

Approach to achieving resilient and smart cities

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SHIMIZU CORPORATION

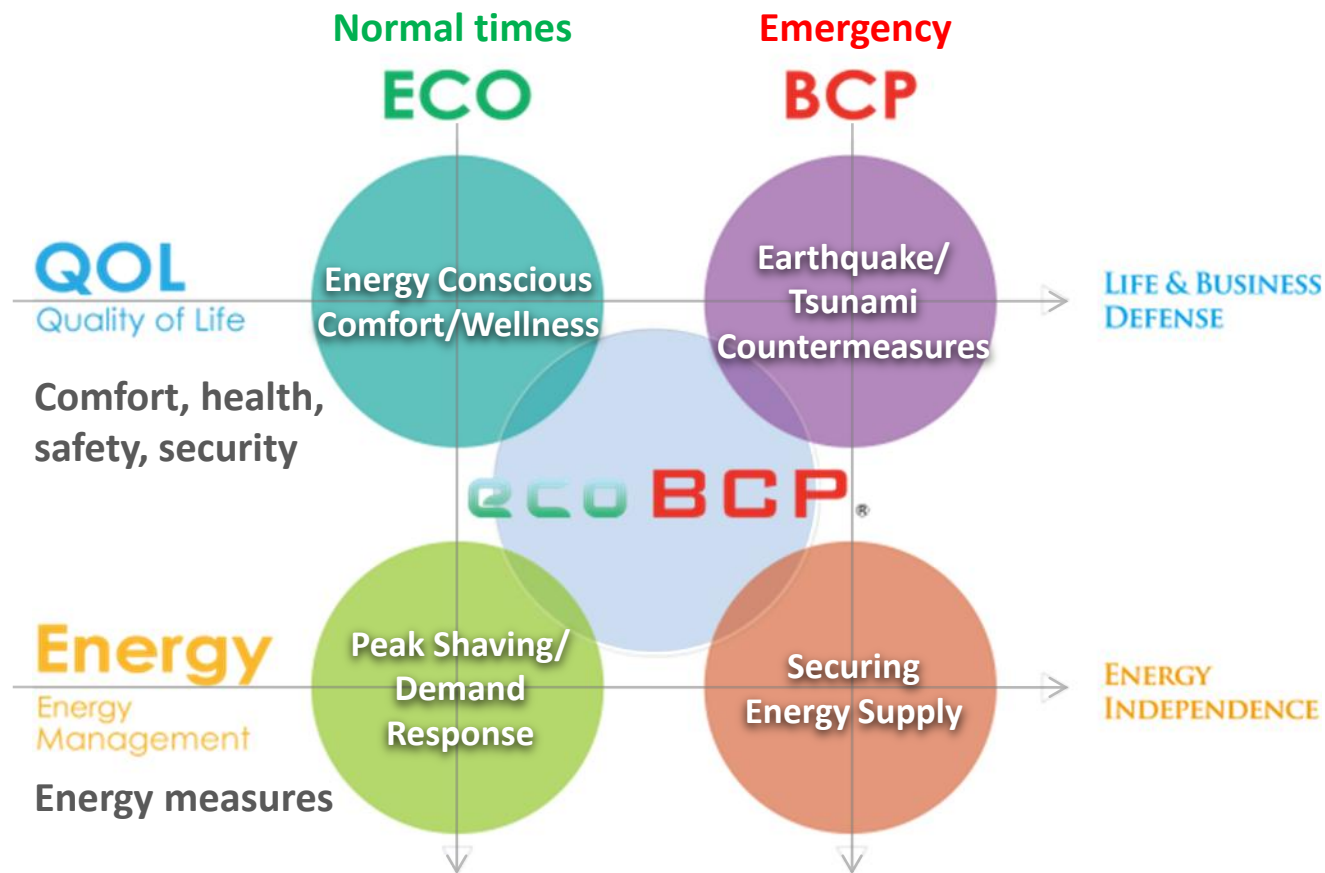
Today's Work, Tomorrow's Heritage



The “ecoBCP” Concept: Basic concept for resilient & smart cities

Low Carbon/Peak Shaving (eco) + Business Continuity Plan (BCP)

Applying energy conservation measures during normal times to build facilities and communities while assuring business continuity and energy independence in the event of an emergency.



Resilient and smart cities

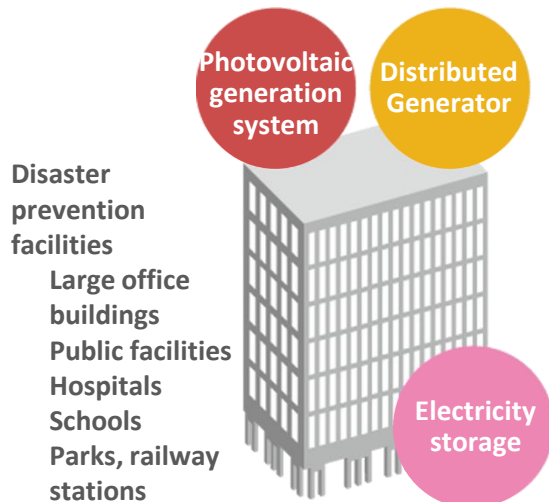
Shimizu's approach to resilient & smart urban revitalization

- Staged “ecoBCP” solutions from facility-level to district-level and area-level.
- Increasing community value and competitiveness by enhancing “ecoBCP” and community-help.

Enhancing “ecoBCP” of disaster prevention facilities

① Facility level

- Energy conservation and the improvement of QOL during normal times
- Securing energy supply during emergency

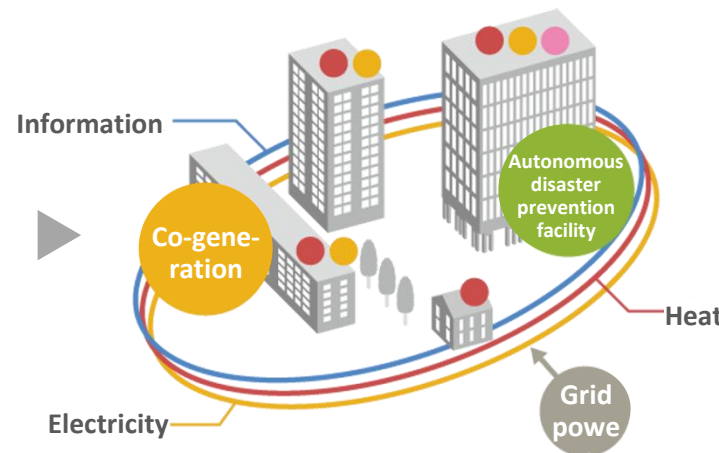


BC: Business Continuity
LC: Life Continuity

District-wide energy utilization

② District level

- Utilizing district heating/cooling/power supply
- Accommodating those unable to return home in the event of an emergency

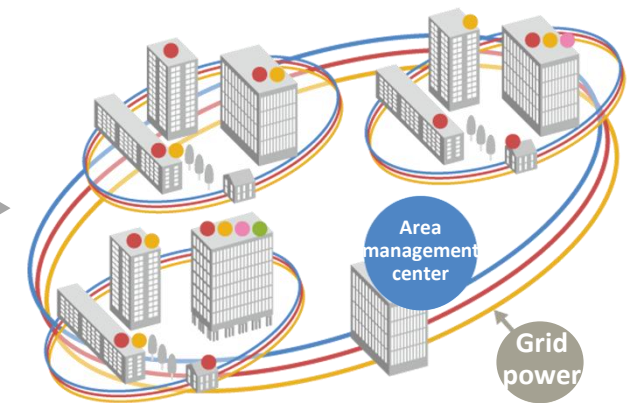


DC: District Continuity

Area-wide “ecoBCP” management

③ Area level

- Area energy management
- Area business/life continuity management



CC: Community Continuity

2. Smart city cases:

Kyobashi Smart City

- ecoBCP management and enhancing community value and competitiveness in the area around Shimizu's head office.

A high-performance, eco-friendly, and disaster prevention facility

① Facility level

- A high-performance, eco-friendly office building
- Accommodating those unable to return home in a disaster

- CASBEE: rank S
BEE score: 9.7 pts.
(highest score ever)

- Community disaster prevention facility:
Accommodates 4,000, employees and others unable to return home.

Shimizu's
head office

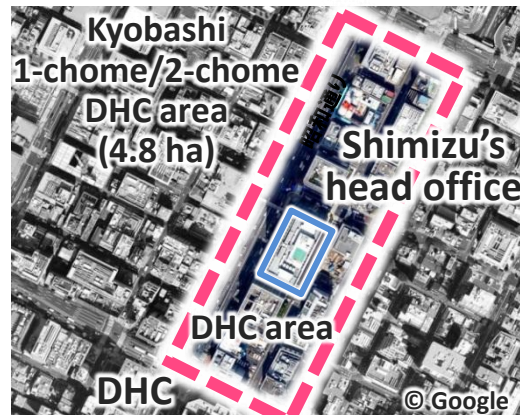


District-wide high-efficiency energy utilization

② District level

- District heating/cooling, effective use of waste heat
- Mutual exchange of supplies in the event of an emergency

- DHC system: comprehensive energy efficiency rate of 1.39
(most efficient in Japan)



Area-wide "ecoBCP" management

③ Area level

- Area energy management
- Area business/life continuity management

- ISO 22301 (Business Continuity)
- ISO 50001 (Energy Management)
(certified as the first area-wide cases in Japan)



Shimizu's head office: an ecoBCP model building

Location: Chuo City, Tokyo

Completed: May 2012

Site area: 3,000 m²

Building area: 2,200 m²

Total floor area: 51,800 m²

Floors: 3 underground levels,
22 above ground levels,
one penthouse

Height: 110 m

Structure: Reinforced concrete
(partial steel frame)
Seismic isolation
structure

CASBEE: S Rank (BEE = 9.7;
highest score ever
achieved)

LEED: NC Gold

CO2 emissions: Reduced 61% in 2013
(compared to the
average of general office
buildings in Tokyo, 2005)

Area level: ecoBCP management

- Area energy management (EnMS; ISO 50001 certified)
- Area business continuity management (BCMS; ISO 22301 certified)
(Model projects of group business competitiveness enhancement: FY 2012, METI)
- Area management with “ecoBCP cloud system (CEMS)”
- District power supply (planned)

① Facility level : Shimizu's head office
High-performance, eco-friendly,
and disaster prevention facility

Planned area

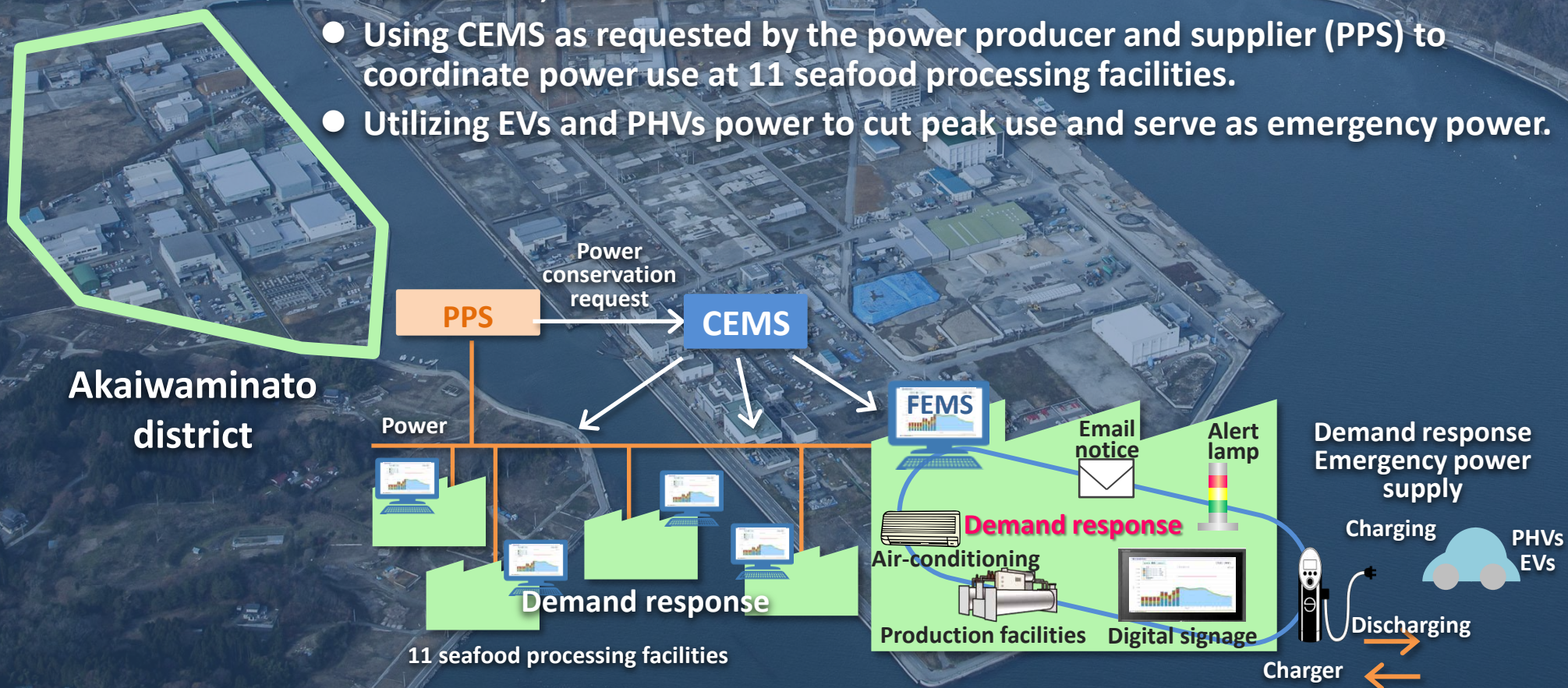
DHC area

③ Area level :
Area-wide ecoBCP management

② District level : DHC
District-wide high-efficiency energy utilization

Kesennuma Smart Industrial Park

- Energy management for a cluster of seafood processing facilities involved in earthquake restoration projects.
- Sponsored by METI (Project to promote the adoption of Smart Community technologies).
- City of Kesennuma, Ebara Environmental Plant, Smart City Project (Shimizu Corp.), Hachiyo Suisan, Abecho Shoten, Kesennuma Fisheries Cooperative Association, and others.
- Using CEMS as requested by the power producer and supplier (PPS) to coordinate power use at 11 seafood processing facilities.
- Utilizing EVs and PHVs power to cut peak use and serve as emergency power.



Akaiwaminato district

PPS

Power conservation request

CEMS

Power

FEMS

Email notice

Alert lamp

Demand response
Emergency power supply

Charging

PHVs
EVs

Air-conditioning

Production facilities

Digital signage

Discharging

Charger

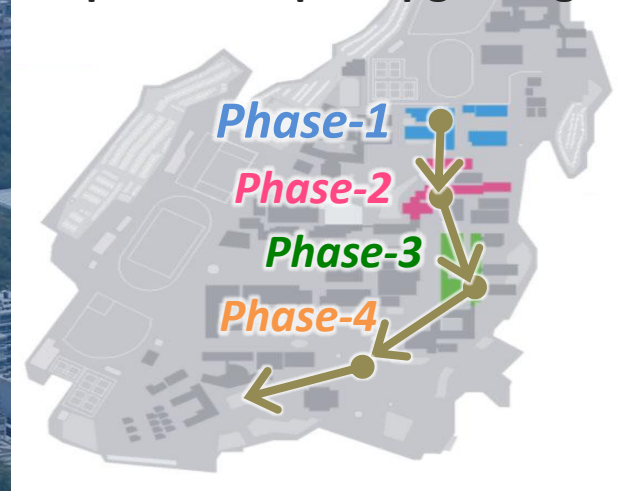
Demand response

11 seafood processing facilities

Chubu University Smart Campus

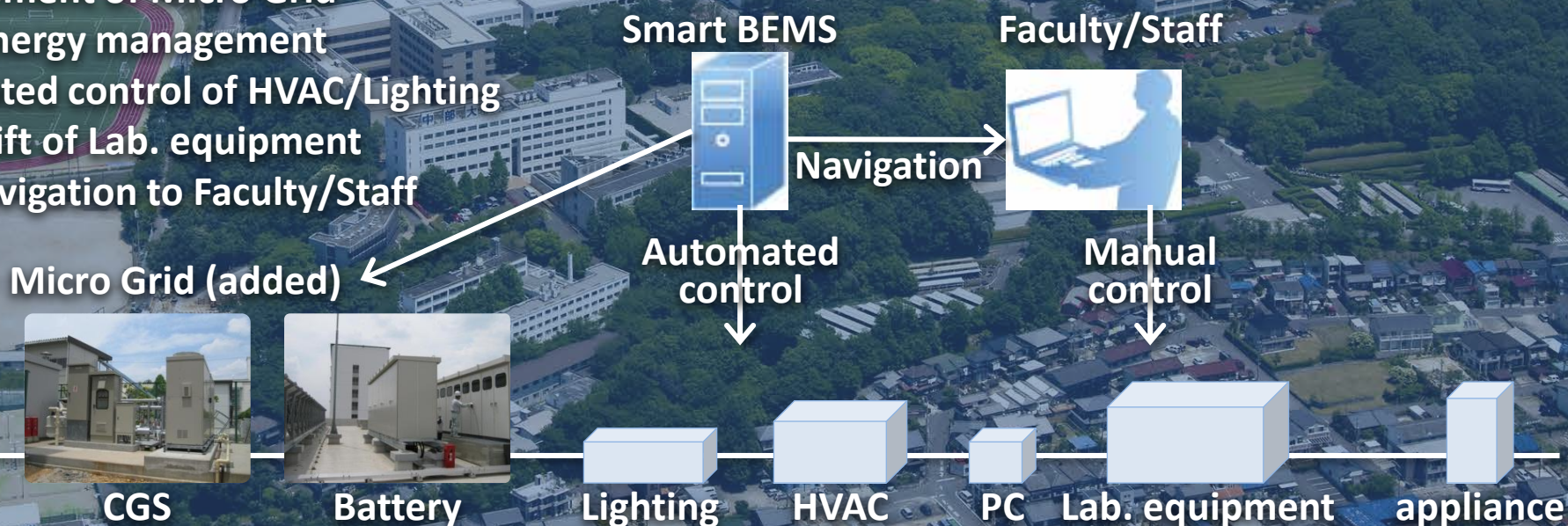
- Stepwise smart renovation at department level
- Installation of micro-grid (PV/CGS/Battery)
- Energy management of department facilities
- Phase-1: Energy saving: 30%/Peak shaving:24%

Stepwise campus upgrading



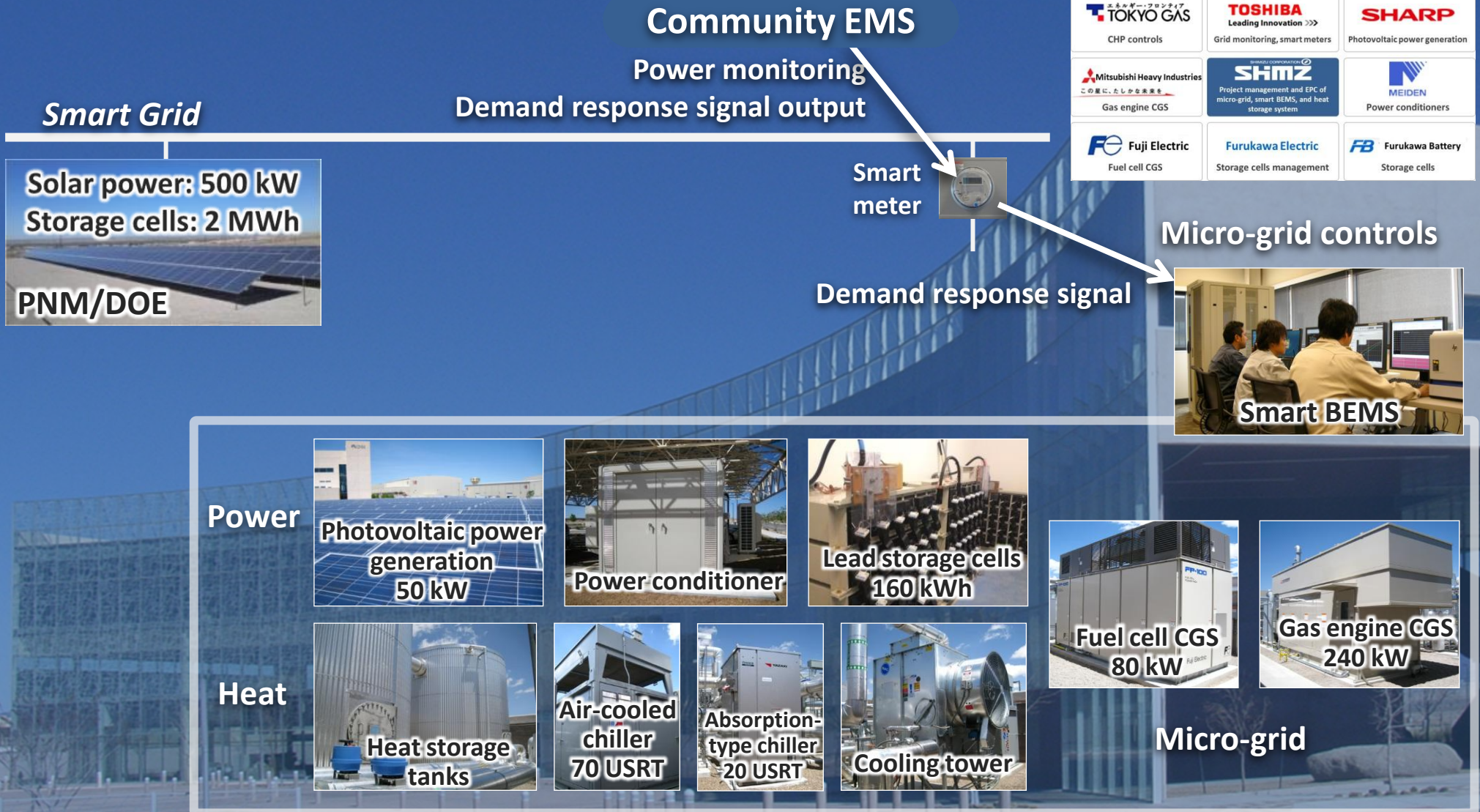
Phase-1: Department-A (five buildings)

- Management of Micro Grid
- Dept. energy management
- Automated control of HVAC/Lighting
- Peak shift of Lab. equipment
- Load navigation to Faculty/Staff



Smart building demonstration project (Albuquerque, New Mexico)

- Demand response level -1: Peak-shifting/peak-shaving controls
- Demand response level -2: Controls of purchased power as zero
- Demand response level -3: Supply of power to the grid



Achieving real sustainability

Resilience

Responding to various risks

Wellness

Creating healthy and comfortable environment

Management
Community revitalization

District-wide energy utilization

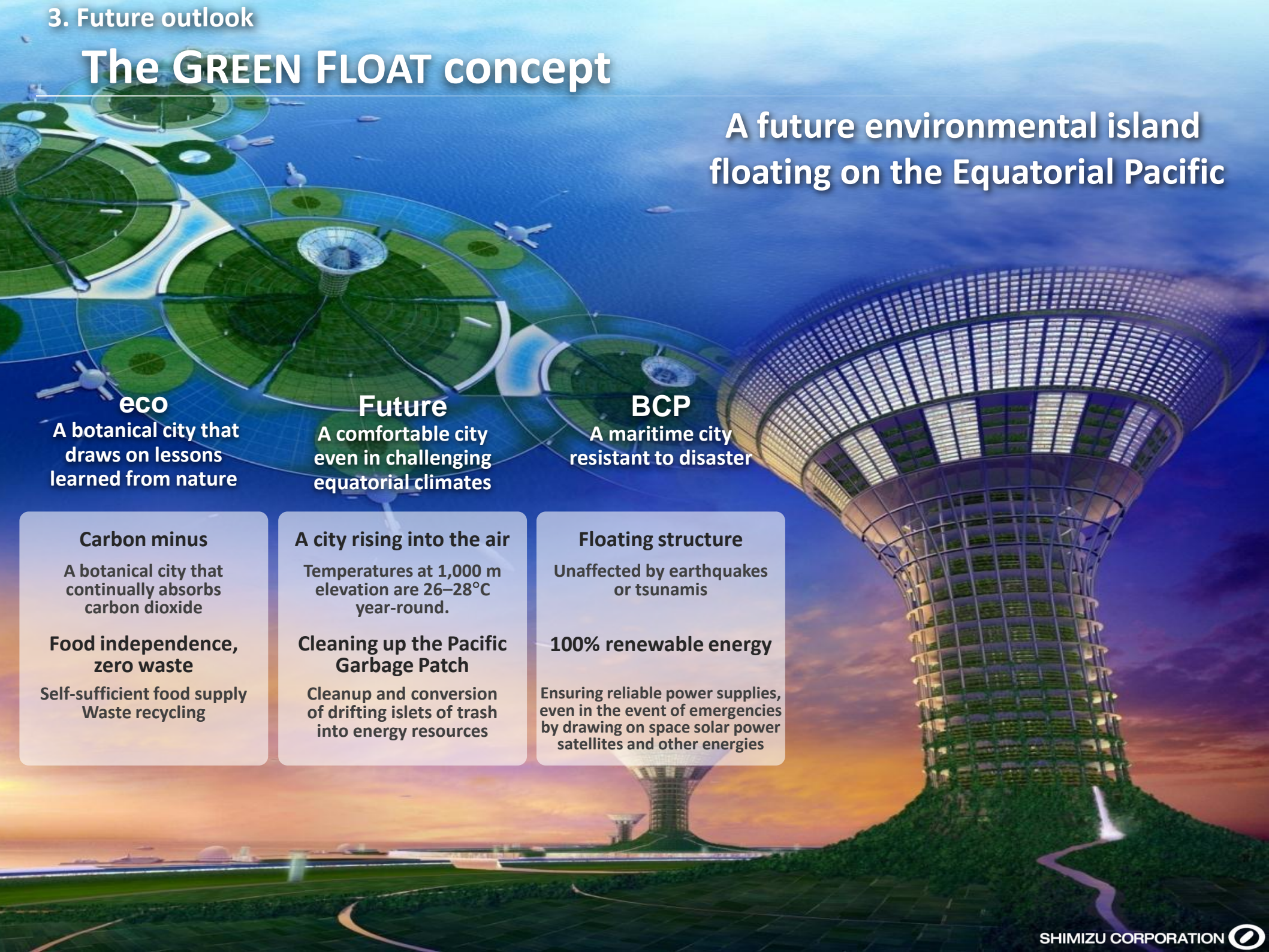
Smart energy

Responsibility for the planet, community, and people

Environment

The GREEN FLOAT concept

A future environmental island floating on the Equatorial Pacific



eco

A botanical city that draws on lessons learned from nature

Carbon minus

A botanical city that continually absorbs carbon dioxide

Food independence, zero waste

Self-sufficient food supply
Waste recycling

Future

A comfortable city even in challenging equatorial climates

A city rising into the air

Temperatures at 1,000 m elevation are 26–28°C year-round.

Cleaning up the Pacific Garbage Patch

Cleanup and conversion of drifting islets of trash into energy resources

BCP

A maritime city resistant to disaster

Floating structure

Unaffected by earthquakes or tsunamis

100% renewable energy

Ensuring reliable power supplies, even in the event of emergencies by drawing on space solar power satellites and other energies