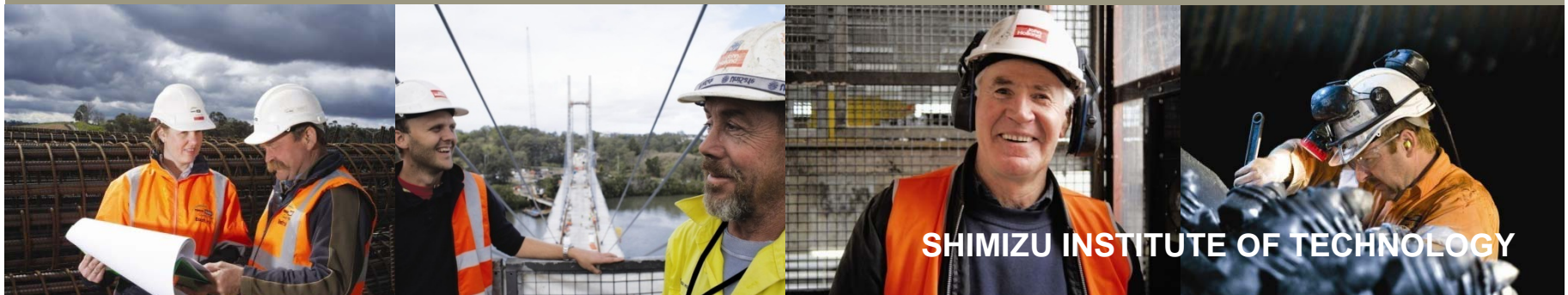


Presentation for the Royal Commission, Christchurch March 2012

Key challenge: Educating the Christchurch people that have experienced the trauma of the earthquakes that we can design safe buildings, low and high rise. We already have the technology.

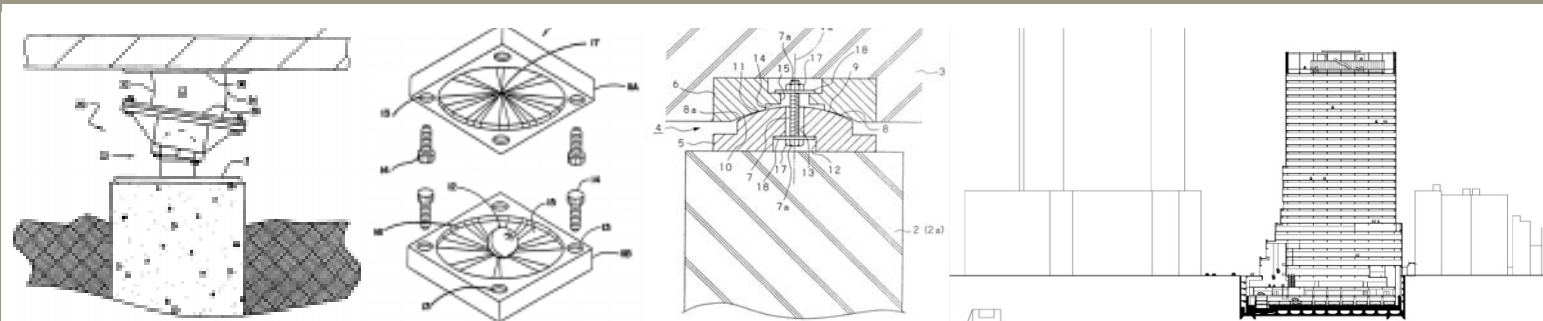


SHIMIZU PRESENTATION



SHIMIZU INSTITUTE OF TECHNOLOGY

SEISMIC ISOLATION



OVERVIEW OF INSTITUTE OF TECHNOLOGY

- The Shimizu Institute of Technology was Established in 1944
- It is first of its kind and is an urban research centre, planned for the purpose of realizing next-generation
- Approximately \$US70m is invested in Research and Development every year
- Comprises of seven research and development centres and a staffing department
- To respond to diverse market needs, the seven centres are involved in research and development across a wide range of technical fields
- Not only do these centres respond to customer requests, they also promote proposal-oriented research and development activities to identify latent customer needs

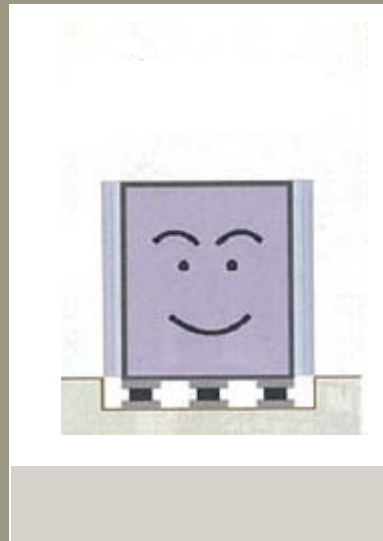
EARTHQUAKE PROOF DESIGN METHODS

Conventional Earthquake Resistant



Designed to make the columns and beams strong enough to withstand earthquake motions

Seismic Isolation



Designed to use base isolation devices to decouple a building from earthquake motions

Vibration Control



Designed to install damping devices into the frame to absorb vibration energy

MID STOREY SEISMIC ISOLATED STRUCTURE

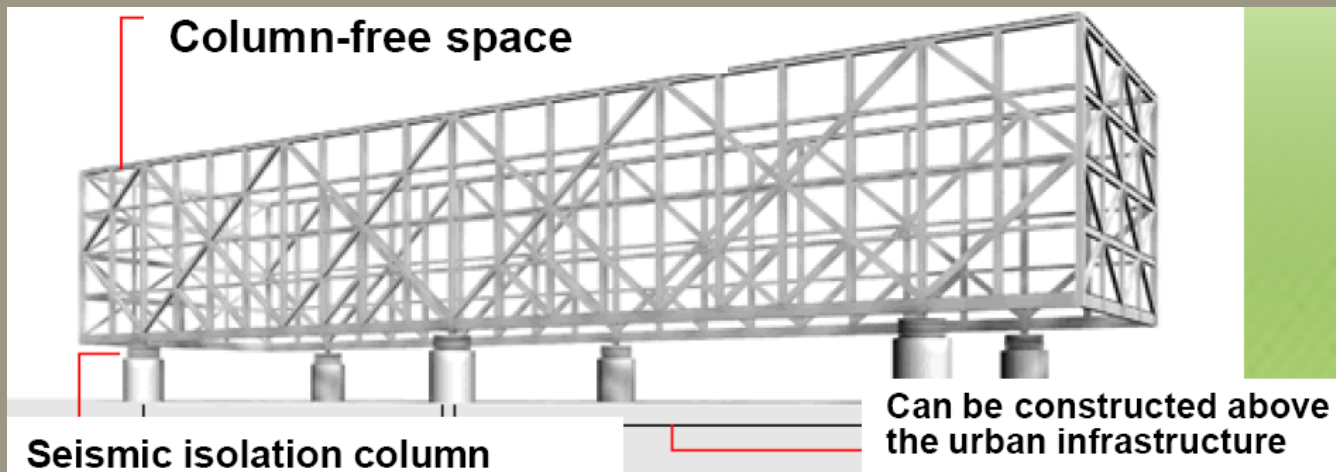
(Main Building of Institute)



Six columns can uphold the entire building

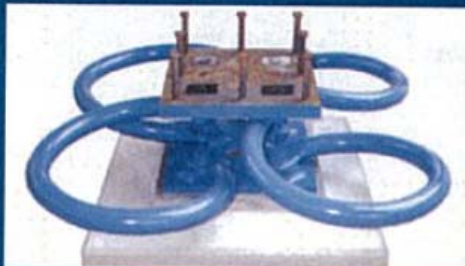
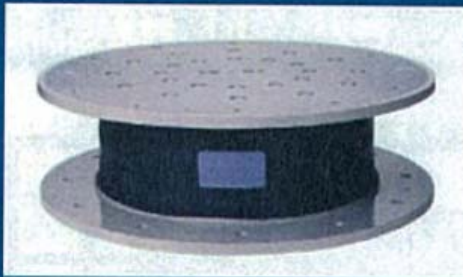


Lead-rubber bearing



SEISMIC ISOLATION SYSTEMS

Laminated Rubber Bearing
+
Steel damper, Lead damper

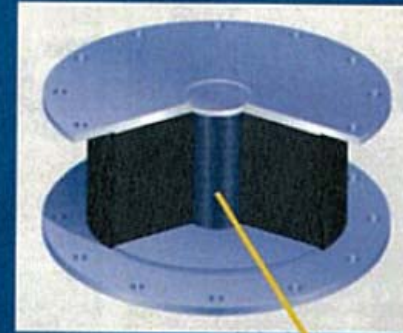


Steel damper



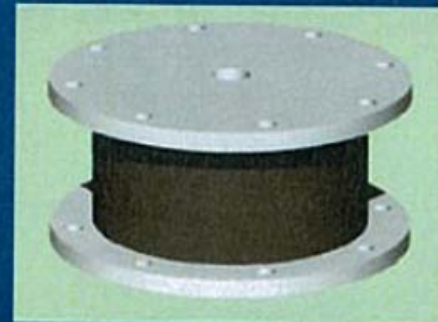
Lead damper

Lead-rubber bearing



Lead plug

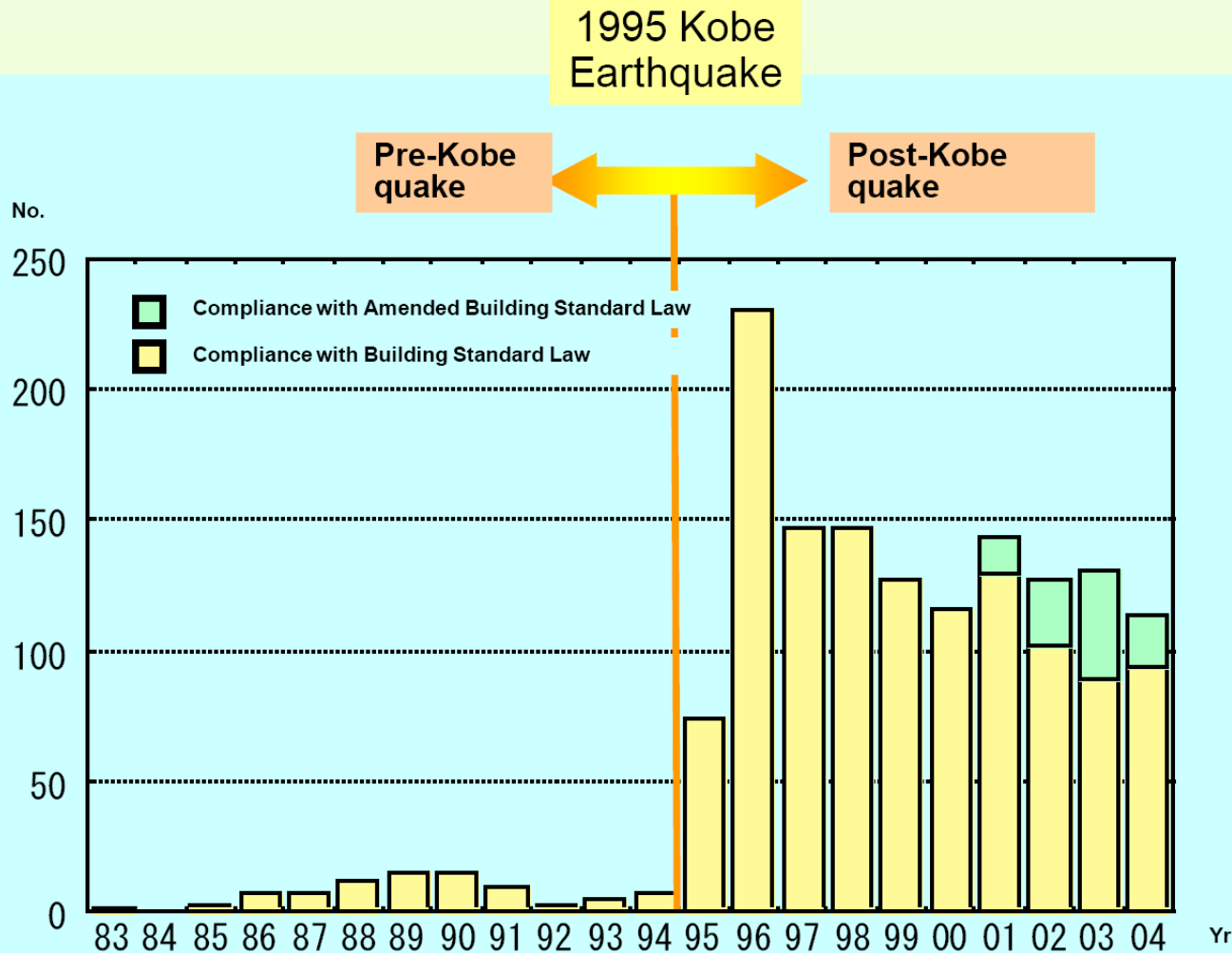
High Damping
Rubber Bearing



SEISMIC ISOLATED BUILDING REVIEWS

**John
Holland**

Fulton Hogan



PARTIAL-FLOAT SEISMIC ISOLATION SYSTEM

**John
Holland**

Fulton Hogan

(Wind Tunnel Testing Laboratory)



Total Floor Area:	1253m ²
No of Floors:	1 FI below and 1FI above ground
Structure:	RC (particularly steel-frame)
Weight:	2900t
Draft:	2.3m
Water Reservoir:	Plane area 830m ² Depth 4.5m Storage Volume 1540

CORE- SUSPENDED ISOLATION SYSTEM

John
Holland

Fulton Hogan



Structure: Core –suspended isolation structure, RC core shaft wall, steel-framed outer structure

Foundation: RHC pile foundation (800 x 4)

Floor Height: 1Fl. 4.15m, 2-4 Fl, 3.0m

Total Weight: About 180t (including live load)

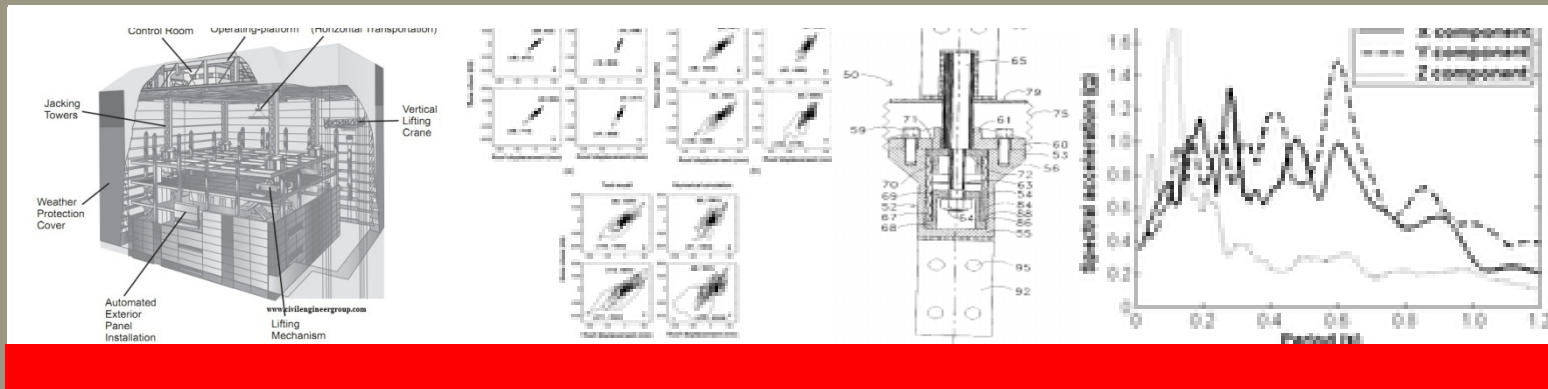
CONCEPTUAL DRAWINGS OF THE CSI SYSTEM

**John
Holland**

Fulton Hogan



ADVANCED BUILDING



HALF CARBON BUILDING

(Green Technologies of Shimizu HQ Project)

Half Carbon Building

50% reduction
in CO₂ Emissions

Advanced Technologies

Lighting System

Lighting system with daylight and LED

Air Cond. System

Air conditioning system for enhancement intellectual productivity

Exterior System

PC hybrid panels

EMS and Micro-grid

Micro-grid system with batteries and PVs

Existing Technologies

Roof top greening

VAV system

Outside air cooling control

Large temp. differential system

VWV system

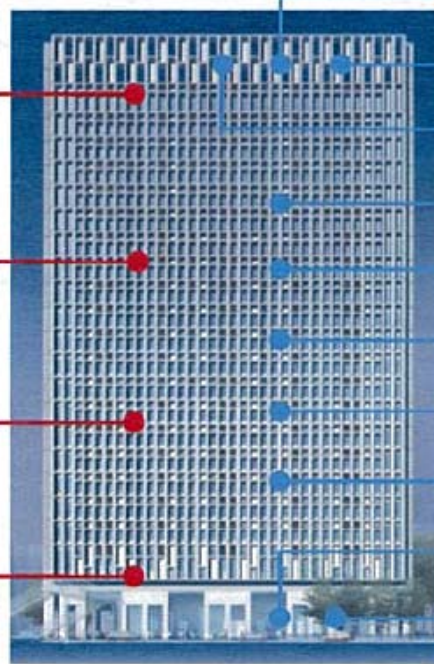
LED lighting

Reclaimed water

Water-equipment system

High efficiency transformer

Reuse the existing concrete



50% REDUCTION OF CO2 EMISSIONS

50% Reduction of CO2 Emissions

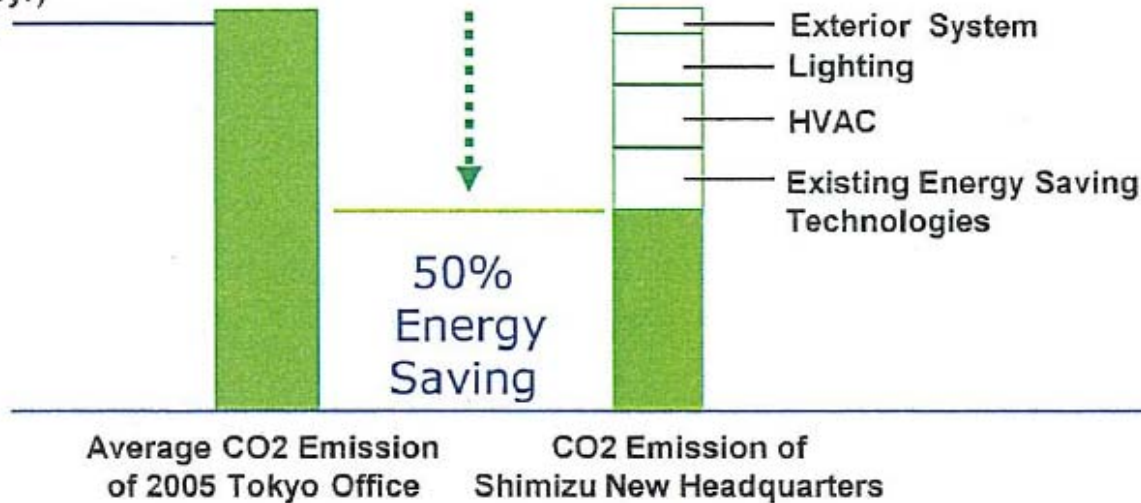
Hybrid Exterior

+

Hybrid HVAC

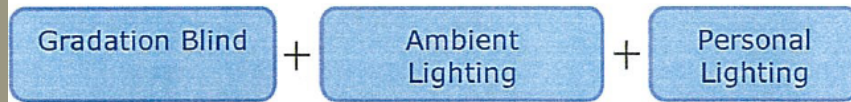
+

Hybrid Lighting

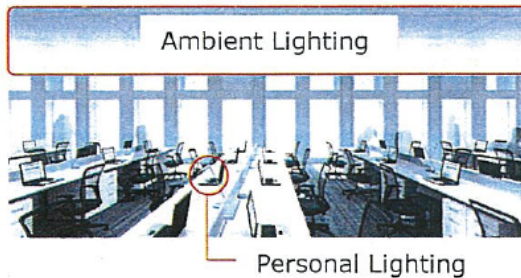
(t-CO₂/yr)
5000

HYBRID LIGHTING

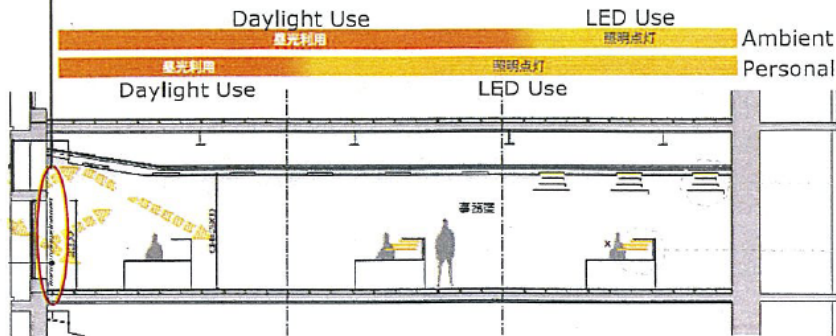
Hybrid Lighting



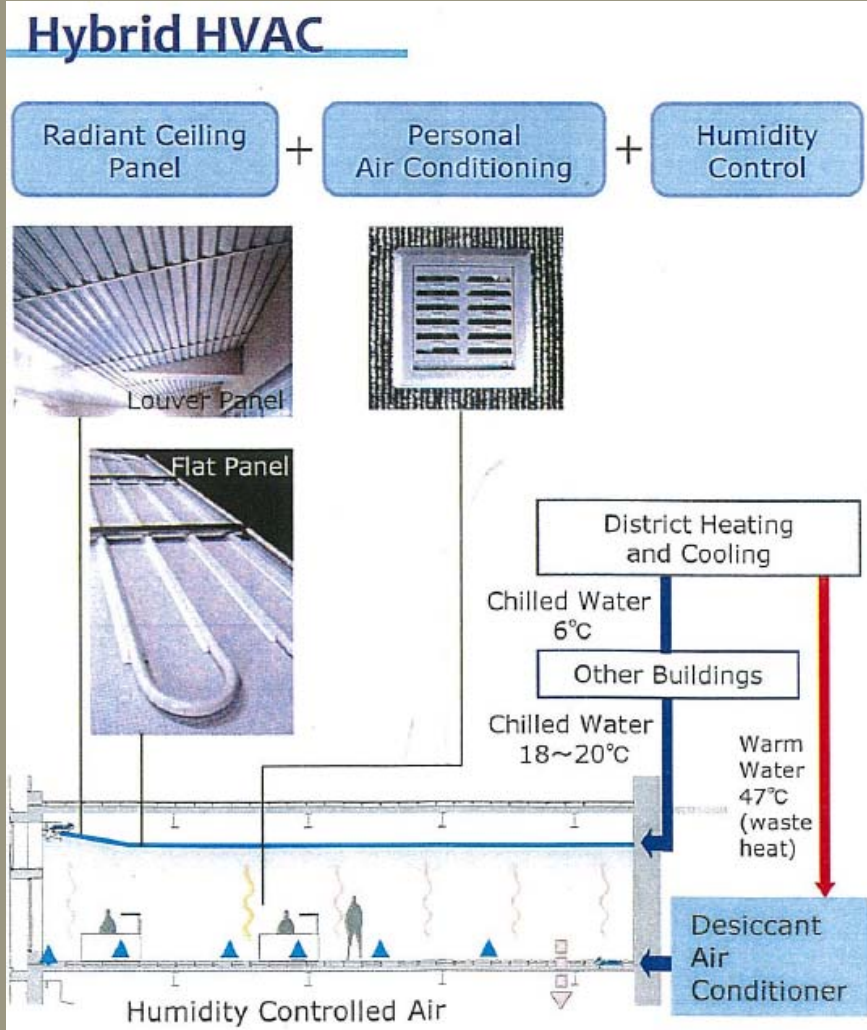
Daylight is used as indirect light, reducing usage of LED light.



Daylight + Ambient lighting offer sufficient light to work. Personal lighting is additional. All three maintain 700lx on the desktop.

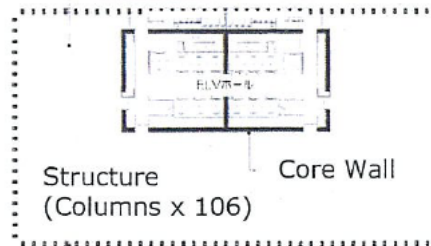
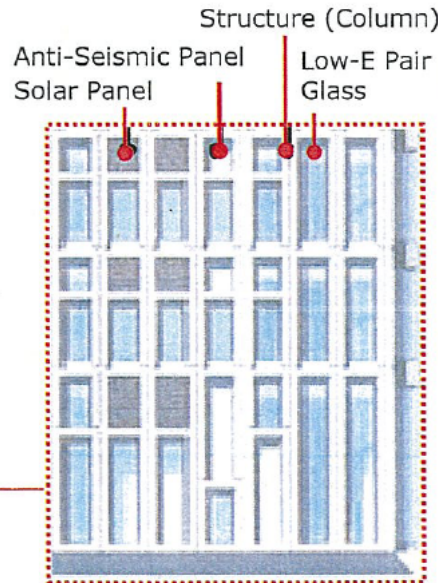
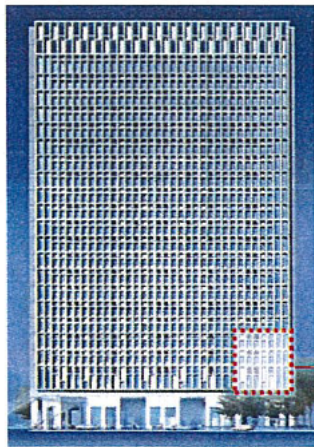


HYBRID HVAC



HYBRID EXTERIOR SYSTEM

Hybrid Exterior System



■ No-Column Floor

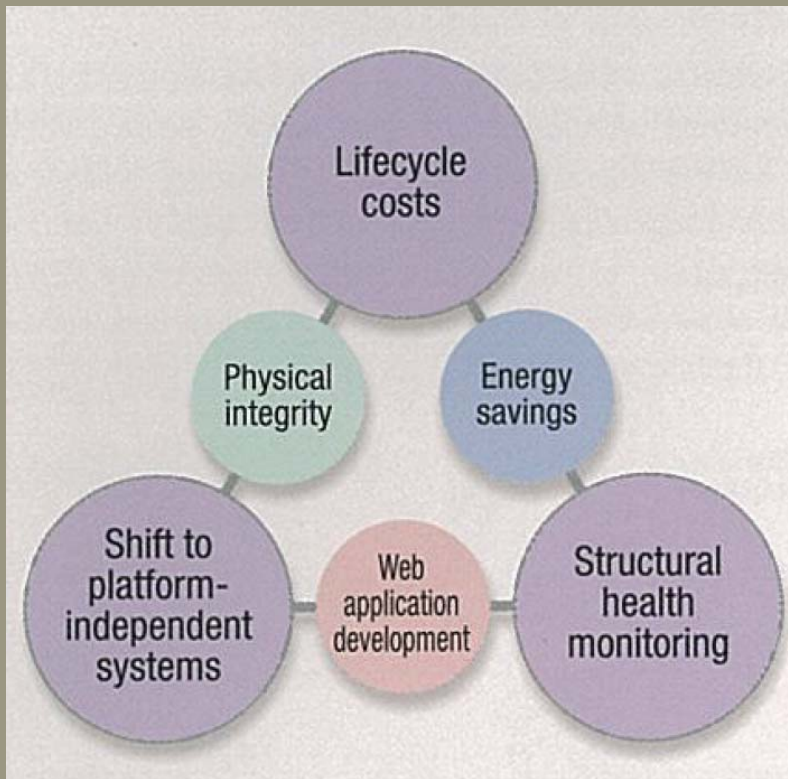
Anti-Seismic Panel, Core Wall, and 106 Beams permit no-column floor.

Standard Floor Plan

BUILDING MANAGEMENT SYSTEM

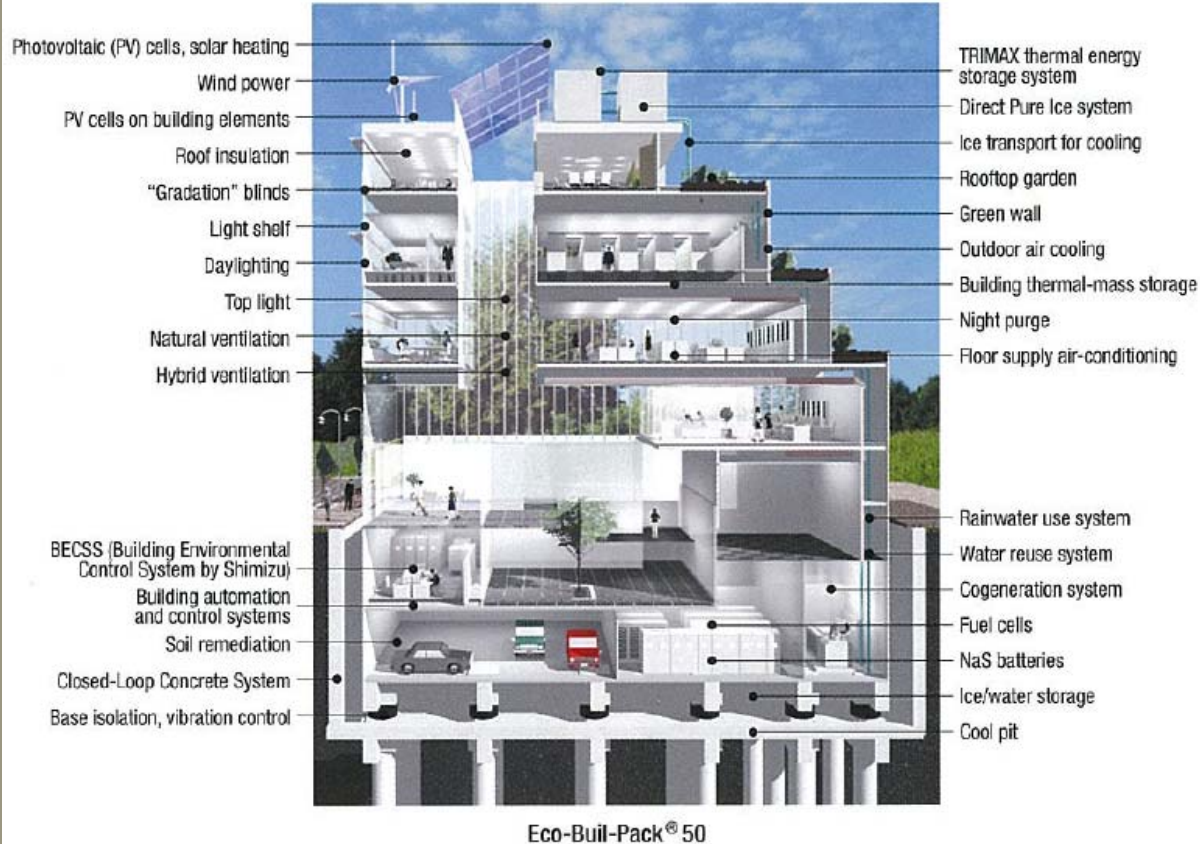
**John
Holland**

Fulton Hogan



Our BECSS System integrates supervisory control of building services, including HVAC systems, lighting, plumbing, and electrical equipment. It facilitates consistently efficient operation and is easy to link with other energy-control and life cycle support systems.

SUSTAINABLE ENVIRONMENT



Shimizu offers new ideas for environment-conscious buildings designed with optimized packages of technologies that help lighten load on our environment.

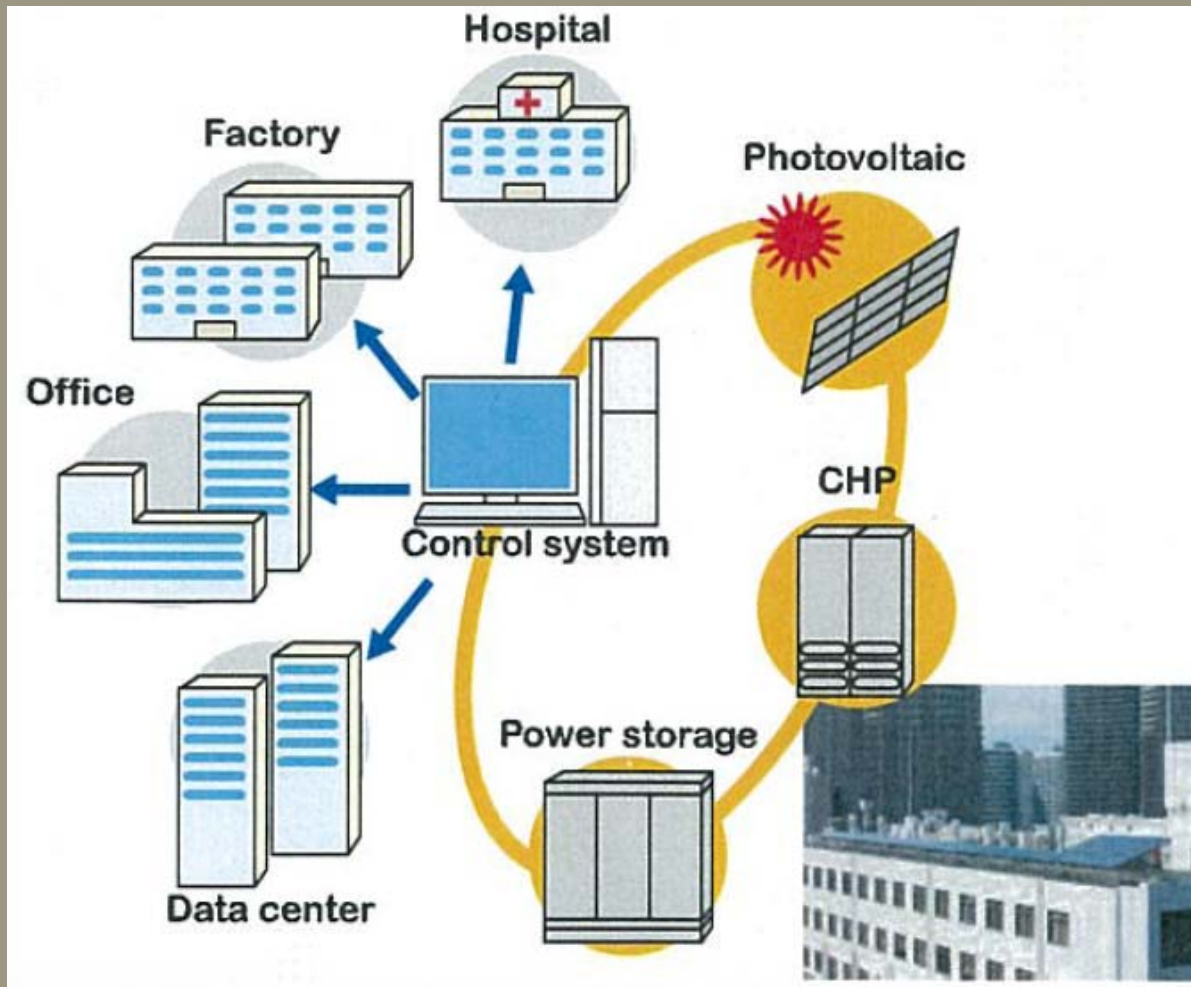
MICRO-GRID IN URBAN AREAS

The logo for John Holland, featuring the name "John Holland" in white text on a red background with horizontal lines.

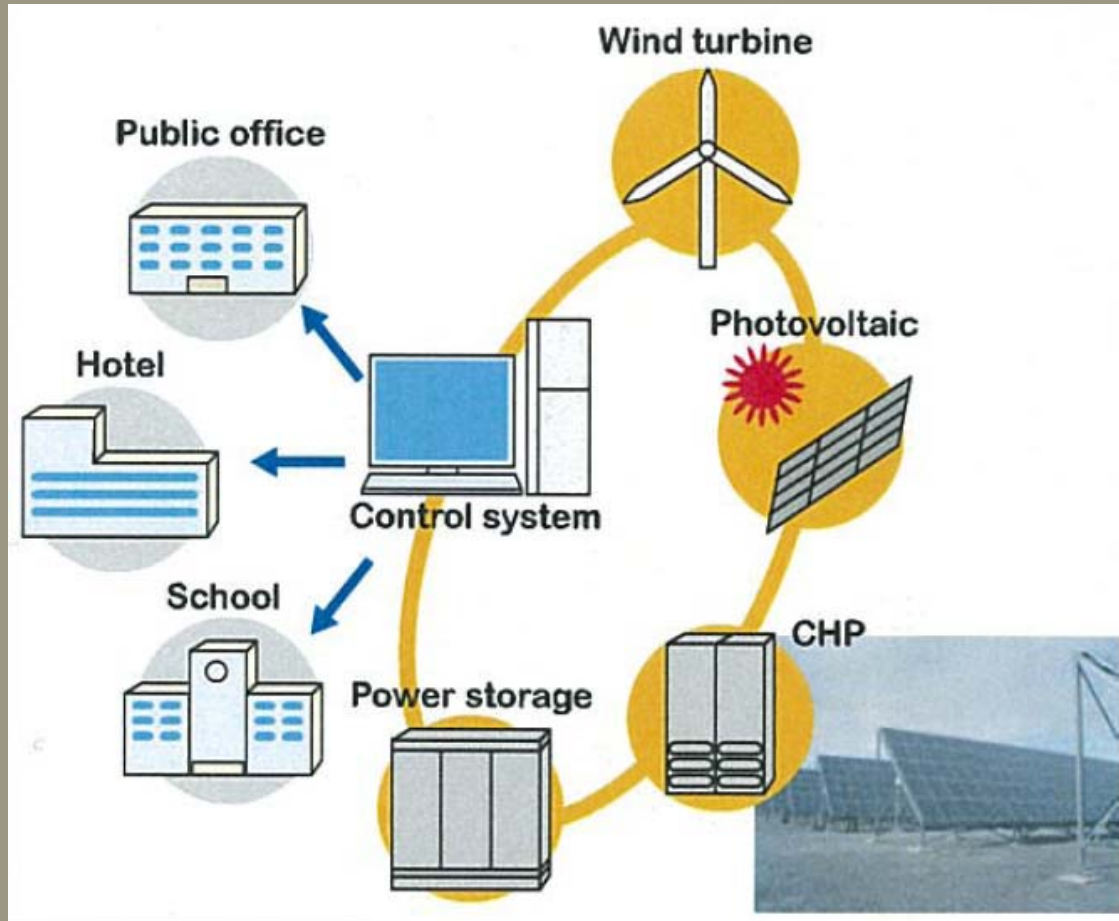
Micro-grids are expected to promote the introduction of distributed generators which contribute to the reduction of CO₂ emissions for the climate change problems. Shimizu has developed a micro-grid system which is a small scale power supply consisting of the photovoltaic and CHP operation apart from the existing grid. The 600kW scale micro-grid has been operating in the Shimizu laboratory since July 2006.

The micro-grid can be classified into two categories depending on installed quantities of photovoltaic. Installed quantity of the photovoltaic is considered relatively small in urban areas, compared with that in a rural area because of the limitation of installation space. We are proposing the micro-grid to reduce CO₂ emissions for power supply system in buildings.

MICRO-GRID IN URBAN AREAS



MICRO-GRID IN RURAL AREAS



END OF PRESENTATION