

"How To Promote A New Energy Network"

Area Energy Network is the entrance to a Smart Society

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Promote area energy network from a single facility and improve energy efficiency



From a single facility to Area Energy Network 1

1. Our company's Technical Research Institute: Cooperative control of a total of 12 buildings with a micro grid

Automatic control of multiple distributed batteries and storage batteries, and optimal delivery of power and heat to multiple facilities

36% reduction at peak time, 30% reduction in usage

energy saving in block assuming urban area (12 experimental facilities at the Shimizu Corporation Institute of Technology in 2011)

Energy independence: Already verified 72 consecutive hours of self-reliant operation

Alleviate impact of renewable energy on power grid



From a single facility to Area Energy Network 2

2. Chubu University: Stepwise energy control of 7 faculty facilities

Operating since July 2012

Power and energy saving over the entire campus, emergency response

- Changed to "Smart" on a faculty basis, expanded stepwise
- Energy control of facilities with Smart BEMS
 - Introduction of cogeneration, photovoltaics, storage batteries
 - Peak cut on a faculty basis, energy saving







From a single facility to Area Energy Network

Create Area Energy Network through certification of one building



- Control multiple facilities with Smart BEMS
- Peak reduction of area energy demand, improvement of BCP function

Introduction of distributed energy (cogeneration, PV, storage battery, etc.)

- Reduction in electricity purchased, peak shift, peak cut
- Self-reliant operation during emergency





Gradual development from a single facility to an Area Energy Network

Facility level

Facility block, urban area level

- eco during normal period
- Secure energy for emergency
- Constitutes block of multiple facilities
- Power and heat interchange in urban area

Area level

- Energy self-reliance through disaster-prevention facility
- Energy interchange within area



ecoBCP Building Large office Disaster-prevention facility : Public facility, hospital School, park station

[Power, Heat, Information] networks are important

- ecoBC (Business Continuity)
- overall eco
- **DC** (District Continuity)

Strong, Smart City

CC (Community Continuity)

Overall interchange leads to a new dimension!

Shimizu Corporation Headquarters (Super environment-conscious office with state-of-the-art technology)



Comfort control of temperature, humidity, air current (approx. 50% energy saving)

Optimize use of solar light (approx. 90% energy saving)

Overall interchange leads to a new dimension!

• Efficient use of urban exhaust heat in collaboration with area DHC system (Shimizu Corporation Headquarters)

• (*a) Comprehensive energy efficiency, 1.39, Japan's highest figure; (*b) National average. 0.823



How to promote city development and Area Energy Network



Promote as a special area with three adjacent neighbor-type emergency collaboration/arrangement, introduction of distributed energy (cogeneration)

Advantage 1: Improve self-reliant BCP readiness by utilizing Area Energy Network in emergency, etc. Advantage 2: Speeding up the wide use of area energy network, and large increase in the number of cases applicable



- 1. Enhanced energy independency when a building is new or renovated
- 2. Energy interchange to neighboring buildings
- 3. Implementation of Area Energy

Management

How to promote town development and Area Energy Network

Normal

- Natural Energy Area Network
- \bullet Overall power and heat interchange, CO_2 reduction
- Entire area peak cut

Emergency

- Life and business continuity, secure medical services
- Secure energy independence in area
- Accept commuters who have difficulty getting home



Issues on city development and Area Energy Network

Policy area		Issues	Details
Grant public benefit to supply route		Installation of power grids on public roads	Area energy interchange for power will ease if electricity generated by cogeneration and solar and wind power are approved for transmission by public roads.
		Area energy (utility) Permission for occupancy of roads to heat conduit pipe	Positioning of heat conduit pipes except for the DHC conduit pipe through city planning decision (heat source water pipe, pipe for seawater/river water, steam pipe from waste treatment plant, etc.) is not determined; desirable that permission for occupancy of roads is also granted to these heat conduit pipes, as is the case with other infrastructure
Policy for efficiency in block use of heat and power	System in city block, infra- structure's flexible use	Concurrent power receipt from specified electricity utility Easing to 50% → diversification Easing of regulations and interchange between city blocks	In terms of license of specified electricity business, it is stipulated that "the commencement of the electricity business corresponds to demand at the service point." This is interpreted as a requirement to install a full-capacity power generation facility that corresponds to demand. However, installing a full-capacity power generation facility for the service area imposes a large economic burden on electricity utilities. Therefore, it is considered that it will become easier to launch the specified electricity business by authorizing concurrent power receipt from a power generation facility and commercial electricity. When developing a city block with low carbon through Area Energy Network, a city block that contributes area continuity (including multiple blocks) will be promoted by granting incentives, such as easing of restrictions for building height, diagonal line, cubic volume, open-space ratio, etc., and interchange between city blocks. (Assuming specific city block, comprehensive design, district planning, etc.)
	Expansion policy of DHC	Easing of DHC terms and conditions →Special treatment to small- scale interchange DHC plant space Grant incentives to a building providing space	In DHC business, supply heat media (chilled water, warm water, steam, etc.) and supply terms (temperature, pressure) are fixed, so it is difficult to conduct flexible and efficient operation according to seasonal load changes. In western district heating, common knowledge is to seasonally adjust the temperature of warm water supplied. It is a desire that our country will address this. Although there is an advantage to a building providing a machinery room for a DHC plant through exclusion of the cubic volume of the machinery room, the incentive is not sufficient to expand area energy interchange with only this advantage. Further favorable treatments are advisable, such as exclusion of cubic volume of the utility consumer reception facility, and addition of the cubic
Expansion of unharnessed energy use		Simplify procedures to use river water, seawater, sewage, etc.	volume used for environmental contribution.Since it requires a long time to obtain approval and authorization for facility improvement related to the use of river water, seawater, or sewage after obtaining understandings from river administrators, port authority, etc., it is difficult to expand unharnessed energy use.

Issues in town development and Area Energy Network

• Issues at the planning and design stage

• It is difficult at the design stage of a single facility to address consensus-building on Area Energy Network.

(Area energy business decision cannot be made unless there is a certain range of consensus-building)

• It is necessary to consider the policy of the entire-area heat energy supply and demand, and promote consensus-building from the planning stage of a facility with a high heat demand, such as a hospital or hotel, in order to promote energy high efficiency through Area Energy Network

• It is effective to consider and introduce a system that is integrated with urban development and improvement

- Issues in promoting commercialization • Large initial investment cost such as heat source facility, heat conduits
- Cost increase by introducing cogeneration system, etc.

Consider Area Energy Network (interchange) in city and town development/make connection mandatory

The key to stable fund procurement is consumers' small dropout risk.

 Must have a tax system and structure, which enables NEB, that brought by an area's efforts for low carbonization and BCP improvement, to be returned and redistributed in the area

Overseas, public-installed, private-managed style exists. (Paris, Copenhagen, etc.)

Recommendation

Promote gradual upgrading of network and attain improvement of energy efficiency and self-reliant BCP

Large-scale redevelopment style

- 1) Install One-Stop Service window
 - Simplify application procedures, unify consultation contact
- 2) Clarify approval conditions for special district
 - Energy efficiency (energy saving ratio 30% improvement, etc.)
 - Smart coordination with top grid, including BCP
 - Structure of data collection and upgrading follow-up system
 - Labeling system with above stated rating index

3) Preferential treatment, easing of regulations

- Easing of installation standards for legally controlled overall interchange buried piping and wiring (Road Act)
- Diversified supply energy, easing of supply conditions (Heat Supply Business Act)
- Permit for combined supply of heat and power
- Need to have a structure that works horizontally among multiple government agencies and related organizations when using unharnessed energy. (River Act, Coast Act, Ports and Harbors Act)
- Establish preferential treatment in tax breaks, easing of floor area ratio, technical development support, etc.

Stepwise development style

- [Urban regeneration that starts from one building's certification]
- (Connect adjacent land with shared facility, and make a new "block")
 - 1) 3) on the left are common

4) Additional preferential treatment, easing of regulations

- Interchange of heat and power Interchange heat among private cogeneration sites.
 Interchange power between individual power receiving buildings (system, independent cable)
 Power joint contract for Area Energy Network buildings, etc.
- Preferential treatment for "connecting." Granting incentives to cut peak
 Granting incentives to BCP functions
- Preferential treatment for "distributed energy, overall BEM installation"
 Incentives for burden of easement

Creation of Smart City

Floating style

Wind-generated power business

Implantation style

Wave-dissipation type

Green $mound_{\mathbb{R}}$

Evacuation type

Smart urban area

Smart eco-campus_®

Photovoltaic Business

Arch shelter_®

ecoBCP Buildings

ecoLCP complex housing ZEB (Zero energy buildings)

Smart eco hospital_®