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Situating CASBEE, a Japanese-made unique building rating and certification system, within a broader context

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Abstract An underlying premise of the voluntary assessments and certifications offered by existing major building performance assessment systems is that if the market is provided with improved information and mechanisms, a discerning client group can and will provide leadership in environmental responsibility, and that others will follow suit to remain competitive. Building environmental ratings have provided building owners with a credible and objective means to communicate to prospective tenants the environmental qualities of the building they are leasing and, by emphasizing more demanding performance goals and the benefits over typical practice, have begun to reframe expectations. Over the past twenty plus years, building environmental assessment has matured into a legitimate area of research and study. Assessment tools in use worldwide generally fall into two general categories:
1) Those developed by an organization within a country that maintains and manages it and provides the associated educational support and operational infrastructure. All the major recognized systems – BREEAM, LEED, CASBEE, Green Star in Australia, etc., – fall into this category.
2) Those developed by academics either for research purposes or in hopes that they could become a certification system but to date have yet to gain widespread adoption in their respective countries.

CASBEE WITHIN A HISTORICAL CONTEXT

Until the 1990 release of the "Building Research Establishment Environmental Assessment Method" (BREEAM) in the United Kingdom (Baldwin, *et al.,* 1990) little, if any, attempt had been made to establish an objective and comprehensive means of simultaneously assessing a broad range of environmental considerations against explicitly declared criteria and offer a summary of overall building performance.
BREEAM can now be viewed as the beginning of a culture of building performance assessment that has spurred the development numerous other systems worldwide and, to varying degrees, all building environmental assessment methods have drawn on the collective knowledge and experience of other systems.

An underlying premise of the voluntary assessments and certifications offered by these systems is that if the market is provided with improved information and mechanisms, a discerning client group can and will provide leadership in environmental responsibility, and that others will follow suit to remain competitive. Building environmental ratings have provided building owners with a credible and

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objective means to communicate to prospective tenants the environmental qualities of the building they are leasing and, by emphasising more demanding performance goals and the benefits over typical practice, have begun to reframe expectations.

Over the past twenty plus years, building environmental assessment has matured into a legitimate area of research and study. Not only has environmental performance assessment been a category of almost every major green building conference over the past fifteen years or so, but the "1st International Conference on Building Sustainability Assessment" in Porto, Portugal in 2012 (Amoeda, *et al*., 2012) devoted exclusively to the topic is testimony to this claim.

The emphasis of the discussion and research regarding building environmental assessment methods has changed significantly over this period (Cole and Valdebenito, 2013). Initially, concerns and efforts were primarily related to a host of technical features and requirements of assessment tools: scope, structure, weighting protocols, performance indicators, etc. (Nibel, 2000; Andresen, 1999). As more systems were developed and used, the emphasis shifted to their side-by-side comparison: what is included, differences in assigned weightings within the respective systems, assessment and certification fees, number of buildings registered/certified, etc., often with the aim of offering a basis for selecting one method over another (Yokoo and Oka, 2000; IEA, 2001; Kaatz, 2002; Ding, 2008; Haapio and Viitaniemi, 2008; Kajikawa, Inoue and Goh, 2011; Reed, *et al.,* 2011). Again with greater application, the development of versions of the methods for different building types – residential, or aspects – existing buildings, core and shell, etc., – initially as separate systems and later, as for example in the case of LEED in North America, harmonizing them into a coherent and recognizable suite of tools. More recently, given that several of the methods have existed for more than ten years and matured into established industry systems, the focus is shifting toward their application – where and why are assessment tools being used and by whom – particularly beyond their country of origin (Cole, 2011; Todd and Tufts, 2012) and on explicit comparisons of BREEAM and LEED (Rivera, 2009; Julien, 2009; Reed, *et al.,* 2010; Sleeuw, 2011). From its introduction in 2001, CASBEE has been increasingly evidenced in this discussion.

Assessment tools in use worldwide generally fall into two general categories:

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- Those developed by academics either for research purposes or in hopes that they could become a certification system but to date have yet to gain widespread adoption in their respective countries. The difficulties in generating the necessary organizational and financial resources required to support the attendant educational, management and certification programs means that the number of assessed buildings assessed by using these methods remains modest.

Organisational Context

While the technical characteristics of the assessment systems have enjoyed widespread attention, their origins and organisational settings are less discussed and there are scant records on the roles and contributions of the individuals and organizations that created and shaped them. Indeed, this history is often unrecorded and subsequently at risk of being lost.

Assessment systems are initiated through the actions of individuals and organisations, for example:

- In the UK, "ECD Architects and Energy Consultants, Stanhope Properties and the Building Research Establishment" (BRE) initiated efforts in 1988 to encourage the construction industry to take environmental issues seriously. Following 18 months of identifying and debating what they considered the most significant global, neighbourhood and indoor environmental considerations, the first BREEAM for offices was launched 1990 through the BRE. Since 1999, the BRE has certified and approved products through "BRE Certification". This was renamed "BRE Global" in 2006 in recognition of its offering of its services worldwide and environmental certification and rating – including BREEAM – were also "brought under the BRE Global brand"[1] at this time.

- The "U.S. Green Building Council" (USGBC) was co-founded by three private sector individuals - Mike Italiano, David Gottfried and Rick Fedrizzi - in 1993. This membership-based non-profit organization - formed to promote sustainability in how buildings are designed, built, and operated - developed "Leadership in Energy and Environmental Design" (LEED) as its primary vehicle for market transformation.
  While the development continues to be shaped through a broad range of technical committees, approval is required by the collective USGBC membership. Development of LEED began in 1994, spearheaded by Natural Resources Defense Council's (NRDC) senior scientist Robert Watson who served as the founding chairman of the LEED Steering Committee. The first draft version of the US Green Building Council's "Leadership in Energy and Environmental Design" (LEED) was piloted in 1999 (Todd and Lindsey, 1999), but the widely used version – LEED Version 2.0 – was released in 2000. An important development was the creation of the "Green Building Certification Institute" (GBCI) in 2008. The GBCI became responsible for the administration of LEED certification and professional credentialing, permitting the USGBC to focus on developing and refining the LEED standards.

- The "Comprehensive Assessment System for Building Environmental Efficiency" (CASBEE) was created by the Japan Sustainable Building Consortium (JSBC) in 2001 and CASBEE NC (New Construction) was officially released in 2003. Research and development of CASBEE have been carried out as a cooperative project between industry, government and academia with the assistance of Japanese Ministry of Land, Infrastructure, Transport and Tourism under the leadership of Dr. Shuzo Murakami. The JSBC and its affiliated sub-committees provide overall management of CASBEE, and the secretariat is set within the "Institute for Building Environment and Energy Conservation" (IBEC). Hence, the development of CASBEE has been driven by centralized leadership and authority rather than through the membership consensus process required in the development of LEED. This has permitted CASBEE to have the greater conceptual clarity evidenced in its structure, scope and emphasis.

- In Australia, the strategic consulting, engineering and project delivery company - Sinclair Knight Merz - through a Memorandum of Understanding with the Building Research Establishment, developed Australian BREEAM in 2000. This was sold to the Australian Green Building Council (GBCA) in 2002 and subsequently developed as the "Green Star Environmental Rating System for Buildings" in 2003. Green Star is considered pivotal in meeting GBCA's key objective "to drive the transition of the Australian property industry" towards sustainability by promoting green building programs, technologies, design practices and operations and the integration of green building initiatives into mainstream design, construction and operation of buildings.

1 BRE: Our History, Downloaded January 15th 2013 from www.bre.co.uk/page/jsp?id-1721

All of the above voluntary building environmental assessment systems are used and/or referenced internationally and are considered as major systems. These, like many others operating within their respective countries, are now viewed as the single most potent approach to market engagement and transformation. Certainly, to some extent, this has occurred and it is reasonable to argue that they have institutionalized the range of environmental performance issues deemed important in green buildings and have played a significant role in mainstreaming green building practices. The major systems have been increasingly referenced and adopted by institutions and authorities in their respective countries as a required building environmental performance "standard."

CASBEE WITHIN GLOBAL CONTEXT

CASBEE has provided a unique role and contribution within the evolving theory and practice of building environmental assessment, primarily in respect to its structural and operational features relative to those of other major systems.

All green building assessment systems are primarily directed at the twin goals of improving indoor environmental quality and 'doing less harm' or, more generally, reducing the degenerative consequences of human activity on the health and integrity of ecological systems (McDonough and Braungart, 2002; Reed, 2007). Their scope and structure represent their developer's understanding and priorities of these environmental performance issues and are clearly influenced by a host of unique cultural and capability considerations.

Building environmental assessment methods typically consists of three major components (Cole, 1999; Cole, 2005):

- A declared set of environmental performance criteria organized in a logical fashion – the "**structure**".
- The assignment of a number of possible points or credits for each performance issue that can be earned by meeting a given level of performance – the "**scoring**".
- A means of showing the overall score of the environmental performance of a building or facility – the "**output**".

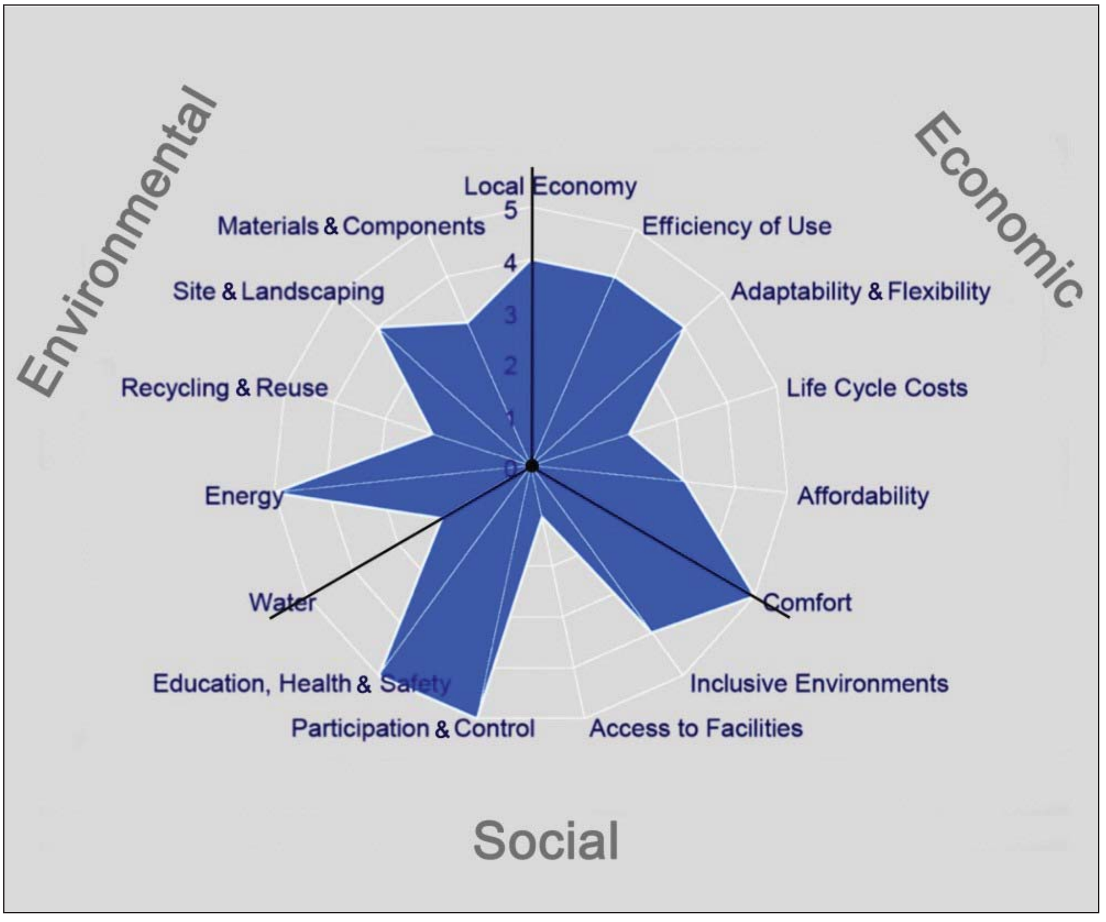
The development of assessment methods has, for the main part, been driven by the scoping and structuring of performance criteria. Although it is generally accepted that environmental criteria must be organized in ways that facilitate meaningful dialogue and application, the structuring of criteria within the assessment method is perhaps most important during the "output" of the performance evaluation, when the "story" of the performance must be told in a coherent and informative way to a variety of different recipients. While CABSEE addresses the range of environmental considerations evident in the other major systems, their organisation and emphasis is qualitatively different and implicitly embody Japanese cultural traits, *e.g.*, the value placed on a predetermined set of rules and group-conscious interdependency, the emphasize on continuums rather than binary divisions of opposite poles, and Japan's emphasis on technical prowess and, especially, service. (Blaviesciunaite, 2012) More importantly, the conceptual underpinnings of CASBEE offer important distinctions in each of the above three areas.

The structure of environmental assessment methods is shaped by a number of considerations and practicalities. The majority of systems organize performance criteria or credits in distinct categories – site, water, energy, materials, indoor environmental quality, etc., and, with the exception of CASBEE, rely on the simple addition of points attained within these to derive an overall score. A key distinction lies between those methods that adopt a hierarchical framing of the issues (main categories with criteria and sub-criteria wherein score at this lower level are weighted and aggregated to attain an overall score) and those that have credits (with implicit or explicit weightings) that are simply added.

A significant rethinking occurred in the structure of assessment systems when shifting from green performance to "sustainability" assessment:

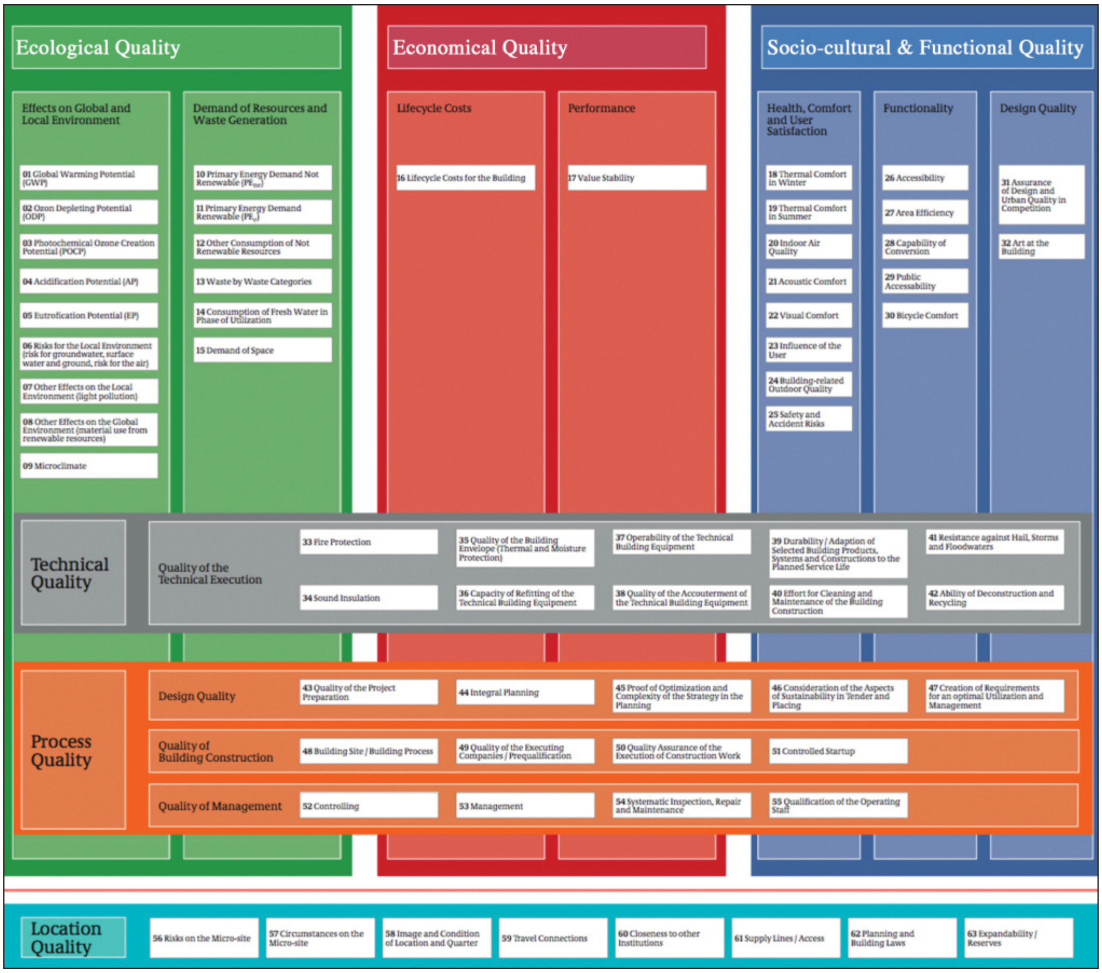
The South African "Sustainable Building Assessment Tool" (SBAT), for example, explicitly introduced performance criteria that acknowledge social and economic issues. (Gibberd, 2001; Gibberd, 2005) A total of 15 performance areas are identified, equally divided within the overarching sustainability framework of environmental, social and economic categories, each described through five performance criteria. (See Figure 1) Further, SBAT considers how it could become an integral part of, and subsequently influence, the building production process by relating its application to a nine-stage process based on the typical life cycle of a building: Briefing, Site Analysis, Target Setting, Design, Design Development, Construction, Handover, Operation, Reuse/Refurbish/Recycle. Weighting the three respective social, environmental and economic categories offer an overall performance score.

Figure 1 Sustainable Building Assessment Tool (SBAT) (Gibberd, 2001; Gibberd, 2005)



The more recent “Deutsche Gesellschaft für Nachhaltiges Bauen” (DGNB) Certification System[2] comprises of five general sustainability “quality” categories are assessed and form the overall aggregate building score: Ecological; Economic; Socio-cultural & Functional categories with Technical; and Process categories conceptually cross-cutting them. A sixth quality with 6 sub-criteria – location – is evaluated and presented separately. (See Figure 2) Criteria within these performance areas are evaluated individually and aggregated to determine an overall performance designation of gold, silver or bronze.

Figure 2 “Deutsche Gesellschaft für Nachhaltiges Bauen” (DGNB) Certification System



Other systems desiring to shift from “green” assessment to “sustainability” assessment have typically simply added an additional set of social and economic performance requirements to the key environmental ones in green building assessment.

Some of the key unique conceptual distinctions offered by CASBEE related to the structure and definition of the performance assessment criteria are:

2 http://www.dgnb-system.de/en/schemes/scheme-overview/

- The use of the hypothetical boundary to explicitly distinguish the evaluation of Building Environmental Quality (Q) which relates to the "...improvement in living amenity for the building users within the hypothetical enclosed space" and the evaluation of Building Environmental Load (L) which relates to the "...negative aspects of environmental impact which go beyond the hypothetical enclosed space to outside" (JSBC, 2010). By scoring these separately to determine the Building Environmental Efficiency, i.e., the ratio of Environmental Quality and Performance to Environmental Loading, the structure of the CASBEE itself embodies and conveys an eco-efficiency view of assessment. This is important because it illustrates how the structure is, itself, educational. In CASBEE, the BEE explicitly conveys the environmental impacts associated by offering human amenity and illustrates a variety of permutations of Q and L can offer a similar overall measure of performance. (See Figure 3)

- In contrast to many other systems wherein there is typically no specific order as to how the requirements are to be met and where the importance of the credit entirely relies on the weightings, the distribution of the credits in CASBEE imply a hierarchical relationship, *i.e.*, Q1 evaluates separate categories of the indoor environment, Q2 – how well the separate categories are integrated and Q3 aims to relate the building with its surroundings. (Blaviesciunaite and Cole, 2012) This nesting of performance criteria again provides a conceptual clarity for the framing of environmental considerations that is less evident in other assessment systems.

- The credits are assessed on a five scale, where "1 is earned for satisfying the minimum conditions required by laws, regulations and other standards of Japan... and a building at what is judged to be general, typical level earns 3" (JSBC, 2010). Levels 4 and 5 then are assigned to performance levels that exceed the standard practice. Herein, the specific performance requirements in CASBEE are consciously less clearly specified than in other systems but are framed to equally account for the range of efforts that are invested in the achieving performance requirements. Thus, rather than assigning points for achieving specific performance requirements, CASBEE distributes points in a way that corresponds to the level achieved and acknowledges how the context affects this possibility. (Blaviesciunaite and Cole, 2012)

- Building environmental assessment methods were initially conceived, and still largely function, as voluntary, market place mechanisms by which owners striving for improved performance would have a credible and objective basis for communicating their efforts. Within this context, ensuring that the methods are simple, practical and inexpensive in both use and maintenance was deemed paramount in their design. At a practical level, the accommodation of complexity relates to the relationship between the structure of the assessment method (*i.e.*, the range and organization of the performance issues) and the specificity of the constituent criteria requirements. Whereas a key ambition of other assessment methods is to strive for simplicity, CASBEE, especially in the process of scoring, weighting and presenting the evaluation results, is more accepting of complexity.

- As a direct response to Japan's declared commitment to significant carbon emissions reductions, a separate evaluation process for Lifecycle CO_2 is used in CASBEE.

Figure 3 Deriving Overall Performance Score in Major Assessment Methods

Management	Sustainable Sites	Management	Q: Environmental Quality
Health & Wellbeing	Water Efficiency	Indoor Environmental Quality	Q1: Indoor Environment
Energy	Energy & Atmosphere	Energy	Q2: Quality of Service
Transport	Materials & Resources .	Transport	Q3: Outdoor Environment on Site
Water	Indoor Environmental Quality	Water	
Materials		Materials	LR: Environmental Load Reduction
Waste		Land Use & Ecology	LR1: Energy
Land Use & Ecology		Emissions	LR2: Resources & Materials
Pollution			LR3: Off-site Environment
Addition of points attained in each credit category	**Addition of points attained in each credit category**	**Addition of points attained in each credit category**	**BEE = Q score/L score**

CASBEE offers an equally significant conceptual distinction by explicitly distinguishing between the way that performance information is organized during the assessment process and how it is transformed to communicate a variety of different outputs. As mentioned earlier, while employing an additive/weighting approach, it breaks away from the simple addition of points achieved in all performance areas to derive an overall building score, which has been the dominant feature of all previous methods.

The Building Environmental Efficiency (BEE) score is represented on a plane with Q on the Y-axis and L on the X-axis and which is delineated into five distinct performance designations ranging from "S" – the highest level, through "A", "B" down to "C".
Moreover, stars are assigned according to the obtained S~C level. Most importantly, this graphic provides the 'landscape' on which the BEE values of multiple projects or shifts in performance can be readily communicated.

CASBEE is therefore based on a more diverse approach to both assigning points and presenting the results. By using several types of graphical representations, CASBEE therefore permits a variety of "stories" to be communicated – an overall performance as well as more detailed descriptions – rather than the single score-sheet used in many other systems.

CASBEE WITHIN A CHANGING CONTEXT

Whereas early in the history of building environmental assessment systems there were fewer systems and developments occurred relatively slow, today it is a rapidly developing field and they are in continual states of evolution and development.
Therefore not only does information on the various systems become quickly dated, trying to assess

future directions is equally problematic. Nonetheless, several possible ways in which CASBEE is able to respond to this changing context as well as offer positive direction:

"Moving Cross-Scale": The major environmental assessment methods were initially conceived to assess *individual* buildings, and performance issues are bounded by those factors that influence and are influenced by them. The sequence in the development of assessment methods is important in revealing the increasing acknowledgment of a broader context. The majority of the systems began with a version for new office buildings and then subsequently expanded the range of products to include existing office buildings, multi-unit residential and then other broader applications – schools, homes, etc. Now, the major building environmental assessment methods offer a suite of products, each targeted at a specific building type or situation and, more recently, have introduced versions that address a broader context *e.g.*, "LEED for Neighbourhood Development" (LEED-ND®), "BREEAM Communities", etc. While these versions reference performance issues at the buildings scale, they are typically distinct tools. From the outset, CASBEE has conceptually set its "family" of tools within a framework defined by scale and lifecycle. "CASBEE for Urban Development" (CASBEE-UD), by retaining the use of the BEE determined by Q/L, permits the expansion or reduction of the hypothetical boundary. Individual buildings are therefore set within a logical and hierarchical framework. Perhaps the most significant recent advance in the ongoing development of CASBEE has been to extend assessment beyond the neighbourhood scale to embrace the city. Retaining the same conceptual framing of Q and L within the previous scales, these performance dimensions focus primarily on Social and Economic factors, and CO_2 emissions respectively. (See Figure 4).

Figure 4 Assessment Tools for Various Scales

CASBEE-City is designed to assess Japan's effort toward low carbonization and to provide an equitable assessment system for all cities – be they small, medium or larges commercial and industrial. While industrial cities invariably have higher greenhouse gas emissions than commercial and cultural cities, they produce goods that are exported to and used in other cities. CASBEE-City provides the opportunity to contrast two approaches for assessing and presenting the greenhouse gas emissions:
Emitter-pays: All greenhouse gas emissions are allocated to the industrial areas producing areas.
Beneficiary-pays: Greenhouse gas emissions as a result of industrial production are reallocated to those areas consuming industrial products and thereby sharing the burden of associated greenhouse gas emissions.

The importance of this is two-fold. Firstly, it points not only to the necessity to understand resource flows and production impacts within developments – be they buildings, neighbourhoods or cities – but also the exchanges between them. Secondly, the ability to represent the shifts and exchanges on the CASBEE Q-L graphic, is illustrative of the versatility of CASBEE's powerful conceptual underpinnings.

Building Valuation*:* The need to establish a business case for the development of 'green' commercial properties within the real estate industry has paralleled the technical development and application of building environmental assessment methods. (Lorenz and Lützkendorf, 2008) Although the possible capital cost premiums associated with attaining higher building environmental performance has been a recurring issue over the past twenty years, the emphasis of these economic considerations has also changed considerably. Initially the business case was framed around the added benefit and reduced revenue costs to the building owner. Today, however, the business case is increasingly rooted in the added value associated with higher building environmental performance and the demonstration that green buildings may be 'worth more' to investors, owner and tenants. (Sayce *et al.,* 2009) Whereas the cost arguments have consistently referenced building environmental assessments, *e.g.*, the cost of LEED (Kats, 2003; Matthiessen, 2004), very little attention has been directed at connecting green rating to value. CASBEE is the first system to introduce a version explicitly linking building environmental performance assessment with real estate appraisal. CASBEE for Property Appraisal (CASBEE, 2009) is an "appraisal support tool that measures the impact degree of [design for the environment] on the property value" that when widely applied will significantly increase the demand for green buildings.

These and other features permit CASBEE to more readily respond to and accommodate changing issues and priorities.

CASBEE WITHIN A FUTURE CONTEXT

There are several emerging trends that will shape the future design, roles and use of assessment tools:
Voluntary & Mandatory Mechanisms: The majority of current "green" environmental assessment methods are voluntary in their application and have the primary objective of stimulating market demand for buildings with improved environmental performance. Indeed, the "acceptance" of current assessment methods currently derives largely from their voluntary application. However, the voluntary nature of existing methods significantly compromises both their comprehensiveness and rigor. Higher environmental performance requirements are increasingly being mandated bringing into question the ways that voluntary assessment methods will have to be cast within a broader array of mechanisms for creating necessary change. As such, the relationship between building environmental

assessment methods and other change instruments both regulatory and incentive based, will likely gain in importance. Historically, regulation provided minimal acceptable performance requirements and the voluntary mechanisms offer the complementary high performance aspiration. Recently, the mandates of far reaching performance requirements such as carbon neutrality will profoundly change these roles. In Europe, for example, demanding energy and carbon emissions standards for buildings are now being introduced requiring phased reductions to net- zero energy performance. (Dyrbøl, *et al.* 2010; Kolokotsa, *et al.* 2011) Although the structure and specific performance requirements of the assessment systems will be important in this regard, the organisational context of the JSBC may permit a more effective integration of CASBEE with other mandatory mechanisms in Japan.

Achieved Performance: The assessment of building environmental performance of new buildings is typically made at the design stage and based on default patterns of occupant behaviour, systems efficiencies and building operation. There is sufficient evidence to show that a building's performance in use is often markedly different from that anticipated or predicted during design and this discrepancy has initiated a shift towards basing assessments on achieved performance. The International Living Building Institute's "Living Building Challenge", for example, requires one-year energy and water use data to be submitted before certification is granted. It is anticipated that the owners and developers the major assessment systems will be actively seeking to base assessments on the actual performance of buildings, particularly energy and water use, and energy-related emissions.

Regionalisation: The past decade or so has witnessed many countries worldwide now either having or in the process of developing domestic systems. This carries the implicit expectation for domestic systems to encourage green building practices appropriate to their specific climatic and cultural contexts. Within many countries, there can be significant regional differences and environmental priorities that must be recognised and accounted for in an assessment system. Currently, this is accomplished either by permitting changes to the relative weightings of performance criteria or offering additional points if credits of specific regional significance have been achieved. One can anticipate that the notion of regionalization will eventually be infused more effectively throughout the assessment methods. Japan has a wide range of regional differences and thereby faces a number of challenges when aiming to adequately adopt a singular framework. CASBEE is currently being incorporated into governmental programs depending on the willingness of the administrative regions to adopt the system. Each regional authority is permitted to make locally determined adaptations within CASBEE and thereby ensure that a balance is achieved between the priorities of regional and national levels. (Blaviesciunaite, 2012)

Simplified Certification Procedures: Although assessment systems may begin with simple organisations, credit and performance requirements, this invariably changes as they mature. With greater use and greater understanding of the evaluation of specific performance criteria in different contexts, typically more requirements are placed on the assessment process. Perceived improvements are typically by adding more requirements rather than reducing them. CASBEE is the only system that has "brief" versions of its basic suite of tools to support consensus building between owners, designers and builders at the early stages of design, setting performance targets and establishing reporting systems for local governments. In contrast to the 3-7 days required to complete a full CASBEE assessment for New Construction, the brief version takes only a couple of hours.

Branding: The demand for "brand recognition" in a global market, the desire for international standards and the motivation of the owners of the systems to expand the adoption of their assessment systems abroad, are among many of the forces driving toward the increased international use of some of the most established methods (Cole, 2010; Cole and Valdebenito, 2013). Although this branding can, in one sense, be seen as a measure of their success, there are several problems associated with this development. Issues here relate to the protection and maintenance of the brand which can constrain making major structural changes to the system. Moreover, since all assessment tools have their roots in the culture and organizational practices that operate within their respective countries, the ability to nurture or retain approaches to green building assessment that support culturally and climatically appropriate design practices within this emerging context of globally deployed “brand” systems remains a major concern.

Multiple Certifications: While building owners have been striving for and achieving the highest level of performance offered by the assessments systems in their countries (*e.g.*, LEED Platinum in North America, BREEAM Outstanding in the UK, CASBEE “S” rank in Japan or 6 Stars in Australia), a new phenomenon is emerging particularly in several Asian countries. The notion of achieving “double” or “triple platinum” wherein building owners are having their buildings assessed with both the domestic system and one or two other systems – one of which is typically an international “brand”. It can be anticipated that such a phenomenon will occur in Japan.

Regenerative Design: The notion of regenerative design has recently emerged as a necessary compliment to the slowing down of the rate of degradation of natural systems implicit in green design. Regenerative design promotes a co-evolutionary, partnered relationship between humans and natural systems rather than a managerial one and, in doing so, builds, rather than diminishes, social and natural capitals. As with other assessment systems, CASBEE is premised on reducing resource use and environmental loadings and enhancing human health and well-being. However, by making a clear distinction between human requirements (Q) and the consequences on resource use and loadings (L), CASBEE permits the simultaneous evaluation and representation of the progress made in each realm and, as such, can be considered as being potentially more receptive of accommodating the notion of regenerative design.

In summary, the conceptual underpinnings that have shaped the design, development and application of CASBEE provide a consistent, scientifically-based and qualitatively robust way of framing building environmental performance assessment. The expandability of the Building Environmental Efficiency (BEE) across scale – from buildings to cities – and the flexibility of the CASBEE scoring graphic to represent the performance of either individual buildings or portfolios, individual cities or a range of cities, are enormously powerful attributes. Such characteristics in and of themselves offer considerable education value in representing and communicating the performance of buildings individually and collectively. What is perhaps equally significant in situating CASBEE within a broader context is that it is a reflection of its organizational and cultural setting. Many lessons can be learned from CASBEE’s structure and content, but these must necessarily be viewed through a cultural lens. Such is the case with all assessment systems.

(*This article was written by Professor Raymond J. Cole for the book, entitled “CASBEE, A decade of Development and Application of an Environmental Assessment System for the Built Environment, Murakami, Iwamura & Cole, 2014, pp. 12~25.”*)

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