

Promotion of ZEB Renovation Projects in Existing Buildings



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Current State of ZEB Renovations in Existing Buildings



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1 Less existing buildings take the ZEB route than new construction

Why? 

Reasons

- 1 ZEB has not penetrated to the owners and top management of existing buildings
- 2 Many people believe that a reduction rate of 50% or more on existing building renovations is difficult
- 3 There are not enough building drawings and equipment drawings etc. required for web performance calculations
- 4 There is a worry that large-scale renovations will interfere with business
- 5 The capital investment will increase with a large-scale renovation
- 6 The partial renovation of existing facilities has been completed, making it difficult to convert to ZEB
- 7 For large-scale renovations, it is difficult to choose partial renovation
- 8 Removal work ⇒ Removal and loading work adjusted to renovation times (high cost)

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 I See!

Considerations

- 1 A reduction rate of more than 50% on ZEB criteria for existing renovations is not difficult to achieve
- 2 Old style air conditioners and lighting ⇒ Power consumption of 50% or less with latest energy-saving models

Buildings built more than 15 years ago should be updated as soon as possible

- 3 Maintenance costs due to faults and repairs will soar

Life cycle costs (lifetime costs) are higher with partial repairs

- 4 It is time to update the facilities in buildings that were built more than 15 years ago

Should consider ZEB renovation

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2 Outline of ZEB renovation projects handled by our company for existing buildings

	Name of Building	Year	Floor Area (㎡)	Use	Age (years)	Region Class	Reduction Rate (%)	
							Not incl. PV	Incl. PV
1	Home Center Brico Kera Store	2014	2,481	Market	19	7	51.4	52.9
2	Onomiso Special Elderly Nursing Home	"	2,765	Nursing Home	22	6	51.4	54.7
3	Aonoyama Special Elderly Nursing Home	2016	3,601	Nursing Home	23	6	57.1	62.2
4	Home Center Brico Sanbashi Store	"	3,753	Market	19	7	57.2	62.5
5	Yamasaki Orthopedic Hospital	2016-2017	4,193	Hospital	44	5	51.6	52.8
6	Sawarabi Long-term Care Welfare Center	2017	3,927	Nursing Home	23	7	52.3	54.3
7	Tosa Seifuen Special Elderly Nursing Home	"	4,046	Nursing Home	17	7	53.9	56.8
8	Kochi Joto Hospital	2017-2018	10,716	Hospital	36	7	51.5	52.2
9	Joseikan	2018	11,944	Hotel	24	7	55.5	56.0

* Of the 19 ZEB cases from the 2014 supplementary budget to 2018, 9, or about 50% were ZEB renovations of existing buildings

* ZEB renovations are possible on existing buildings, regardless of the building use

* There are many existing buildings whose statutory useful life has passed more than 15 years, and are ready for renovation

3 Requirements and Reasons for ZEB Renovations

1 Architectural drawings are available
(confirmation certificate, completion drawings, record drawings) etc.

Outer wall web performance (PAL*) can be calculated

2 Facility drawings are available
(electrical work, machinery and equipment construction, record drawings)

ZEB conversion plans are simple to set up

3 Understand overview of renovated facilities

Determine whether energy-saving equipment can be reused (update if not energy-saving)

4 Owner cooperation system

ZEB renovation construction will take place while maintaining facility sales

It is essential that construction take place with response to residents and a cooperation system for the construction period

5 Cooperation on site surveys
Many inconsistencies between completion drawings and actual finished work (changes after completion)
⇒ Need to understand actual condition before a renovation


6 Organization of ZEB Promotion Committee
Organization of a project promotion system is essential (owners, managers, planners, persons in charge of design etc.)

7 Time availability
Site survey and implementation design take a long time
⇒ Not compatible with the assistance application schedule in the case of Japan

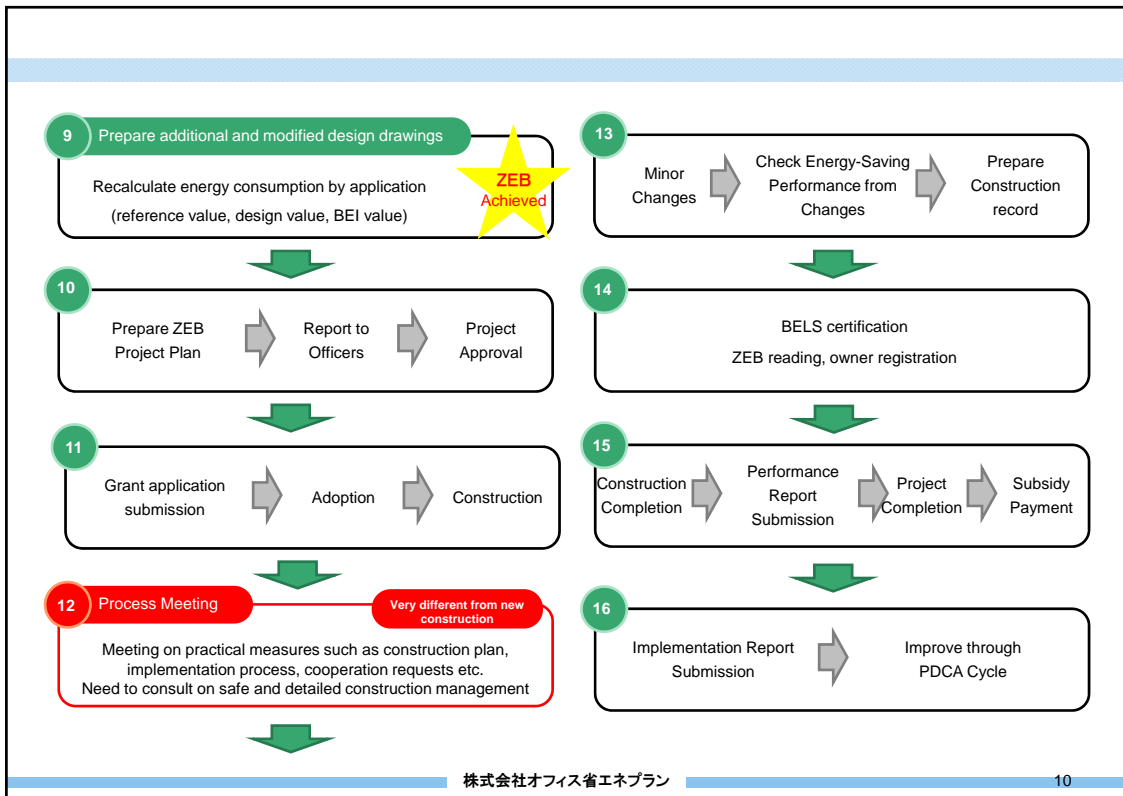
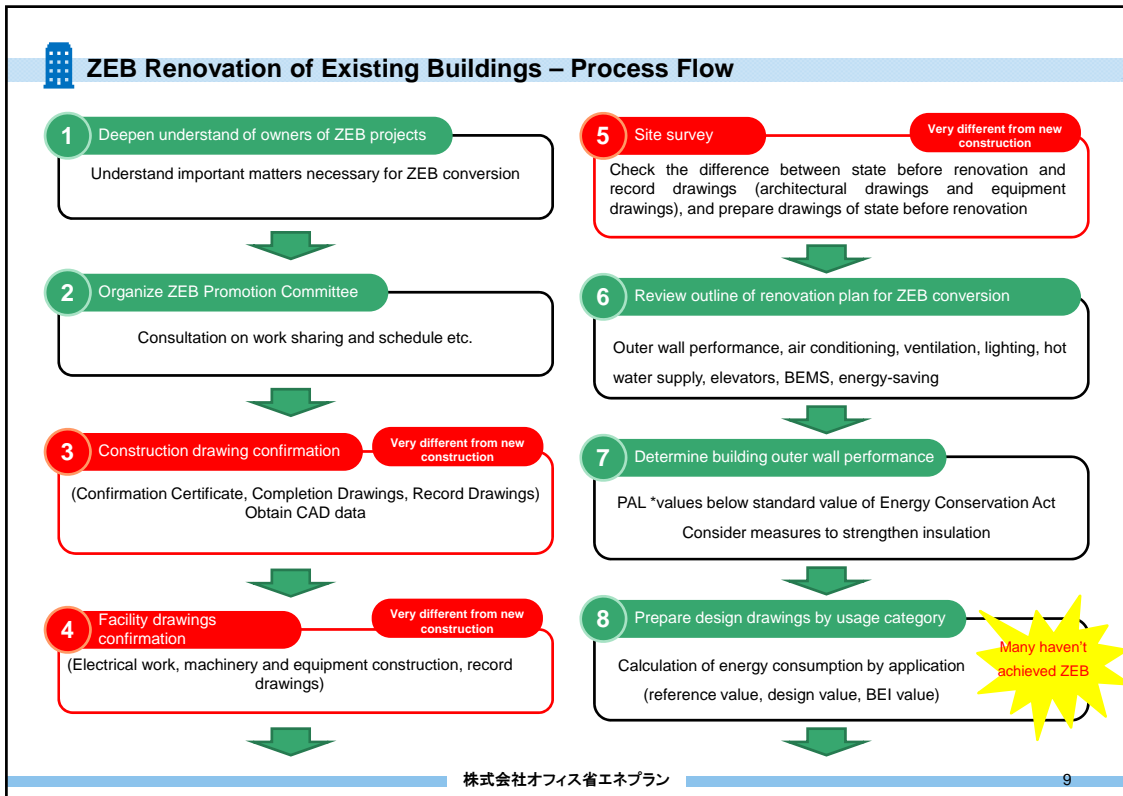
8 Other structural or aesthetic limitations of the existing building
Confirmed issues with the installation of solar power generation and solar heat use equipment etc.

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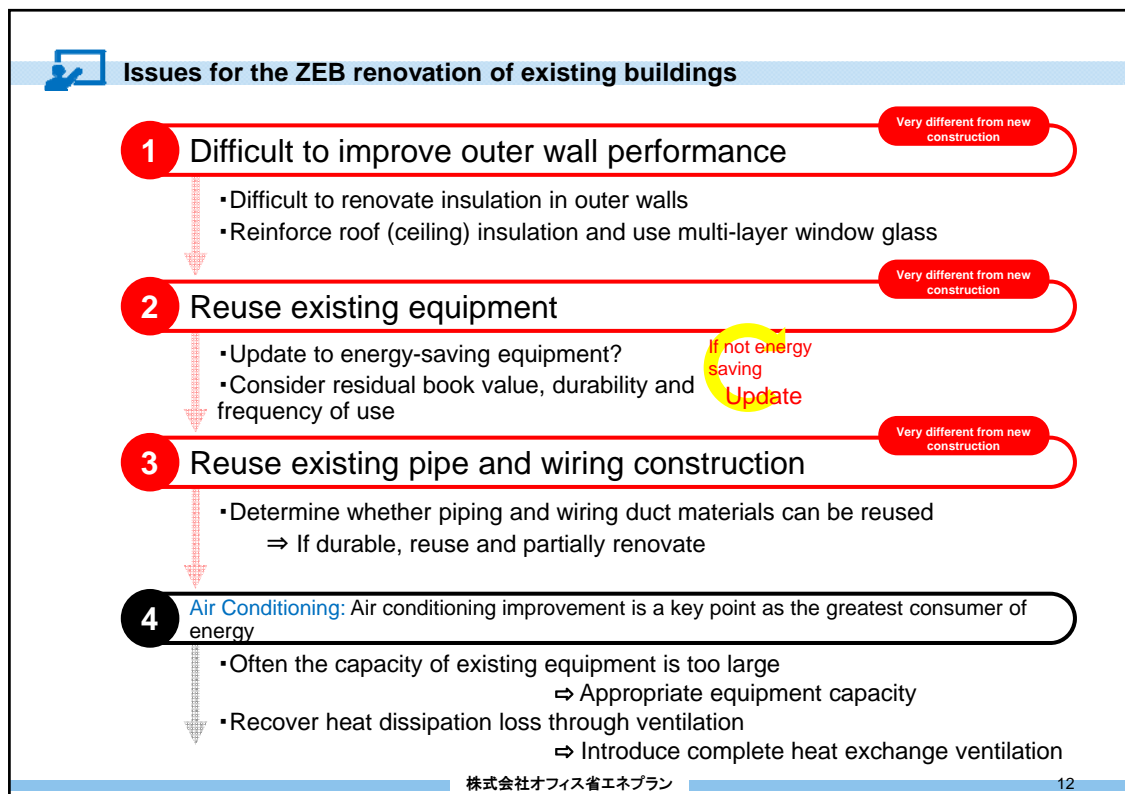
Approach of ZEB Proposals to Building Owners

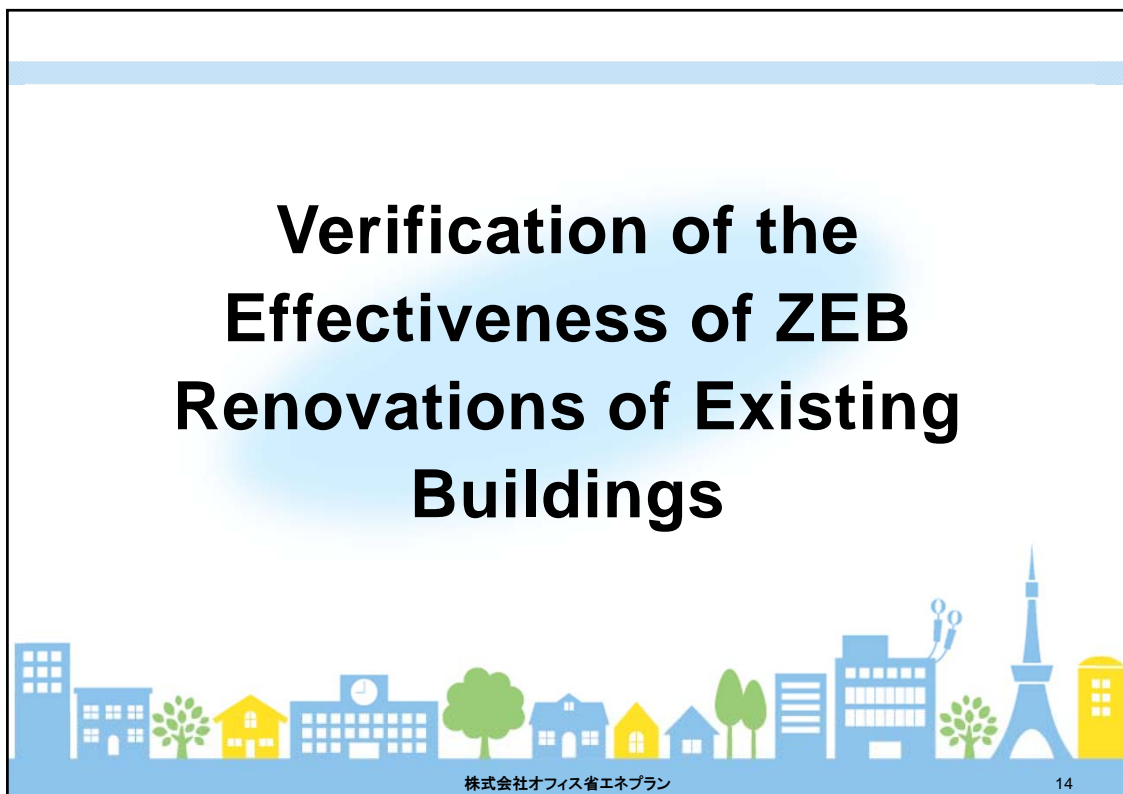
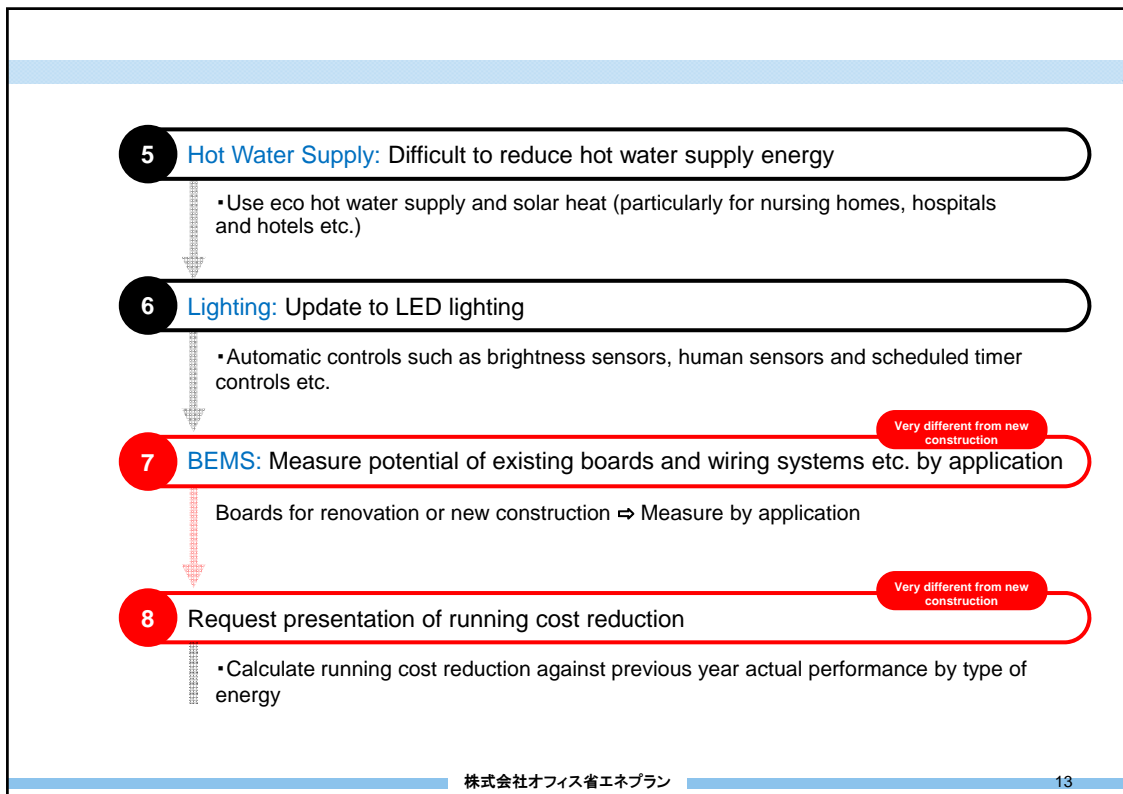


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Issues in ZEB Renovations of Existing Buildings





1 Relationship between the Web calculated primary energy reduction rate and running cost reduction rate

In the case of a reduction rate of 50%, the running cost reduction is not 50%

↓

Request presentation of reduction of running costs

2 Running cost reduction calculation
(calculation is not necessary for ZEB project application)

Calculate running costs by type or energy (electricity, oil, gas) by application category

3 Ventilation facility and other
(OA equipment) energy consumption can be difficult to measure


Most existing buildings have power supplied from electric socket outlets (shared wiring with other equipment)

4 Actual Evaluation Method: Manage measurements on the computer by month for each application category (reference value, design value, actual value, achieved rate etc.)

ZEB Promotion Committee in Japan analyzes monthly and annual reports and makes improvements through the PDCA cycle.

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Approach Utilizing Local Government Policies



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Important to broadly spread awareness through cooperation with local governments etc.

Kochi Prefecture New Energy Promotion Division

- ◆ Holding various meetings, training sessions and presentations to promote the spread of new energy
 - ◆ Subsidies to welfare facilities (evacuation centers), hospitals and clinics (rescue hospitals, medical aid centers)
- Solare power generation and storage battery assistance (1/3, up to 5 million yen)

Kochi City New Energy Promotion Division

- ◆ Holding various meetings, training sessions and presentations to promote the spread of new energy
 - ◆ Subsidies to ZEB selected sites
- Solare power generation and storage battery assistance (planned from 2019, Subsidy rate of 1/6)

Value of ZEB in Planning




- 1 **Emphasis on a building's life cycle cost (LCC: lifetime cost)**
 $LCC = (\text{Initial Cost}) + (\text{Running Cost}) + (\text{Repair Cost etc.}) + (\text{Disposal Cost etc.})$
- 2 **LCC is more than 4 times the initial cost ⇒ Reducing running costs reduces the LCC**
 ZEB is the most effective way to lower LCC ⇒ Cost-effectiveness is high ⇒ Value of introduction is high
- 3 **Energy resources are scarce in Japan ⇒ Future energy prices will inevitably rise**
 Primary energy reduction ⇒ Reduction in rise range of water and utility costs ⇒ Safer, and insurance for the future
- 4 **ZEB ⇒ Reduce ordinary expenses ⇒ Use surplus money for new services and improvements**
- 5 **ZEB ⇒ Contribute to the global environment ⇒ Improved employee consciousness and great social contribution**
- 6 **ZEB ⇒ Running cost reductions you can see ⇒ Repeat and introduce other facilities etc.**

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Example of a Case Study

(Yamazaki Surgical and Orthopedic Hospital)



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Project outline Fiscal 2017 Subsidy for expenses for promotion of introduction of innovative energy-saving technology for houses and buildings (Verification project of Net-Zero Energy Building)

Name of the subsidized project: Yamazaki Surgical and Orthopedic Hospital ZEB development project

Name of the subsidized building: Medical Corporation Sanshukai

[Hot water supply equipment]

- Heat pump water heater (15 kW)
- Hot water storage unit for the above (560 L)

* Eco-friendly hot water supply system for business use comprised of a heat pump and a hot water storage tank unit

* Leveling of peak load by heat storage, utilization of midnight electric power and high-load high-efficiency operation

* The existing and renewed latent heat recovery type gas water heater shall be reused.

[Air conditioning equipment]

- Multi air conditioner outdoor unit (high efficiency type)
- Package air conditioner outdoor unit (energy-saving type)
- Individual air conditioner outdoor unit (energy-saving type)
- Indoor unit
- Energy-saving air-conditioning system by combination of a high-efficiency multi air conditioner for buildings and an energy-saving type individual air conditioner
- Air conditioning control by centralized remote control


[Lighting equipment]

- LED base light
- LED down light, etc.
- LED guide light
- Light control switch

* Overall adoption of LED lighting equipment

* Adoption of LED guide lights

* Prevention of forgotten light-out by motion sensors



[Photovoltaic power generation]

- Photovoltaic power generation (10.8 kW)
- Power conditioner (10 kW)
- Actinometer
- Outside-air temperature gauge

* Installation of photovoltaic power generation device on the roof surface (10 kW)

* The generated power is interconnected to the grid system of the Shikoku Electric Power Co., Inc. as well as self-consumed.

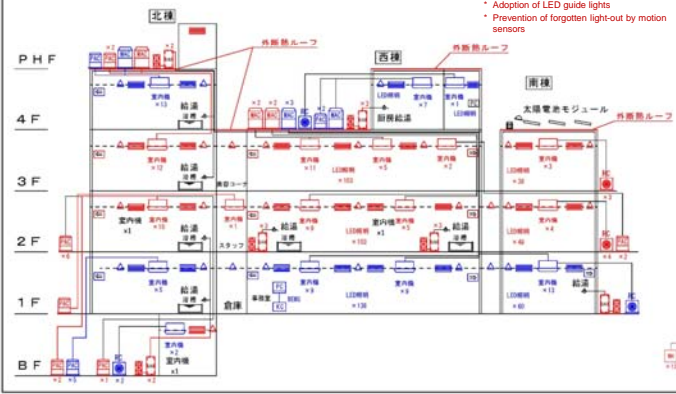
* Subsidy is applied to the Japan Environment Association.

[Performance improvement of outer surface]

- Construction of externally heat insulation on the flat roof of the top floor (rigid urethane foam 50 mm)

[BEMS]

- Central monitoring personal computer
- Control software
- Communication adapter
- Measuring equipment



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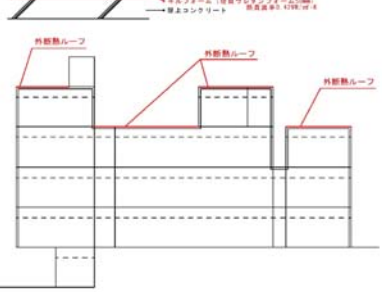
◆System Concept Diagram (Comparison of Before and After ZEB Renovation)

[Outer surface]

Before

After

* 最上階の換気屋根部をサーモコントロール断熱防水工法により外皮性能の向上 (硬質ウレタンフォーム系断熱材 50mm t)



PA L・基準値=5.93
PA L・設計値=4.42

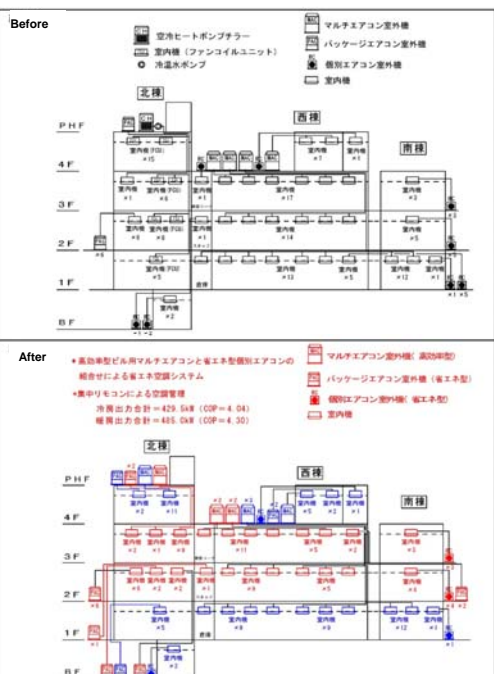
[Air conditioning equipment]

Before

- 空冷ヒートポンプチャラー
- 室内機 (ファンコイルユニット)
- 冷凍水ポンプ
- マルチエアコン室外機
- パッケージエアコン室外機
- 個別エアコン室外機
- 室内機

After

- 高効率型ビル用マルチエアコンと省エネ型個別エアコンの組合せによる省エネ空調システム
- 東リモコンによる空調管理
- 冷房出力合計=429.5kW (COP=4.04)
- 暖房出力合計=426.0kW (COP=4.20)
- マルチエアコン室外機 (高効率型)
- パッケージエアコン室外機 (省エネ型)
- 個別エアコン室外機 (省エネ型)
- 室内機



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