

Application of a Building Environmental Assessment, CASBEE, and its Influence on the Building Market

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ABSTRACT

CASBEE (Comprehensive Assessment System for Building Environmental Efficiency) is an environmental labelling method for buildings, based on assessment of the environmental performance of buildings. The framework of basic and extended CASBEE tools as a structured assessment system is called the "CASBEE family." CASBEE consists of a set of four basic assessment tools, namely "CASBEE for Pre-design" (CASBEE-PD), "CASBEE for New Construction" (CASBEE-NC), "CASBEE for Existing Building" (CASBEE-EB) and "CASBEE for Renovation" (CASBEE-RN). These correspond to the individual stages of the building's lifecycle. There are also needs for detailed assessment targeting specific environmental aspects. "CASBEE-HI", as an extended tool, assesses efforts made in buildings to alleviate the heat island effect. A new tool called "CASBEE for Urban Development" (CASBEE-UD), is developed for assessment of a group of buildings. The basic concept of each tool is defined, and their applications in terms of building life stages and their associated users are examined. Some local authorities introduced CASBEE into their building administration as assessment methods for their sustainable building reporting systems. This requires building owners to submit a planning document assessing the environmental performance of their buildings to the authorities. In April 2004, the city of Nagoya introduced "CASBEE Nagoya". Introduction of CASBEE followed in the city of Osaka, Yokohama, Kyoto, and other municipalities.

KEYWORDS: Environmental policy, Local characteristics, Sustainable Building Reporting System, Information disclosure, Sogo Sekkei Seido, Building permission

1. INTRODUCTION

The development of the Comprehensive Assessment System for Building Environmental Efficiency (CASBEE) was started in 2001 with the assistance of Japanese Ministry of Land, Infrastructure and Transportation (MLIT). To date, a series of CASBEE tools have been elaborated and released for the wide range of building types. This paper presents the concept and framework of the assessment method and its application, especially administrative use of CASBEE by local governments.

2. THE FRAMEWORK; CASBEE-FAMILY

2.1 Building Lifecycle and CASBEE-Family

CASBEE consists of a set of four basic assessment tools which include, "CASBEE for Pre-design" (CASBEE-PD), "CASBEE for New Construction" (CASBEE-NC), "CASBEE for Existing Buildings"

(CASBEE-EB) and “CASBEE for Renovation” (CASBEE-RN), which correspond to the individual stages of a building’s lifecycle as shown in Figure 1. These tools can be applied for many types of buildings, such as offices, schools, retail stores, restaurants, halls, hospitals, hotels and apartments. These tools are basically designed to assess single buildings. “CASBEE Family” is the collective name for these four tools and the extended tools for specific purposes (Japan Sustainable Building Consortium, 2006). Figure 2 shows the scope of the CASBEE-Family.

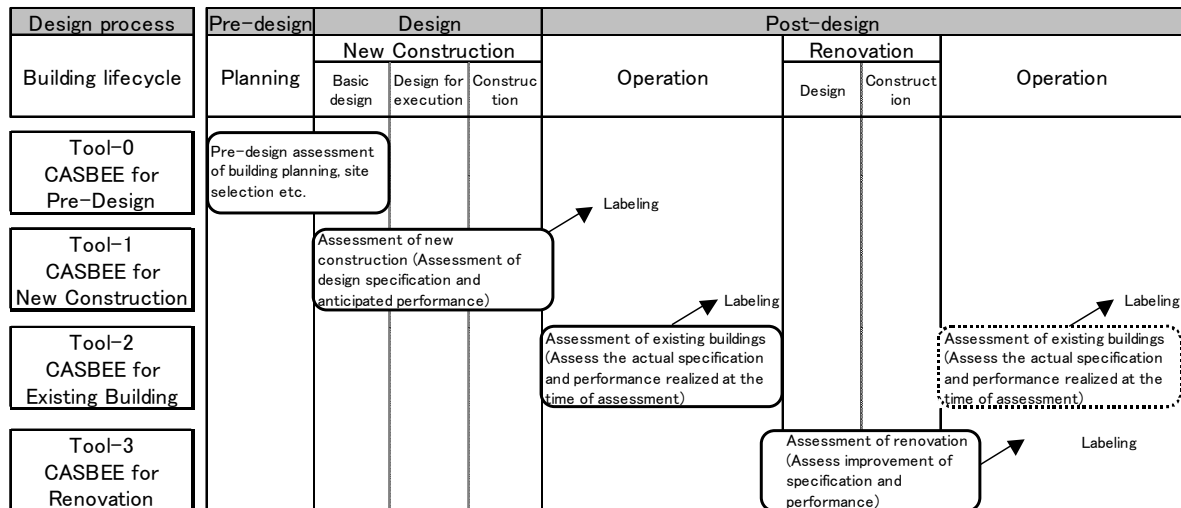


Figure 1. Building Lifecycle and the Four Assessment Tools

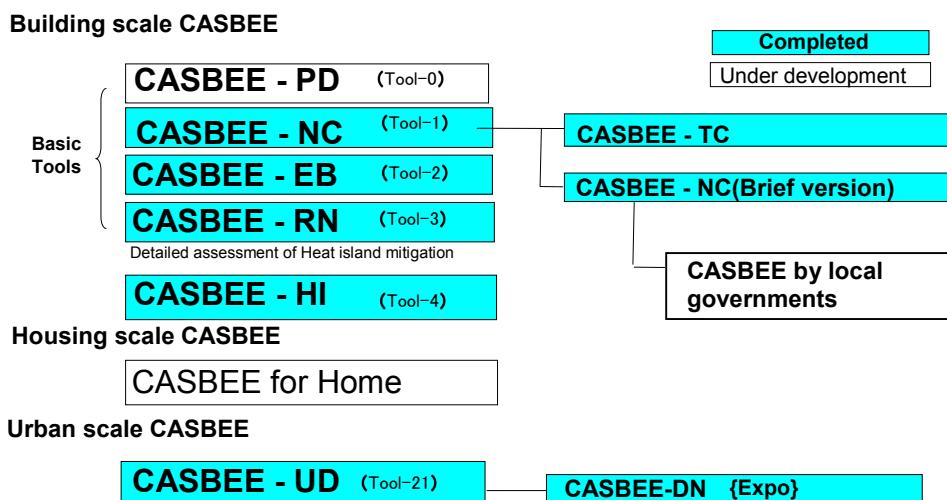


Figure 2. Scope of CASBEE-Family

CASBEE for Pre-design (CASBEE-PD) aims to assist the owner, planner and others involved in the planning (pre-design) stage of the project. It can be used to assist in grasping issues such as the basic environmental impact of the project, in selecting a suitable site, and to evaluate the environmental performance of the project in the pre-design stage .

CASBEE for New Construction (CASBEE-NC) is used by architects and engineers to increase the BEE value of a building during the design process. This can be used as a design support tool as well as a self check list. This tool, formerly named DfE (Design for Environment) tool, makes assessments based on the design specifications and the anticipated performance. Rebuilding projects are assessed by CASBEE-NC. As environmental performance and assessment criteria change over time, the results

of assessments under “CASBEE for New Construction” only remain valid for three years after the completion of construction.

CASBEE for Existing Building (CASBEE-EB) targets existing building stock, based on operation records for at least one year after completion. The tool was also developed to be applicable to asset assessment. This assessment tool evaluates achieved performance or installation when the assessment is made. The result is valid for 5 years. It can be used as a labelling tool to declare the environmental performance of buildings. CASBEE-EB is also utilized to support building maintenance. Building owners, such as the real estate sector and large enterprises, may use it as a self-evaluation tool for mid-term and long-term management plans.

CASBEE for Renovation (CASBEE-RN) is designed to evaluate the performances of existing buildings based on predicted performance and specifications with renovation. It can be used for building-stock renovation, and to generate proposals for building-operation monitoring, commissioning and upgrade design with a view to ESCO (Energy Service Company) projects. It is valid for three years after completion of the renovation work. This tool can be used to evaluate the degree of improvement (increased BEE), relative to the level that preceded renovation. CASBEE-RN may also assess improvement of specific performance in relation to the purpose of the renovation. For instance, the BEE for energy saving can be presented, that is determined by the scores for assessment categories especially related to energy saving renovation, such as Energy and Indoor environment.

2.2 Extended Tools of CASBEE

The basic CASBEE tool suite is applicable to a diverse range of individual applications. Several extended tools have been developed as shown in Table 1.

Table 1. Extended CASBEE tools for specific purposes (as of January 2007)

Name	Application	Outline
CASBEE for Temporary Construction	Temporary Construction	Currently adapted to exhibition facilities.
CASBEE for New Construction (Brief version)	Simple preliminary assessment	Simplified edition of CASBEE for New Construction.
CASBEE used by local governments	For individual local areas	CASBEE for New Construction (Brief version), tailored to regional characteristics
CASBEE-HI	Assessment on the efforts in alleviating the heat island phenomenon	Detailed assessment of the heat island effect using CASBEE
CASBEE for Home	Houses	Pilot version is released for Detached House
CASBEE for Urban Development	Urban scale development	Assessment of groups of buildings for urban scale development

CASBEE for Temporary Construction (CASBEE-TC) was developed as an extension to CASBEE for New Construction for evaluating temporary buildings constructed specifically for short-term use, such as expo pavilions. Buildings of this type have short-term lifecycles, and therefore consideration must concentrate largely on material use and recycling in the construction and the demolition phases. The scoring criteria and weighting reflect the features of this type of buildings. So far, the tool has been completed in a version limited to exhibition facilities.

Assessment using CASBEE for New Construction may take 3~7 days, including the time required to prepare documents necessary as the basis for scoring. “CASBEE for New Construction (Brief version)” was developed to meet the growing need for a tool to handle objectives such as a simplified setting of the Building Environmental Efficiency level and preparation of documents for submission to

government agencies. It makes a simplified, provisional assessment possible in around two hours (excluding time for the preparation of an Energy Saving Plan).

CASBEE is used by local authorities in construction administration, namely sustainable building reporting systems. They can tailor CASBEE for New Construction (Brief version) to local conditions, such as climate and prioritized policies. Examples are “CASBEE Nagoya,” “CASBEE Osaka” and “CASBEE Yokohama.” Assessment results by CASBEE-Nagoya are reported as shown Figure 3.

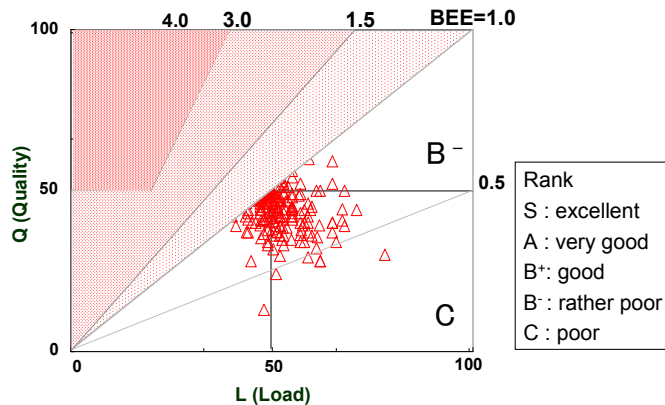


Figure 3. Assessment results of new building projects in Nagoya City using CASBEE-Nagoya

Assessment of the heat island effect is essential in major urban areas, such as Tokyo and Osaka. “CASBEE for Heat Island Relaxation” (CASBEE-HI) is a tool aiming for more detailed quantitative assessment of heat island relaxation measures in building design. In CASBEE-HI, the criteria deal with more detailed conditions in the outdoor thermal environment and the heat island load to surroundings. (These are also addressed in CASBEE-NC.) CASBEE-HI is also evaluated with the concept of eco-efficiency.

The four basic tools are not applied to detached houses, although they are applied to apartments. “CASBEE for Home” is being developed for detached houses. Pilot version is released in July 2006.

CASBEE for Urban Development is applied to projects including multiple buildings. This tool considers the human efforts and effects of group of buildings, other than these of single buildings, which improve the environmental performance of the urban area as a whole. As a specialized tool, “CASBEE for District Neighbourhoods (Expo) version March 2005” has been completed and was used to assess the site plan of the World Expo 2005 Aichi, Japan.

3. ADMINISTRATIVE USE OF CASBEE

3.1 Outline of “Sustainable building reporting systems”

Local governments are enthusiastic in adopting environmental performance assessment for their building administration in Japan. In recent years, many major cities in Japan have been adopting “Sustainable building reporting systems” as an environmental policy in their building administration. To operate this system, these local authorities utilize an environment performance evaluation method for buildings as policy instruments. The system appear to have become a very strong driving force in spreading environmental measures in building construction, and consequently environmental performance assessment of buildings is carried out in many buildings.

Table 2 shows local authorities that have introduced sustainable building reporting systems. Most governments adopt CASBEE for their reporting systems. Under required ordinances and guidelines, building owners are asked to carry out comprehensive assessment of their buildings’ environmental performance when a building above a certain size is newly constructed. These results must be reported to the authority and the authority must publish the submitted assessment results of environmental

performance. Most authorities use the Internet to disclose the results and the summary of environmental measures taken by the building owner to improve environmental performance. The system is designed to promote voluntary actions by building owners for the environment through information disclosure to the local residents, by showing which building owners are active in environmental measures.

Table 2. Administrative use of environmental performance assessment tool for buildings by local governments

Municipals*	Started	Subject Building
Tokyo Metropolitan Government**	2002.06	New construction over 10,000 m ² total floor area
Nagoya City	2004.04	New construction or extension over 2,000 m ² total floor area
Osaka city	2004.10	New construction over 5,000 m ² total floor area or New construction applied for extra maximum floor-area ratio more than 1,000 m ² site area
Yokohama city	2005.07	New construction or extension over 5,000 m ² total floor area
Kyoto city	2005.10	New construction or extension more than 2,000 m ² total floor area
Kyoto prefecture	2006.04	New construction or extension more than 2,000 m ² total floor area
Osaka prefecture	2006.04	New construction or extension over 5,000 m ² total floor area
Kobe city	2006.08	New construction or extension more than 5,000 m ² total floor area or New construction applied for extra floor-area ratio more than 2,000 m ² total floor area
Kaswasaki city	2006.10	New construction or extension over 5,000 m ² total floor area
Hyogo prefecture	2006.10	New construction or extension more than 5,000 m ² total floor area

* Shizuoka prefecture, Fukuoka City and Sapporo City will also introduce CASBEE.

** The system does not use CASBEE as assessment tool

3.2 Localized CASBEE for “Sustainable building reporting systems” by local governments

Now that CASBEE has been developed to a level where it is applicable to new buildings, as CASBEE for New Construction (CASBEE-NC). “CASBEE for New Construction (brief version)” have been developed to meet the growing need for a simpler version of CASBEE-NC that saves time for document preparation. CASBEE-NC (brief version) is now widely used by the sustainable building reporting systems. On the other hand, CASBEE is also intended to take regional conditions into consideration as background for the assessment. Local characteristics such as infrastructure, local economy, climate and history may be different. Local authorities that use this tool can tailor it to local conditions, such as climate and prioritized policies. Changes are generally made by modifying the weighting coefficients. Flexible response to regional character is a common feature of all elements of CASBEE. One example is “CASBEE-Nagoya”. CASBEE-Nagoya has its own scoring guidelines that instruct some criteria in relation to local contexts, such as materials from local industry, and that define some excluding criteria (Noda, H. 2004). Another example is CASBEE-Osaka that altered weighting coefficient from the original to reflect the high priority they give to heat island policy. The city of Osaka also started administrative use of CASBEE from October 1, 2004, changing the weights of Q-1 Indoor environment from 0.4 to 0.3 and Q-3 Outdoor environment on site from 0.3 to 0.4 (City of Osaka).

3.2 Advanced application of CASBEE to promote sustainable buildings in the building markets

Further, it is possible to provide incentives to buildings which gain high ratings with CASBEE. In May 2004, Osaka city established the guidelines called CASBEE Osaka, which went into effect since October 2004. This guideline applies to buildings over 5,000 m² of total floor space, or buildings of over 1,000 m² of site area. These buildings cover approximately 40% of total floor area of annual new construction in Osaka city. In Osaka city, the rating should at least reach the B⁺ class, the third of CASBEE's five grades, if the approval for an administrative scheme, called "soukou sekkei seido," is given to the building being assessed (Osaka City, 2004). The maximum floor-area ratio of the building can be increased in this scheme. The city of Osaka is the first municipality to make rating by CASBEE Osaka a condition in qualifying for the scheme.

Financial support can be provided for high score buildings assessed by CASBEE. The city of Osaka subsidizes residential buildings that are A-ranked by CASBEE. The city of Nagoya also subsidizes the residential buildings selected in order of BEE value by CASBEE. In Kawasaki city, developers who are selling multi residential units must publish CASBEE results in their advertisements to inform consumers about the environmental performance of the buildings (Kawasaki city). Financial sector, such as banks, may utilize such information to offer better interest rates to the consumers who buy environmentally high performance residential units.

6. CONCLUSIONS

CASBEE is intended to serve various applications in the market. Local governments seem to be the most active in introducing CASBEE for practical use. The scope of CASBEE is summarized as below.

(1) "CASBEE Family" is the collective name for CASBEE's four basic assessment tools, "CASBEE for Pre-design," "CASBEE for New Construction," "CASBEE for Existing Building" and "CASBEE for Renovation", and the extended tools for specific purposes.

(2) Some extended tools for specific purposes have been developed, such as CASBEE for Temporary Construction (exhibition facilities), CASBEE for New Construction (Brief version) and its variations reflecting local conditions, CASBEE-HI. "CASBEE for Urban Development" broadened assessment to cover efforts applied to areas including multiple buildings.

(3) Local governments seem to be the most active in introducing CASBEE for practical use. CASBEE Nagoya and CASBEE Osaka were first enacted in 2004 as tools for the sustainable building reporting systems. These governments make use of market system to promote sustainable building through providing incentives to buildings which gain high ratings with CASBEE.

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