

How can a midsize ZEB be both energy-efficient and comfortable?

Kyoto, Japan



Pursuing ZEB concepts in a midsize building

Panasonic Life Solutions Company's Kyoto Bldg. was designed on ZEB concepts so that the office space would be both comfortable and energy efficient. The idea was also to promote the spread of ZEB since Japan's Ministry of Economy, Trade and Industry wants new public buildings built in 2020 and beyond to be of ZEB design. The building was also planned as a showroom for providing information on midsize building solutions because, unlike high-rises that consume huge amounts of energy, midsize buildings can more easily balance the roof area where the solar panels are installed and the amount of energy consumed.

Moreover, it was also necessary to comply with building codes that Kyoto City placed on appearance within the cityscape, e.g., the color and lumination method of signs, rooftop greening, etc.



Full package of “energy generation”, “energy conservation” and “energy management” solutions reduced power consumption by about 35%.

As the “energy generation” solution, 10 kW crystalline solar cell modules were installed on the roof. For the “energy conservation” solution, LED downlights were chosen in the building and three types of high-efficiency lighting fixtures were installed for the 4th floor to compare the effects. The offices on all floors were outfitted with brightness sensors for detecting incoming outdoor light and a control system that automatically adjusts lighting output.

Proximity sensors dim lighting to 300 lx when users are away from their desks and shut the lights off if users are away for an extended length of time. The air conditioning is interlocked to shut off as well in order to conserve energy in any which way.

As the “energy management” solution, the WeLBA500 was introduced in order to centrally manage and control the building systems – lighting, air conditioning, power, alarm monitoring, energy measurement, etc. The compact BA system was perfect for managing the midsize building. Moreover, energy consumption in each area is automatically measured every 30 minutes by multiple-circuit energy monitors inside the power distribution panels on each floor, and the data is automatically stored in an “Eco-Sas” data center. Eco-Sas allows graph projections as well as simulations of energy-saving measures to be run online, so everything is planned out to enable building energy management.

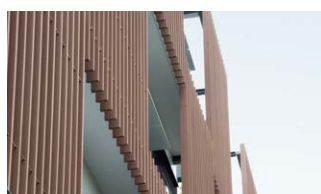


The thinking behind the ZEB concept is to reduce the building's power consumption to a minimum by enhancing the passive performance of the structure and optimally controlling high-efficiency systems, and producing that power with renewable energy so that the building's energy balance is zero. This building was completed as a showroom loaded with all sorts of clever ideas for achieving that. An energy conservation committee was created after the building was completed, and found that power consumption of the building as a whole decreased by about 35% in September 2011. And, energy conservation solutions have been pursued ever since.

Designed to let in natural light and breezes

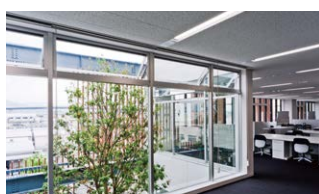
As another level of energy efficiency, the Kyoto Bldg. applies the concept of “energy harvesting” to reduce lighting and air conditioning loads by letting in natural light and breezes. It has vertical louvres similar to the traditional lattices seen on townhouses in Kyoto arrayed in a checkerboard pattern across the front of the building.

These louvres serve to reduce air conditioning load by blocking direct sunlight and solar radiated heat. Meanwhile, in the areas without the vertical louvres, light shelves have been introduced to block the sunlight in summer and reflect light off the underside of the eaves and towards the rear of the room inside. “Breeze channels” that introduce outside air were also created, in order to lessen air conditioning load during the cooler seasons of spring and autumn.



Shading

The vertical louvres serve to reduce air conditioning load by blocking direct sunlight and solar radiated heat.



Breeze harvesting

Creating breeze channels that let in outdoor air and allow it to circulate throughout the building.



Light harvesting

Light shelves block the sunlight in summer and reflect light off the underside of the eaves towards the rear of the room inside.



Greenery

A rooftop garden has been built in compliance with city codes. Also, to create a pleasant ambiance, local evergreen bamboo-leaved oaks are growing in a series of staggered courtyards and terraces between the 1st and 4th floors.

Installed Products



Solar Power System



Air Conditioning System



Facility Energy Monitoring System, “WeLBA Series”



Multi Circuit Energy Monitor



Passive Infrared Sensor



Surveillance Camera System



Eco-Friendly Lighting Fixtures



LED Lighting

