Performance Evaluation Systems for University Facilities

(FY2011)

School buildings

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National Institute for Educational Policy Research of Japan
Working Group for “The Investigative Research on the Functional Standards of National University Corporations Facilities”

Introduction

The facilities of National University Corporations, etc. (hereinafter referred to as "national university facilities") form the basis of educational and research activities. Maintaining and increasing their standard is essential to elevating the level of education and research, and to ensuring safety. The National Government and National University Corporations, etc. (NUCs) are promoting the expansion of educational and research facilities, and the improvement of dilapidated facilities; however, a variety of problems remains at many national university facilities.

In "Centers of Knowledge―Approaches to the Development and Enhancement of Facilities at National University Corporations, which Bring a Bright Future for Japan (Interim Report)," which was made public in August 2009, the Ministry of Education, Culture, Sports, Science and Technology (MEXT) indicated that "the Government should support individual corporations' efforts for effective and efficient development by formulating and disseminating objective and reasonable indices for accurate understanding of facilities' conditions" as one of the measures to promote systematic facility development.

To that end, the Educational Facilities Research Center of the National Institute for Educational Policy Research set up the Working Group for "The Investigative Research on the Functional Standards of National University Corporations Facilities" (Head: Yukio Komatsu, Professor, Faculty of Science and Engineering, Waseda University) to study methods to evaluate buildings' conditions against the performance standards expected of national university facilities.

Earthquake resistance capacity index (Is value) and years since construction have been used as indices to indicate the condition of a building. In addition, items such as low-carbon measures, deterioration of parts of the building, living environment for users, and functions supporting education and research are included in this "Performance Evaluation Systems for University Facilities" to form a new index for the comprehensive evaluation of a building's conditions.

In the study process, we analyzed the 13 existing methods of evaluation, including the Comprehensive Assessment System for Built Environment Efficiency (CASBEE), but many of them require a huge amount of time and effort for evaluation or assume new construction or improvement work and are therefore difficult to use as they are. For this reason, we decided to build a new evaluation system by setting evaluation items and standards suitable for the actual situation of national university facilities with reference to these existing methods. After developing a draft version, we conducted trials of the system in cooperation with several universities and other institutions, checked for potential problems in operation of the system, and corrected a part of evaluation items and criteria.

We hope that NUCs across the country will use the system as one of the measures to promote the development of national university facilities in the future.

Contents

Chapter 1 Outline of the Performance Evaluation Systems for University Facilities

I. Objective

Performance Evaluation Systems for University Facilities (hereinafter referred to as "the Evaluation System") evaluates the standard of buildings against the functions and the standard expected of facilities of National University Corporations (NUCs; including Inter-University Research Institute Corporations and Institutes of National Colleges of Technology).

Evaluation results can be used as one of the grounds for decisions on the refurbishment priority in facility development and also as a tool to understand the development needs of all NUCs.

When building the Evaluation System, we were careful to make the system easy to implement so that all NUCs would be able to use it with less burden on evaluators.

II. Target of Evaluation

The Evaluation System can be used for school buildings (undergraduate school buildings, graduate school facilities, laboratory facilities), university libraries, welfare facilities and dormitories (including international exchange halls and accommodations for researchers), but not for university hospitals, special experiment facilities (RI facilities, animal experiment facilities), or indoor athletic facilities, such as gymnasiums. The term "welfare facilities" here means facilities that have a school cafeteria.

The Evaluation System can be used for welfare facilities without a school cafeteria (hereinafter referred to as "other student support facilities"), administration buildings, and other facilities by excluding specific evaluation items from those for similar purposes. **6. Points to Remember in Operation** apply to their operation.

The targets of evaluation are existing NUC facilities. The Evaluation System may be used even for dilapidated facilities and newly built facilities, regardless of the years since construction. However, the Evaluation System is not applicable to evaluations where change of purpose after refurbishment is assumed, for example, a school building can not be evaluated using the evaluation items for a university library.

The Evaluation System is not applicable to cases where the building and major equipment for the supply of power, water, heat, etc. are outside the range of the building that is to be evaluated (ex. energy center of a complex) if not otherwise specified.

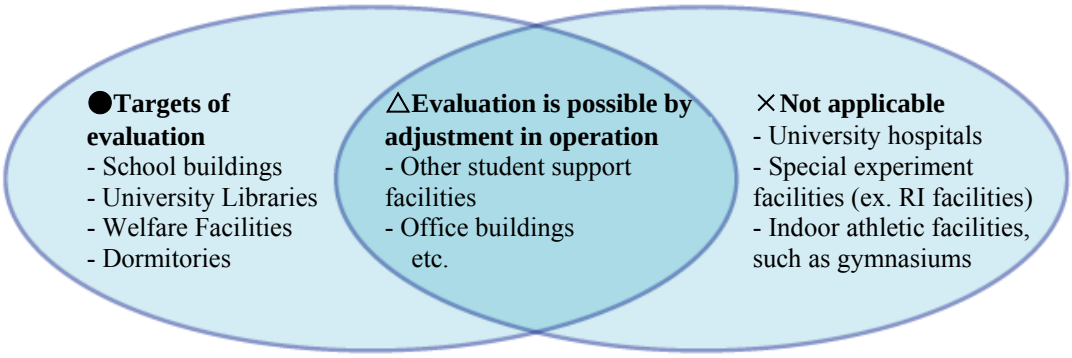

Chart: Applicable and not applicable purposes

III. Evaluation Method

1. Applicable Purposes

If the building to be evaluated has multiple purposes, conduct evaluation based on the purpose for which the largest floor area is allocated.

2. Evaluation Items

i) Evaluation items are divided into "fundamental performance of building" and "performance necessary for the purpose."

ii) Evaluation items include "large items," "middle items" and "small items," as listed by purpose in **Table 1. List of Evaluation Items**.

iii) Assess the level for each evaluation item with a weighting of large, middle or small given to each item. The weight coefficient of each item is as listed in **Tables 2 to 4**.
iv) The need for refurbishment is assessed by ranking the overall score obtained through the comprehensive weighting of multiple evaluation items.

Table 1. List of Evaluation Items

Item	Large item	Middle item	Small item	School buildings	University library	Welfare facility	Dormitory
A Fundamental performance of building	1. Low-carbon-related indices	1.1 Thermal insulation / sun-shielding performance	-	○	○	○	
			1.1.1 Roof insulation				○
			1.1.2 Wall insulation				○
			1.1.3 Window insulation				○
		1.2 Facility efficiency improvement	1.2.1 Individual air-conditioning	○	○	○	○
			1.2.2 Central air-conditioning	○	○	○	○
			1.2.3 Lighting fixture	○	○	○	○
		1.3 Natural energy use	-	○	○	○	○
	2. Earthquake -resistance-related indices	2.1 Seismic index of structure	-	○	○	○	○
		2.2 Nonstructural members	-	○	○	○	○
	3. Deterioration-related indices	3.1 Degree of deterioration of finishing materials	3.1.1 Roof	○	○	○	○
			3.1.2 Outer wall	○	○	○	○
			3.1.3 Exterior fitting	○	○	○	○
		3.2 Degree of deterioration of electrical facilities	3.2.1 Transforming /power-receiving facilities or main line facilities	○	○	○	○
		3.3 Degree of deterioration of mechanical facilities	3.3.1 Water-supply facilities	○	○	○	○
			3.3.2 HVAC facilities	○	○	○	○
		3.4 Conformity with laws	-	○	○	○	○
	4. Living-environment -related indices	4.1 Indoor condition	4.1.1 Thermal sensation	○	○	○	○
			4.1.2 Illuminance	○	○		
			4.1.3 Natural ventilation	○			
			4.1.3 (2) Sound absorption		○	○	
			4.1.2 Sound proofing				○
			4.1.3 Mechanical ventilation			○	○
		4.2 Barrier-free	-	○	○	○	○
B Performance necessary for the purpose	5. Indices concerning education and research base	5.1 Enhancement of educational and research environment		○			
		5.2 Space		○			
		5.3 Electrical facilities		○			
		5.4 Information Communication infrastructure		○			
		5.1 Enhancement of library functions			○		
		5.2 Bookcase occupancy rate			○		
		5.1 Enhancement of welfare facility functions				○	
		5.2 Seating capacity of cafeteria				○	
		5.1 Enhancement of dormitory functions					○
Number of evaluation items				22	20	20	21

Table 2 Weight Coefficient of Large items

Large item		Weight coefficient	Note
A	1. Low-carbon related indices	2	Score when full points are given to all large items: 10.0 × 2 × 5 = 100
	2. Earthquake-resistance-related indices	2	
	3. Deterioration-related indices	2	
	4. Living-environment-related indices	2	
B	5. Indices concerning education and research base	2	

Table 3 Weight Coefficient of Middle Items

Purpose	Large item	Middle item	Weight coefficient	Subtotal
Common	1. Low-carbon-related indices	1.1 Thermal insulation / sun-shielding performance	0.5	1.0
		1.2 Facility efficiency improvement	0.4	
		1.3 Natural energy use	0.1	
	2. Earthquake-resistance-related indices	2.1 Seismic index of structure	0.8	1.0
		2.2 Nonstructural members	0.2	
	3. Deterioration-related indices	3.1 Degree of deterioration of finishing materials	0.5	1.0
		3.2 Degree of deterioration of electrical facilities	0.2	
		3.3 Degree of deterioration of mechanical facilities	0.2	
		3.4 Conformity with laws	0.1	
	4. Living-environment-related indices	4.1 Indoor condition	0.6	1.0
		4.2 Barrier-free	0.4	
School buildings	5. Indices concerning the education and research base	5.1 Enhancement of educational and research environment	0.3	1.0
		5.2 Space	0.3	
		5.3 Electrical facilities	0.2	
		5.4 Information Communication infrastructure	0.2	
University library	5. Indices concerning the education and research base	5.1 Enhancement of library functions	0.5	1.0
		5.2 Bookcase occupancy rate	0.5	
Welfare facilities	5. Indices concerning the education and research base	5.1 Enhancement of welfare facility functions	0.5	1.0
		5.2 Seating capacity of cafeteria	0.5	

Table 4 Weight Coefficient of Small Items

Purpose	Middle item	Small item	Weight coefficient	subtotal
Common	1.2 Facility efficiency improvement	1.3.1 Individual air-conditioning	0.4	1.0
		1.3.2 Central air-conditioning	0.3	
		1.3.3 Light fitting	0.3	
	3.1 Degree of deterioration of finishing materials	3.1.1 Roof	0.3	1.0
		3.1.2 Outer wall	0.4	
		3.2.3 Exterior fitting	0.3	
	3.3 Degree of deterioration of mechanical facilities	3.3.1 Water-supply facilities	0.5	1.0
		3.3.2 HVAC facilities	0.5	
School buildings	4.1 Indoor condition	4.1.1 Thermal sensation	0.4	1.0
		4.1.2 Lighting	0.4	
		4.1.3 Natural ventilation	0.2	
University library	4.1 Indoor condition	4.1.1 Thermal sensation	0.4	1.0
		4.1.2 Lighting	0.3	
		4.1.3 Sound absorption	0.3	
Welfare facilities	4.1 Indoor condition	4.1.1 Thermal sensation	0.4	1.0
		4.1.2 Sound absorption	0.3	
		4.1.3 Mechanical ventilation	0.3	
Dormitory	1.1 Thermal insulation / sun-shielding performance	1.1.1 Roof insulation	0.4	1.0
		1.1.2 Wall insulation	0.3	
		1.1.3 Window insulation	0.3	
Dormitory	4.1 Indoor condition	4.1.1 Thermal sensation	0.4	1.0
		4.1.2 Sound proofing	0.3	
		4.1.3 Mechanical ventilation	0.3	

3. Concept of the Evaluation Standard

i) The evaluation of each item is made on a 4-point scale where each grade is expressed as “Level X” (X is a digit from 1 to 4).
ii) The standard level is “Level 4,” followed by “Level 3,” “Level 2,” and “Level 1” in descending order of performance.
iii) The standard level is the level equivalent to the general technical/social level at the time of evaluation.
iv) The score of level 4 is 10.0; that of level 3 is 7.0; that of Level 2 is 3.0; and that of Level 1 is 0.0.
v) The evaluation standard shall be designed so that the investment effect of large-scale refurbishment is reflected as a higher rating.

4. Concept of Rating

Total counts are graded in the following four levels or grades. Conditions corresponding to each grade are exemplified as follows. The relationship between each grade and the total count is given in **Table 5**.

Grade D
- There is a problem in low-carbon-related performance, which calls for highly urgent refurbishment
- There is a problem in seismic capacity, external finish, facility deterioration, and conformance with the current laws, which calls for highly urgent refurbishment
- There is a problem in the operation of the facility that calls for highly urgent refurbishment

Grade C
- There is a problem in low-carbon-related performance, which calls for urgent refurbishment
- There is a problem in seismic capacity, external finish, facility deterioration, and conformance with the current laws, which calls for urgent refurbishment
- There is a problem in the operation of the facility that calls for urgent refurbishment

Grade B
- There is room for improvement in low-carbon-related performance
- There is a problem in seismic capacity, external finish, facility deterioration, and conformance with the current laws, which calls for systematic refurbishment.
- There is a problem in the operation of the facility that calls for systematic refurbishment

Grade A
- There is no problem in low-carbon-related performance
- There is no problem in seismic capacity, external finish, facility deterioration, or conformance with the current laws; or there is a minor problem that does not interfere with operation.
- There is little or no problem in the operation of the facility.

Table 5 Grading Level (Grade)

Grade	Total count
D	Less than 30 points
C	30 to 50 points
B	50 to 80 points
A	80 points and over

5. Implementing Evaluation

Evaluation is carried out by personnel in charge of facilities of the NUC in principle.

Calculation and grading of the total count is made using Forms **I-1** to **I-4 [Output Overview Sheet] and Forms II-1** to **II-4 [Point Breakdown Output Sheet]**

(*In this English version, Forms I-2 to I-4 and Forms II-2 to II-4 are omitted.)

6. Points to Remember in Operation

i) Weight coefficient of evaluation items

Weight coefficients of large items are established by MEXT in accordance with the basic policy concerning development and enhancement of NUC facilities and may be reviewed as needed in consideration of policy circumstances.

If the basic policy is changed due to changes in circumstances surrounding facilities, performance evaluation may be adapted to the new measures by increasing or decreasing the weight coefficients of large items.

Where there is no target of evaluation for weight coefficients of medium and small items, make a correction by dividing each of the coefficients by the total, excluding the weight coefficients that have no target of evaluation.

ii) Purposes for which evaluation is possible by adjustment in operation

Similar purposes and evaluation items to be excluded for the purposes for which evaluation is possible by adjustment are listed in the **table below**:

Purpose	Similar purpose	Evaluation items to be excluded
Other student support facilities	Welfare facilities	5. Indices concerning education and research base
Administration building	School building	5. Indices concerning education and research base

*Correct the weight coefficient of a large item by dividing the coefficient by the total of weight coefficients, excluding those of the evaluation items to be excluded.

Chapter 2 Evaluation Standard and Method

I. School Buildings

Table 1-1 Evaluation items [School buildings]

Large item	Middle item	Small item	Evaluation item
1. Low-carbon -related indices	1.1 Thermal insulation / sun-shielding performance	-	Thermal insulation performance of outer walls and windows
	1.2 Facility efficiency improvement	1.2.1 Individual air-conditioning	Ratio of total heat exchanger installation for individual air-conditioning; efficiency of heat source equipment
		1.2.2 Central air-conditioning	Number of cases of introduction of energy-saving techniques to central air-conditioning
		1.2.3 Lighting fixture	Lighting efficiency/control techniques
	1.3 Natural energy use	-	Number of natural energy introduction cases
2. Earthquake -resistance-related indices	2.1 Seismic index of structure	-	Is value
	2.2 Nonstructural members	-	Number of initiatives for earthquake resistance of nonstructural members
3. Deterioration -related indices	3.1 Degree of deterioration of finishing materials	3.1.1 Roof	Age; specification level; safety; degradation phenomena
		3.1.2 Outer wall	
		3.1.3 Exterior fitting	
	3.2 Degree of deterioration of electrical facilities	3.2.1 Transforming /power-receiving facilities or main line facilities	Age; specification level; safety; degradation phenomena; functionality
	3.3 Degree of deterioration of mechanical facilities	3.3.1 Water-supply facilities	Age; specification level; degradation phenomena; functionality
		3.3.2 HVAC facilities	Age; specification level; safety; degradation phenomena; functionality
	3.4 Conformity with laws	-	Number of items that do not conform with the current laws
4. Living -environment -related indices	4.1 Indoor condition	4.1.1 Thermal sensation	Number of items that pose a problem
		4.1.2 Illuminance	Intensity of illumination
		4.1.3 Natural ventilation(*)	Effective opening area for natural ventilation
	4.2 Barrier-free	-	Achievement rate of legal standard items
5. Indices concerning education and research base	5.1 Enhancement of educational and research environment		Number of initiatives contributing to enhancement of the educational and research environment
	5.2 Space		Office area per capita
	5.3 Electrical facilities		Number of items that pose a problem
	5.4 Information communication infrastructure		Number of items that pose a problem
(*) indicates the items to be excluded according to the purpose. Number of middle items: 15; Number of middle items with multiple small items: 4; Number of items for which the level is to be assessed: 22			

1. Low-carbon-related Indices

1.1 Thermal insulation / sun-shielding performance

Evaluate the thermal performance of the building's skin (the building's parts facing outside, such as outer walls, windows and the roof). Here, the lower the level, the poorer the thermal insulation performance.

(1) Evaluation standard

Level	Thermal insulation / sun-shielding performance: specification criteria [simple point method]
Level 1	Point value < 80
Level 2	80 ≤ point value < 100
Level 3	100 ≤ point value < 120
Level 4	120 ≤ point value

(2) Evaluation method

Evaluate thermal insulation / sun-shielding performance by using the specification criteria [simple point method] based on the "Energy Conservation Standards for Buildings" in principle. The level of the outer walls, windows, etc.

of the building is assessed based on the points calculated using the following formula:

Point value = [score of i] + [score of ii] + [value of Table 1.1.1]

i) Scores for outer wall thermal insulation performance in temperate regions (the regions other than the cold regions of Hokkaido, Aomori, Iwate and Akita Prefectures and the hot regions of Okinawa Prefecture, the Tokara Islands, the Amami Islands of Kagoshima Prefecture, and Ogasawara Sub-prefecture of Tokyo; the same applies hereafter) and cold regions are the respective points listed in the following table; the score for such performance in hot regions is 0. Identify the floor deemed to serve as a standard floor ("standard floor") and carry out evaluation for the standard floor.

Region	Measures taken	Points
Temperate region	Spray-applied rigid polyurethane foam insulation at least 20mm thick, or other material with equivalent thermal insulation performance, is used.	65
	Spray-applied rigid polyurethane foam insulation between 15 and 20mm thick, or other material with equivalent thermal insulation performance, is used	55
	Other than those listed above	0
Cold region	Spray-applied rigid polyurethane foam insulation at least 40mm thick, or other material with equivalent thermal insulation performance, is used	50
	Spray-applied rigid polyurethane foam insulation between 20 and 40mm thick, or other material with equivalent thermal insulation performance, is used	35
	Other than those listed above	0

- "Spray-applied rigid polyurethane foam insulation" means spray-applied rigid polyurethane foam insulation material as specified in JIS A9526 (Spray-applied rigid polyurethane foam for thermal insulation).
- When thermal insulation is not installed on the outer wall facing some directions, it is deemed effective if the thermal insulation is installed on 70% or more of the total area of outer walls (excluding the window area) of the standard floor.

ii) Points concerning the thermal insulation and sun-shielding performance of windows are the total of the points listed in the table below in accordance with the measures taken concerning the respective category of the region and the item.

Region	item	Measures taken	Points
Temperate region	Window area	Percentage of window area is under 20%	40
		Percentage of window area is from 20% to under 40%	25
		Percentage of window area is 40% or more	0
	Glass type	Low-emissivity sealed insulating glass is used	35
		Sealed insulating glass (excluding low-emissivity sealed insulating glass) is used	30
		Other than those listed above	0
Cold region	Window area	Percentage of window area is under 20%	25
		Percentage of window area is from 20% to under 40%	20
		Percentage of window area is 40% or more	0
	Glass type	Low-emissivity sealed insulating glass is used	15
		Other than those listed above	0
Hot region	Window area	Percentage of window area is under 20%	50
		Percentage of window area is from 20% to under 40%	35
		Percentage of window area is 40% or more	0
	Glass type	High-performance solar reflective glass is used	20
		Solar reflective glass is used	10
		Other than those listed above	0
	Horizontal eave	With projection of 1.0m or more	20
		With projection from 0.5m to under 1.0m	15
		With projection under 0.5m	0

1 "Percentage of window area" is the percentage of the outer wall area (including the window area) accounted for by windows facing the principal direction for the representative span of the standard floor.
1-1 "Principal direction" is the direction that the outer wall with the largest total window area among the outer walls faces.
2 "Low-emissivity sealed insulating glass" is sealed insulating glass with low-emissivity. It consists of more than one sheet of glass with a normal emittance, as established in JIS R3106 (Testing Method on Transmittance, Reflectance and Emittance of Flat Glasses and Evaluation of Solar Heat Gain Coefficient), of 0.20 or lower, or of more than two sheets of glass with a normal emittance of 0.35 or lower.
3 "Sealed insulating glass" means sealed insulating glass as specified in JIS R3209 (Sealed insulating glass).
4 "High-performance solar reflective glass" means heat-reflective glass defined by JIS R3221 (Solar reflective glass) and classified as Class 2 or 3 by its solar heat shading property.
5 "Solar reflective glass" means heat-reflective glass defined by JIS R3221 (solar reflective glass) and classified as Class 1 by its solar heat shading property.

Table 1.1.1

Temperate region: 35	Cold region: 55	Hot region: 50

1.2 Facility Efficiency Improvement

Conduct evaluation according to "1.2.1 Individual air-conditioning" when the principal air-conditioning equipment is individual air-conditioners, and according to "1.2.2 Central air-conditioning" when the principal air-conditioning equipment is a central air-conditioner.

Central air-conditioning equipment installed outside the range of the building that is to be evaluated (ex. energy center) is also covered by the evaluation.

1.2.1 Individual air-conditioning

(1) Evaluation standard

Level	Individual air-conditioning: specification criteria [simple point method]
Level 1	Point value < 70
Level 2	70 ≤ point value < 100
Level 3	100 ≤ point value < 130
Level 4	130 ≤ point value

(2) Evaluation method

Individual air-conditioning is evaluated according to the specification criteria [simple point method] based on the "Energy Conservation Standards for Buildings" in principle.

The level of the principal air-conditioning equipment in terms of the energy use of the building is evaluated based on the points calculated using the following formula. However, evaluation may be conducted only for package air-conditioners (limited to air-cooling type) and gas heat pump air-conditioners. Principal equipment in terms of energy use is the model with representative performance among the equipment used in the building.

Point value = [points of i] + [points of ii] + [J0 value of Table 1.2.1.1]

i) Points concerning the outdoor air load reduction consist of the total of the following points according to the measures taken:

Measures taken	Points
A total heat exchanger is used for over 50% of the air-conditioning area	J1
Outdoor air cooling based on bypass control using a total heat exchanger is used for over 50% of the air-conditioning area	J1 + J2
Other than those listed above	0
1 "Bypass control" means a control method for cooling where the heat is not exchanged in the outdoor air intake process when the enthalpy of the outdoor air is smaller than that of the indoor air. 2 J1 and J2 of the table are the numeric values listed according to the category of the region in **Table 1.2.1.1**. 3 The air-conditioning area is calculated at the standard floor.	

Table 1.2.1.1

	Region I	Region II and III	Region IV
J1	30	20	10
J2	5	5	5
J0	60	65	70

ii) Points concerning the efficiency of heat source equipment are as listed in the following table according to the measures taken.

Type of air-conditioner	Measures taken	Points
Package air-conditioners or gas heat pump air-conditioners	Using heat source equipment whose cooling/heating average COP is 1.25 or more	60
	Using heat source equipment whose cooling/heating average COP is 1.00 or more	20
	Other than those listed above	0

Cooling/heating average COP is calculated using the following formula:
Cooling/heating average COP = qc × cooling average COP + qH × heating average COP
In this formula, qc, qH, "cooling average COP" and "heating average COP" represent the following numeric values respectively:
qc: Numeric value listed in **Table 1.2.1.2** according to the category of the region
qH: Numeric value listed in **Table 1.2.1.2** according to the category of the region
Cooling average COP: numeric value obtained by dividing the total value of the rated cooling capacity of the heat source equipment of the representative performance model by the total value of the rating of energy consumption for cooling of the same equipment
Heating average COP: numeric value obtained by dividing the total value of the rated heating capacity of the heat source equipment of the representative performance model by the total value of the rating of energy consumption for heating of the same equipment
Rating of energy consumption for cooling and rating of energy consumption for heating are calculated using the following formulas respectively:

Rating of energy consumption for cooling	Rating of energy consumption for heating
α × Cw / 3600 + Cf	α × Hw / 3600 + Hf

In the table above, α, Cw, Cf, Hw and Hf represent the following numeric values respectively:
α: numeric value listed in Table 1.2.1.3 Electricity according to the operational condition of the principal equipment in terms of energy use
Cw: rating of electric power consumption for cooling (kilowatt)
Cf: rating of fuel consumption for cooling (kilowatt)
Hw: rating of electric power consumption for heating (kilowatt)
Hf: rating of fuel consumption for heating (kilowatt)

Table 1.2.1.2

	Region 1	Region II and III	Region IV
qc	0.2	0.5	0.8
qH	0.8	0.5	0.2

Regions I to IV are as listed below; the same applies hereafter:
Region I: Hokkaido
Region II: Aomori, Iwate, Akita, Miyagi, Yamagata, Fukushima, Gunma, Tochigi, Ibaraki, Niigata, Toyama, Ishikawa, Fukui, Nagano and Gifu Prefectures
Region III: Chiba, Saitama, Tokyo, Kanagawa, Yamanashi, Shizuoka, Aichi, Shiga, Mie, Nara, Kyoto, Hyogo, Okayama, Hiroshima, Yamaguchi, Shimane, Tottori, Osaka, Wakayama, Kagawa, Tokushima, Kochi, Ehime, Fukuoka, Saga, Nagasaki, Oita and Kumamoto Prefectures
Region IV: Miyazaki, Kagoshima and Okinawa Prefectures

Table 1.2.1.3 Electricity

9,760 kilo joule per 1 kilowatt/hour (when a nighttime power purchase*1 agreement is made, electric power consumption of daytime power*2 may be deemed to be 9,970 kilo joules per 1 kilowatt/hour, while power consumption during the night may be deemed to be 9,280 kilo joules per 1 kilowatt/hour)
*1 Nighttime power purchase: means receiving a supply of electric power from a General Electricity Utility provided in Article 2, Paragraph 1, Item (ii) of the Electricity Business Act (Act No. 170 of July 11, 1964) during the time period from 22:00 to 8:00.
*2 Day time power purchase: means receiving a supply of electric power from a General Electricity Utility provided in the item above during the period from 8:00 to 22:00.

1.2.2 Central air-conditioning

(1) Evaluation standard

Level	Introduction of efficiency improvement method to central air-conditioning
Level 1	No initiative for evaluation
Level 2	One initiative for evaluation
Level 3	Two initiatives for evaluation
Level 4	More than three initiatives for evaluation

(2) Evaluation method

Evaluate introduction of the following methods for efficient improvement of central air-conditioning:

[Efficiency improvement of heat source]

i) Introduction of high-efficiency heat source equipment
ii) Control of the number of heat sources and pumps
iii) Variable flow system: method to reduce carrier power by controlling the chilled- or hot-water volume of the air-conditioner coil using a two-way valve according to the changing thermal load and by controlling the number of pumps or revolutions through an inverter.
iv) Water-supply system using a large temperature difference: method to reduce carrier power by reducing the capacity of pumps and piping by leveraging a large difference in the temperature of the water supply

[Heat storage system]

v) Water thermal storage: a system to store heat by storing water in an integrated water tank or in a pit within a double slab of the building foundation
vi) Ice thermal storage: a method to store cold thermal energy as ice in an underground water tank (pit) or tank unit

[Thermal load reduction method]

vii) Total heat exchanger: equipment for heat exchange (sensible heat and latent heat) between the excess exhaust of indoor air and outdoor air that is introduced for air conditioning
viii) Cooling with outside air: a method to introduce low-temperature outdoor air as it is in winter and intermediate seasons to use for cooling
ix) Outdoor air control: a method to control the volume of outdoor air to introduce in accordance with the outdoor air volume necessary for the number of people inside

[Method to reduce air-blowing power]

x) Variable Air Volume (VAV) method: a method of air-conditioning in accordance with indoor heat generation by changing the blowing air volume while keeping the supply air temperature constant
xi) Large temperature difference air supply: a method to reduce the total air supply at the same indoor sensible heat load by making the difference in the supply of air temperature greater than usual (low-temperature air supply)
xii) Task/ambient air-conditioning: an air-conditioning method combining ambient air-conditioning that creates a basic environment and task air-conditioning that is installed individually at points of local heat generation by OA equipment and points where staff density is high, for example
xiii) Occupied Zone Air-Conditioning: an air-conditioning method focused on the occupied zone for human activities in a large atrium or entrance lobby, for example
xiv) Radiant air-conditioning: a method to increase comfort by directly heating or cooling the indoor floor, wall or ceiling surface

[Control techniques]

xv) Optimal start and stop: in this control method, the optimal start is accomplished by estimating the optimum time to start pre-cooling/pre-heating in accordance with the start time based on the conditions, such as the operation of the previous day and outdoor air temperature. For the optimal stop, the earliest possible time to stop the operation of the air-conditioner to maintain the preset temperature until the closing time is estimated and the operation is stopped as early as possible for energy conservation
xvi) Keeping out outside air during pre-cooling/pre-heating: a control method to stop the intake of outside air during pre-cooling/pre-heating (from the start of the operation of the air-conditioner to the time when the room temperature reaches the preset temperature), assuming that there are few people inside during this period

1.2.3 Lighting fixture

(1) Evaluation standard

Level	Lighting fixture: specification criteria [simple point method]
Level 1	Point value < 90
Level 2	90 ≤ point value < 100
Level 3	100 ≤ point value < 110
Level 4	110 ≤ point value

(2) Evaluation method

Evaluate a lighting fixture based on the specification criteria [simple point method] of the "Energy Conservation Standards for Buildings" in principle.

Evaluate the level of the principal lighting section in terms of the energy use of the building based on the point value calculated using the following formula.

Principal lighting section is a lighting section that has an important role for the building to be evaluated and has a relatively large area; consequently, toilets and corridors are not evaluated.

Point value = [score of (i)] + [score of (ii)] + [score of (iii)] + 80]

i) The score concerning the lighting efficiency of a lighting fixture is the score listed in the following table according to the type of the principal light source used in the lighting section.

Measures taken		Score
Fluorescent lamp (excluding compact fluorescent lamp)	High-frequency fluorescent lamp is used	12
	Other than those listed above	0
Compact fluorescent lamp, metal halide lamp or high-pressure sodium lamp is used		6
LED lamp is used		6
Other than those listed above		0
"LED lamp" means a lamp using a semiconductor element that emits light when energized.		

ii) Scores concerning the control method of the lighting fixture are the scores listed in the following table according to the measures taken.

Measures taken	Score
Two of the seven control methods (occupancy sensing control*1 using a card, sensor, etc; automatic switching control*2 based on brightness sensing; optimal lighting level adjustment*3; time schedule control*4; lighting level adjustment utilizing daylight*5; zoning control*6; local control*7) are used.	22
One of the seven control methods is used.	11
Other than those listed above	0

*1 Occupancy sensing control: occupancy status of the room is detected through sensors, a card, room key, etc. for automatic switching or modulation of light

*2 Automatic switching control: the brightness of the space is detected for automatic switching

*3 Optimal lighting level adjustment: because the initial illuminance of a lamp is set higher than the design illuminance, assuming the subsequent illuminance reduction due to aging degradation and dirt on the appliance, power consumption is reduced while ensuring adequate illuminance by adjusting the initial illuminance using an illuminance sensor.

*4 Time schedule control: control through automatic switching and modulation of light according to a time schedule

*5 Lighting level adjustment utilizing daylight: a control method to automatically modulate artificial light by detecting the change in brightness of the space due to the incoming daylight

*6 Zoning control: the lighting space is divided into several zones and an adequate switching/light modulation pattern is used in each of them.

*7 Local control: office workers, etc. individually switch or dim local/task lighting for sections smaller than a zone (office workers' desks, for example).

iii) The points concerning the layout and illuminance setting of a lighting fixture are as listed in the following table according to the measures taken:

Item	Measures taken	Score
Layout and illuminance setting of lighting fixture	TAL method is adopted for 90% or more of the area of the lighting sections that are used as an office	12
	TAL method is adopted from 50% to 90% of the area of the lighting sections that are used as an office	11
	Other than those listed above*2	0
"TAL method" means task/ambient lighting method*1		

*1 Task/ambient lighting method: a lighting method that combines ambient lighting to satisfy basic environmental conditions and task (local) lighting to light working zones with desk lamps, for example

*2 The lighting of a lighting section other than an office is classified as "Other than those listed above," even when TAL is adopted.

1.3 Natural Energy Use

(1) Evaluation standard

Level	Natural energy use
Level 1	None
Level 2	One kind of natural energy source has been introduced.
Level 3	Two kinds of natural energy sources have been introduced.
Level 4	Three or more kinds of natural energy sources have been introduced.

(2) Evaluation method

Natural energy use is evaluated based on the introduction of the facilities, etc. listed below. However, small-scale systems installed for research purposes, etc. are not included in the evaluation.

i) Passive solar system [external sun shade, such as horizontal eaves, awnings, vertical sun shades, louvers]
ii) Greening [green wall, green rooftop]
iii) Measures to improve the efficiency of daylight use, including light shelves, light courts, light wells and light ducts.
iv) Natural ventilation systems using the indoor/outdoor temperature difference, including night purge
v) Natural ventilation systems that automatically control the opening and closing of openings
vi) Photovoltaic installation
vii) Solar heating
viii) Solar hot-water-supply system
ix) Geothermal air-conditioning
x) Snow/ice thermal cooling
xi) Items equivalent to those listed above

2. Earthquake-resistance-related Indices

2.1 Seismic Index of Structure

(1) Evaluation standard

Level	Seismic index of structure (Is value)
Level 1	Is value ≤ 0.4
Level 2	0.4 < Is value < 0.6
Level 3	0.6 ≤ Is value < 0.7
Level 4	0.7 ≤ Is value

(2) Evaluation method

Seismic evaluation is made based on the Is value of "Standard for Seismic Evaluation of Existing RC Buildings," "Standard for Seismic Evaluation of Existing Steel Encased RC Buildings," and "Standard for Seismic Evaluation and Guideline of Seismic Retrofitting of Existing Steel Construction" (Japan Building Disaster Prevention Association) in principle. C_{TU}, the S_D value for RC and SRC buildings, and the q value for S buildings are judged on the level equivalent to the Is value. For RC and SRC buildings, the Is value and the target value of C_{TU}, S_D may be multiplied by Z and Rt. The Is value of a building by the new earthquake resistance standards or when a seismic isolator/vibration controller system is introduced, it is deemed to be not lower than 0.7.

2.2 Nonstructural Members

(1) Evaluation standard

Level	Nonstructural members
Level 1	There are no or less than three initiatives to be evaluated.
Level 2	There are three initiatives to be evaluated.
Level 3	There are four initiatives to be evaluated.
Level 4	There are five or more initiatives to be evaluated.

(2) Evaluation method

Evaluation is made based on the number of initiatives to ensure earthquake protection of the following nonstructural members. If the descriptions of iii to vi do not apply to the building, consider the item as "an initiative to be evaluated" and include it in the number of initiatives.

i) Hard putty is not used for the installation of windowpanes facing outside
ii) Laminated glass, wire-reinforced glass, or tempered glass is used for windows facing external passages, etc.; or glass safety film is applied to them.
iii) A steady brace is used for hanging a lighting fixture whose hanging length is one meter or longer.
iv) The outdoor unit of an air-conditioner installed on an eave, balcony or wall higher than the second floor is bound to the structure.
v) The earthquake resistance of an elevated water tank and cooling tower is ensured by installing a stopper at the groundwork and using flexible (deflection absorbing) joints, for example.
vi) The building has a large space and measures are taken to prevent its ceiling from caving in.
vii) Laboratory instruments, furniture, fixtures, etc. are fixed or bound together.

3. Deterioration-related Indices

Evaluate the following major parts of the building based on the score of the parts survey sheet ("score of parts").
3.1 Finishing materials (roof, wall, exterior fitting)
3.2 Electrical facilities (transforming/power-receiving facilities or main line facilities)
3.3 Mechanical facilities (water-supply facilities, HVAC facilities)
Degree of deterioration
Level 1: Significant deterioration poses safety problems requiring prompt measures
Level 2: It is necessary to take measures to deal with deterioration.
Level 3: There is a sign of deterioration, which requires systematic preventive measures.
Level 4: There is only slight deterioration that poses no problem for operation.

3.1 Degree of Deterioration of Finishing Materials

3.1.1 Roof

(1) Evaluation standard

Level	Score of parts [roof]
Level 1	Score < 40
Level 2	40 ≤ score < 80
Level 3	80 ≤ score < 90
Level 4	90 ≤ score

3.1.2 Outer wall

(1) Evaluation standard

Level	Score of parts [outer wall]
Level 1	Score < 40
Level 2	40 ≤ score < 80
Level 3	80 ≤ score < 90
Level 4	90 ≤ score

3.1.3 Exterior fitting

(1) Evaluation standard

Level	Score of parts [exterior fitting]
Level 1	Score < 40
Level 2	40 ≤ score < 80
Level 3	80 ≤ score < 90
Level 4	90 ≤ score

3.2 Degree of Deterioration of Electrical Facilities

3.2.1 Transforming/power-receiving facilities or main line facilities

If the building to be evaluated has no transforming/power-receiving facility, evaluate its main line facility.

(1) Evaluation standard

Level	Score of parts [transforming/power-receiving facilities or main line facilities]
Level 1	Score < 40
Level 2	40 ≤ score < 80
Level 3	80 ≤ score < 90
Level 4	90 ≤ score

3.3 Degree of Deterioration of Mechanical Facilities

3.3.1 Water-supply facilities

(1) Evaluation standard

Level	Score of parts [water-supply facilities]
Level 1	Score < 40
Level 2	40 ≤ score < 80
Level 3	80 ≤ score < 90
Level 4	90 ≤ score

3.3.2 HVAC facilities

(1) Evaluation standard

Level	Score of parts [HVAC facilities]
Level 1	Score < 40
Level 2	40 ≤ score < 80
Level 3	80 ≤ score < 90
Level 4	90 ≤ score

(2) Evaluation method

Evaluate a central-type fan convector, etc. in “v) air-conditioner”; the same applies to an individual air-conditioner. Evaluate central-type interior piping in “4 deterioration phenomena.”

3.4 Conformity with Laws

(1) Evaluation standard

Level	Conformity with laws
Level 1	There are more than three non-compliances with the current laws
Level 2	There are two non-compliances with the current laws
Level 3	There is one non-compliance with the current laws
Level 4	Meeting the standards based on the current laws

(2) Evaluation method

Evaluate compliance with related laws, including the Building Standards Act and the Fire Service Act. Though there is no retroactive application, evaluate compliance with standards that are desirable to meet in light of the current legal standard (laws to be observed at the time of refurbishment, etc.). Make judgment using data such as regular reports based on the Building Standards Act and the results of fire prevention inspection. However, items concerning new laws on earthquake resistance and barrier-free matters are not evaluated here because there are other evaluation items for them.

4. Living-environment-related Indices

4.1 Indoor Condition

4.1.1 Thermal sensation

(1) Evaluation standard

Level	Thermal sensation
Level 1	There are more than three items that pose a problem concerning thermal sensation.
Level 2	There are two items that pose a problem concerning thermal sensation.
Level 3	There is one item that poses a problem concerning thermal sensation.
Level 4	There is no item that poses a problem.

(2) Evaluation method

Evaluate principal rooms based on the number of items that pose a problem concerning thermal sensation.

No	Item that poses a problem
1	The room has no heating equipment or has equipment that cannot warm the room due to its insufficient capacity.
2	The room has no cooling equipment or has equipment that cannot cool the room due to its insufficient capacity.
3	No room temperature control
4	Lack of heat insulation on windows and walls generates unevenness in room temperature causing local discomfort (ex. radiation heat from the rooftop, outer walls and windows in summer; cold drafts in winter)
5	Control of air-conditioning time by necessary area unit is not possible
6	Problems other than those listed above

4.1.2 Illuminance

(1) Evaluation standard

Level	Illuminance [school buildings, university libraries]
Level 1	Illuminance < 400 lx
Level 2	400 lx ≤ illuminance < 500 lx
Level 3	500 lx ≤ illuminance < 600 lx, or 1,000 lx ≤ illuminance
Level 4	600 lx ≤ illuminance < 1,000 lx

(2) Evaluation method

Evaluate the brightness of the desk surface (approx.80cm above the floor) around the center of the principal room in the daytime using illuminance (lux). Note that illuminance greater than 1,000lx is given a lower evaluation as it is too bright.

Measurement condition:

- Weather: cloudy conditions are desirable
- Number of measurements: 1
- Time zone: 10:00 am – 2:00 pm
- Measurement method: Measure the illuminance during the time of combined use of daylight and artificial lighting
- Note: Avoid the parts radiated by direct light

4.1.3 Natural ventilation

(1) Evaluation standard

Level	Effective opening area for natural ventilation [School buildings]
Level 1	Not meeting the requirement of level 2
Level 2	Effective opening area for natural ventilation is one twentieth or more of the floor area of the rooms with an openable/closable window
Level 3	Effective opening area for natural ventilation is one fifteenth or more of the floor area of the rooms with an openable/closable window
Level 4	Effective opening area for natural ventilation is one tenth or more of the floor area of the rooms with an openable/closable window

(2) Evaluation method
Evaluate whether there are enough openable and closable windows.
Smoke extraction windows may be deemed as openings for natural ventilation here if they are designed for natural ventilation, are easily openable and closable, and can be used anytime the occupants so desire. Evaluate the representative living space on the standard floor, for example.

4.2 Barrier-free

(1) Evaluation standard

Level	Barrier-free [school buildings, dormitories]
Level 1	Not meeting the requirement of level 2
Level 2	Meeting from 50% to under 70% of the items required in the standard for smooth movement, etc. in building (minimum level) of the New Barrier-Free Act
Level 3	Meeting from 70% to under 90% of the items above
Level 4	Meeting 90% or more of the items above

(2) Evaluation method
The barrier-free level is evaluated based on the percentage of the items meeting the requirement of the "items required in the standard for smooth movement, etc. in building" of the Act on Promotion of Smooth Transportation, etc. of Elderly Persons, Disabled Persons, etc. (so-called New Barrier-Free Act). Conduct evaluation for all items in principle (see the table below for "items required in the standard for smooth movement, etc. in a building).
However, if an item includes an object that is not necessary for the building that is to be evaluated (a stairway for a one-storied building, for example), the building is deemed to meet the standard for the item.

Specified facility of building	Standard for smooth movement, etc. in building		Note
	General standard	Route for smooth movement, etc.	
No difference in level	-	○	
Entrance	-	○	
Corridor, etc.	○	○	
Stairway	○	-	
Slope	○	○	
Lifts, such as elevator	-	○	
Toilet	○	-	
Passage on the premises	○	○	Pathway (road inside the campus) from the road in front of the building to the entrance of the building to be evaluated
Signs	○	-	Meaning pictograms
Guiding facility	○	-	Guiding facility installed inside or near the building; a building that has a front desk or office near the entrance is deemed to meet the standard.
Pathway to the guiding facility	○	-	

5. Indices Concerning Education and Research Base

5.1 Educational and Research Environment

(1) Evaluation standard

Level	Educational and research environment [School buildings]
Level 1	There is no or only one initiative contributing to the enhancement of the educational and research environment.
Level 2	There are two initiatives contributing to the enhancement of the educational and research environment.
Level 3	There are three initiatives contributing to the enhancement of the educational and research environment.
Level 4	There are four or more initiatives contributing to the enhancement of the educational and research environment.

(2) Evaluation method

Conduct evaluation based on the number of initiatives contributing to the enhancement of the educational and research environment

No.	Initiatives contributing to the enhancement of the educational and research environment
1	Space for joint use (competitive or common space)*1 is ensured.
2	Space for young researchers*2 is ensured.
3	Refresh space*3 is provided.
4	There is a high-functioning lecture room with an enhanced ICT environment, etc.
5	There are lecture rooms, seminar rooms, etc. for small-group instruction.
6	Security measures*4 are taken.
7	The environment has been improved for female researchers (changing room, toilet, etc.)
8	Other initiatives contributing to the enhancement of the educational and research environment.

*1 Space for joint use: educational and research space for joint use that allows flexible use as stipulated by the university in its regulations, etc. Among such space, "competitive space" is for research, such as a research project selected based on competition, whereas "common space" is for common use, such as a joint laboratory.

*2 Space for young researchers: space to support independent research by young researchers (doctoral students, postdoctoral fellows, assistant professors) (ex. office for young researchers, rooms for joint use by young researchers, competitive space for young researchers)

*3 Refresh space: space where staff and students stop between educational/research activities for a meal, a rest, or a brief meeting

*4 Security measures: to be evaluated if measures are taken to control and monitor outsiders entering the room by means such as introducing intrusion monitoring equipment with the aim of preventing research information leaks, etc.

5.2 Space

(1) Evaluation standard

Level	Office area [School buildings]
Level 1	Office area per capita is less than 1.65m^2
Level 2	Office area per capita is from 1.65m^2 to 3.3m^2
Level 3	Office area per capita is from 3.3m^2 to 6.6m^2
Level 4	Office area per capita is 6.6m^2 or more

(2) Evaluation method

Conduct evaluation based on the office area per teaching staff member, student or administrative staff member (hereinafter referred to as "teaching staff member, etc.") Teaching staff includes professors, associate professors, lecturers, assistant professors and research associates but excludes part-time lecturers. Students include master's students and doctoral students but do not include undergraduates. Administrative staff does not include the secretariat staff or faculty staff. Office area per teaching staff member, etc. is calculated using the following formula:

Office area per teaching staff member, etc. = office area / converted number of people

Office area: room used by the teaching staff and students for deskwork (including space used for everyday meetings, but excludes book rooms divided by a partition reaching the ceiling).

Converted number of people: number obtained by multiplying the head-count of each category by the conversion value listed in the following table and summing up the results

Category	Conversion value (people)
Teaching staff (professors, associate professors, lecturers)	3.8
Teaching staff (assistant professors, research associates, etc.)	1.9
Graduate student (master's and doctoral students)	1.0
Administrative staff	1.0

*Postdoctoral fellows are included in teaching staff (assistant professors, research associates, etc.)

Areas are based on the ground plan of each floor of the actual condition report.

Reference: division of areas including an office area

Gross floor area = i) usable area + ii) area for joint use + iii) mechanical room area

i) Usable area = office area*1 + laboratory/training room area*2 + area for support of education and research*3

ii) Area for joint use = area of rooms for common use*4 + administrative rooms*5 + service area*6 + passage area*7

iii) Mechanical room area: area of mechanical rooms, such as rooms for the control of electric power, air-conditioning, and water supply and drainage

*1 Office area: as described above

*2 Laboratory/training room area: rooms used for experiments, training, etc., excluding rooms used by the teaching staff and students for deskwork

*3 Area for support of education and research: rooms for exclusive use, including seminar room, changing room, library room and faculty office

*4 Area of rooms for common use: lecture rooms, library rooms, office and laboratories used by the entire faculty or the university, etc.
*5 Administrative rooms: area of janitor's room, disaster prevention center, secretariat office, equipment control room, backyard to place waste, etc.
*6 Service area: area of hot-water stations, toilets, etc. for joint use
*7 Passage area: area of the space commonly used for moving between rooms, including lobbies, entrance halls, elevator halls, corridors, and stairways

5.3 Electrical Facilities

(1) Evaluation standard

Level	Electrical facilities [School buildings]
Level 1	There are more than three items that pose a problem concerning electrical facilities.
Level 2	There are two items that pose a problem concerning electrical facilities.
Level 3	There is one item that poses a problem concerning electrical facilities.
Level 4	There is no item that poses a problem.

(2) Evaluation method

Conduct evaluation based on the number of the items that pose a problem for the functioning of electrical facilities.

No	Item posing a problem
1	Electric capacity is not sufficient for adequate educational and research activities.
2	Electric meters are not installed to display power consumption of individual buildings.
3	There is not enough EPS for renewal or repair of electric wiring.
4	There is a problem other than those listed above.

5.4 Information Communication Infrastructure

(1) Evaluation standard

Level	Information communication infrastructure [School buildings]
Level 1	There are more than three items that pose a problem concerning information communication infrastructure.
Level 2	There are two items that pose a problem concerning information communication infrastructure.
Level 3	There is one item that poses a problem concerning information communication infrastructure.
Level 4	There is no item that poses a problem.

(2) Evaluation method

Conduct evaluation based on the number of the items that pose a problem for the functioning of information communication infrastructure

No	Item posing problem
1	Telecommunication functions, such as circuit speed, are not sufficient for adequate educational and research activities.
2	The specification does not enable layout change (ex. OA floor*[1])
3	Space for information communication equipment and wiring to individual floors is not provided.
4	There is a problem other than those listed above.

*1 Including such devices as cable racks and wiring ducts installed on ceilings or walls to provide functions equivalent to OA floors that accommodate layout change without extensive construction work

Form I-1 Output Overview Sheet [School buildings]

Form I-1 Output Overview Sheet

Evaluation Systems for University Facilities [School buildings]	III. Overall score:	points

I. Outline of the building		II. Photograph	IV. Scores of large items
School name		Paste photo of facade Shooting direction	
Complex number/name Building number/name			
Principal purpose			
Location Region/ district Climatic division			
M/Y of construction; years since construction D/M/Y of large-scale refurbishment; years since refurbishment Outline of the large-scale refurbishment			
Building area (m^2); total floor area (m^2) Number of stories (above and under the ground); structure	–		
Date of evaluation Created by (architecture; electricity; machinery): Confirmed by:			

V. Evaluation of middle items

	0.0 2.0 4.0 6.0 8.0 10.0	Content	Note
1. Low-carbon-related indices			
Thermal insulation / sun-shielding performance			
Facility efficiency improvement			
Natural energy use			
2. Earthquake-resistance-related indices			
Seismic index of structure			
Nonstructural members			
3. Deterioration-related indices			
Degree of deterioration of finishing materials			
Degree of deterioration of electrical facilities			
Degree of deterioration of mechanical facilities			
Conformity with laws			
4. Living-environment-related indices			
Indoor condition			
Barrier-free			
5. Indices concerning education and research base			
Enhancement of educational and research environment			
Space			
Electrical facilities			
Information communication infrastructure			

*Describe the current state of the building in the content column for each middle item.

Form II-1 Point Breakdown Output Sheet [School buildings]

Form II-1

Point Breakdown Output Sheet [School buildings]

■School name　■Complex name　■Building name

■Principal purpose　■Complex number　■Building number

Evaluation item	Rating	Weight coefficient of small items	Score of middle items	Weight coefficient of middle items	Score of large items	Weight coefficient of large items	Overall score
1. Low-carbon-related indices				1.00		2.0	
1.1 Thermal insulation / sun-shielding performance				0.50			
1.2 Facility efficiency improvement		1.00		0.40			
1.2.1 Individual air-conditioning		0.40					
1.2.2 Central air-conditioning		0.30					
1.2.3 Lighting fixture		0.30					
1.3 Natural energy use				0.10			
2. Earthquake-resistance-related indices				1.00		2.0	
2.1 Seismic index of structure				0.80			
2.2 Nonstructural members				0.20			
3. Deterioration-related indices				1.00		2.0	
3.1 Degree of deterioration of finishing materials		1.00		0.50			
3.1.1 Roof		0.30					
3.1.2 Outer wall		0.40					
3.1.3 Exterior fitting		0.30					
3.2 Degree of deterioration of electrical facilities		1.00		0.20			
3.2.1 Transforming/power-receiving facilities or main line facilities		1.00					
3.3 Degree of deterioration of mechanical facilities		1.00		0.20			
3.3.1 Water-supply facilities		0.50					
3.3.2 HVAC facilities		0.50					
3.4 Conformity with laws				0.10			
4. Living-environment-related indices				1.00		2.0	
4.1 Indoor condition		1.00		0.60			
4.1.1 Thermal sensation		0.40					
4.1.2 Illuminance		0.40					
4.1.3 Natural ventilation		0.20					
4.2 Barrier-free				0.40			
5. Indices concerning education and research base				1.00		2.0	
5.1 Enhancement of educational and research environment				0.30			
5.2 Space				0.30			
5.3 Electrical facilities				0.20			
5.4 Information communication infrastructure				0.20			
				Overall score		10.0	

Reference Material

(Reference 1) The Investigative Research on the Functional Standards of National University Corporations Facilities (Working Group Regulations)

The Investigative Research on the Functional Standards of National University Corporations Facilities

July 8, 2009
Partially devised on March 25, 2010
Decision by Director-General of the National Institute for Educational Policy Research

1 Purpose

Facilities of National University Corporations, etc. (NUCs) are important bases to support educational and research activities, and therefore they need to have functions to adequately respond to modern education, research, and other needs. However, functional deterioration and obsolescence are progressing due to aging in the current severe fiscal situation.

In this context, we will identify the functions that NUC facilities should have as facilities to support world-class education and research, as well as functions necessary to handle contemporary issues. At the same time, we will explore methods to examine the level of the existing facilities and develop indices by synthesizing necessary functions in order to contribute to the clarification and efficiency improvement of investments for ensuring and enhancing the functions of NUC facilities.

2 Items to be implemented

(1) Study of methods to identify functions and examine the level of existing facilities
(2) Study of the status of the indices developed by synthesizing functions
(3) Trial of the indices for NUC facilities
(4) Other

3 Implementation method

The investigative research shall be implemented in collaboration with MEXT Minister's Secretariat Department of Facilities Planning and Administration, and with the help of the academic experts listed below. Help of other stakeholders may be requested as needed.

4 Implementation period

Implementation period of the Investigative Research shall be from July 8, 2009, to March 31, 2011.

Attached paper

The Investigative Research on the Functional Standard of National University Corporations Facilities

(Listed in the order of Japanese syllabary; Honorifics omitted)

(Working Group Members)

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(Observer: Minister's Secretariat Department of Facilities Planning and Administration, MEXT)

Masao Yamazaki, Director, Office for Facilities Planning, National Facilities Division (until July 31, 2010)
Takashi Fujii, Director, Office for Facilities Planning, National Facilities Division (from August 1, 2010)
Mitsugu Hirota, Deputy Director, National Facilities Division (until July 31, 2010)
Yoshihiro Wagatsuma, Deputy Director, National Facilities Division
Hideki Takami, Senior Specialist, National Facilities Division (from October 1, 2009, to September 30, 2010)
Tsuruhiro Matsunaga, Deputy Director, Office for Facilities Planning, National Facilities Division

The following persons were in charge of the project at the National Institute for Educational Policy Research:

Koichi Shinpo, Director-General, Educational Facilities Research Center
Yoshimi Saito, General Research Officer, Educational Facilities Research Center
Tetsuya Yoshida, Chief of the Planning Unit, Educational Facilities Research Center (until March 31, 2010)
Fumika Iwashita, Chief of the Planning Unit, Educational Facilities Research Center (from April 1, 2010)

(Reference 2) Evaluation System Sheet: Entry Sample 1 [School buildings] (25 to under 40 years since construction)

Form I-1 Output Overview Sheet

Evaluation Systems for University Facilities [School buildings]

III. Overall score: **Grade D** — **28 points**

【1104v.0.00】

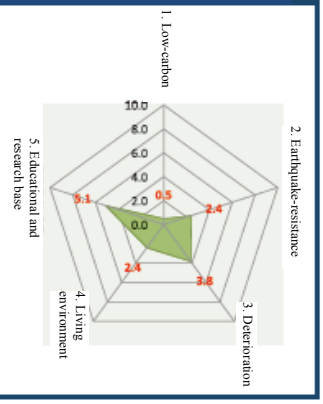
I. Outline of the building

School name	XX University
Complex number/name Building number/name	34; XX (education) 5; Faculty of Education East Building
Principal purpose	School building (undergraduate school building, graduate school facilities, laboratory facilities)
Location Region/ district Climatic division	XX, XX City, XX Prefecture Category 2 residential district Temperate region II
M/Y of construction; years since construction D/M/Y of large-scale refurbishment; years since refurbishment Outline of the large-scale refurbishment	March 25, 1978; 33
Building area (m^2); total floor area (m^2) Number of stories (above and under the ground); structure	401 2,154 5 – 0 RC
Date of evaluation Created by (architecture; electricity; machinery): Confirmed by:	April 1, 2011 ○○×× △△○○ ○○△△ ××○○

II. Photograph

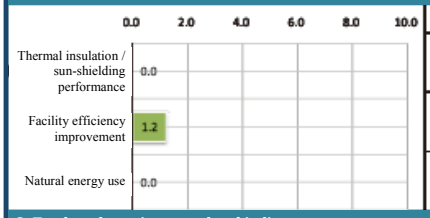
Shooting direction: South side

IV. Scores of large items



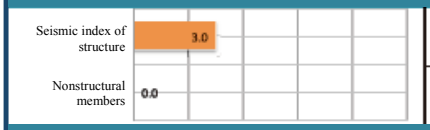
V. Evaluation of middle items

1. Low-carbon-related indices



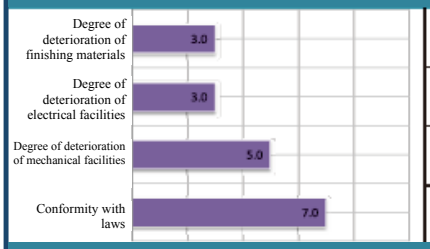
Content	Note

2. Earthquake-resistance-related indices



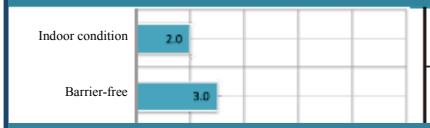
Content	Note

3. Deterioration-related indices



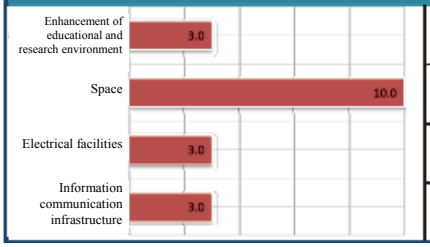
Content	Note

4. Living-environment-related indices



Content	Note

5. Indices concerning education and research base



Content	Note

*Describe the current state of the building in the content column for each middle item.

Form II -1

Point Breakdown Output Sheet [School buildings]

■**School name:** XX University ■**Complex name**: XX (education) ■**Building name**: Faculty of Education East Building

■**Principal purpose**: School building (undergraduate school building, graduate school facilities, laboratory facilities) ■**Complex number**: 34 ■**Building number**: 5

〔1104v.0.00〕

Evaluation item	Rating	Weight coefficient of small items	Score of middle items	Weight coefficient of middle items	Score of large items	Weight coefficient of large items	Overall score
1. Low-carbon-related indices				1.00	0.5	2.0	1.0
1.1 Thermal insulation / sun-shielding performance	0.0		0.0	0.50	0.0		
1.2 Facility efficiency improvement		1.00	1.2	0.40	0.5		
1.2.1 Individual air-conditioning	3.0	0.40	1.2				
1.2.2 Central air-conditioning	0.0	0.30	0.0				
1.2.3 Lighting fixture	0.0	0.30	0.0				
1.3 Natural energy use	0.0		0.0	0.10	0.0		
2. Earthquake-resistance-related indices				1.00	2.4	2.0	4.8
2.1 Seismic index of structure	3.0		3.0	0.80	2.4		
2.2 Nonstructural members	0.0		0.0	0.20	0.0		
3. Deterioration-related indices				1.00	3.8	2.0	7.6
3.1 Degree of deterioration of finishing materials		1.00	3.0	0.50	1.5		
3.1.1 Roof	3.0	0.30	0.9				
3.1.2 Outer wall	3.0	0.40	1.2				
3.1.3 Exterior fitting	3.0	0.30	0.9				
3.2 Degree of deterioration of electrical facilities		1.00	3.0	0.20	0.6		
3.2.1 Transforming/power-receiving facilities or main line facilities	3.0	1.00	3.0				
3.3 Degree of deterioration of mechanical facilities		1.00	5.0	0.20	1.0		
3.3.1 Water-supply facilities	7.0	0.50	3.5				
3.3.2 HVAC facilities	3.0	0.50	1.5				
3.4 Conformity with laws	7.0		7.0	0.10	0.7		
4. Living-environment-related indices				1.00	2.4	2.0	4.8
4.1 Indoor condition		1.00	2.0	0.60	1.2		
4.1.1 Thermal sensation	0.0	0.40	0.0				
4.1.2 Illuminance	0.0	0.40	0.0				
4.1.3 Natural ventilation	10.0	0.20	2.0				
4.2 Barrier-free	3.0		3.0	0.40	1.2		
5. Indices concerning education and research base				1.00	5.1	2.0	10.2
5.1 Enhancement of educational and research environment	3.0		3.0	0.30	0.9		
5.2 Space	10.0		10.0	0.30	3.0		
5.3 Electrical facilities	3.0		3.0	0.20	0.6		
5.4 Information communication infrastructure	3.0		3.0	0.20	0.6		
					Overall score	10.0	28.4

(Reference 3) Evaluation System Sheet: Entry Sample 2 [School buildings] (less than 5 years since refurbishment)

Form I-1 Output Overview Sheet

Evaluation Systems for University Facilities [School buildings] | **III. Overall score:** **Grade A** **83 points**

【1104v.0.00】

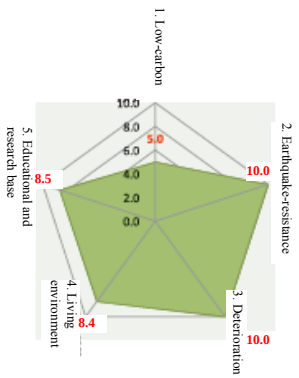
I. Outline of the building

School name	XX University
Complex number/name Building number/name	1; Central Complex 49; General Research No. 3 Building
Principal purpose	School building (undergraduate school building, graduate-school facilities, laboratory facilities)
Location Region/ district Climatic division	xx-cho, xx-ku, xx Category 2 Medium-to-high-rise exclusive residential districts, quasi-fire prevention district, height control district, landscape zone Temperate region III
M/Y of construction; years since construction D/M/Y of large-scale refurbishment; years since refurbishment Outline of the large-scale refurbishment	March 31, 1976; 45 September 10 2007; 3 Earthquake-resistance, outer wall, rooftop waterproofing and interior refurbishments
Building area (m²); total floor area (m²) Number of stories (above and under the ground); structure	563 2,948 4 – 1 RC
Date of evaluation Created by (architecture; electricity; machinery): Confirmed by:	April 1, 2011 ○○×× △△○○ ○○△△ ××○○

II. Photograph

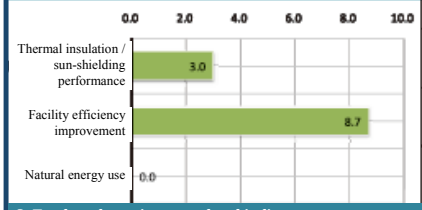
Shooting direction: South side

IV. Scores of large items



V. Evaluation of middle items

1. Low-carbon-related indices



Content	Note
- Insulating material on walls is partially insufficient	
- Natural energy is not used	

2. Earthquake-resistance-related indices

Content	Note

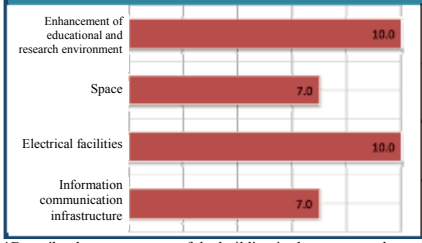
3. Deterioration-related indices

Content	Note

4. Living-environment-related indices

Content	Note

5. Indices concerning education and research base



Content	Note
- No OA floor in the research space	

*Describe the current state of the building in the content column for each middle item.

Form II-1

Point Breakdown Output Sheet [School buildings]

■**School name:** XX University ■**Complex name**: Central Complex ■**Building name**: General Research No. 3 Building
■**Complex number**: 1 ■**Building number**: 49

【1104v.0.00】

Evaluation item	Rating	Weight coefficient of small items	Score of middle items	Weight coefficient of middle items	Score of large items	Weight coefficient of large items	Overall score
1. Low-carbon-related indices				1.00	5.0	2.0	10.0
1.1 Thermal insulation / sun-shielding performance	3.0		3.0	0.50	1.5		
1.2 Facility efficiency improvement		1.00	8.7	0.40	3.5		
1.2.1 Individual air-conditioning	10.0	0.57	5.7				
1.2.2 Central air-conditioning							
1.2.3 Lighting fixture	7.0	0.43	3.0				
1.3 Natural energy use	0.0		0.0	0.10	0.0		
2. Earthquake-resistance-related indices				1.00	10.0	2.0	20.0
2.1 Seismic index of structure	10.0		10.0	0.80	8.0		
2.2 Nonstructural members	10.0		10.0	0.20	2.0		
3. Deterioration-related indices				1.00	10.0	2.0	20.0
3.1 Degree of deterioration of finishing materials		1.00	10.0	0.50	5.0		
3.1.1 Roof	10.0	0.30	3.0				
3.1.2 Outer wall	10.0	0.40	4.0				
3.1.3 Exterior fitting	10.0	0.30	3.0				
3.2 Degree of deterioration of electrical facilities			10.0	0.20	2.0		
3.2.1 Transforming/power-receiving facilities or main line facilities	10.0		10.0				
3.3 Degree of deterioration of mechanical facilities		1.00	10.0	0.20	2.0		
3.3.1 Water-supply facilities	10.0	0.50	5.0				
3.3.2 HVAC facilities	10.0	0.50	5.0				
3.4 Conformity with laws	10.0		10.0	0.10	1.0		
4. Living-environment-related indices				1.00	8.4	2.0	16.8
4.1 Indoor condition		1.00	7.4	0.60	4.4		
4.1.1 Thermal sensation	7.0	0.40	2.8				
4.1.2 Illuminance	10.0	0.40	4.0				
4.1.3 Natural ventilation	3.0	0.20	0.6				
4.2 Barrier-free	10.0		10.0	0.40	4.0		
5. Indices concerning education and research base				1.00	8.5	2.0	17.0
5.1 Enhancement of educational and research environment	10.0		10.0	0.30	3.0		
5.2 Space	7.0		7.0	0.30	2.1		
5.3 Electrical facilities	10.0		10.0	0.20	2.0		
5.4 Information communication infrastructure	7.0		7.0	0.20	1.4		
					Overall score	10.0	83.8