource and energy use, and promote sustainable design procedures with the objective of achieving a healthier built environment by providing effective frameworks intended to” delineate concepts, theories, laws, and models.” (Ramaswami et al., 2009)

When asked in a 2013 interview to give her expert opinion for the future of the green building movement, Jane Henley, Chief Executive Office of the World Green Building Council, responded with this, “Our motto has been one building at a time, and this philosophy has provided a good foundation.” (McGraw-Hill, 2013) The WorldGBC is a network of over ninety national green building councils from countries across the globe, the largest and most influential international organization driving the green building marketplace in the world. “We proved the business case for green building, developed new products and processes, and built capacity and knowledge all over the world” however, Henley explained, “We recognize that the building-by-building approach to sustainability must be scaled up.” (McGraw-Hill, 2013)

And scale up they have. Over the last decade, existing rating and certification systems developers that emerged during the green building movement have since release various tools for application to projects of greater and greater scales. From college campuses to medical complexes to entire neighborhoods, sustainability assessment is quickly becoming a new tool for physical planning of the built environment.

CHAPTER 3

ALTERNATIVE SUSTAINABILITY ASSESSMENT TOOLS SCALE UP

CASBEE for Urban Development

CASBEE for Urban Development, launched in 2006, promotes the adoption of a “holistic approach” with broadened assessment measures such as the use of area energy networks shared by a group of buildings, even if each is owned and managed by different stakeholders (Blanch, Verges. A., 2011).

Applicable to new developments and redevelopment projects, the CASBEE Urban Development scheme categorizes projects as either “city-center type” or “general type”. The two types are assessed based on the same framework, but with differences in criteria weighting to better reflect the context. Assessment rankings are based on five grades based on the final BEE score: Poor, Fairly Poor, Good, Very Good and Excellent (Säynäjoki, E., Kyrö, R., Heinonen, J., & Junnila, S., 2012).

Tokyo, Japan’s Harumi Triton Square, evaluated “A with four stars”, one example of the application of the CASBEE Urban Development tool to assess the large-scale “composite” redevelopment project, measuring 440 m east to west and 210 m north to south. Sustainability is evaluated based on the idea that “ecology is economy”. Redevelopment of the site, formerly comprised of dilapidated apartment buildings and warehouses constructed in the 1950s and 60s, began in the early 1990s in response to a growing demand for better urban land use.

Under the notion that “communities grow”, the integration of an operations and management plan for the area after the project’s completion was part of the initial planning and design process. The planning and design efforts were ambitious to say the least. To promote the creation of a well-balanced

community, the Harumi Triton Square objective “theme” is a “fusion of work, relaxation, and living”. The objective was to create a “town with clear zoning for user friendliness” and a clear landscape transect with defined land uses, building types and density can easily identified (Environmental Efforts, n.d.)

To provide “zonal demarcation” for pedestrians, an artificial ground was built atop nearly the entire site (Environmental Efforts, n.d.). The artificial surface has been extensively designed and planted with parks and natural landscapes. Pedestrians can freely walk along the constructed surface, while cars and service vehicles are parked, loaded and unloaded, below ground.

Below the parking levels, an extensive network of utility systems, collectively called The Center Plant, is located within the third and fourth basement levels of Harumi Triton Square. The Center Plan is a complex mix of substations, water supply and drainage systems, and a district heating and cooling system (DHC), that serve a core support system for the entire area. Incorporating a multitude of energy-saving technologies, the design and construction of the entire site was based on three objectives “Waste no heat”, “Use power efficiently,” and “Produce heat efficiently.” (Environmental Efforts, n.d.)

BREEAM Communities

BREEAM Communities UK is defined by BRE Global as, “a way to improve, measure, and certify the social, environmental and economic sustainability of large-scale development plans by integrating sustainable design into the master planning process.”

Launched in 2008, BREEAM Communities was designed to address sustainability of developments which are “likely to have significant impacts on existing communities, infrastructure or the provision of local services.” (BRE Global, 2013a) The assessment criteria are similar in scope to the original BREEAM building standards, but with an extended agenda that covers a wider range of sustainability issues.

The assessment of sustainability at the masterplanning level involves three specific steps. Step 1- ‘Establishing the principle of development’ immediately follows site selection as part of the application process whereby the design team must demonstrate the “suitability and need for specific types of developments on the site”. Strategic plans for the “wider area”, should indicate the requirements on housing, employment or services of the new development. “All issues must be covered to ensure a holistic strategy for the site” (BRE Global, 2012a). Considerations include community-scale energy generation, transport and access. Step 2- ‘Determining the layout of the development’, is part of the masterplanning process where the layout of the development is designed. Questions of “how people will move around and through the site and where buildings and amenities will be located” are addressed during this step. Finally, Step 3- “Designing the details” involves the specification of the development design including landscaping, ‘sustainable drainage solutions’, transportation facilities, and other various design details related to the built environment (BRE Global, 2012a).

BREEAM Communities has related 51 issues into six different categories including, Governance, Social and economic wellbeing, Resources and energy, Land use and ecology, Transport and movement, and Innovation. The system certifies developments with ratings of Pass (25-39%), Good (40-54%), Very Good (55-69%), Excellent (70-84%), and Outstanding (85-100%) (BRE Global, 2010-2014). The BREEAM Communities rating system has been tailored for the assessment of nine different regions in the UK. Internationally, a Bespoke Standard can be created for an individual project or a particular region or country can develop an adapted scheme through collaboration with BRE Global (BREEAM, 2013b).

According to the BREEAM Communities FAQs released June 2013 by BRE Global, there is no size specifications imposed on planning projects eligible for BREEAM Community certification, though the framework is advised for a project scale where certain points apply regarding the sites impact on the surrounding area (2013).

The framework is based on a process, rather than a checklist of imperatives, and does not mandate design solutions due to the significance of scope, scale and context in the planning and design decision making process. BREEAM Communities promotes the collaboration between developers and planners to achieve the most sustainable outcomes for major sites. “It’s a solution to help move projects through the planning system and should be welcomed by everyone with an interest in securing sustainable communities”, stated Practitioner Sean Nicholson, Technical Director, WSP, (BREEAM, 2014)

The BRE Trust “has not been shy about selling BREEAM across the globe.” (Parker, J. (2009). BRE’s goal for BREEAM Communities is to ensure that the model is an “asset” available and applicable for master planning and design projects anywhere in the world”. To do so, the developers introduced the Bespoke international process in 2004 to ease cross-regional application. The adaptive model was developed to ensure that the key issues and challenges facing a region outside of the UK are fully acknowledged and addressed including; the location and current use of the development site, local climatic conditions (micro climate change), timescales and phasing of the development, local/national development and planning standards, land use pressures across the country and in the local area, among others (BRE, 2013).

Country-specific BREEAM schemes can be developed and owned by NSOs, which may be a government body, a national Green Building Council or other “relevant organization”, either by adapting the BREEAM UK, European or International schemes to the nation’s particular local context, or by interpreting the BREAM Core Technical Standard for the local context. As long as the requirements established by the Code for a Sustainable Built Environment are upheld, the schemes developed by NSOs can be in any format seen fit (BRE, 2013).

The Masthusen project located in Malmo, Sweden, the country’s third largest city, was the first project to be awarded BREEAM Communities certification outside of the UK. Encompassing 100,00m², the site is a former industrial area in the Western Harbor that is central to Malmo’s sustainable city

initiative. Located within close proximity (15 minute walking distance) to the Malmo Central Station, the site has become a central destination for those who live and work in the Western Harbor community. Redevelopment of the site included the creation of an 18 block street network, 700 residential units, education and healthcare facilities, and 70,000 m² of new office space and 20,000 m² of retail and service space. The goal is to “provide a variety of commercial space so that the area has a strong economy and is a vibrant place to be”, says Andres Danielsson, WSP’s Malmo environmental consultant. A large square forms the “centerpiece” for the development and all public spaces are accessible to everyone.

All of the buildings on-site must achieve BREEAM ratings of GOOD for residential buildings and Excellent for other new buildings (Sustain, 2012). Green walls and green roofs incorporated into the building designs throughout the site are intended so that people experiencing the area “immediately can feel the difference”, Danielsson stated. Emphasizing the value of “visible sustainability”, He went on to explain that “it is important that people notice that this is a different kind of place, and feel it’s nice to be there. People don’t have to know about all of the sustainable measures that will be incorporated, but they have to want to visit the area and be part of living and working there.” (WSP Group,2012)

To date, 8 projects have been certified under BREEAM Communities and 18 registered projects are currently undergoing assessment including projects via the ‘bespoke’ process in Sweden, Norway, Belgium and Turkey. There are 66 licensed assessors in 13 different countries. The scale of these projects range in size from 2ha to 179ha, or approximately 5 to 442 acres (BREEAM, 2010-2014).

LEED for Neighborhood Development

In 2009, the USGBC released the LEED 3.0 updates, aligned with Smart Growth America and launched their latest rating system, developed in partnership with the Congress of New Urbanism and the National Resource Defense Council, LEED for Neighborhood Development. The call for pilot projects was met with reported “overwhelming interest”, so much so the USGBC had to gather additional resources to accommodate 238 projects, double what was anticipated, in 39 states and 6 countries.

There are 12 prerequisites that must be met in order to achieve certification. A maximum of 106 points can be awarded for international projects. A project that obtains 40 points is Certified, a project that obtains 50 points is Silver, 60 points is gold, and a project that obtains 80 or more points is platinum.



The pre-requisites and credit categories included in the rating system are related by three separate categories; Smart Location and Linkage, Neighborhood Pattern and Design, Green Infrastructure and Buildings. Figure 2.2 Additional credit is awarded to projects that achieve criteria specified in the Innovation and Design Process, and Regional Priority categories. All LEED-ND projects must include one LEED certified building and additional credits can be gained if the project includes multiple (USGBC LEED ND FAQs).

The first LEED-ND project to achieve certification in the US was the St. Luis Park Excelsior & Grand project, located in the Minneapolis suburbs of Minnesota. The new-urban neighborhood redevelopment project encompasses 17.5 acres site comprised of 960,000 sq. feet of first floor retail, upper level residential four-structure building complex. A village green situated behind the buildings provides a gathering space and direct access to a major city park adds to amenity accessibility.

Though the proposed project had already been intent on transforming the suburbanized area “without any tradition of density” into a multi-use neighborhood with sustainability in mind, when Elness Swenson Graham, the contracted architect, realized that the project could potentially be the first to achieve LEED-ND Certification, the firm invested a reported \$70,000 in non-billable hour to pursue registration in the pilot program, a decision that added luster to both the neighborhood and the firm’s reputation (Jossi, F., 2013).

Another one of the first sustainably certified neighborhoods in the country, also located in the St. Louis metro-area, was once among the Nation’s most impoverished. Located on the former Blumeyer Public Housing Complex site, described as notoriously distressed, St. Louis Missouri’s Renaissance Place is now a 512-unit functional and efficient mixture of market-rate and publicly subsidized housing, including apartment buildings, townhomes, accommodations for seniors and residents with disabilities. The LEED Certified St. Louis Housing Authority is also located within the site. The site is centrally

located and within close proximity to an art district, retail and access to the city's light rail system (Jossi, F., 2013).

Though LEED-ND Certification did well to benefit the form and function of redevelopment project, the rating system also helped in another way by providing the third-party validation that reportedly attributed significantly to the acquisition of funding. As William Carson, director of sustainability for McCormack Baron Salazar, the planning firm responsible for facilitated the Renaissance Place project, explained, financing came in the form of Hope IV money from Housing and Urban Development and a “complex mix of state, local and philanthropic funding.” (Jossi, F., 2013)

According to Carson, building green is common sense for the long-run operation of low income communities where wasteful resource consumption can translate into unaffordable costs. Additionally, when a development operates on subsidies from public authorities or the federal government, there is added incentive to keep expenses “flat”, a significant benefit of green building practices that is becoming increasingly recognized by “public partners” (Jossi, F., 2013).

Renaissance Place demonstrates how leveraging LEED-ND is good for the private stakeholders and for the community, but it is also good for the business of planning, attributed to the fact that McCormack Baron Salazar credits their involvement with the project in helping to win work on numerous LEED-ND projects in major cities across the US.

LEED-ND is designed to guide the planning and development of neighborhoods, especially those that contain a mix of uses, contribute to urban infill, brownfield redevelopment, and improve connection between developments. Awarding connections beyond the site, the creation of walkable streets and a mix of uses within the site, and the preservation and incorporation of existing structures to promote sustainable neighborhood planning and development promotes livable neighborhood developments contributes an improved form and function of the urban fabric.

There are five elements of what constitutes a “sustainable neighborhood”; an identifiable center and edge, a ‘walkable’ scale, mix of land uses and housing types, integrated network of walkable streets, and special sites are reserved for public spaces.

A reference neighborhood was used to model environmental impacts of the 15 different sub-categories comprising the Neighborhood Pattern and Design category of the rating system, as determined ‘typical’ for a neighborhood development that would pursue LEED certification. The categories are applied to the neighborhood scale and the number of points allocated to each credit is based on the “relative importance of the neighborhood-related impacts that it addresses”.

Neighborhood Structure Defined

A traditional neighborhood is composed of a robust network of thoroughfares, multiple intersections, as well as good connections to surrounding communities, pedestrians, cyclists and motorists can better navigate the neighborhood safely and more efficiently. In 1961, Jane Jacobs, urban theorist and author of the landmark work *The Death and Life of Great American Cities*, argued that “...frequent streets and short blocks are valuable because of the fabric of intricate cross-use that they permit among the users of a city neighborhood.” (Jacobs, 1961) To new urbanists, ideally, block faces are no more than 450 feet uninterrupted. Lanes and alleys are an integral part of thoroughfare design and can serve as drive aisles, provide additional parking on street, and offer solutions to design problems associated with emergency vehicle access requirements (Ewing, R., Meakins, G., Bjamson, G., & Hilton, H., 2011)

Definitive parameters of neighborhoods vary across regions but in general, they are characterized by identifiable centers and edges, a viable network of connections both internally and to surrounding areas, walkable streets, sites for civic uses and social interactions, and a cultural identity. The traditional urban neighborhood is compact, connected and has the ability to meet the needs of its inhabitants, such as

housing, employment, and daily shopping etc., while providing a safe and healthy environment for its inhabitants.

In the case of LEED-ND, the core committee suggested that the most appropriate scale for what constitutes a traditional neighborhood is an area of 320 acres (USGBC, 2013b). The committee came to this scale by referring back to traditional neighborhood development in the US in its prime. In 1929, urban planner Clarence Perry designed a regional plan for New York and Environs that outlined the neighborhood structure with a defined center and surrounded by civic amenities, parks and green space, residences, a school and daily retailers at the edge, all within one-quarter of a mile, the distance determined to be a comfortable 5-minute walk. From the center, this amounts to an area of 125 acres, 160 acres if area is a square (USGBC, 2013b).

Though Perry's mixed-use pedestrian shed provides the foundation upon which both developers of smart growth and new urbanist principles and techniques, as well as the LEED-ND core committee base the defining structure of a neighborhood, there was some tweaking involved to bring Perry's plan to speed with the times. For instance, though research still holds the quarter mile rule for an appropriate walking distance to meet daily needs, there is evidence that people will walk up to one-half of a mile to access multi-modal transportation options, such as heavy rail transit systems, and more specialized shops or service providers (USGBC, 2013b). Half a square mile is 320 acres, and thus the core committee determined this scale as appropriate for the upper limit of a LEED-ND site. Density decreases, as a general rule, following the landscape transect from center to edge. Though 'center' is often associated as the geometric middle, the center of a neighborhood does not have to be located within the geographic center; in fact a neighborhood center could technically be situated directly along the edge (USGBC, 2013b).

The primary function of the center is to serve as the dense congregation of interactions, diverse uses, buildings and people. At the neighborhood center, building patterns should be compact; a minimum of 60,000 sq. ft of built area per acre is prescribed by the LEED developers (USGBC, 2013b). Though LEED-ND does not set specific parameters for project scale, based on its founding principles, size is a defining feature of a neighborhood and a comfortable walk is the defining characteristic of that size.

Sustainability Assessment at the City Scale

There are a multitude of differences between what constitutes sustainable building and what constitutes sustainable cities and the proposition of how an evaluation, assessment and performance rating system could be accurately applied to a large-scale planning project must include additional considerations such as local ecosystems, population, demographics, infrastructure, community involvement, public use, activities, as well as ownership and control, political and economic interests, investment decisions and time-frame objectives, and the list goes on. According to Ramaswami et al, “Presently available frameworks of urban sustainability begin to but do not fully address the transboundary and cross-scale linkages between natural systems, engineered infrastructure, actors, and institutions that shape city sustainability outcomes, while also providing detail on underlying theories and linkages across diverse disciplines (Ramaswami et al, 2009)

The unique condition and context of localities across regions add to the complexities involved in developing an effective sustainability assessment frameworks for large-scale urban planning that can be universally applied and provide consistent results for comparison. This issue is complicated by matters of both domestic and internationally market alternatives, as well as questions of project scope and scale that can be accommodated by the industry. Commonly cited challenges to widespread adoptability have been in regards to difficulties in making cross-regional adaptations that can account for the many unique characteristics of local landscapes’ regional differences. Critics have also problematized the ability of infrastructure planning to keep up with the rising demand for sustainable communities. Among these

criticisms is the fact that green infrastructure planning initiatives are small in scale and isolated effort, rather than “integrated, community-wide efforts (Young, 2011).

Under the notion that cities are “embedded within larger-scale engineered infrastructure (e.g. electric power, water supply and transportation networks) that convey natural resources over large distances for use by people in cities”, Ramaswami et al argue that the sustainability assessment of city systems requires addressing the integration of “complex, cross-scale interactions between the natural systems, the transboundary engineered infrastructures, and the multiple social actors and institutions that govern these infrastructures”.

CASBEE City

In Japan, the Eco-Model Cities (EMC) was a national initiative launched in 2008, to “create and propagate” environmental cities was supported at the national government level by the Cabinet Secretariat in order to promote cooperation among the national government ministries, between the national government and municipalities, and between business and universities (Blanch, Verges, A., 2011). The application of the CASBEE tool at the city scale was tested in national efforts to evaluate EMCs and promote low-carbon societies (Murakami, S. (2008, December).

The council on promoting low carbon cities was established to undertake the daunting task to formulate a way to reduce CO₂ emission by 60 to 80 % by the year 2050. A process initiated by this question, “How should we, as a potential environmental city, proceed with the establishment of a low-carbon-society?” The process first requires an assessment of exiting conditions and projections of the city. Next, it is necessary to identify “bottlenecks and barriers and clarify the roles of each stakeholder. After that we need to set a future vision, formulate a road map based on “backcasting” and determine an action plan,” it is also crucial not to neglect monitoring and management plans to ensure environmental performance goals are being actively met (Murakami, S. (2008, December).

CASBEE for Cities (CASBEE Cities) is the comprehensive framework that resulted from the research, development and testing process and it has extended the implementation of city scale assessment in practice perhaps more extensively and comprehensively in comparison the alternatives reviewed in the previous chapters. CASBEE Cities is as a system for comprehensively evaluating the environmental performance of cities, using the triple bottom line approach of 'environment', 'society' and 'economy' and has been applied to nearly 1800 cities in Japan (JaGBC/JSBC).

The fundamental principle guiding the development of this tool was the need to “reduce environmental loads and create a low-carbon society while also improving the quality of life.” Additionally, the developers recognized the importance of communicating assessment results in a “Clear, simple and comprehensive” visual format in order to garner consensus from the general public.

The CASBEE-City framework was designed to evaluate the a city within a defined Hypothetical Boundary necessary to rate the Built Environment Efficiency based on a combination of two aspects: the environmental “load”, meaning that imposed on the environment outside of the city boundary, and the “quality” of life, meaning the integrity of the built environment and landscape ecology within the city. The objective is based on the original core concept of Built Environment Efficiency (BEE).

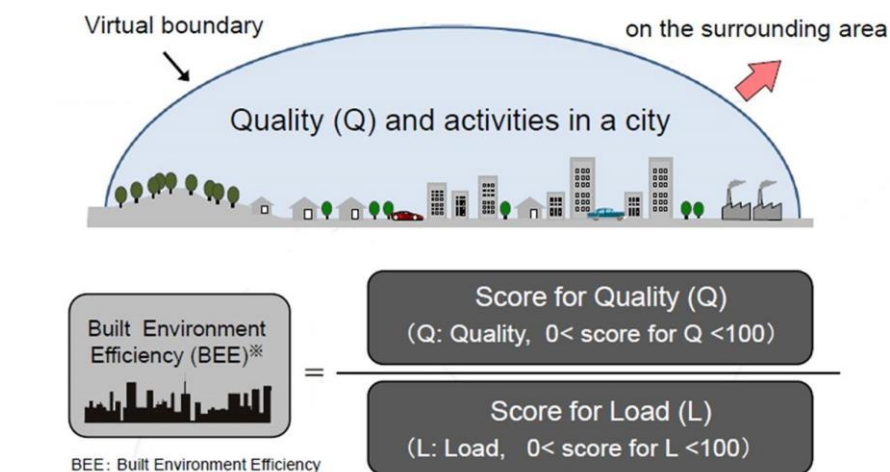


Figure 3.1 2 CASBEE Method Applied to City Scale

Essentially, a city that exhibits a low environmental load and a high quality of life would receive a high Built Environment Efficiency value and be recognized as a sustainable city in accordance with the CASBEE framework.

All CASSBEE City assessment result sheets include a radar chart to illustrate the current sustainability performance of cities and locate areas of concern, as well as the specific assessment criteria affecting the BEE value ratio. The chart provides a visualization of the individual areas in which the sustainability performance of a particular city are high or may need prioritization.

The CASBEE City assessment method begins with an evaluation of the current BEE value of the city, which is then modeled against two scenarios, one for projecting a case where specific environmental policies and sustainability measures are enacted, and a case for projecting the city maintains ‘business as usual’.

This allows for a clear understanding of the current condition of the city, the effectiveness of policy sustainability measures, and how to prioritize efforts to achieve a higher BEE.

Evolution of Alternative Sustainability Assessment Tools:

Collectively, these tools have proven effective as sustainable development incentives and planning tools utilized by both private planning firms and local planning authorities. How these tools can leverage to further promote improvements in the built environment worldwide is a point of much discussion amongst academics, practitioners and government agencies across the globe. Developers of these tools are in a self-proclaimed state of improvement in aspiration of sustainable development and there is a clear indication that “the paradigm of sustainability assessment tools is changing from the building scale to the built environment scale” (Castanheira, 2013).

Marked by this shift is the emergence of neighborhood sustainability assessment tools that can, by their very nature be categorized as urban planning tools. Also, as part of this shift, the heighten

interest in and demand for vibrant, livable communities where people can “live, work and play”, there is an obvious focus on walkability, a both the means and the end of what creating such communities. Demonstrative of this is the increasing weight of walkability criteria incorporated into existing assessment frameworks, but more notable, by the emergence of assessment frameworks developed solely for the purpose of neighborhood walkability assessment.

Interest in the development of a tool for comprehensive city assessment is at a high point. It is believed that public disclosure of results could provide a clear and objective resource for citizens to better understand the reality of their city’s condition, and potentially induce mechanisms, market driven, public pressure etc., to persuade and incentivize local governments to more effectively prioritize improvements to the city condition. Though to date, only one such tool exists, CASBEE Cities, which is neither internationally applicable nor universally accepted.

Ultimately, there does not yet exist a comprehensive sustainability assessment method that can be cross-regionally applied and universally comparable, though there are extensive efforts underway to address this need. Researchers have suggested that the potential for integration and possible “synergies” of existing assessment system components could further improve the applicability and overall success of sustainable development initiatives (Dall’O et al, 2013).

The figure below provides a graphic demonstration of the evolution of the alternative sustainability assessment system from building envelope to built environment, to the city scale.

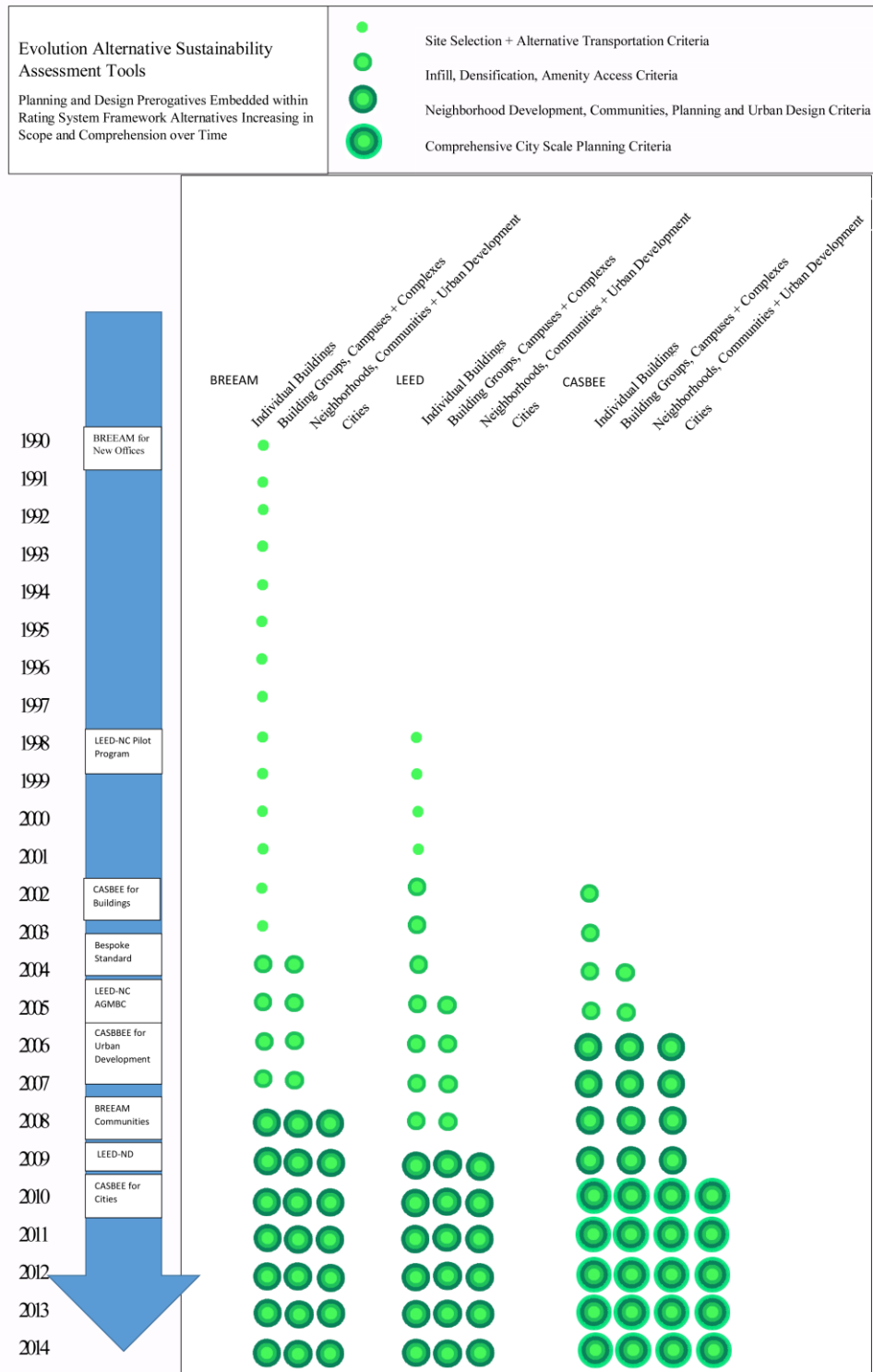
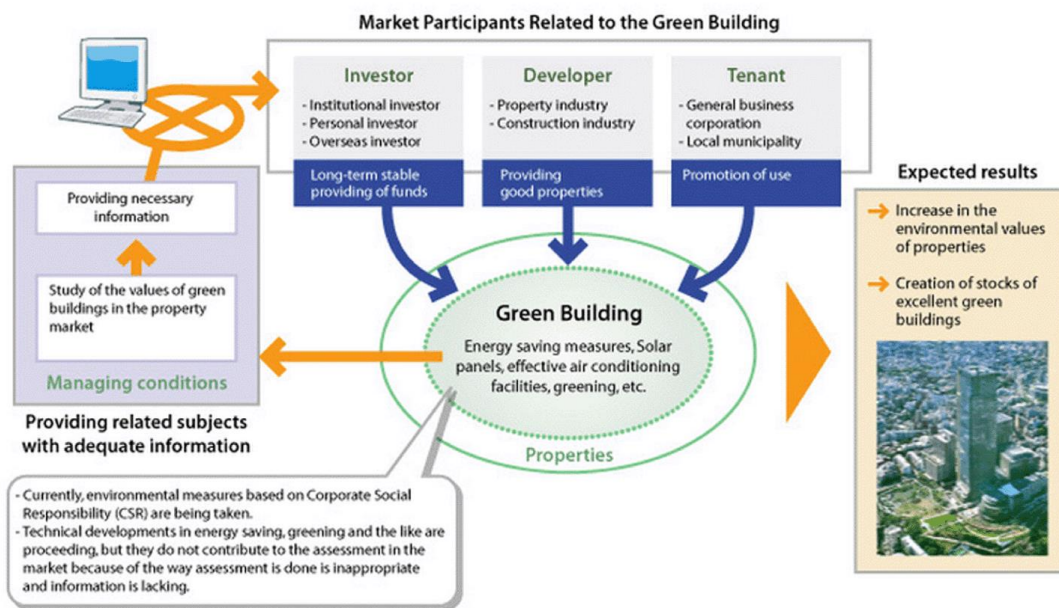


Figure 3.1 3 Graphic Illustration of Alternative System Evolution from Building to City Scale

CHAPTER 4

FACTORS INFLUENCING CONDITIONS OF THE GREEN BUILDING MARKETPLACE

Utilization of the green building industry's third-party assessment and rating systems has been credited as one of the most effective ways to provide incentives for clients, developers, designers and property owners to promote environmentally responsible development practices.



Source: <http://tochi.mlit.go.jp/greenbuilding/kankyo/english/about/>

Figure 4.1 1 Interactive Green Building Web

Both private developers and public agencies have successfully applied existing sustainable building performance rating systems with realized benefits, including increased property value to energy savings, as a result being certified or ranked for sustainable performance.

According to an article released by the BSRIA, “Publically displaying your green credentials is becoming a must for organizations in our new sustainably-aware society.” (BSRIA, 2009) In the 2012 Global Energy Efficiency Indicator (EEI) survey conducted by the Johnson Controls institute for Building efficiency, 44 percent of building executives said their organizations planned to pursue voluntary green building certifications for existing buildings in the next year. Sixty percent of respondents said they had at least one certified green building. (IBE, 2012).

Market Forces

The momentum of sustainable development is being driven by public interest and consumer demand and there is no sign of it slowing down. “As consumer awareness about climate change and energy independence continues to grow along with increasing energy costs, consumer demand for green buildings and sustainable development will only continue to increase” (Kibert & Kibert, 2008). However, it is crucial for those invested in promoting the use of these tools to recognize the challenges, either real or perceived by the consumer market, in order to take effective measures to address what factors are deterring its growth.

A fortunate economic side effect of the widespread adoption of green building practices is the associate decrease in how much green building practices cost. In economic jargon, this effect is known as economies of scale to describe the “The cost advantage that arises with increased output of a product. Economies of scale arise because of the inverse relationship between the quantity produced and per-unit

fixed costs; i.e. the greater the quantity of a good produced, the lower the per-unit fixed cost because these costs are shared over a larger number of goods.”

As progress and innovation in sustainable design technologies allow, aspirations for “net-zero” buildings and landscapes are becoming increasingly feasible and alternative sustainability assessment tools are having to tighten down on the stringency of criteria to keep from becoming mainstream. Cascadia’s Living Building Challenge, which emerged from a stance that existing sustainability assessment systems were too lax, is an example of an alternative assessment framework considered to be the highest standard for sustainable buildings in the US. The Living Building Challenge is included in this analysis because for one, it too promotes connections beyond the site by employing a ‘scale jumping’ overlay, but it also may be a system to watch for other reasons. As “living” becomes the new “green” and “net-zero” becomes the new “sustainable”, the LBC’s head start may leave it well situated for competition in the green building market place.

Cascadia’s Living Building Challenge

“It’s a certification program, but it’s also a philosophy, and a market-changing tool, and an advocacy tool.” (Hiskes, J (2014))

The Living Building Challenge was born from the objective to “produce the most advances sustainable design project in the world” as part of the National Institute of Standards and Technology funded Epicenter project. McLennan led the research and technology efforts during the project and proceeded to develop the theoretical model into a codified standard that in 2005, he named the Living Building Challenge (ILFI-LBC 2.1, 2012). The standard was formally launched in partnership with the Cascadia Region Green Building council (Cascadia) in 2006 (ILFI-LBC 2.1, 2012). Cascadia founded the International Living Building Institute (ILBI) in 2009 to promote the creation of “Living Buildings, Sites and Communities in countries around the world while inspiring, educating and motivating a global

audience about the need for fundamental and transformative change” (ILFI-LBC 2.1, 2012). The institute was renamed as the International Living Future Institute (ILFI), in 2011. Net Zero is the ultimate goal of the Living Building Challenge and thus, standards are considered to be rigorous.

Project teams must identify a project as one of four ‘typologies’ as outlined by the Living Building Challenge to determine how the imperatives will apply. The typologies are reasonably flexible and unrestrictive in terms of welcoming participation and project “typologies” range from new construction to remodels to historic rehabilitation projects.

Additionally, Living Building Challenge has a typology beyond the scope and scale of the building envelope, including typologies that align with a wide variety of Landscape and Infrastructure projects for ‘non-conditioned development’ ranging from roads and bridges, to parks and plazas. Large scale projects that contain multiple buildings are grouped together in the Neighborhood typology. The neighborhood typology ranges in scale from campus to districts.

To address issues of context, every project is defined along The Living Transect, modeled after the work of Duany Plater Zyberk & Company’s New Urbanism Transect model, for categorization of landscapes from rural to urban.

The standards are strictly performance based. Buildings must operate and meet the sustainability standards for 12 consecutive months before they have achieved all of the imperatives necessary to have certifiably completed the “Living Building Challenge” (ILFI-LBC 2.1, 2012).

The Living Building Challenge framework also acknowledges the fact that, in their words “the ideal scale for solutions is not always within a project’s property boundary and have created a tool that incorporates the role of planning, environmental design and public space in achieving sustainability in a more holistic sense by promoting an appropriate match of scale, technology and end use. The Scale Jumping overlay creates an incentive and process to guide multiple buildings or multiple projects at

varying scales to operate in a “cooperative state-sharing green infrastructure as appropriate and allowing for the Living Landscape, Infrastructure, Renovation, Building or Neighborhood status to be achieved as elegantly and efficiently as possible.” (IFLI-LBC, 2.1, 2012)

In recent interview, Jason F. McLennon, founder of Cascadia’s Living Building Challenge, explained the motivation for launching the assessment tool as “the classic reason you put something on the market: because there is nothing quite like it out there.” Hiskes, J (2014))

Figure 4.2 (right) Living Building “Best in

Show”, Designed by Mithun Architects

this “off-grid building”, located on less

than a one acre site, is designed to be

completely energy and water sufficient

and includes greenhouses, rooftop

gardens, a chicken farm and fields for

growing produce”, is an example of the

innovation and technological progress

giving rise to a new era of green

buildings today. (Aylett, Alex, 2009)

Figure 4.1 2 Living Building Best in Show.



Source: Photo (right) Mithun Architect’s’ Vertical Farm for Seattle. MNH Holding Company.

<http://www.treehugger.com/sustainable-product-design/mithun-architects-vertical-farm-for-seattle.html>

The Role of Indicators

Performance indicators are critical for setting targets and measuring impacts of the site, making comparison and prioritizing goals. Indicators allow planners to follow the evolution of performance improvements and to observe the results of political or physical sustainability measures implemented by municipalities. For this, there is a need for “planning more than monitoring indicators, geometrical and related to Urban Morphology” (Salat, S., Vialan, D., Nowacki, C., 2010).

Just as building assessment systems rely on quantifiable measures to gauge energy efficiency, indicators are crucial for evaluating the performance of the built environment. In the assessment and rating of sustainable neighborhoods and communities, where fewer people in cars and more people on foot, bicycles, buses and rail is a top prerogative, walkability is the indicator.

Interestingly, the same market driven approach responsible for the wave of green building assessment and rating systems that have inundated the real-estate market, could potentially fuel the emergence of a new era for assessment and rating tools for the built environment. Walkability is more than a current buzzword; it is something people want and are willing to pay for, and just as developers, building owners and government agencies want to bear the attractive green building emblem for recognition, municipalities are increasingly looking to attract residents and business via similar means.

The Value of Walkability

Charles Leinberger studied these effects in terms of real estate performance by classifying the built environment of American cities as either walkable urbanism or drivable sub-urbanism. In the Detroit area, the walkable urbanism lifestyle came at a 40% higher premium than that of drivable sub-urbanism. That premium was 51% in the Seattle area, 150% in the Denver area, and around New York City walkability came at a 200% higher premium than drivable sub-urbanism (Speck, 2012).

This does not mean that walkability is only for the rich. In 2013, AAA's "Your Driving Costs", found that for the average American driving an average of 15,000 per year, owning a personal vehicle costs over \$10,000 annually. The average work commute alone costs over \$1,335 annually. Taking public transportation to work can save the average American \$500 every month and walking is free (iCommute, 2009)

The Walkability Performance Indicator

In his work *The Walkable City*, Speck describes walkability as an end and a means, as well as a measure. As discussed earlier in this work, sustainability assessment frameworks rely on certain indicators to evaluate the state of a system's performance and monitor change. As progress in the viable application of sustainability assessment methods to urban planning developments and neighborhood planning, the walkability factor is growing in recognition as both a valuable contribution to urban vitality and a telling indicator of that vitality. (Speck, 2012)

Just as building assessment systems rely on quantifiable measures to gauge energy efficiency, indicators are crucial for evaluating the performance of the built environment. In the assessment and rating of sustainable neighborhoods and communities, where fewer people in cars and more people on foot, bicycles, buses and rail is a top prerogative, walkability is increasingly used as the performance indicator. Demonstrative of this is the recent explosion of Walk Score

Rating Walkability

Walk Score is a computer system developed by Front Seat, a Seattle based company that uses GIS data to assess and rate 'walkability' and can be applied to almost any street address entered into the program entered into the program. The max score is 100, "a walker's paradise", and any score under 50 means residents will be car-dependent. The system was first introduced in 2007 and immediately took off. Matt Lerner, Front Seat founding partner, recounted that the day they got the system up, "I emailed twenty people about the site, and we had 150,000 unique visitors the next day". The Walk Score system calculates the walkability of neighborhoods based on proximity to nine different daily destination categories, from coffee shops to parks to schools and provides a 'commuter rating' that identifies the best transit routes between different locations (Herst, 2013). Today, Walk Score turns out over 13 million scores on a daily basis (Herst, 2013).

Walkability is a hot commodity and cities that are trying to attract more citizens are becoming increasingly aware of the influence it has where people choose to live. Many cities are utilizing Walk Score as a tool to facilitate local planning goals. It has been well documented that people currently are and will continue to flock to urbanized cities. The question at the forefront of the minds of local governments is now, how to get those people to flock to their city. Given that consumer demand for green buildings and walkable communities is only projected to increase, as is the global urgency for meaningful sustainability achievements, the combination of the two could serve as a holistic and landmark solution.

Social Factors

There has been a significant shift in the green building movement from an ideology, to big business and the incentives for building green are rapidly growing in recognition. It is important to identify and analyze the factors that influence stakeholder decision-making processes to either ‘go green’ building or to not. How these factors are changing over time and how the green building industry is adapting to the influence of these factors reveals the evolution of building sustainability rating and certification systems from a different perspective, that of the receivers.

A survey carried out by McGraw-Hill Construction over the span of four years from 2008 to 2012 reveals the sentiments of green building industry stakeholders and practitioners, including architects, engineers, and contractors, building owners and building consultants from over 60 countries worldwide.

The report found that with regard to specific environmental factors, energy savings were by far the most influential according to all respondents, though there were more regional variances in what was reported to be the second most important factor. For example, details from the report identified that water conservation was second to energy in importance in the UAE, US and Brazil, reducing GHG was second in the European Union and Australian respondents, and the conservation of natural resources was second in importance for South Africa and Singapore.

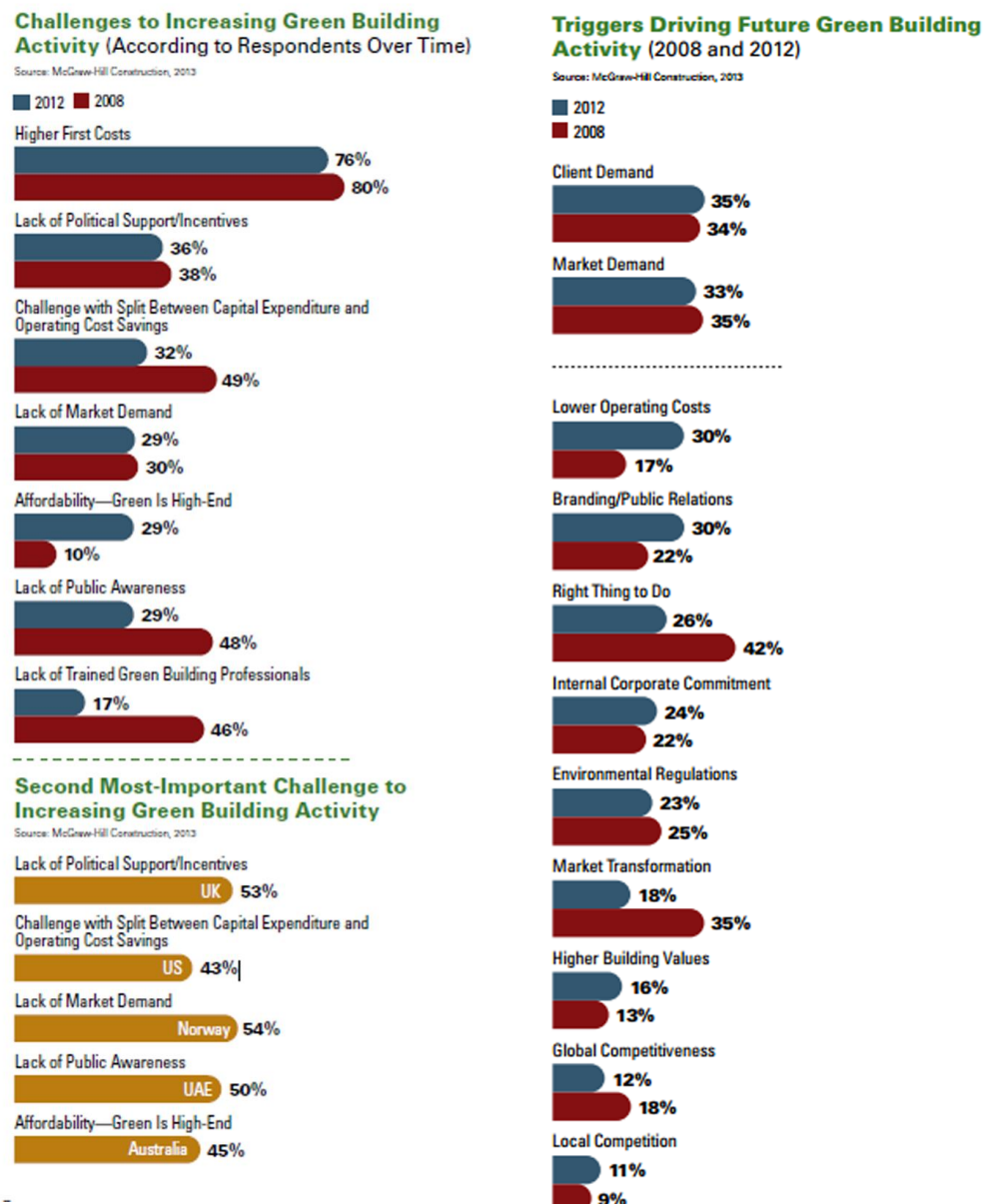


Figure 4.3 1 Green Building Triggers and Challenges

Advocates, practitioners, stakeholders and academics all seem to be at a general consensus about the benefits and the potential of green building to reduce the impact of the built environment on the natural environment and improve human-health and well-being. Studies have made the business case for green building with proven benefits for the bottom line. Research has revealed that both individual worker quality improvement and increased production performance is also associated with green building design.

The gains from increased human productivity is an interesting example of the benefits resulting from green building design because it reveals an objective value for improving peoples living, learning and work environment and overall comfort, and validates the promotion of the human health and well-being imperative. Actual benefits from human productivity can be significant and those gains are increasingly being recognized as incentives for adopting green building in practice. Data results from private commercial organizations were compiled by ASHRAE to support the relationship between green building and human-capital benefits including the West Bend Mutual Insurance Company which demonstrated a 16% increase in claims processes; NG Bank saw a 15% decrease in absenteeism; and Lockheed, which saw a 15% increase in productivity and a 15% drop in absenteeism (ASHRAE GreenGuide, 2010).

The results of the McGraw-Hill study found the increasing recognition of worker productivity as a benefit to building green, nearly tripling in impact from 6% in 2008 to 17% in 2012.

Concern for social factors, including health and well-being, has more than doubled, (from 29% in 2008 to 55% in 2012), in reports from green building stakeholders as reasoning for incorporating green building design into their business model. Making it a tie with the top factor, 'encourages sustainable business practices', according to 55% of all respondents, up from 52% in 2008.

The increasing impact of social implications on public interest in green building is a trend observed across the globe, suggesting that there is a “unifying global opinion on how green building can improve the human condition”. For an overall perspective, the figure (right) provides an objective overview of the top factors driving green building activity from all respondents.

Sentiment Variations between Sectors

Variation in survey responses also existed between firm ‘types’. The design community is recognized as one of the earliest to adopt green building practices and according to the McGraw-Hill Construction research, this sector “remains more emotionally invested in green building as compared to their peers”. Details from the report showed that 40% of architects surveyed maintained that “doing the right thing” as the primary reason to promote building green. The engineering and contractor sectors were most influenced by market forces and client demand. Building owners are similarly interested in the bottom-line benefits of green building. Interestingly though, owners are motivated by business factors that provide more long-run profitability. For example, the majority of building owners site lower operating costs as a major factor, as well as higher occupancy, higher rents, and higher ROI and increased property values in their inclination to implement green build practices.

The importance of understanding the factors that influence green building activity in the global marketplace is met equally with the importance of understanding the challenges facing the industry in increasing green building practice in the global marketplace. Survey results reveal that with very little variation that high first costs, either real or perceived, dominate as the number one reason hindering higher adoption of green building according to respondents. However, it is essential to look closer at the scenario. The percentage of firms that consider high first costs as their number one obstacle to go green, actually decreased from 80% in 2008, to 76% in 2012.

This could be explained by either a growing notion that cost-benefit for green building trumps aversions to what may be higher costs upfront, or simply by upfront costs decreasing as a result of technological progress and economies of scale being allowing for lower green building costs.

That said, the firms' aversion to high first costs associated with green building more than doubles the second most cited challenge, 'lack of political support/incentives', by 36% of firms. Evidence revealed too that green building is not 'affordable' is a notion shared by 29% of firms surveyed. The perception that green building is not generally affordable has almost tripled from 10% in 2008, to 29% in 2012.

In evaluating the survey results, it appears that the business case for the market could be strengthened in order to increase industry adoption. Also, the lack of government incentives/support, is an indication better collaboration between public agencies and green building organization could provide mutual benefits for promoting green building for federal, state and local governments, as well as the industry.

CHAPTER 5

SUSTAINABILITY ASSESSMENT AND RATING SYSTEMS AS PLANNING ASSEST

The land use and development patterns that shape physical environments and compel behaviors directly affect the sustainability of a place. In the US, the predominant development practices over the last half century has created segregated areas dominated by single land uses, navigable primarily via expansive networks of high speed roadways that fragment critical habitat and has ultimately resulted in alienated, auto-oriented neighborhoods hostile to pedestrianism and burdensome on existing infrastructure and utilities. This pattern of growth, known as sprawl, is a result of the conventional planning principles that abandoned the neighborhood structure defined a vibrant mix of uses, buildings and people and created fragments of single use subdivisions, strip malls and office parks.

Sustainability assessment frameworks developed nationally tend to reflect the domestic conditions and priorities from which they emerged.

The LEED-ND rating system was designed to respond to land use concerns, social and environmental considerations, and sustainable development trends in the US and today these factors are increasingly demonstrative of the collective movement against suburban sprawl. The prerequisites and criteria are written in such a way as to encourage a certain type of development as representative of the siting and design of traditional neighborhoods. The principles on which the rating system is founded are evident in the language and intent of the criteria and these principles are known as new urbanism and smart growth.

New urbanism has been described as a planning and design movement that emerged as a reaction against suburban sprawl, as a revival in the lost art of place making, and a “convenient remedy for an inconvenient truth” (Epstein and Ferber, 2011). Essentially, new urbanism is a throwback to traditional town planning. In the US, remnants of its original application can be seen in such place as Charleston, South Carolina’s downtown and Washington D.C.’s Georgetown, both ideal examples used by new urbanists for their commonly shared characteristics, specifically the walkable ‘Main Street’, downtown parks and public spaces, shopping districts and grid iron street layout. Essentially, new urbanism in planning can be achieved by planning in the US the way we did prior to the last mid-century.

Principles of smart growth can be understood as a compilation of planning theories and design techniques developed to progress movement towards new urbanism. Smart growth is largely structured around the concept of traditional neighborhood development and neighborhood structure is of central importance to urban planning operations, considered as the fundamental planning unit of cities. By drawing attention back to traditional neighborhood planning, proponents of smart growth principles argue that new urbanism is the means for incrementally and opportunistically reversing the development pattern that has resulted is sprawl. (Duany and Speck, 2011)

Across all scales, local, city, regional and national, planning decisions are made that shape the built and natural environment. At the local level, planning authorities are responsible for making decisions that affect community and economic development, public goods and services, historic preservation, land use, etc. and the list goes on and on. These planning professionals are obligated to prioritize, organize and initialize a variety of planning measures to best suit the needs of the community for which they serve.

Planning is, to put briefly, a “dynamic profession” that extends across a broad range of scales, from the neighborhood to the city to the state to the region, that “works to improve the welfare of people and their communities by creating more convenient, equitable, healthful, efficient, and attractive places

for present and future generations.” The planning *process* is the catalyst for collaboration and cooperation that enables public officials, civic leaders, private stakeholders, and members of the community to “play a meaningful role in creating communities that enrich people’s lives.” *Planning professionals* help civic leaders, businesses, and citizens formulate future visions with the right balance of economic development and essential services, environmental protection, and innovative change. *Good Planning* creates better environments for accommodating how people live (APA, 2013)

The potential uses of sustainability assessment tools for planning include:

- as an input to strategic planning, decision making, programming and standard setting;
- as an information and technical assistance resource for monitoring, evaluating sustainability measures
- as a verifiable framework for comparison and awareness;
- as a platform for local government, citizen and stakeholder participation

For Regional and National Environmental Planning

The potential for utilization by the planning field is greater than a framework to guide large-scale sustainable development projects. There is a need to improve the applicability and universal acceptance of sustainable performance assessment and rating systems to appropriately evaluate and compare the status of cities at the regional scale in order to guide, assist and monitor progress towards sustainability.

CASBEE City demonstrates the potential as tool for State and Regional Planning to compare the sustainability performance of cities across a region in order to identify areas of concern and prioritize policy and funding decisions.

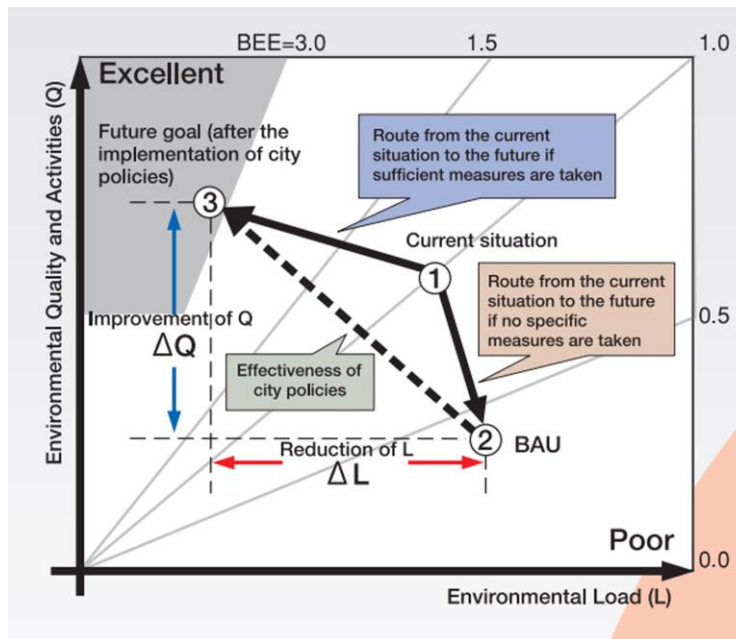


Figure 5.1 1 CASBEE Cities Framework Measure for Policy Effectiveness

This allows the public to realize and understand the status and impact of their city and gives recognition in observance of successful sustainability efforts and policy measures implemented by cities.

“Maps are the quickest way to summarize large amounts of information about sustainability... from the details of each indicator used in the assessment to visual interpretations of human and ecosystem wellbeing.” (ICNU, 2010) Figures 8.4 and 8.5 below illustrate how CASBEE Cities can be used to for comparative cross-scale analysis of a city’s performance at the regional and national scales as a tool to ease physical planning decisions making, prioritization of investment and policy attention.

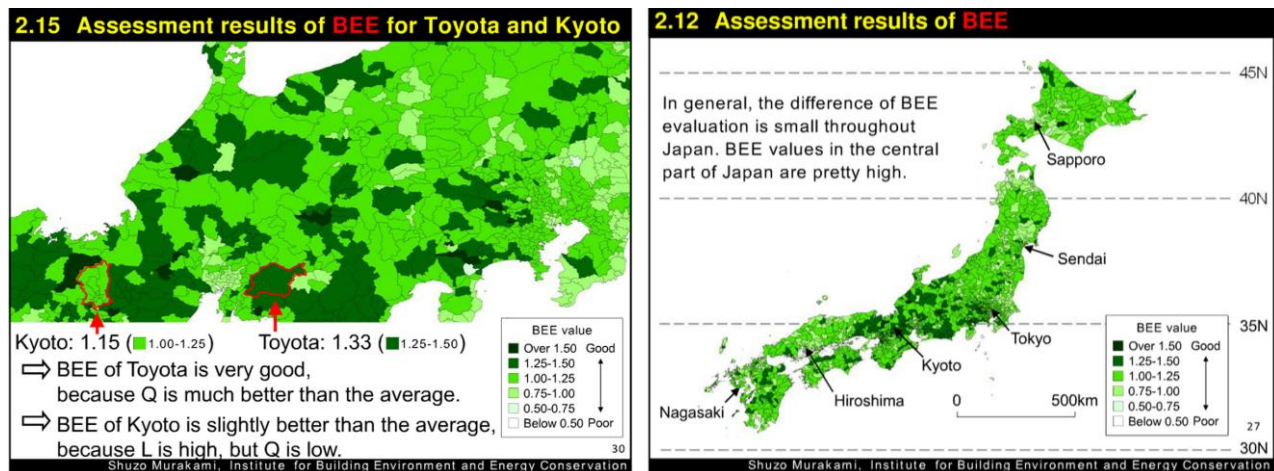


Figure 5.1 2 Cities for Regional and National Scale Planning and Assessment

Classically speaking, a consumer city was a center of government or military occupation responsible for providing administrative and protection services in return for taxes, land-rent and the production and exchange of goods from the hinterland. Today, the difference between a consumer city and a producer city is generally a matter of industrialization. An issue that arises when cities are expected to be incentivized by recognition for sustainable performance by a certification or high rank is that highly industrialized cities may be at a disadvantage when performance standards are measured using emission loads. However, CASBEE Japan acknowledges that the nation benefits from the industrial cities that represent the major production hubs in Japan.

To address this issue, CASBEE City employs two separate methods for assessing a city's BEE, based on the principals of either 'emitter pays' or 'beneficiary pays'.

An "eco-city" will have differences in appearance depending on the scale of the city. For metropolitan areas, environmental load is largely tied to the structure of the city itself and significant improvements may require entire transformation of energy and transformation systems, institutional reforms and a retrofitting of urban infrastructure that utilizes the city's specific natural environment.

Additionally, creating a truly sustainable society will require the cooperation of metro areas and their surrounding suburbs.

According to Murakami, city scale sustainability assessment tools will have the positive effects above and beyond the contributions to local government environmental measures, including the attraction of new residents and a heightened “hometown awareness”, as well as the stimulation of regional revitalization via “inner city competition” for sustainability achievements. The overall outcomes are projected to be a holistic movement away from mass production, mass consumption society, to a low carbon and livable society, city by city.

Barriers and Bottlenecks

Across all scales, local, city, regional and national, planning decisions are made that shape the built and natural environment. At the local level, planning authorities are responsible for making decisions that affect community and economic development, public goods and services, historic preservation, land use, etc. and the list goes on and on. These planning professionals are obligated to prioritize, organize and initialize a variety of planning measures to best suit the needs of the community for which they serve.

Planning is, to put briefly, a “dynamic profession” that extends across a broad range of scales, from the neighborhood to the city to the state to the region, that “works to improve the welfare of people and their communities by creating more convenient, equitable, healthful, efficient, and attractive places for present and future generations.” The planning *process* is the catalyst for collaboration and cooperation that enables public officials, civic leaders, private stakeholders, and members of the community to “play a meaningful role in creating communities that enrich people’s lives.” *Planning professionals* help civic leaders, businesses, and citizens formulate future visions with the right balance of

economic development and essential services, environmental protection, and innovative change. *Good Planning* creates better environments for accommodating how people live (APA, 2013)

In efforts to promote sustainable development, local governments are faced with commonly shared barriers. Conventional planning regulations hinder the permission of infill/densification, diversification of uses, and the provision of pedestrian friendly street networks typified by form-based zoning for sustainable neighborhood development (USGBC, 2012, Resources).

Currently, there is a growing consensus that the largest roadblocks are ultimately the result of outdated planning principles that remain embedded within the local planning frameworks in countless cities across the country. One of the most cited obstacles by local governments that have attempted adopting LEED-ND standards have been the in regards to the time consuming and costly processes associated with applying for waivers and variances, which “introduces risk into the land development process.” (TCRC-PA, 2013)

True, as a measure for smart growth imperatives, LEED ND provides criteria for compact development, diverse uses and housing types, connectivity and transportation access and transform suburban office parks and strip malls into vibrant urban neighborhoods. However, it is also a voluntary and market based rating and certification system whose use is dependent entirely by the motivation of its users, there may be a disincentive for suburban developers to take the time and expense to implement the LEED ND framework because of the criteria is heavily focused on characteristics of urban planning principles, such as high density and connectivity, and credit is awarded for many factors that exist beyond the site.

According Dudley Onderdonk, LEED AP and experienced planning director for multiple suburban areas, there are benefits in advocating for the LEED rating system standards because, “they give us serious metrics to shoot for,” however, he goes on to note that the system excludes a large area of the planning field. Onderdonk explained that, “Many planners who practice in suburbia feel kind of left out

because LEED is too urban-oriented” (Knack, 2010). Many development projects in suburban areas would be hard pressed to achieve the points necessary for certification, if not be all together ineligible.

In many cities, block lengths in excess of up to 1,800 feet are mandatory, minimum paving width requirements promote high traffic speed, and minimum lot size and set back restrictions in combination with single-use zoning ordinances contribute to a lack of housing diversity and amenity access. “You would be hauled off to jail if you did LEED-ND in a lot of communities,” explained Farr. (Jossi, F., 2013)

Rollin Stanley, AICP, director of the Montgomery County, Maryland Planning Board has been leading efforts to incentivize transit-oriented development in the suburban area, giving credits to developers that locate new transit stops and liberally changing zoning policies for higher density projects. Stanley notes that it is often an arduous task to convince board officials that such policy incentives are necessary. “We need empirical evidence-of the benefits of locating next to basic services”, Stanley explained, and “The LEED-ND people could not provide the data I was looking for” (Knack, 2010).

Today, communities, towns and cities across the country are recognizing the need to go “greener”, and the importance of encouraging development patterns that minimize resource consumption, optimize land utilization, provide walkable neighborhoods and improve alternative transportation access. However, these imperatives, associated with the resurgence of traditional urban development and smart growth planning practices, are planning and design aspirations of many jurisdictions whose basic planning frameworks have not changed in over fifty years. Entering into this new planning territory requires knowledge of its parameters, and that knowledge must come from somewhere.

Addressing Obstacles with Applied Planning Guidance

There is a recent trend in practice to approach community planning through the sustainability lens in the US (specifically LEED-ND), and this trend has been countered by the trend of the developers of

sustainability assessment tools (specifically USGBC) to develop planning guidance and resources to support this process.

The recent outpouring of planning assistance developed and released by the USGBC, with governmental and non-governmental advocacy organizational support, to ease the prospects of the LEED-ND rating system framework as a planning asset for local planning authorities, local governments and community members has been significant.

In March 2011, in response to both a growing interest in sustainable neighborhood development and a growing demand for a tool to ease the process of implementation, the USGBC followed suite and released the *Local Government Guide to LEED for Neighborhood Development*, to provide instruction and real life examples of how local planning authorities can barrow from the rating system framework.

The Local Government Guide offers advice based on the following approaches:

- Set Examples for others to follow by exhorting LEED-ND standards to municipal action
- Remove barriers and bottlenecks by aligning existing development codes and ordinances with LEED-ND criteria
- Offer incentives in the form of preferential permitting, density bonuses, tax credits, fee reductions, grants, and marketing assistance.
- Provide technical assistance and planning resources

Also at this same point in time, Oregon based Criterion Planners developed *The LEED-ND Planners Guide & Model Ordinance*. This comprehensive resource approaches local planning policies structurally and presents the LEED-ND rating system in how it can be used as a planning ordinance itself, and to define the “process of LEED-ND leveraging, identify the geography of ND-eligible areasm provide local development standards aligned with ND criteria, and offer incentives for ND Certification.”

Perhaps most notably, an NDO can be used to increase the frequency of LEED-ND implementation, at a rate faster than private developers would be able to achieve on their own.

To better address a larger, more broad and general audience, the public, the NRDC developed A *Citizen's Guide to LEED for Neighborhood Development: How to Tell if Development is Smart and Green*. Published in May of 2011, this resource is a relatively brief, yet colorful asset for community members interested in gaining a better understanding of the implications of development proposals and finding creative suggestions for improving the condition of local neighborhoods, informing community planning and zoning, and other relative policy decision-making.

The *Citizen's Guide* identifies key elements for neighborhood sustainability by referencing the LEED-ND credits and prerequisites that influence each, as outlined by the three major categories of the rating system:

- Where to Build
- What to Build
- How to Manage Environmental Impacts

In March of 2012, Criterion released *the Local Planners Catalog of LEED-ND Measures* as a tool to ease the effective translation of the LEED-ND criteria embedded within the rating system framework into planning/code language that is more familiar and accessible to local planners and community stakeholders. The catalog streamlines the LEED-ND standards and consolidates related prerequisites and criteria presented in the Technical Manual under individual planning measures. The overall objective of this publication is to present the rating system framework as a user-friendly planning asset to guide and prioritize policy decision making.

The USGBC and the Land Use Law Center at Pace University teamed up to develop the two part planning asset, the *Technical Guidance Manual for Sustainable Neighborhoods*, and the *Neighborhood*

Development Floating Zone, both published in December 2012. The former is a compilation of case study analysis of over 60 local governments that incorporated LEED-ND criteria into their local planning frameworks. Described as a “menu of options” proven through successful implementation, the resource was designed to guide the process of leveraging LEED-ND as a planning tool using LEED-ND certification criteria as a basis for “ordinance and policy recommendations for municipalities” (Surv, S.G.) The latter is described as “A Model Ordinance to Foster Green Community Development Using the LEED for Neighborhood Development Rating System”. Similar to overlay zoning, a “floating zone” is an incremental alternative option to extensive and comprehensive planning policy retrofits.

In 2012, New York State’s City of Mount Vernon initiated a project to develop a Green Mixed-Used District Ordinance with the intention of stimulating sustainable community planning and design practices along a designated commercial corridor. To carry out these efforts, the City utilized the Technical Guidance Manual for Sustainable Neighborhoods for the evaluation and analysis of the proposed district ordinance and identified the necessary adjustments needed to eliminate regulatory barriers and amp up incentives for sustainable development (USGBC, 2012b).

Similarly, the Las Vegas Planning and development Department recently audited the city’s regulatory zoning framework against LEED-ND standards to identify barriers and prioritize policy alterations by utilizing both the Technical Guidance Manual, as well as the Local Government Guide to LEED.

Prescriptive changes included in the report:

- Enhance historic preservation and adaptive reuse,
- Incorporate post-construction best management practices for proposed development site plans,
- Extend building height permission for green buildings,

- Eliminate restrictions in solar panel regulations,
- Amend parking standards to promote public transportation usage,
- Reduce impervious surfaces,
- Require regionally appropriate landscape design standards.

Future Direction

In 2012; LEED underwent major modification, including the LEED V4 name change. The updated system components have expanded the scope of ‘site selection’ and significantly increased its potency. The new prerequisite, Sensitive Land Protection, is a strong persuasion against “the development of inappropriate sites”, those that may threaten sensitive landscapes (USGBC, 2012b). The LEED rating systems for building also got a new credit category, Location and Transportation (LT). This category takes the 2009 SS credits related to parking, alternative transportation options/access, and bicycle infrastructure, and expands on walkability imperatives with credit additions such as the new Walkable Streets. Riddled with its foundational smart growth techniques and new urbanist ideals, this credit really tightens down on walkability standards, compliance requiring “all weather” access from the sidewalk (as opposed to from a parking lot) to enter all building on site. These “principal functional entry” criteria, is just one example of the detailed imperatives comprised within the new rating system.

The former (2009) Site Selection credit has, with some modifications, been promoted to a prerequisite, and the new *Enhanced* Site Selection credit focuses entirely on promoting development towards sites that have “difficult development constraints.” Projects can gain additional points by locating within “high-priority redevelopment areas”, including brownfield sites, specified infill locations within a historic district; or located on a site for “preferential development”, as designated by certain federal programs, including the EPA National Priorities List (leeduser, 2012)

The V4 modifications included the alignment of the two categories discussed above, with that of the LEED-ND rating systems. The Walkable Streets credit, for example is one of many now shared by both LEED for Individual buildings, within the LT category, and LEED-ND, within the Neighborhood Pattern & Design Category. Aligning the LEED rating systems is a clear demonstration of the core committee in an effort to promote large-scale new urbanist ideals under the notion that spurred the rating system's emergence, every building counts.

LEED V4 is currently still in the process of being phased in as the LEED 2009 replacement. Interestingly, because the rating system is seemingly a more stringent version of its former self, in terms of site selection, density and connectivity requirements, it is not likely that the marketability of certification will increase as the driving factor for application of the framework, especially true in suburban areas.

There is though, value in the utilization of the LEED rating system framework as an asset for planning in practice that may still garner attention, attract residents, and improve communities.

Chapter Summary

There is a growing realization that large-scale, planned redevelopment and infill projects “may be the only options available to cities trying to respond to new market demands and population growth and can help can help older urban and suburban areas to maintain their desirability as places to live and conduct business.” (APA, 2013b)

Though the viewpoint of many urbanists is that the “answers to resiliency must be sought primarily in building up center cities,” it must be acknowledged that today, “suburbs now comprise the majority-in land area, population and economic activity—of or urbanized areas.” Recent attention has been focused on the potential benefits that could be realized by focusing attention towards transforming the “least sustainable landscapes”, suburban areas, into more “resilient, equitable, walkable, transit-oriented, and more public-oriented places” (Williamson, J. (2013))

As noted previously in this chapter, exhorting sustainable planning principles to action for local planning authorities practicing in suburban America can be more complicated. There has been an outpour of technical assistance resources, guidance manuals and reference standards aimed to ease the process. There has also been a growing argument in the urgency to intensify planning attention, resources and efforts.

According to Duany and Speck, “in monitoring the crises surrounding climate change, energy dependence, public health, decaying infrastructure, and financial instability, we are reminded that all five are the result of sprawl and thus can find solutions only in smart growth.”

The argument for the prioritization of implementing planning measures to combat sprawling development patterns and promote the repair of auto-oriented suburban areas is that, in addition to the quality of life improvements associated with complete, walkable communities, are the environmental benefits that can be realized by transforming neighborhoods characteristic of suburban America into viable communities characteristic of traditional urban planning and design.

Existing neighborhoods provide the benefits of historic buildings and landscapes that serve as a cultural artifact of urban durability. New neighborhoods provide the opportunity to integrate architectural diversity, technological innovation, social movements and human progress. Obsolete areas of industrial abandon provide the opportunity for land-use optimization. If successful, redevelopment can transform an area in distress into a viable part of the community.

Since the early 1960s, Jacobs has argued against single-purpose zoning, which isolates where people live, from where people work and play. At the heart of these principals, is the traditional urban neighborhood structure and “Nearly five decades later, the futility of exclusionary zoning is not only heavily anticipated by the New Urbanism movement, but it also unites many activists in the planning field.” (Wendt, M., 2009)

Ironically, suburban development constitutes upwards of 75% of construction in the US (Dunham-Jones, 2000). The development industry continues to tend towards suburban areas because it is easier to finance, faster to permit, cheaper to plan and easier to build and the remnants of conventional planning and development institutions in the US have made it simpler to attach components of sprawl to existing sprawl than it is to redevelop underutilized areas in close proximity to city's urban core (Tachieva, 2010).

There is an overarching imperative to figure out how to stem sprawling development and how existing suburban areas can be reinvented to participate as interdependent regions within the larger metropolitan milieu, and how architectural and urban planning and design operatives can support this transformation.

CHAPTER 6

CONCLUSION

In the Introduction of his book “Triumph of the City”, Edward Glaeser, Harvard University professor of urban economics, expresses his appreciation of urban virtue with the following description:

“Cities, the dense agglomerations that dot the globe, have been engines of innovation since Plato and Socrates bickered in an Athenian marketplace. The streets of Florence gave us the Renaissance, and the streets of Birmingham gave us the Industrial Revolution. The great prosperity of contemporary London and Bangalore and Tokyo comes from their ability to produce new thinking. Wandering these cities—whether down cobblestone sidewalks or grid-cutting cross streets, around roundabouts or under freeways—is to study nothing less than human progress.”
(Glaeser, 2011)

That being said, in cities with a population of 1 million or greater, the annual mean air temperature can be 1.8-3.4 degrees F warmer than its surroundings. In the evening, the difference can exceed 20 degrees. Urban heat islands have been blamed for up to 10% of peak electricity demand for cooling, increased emissions, as well as heat-related illness and mortality(US EPA, 2009). Urban stormwater runoff is the sixth leading source of degradation in rivers, ninth in lakes, and fifth in estuaries. (US EPA, 2009)

“For the first time ever, the majority of the world's population lives in urban cities, and this proportion continues to grow...” (WHO, 2014.retrieved 1/22). Some believe that cities “will give answers to a sustainable future”, due to the fact that cities are arguably the world’s largest consumer of resources

as well as the largest producers of waste, cities may also be the “place where it is possible to act more effectively to save the planet from ourselves.” (Castenheria, et al, 2014) If the challenge is to achieve a built environment that is sustainable to the greatest extent possible, city planning will play a pivotal role in addressing such challenges.

To avoid haunting consequences, “We need cities to work. We need them to be energy efficient, resource conserving, and nonpolluting as much as possible.” Stated Kaid Benfield, the NRDC Smart Growth Initiative director, “But we also need them to be places where people want to be.”, and according to Jane Henley, CEO of the WorldGBC, “How we green our neighborhoods, our districts and our cities has become the next great challenge. Leveraging the lessons learnt from greening our buildings is crucial.” (Mcgraw-Hill, 2013)

The surge in the wide spread adoption of sustainability assessment and ranking systems as a method to guide and incentivize sustainable development practices at a global scale is marked by these systems ability to be scientifically relevant, widely adaptable and cost effective.

Rating system frameworks have collectively morphed in response to market pressure, legislation, and the tightening up of what constitutes “standard practice”, as well as, domestic and international competition. As these methods are market based tools, reliant on voluntary adoption, there is an obvious objective to be relevant, competitive, and in today’s global market place, applicable across as many different regions as possible.

These systems are evolving constantly to breach their various gaps and limitations, and promote an appropriate balance of the social, economic and environmental dimensions of sustainability, while at the same time being practical, transparent, and flexible enough to be user friendly (bragaca, 2010).

How each of the rating system alternatives discussed approaches the task of sustainability assessment at the city scale, what performance indicators take priority, and how challenges are being addressed reveal one planning issue after another.

In what seems like an arms race, these systems are in a continuous state of transformation. Developers are reinventing the frameworks of existing rating systems and introducing pilots for new and more extensive rating systems at a near constant rate. Consumer demand for green building is only projected to increase and the industry is actively responding facilitate the adoption of their respective rating system frameworks

In the US, there has been a resurgence of urban virtue. Based on smart growth planning principles, new urbanism has been acclaimed for being a “convenient remedy for an inconvenient truth”. Essentially new urbanism is a collective movement against urban sprawl. In keeping with the times, the leading sustainability assessment tools for large-scale planning projects in the US, as well as abroad, are designed to be anti-sprawl.

There are a multitude of benefits associated with densification and infill projects in urban areas. It is important though, that these system frameworks do not become so rooted in the urban dimension as to neglect the communities that could potentially benefit the most from utilization of these tools, specifically those within American suburbs.

Final Remarks

The green building movement, is considered by many as one of the greatest success stories of the modern American environmental movement, offering an “unprecedented opportunity to respond to the most important challenges of our time, including global climate change, dependence on non-sustainable and expensive sources of energy, and threats to human health” (USGBC LEED 2009 for Neighborhood Development, Updated 2013).

The example of climate change is interesting, arguably the most discussed and debated environmental issue of the last decade, the public sentiment on how to address the issue is split. Public attitude toward the federal Government is similarly mixed on whether the government is too big, too small, too corporate, too conservative, too liberal, etc., and it is reflected the public's view on how society should solve environmental problems.

A poll conducted by the World Wildlife Fund found that 74 percent of the public felt that the problem of warming of the Earth's atmosphere was either "somewhat serious" or "extremely serious". When people were asked what actions the United States should take to reduce the major cause of global warming; "Do you think we should rely mainly on strict regulations to limit emissions of carbon dioxide, or do you think we should rely on incentives that cause the free market to discourage carbon dioxide pollution?" Respondents were split almost evenly between those who favored government regulation 37 %, those who support free market options 32%, and those who felt they lacked enough information to choose 30%." (Cox, 2010 p 4)

Though an agenda or strategy to address environmental problems is not exactly at a point of consensus, the public's eagerness for sustainable development is evident. A US opinion poll reported on the 30th anniversary of the first Earth Day found that more than 8 out of ten Americans, "readily agreed with the broadest goals of the environmental movement". A poll by CNN/Opinion Research from 2008, a time when the stability of US economy was in question, it was revealed that "a plurality of Americans say that protection of the environment should be given priority, even at the risk of curbing economic growth." (Cox, 2010)

In the words of Edward Glaeser, urban economist and author of *Triumph of the City*, "Environmentalism is hardly a tidy, well-ordered movement. In the United States, it includes the bird watchers of the Audubon Society and the Activists of Greenpeace, the hikers of the Appalachian Trail and drivers of Toyota hybrids." (Glaeser, 2011 p 213) At a time when prerogatives amongst environmental

groups vary from public health and wellbeing, to wilderness conservation and the protection of biodiversity, to pollution and climate change, the green building movement has provided the critical platform for an outpour of information on the impact of the built environment and conventional ‘building over nature’ development practices, and the green building industry has “promoted the concept of green design, exhort it to action, strived to motivate, warned of consequences from ignoring it, and instructed how to do it.” (ASHRAE, 2010)

If there is a take away from the discussion above, it is this, if for no better reason to direct time, investment, and resources towards exploring the planning potentials and opportunities of sustainability assessment tools, such as the alternatives discussed in this work, it is finally something on which people, the public, the private; the corporate, the non-profit; the conservationists, the urbanists.

These method alternatives are constantly reinventing themselves to keep speed with the times, via updates, modifications and pilot launches, the evolution and emergence of sustainability assessment tools are collectively and increasingly representative of the link between green building and the realm of large-scale physical planning operations. But there are still many gaps in this link. Closing those gaps is a process that could potentially benefit greatly from increased collaboration with planners and vice versa.

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