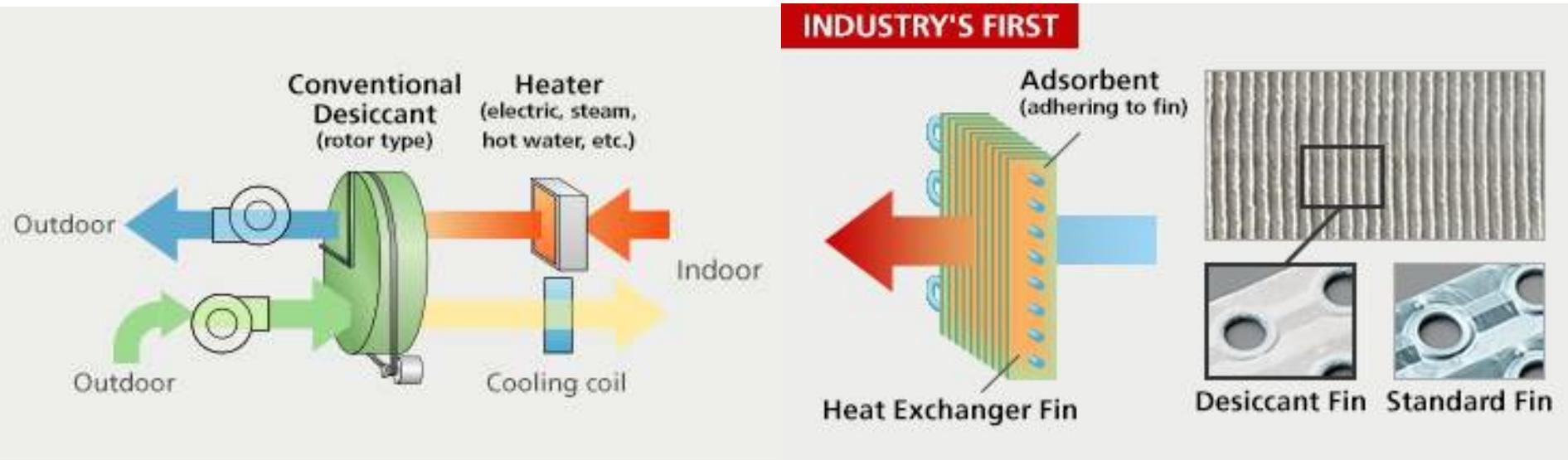


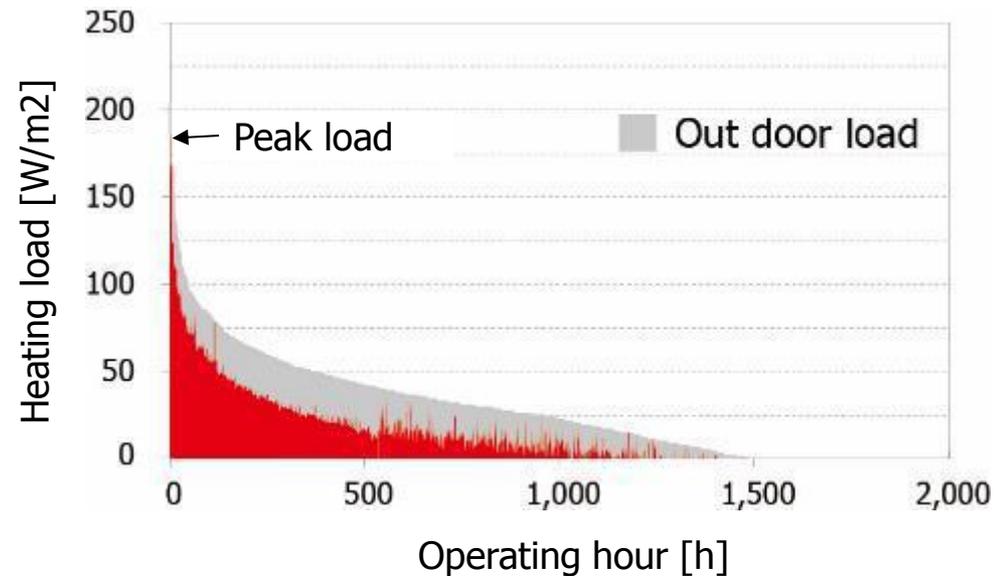
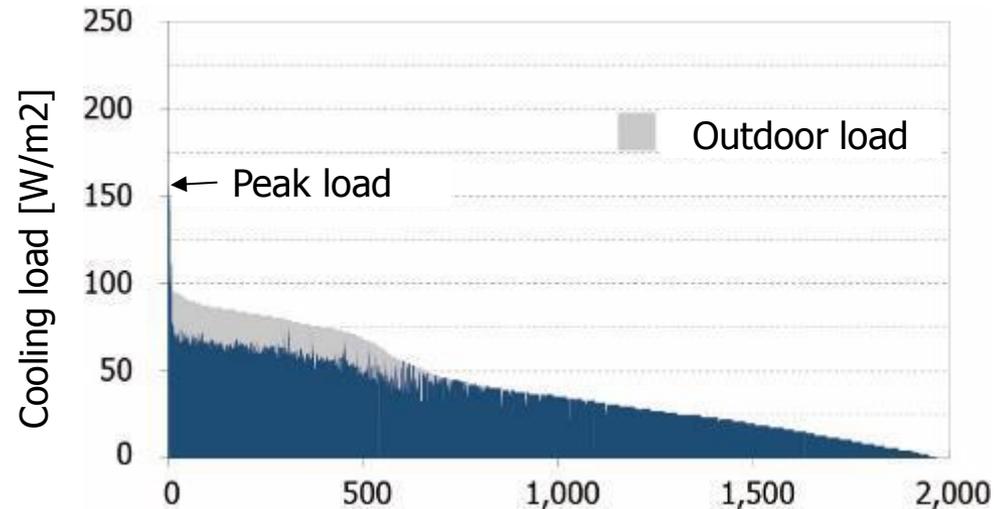
Control air humidity and air quality



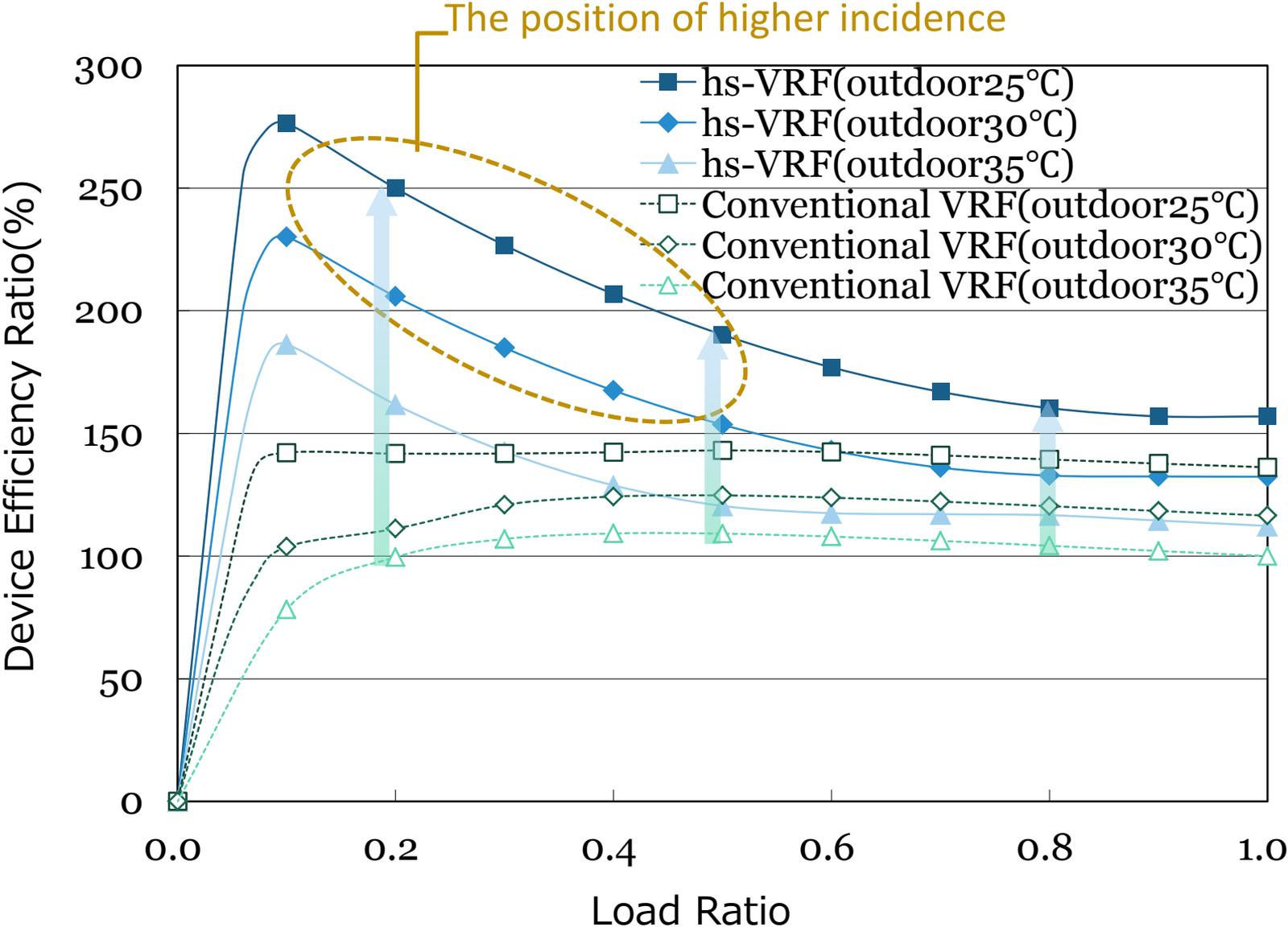
“DESICA” with air-volume control system depending on the CO₂ concentration for TIC

Improvement of part-load efficiency

- Annual cooling and heating load distribution of an office.
- Most cooling and heating loads are less than 50% of peak load.
- Operation period at part-load is very long.



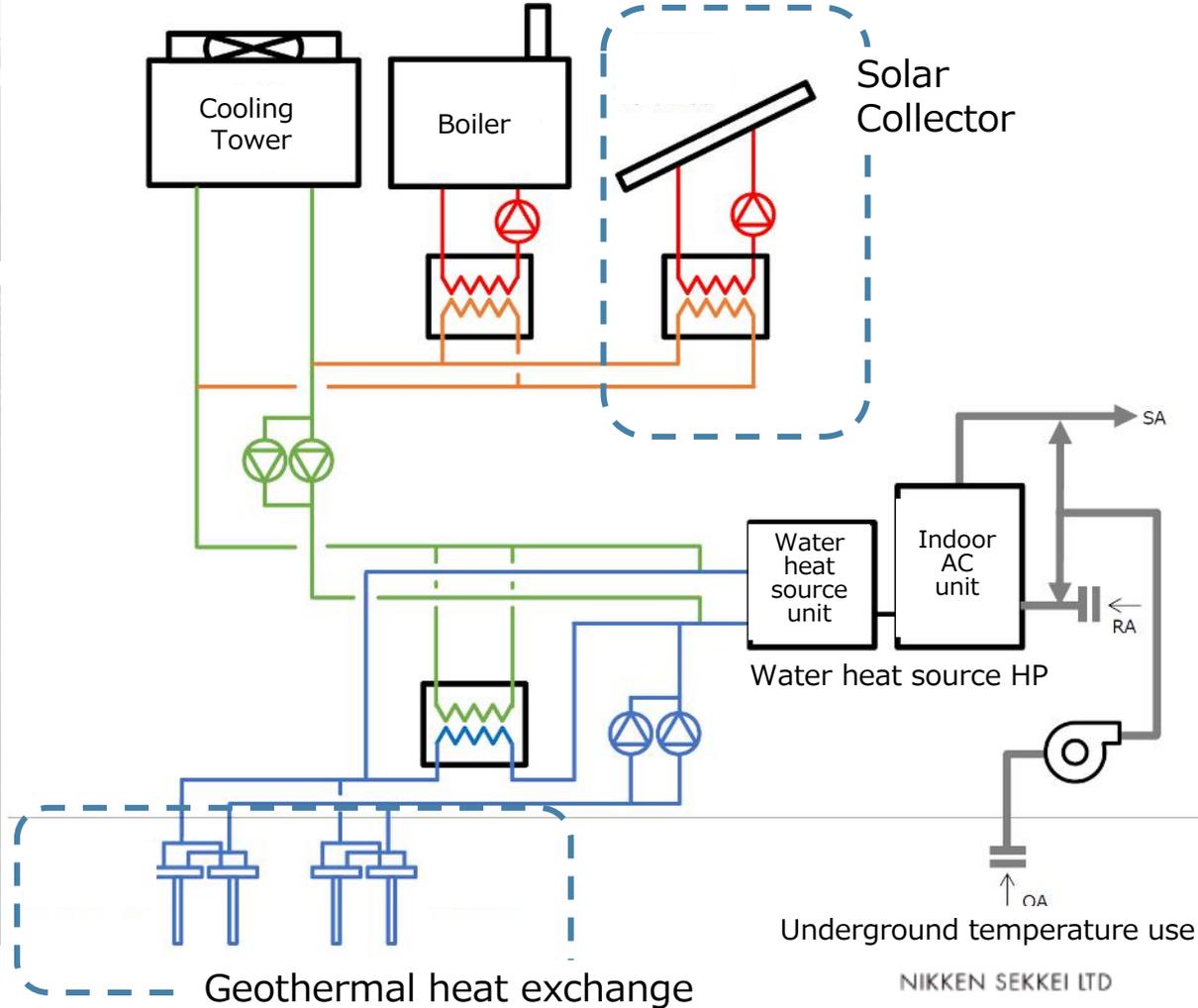
hs-VRF system (New VRF system for TIC)



Solar and geothermal VRF

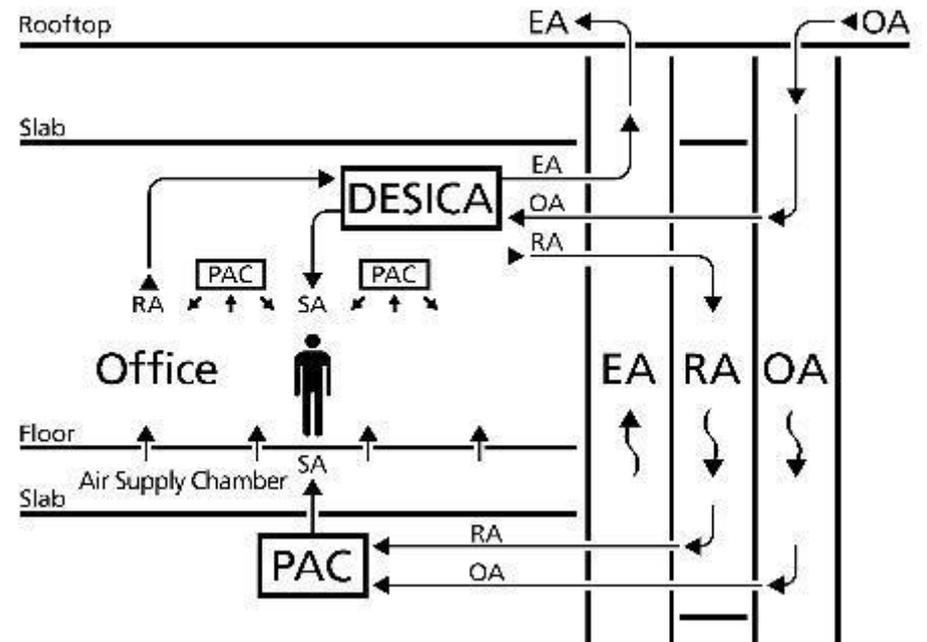


NIKKEN



NIKKEN SEKKEI LTD

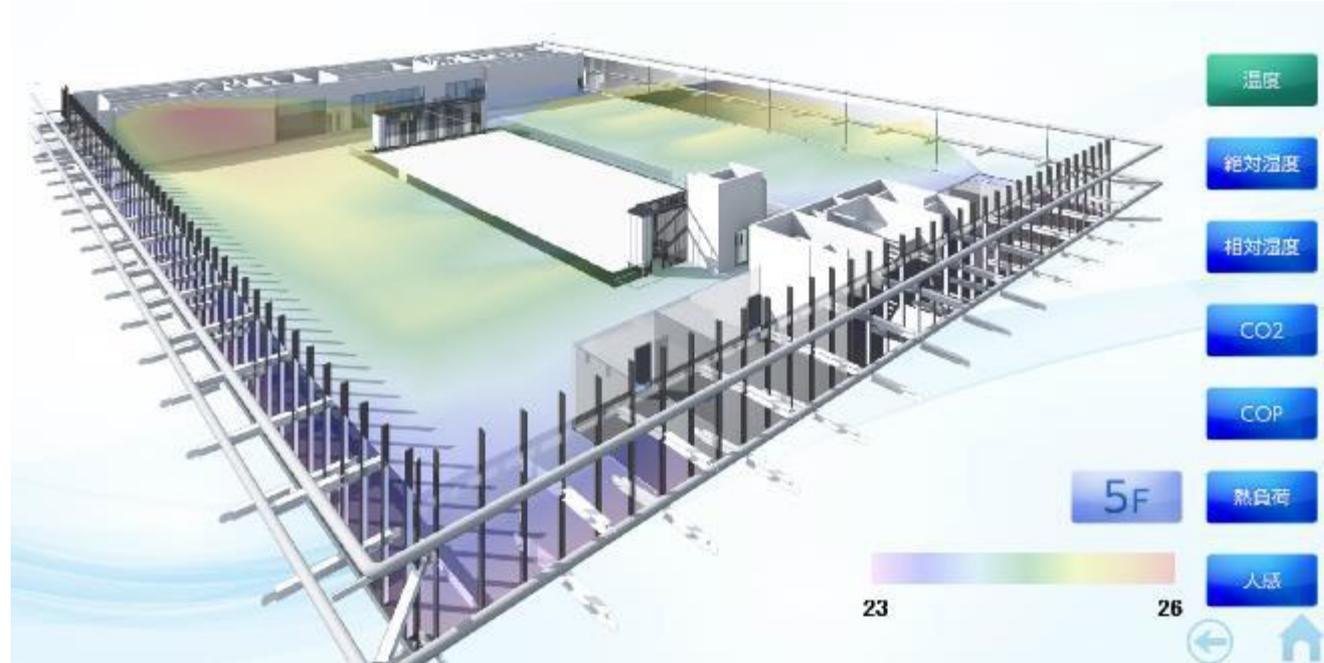
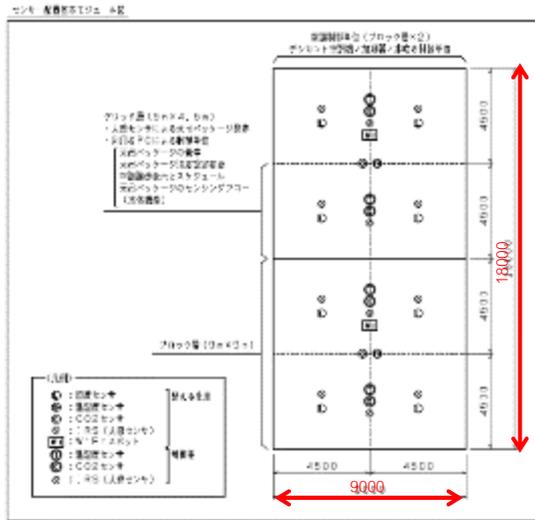
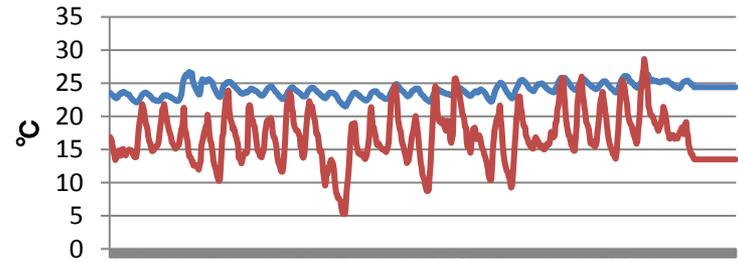
Glazing duct



Real time visualization of indoor environment

4.5m×4.5m: Human sensor

4.5m×9m: Temperature, humidity, CO2,

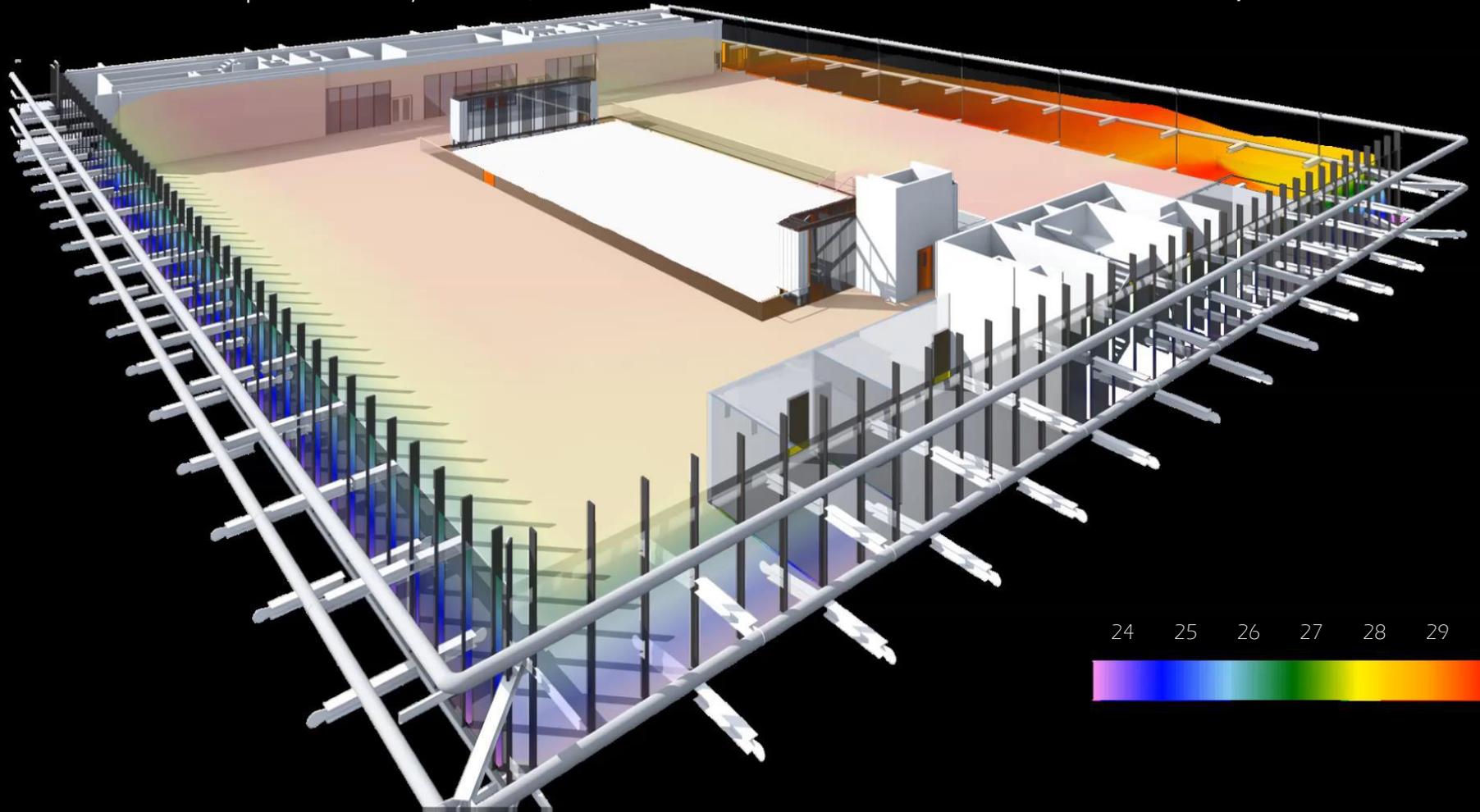


Indoor environment real time contour

Real time visualization of indoor environment

5th Floor Indoor air Temperature (Oct ,20th 2016)

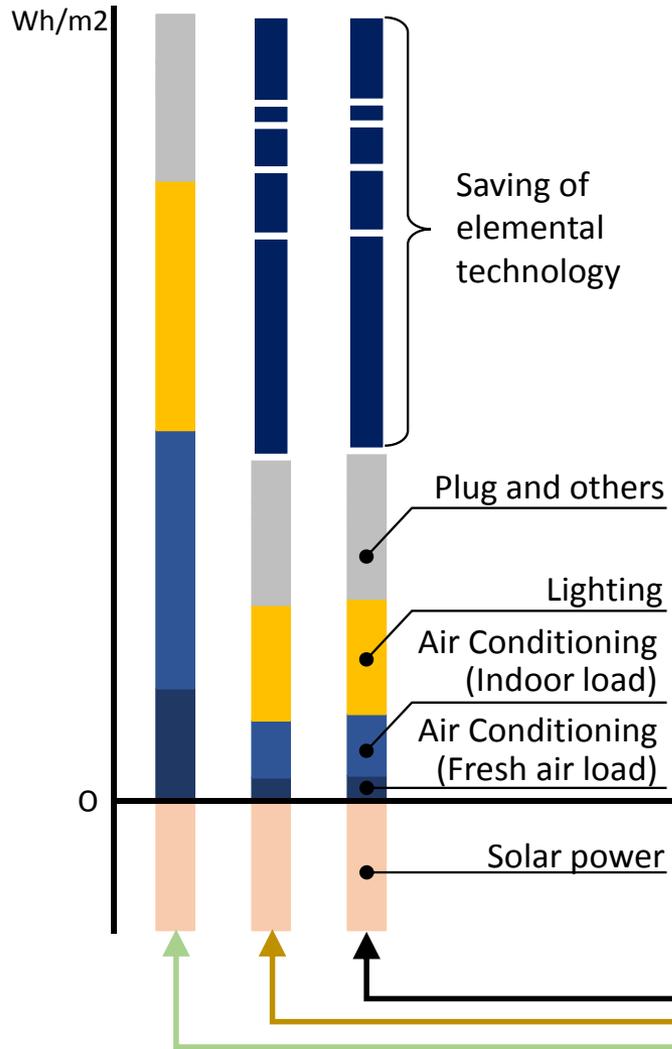
natural ventilation +VRF System



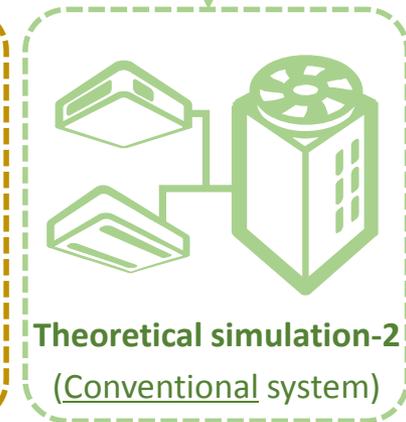
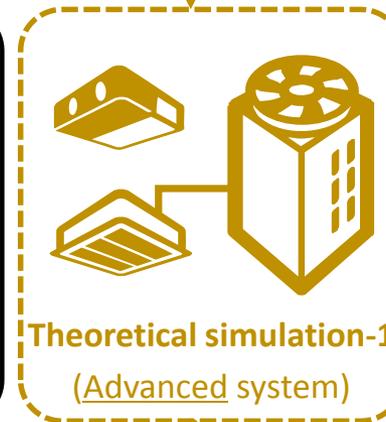
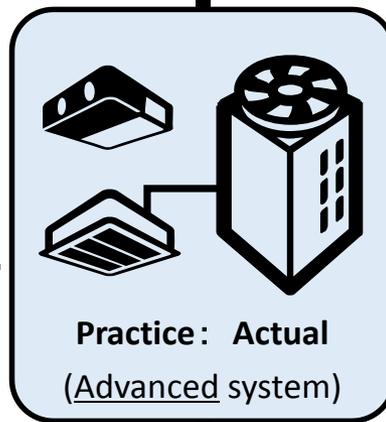
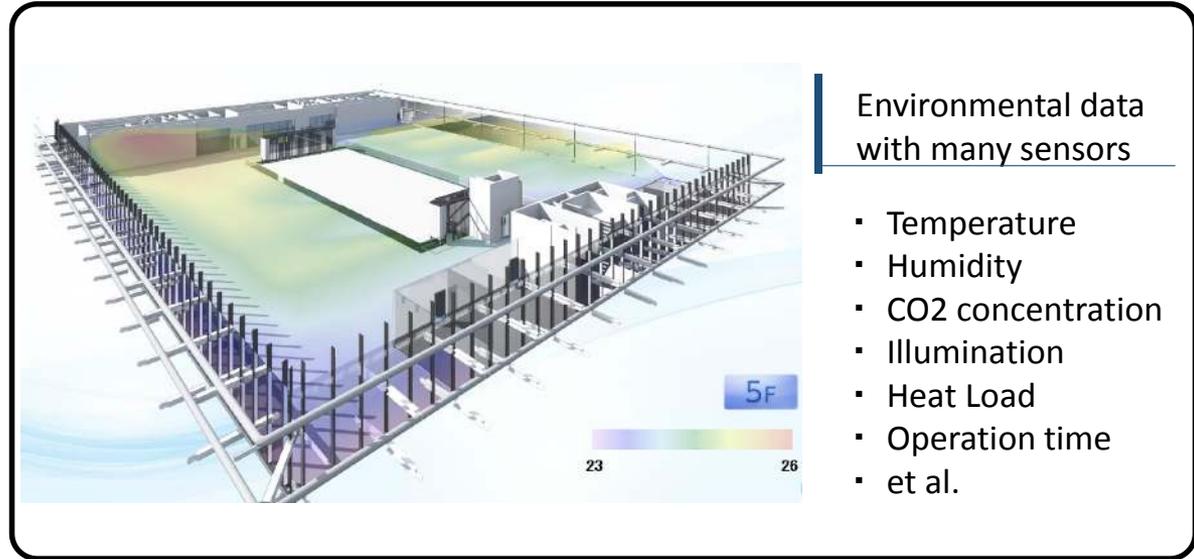
Real time commissioning

Real-time energy analysis

(Comparison between "Theory" and "Practice")
[every 30min.]



Real-time visualization





**LEED
Platinum
85 / 110**



LEED Score



敷地

Sustainable Sites

24_{/26}



水

Water Efficiency

10_{/10}



エネルギー

Energy & Atmosphere



材料

Material & Resources

7_{/14}



空気質

Indoor Environmental Quality

11_{/15}



新技術

Innovation in Design

6_{/6}



地域特性

Regional Priority

4_{/4}

23_{/35}

85_{/110}

3. Case of ZEB architecture 2

-Achievement of ZEB

by architectural elements and education

Super Eco-School “Mizunami” Middle School”



1. Background and Concept

2. Technology for ZEB

3. Education and Operation

1. Background and Concept

2. Technology for ZEB

3. Education and Operation

Four Keywords of this project



Living

- Enclosed in rich green
- A comfortable classroom to serve as the base of life



Learning

- Learning commons promoting voluntary learning
- Realization of a pleasant learning environment



Region

- Using local materials actively
- Deepen interaction with the community, rooted in the local



Environment

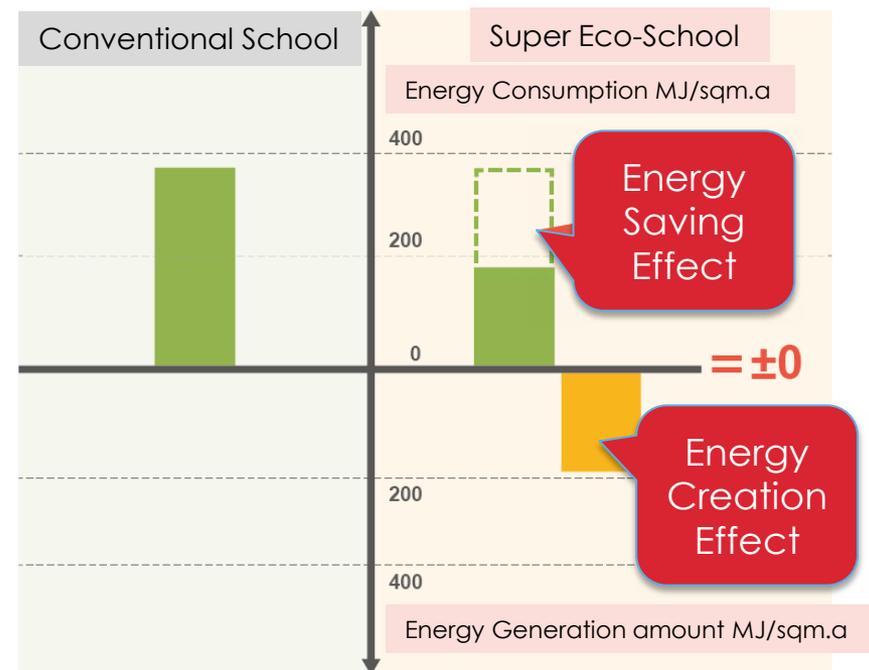
- Realization of zero energy school
- Operation system conducted by the students themselves

What is Super Eco-school ?

- Reduce energy consumption by thorough energy conservation
- Energy consumption is covered with renewable energy and annual energy consumption is made substantially Zero

“Promotion project of MEXT ”

MEXT : Ministry of Education, Culture, Sports, Science and Technology



What is Super Eco-school ?

Subsidy system for project cost

■ Super Eco School Demonstration Project

“MEXT” :Ministry of Education, Culture, Sports, Science and Technology

+ 5 millions \$

■ Sustainable Buildings Leading Project

“MLIT” :Ministry of Land, Infrastructure, Transport and Tourism

1.5 millions \$

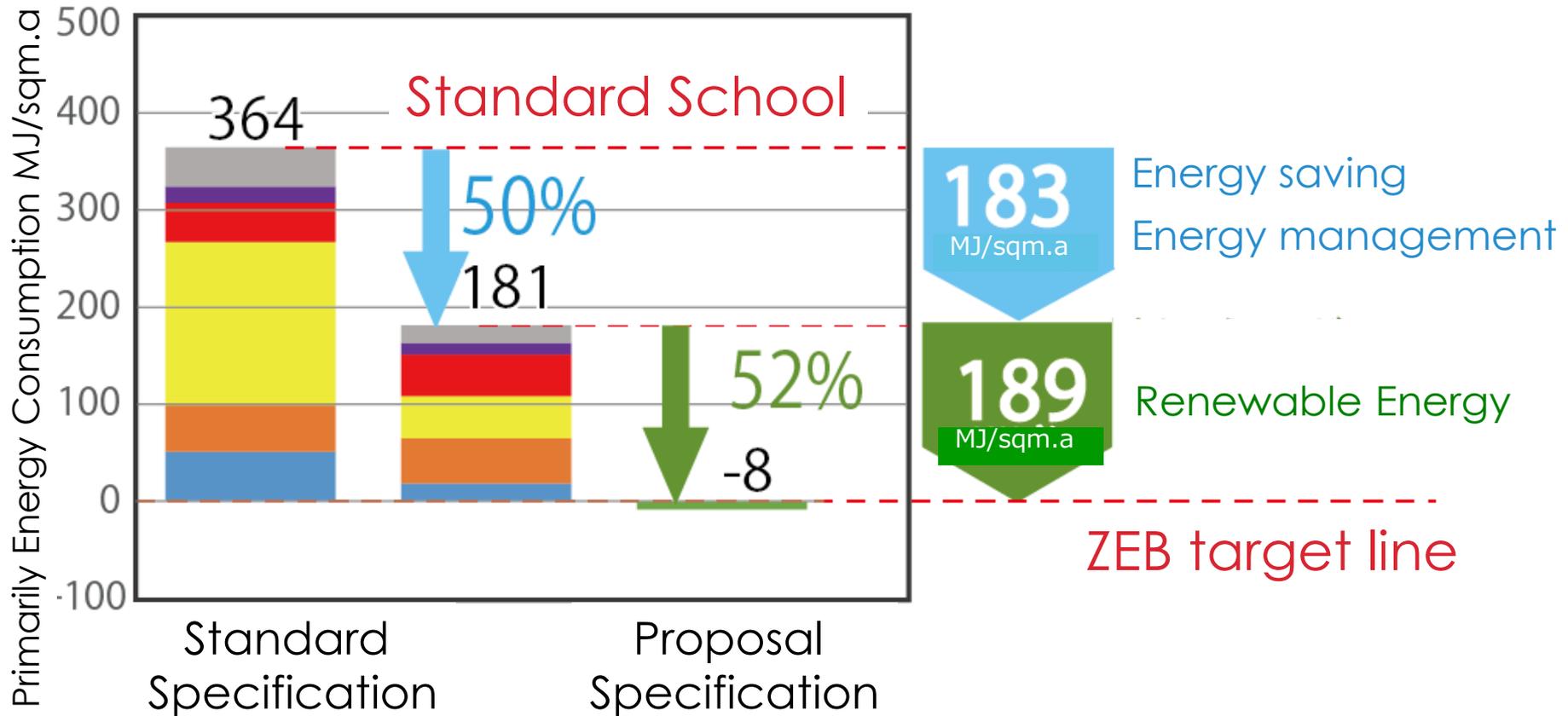
■ Interior woodening support project

“Gifu prefecture”

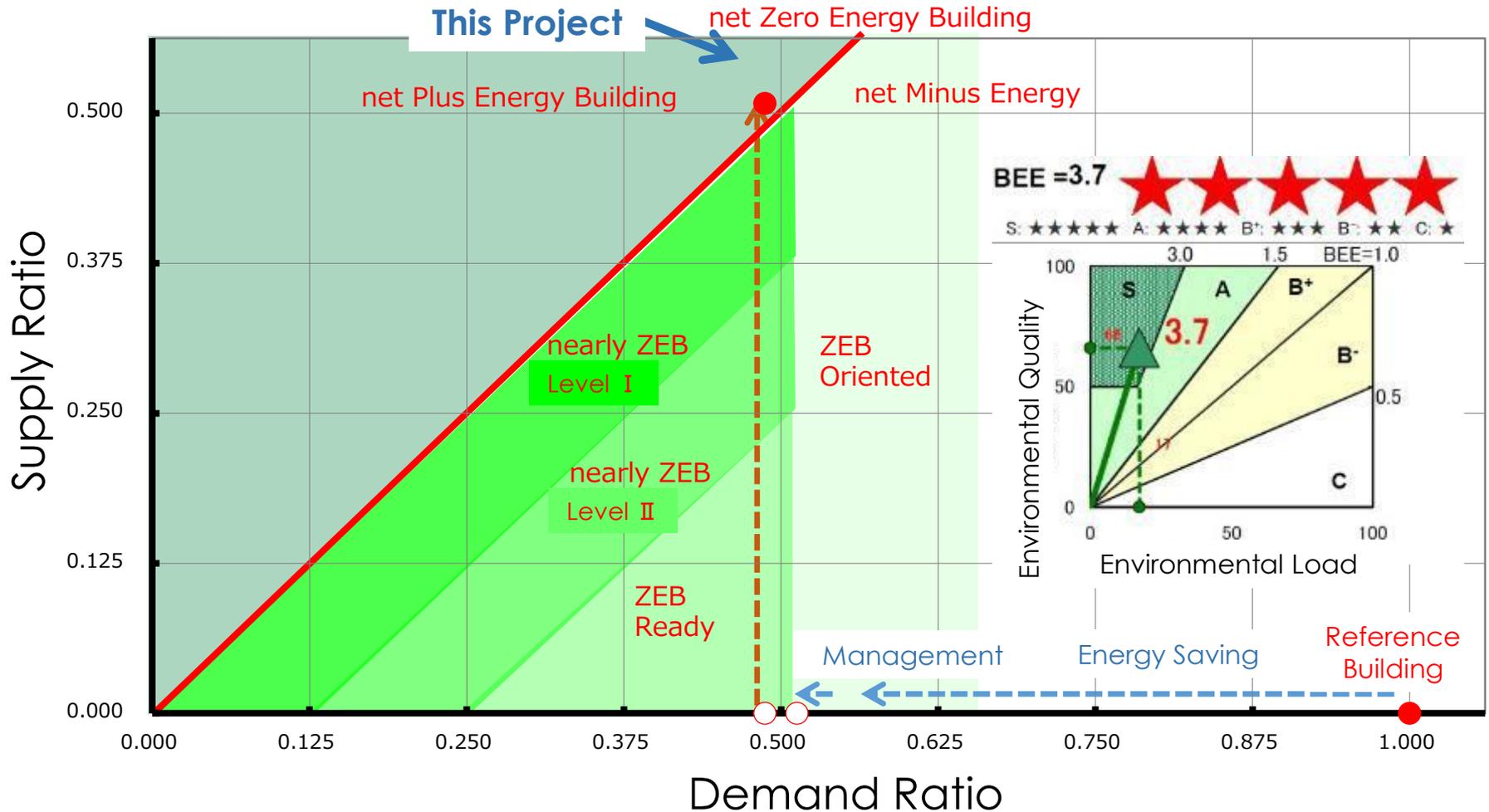
0.5 millions \$

Scheme for achieving zero energy

■ Cooling ■ Heating ■ Lighting ■ Ventilation ■ Plug load ■ Others ■ Renewable Energy



Level of ZEB in this project



Toward achieving Zero Energy Building

Instead of automatically controlling everything, utilize SI (Student Intelligence) to lead to environmental learning

Encourage school to zero energy
promote environmental education

Super Eco-school

1. System operated by students

Eco activities by students themselves



Eco monitoring



Student's own activities

2. Zero Energy System as Mizunami method

Use natural energy based on industry and climate



Natural Ventilation



Underground Heat Exchange



Daylighting



Solar Energy

3. Lighting, HVAC, Water saving system

Energy saving efficiently



Reduction of Heat Load



Heat exchange
CO2 control



Water Saving
Equipment



Power Saving
LED lighting

/ Occupant detection sensor



1. Background and Concept

2. Technology for ZEB

3. Education and Operation

Project site

