

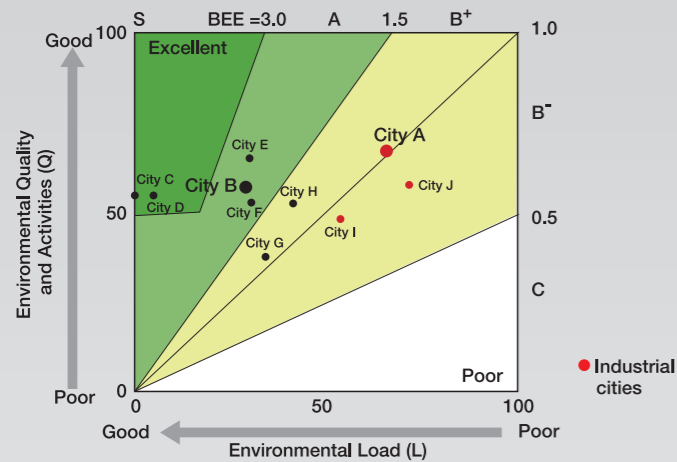
## Built-Environment Efficiency (BEE) of cities

CASBEE City carries out assessment of each category of Q and L. Total scores for Q and L are each given on a 100-point scale. Then, for comprehensive assessment, a BEE value is calculated from Q and L and shown in a 2D graph, called a BEE chart, which plots a Q value on the vertical axis and an L value on the horizontal axis. The gradient of the straight line that passes through the origin (0, 0) and the point of intersection of Q and L

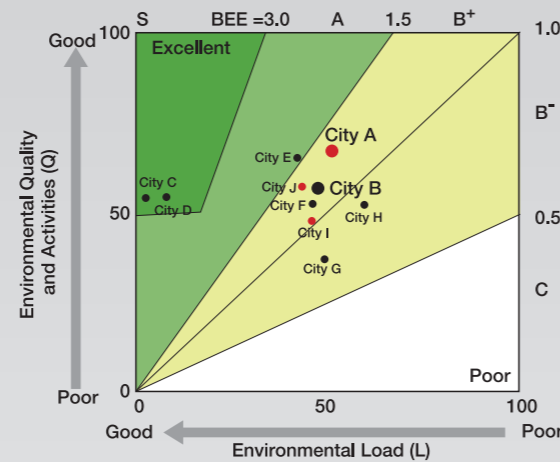
values represents the BEE of a city.

CASBEE City uses two BEE charts, based on the emitter-pays principle and the beneficiary-pays principle. The assessment results of industrial cities are relatively poor compared with those of other cities under the emitter-pays principle. However, on the right-side chart, based on the beneficiary-pays principle, industrial cities are rated as high as other cities.

### (1) BEE chart based on the emitter-pays principle



### (2) BEE chart based on the beneficiary-pays principle

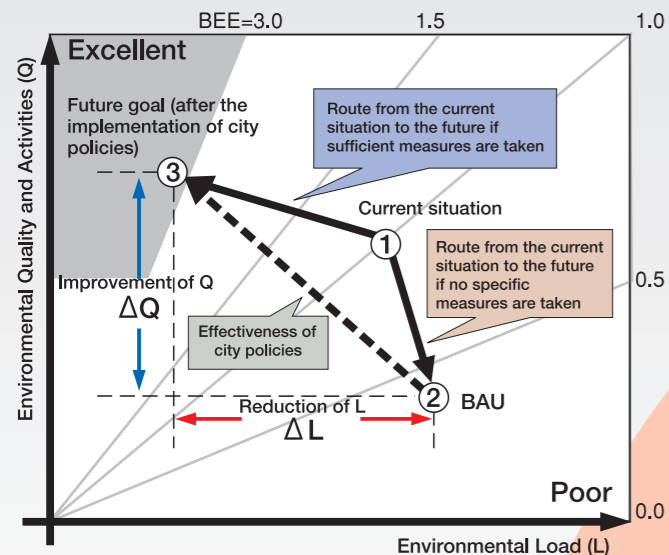


These charts present the assessment results of 10 cities, including the aforementioned City A and City B. In the same way as other CASBEE tools, CASBEE City classifies the results in five ranks: S (Excellent), A (Very Good), B+ (Good), B- (Fairly Poor) and C (Poor).

## Effectiveness of city policies: expected improvement from the current situation

CASBEE City measures the current BEE of a city and estimates the BEE after the implementation of policies. By comparing the two values, CASBEE City quantitatively evaluates (estimates) the effectiveness of city policies and presents the results in an easy-

to-understand form. We hope this new tool will help administrative officers and other stakeholders to share a common understanding of the current state and cooperate together in setting goals and pursuing them in order to create a low-carbon society.



Reference:

- 1) Eco-Model City Program  
<http://ecomodelproject.go.jp/en/ecomodel/>
- 2) Promotion Council of Low Carbon Cities  
<http://ecomodelproject.go.jp/en/pclcc/>
- 3) Institute for Building Environment and Energy Conservation  
<http://www.ibec.or.jp/>
- 4) Japan Sustainable Building Consortium  
<http://www.jsbc.or.jp/>
- 5) Research Paper  
Murakami, Shuzo; Kawakubo, Shun; Asami, Yasushi; Ikaga, Toshiharu; Yamaguchi, Nobuhaya and Kaburagi, Shinichi (2011)  
'Development of a comprehensive city assessment tool: CASBEE-City', Building Research & Information, 39(3), 195-210.

The committee for the development of CASBEE City would like to express its sincere gratitude to the members of the Promotion Council of Low Carbon Cities and all others who have contributed to the development of this document.

# Environmental Performance Assessment Tool for Cities for the Creation of a Low-Carbon Society

## Overview of CASBEE® for Cities

Comprehensive Assessment System for Built Environment Efficiency

This assessment tool helps identify environmental, social and economic characteristics of your city and quantifies the effectiveness of your citywide policies.

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■ Published by: Japan Sustainable Building Consortium (JSBC)

## Background of the development of the CASBEE assessment tool for cities

Upon the adoption of the Alborg Charter in Denmark in 1994, people became highly aware of the importance of actions at the city level for the creation of low carbon societies. Since then, countries around the world have been implementing a variety of programs and policies. In order to evaluate (estimate) the

effectiveness of these city-led policies, the Japan Sustainable Building Consortium (JSBC) decided to develop a new assessment tool for cities, applying the methodology of a Comprehensive Assessment System for Built Environment Efficiency (CASBEE) — a widely used system in Japan.

## Outline of CASBEE for Cities

“CASBEE for Cities” (hereinafter referred to as “CASBEE City”) is a system for comprehensively evaluating the environmental performance of cities, using a triple bottom-line approach of “environment,” “society” and “economy.” The JSBC has been developing this new tool with the cooperation of the Promotion Council of Low Carbon Cities (PCLCC) (Secretary: The Regional Revitalization Bureau of Cabinet Secretariat). The PCLCC consists of Eco-Model Cities and other local governments, government related organizations, relevant ministries and agencies, private

companies and other bodies in Japan.

When evaluating a city, CASBEE City sets a hypothetical boundary to enclose the city. In doing so, it can evaluate the Built-Environment Efficiency (BEE) of the city. Improvement in environmental quality and activities (referred to as “Quality,” or “Q”) within the enclosed space and reduction in negative environmental impact (referred to as “Load,” or “L”) on the area beyond the boundary lead to higher BEE values, thus a better rating.



$$\text{BEE of a city} = \frac{\text{Score for Q}}{\text{Score for L}}$$

## Assessment items of CASBEE City

CASBEE City calculates Environmental Load (L) of cities and evaluates Environmental Quality and Activities (Q) in cities from the following assessment items

Major category	Middle category	Subcategory
L1. GHG emissions	L1.1 CO2 from energy sources	L1.1.1 Industrial sector*
		L1.1.2 Building (residential) sector
		L1.1.3 Building (commercial) sector
		L1.1.4 Transportation sector
		L1.1.5 Energy conversion sector*
	L1.2 Industrial processes*	
L2. Environmental load reduction and CO2 absorption	L2.1 Low-carbon energy sources	
	L2.2 CO2 sinks	
L3. Support to other regions for reducing CO2 emissions	L3.1 Domestic trade, etc.	

Major category	Middle category	Subcategory
Q1. Environment	Q1.1 Nature conservation	Q1.1.1 Ratio of natural and agricultural land use
		Q1.2 Local environmental Quality
		Q1.3 Resource recycling
		Q1.4 Environmental measures
Q2. Society	Q2.1 Living environment	Q2.1.1 Adequate quality of housing
		Q2.1.2 Adequate provision of parks and open spaces
		Q2.1.3 Adequate sewage systems
		Q2.1.4 Traffic safety
		Q2.1.5 Crime prevention
	Q2.2 Social services	Q2.2.1 Preparedness for natural disaster
		Q2.2.2 Adequacy of education services
		Q2.2.3 Adequacy of medical services
		Q2.2.4 Adequacy of child-care services
		Q2.2.5 Adequacy of services for the disabled
Q3. Economy	Q3.1 Industrial vitality	Q3.1.1 Amount equivalent to gross regional-products per capita
		Q3.1.2 Ratio of change in the number of employees
	Q3.2 Economic exchanges	Q3.2.1 Index equivalent to the number of people visiting the city
		Q3.2.2 Efficiency of public transportation
	Q3.3 Financial viability	Q3.3.1 Tax revenues
		Q3.3.2 Outstanding local bonds

Note: There are two calculation methods for assessing environmental load: “emitter-pays principle” and “beneficiary-pays principle.” The latter method is applied to items marked with an asterisk; GHG emissions from the producing area are deducted and reallocated evenly to consuming areas across the country.

## Two principles for assessing Environmental Load (L): “emitter-pays principle” and “beneficiary-pays principle”

By calculating Environmental Load (L) from GHG emissions, industrial cities tend to receive lower scores. Acknowledging the fact that environmental loads are high, industrial cities need to continue their efforts to reduce emissions. Yet we must not forget that the entire nation benefits from the industrial activities in these cities (i.e., the products that are produced). With this aspect in

mind, the JSBC developed two assessment methods for the calculation of GHG emissions resulting from industrial activities. CASBEE City uses “emitter-pays principle,” which allocates all GHG emissions to producing areas, and “beneficiary-pays principle,” which reallocates GHG emissions to consuming areas.

## Assessment of current and future environmental performance

CASBEE City aims to evaluate the current environmental performance of cities. It also aims to assess the projected effect of city policies by assuming a case where no measures are taken

(Business As Usual [BAU]) and a case where specific measures are taken, and comparing the difference in the two scenarios.

## Environmental Load (L) and Environmental Quality and Activities (Q): Case studies

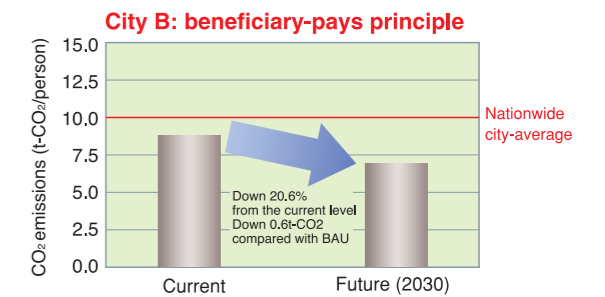
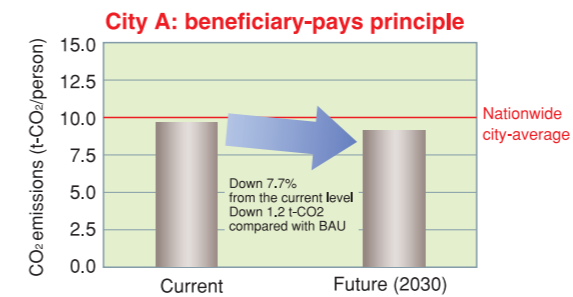
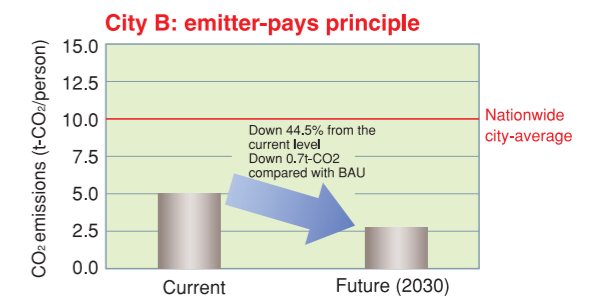
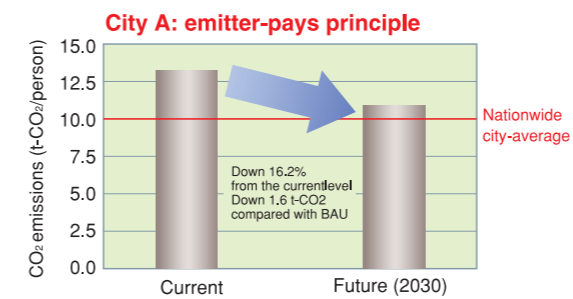
### 1) City A (medium-size, industrial city)

Core city in the region, with population of about 400,000  
Major industry: secondary industry

### 2) City B (large-size, commercial city)

Government-ordinance city, with population of over 1 million  
Major industry: tertiary (commerce and service) industry

## Estimation of Environmental Load (L) (Comparison between current and projected future emissions)



## Assessment results of Environmental Quality and Activities (Q)

On every assessment result sheet there is a radar chart showing the results for each middle category on a 1-5 point scale in the areas of environment (Q1), society (Q2) and economy (Q3). The chart helps identify positive characteristics and advantages of the particular city.

