Panasonic

“Challenge 50” Energy-Saving Initiative in Panasonic Tokyo Shiodome Building

FEB 3 2017

Panasonic Corporation

Eco Solutions Company

Takamitsu Yasukouchi

Company profile

Panasonic was found in 1918 by Konosuke Matsushita. Last fiscal year we had a turnover about $65 billion USD, We are committed to creating a better life and better world, continuously contributing to the evolution of society and to the happiness of people around the globe.

Panasonic Corporation
Founded in 1918

Net Sales : JPY7.7trillion (USD65Bil.)
(FY2014, ending March 2015)

Head office: 1048, Kadoma-shi, Osaka, Japan

Employees: 254,084

Consolidated companies: 469

Founder
Konosuke Matsushita

Corporate Brand

Panasonic

Brand Promise

Panasonic is committed to creating a better life and better world, continuously contributing to the evolution of society and to the happiness of people around the globe.

Brand slogan

A Better Life, A Better World

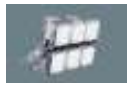
Aiming to realize a better life for all its customers, and is promoting environmental initiatives as an important element in achieving that goal.

Business of Panasonic

Panasonic has 4 companies. The business of Eco solutions Company is Energy related products like Solar, battery, BEMS/HEMS, Lighting, Housing system

ES





Eco Solutions Company

Lighting
Energy System , Housing System

AP

Appliances Company

AVC

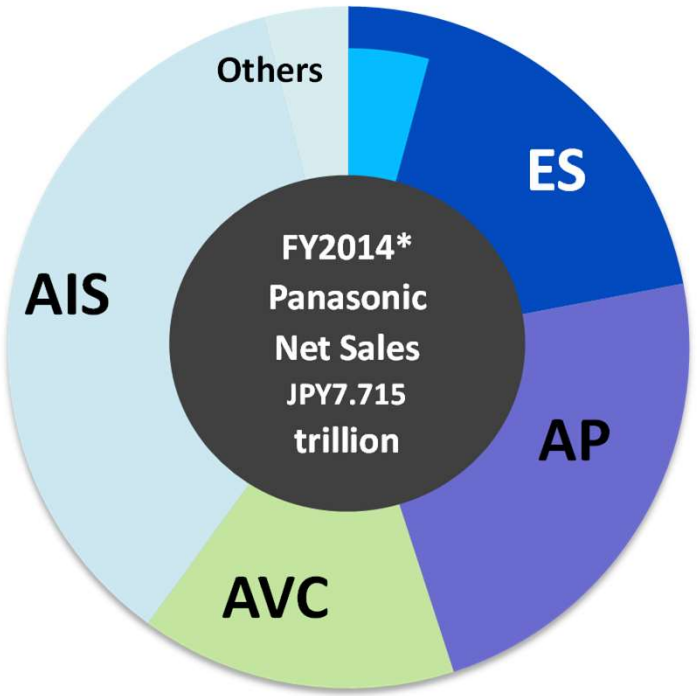


AVC Networks Company

AIS



Automotive & Industrial Systems Company



*ending March 31, 2015

Panasonic Environmental Policy

A Better Life, A Better World

Aiming to realize a better life for all its customers, and is promoting environmental initiatives as an important element in achieving that goal.

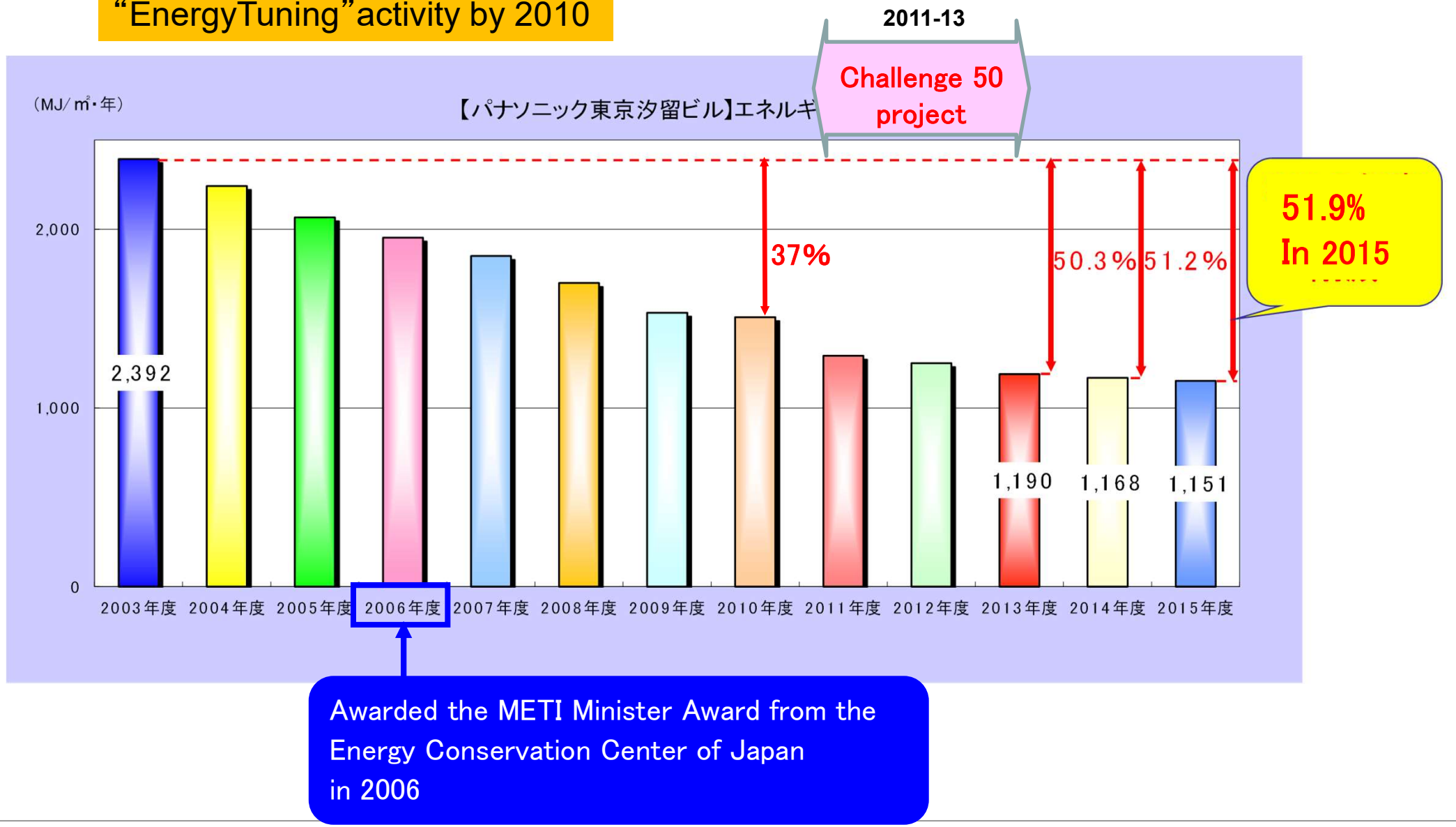
Numerical Targets and Performance Levels under Green Plan 2018

Targets	Results in 2015
Size of contribution in reducing CO_2 emissions: 47 million tons in 2015	Size of direct contribution: 43.12 million tons
	Additional size of indirect contribution: 10.47 million tons
Reduction in CO_2 emissions per basic unit in logistics: By 46% or more in 2018 compared to 2005 (Japan and international)	39%
Reduction in CO_2 emissions from offices: By 2% or more on yearly average until 2018 compared to 2007 (Self-owned buildings in Japan)	4.2%
Recycled resource utilization ratio: 16% or more in 2018	16.9%
Factory waste recycling rate: 99.5% or more in 2018	99.2%
Provide environmental education to 2 million children around the world by 2018	2.709 million children*11

History of Energy-saving Initiatives and New Target toward 2018

Achieved 37% through "EnergyTuning"activity by 2010

Set Target 50% toward 2018



Awarded the METI Minister Award from the Energy Conservation Center of Japan in 2006

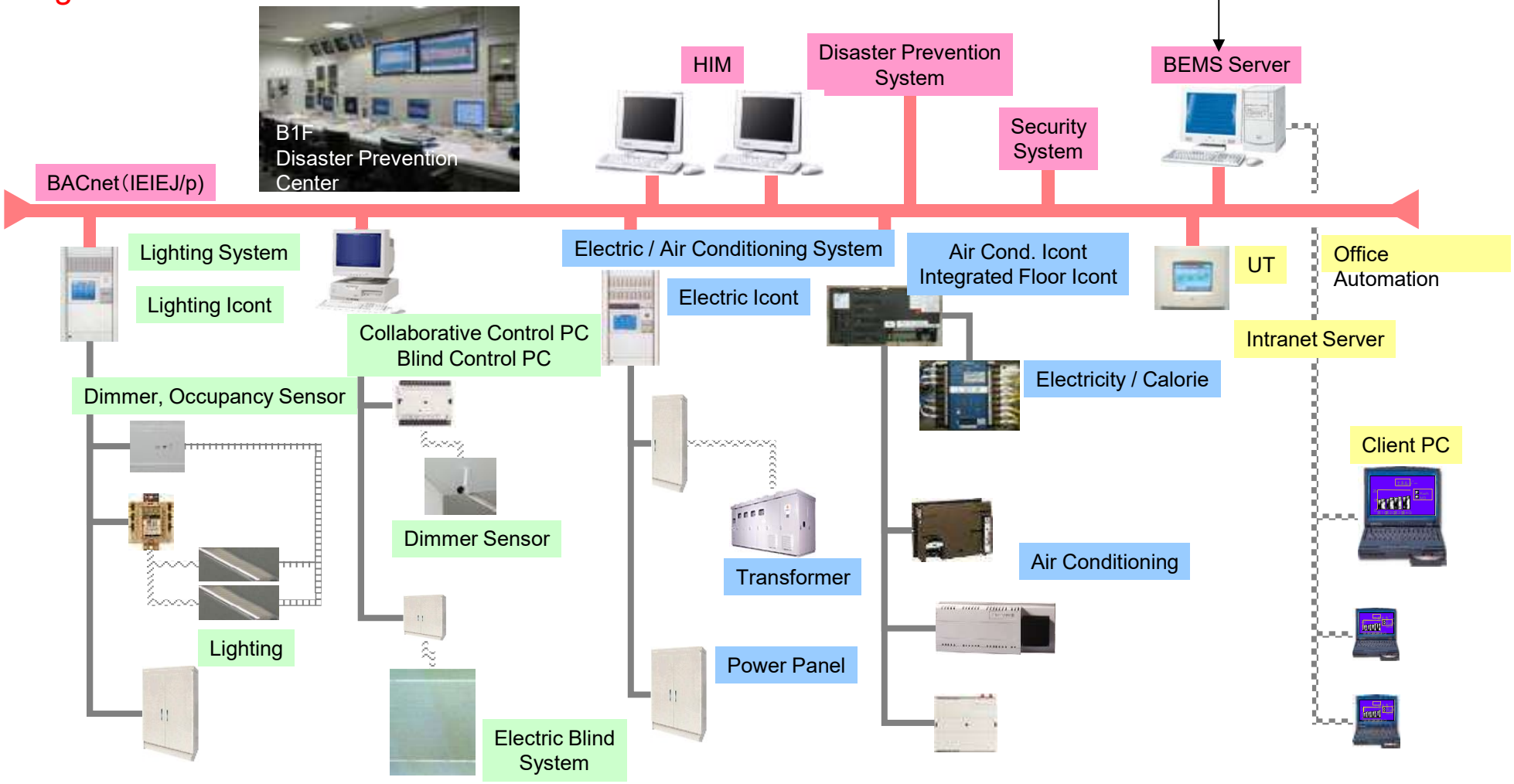
Panasonic Tokyo Shiodome Building

Advanced Energy-Saving Technologies Implemented

Energy-saving Technique	Result of Implementation	Element for Possible Energy Reduction
Double-skin Air Flow Windows & Low-E Glass	Reducing the burden of air conditioning on the west side through adopting a high insulation outer wall system	Electric, Heat, Water
High Voltage Electricity Distribution Equipment	Reducing electricity loss through in-building high voltage (6.6KV) wiring	Electric
Blind Control & Variable Lighting Equipment	Reducing electricity consumption through the effective use of daytime blind controls and variable lighting	Electric
Area Control System	Reducing lighting and energy by automatically turning off lighting when nobody is present	Electric, Heat
Variable Air Volume (VAV) System	Reducing air conditioning delivery power by automatically adjusting air conditioning ventilation	Electric
Variable Wind Volume (VWV) System	Reducing air conditioning delivery power by automatically adjusting the volume of water supply for air conditioning	Electric
Solar Power Generation Equipment	Reducing energy consumption through solar energy generation	Electric
Natural Ventilation System（Ventilation Window）	Reducing air conditioning energy through the use of a natural ventilation window（nighttime purge is also possible）	Electric, Heat
Outside Air Conditioning System	Reducing a medium amount of energy through interaction with outdoor air conditioning	Electric, Heat
Water Conservation and Sanitation Equipment	Reducing the amount of recycled water and water-cleansing procedures through water conservation and sanitation tools	Electric
Air Conditioner Drain Collection Equipment	Reducing the amount of recycled water and collecting/filtering/reusing condensation drain water and air conditioner humidification drain water	Water
Urine Disposal System	Reducing the amount of water for urinal cleaning by adopting a urine disposal system	Electric, Water
BEMS (Building Energy Management System)	Reducing energy loss through the optimization and management of equipment	Electric, Heat, Water
Fusion of Building Management System and Intranet	Reducing lighting and air conditioning energy and promoting energy-saving measures through communication aimed at tenants and the public	Electric, Heat

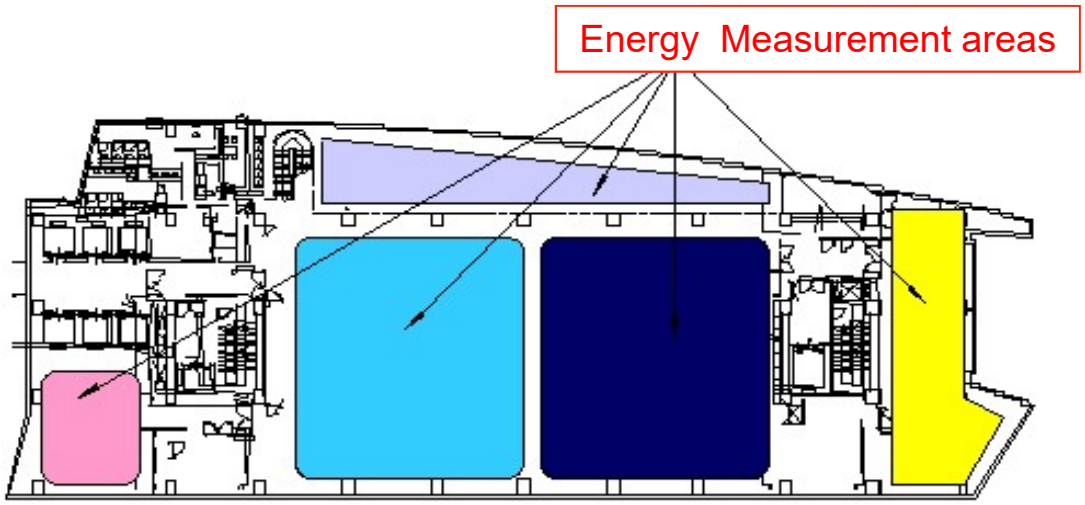
Integrated Control System for energy managemet

Energy-saving Tuning ← Monitor and control every systems with BEMS for continuing saving energy every year ← Various types of information are collected to BEMS



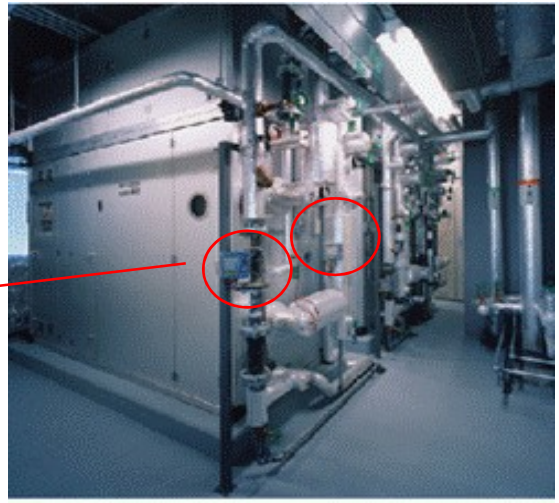
Sub systems talk each other and make some useful relationships through BACnet

Energy Measurement Units: Standard floor



Electrical Power Measurement Unit

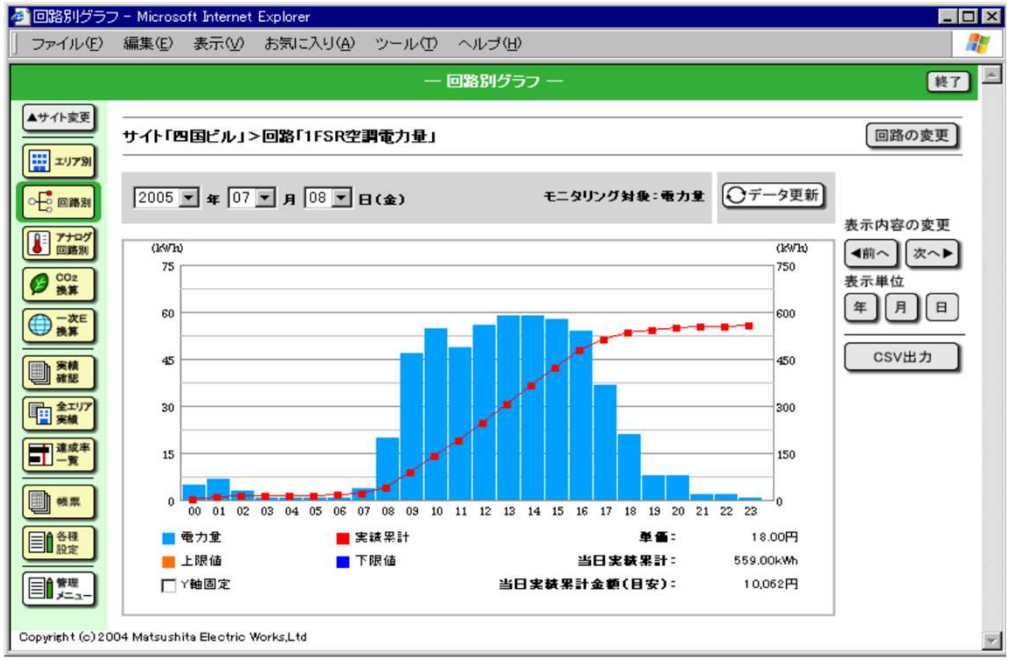
Calorimeter Measurement

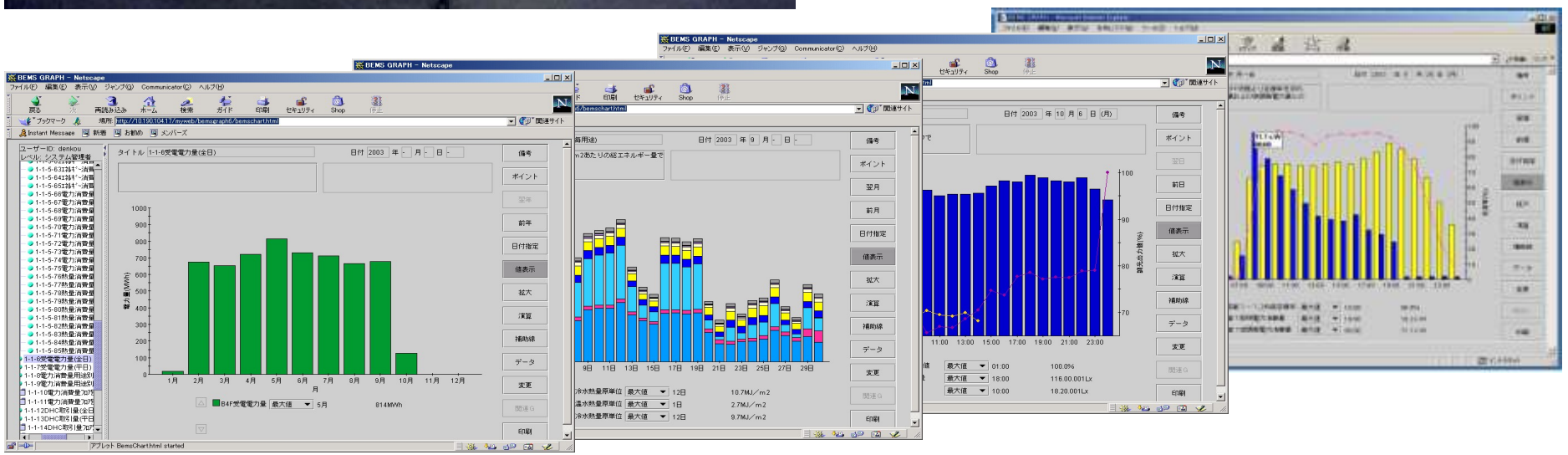


For “Tuning” , measurement and computation equipment is necessary

Design of this system is difficult because of the balance between cost and benefit

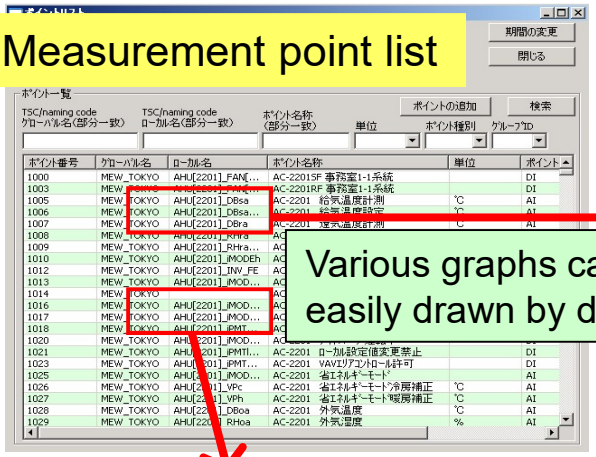
BEMS（Building Energy Management System）





Visualization for energy saving tuning （SatTool）

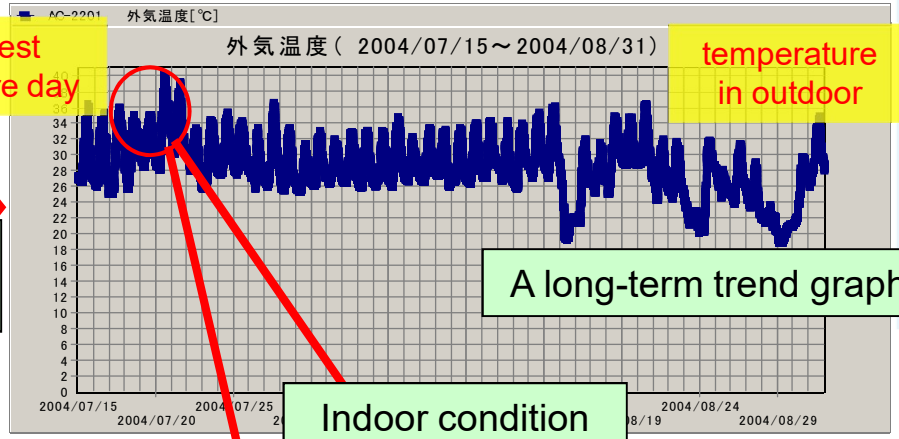
Measurement point list



Various graphs can be easily drawn by drag&drop

the highest temperature day

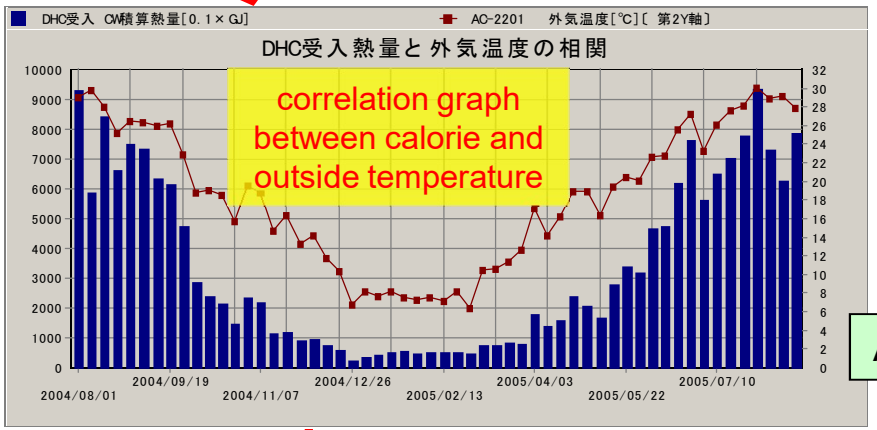
temperature in outdoor



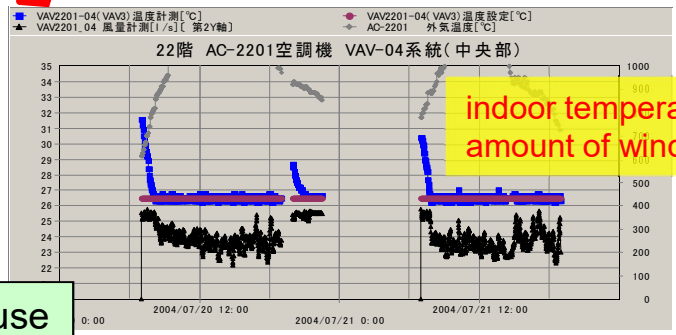
A long-term trend graph

SatTool

Indoor condition



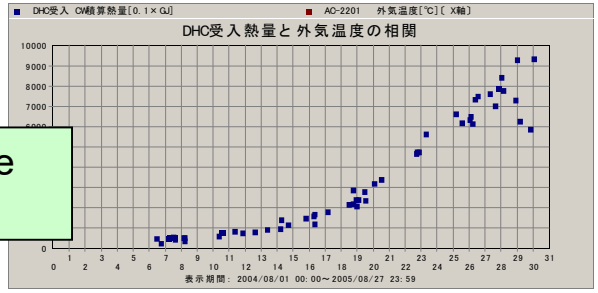
correlation graph between calorie and outside temperature

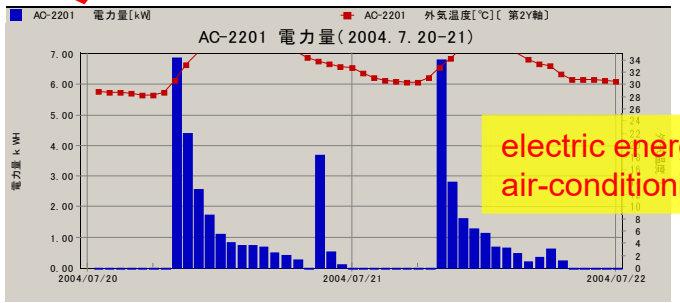


indoor temperature and amount of wind

Amount of energy use

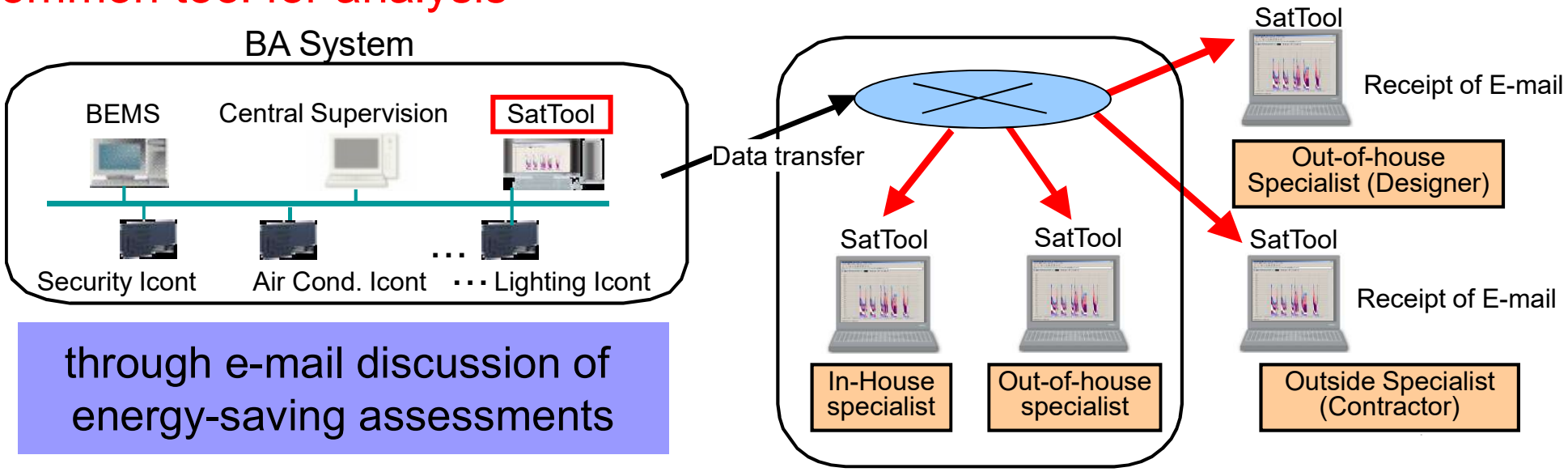
The graph type can be easily changed





electric energy of air-conditioning fan

Common tool for analysis



through e-mail discussion of energy-saving assessments

※Data Distribution Function Utilizes a PC

Energy-saving Special Committee (periodically,once/month)

- Carrying out detailed inspection and counter-measures through a point of view based upon prior inspection results
- Processing, analyzing, and graphing data through on-site data inspection

Drafting Efficient (Time & Cost) Technical Examination of Energy-saving and Permanent Counter-measures

4 different perspectives for ECO-Tuning initiative

1. Tuning based on design concept (Optimization)

→【example】usage of “outside air” in kitchen while quiet time after 2 pm

2. Tuning for fixing initial failures

→【example】change “sensor positions” for getting proper data

Initial failures are inevitable, we must find unusual data and fixing them

3. Tuning customized for usage conditions

→【example】 Usage condition changes while long use of facilities,
Therefore we must optimize systems and facilities.

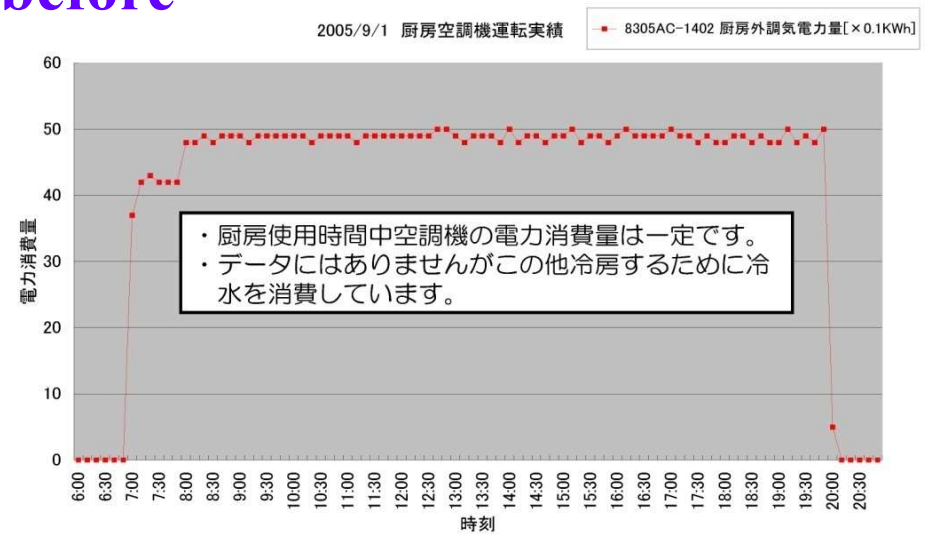
4. Advanced tuning for facility/equipment

→【example】Control parameters for optimization of air-conditioners,lighting

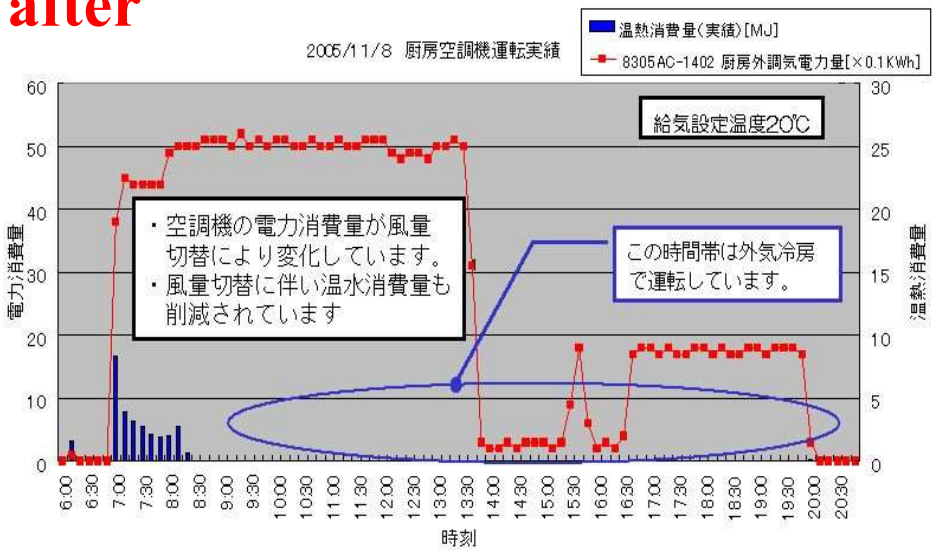
Ideal “TUNING” is achieved through 4 perspectives above mentioned

◆ Intaking outside air for air-conditioner operation was the original design concepts. Monitoring data was the key to find.

before



after



【design concepts】

Kitchen air-conditioner is designed to intake outside air with manual operation. Employees did not use this function. This fact was detected by electrical power monitoring.

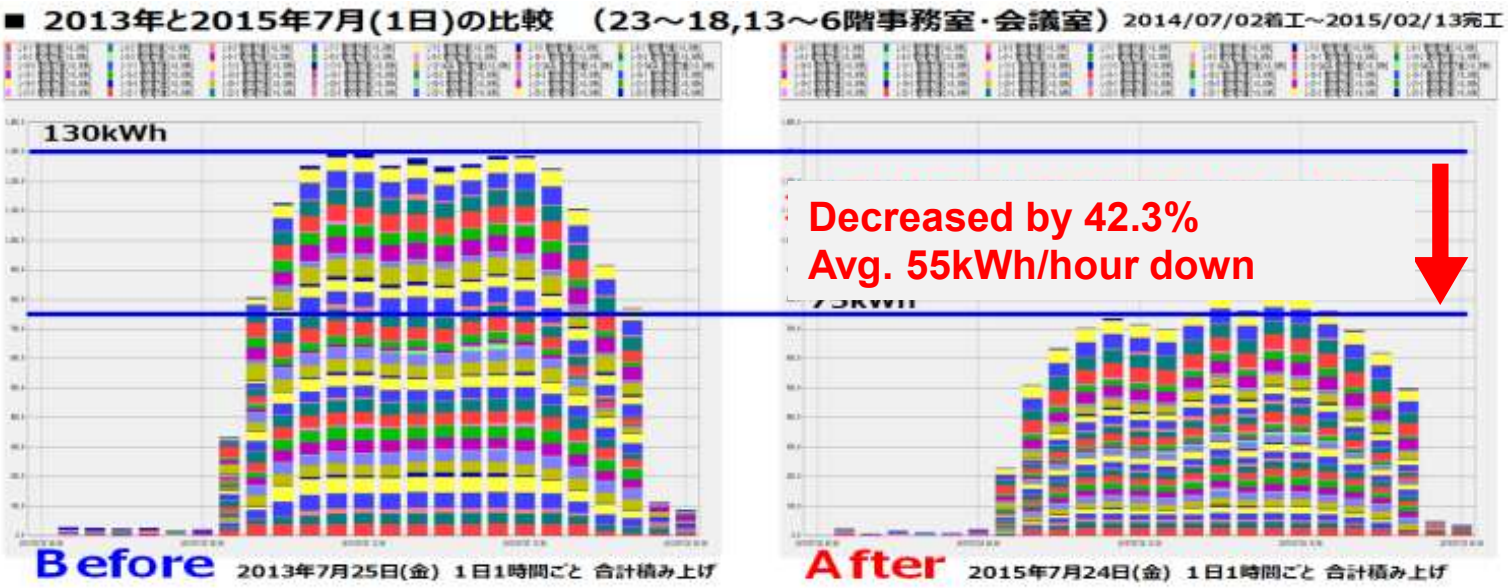
【Measures and Results】

This power monitoring data is informed to employees, and asked to improve with the manual operation. Electrical power consumption and heating value were vastly improved.

Energy Saving by LED Lighting （based on actual measurement)

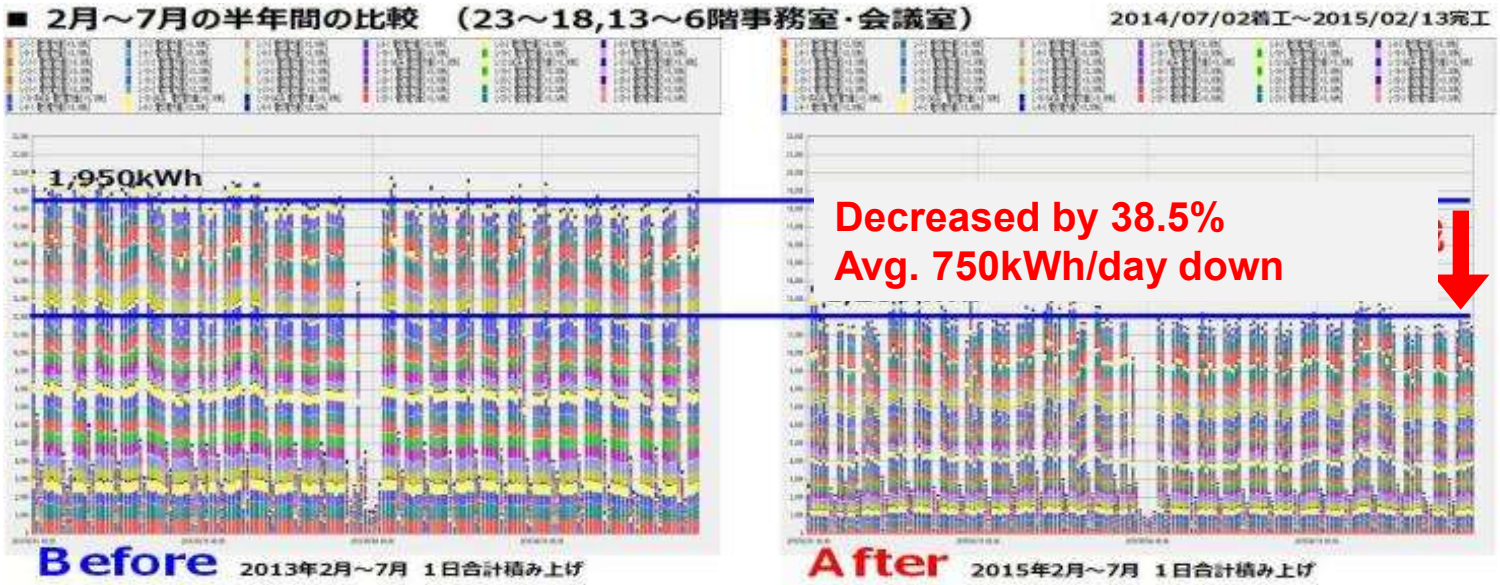
On July 1,2013 vs. On July 1,2015

At all office areas & meeting rooms



Half year base Feb.-July,2013 vs. Feb.-July,2015

At all office areas & meet ing rooms



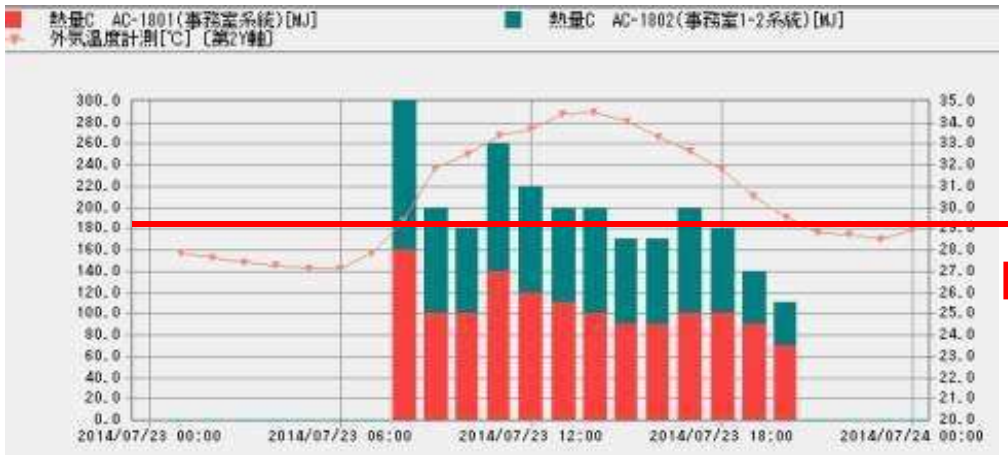
Energy Saving of HVAC by LED Lighting（based on actual measurement）

Lighting fixtures radiate away the heat energy.
・10%: above ceiling
・90%: down below ceiling ⇒ becomes the Load on HVAC

Diminution in HVAC according to our plan was confirmd.
(Decreased by 10%)

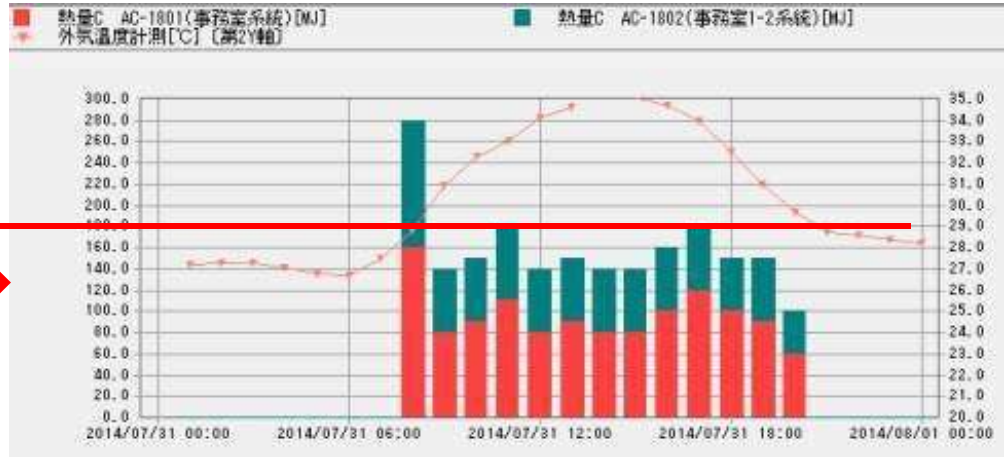
HVAC's consumption of heat energy on 18F as of July 23, 2013

On 18F ※unit: MJ



w/ Conventional Lighting

HVAC's consumption of heat energy on 18F as of July 31, 2015

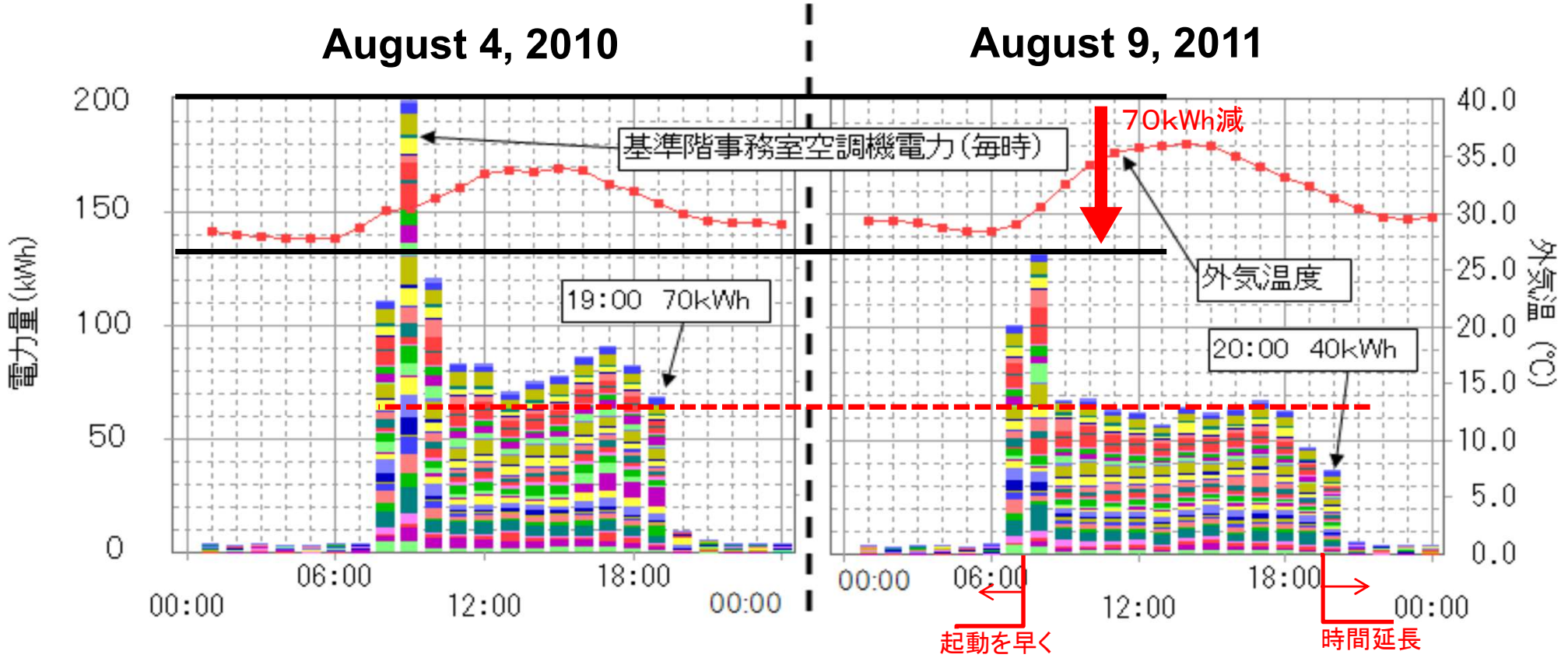


w/ LED Lighting

20MJ decrease

Our energy saving action in 2011 by Japan Government request

■Eco-tuning corresponded to “Great East Japan Earthquake”

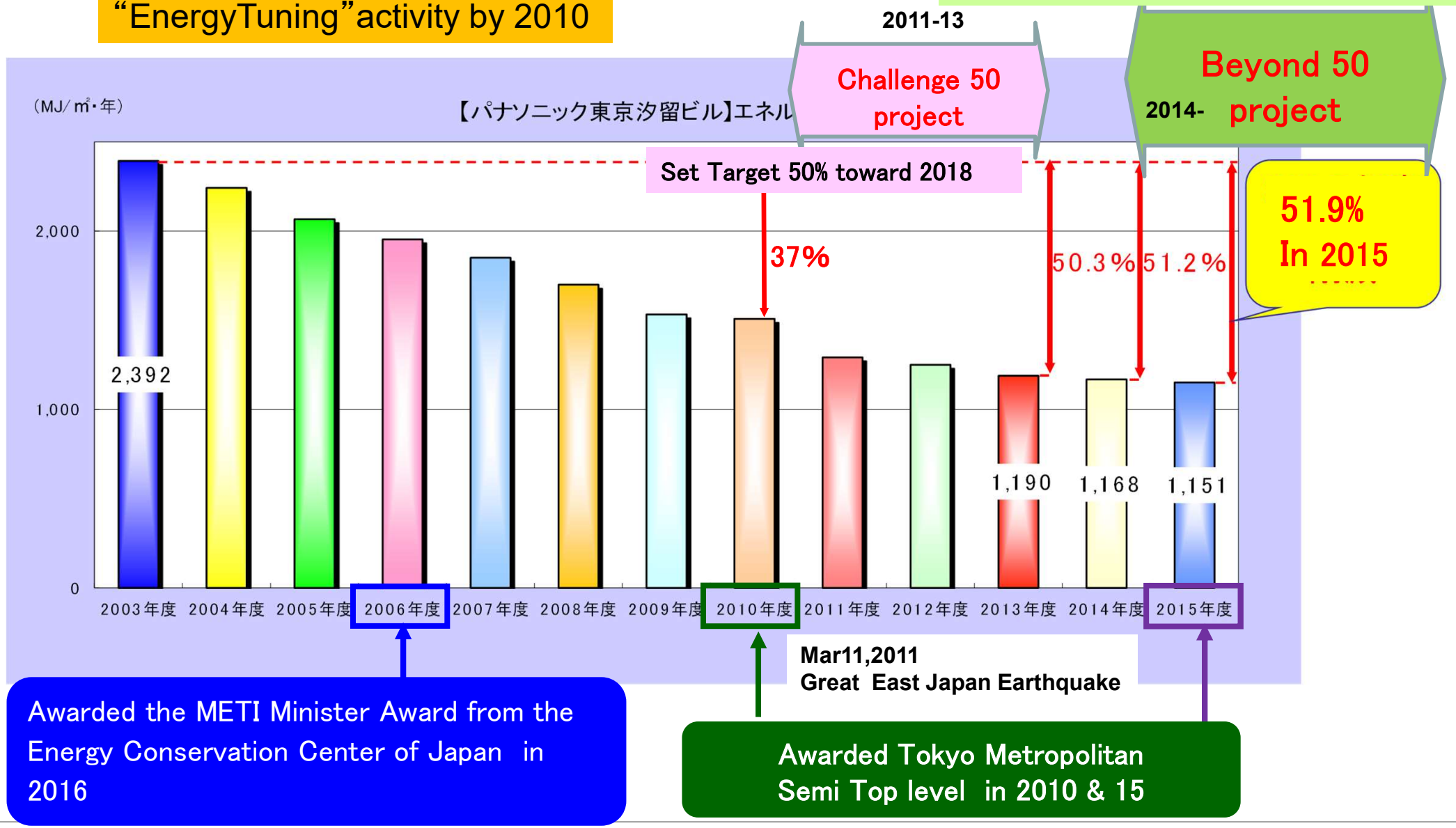


We hastened HVAC’s turn-on and extended turn-off for 1 hour.
As a result, peak time of energy consumption was moved up for 1 hour and decreased.
Energy consumption in 2011 was lower despite the fact that average of outdoor air temperature in 2011 was higher than in 2010 (avg.1.5℃ higher).

History of Energy-saving Initiatives and New Target toward 2018

Achieved 37% through "EnergyTuning"activity by 2010

Cope with both comfort & productivity



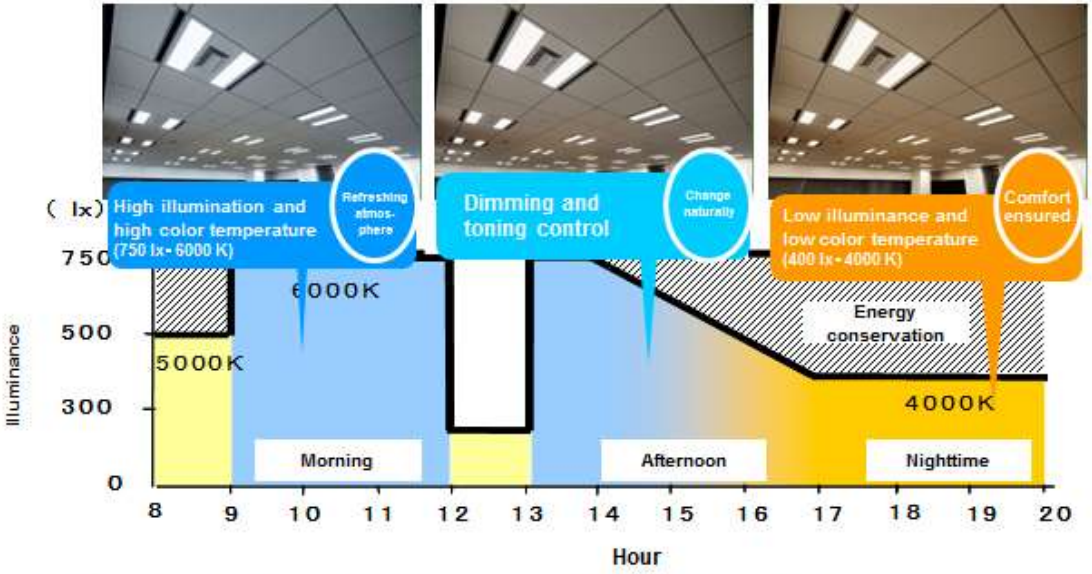
Awarded the METI Minister Award from the Energy Conservation Center of Japan in 2016

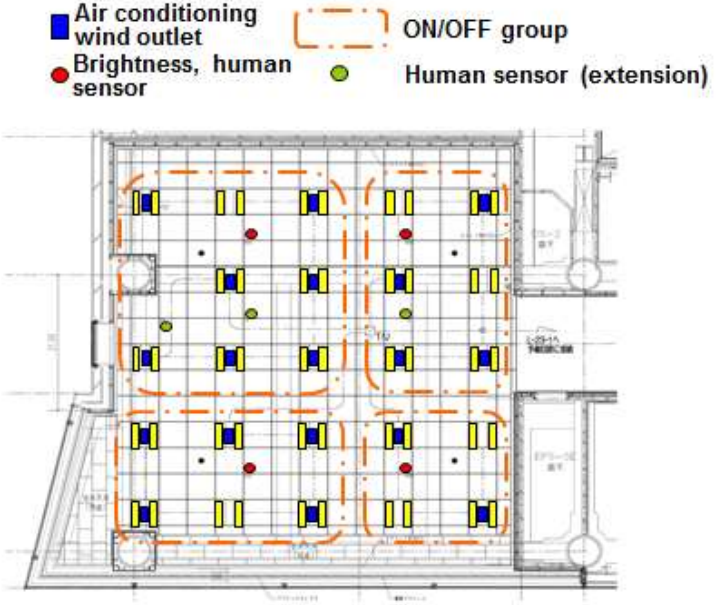
Awarded Tokyo Metropolitan Semi Top level in 2010 & 15

Beyond 50 Circadian Lighting

- an optimal control system of illuminance and color temperature : morning, daytime and nighttime.
- an optimal operation schedule depending on office hours or season.

◇Dimming and toning schedule in a day is follows:





Time zone	Illuminance	Color temperature
Before staring work	500 lx	5000K
Morning	750 lx	6000K
Lunch break	250 lx	5000K
Afternoon 1	750 lx	6000K
Afternoon 2	Change	Change
Nighttime	400 lx	4000K

- Set at 400 lx/4500 K during nighttime in the summer season (from Jun. 22 to Sep. 23)
- Set at 400 lx/3500 K during nighttime in the winter season (from Dec. 22 to Mar. 21)
- On/off control by human sensor on holidays (all day) and from 8:00 p.m. to 8:00 a.m. on weekdays
- For visitors, show a demonstration using a short version of about 1 minute.

LED color temperature adjusting equipment

(COB type 2 colors x 2)

Luminous flux of the equipment:
Power consumption: 72 W (when fully lit)
Color rendering property: Ra80 or more
Dimming: 5 to100%
Air conditioning return area: 0.041 m²

Low color temperature LED High color temperature LED

Beyond 50 Task & Ambient Lighting

- Set illuminance at 300 lx , Space luminance at Feu 8 for general lighting, secure illuminance of 750 lx on the working place by Task light.
- LED Lighting equipment to irradiate the ceiling complements space luminance.
- The wind outlet of personal air conditioner keep concentration & awakening

LED Feu up equipment

Power consumption: 36 W
Color rendering property: Ra84
Color temperature: 4,000 K
Dimming: 25 to 85%
With function to correct initial illumination
Air conditioning return area: 0.04 m^2

LED task light (SQ400S)

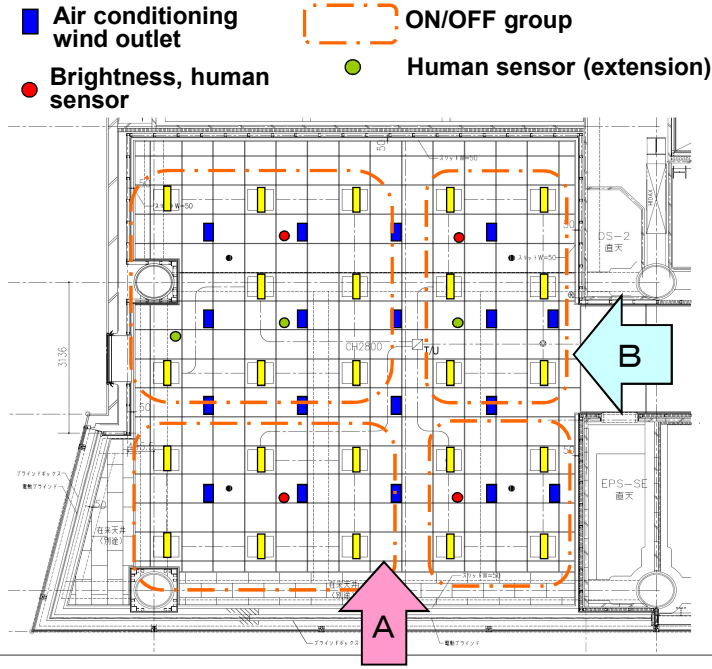
Luminous flux of the equipment: 340 lm (equivalent to 60 W incandescent lamp)
Power consumption: 7.6 W
Color rendering property: Ra90
Color temperature: 5,000 K
Dimming: 30-100%

Wind outlet of personal air conditioner

Ambient illuminance 300 lx
(Dimming rate: 50%)

Direction A **Feu 10.3**

Direction B **Feu 8.7**



*Recommended values

	Illuminance	Feu
Task light	750 lx or higher combined with ambient light*1	–
Ambient light	250-600 lx*2	8 or more*3

*1,2 "Task and Ambient Lighting System Research Committee Report" by the Illuminating Engineering Institute of Japan
*3 In-house test

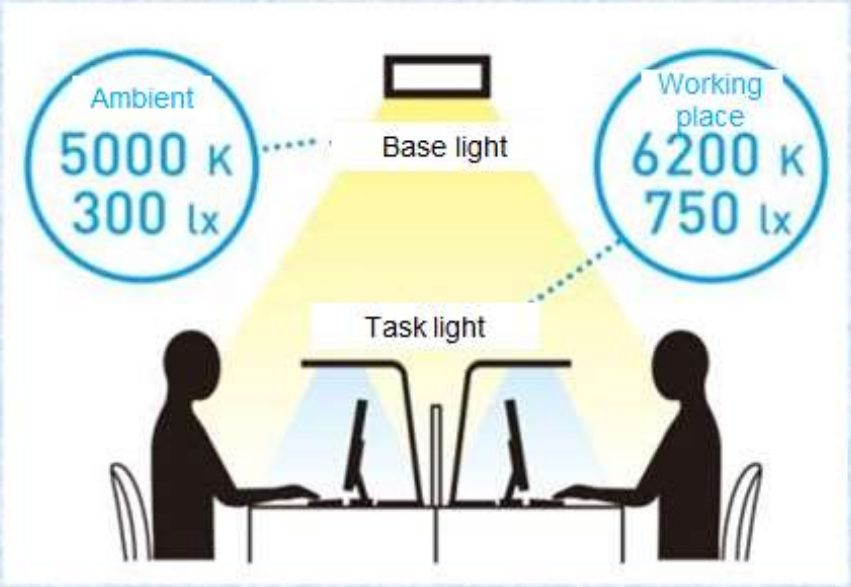
Beyond 50 Environment Heighten Concentration

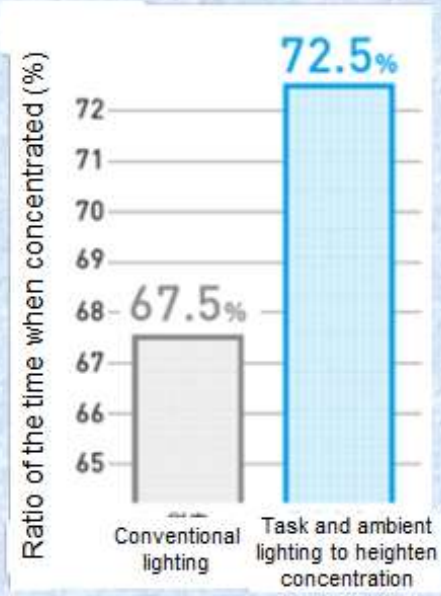
- 7.4% rise in the concentration level was confirmed compared with standard lighting for office. (Laboratory test. About 4% in the field)

  Confirmed effective for preventing eye strain and enhancing comfort.

- Compared with standard office lighting, energy conservation effect is higher by 30%

cope with both comfort & productivity





(reference) Energy saving effect by Feu (panasonic original index)

Feu = method of Optimizing lighting on design illumination

What is Fue?

・The index of luminance which one feel illumination from the whole space (floor+ceiling+wall)

・the method of lighting design to improve comfort and productivity in addiion to energy saving

図5 人が空間を観察する時の視点と視野

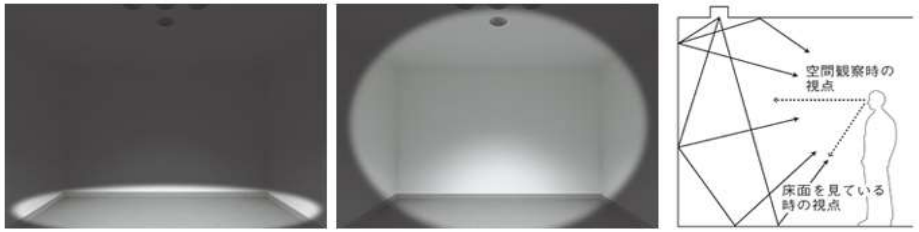
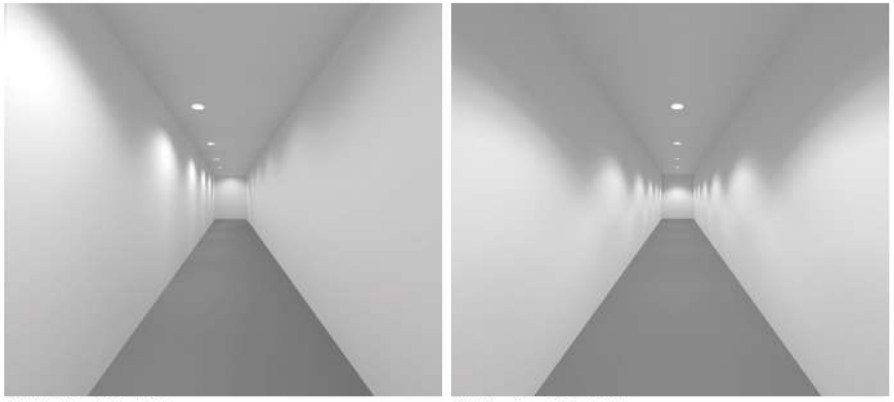


図7 照明方法の異なる廊下空間の比較



空間A Feu 9.5 150 lx
消費電力：186W

空間B Feu 9.5 180 lx
消費電力：222W

example by “Fue” method

【図2.5 従来照明との比較】

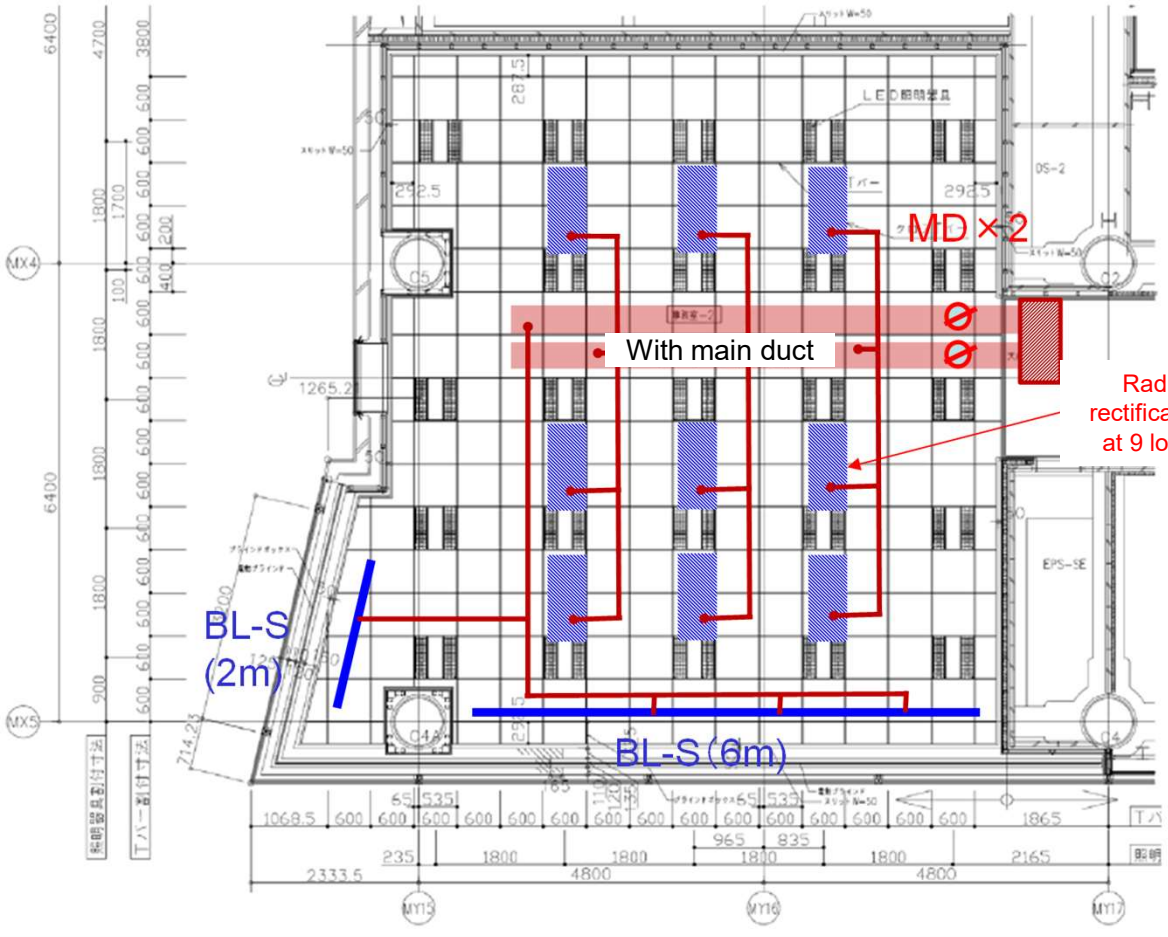
使用器具	スペースコンフォート 直管LED (LDL40)		SmartArchi Eco&Feu LED一体型ベースライト
器具品番	XFL312TSC-LT9		FYY26672Z LT9
空間の明るさ感(Feu値)	12.4	明るさ感同等	12.6
机上面の平均照度[lx]	748	20%減少	604
器具台数[台]	230		180
消費電力[W]	33		31
年間点灯時間[h]	3,000		3,000
消費電力合計[kWh]	22,770	26%削減	16,740
CO_2排出量[t-CO_2/年]	9.8		7.2
イニシャルコスト [円]	13,271,000		13,680,000
年間ランニングコスト [円]	569,250	約15万円安	418,500

26% eco ✓

■計算条件／空間：約650m²(36m×18m)、天井高さ：2.7m、反射率：天井50%、壁30%、床10%、床上0.7m、壁から1m以内の平均照度
年間点灯時間：3000時間、電力料金目安単価：25円/kWh(税抜)、CO_2排出係数0.43kg-CO_2/kWh

Radiant Air Conditioning Control

Radiant air conditioning is the most energy-efficient of all systems. It is silent, comfortable and causes no temperature irregularity. It can create an ideal office space by combining it with LED lighting, which is compatible with the radiant air conditioning system.



■Add automatic control (AirOpty)
・External air intake CO_2 control
・Change frequency setting of air conditioning units

■Expected energy conservation effect
・Heat value of cold water: Annual consumption decreased by 7.2%
・Heat value of hot water: no increase/decrease by offsetting values in summer and winter
・Electric energy: A 24.9% decline during cooling period (May to October) (A 10.9% decrease a year)

For the full year, a 5% decline in energy consumption is expected

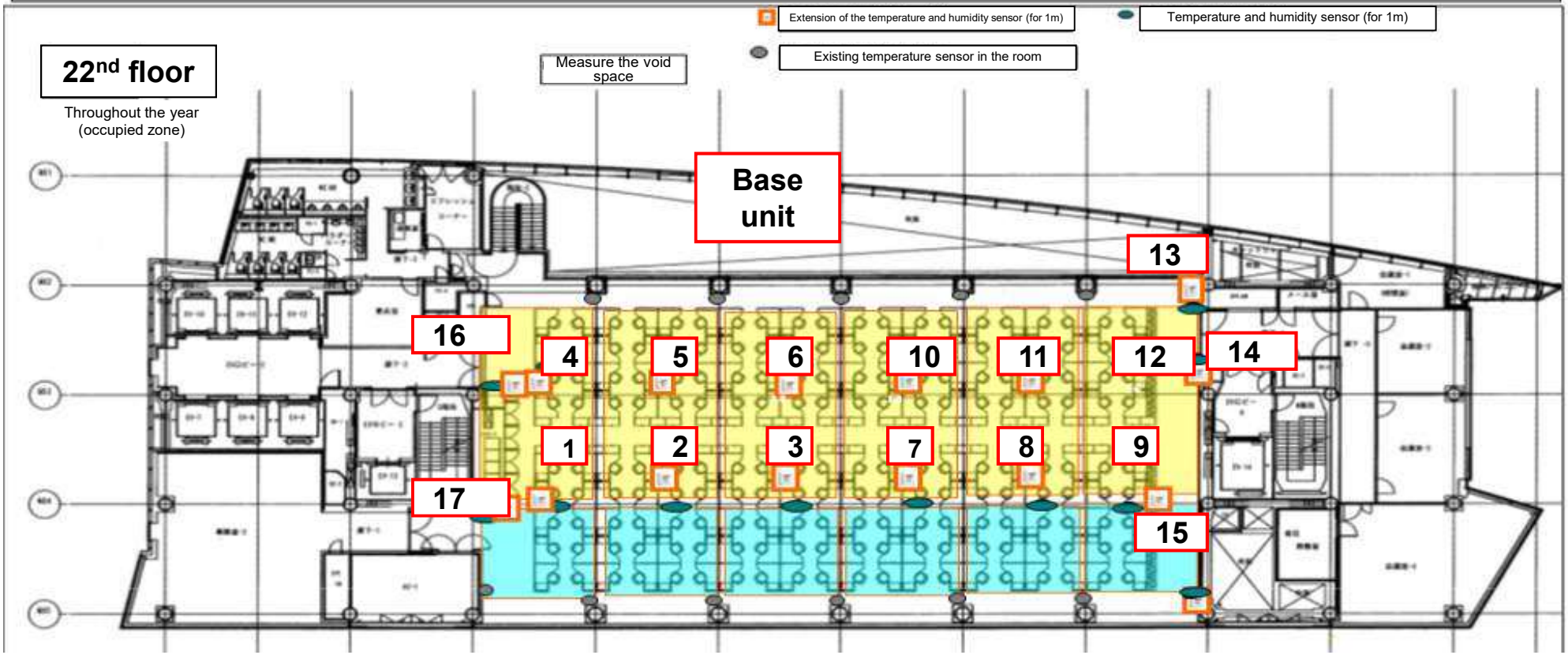
■Comfort evaluation
・Evaluation of intellectual productivity
・Subjective evaluation using questionnaire

Reducing Temperature Irregularity of the Air Conditioning System

Improve comfort level and achieve further energy conservation by eliminating temperature irregularities in the indoor space and leveling the temperature.

Extensions and temperature and humidity sensor arrangement (temperature distribution)
***Numbers indicate the sensor number registered in the SatTool**

Illustration of measuring items and the purpose | Temperature and humidity measurement | Sensor arrangement details



Panasonic

Thank you for your kind attentions!

Prambanan LED by Panasonic