Shimizu Approach to build Resilient and Smart Cities

Seminar on Expanding Technology Cooperation for Smart Community in Andhra Pradesh, India
March 5, 2015

Kazunori Nakayama
Shimizu Corporation

Founded 210 years ago, Shimizu is one of the largest Design / Engineering / Construction firms in Japan.

Shimizu Corporation ※Consolidated Accounting for FY 2013
Founded : 1804
Const. Order Awarded : US$ 14,321 million
Ordinary Income : US$ 284 million
Employees : 15,518 (as of March, 2014)
Business Line : Building, Civil Engineering, Engineering, Construction, Real Estate Development
Corporate Slogan : Today's Work, Tomorrow's Heritage

*US$1=¥102.93

Kisuke Shimizu, Founder

Head Office, Tokyo, Japan

Current HQ since 2012
Shimizu Global Business

Tokyo HQ
Singapore International HQ
20 Regional Offices
7 Overseas Subsidiaries
Total: 15,000 Staffs
Shimizu in India

- Shimizu Corporation is in India since 1985.
- Established its permanent office in India in 2007 at New Delhi
- Established its Headquarters in Bangalore in 2009.
- **Shimizu Corporation India Pvt. Ltd.** was established as a wholly owned subsidiary of Shimizu Corporation in **April 2011**.
Approach to achieve Real Sustainability

1 Concept
2 Implemented Cases
3 Future Outlook
1 Concept

- “ecoBCP” concept
- Shimizu Approach to Real Sustainability
  ~ Resilient & Smart ~
“ecoBCP” Concept: ~ Resilient and Smart ~

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.
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

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

3. Area level
   - Area energy management
   - Area business/life continuity management

Staged “ecoBCP” Solutions - Building/ District/ Community

BC: Business Continuity
LC: Life Continuity
DC: District Continuity
CC: Community Continuity

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2 Implemented Cases

- Kyobashi Smart Community (Tokyo, Japan)
- Smart Building Demonstration Project in Albuquerque (New Mexico, USA) (NEDO Demonstration Project)
- Net Zero Energy Demonstration Project in Albany (NY, USA) (NEDO Demonstration Project)
- Industrial Park Model in India
2. Implemented Cases:

Kyobashi Smart City

- ecoBCP management and enhancing community value and competitiveness in the area around Shimizu Head Office.

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

**1. Facility level**
- A high-performance, eco-friendly office building

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

**3. Area level**
- Area energy management
- Area business/life continuity management

- CASBEE: rank S BEE score: 9.7 pts. (highest score ever)
- LEED NC v2.2 Gold
- Community disaster prevention facility: Accommodates 4,000 employees and others unable to return home.

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

- ISO 22301 (Business Continuity)
- ISO 50001 (Energy Management) (certified as the first area-wide cases in Japan)
Shimizu Head Office: an ecoBCP Model Building

<table>
<thead>
<tr>
<th>Location</th>
<th>Chuo City, Tokyo</th>
</tr>
</thead>
<tbody>
<tr>
<td>Completed</td>
<td>May 2012</td>
</tr>
<tr>
<td>Site area</td>
<td>3,000 m²</td>
</tr>
<tr>
<td>Building area</td>
<td>2,200 m²</td>
</tr>
<tr>
<td>Total floor area</td>
<td>51,800 m²</td>
</tr>
<tr>
<td>Floors</td>
<td>3 underground levels, 22 above ground levels, one penthouse</td>
</tr>
<tr>
<td>Height</td>
<td>110 m</td>
</tr>
<tr>
<td>Structure</td>
<td>Reinforced concrete (partial steel frame) Seismic isolation structure</td>
</tr>
<tr>
<td>CASBEE</td>
<td>S Rank (BEE = 9.7; highest score ever achieved)</td>
</tr>
<tr>
<td>LEED</td>
<td>NC Gold</td>
</tr>
<tr>
<td>CO2 emissions</td>
<td>Reduced 58% in 2013 (compared to the average of general office buildings in Tokyo, 2005)</td>
</tr>
</tbody>
</table>
Kyobashi Smart City:

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)
**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

**Smart Grid**

- **Solar power:** 500 kW  
  **Storage cells:** 2 MWh

**Smart Grid Components**

- **Photovoltaic power generation:** 50 kW
- **Power conditioner**
- **Lead storage cells:** 160 kWh
- **Fuel cell CGS:** 80 kW
- **Gas engine CGS:** 240 kW

**Micro-grid**

- **Micro-grid controls**

**Power**

- **Energy storage tanks**
- **Air-cooled chiller:** 70 USRT
- **Absorption-type chiller:** 20 USRT
- **Cooling tower**

**Heat**

- **Heat storage tanks**

**Community EMS**

- **Power monitoring**
- **Demand response signal output**

**Smart BEMS**
SEPTEMBER 30, 2014

Governor Cuomo Announces Japan's New Energy and Industrial Development Organization to Invest in Emerging Technologies at the SUNY CNSE 'Zero Energy Nano' Building

This global partnership with Japan’s NEDO aims to leverage one of the largest mixed-use, zero energy buildings in the world to design ultra-high energy efficient capabilities which can be adopted to cut the operating costs of buildings in New York State and around the world through the reduction of energy loads and the utilization of optimum onsite energy generating opportunities.
3 Future Outlook

- Leveraging of Experiences of Demonstration Projects
- Achieving Real Sustainability
3. Future Outlook

Leveraging of Experiences of Demonstration Projects

Adapting the experienced “Localization processes” to fit into the local needs, availabilities and economic viabilities, to another countries, such as developed and/or developing countries in Asia.
3. Future Outlook

Achieving Real Sustainability

Resilience
- Responding to various risks

Wellness
- Creating healthy and comfortable environment

Management
- Community establishment and revitalization

Smart Energy
- District-wide energy utilization

Environment
- Responsibility for the planet, community, and people

Creating healthy and comfortable environment
Responding to various risks
District-wide energy utilization
Community establishment and revitalization
Responsibility for the planet, community, and people
3. Future Outlook

Achieving Real Sustainability

“ecoBCP” Concepts toward the resilient and sustainable world

Key Concepts:
- Green Float concept
- Offshore wind farm project (floating)
- Offshore wind farm project (fixed-bottom)
- Wave-dissipating Green Mound
- Evacuation Green Mound
- Smart district
- Smart eco-campus
- Zero Energy building (ZEB)
- Resilient hospital
- Mega solar power generation
- Frame shelter
- Arch shelter
- ecoBCP factory
- biomass power station
- ecoLCP housing complex

Shimizu Corporation

3. Future Outlook

Achieving Real Sustainability

“ecoBCP” Concepts toward the resilient and sustainable world

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