

Eco-Model-City Program and Performance Assessment by CASBEE-City

Shuzo Murakami

Chief Executive, Building Research Institute

1

Shuzo Murakami, Building Research Institute

Outline

1. Low carbonization efforts,
led by Eco-Model-Cities (EMC)
2. Comprehensive assessment of
city performance by CASBEE-City

2

Shuzo Murakami, Building Research Institute

1.1 Movement towards low-carbon cities all over the world

Major agencies and cities around the world have begun pioneering-efforts for the creation of low-carbon cities.

1. Aalborg Charter (1994~)
2. Urban Audit (2003~)
3. Global City Indicators (2006~)
4. Climate Change Action Plans (C40 Cities) (2006~)
5. The City Climate Catalogue (ICLEI) (2008~), and others

(ICLEI: International Council for Local Environmental Initiatives) 3
Shuzo Murakami, Building Research Institute

1.2 Why cities and municipalities?

Because they are:

- the main bodies that draw up and execute policy measures.
- responsible for promoting policies for energy-saving and CO₂ emission reductions.
- influential to the stakeholders that consume energy.
- administrative units directly connected to citizens' daily lives.



**Collaboration among municipalities is highly expected on
CO₂ emission reduction policies**

4

Shuzo Murakami, Building Research Institute

1.3 Leading citizens towards the creation of a low-carbon society

- ⇒ Even if high-performance energy-saving buildings and cities are created, we cannot achieve the expected energy-saving if citizens use energy extravagantly.
- ⇒ How can we motivate people to change from a high-carbon lifestyle to a low-carbon lifestyle?
- ⇒ Presenting a model of the future low-carbon city in a visible form to the citizens
- ⇒ Motivating people to be conscious of saving energy, thus leading them to a low-carbon lifestyle.

5

Shuzo Murakami, Building Research Institute

1.4 Presenting targets in order to create a low-carbon society

- ⇒ First, presenting a clear image of a low-carbon society of the future to the public
- ⇒ EMCs as targets to be reached
- ⇒ Presenting the target will lead to strengthening local identity and regional revitalization.
- ⇒ Spreading the EMC scheme throughout Japan and overseas
- ⇒ Will trigger the transition to a low-carbon society

6

Shuzo Murakami, Building Research Institute

1.5 Outline of the EMC project

1. Based on Governmental Decisions:

- 1) Policy speech by Former Prime Minister Yasuo Fukuda (Jan. 2008)
- 2) Action Plan for Achieving a Low-Carbon Society (approved by the Cabinet in Jul. 2008),
and others

2. Application (Apr.11-May 21, 2008)

- Guideline: drawn up by the Committee of Eco-Model Cities (Chair: Shuzo Murakami), established by the Cabinet Secretariat
- Number of applicant cities: 82 in total

3. Selection method:

- ⇒ Classification of cities by size
(1) Large cities, (2) Medium-size cities, (3) Small cities and towns
- ⇒ Consideration of the balance of types of initiatives, geographic locations, etc. so as to produce the greatest positive effects on non-EMCs

Shuzo Murakami, Building Research Institute

7

1.6 Five selection criteria

1. Drastic reduction of CO₂ emissions

- Mid-term target: 30% or more by 2020
- Long-term target: 50% or more by 2050

2. Models and leadership

- Serving as a model/reference for other cities in Japan and overseas

3. Initiatives suitable for each region

- Creative ideas that make good use of specific local conditions and characteristics

4. High achievability

- Carrying out proposed plans smoothly and successfully

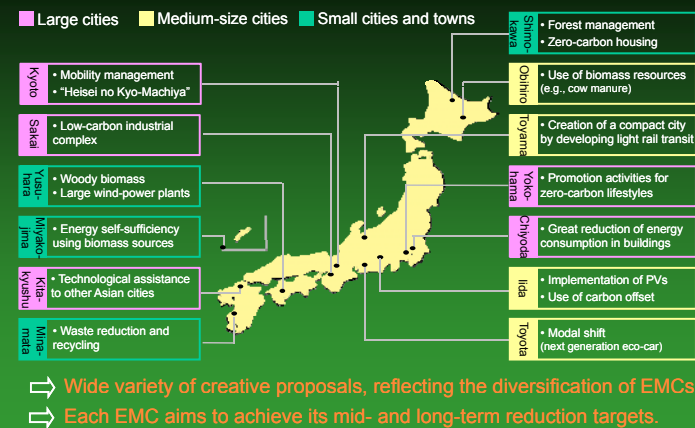
5. Sustainability of initiatives

- Creation of long-term vitality in cities by implementing concepts for new city-development

Shuzo Murakami, Building Research Institute

8

1.7 13 Selected EMCs and their action plans to achieve mid & long term reduction targets



Shuzo Murakami, Building Research Institute

9

1.8 Reduction targets set by EMCs (totals for the building, transportation and industrial sectors)

City Size	City	Reduction Targets	
		Mid-term (2020-2030)	Long-term (2050)
Large cities	Kitakyushu city	30%	50-60%
	Kyoto city	40%	60%
	Sakai city	15%	60%
	Yokohama city	30%	60%
	Chiyoda ward	25%	50%
Medium-size cities	Iida city	40-50%	70%
	Obihiro city	30%	50%
	Toyama city	30%	50%
	Toyota city	30%	50%
Small cities and towns	Shimokawa town	32%	66%
	Minamata city	33%	50%
	Miyakojima city	30-40%	70-80%
	Yusuhara town	50%	70%
Average		Approx. 30%	Approx. 60%

- ⇒ Ambitious reduction targets
- ⇒ Achievements of EMCs will inspire non-EMCs.
- ⇒ The Japanese govt. can achieve its mid- and long-term targets by promoting this.

(Source: The Regional Revitalization Bureau of Cabinet Secretariat, Action Plans of EMCs, as of May 15, 2009)

Shuzo Murakami, Building Research Institute

10

1.9 Examples of best practices led by EMCs

- 1) Photovoltaics
- 2) Public transportation
- 3) Eco-house
- 4) Street lighting with LED bulbs
- 5) Voluntary actions of citizens
- 6) Next-generation vehicles
- 7) Biomass fuel
- 8) Greening, forest management
- 9) Eco-tours
- 10) Others

Shuzo Murakami, Building Research Institute

11

1.10 Framework for promoting the spread of EMCs

1. Establishment of Promotion Council for Low-Carbon Cities

(Dec. 2008)

Council members: 193 bodies (as of Jan. 2011)

- 1) EMCs
- 2) Non-EMCs
- 3) Relevant ministries and agencies
- 4) Relevant local governments
- 5) Private sectors

2. Council activities

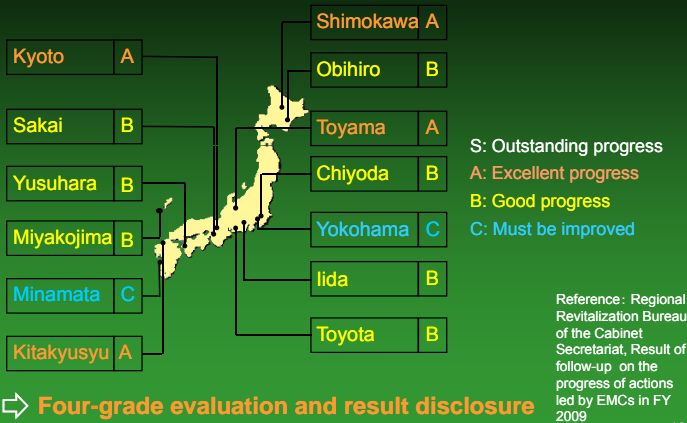
- 1) Devising methods for promoting actions towards low carbonization
⇒ e.g., Development of an environmental assessment tool for cities: CASBEE-City
- 2) Evaluation of actions implemented in cities
- 3) Disseminating information worldwide

(CASBEE: Comprehensive Assessment System for Built Environment Efficiency)

Shuzo Murakami, Building Research Institute

12

1.11 Evaluation results of actions promoted by EMCs (FY 2009)



⇒ Four-grade evaluation and result disclosure

1.12 Key factors which led to the success of EMC program

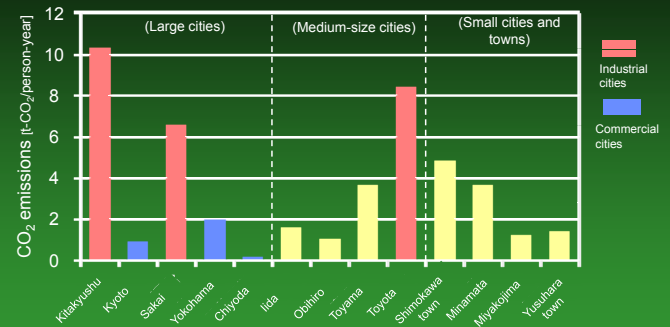
- Motivation and incentive that local governments have when they receive the prestigious title of "EMC" from the Central Government
- The budget for the EMC program provided by the Central Government was small. Therefore, EMCs promoted their action plans on their own initiative, without depending on subsidies from the Central Government
 - ⇒ The Central Government is now promoting their next program, "Future City", with a big budget. The "self sustaining model" established by the EMC program is sure to lead to the success of the "Future City" project.
- Establishment of a nationwide promotion council that shares best practices promoted by EMCs
- Evaluation of EMCs' actions by the Central Government, using four grades
- Awarding the best practices of EMCs and disseminating them to overseas

Outline

- Low carbonization efforts, led by Eco-Model-Cities (EMC)
- Comprehensive assessment of city performance by CASBEE-City

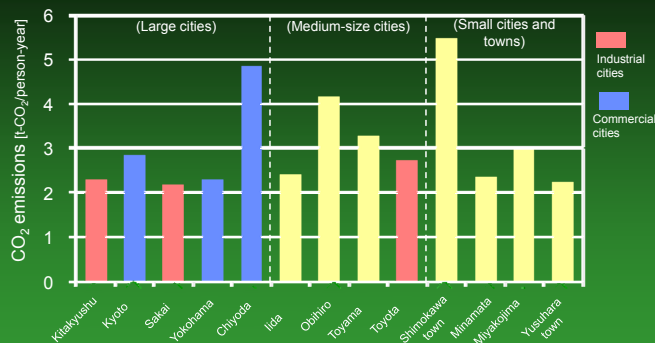
2.1 CO₂ emissions in EMCs

2.1.1 Comparison in the industrial sector



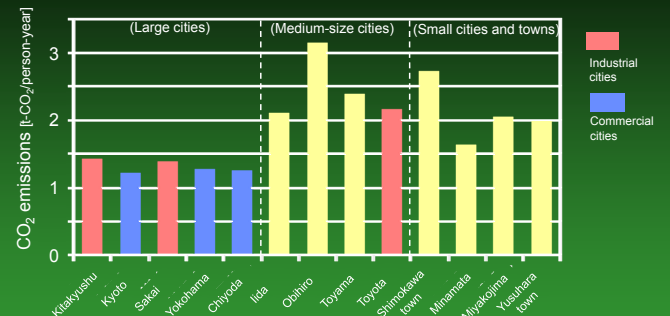
⇒ Remarkably higher CO₂ emissions in industrial cities than in other cities

2.1.2 Comparison in the building sector (residential/commercial)



⇒ No differences in CO₂ emissions between industrial and other cities

2.1.3 Comparison in the transportation sector



⇒ Relatively low CO₂ emissions in large cities with good public transportation systems

2.2 What comparisons of CO₂ emissions show:

- (1) Each sector shows a distinctive CO₂ emission trend.
- (2) This diversity in the trends of CO₂ emissions exists because the trends of climate conditions, citizens' lifestyles and structure of industry vary greatly by each city
- (3) Necessity for a method that allows comprehensive assessment of city performance from both the aspects of environmental load (L) and environmental quality (Q)
 - ⇒ EMC program only evaluated the aspect of L
 - ⇒ Development of CASBEE-City based on Q and L

19

Shuzo Murakami, Building Research Institute

2.3 Background and objectives of the development of CASBEE-City

- 1) Growing interest around the world in assessing the environmental performance of cities
- 2) Development objectives
 - ⇒ To evaluate the environmental performance of cities both for the present and for future stages
- 3) Basic principles
 - ⇒ Comprehensive assessment that takes into account both the aspects of environmental load (L) and quality of life (Q)
 - ⇒ Tool that can assist local governments in promoting their environmental policies

Note: Since Nov. 2008, Development Committee for CASBEE-City (Chair: Shuzo Murakami), set up within the Institute for Building Environment and Energy Conservation, has been developing CASBEE-City.

20

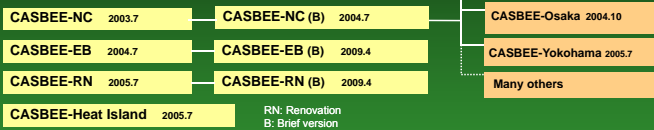
Shuzo Murakami, Building Research Institute

2.4 CASBEE family

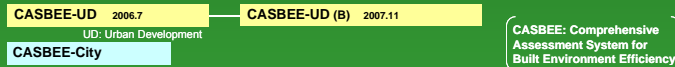
1) Housing scale



2) Building scale



3) Urban scale

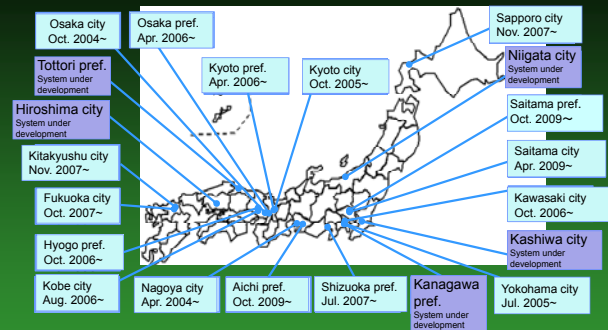


⇒ Now widely used for public and private sectors in Japan

21

Shuzo Murakami, Building Research Institute

2.5 Utilization of CASBEE by local governments

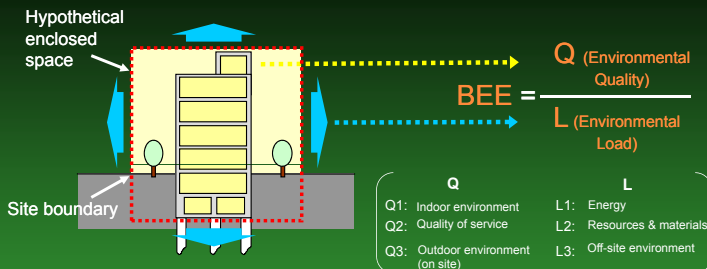


- ⇒ Many local governments require mandatory submission of CASBEE assessment results when applications are submitted for new construction of buildings.
- ⇒ Results are disclosed to the public on local government websites.

22

Shuzo Murakami, Building Research Institute

2.6 Assessment system of CASBEE based on the concept of built environment efficiency (BEE)

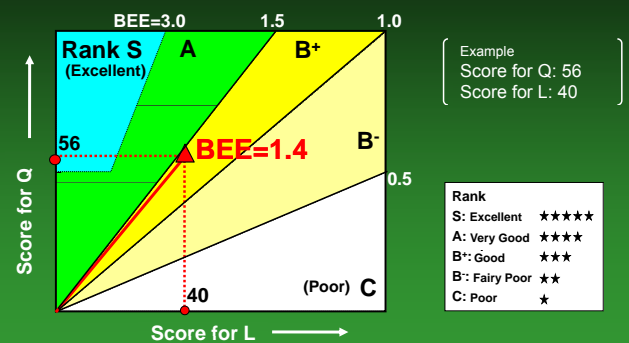


1. Considering both aspects: Environmental Load (L) & Environmental Quality (Q)
2. Assessment by Built Environment Efficiency: BEE = Q / L
 - ⇒ Higher Q with Lower L

23

Shuzo Murakami, Building Research Institute

2.7 Rating based on BEE, illustrated by a 2D Graph of Q & L



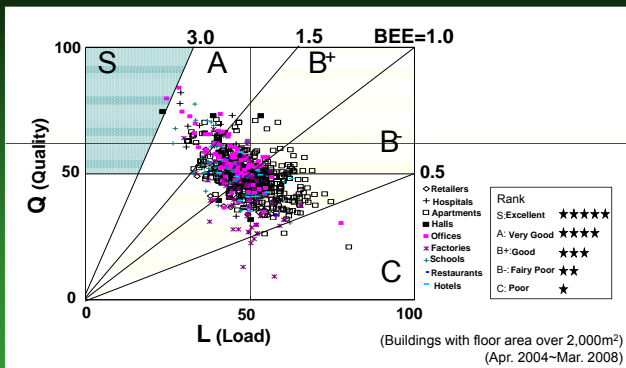
Example
Score for Q: 56
Score for L: 40

Rank	Star Rating
S: Excellent	★★★★★
A: Very Good	★★★★
B+: Good	★★★
B-: Fairly Poor	★★
C: Poor	★

24

Shuzo Murakami, Building Research Institute

2.8 Case study of CASBEE-Nagoya (for newly-constructed buildings)

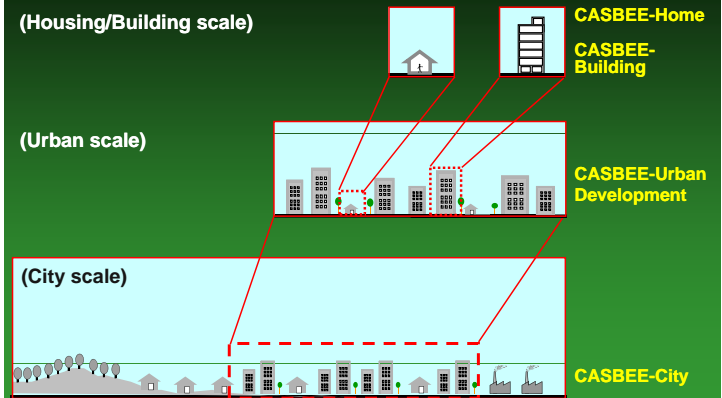


2D graph clearly illustrates the distribution of CASBEE ranks

25

Shuzo Murakami, Building Research Institute

2.9 Nested system of CASBEE tools, according to scale



26

Shuzo Murakami, Building Research Institute

2.10 Framework of CASBEE-City



1) Evaluation of Environmental Load

⇒ Focusing on CO₂ emission reductions

2) Evaluation of Quality

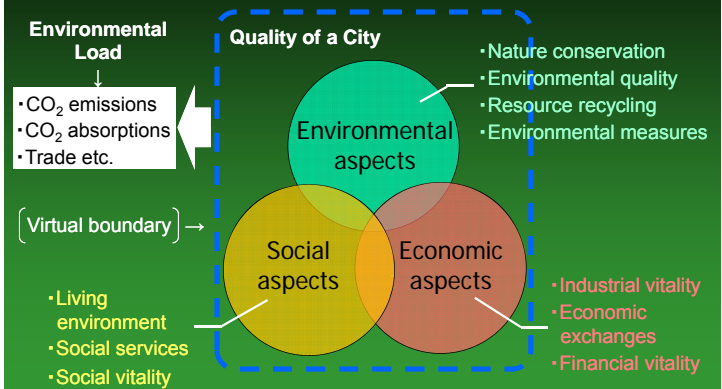
⇒ Assessment of not only environmental aspects, but also social and economic aspects

27

Shuzo Murakami, Building Research Institute

2.11 Assessment items for CASBEE-City:

based on the Triple Bottom Line (TBL)



28

Shuzo Murakami, Building Research Institute

2.12 Two principles for assessing CO₂ emissions

1) Principle 1: Emitter-pays-principle

Allocation of CO₂ emissions to producing areas to acknowledge the current state

- Naturally, environmental load is heavy in industrial cities
- We need to accept this fact.
- At the same time, we should not forget that those cities contribute greatly to other cities through their industrial production.

2) Principle 2: Beneficiary-pays-principle

Reallocation of CO₂ emissions to consuming areas in consideration of the large contribution of industrial cities to consuming areas through their industrial activities

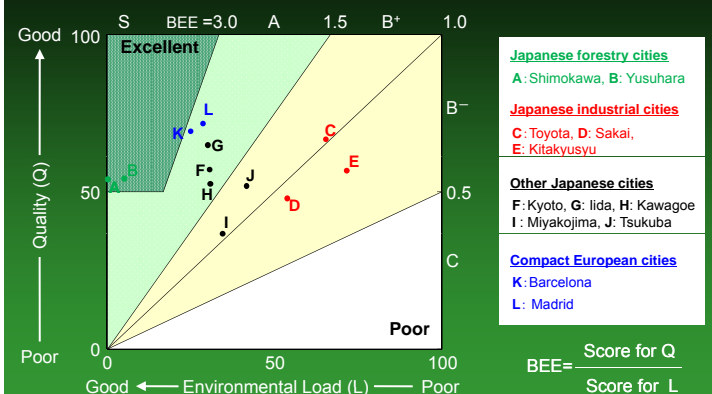
- Concept that areas consuming industrial products should share the burden of CO₂ emissions resulting from industrial production.

⇒ Need for these 2 types of principles for assessing CO₂ emissions

29

Shuzo Murakami, Building Research Institute

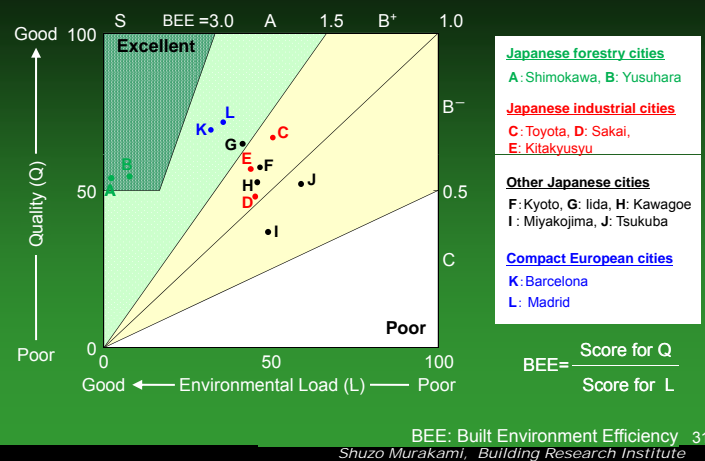
2.13 BEE of EMCs of Principle 1 (Emitter-pays-principle)



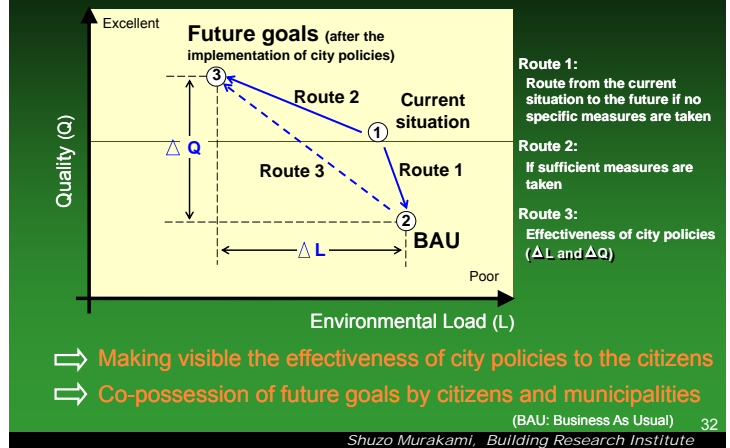
30

BEE: Built Environment Efficiency
Shuzo Murakami, Building Research Institute

2.14 BEE of EMCs of Principle 2 (Beneficiary- pays-principle)



2.15 Presentation of future goals to citizens by municipalities



2.16 Advantages of utilising CASBEE-City

1. CASBEE-City is an expanded version of CASBEE for buildings, which is widely used by public and private sectors in Japan
2. CASBEE-City enables not only the assessment of the current condition of a city, but also that of future stages
3. Assessment items can be partially modified, taking into account circumstances peculiar to each city
4. Assessment by CASBEE-City can be applied to not only Japanese cities, but also to foreign cities
5. It allows us to "see" the present and future performances comprehensively from the "Q" and "L" aspects. Thus, it contributes to the sharing of future visions of the city among citizens and local governments.

33

Shuzo Murakami, Building Research Institute

Thank you very much for your attention.

Bibliography:

- 1) Shuzo Murakami, Yasushi Asami, Toshiharu Ikaga, Nobuhaya Yamaguchi, Shinichi Kaburagi, Ryota Kuzuki, Noriyoshi Nakamura, Akio Tanaka, Shun Kawakubo: Study on Comprehensive Assessment System for Built Environment Efficiency (CASBEE) Part 81-85, *Summaries of Technical Papers of Annual Meeting of the Architectural Institute of Japan* (August 2009)
- 2) The Institute for Building Environmental and Energy Conservation (IBEC): New Developments in Urban and Building Environment and Energy Conservation: Eco-Model Cities and CASBEE-City, document for the 27th Built Environment and Energy Conservation Forum (February 2009)
- 3) Shuzo Murakami, Shun Kawakubo, Yasushi Asami, Toshiharu Ikaga, Nobuhaya Yamaguchi and Shinichi Kaburagi: Development of comprehensive assessment tool for the built environment of cities: CASBEE-City-Concept and framework of assessment system, *AJ Journal of Technology and Design*, Vol.17 No.35, 239-244, Feb. 2011

34

Shuzo Murakami, Building Research Institute