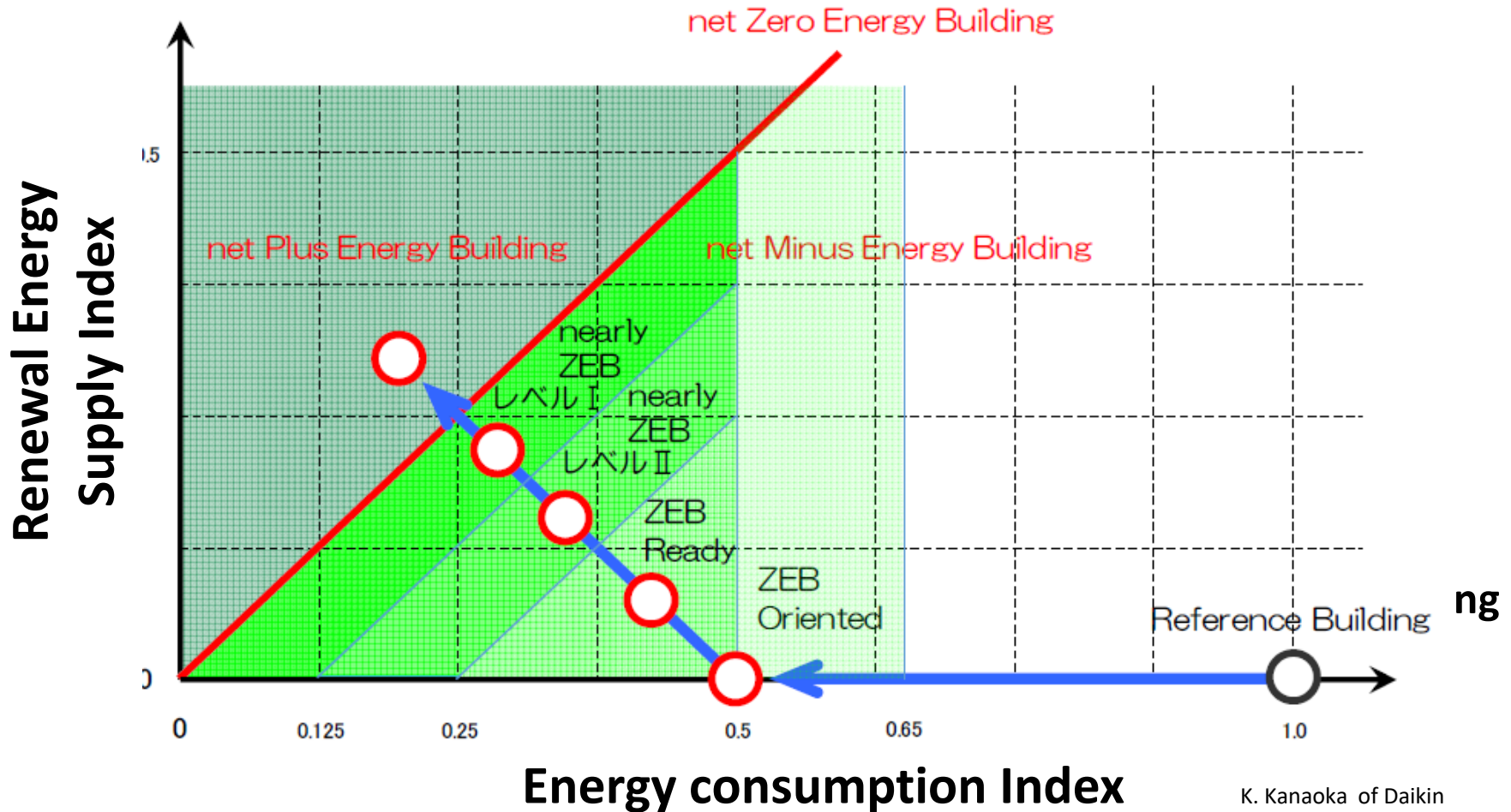




Zero Energy Building

Assisted by renewal energies and energy saving technologies, annual primary energy consumption is nearly equal to “zero” in the building



Technology Innovation Center (TIC)

● Profile

- ✓ Location: Osaka Japan
- ✓ Total floor area: 48000m²
- ✓ Number of floors : 6F+B1
- ✓ Number of occupants: 700
- ✓ Designed by: Nikken Sekkei
- ✓ Constructed by: Takenaka
- ✓ Completion: Nov. 2015



● Air conditioning System

- ✓ Air cooled VRV Heat Pump type : 930 HP for office area
- ✓ Air cooled VRV Heat Recovery type : 276 HP for office area
- ✓ Air cooled VRV Cooling only type : 20 HP for server room
- ✓ Water heat source VRV : 44 HP for entrance hall assisted by geothermal heat source

3 approaches to materialize ZEB

1. Passive Technologies

- ✓ Natural ventilation
- ✓ Natural illumination
- ✓ Solar radiation shading
- ✓ Thermal insulation coating



2. Active Technologies

- ✓ Ultra-high efficiency AC
- ✓ Ultra-high efficiency lighting



3. Creating Renewal energies

- ✓ Photo-battery
- ✓ Geothermal pile



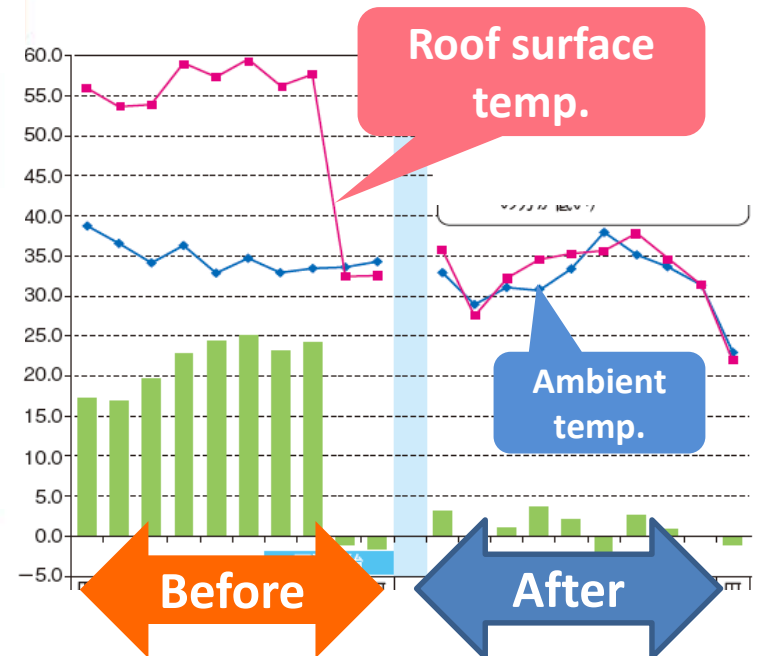
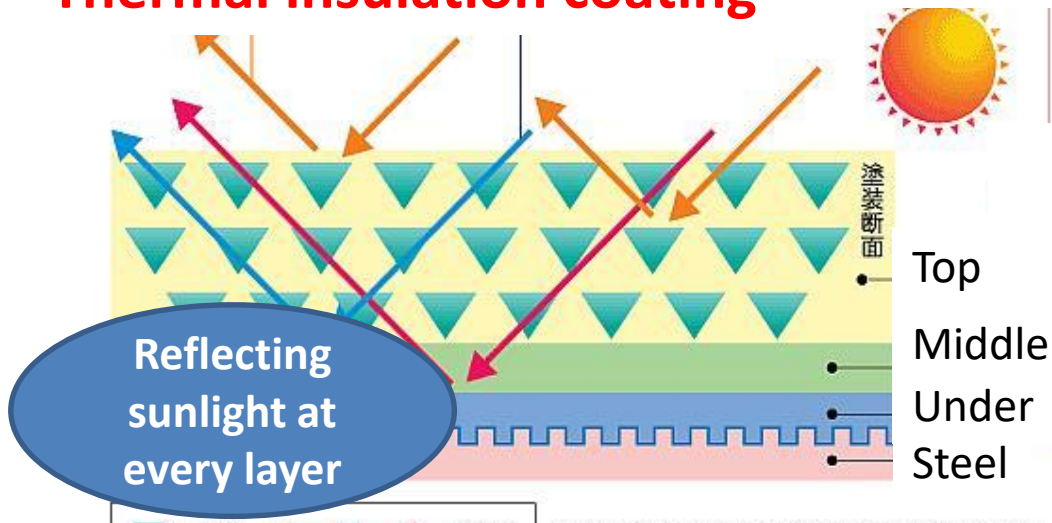
Passive Technology (1)



Solar radiation shading

- 50% shading of direct sunlight
- Unique eaves design creates attractive appearance
- The room is brightening by reflected sunlight at the top of eaves

Thermal insulation coating



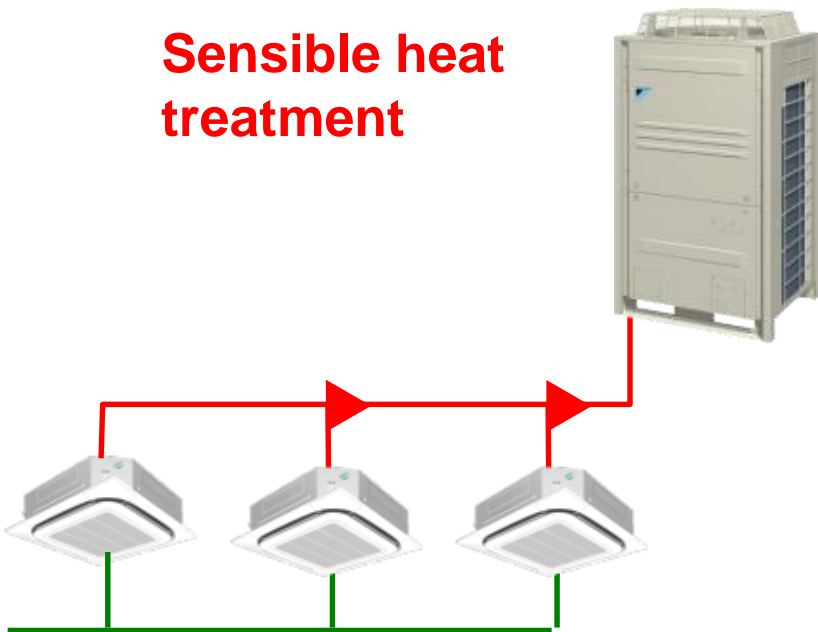
Active Technology

AC efficiency improvement

- ✓ Separated SH & LH treatment
- ✓ Variable Te control based on capacity demand
 - ▶ Excellent part load performance
- ✓ High efficiency dehumidifier
- ✓ Recovery of humidity absorber by rejected heat of condenser

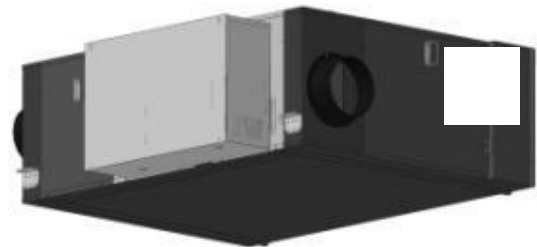
VRV

Sensible heat treatment



DESICA

Latent heat treatment



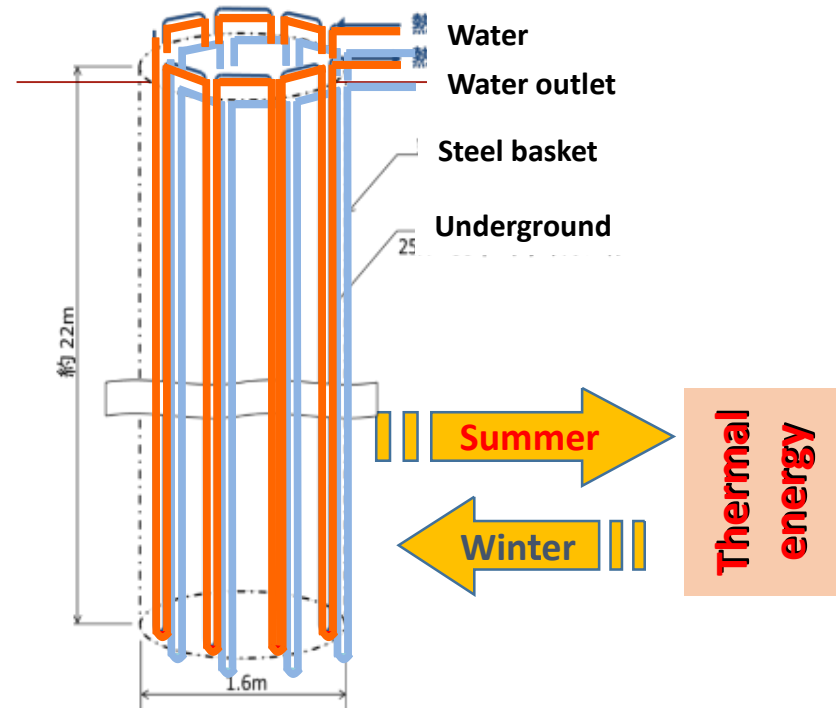
Renewal Energy (1)

Photo Battery



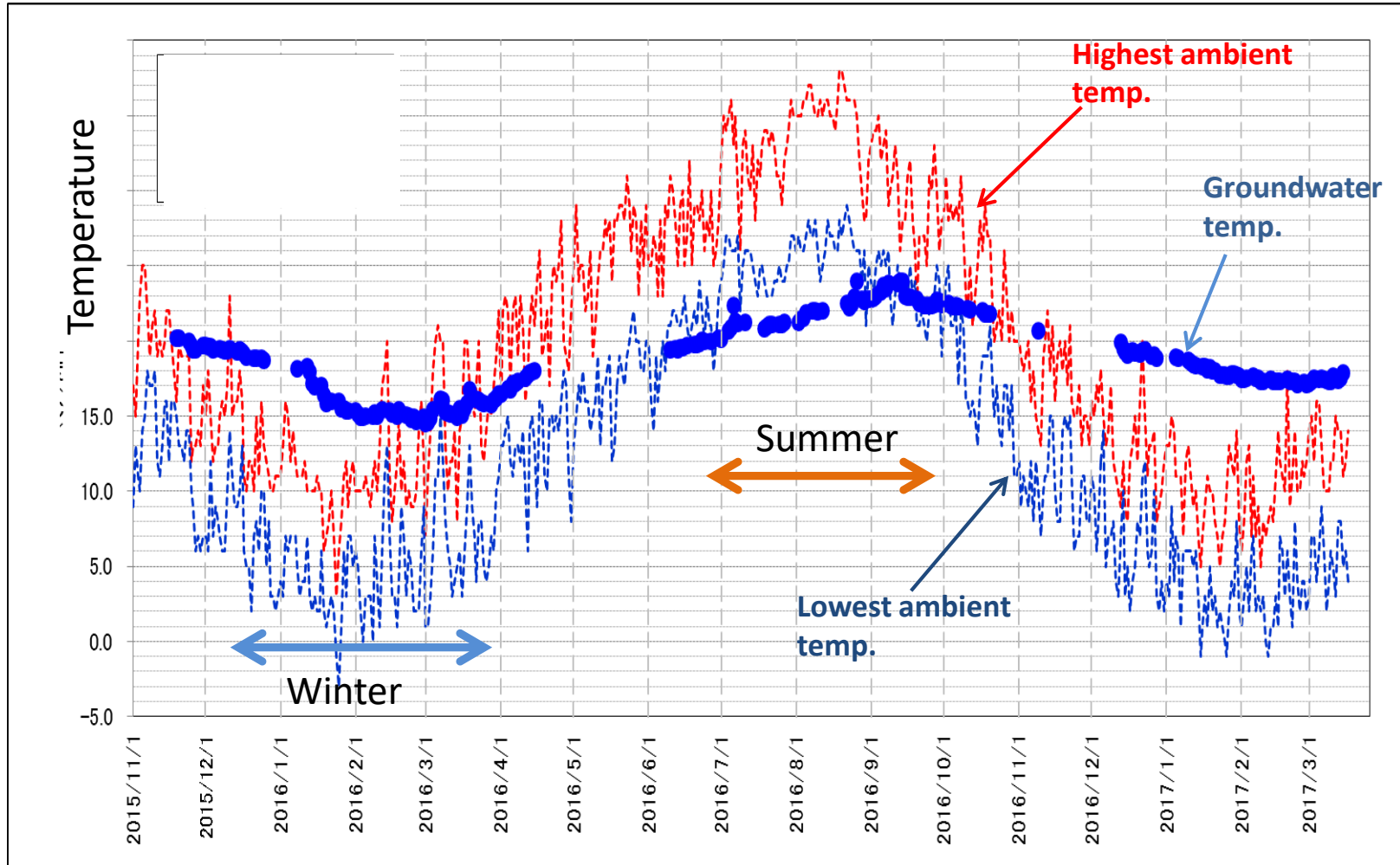
Fixed type : 263 KW
Tracking type : 37 Kw

Geothermal pile



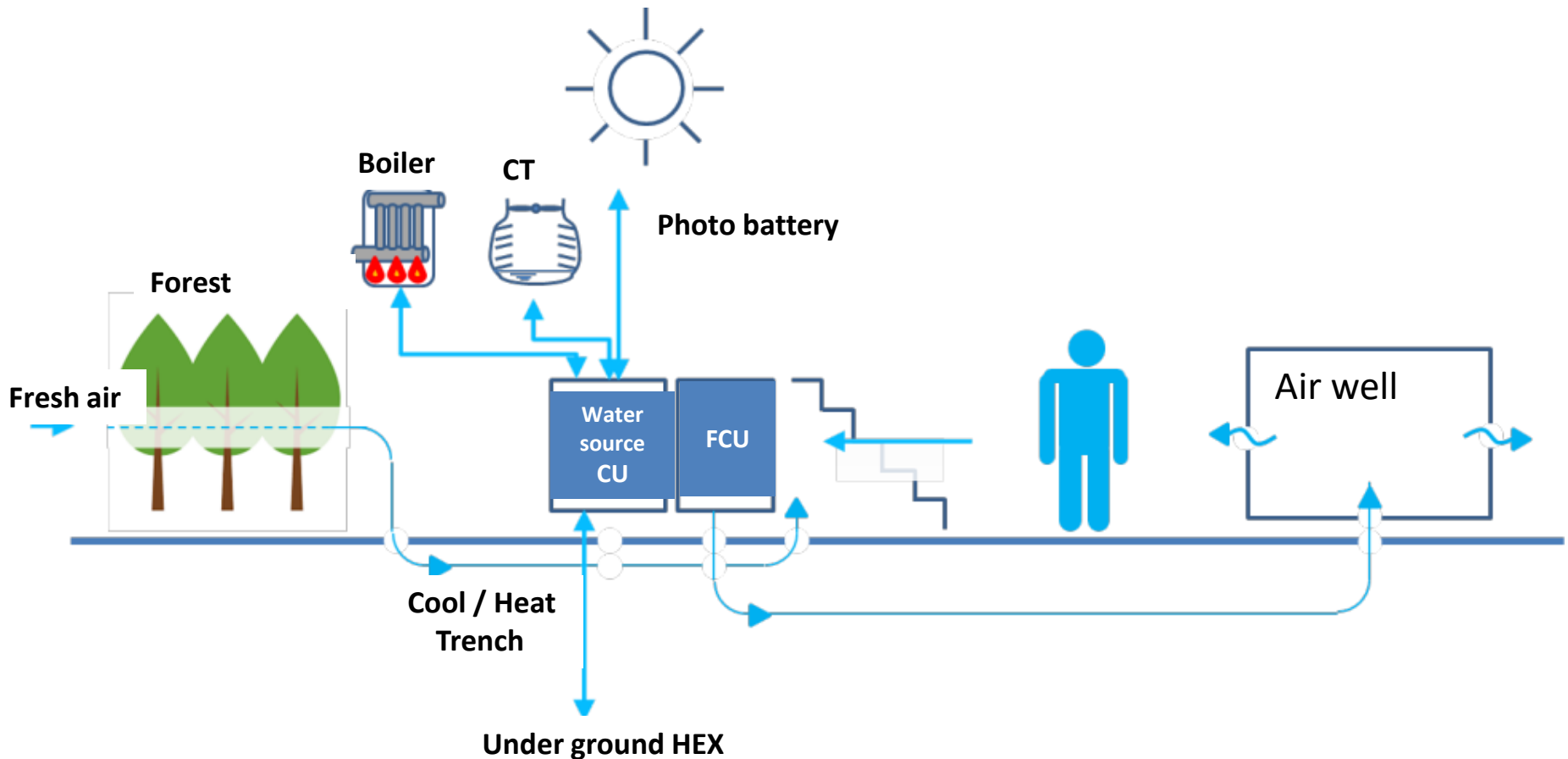
Renewal Energy (2)

Geothermal : Using stable temperature groundwater

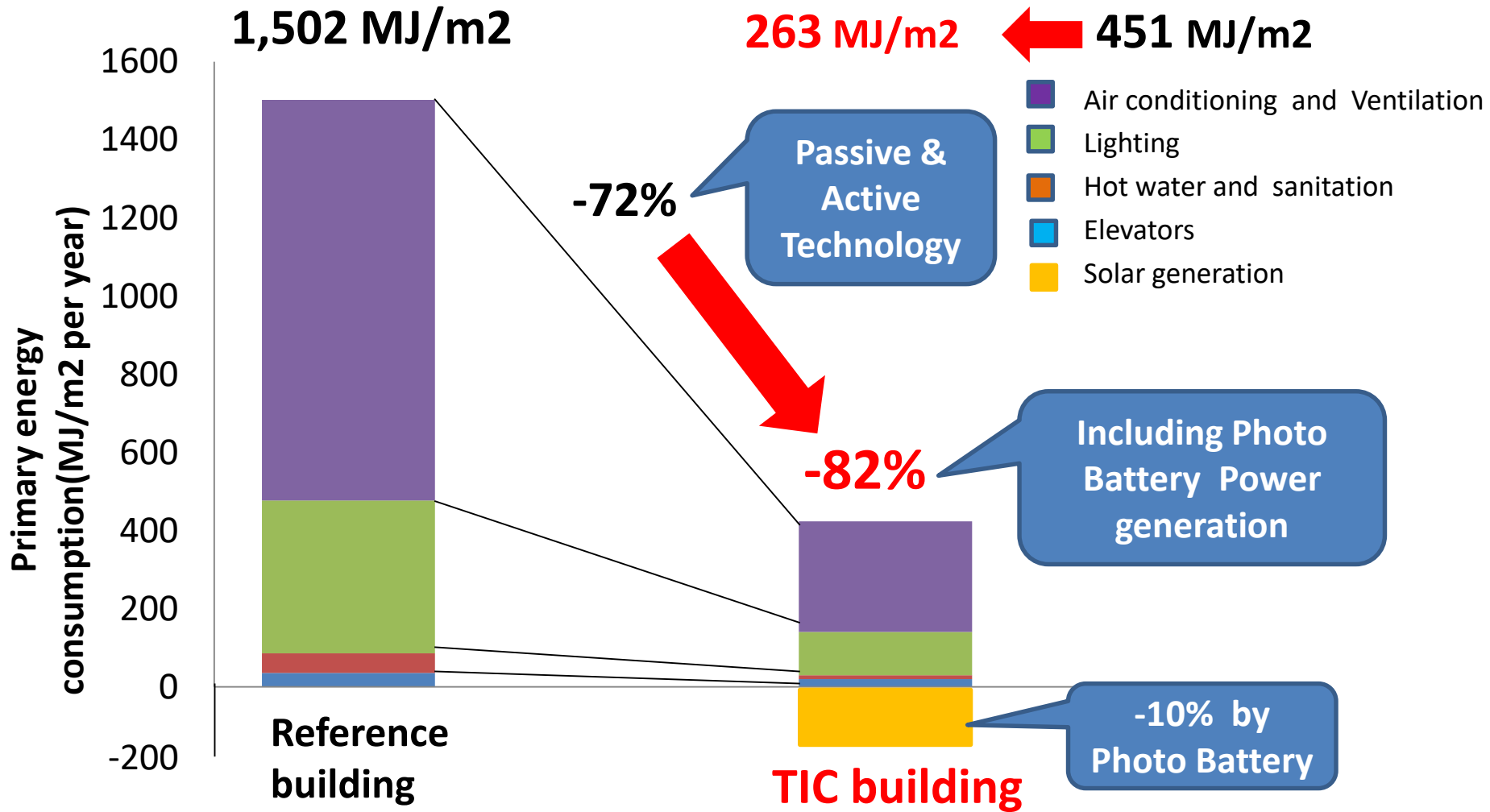


Renewal Energy (3)

Mobilize all renewal energy possibilities

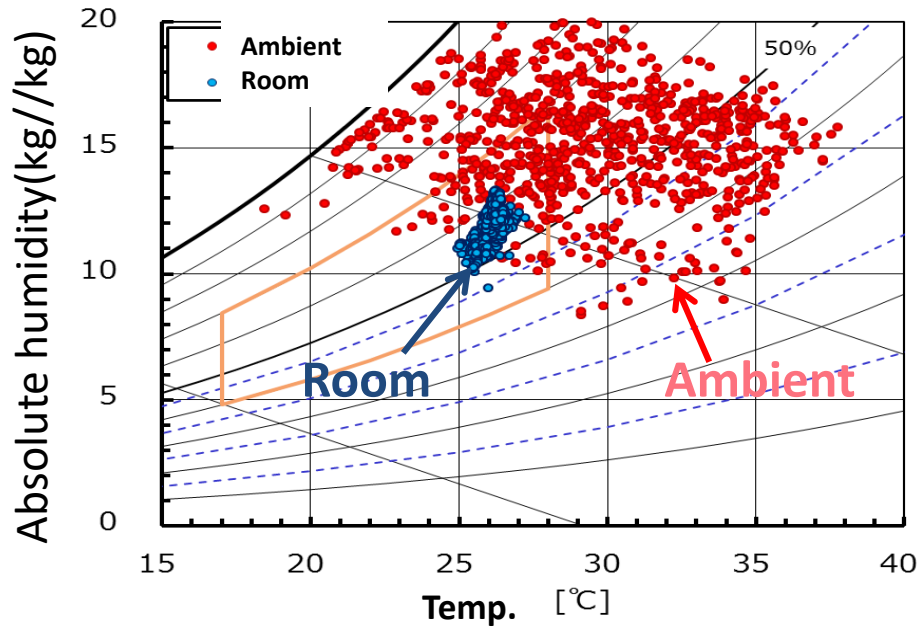


Annual power consumption



The result shows that the building earns a rank of “Nearly ZEB”

Summer



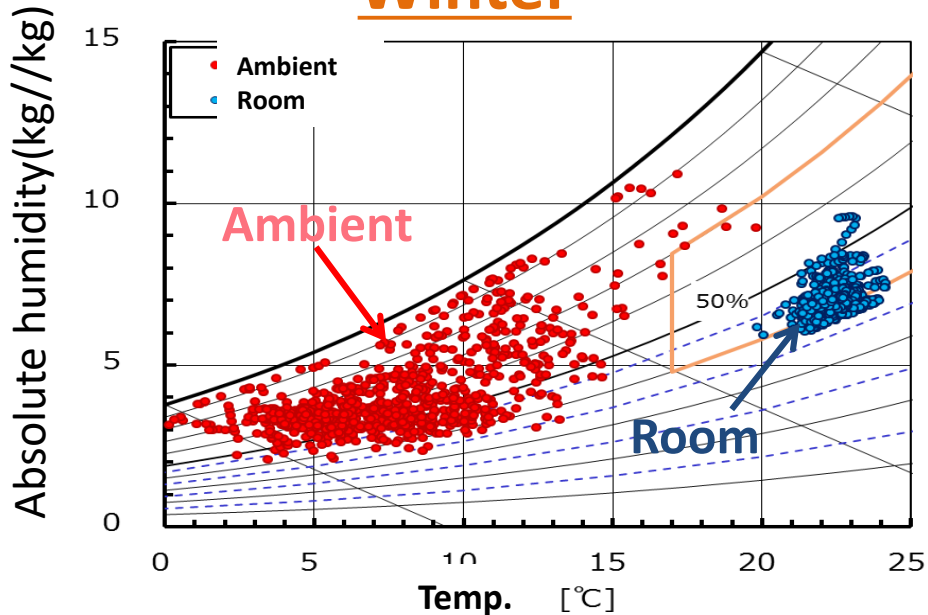
Room condition

Temp. : 25 – 27 C,
Humidity : 50-60%

Period: 15 June 2016 to 15 Sept. 2016

Target: 27°C 60%RH(13.4 g/kg)

Winter



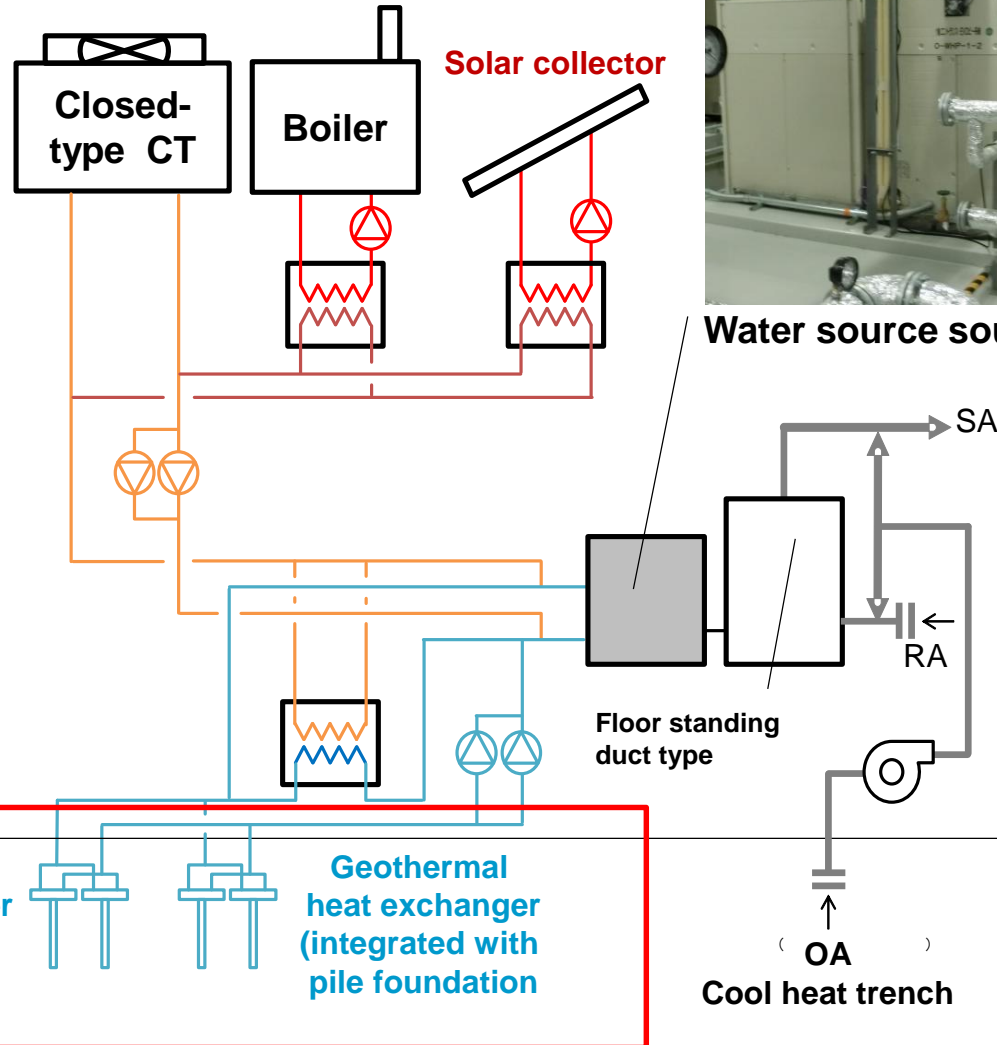
Temp. : 22 – 24 C,
Humidity : 40-50%

Period: 15 Dec. 2016 to 15 Mar.

2017 Target: 21°C 40% RH (6.2 g/kg)

Energy Saving AC System

Optimum integration of AC, Geothermal and Solar collector



Water source VRV

