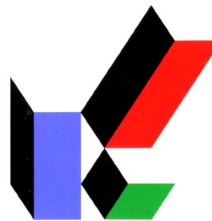


**Lighting retrofit in office building
for
better lighting quality and energy efficiency**
(事務所ビル照明設備の省エネ改修取組事例)

Mika Katsuta



KYUDENKO CORPORATION
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Agenda

1. Energy saving solution for Kyudenko main office

(九電工本社ビルにおける省エネルギー化への取組)

2. Lighting retrofit

(照明設備改修計画内容について)

3. Energy efficiency

(省エネルギーの実績について)

4. Example of subsidize retrofit project

(補助金を利用した照明改修工事の事例)

5. LED lighting for lighting retrofit

(照明改修とLED照明器具について)

Energy saving solution for Kyudenko main office

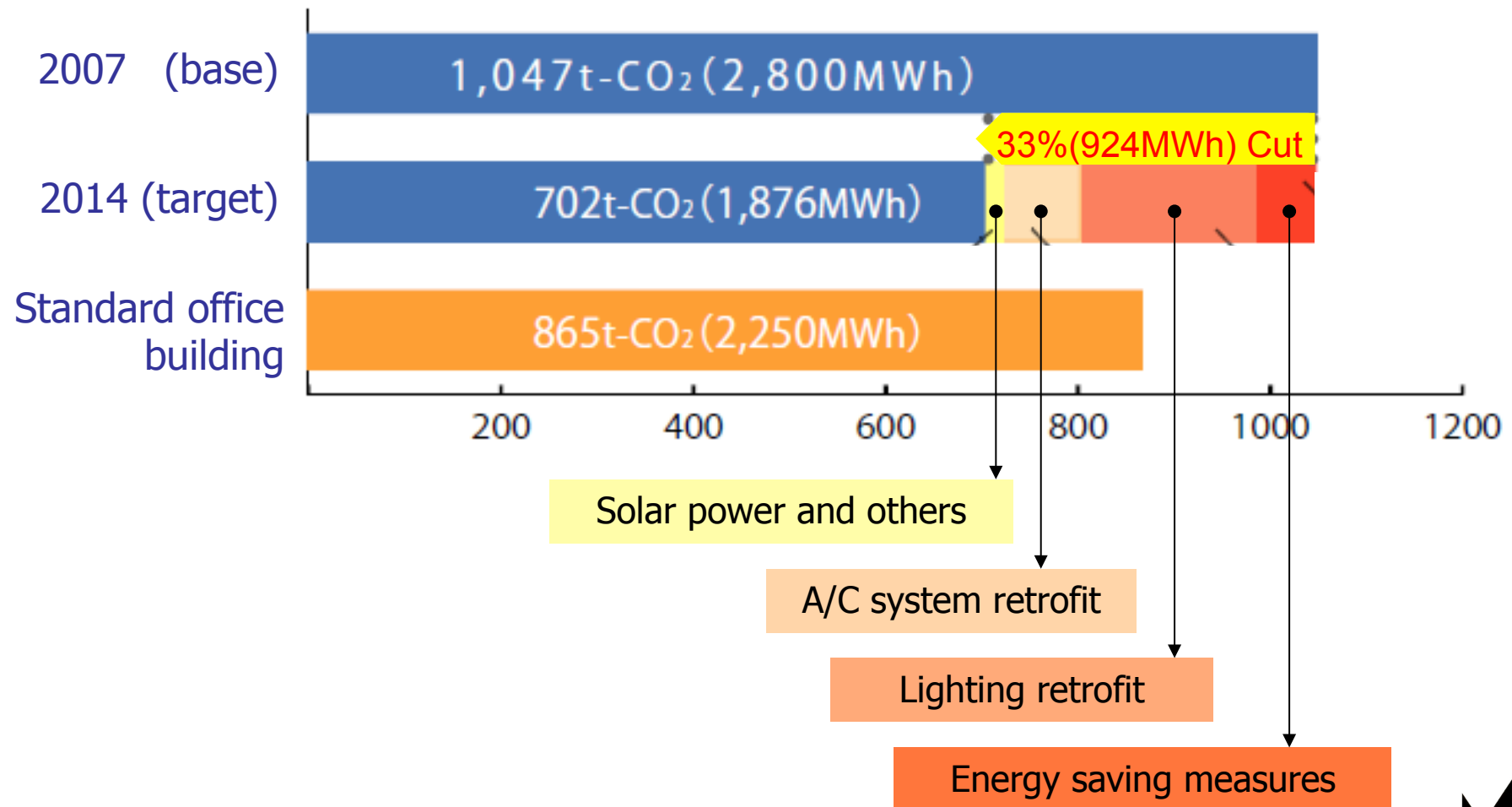
◆ Building outline of Kyudenko main office (2014)

Construction completion	December 1974 (39-years-old building)
Floors	10 floors Basement 1 :Parking area, cafeteria, machine room 1 st :Entrance hall, offices 2 nd -8 th :Offices 9 th :Hall, conference rooms 10 th :Switch room and machine room
Total floor area	12,531m ²
Electrical services	Receiving voltage :6.6kV Contract demand :550kW (43.9W/m ²)
Heat-source equipment	Air-cooling heat pump chiller :30HP×9 heat storage tank:600m ³ Sub heat storage tank :30m ³ ×2
Air conditioning equipment	Air-conditioning unit: 19units Fan-coil units :144units Air-conditioning system :27units
Plumbing equipment	Electrical water heater: 10units



Energy saving solution for Kyudenko main office

◆ Target for energy use (set in 2008)



Energy saving solution for Kyudenko main office

◆ Three main energy saving solutions



Lighting

Replace existing lighting with LED lighting



Energy management system

Installation of Q-BEMS
(Kyudenko Building Energy Management system)

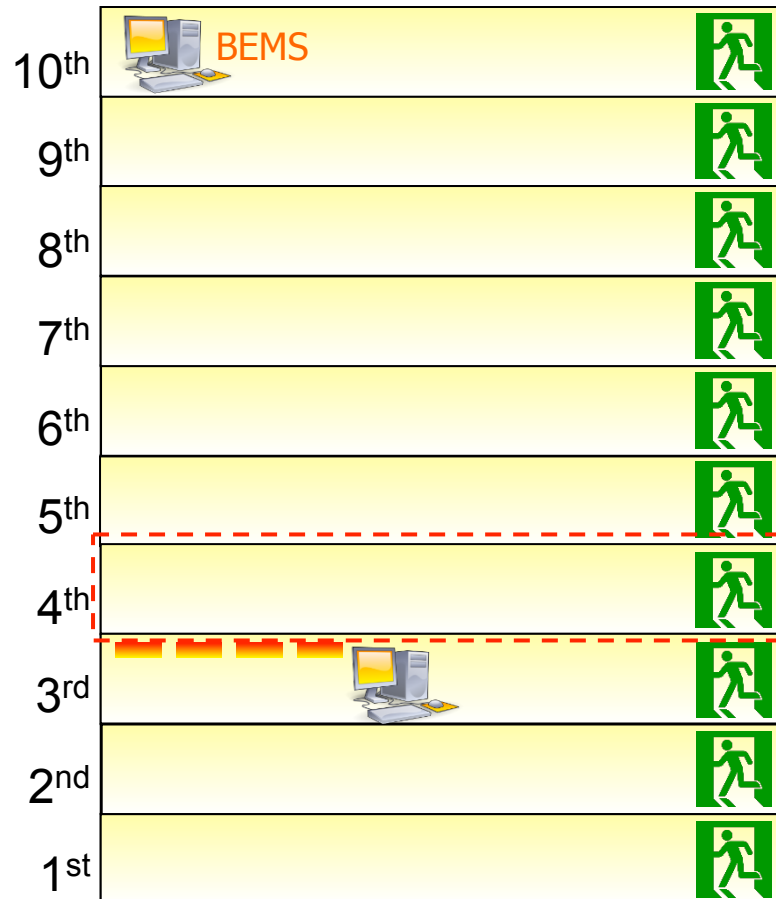


A/C system

Replace existing A/C system with cocktail A/C system
(self developed A/C system)

Lighting retrofit

◆ Lighting installation to main office



1) Replace existing lighting with LED lighting

2009 : 1st 8th 9th 10th floor
2010 : 3rd 6th 7th floor
2011 : 2nd 4th 5th floor

2) Replace existing emergency light with LED lighting (2009)

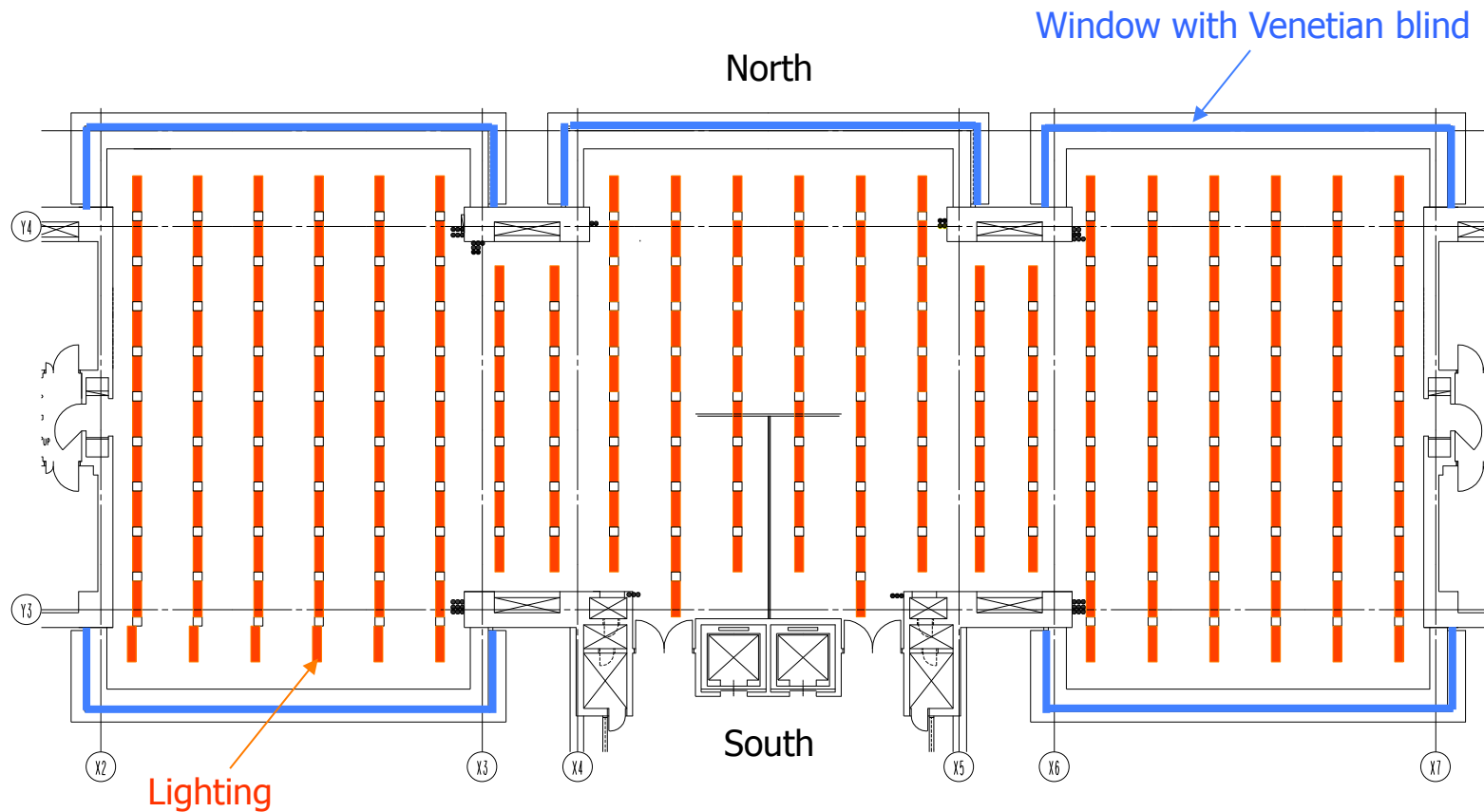
3) Installation of intelligent lighting system on 3rd floor (2010)

Prior to retrofit 20.1 W/m²

After retrofit 4.8 W/m²

Lighting retrofit

- ◆ Lighting retrofit on 4th floor (E&M design department office area)



Lighting plan

Lighting retrofit

◆ Lighting retrofit on 4th floor (E&M design department office area)



Prior to retrofit 28W/m²



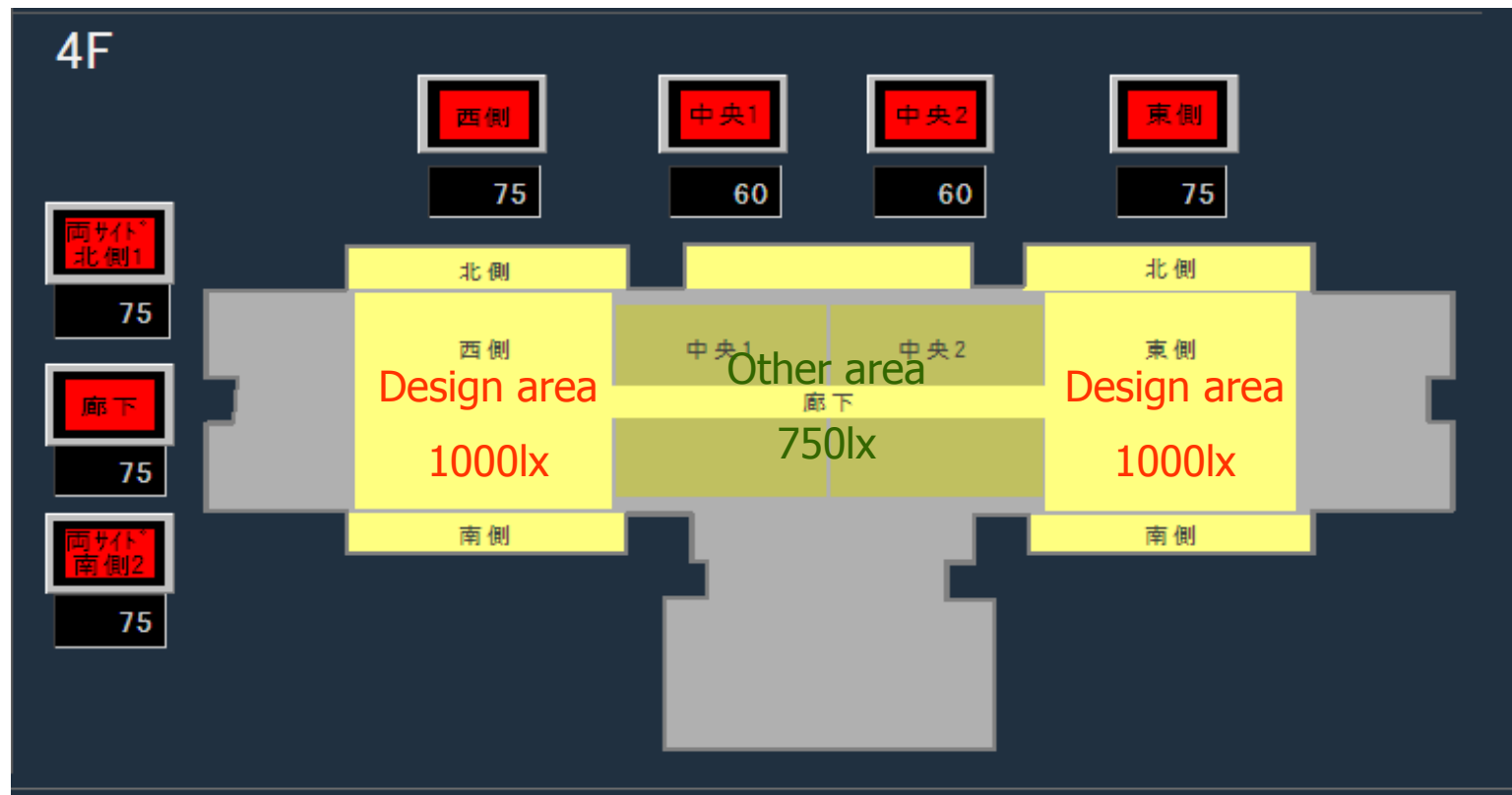
After retrofit 9.6W/m²(-66%)
(Dimming to setting the right light level)

Average horizontal illuminance : 1000lx
Color temperature : 3500K
General color rendering index : Ra=84
Type of Lamp : Fluorescent lamp
Life time : 12000hours
Rated power consumption : 94W each
Luminous flux : 5000lm

Average horizontal illuminance : 1000lx
Color temperature : 4000K
General color rendering index : Ra=80
Type of Lamp : LED
Life time : 40000hours
Rated power consumption : 48W each
Luminous flux : 3340lm

Lighting retrofit

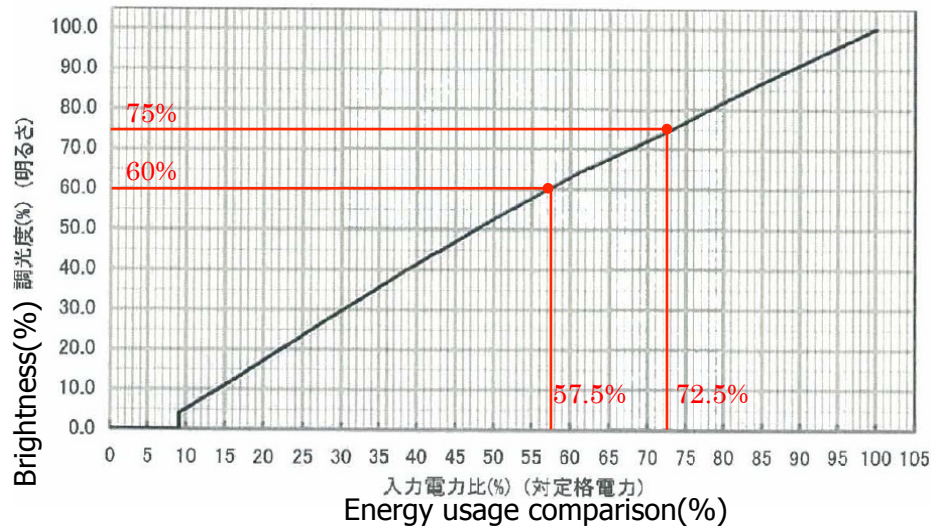
- ◆ Lighting retrofit on 4th floor (E&M design department office area)



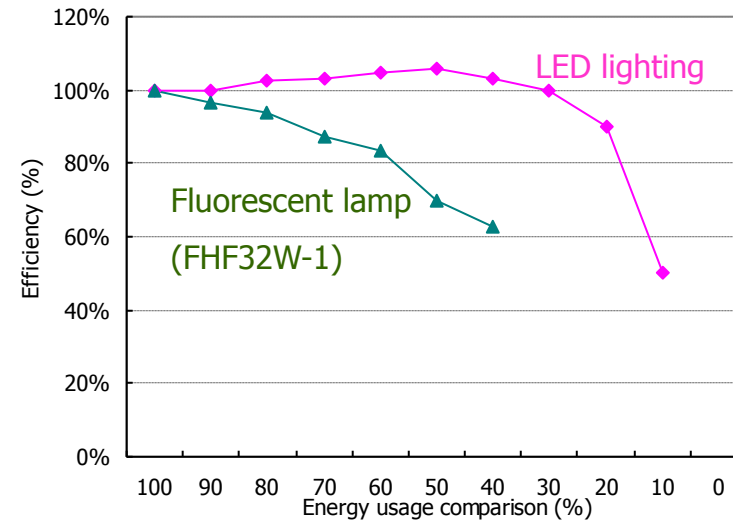
Monitor of Building Energy Management System
(showing dimmer load factor ratio)

Lighting retrofit

◆ Lighting retrofit on 4th floor (E&M design department office area)



Energy usage comparison vs. Brightness

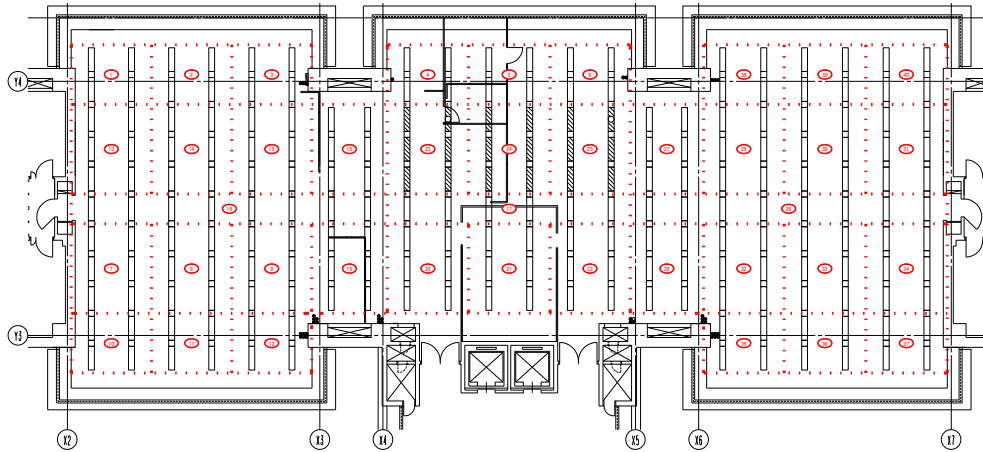


Energy usage comparison vs. Efficiency

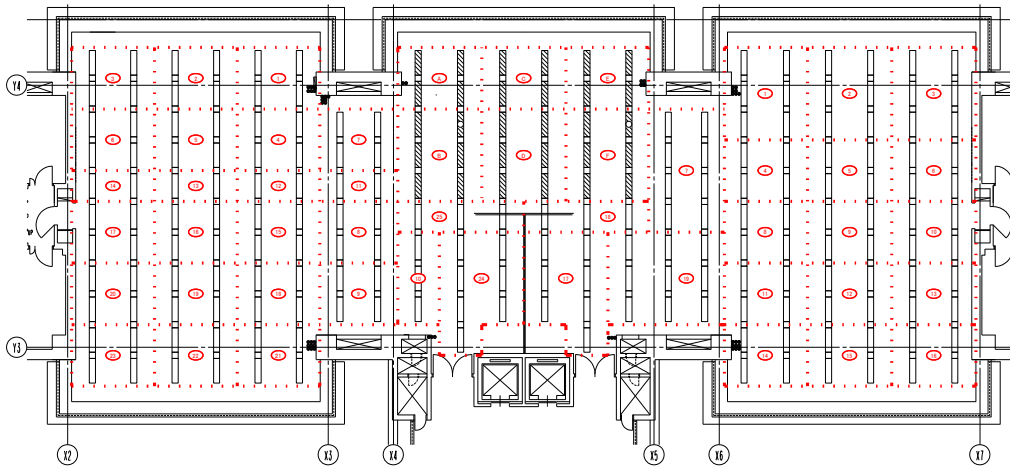
	Type of Lamp	Energy use (W)	Number	Total Energy use
Prior to retrofit	Fluorescent 40W-2	94	214	20.1kW
After retrofit	LED	48 × 57%	74	6.9kW
		48 × 72%	140	
Energy saving				13.2kW (66%)

Lighting retrofit

◆ Lighting retrofit on 4th floor (E&M design department office area)



Prior to retrofit 39 switching divisions



After retrofit 50 switching divisions

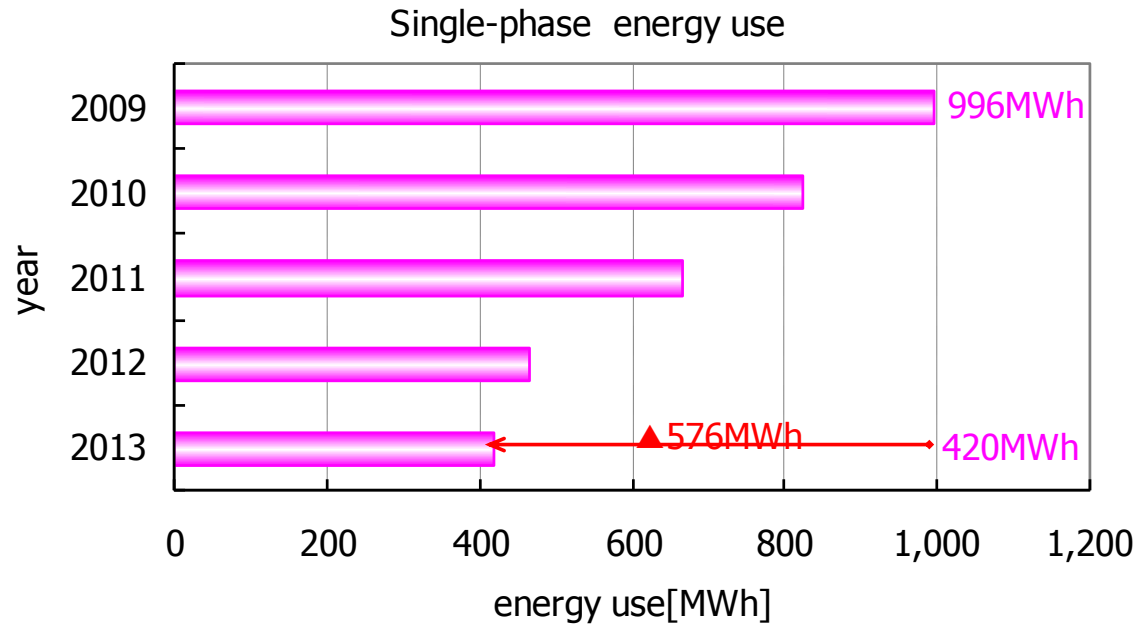
Improve lighting practices

- Switch off light in lunch time
- Effective use of daylight or task light



Energy efficiency

◆ Reduction of single-phase energy usage



Distribution board(1φ3W)

Usually in old office buildings, measurement is not able to separate usage by lighting and usage by outlet and others because of electrical main line.

Example of subsidize retrofit project

◆ A subsidized retrofit project in Japan

建築物省エネ改修等推進事業(国土交通省)

Subsidy to promote retrofit for energy saving of architecture (Ministry of Land, Infrastructure, Transport and Tourism)

This subsidy is provided for retrofit for energy saving, barrier-free and energy measurement retrofits.

Project requirement example

- ・Retrofit building envelope system (insulation, eaves, louver, glazing etc)
- ・Estimate more than 15% energy saving
- ・Measure energy usage, continuous energy management, energy saving measures

Percentage in construction cost

Percentage: a third of construction cost



Thank you !

We are waiting for you on 1st Oct