

# APEC-ISGAN Smart Grid Test Bed Networks Workshop

## Country Presentation Japan

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## **I: Country/Economy Smart Grid Status**

**1. High priority technical needs for smart grid development and/or deployment**

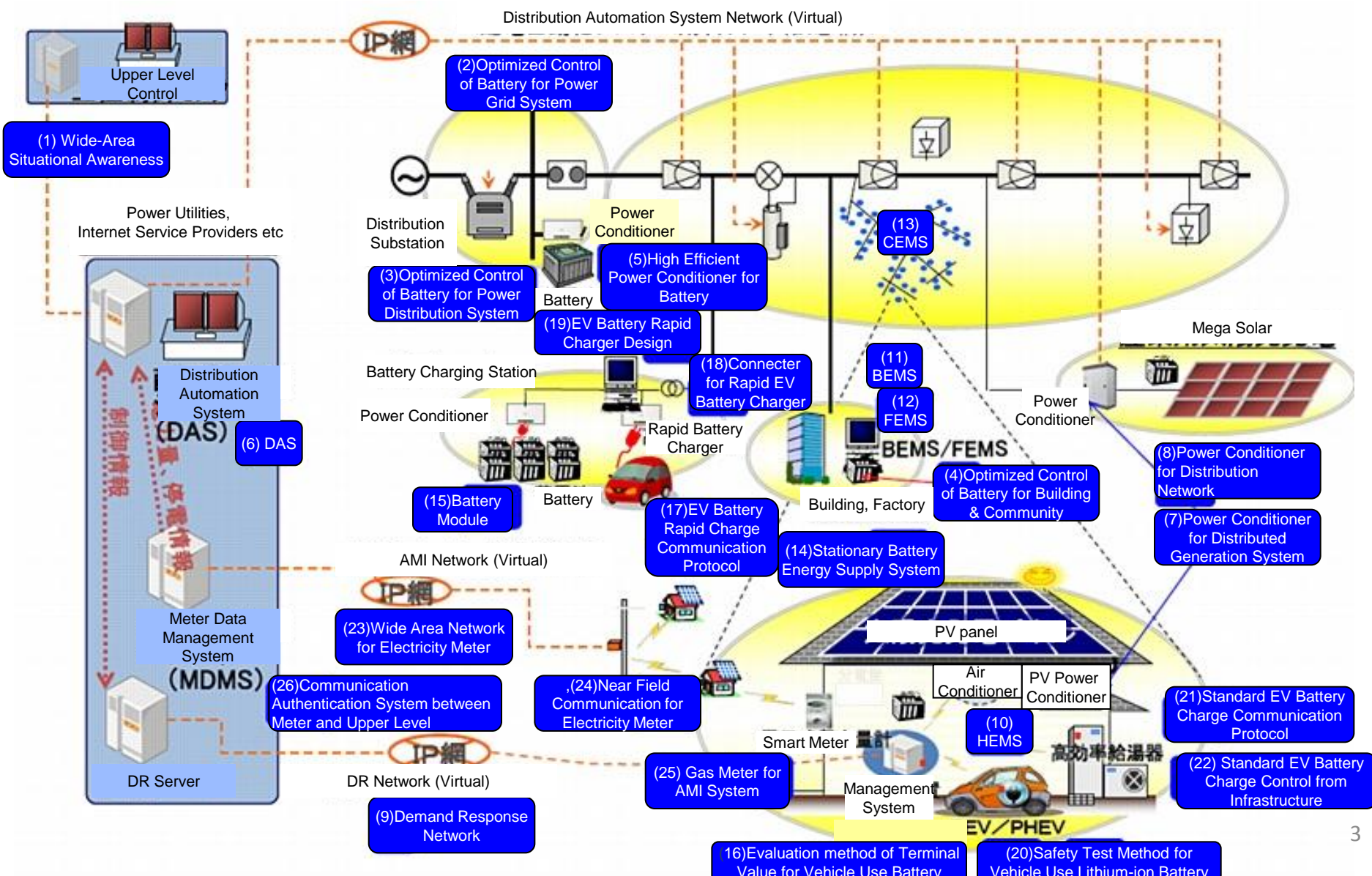
## **II: Potential smart grid test bed facilities**

**1. Capabilities of your facility.**

**2. Research and/or technology focus areas of your facility.**

**3. Value you anticipate in a collaborative research/test-bed network**

# High priority technical needs for smart grid development and/or deployment (1)



# High priority technical needs for smart grid development and/or deployment (2)

## 26 Priority Technologies of 7 Priority Areas

### 1. Wide-Area Situational Awareness :

(1)Wide-Area Situational Awareness (WASA)

### 2. Utility Grid Battery Energy Storage Systems:

(2)Optimized Control of Battery for Power Grid System, (3)Optimized Control of Battery for Power Distribution System, (4)Optimized Control of Battery for Building & Community, (5)High Efficient Power Conditioner for Battery

### 3. Management of Power Distribution System:

(6)Distribution Automation System (DAS), (7)Power Conditioner for Distributed Generation System, (8)Power Conditioner for Distribution Network

### 4.Demand Response:

(9)Demand Response Network, (10)Home Energy Management System (HEMS), (11)Building Energy Management System (BEMS), (12)Factory Energy management System (FEMS), (13)Community Energy Management System (CEMS)

### 5.Demand Side Battery:

(14)Stationary Battery Energy Supply System, (15)Battery Module, (16)Evaluation method of Terminal Value for Vehicle Use Battery

### 6.Electric Vehicle:

(17)EV Battery Rapid Charge Communication Protocol, (18)Connector for Rapid EV Battery Charger, (19)EV Battery Rapid Charger Design, (20)Safety Test Method for Vehicle Use Lithium-ion Battery, (21)Standard EV Battery Charge Communication Protocol, (22) Standard EV Battery Charge Control from Infrastructure

### 7. AMI system:

(23)Wide Area Network for Electricity Meter,(24)Near Field Communication for Electricity Meter, (25) Gas Meter for AMI System, (26)Communication Authentication System between Meter and Distribution Network

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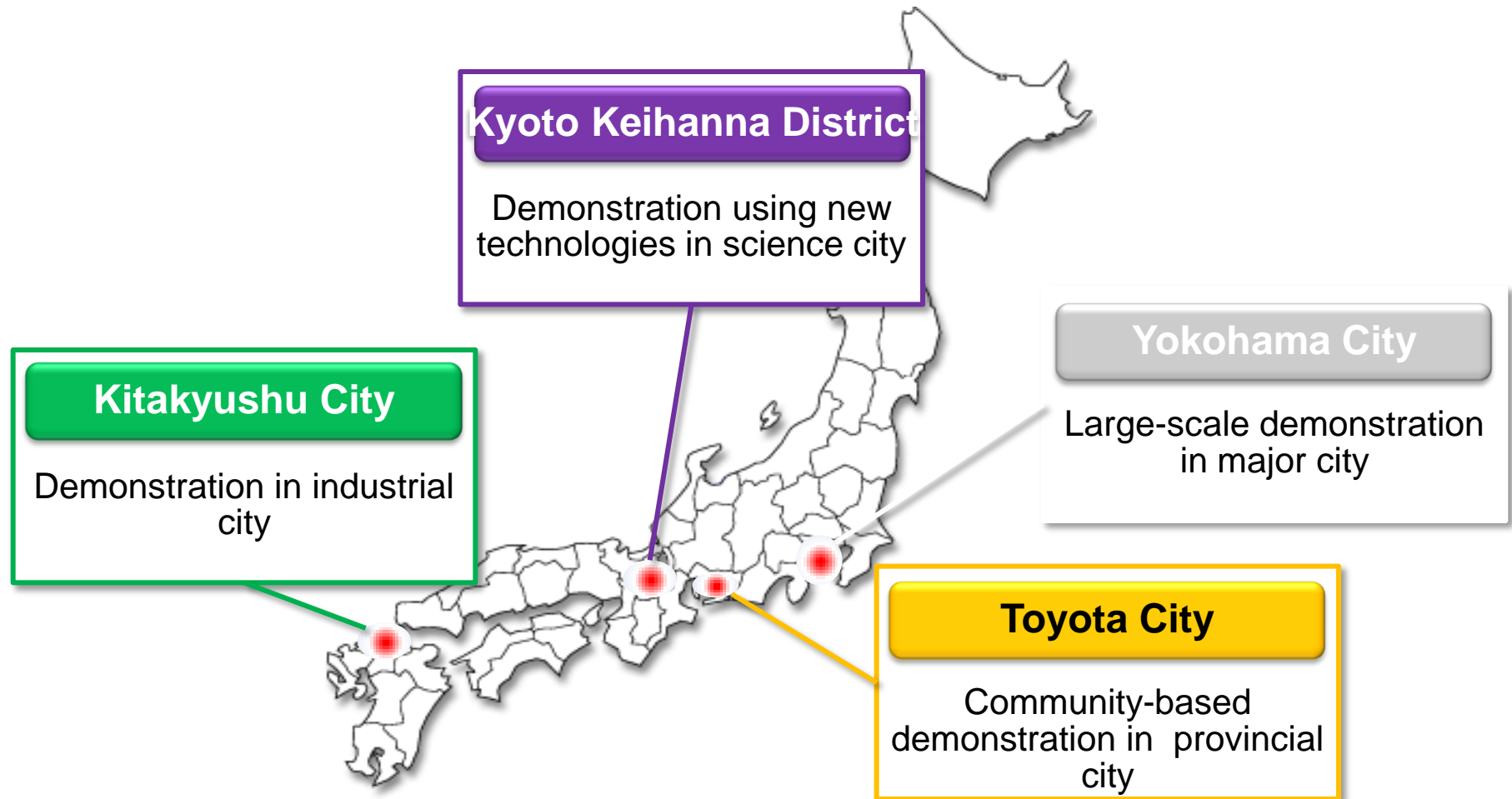
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# Demonstration Project on Next-generation Energy and Social Systems in Japan

Large-scale and cutting-edge pilot projects have been launched in 4 areas. The outcomes to be accumulated through the projects will be utilized to create smart communities and smart cities in Asia and other countries.



# Yokohama City (1 / 2)

## Objective

- Disseminate leading city Yokohama's approach to achieve the world's most advanced smart city model

### Project characteristics

- Demonstration project in a large city with a population of over 3.7 million (voluntary participation: 4,000 households)
- Building a network among 3 separate areas and exploring new energy management systems for an established city
- As a leading smart city model, deploying Yokohama's vision (4Ss\*), experience and expertise overseas

\*4Ss: Scalable, Speed, Sophisticated, Satisfaction

### Project activities

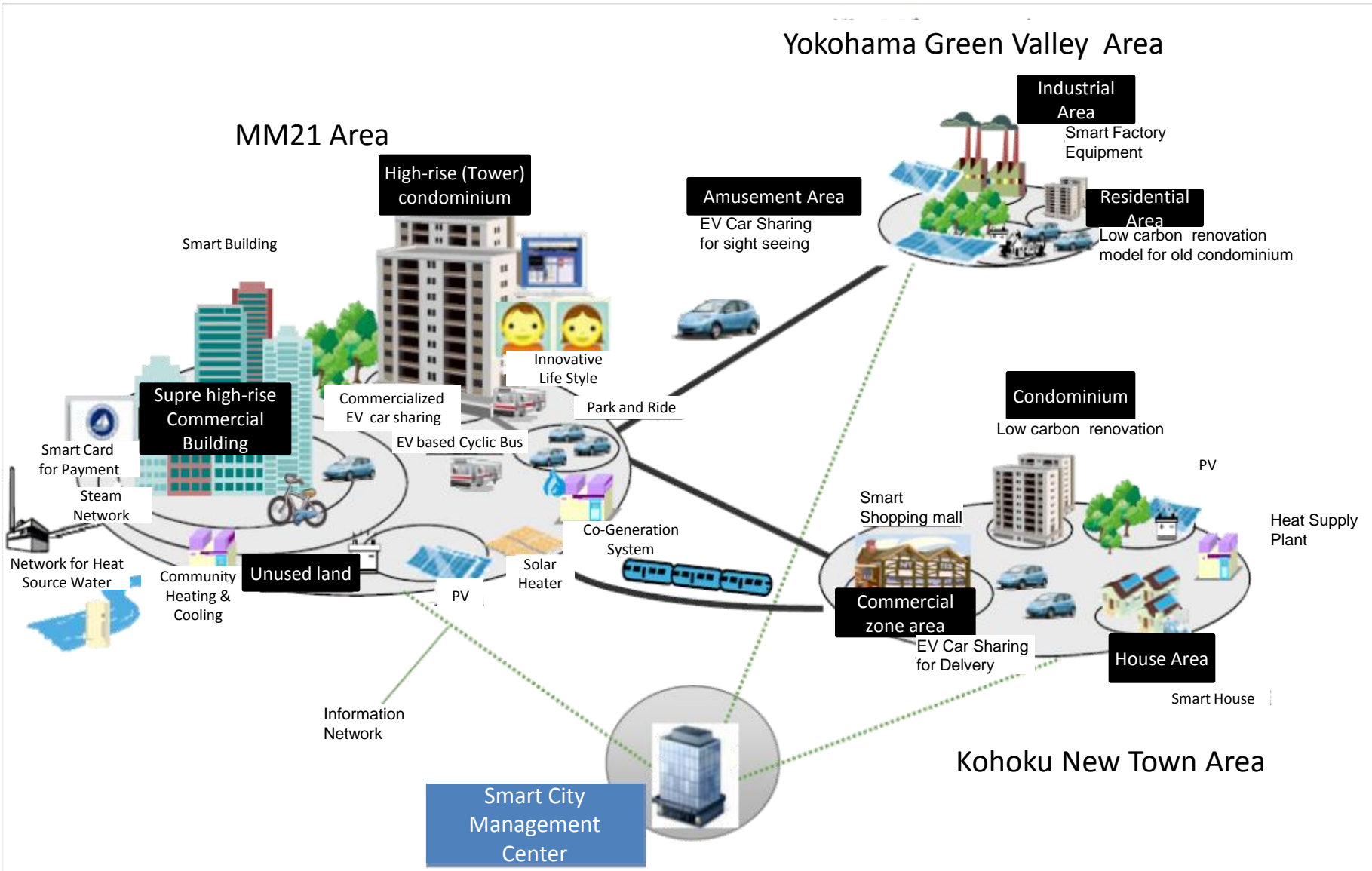
- Introduction of renewable energy (approx. 27 MW)
- Installation of home energy management systems (HEMS) at 4,000 households
- Installation of building energy management systems (BEMS) and inter-building power allocation
- Demonstration of EV charging and discharging systems and diffusion of EVs (2,000 vehicles)
- Installation of community energy management systems (CEMS)

### Participating companies

Accenture, Toshiba, Tokyo Electric Power, Tokyo Gas, Panasonic, Nissan Motor, Meidensha, others



# Yokohama City (2 / 2)





# Toyota City (1 / 2)

## Objective

- Construct a community-based low-carbon social system and deploy the system to other cities as an ideal model to boost local development

### Project characteristics

- Focus on the household sector and conduct activities based on a vision of the communal environment ten years in the future
- Aim to establish a community-based low-carbon social system while limiting social costs
- Study the difference between regional and national issues/needs in the hope of leveraging project outcomes on a global basis

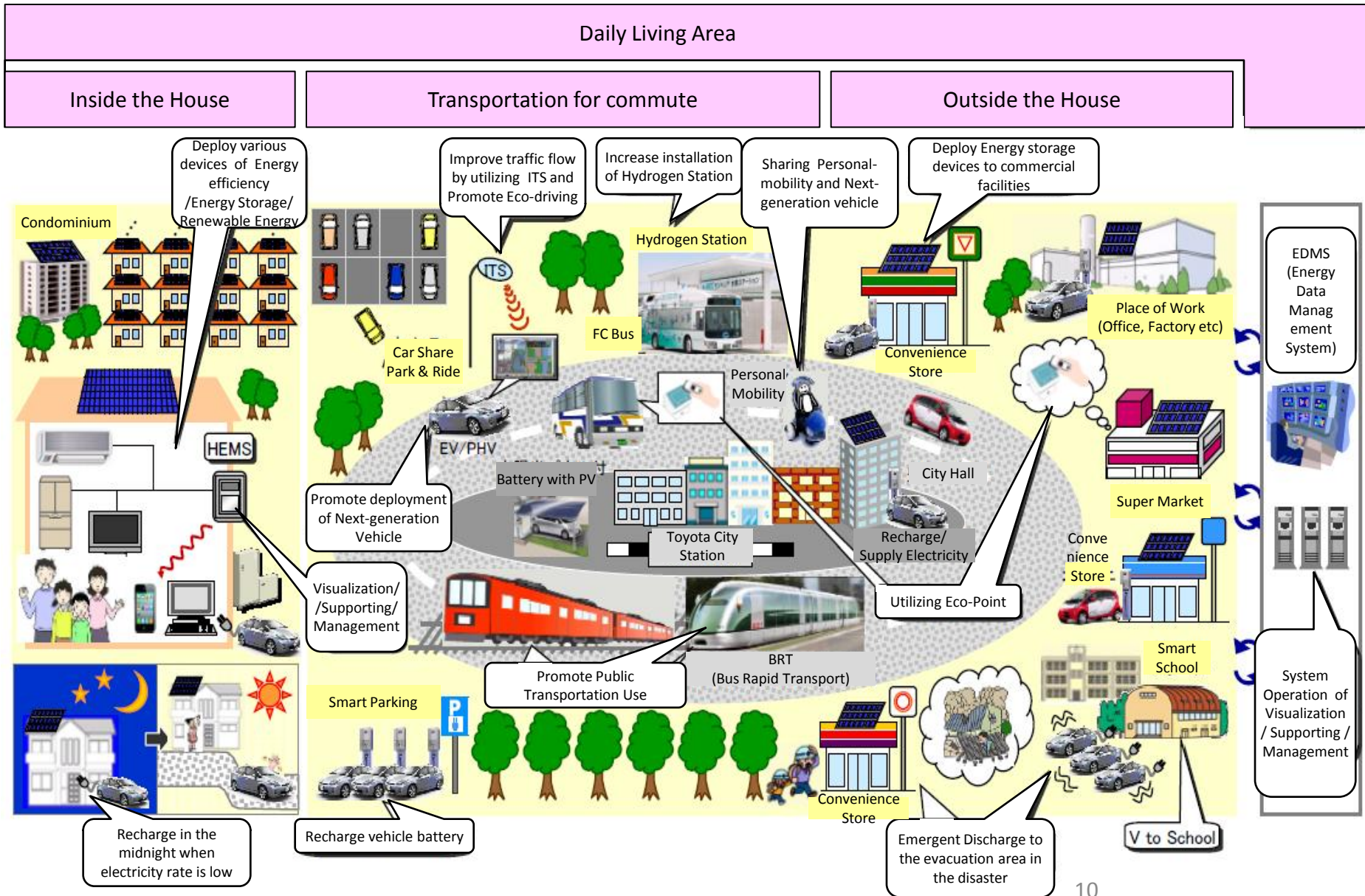
### Project activities

- Optimization of energy use in households (70 households)
- Establishment of a low-carbon transportation system (diffusion of approx. 4,000 next-generation vehicles and 20 charging stations)
- Efficient use of energy and installation of charging stations for next-generation vehicles in commercial buildings
- Provision of incentives to encourage consumer movement toward a low-carbon society

### Participating companies

Toyota Motor, Denso, Chubu Electric Power, Toho Gas, Sharp, Toyota Home, Fujitsu, Toshiba, KDDI, Circle K Sunkus, Mitsubishi Heavy Industries, Toyota Industries, Dream Incubator, others

# Toyota City (2 / 2)



# Kyoto Keihanna District

## Objective

- Achieve an eco-city model in an academic city, create new industries and promote international deployment

## Project characteristics

- Improve energy efficiency and maximize the use of renewable energy throughout the entire district by exchanging data among houses, buildings, EVs and power grids, controlling storage batteries and using demand response mechanisms
- Aim to demonstrate an “on-demand power management system” and “power coloring” to be developed in this project

## Project activities

- Establishment of regional nano-grids
- Establishment of EV charging networks
- Establishment of nano-grids in houses
  - ✓ On-demand power management system
  - ✓ Power coloring
- Introduction of new and renewable energy technologies (PV, fuel cells, heat pumps, etc.)

## Participating companies

Kansai Electric Power, Osaka Gas, Mitsubishi Electric, Mitsubishi Heavy Industries, Mitsubishi Motors, Omron, Fuji Electric Systems, Nihon Unisys, others

# Kitakyushu City

## Objective

- Achieve an ideal regional energy management system and improve local development
- Deploy the project outcomes throughout the world, particularly in Asia

## Project characteristics

- Active implementation of low-carbon measures and establishment of an energy management system through promotion of regional energy saving stations in a designated district (Higashida)
- Deployment of project outcomes overseas, including Asian countries, through the Kitakyushu Asian Center for Low Carbon Society

## Participating companies

Nippon Steel Engineering, IBM Japan, Fuji Electric Systems, Nittetsu Elex, Yasukawa Electric, others

## Project activities

- Introduction of renewable energy technologies (mega solar systems, small wind turbines, biomass, etc.)
- Promotion of consumer-oriented energy saving/control systems (smart stores, smart schools, smart houses, energy saving street lights, etc.)
- Establishment of a community energy management system through the promotion of regional energy saving stations
- Development of environmental learning systems, e-learning systems, etc.
- Promotion of EVs, PHVs, rental electric bicycles, etc.

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# Japan's Joint Demonstration Projects on "Smart-Community" and "Renewable Energy"



**UK**

Smart-Community (DMS)



**France**

Smart-Community (Lyon)



**Turkey**

Smart-Grid

- Wind plus Pumped hydro
- Zero Emission Building



**USA**

- Smart-Grid (New Mexico)
- Island type Smart-Grid (Hawaii)
- Zero Emission Building (New York)



**Spain**

Smart-Community (Malaga)

**UAE**

Solar Cooling System

**Morocco**

PV Mega-Solar

**Tunisia**

Concentrated Solar Power



**China**

Smart-Community  
(Tianjin, Gongqing)



**Vietnam  
Thailand**

Smart-Community  
(Industrial complex)



**Malaysia**

Smart-Community  
(Putrajaya, Cyberjaya)



**India**

Smart-Community  
(Delhi-Mumbai area)



**Singapore**

Smart-Community  
(Zero Emission Building)



**Indonesia**

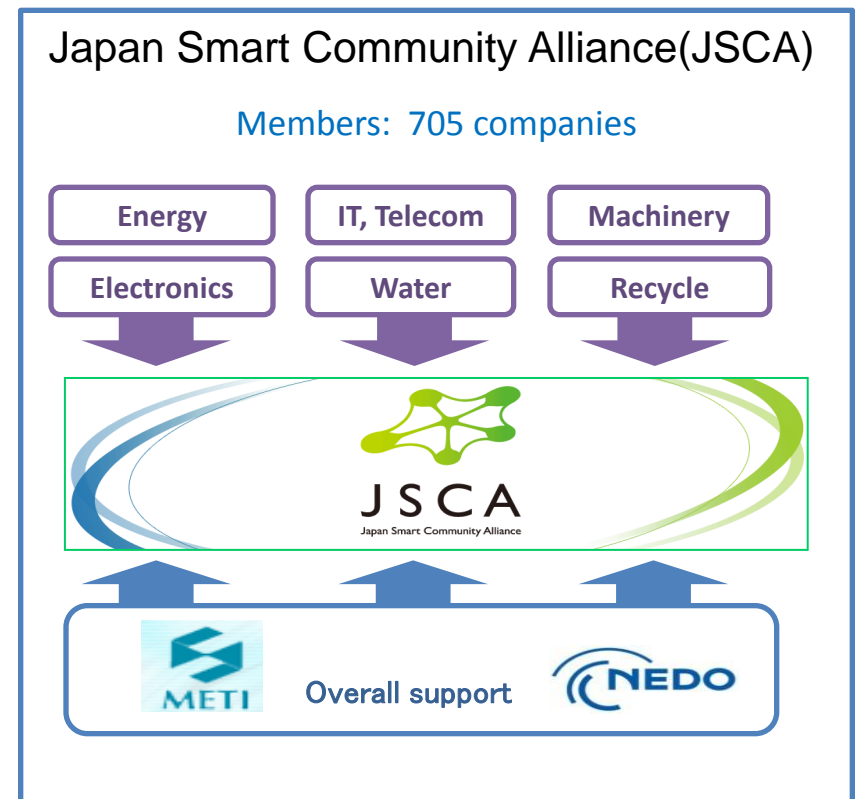
Smart-Community  
(Industrial complex)



# Japan Smart Community Alliance(JSCA)

The platform for collaboration among businesses has been launched. A wide range of private sector players joined the JSCA (705 member companies (December,2011) ). This platform is open to the world.

- A wide range of private sector players joined the JSCA as a platform for collaboration. The public sector supports their activities.
- The working groups of the JSCA are cooperating on policy issues such as standardization, road-mapping of technologies, etc.
- The JSCA is seeking further global cooperation and partnerships. (the JSCA agreed on MOU for a cooperative relationship with the Grid Wise Alliance(USA)).





# East Asia Smart Community Initiative (EA-SCI)

- The concept of “Smart Community” plays an active role as a driving force toward the region-wide deployment of next-generation energy and social systems.
- IT integrates the following social needs and elements through efficient use of the IT network ; (i) maximum use of renewable energy (e.g. solar and wind) and unused energy (e.g. waste heat), (ii) transformation of regional transport systems, and (iii) transformation of people’s lifestyles.
- Japan supports public/private efforts to establish Smart Communities globally.
- EA-SCI is the initiative to promote Smart Communities in ASEAN and East Asia, as was noted in the Chairman’s Statement of the 13<sup>th</sup> ASEAN-Japan Summit and the Joint Media Statement of AEM-EAS last year.

## Contribution from Japan

- The Japanese government and Japan Smart Community Alliance (JSCA) dispatch special missions to Asian nations to identify specific cooperation concerning the Smart Community Initiative.

### ◆ Japan Smart Community Alliance (JSCA)

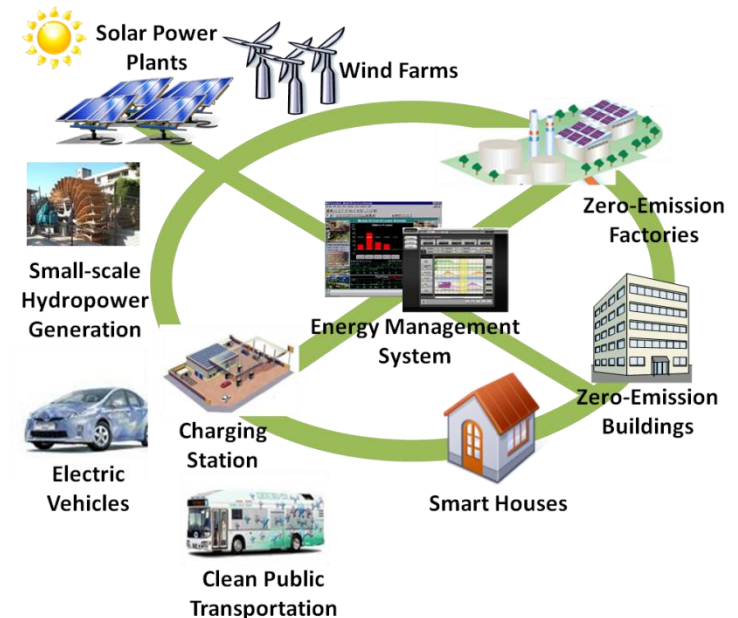
The Secretariat: New Energy and Industrial Technology Development Organization (NEDO)  
Members : 664 companies (as of August 2011)

### ◆ Special missions

- Malaysia December 2010
  - Thailand February 2011
  - Vietnam August 2011
  - Indonesia, Singapore, and etc. (to be planned)
- METI and JSCA will support the formation and activities of the project-based consortiums in private sector that have advanced technologies concerning the smart energy systems and social infrastructures.

## Image of Smart Community

Japan will strengthen this initiative, recognizing the importance of the construction of the Smart Communities with resiliency and reminding of the experience of the Earthquake and Tsunami.



**Thank you for your attention !**