

Innovative Urban Solution Developed by Yokohama

Towards comprehensive support to cities in emerging economies

Background and Goal

- The City of Yokohama has established Y-PORT Center to provide smart urban solutions to cities in Asia and the world. One of the main objectives of Y-PORT Center is to co-create and provide “best available” smart urban solutions through dialogue with private firms in Yokohama with cutting-edge technologies, cities in emerging economies, and global think tanks.
- For the past few years Y-PORT Center has been undertaking city-to-city collaboration with cities in emerging economies including Cebu (Philippines), Da Nang (Vietnam), Bangkok (Thailand) and Batam (Indonesia).
- During the fiscal years 2016 and 2017 in particular, the City of Yokohama conducted site-visits, technical seminars, and business matching seminars with over of 71 Japanese firms in Da Nang (Vietnam), Batam (Indonesia), Metro Cebu and Cagayan de Oro (Philippines). Through these initiatives the City of Yokohama and participating private firms undertook intensive dialogue with city officials, technical experts, and firms in these cities. Through these dialogues, integrated smart urban solutions have emerged in the form of innovative “packages” based on the high quality technologies of the private sector and urban management expertise of the City of Yokohama.
- This brochure will provide a prototype concept for these smart urban solutions provided to cities in emerging economies by the City of Yokohama and private firms. The target areas of work are: (1) waste separation and recycling promotion, (2) wastewater treatment systems, (3) green buildings and factories, (4) smart energy management, (5) efficient mobility, and (6) disaster prevention/reduction. We believe that with further refinement based on respective local social, economic, and financial conditions, these prototypes can serve as “best available” integrated infrastructure packages.



Solutions for
Urban issues



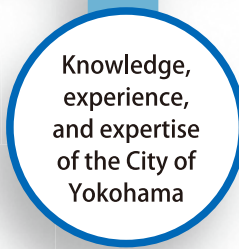
Yokohama Urban Solutions



Support from the Japanese Government and Development Organizations



Technical capacities of private firms in Yokohama



Knowledge, experience, and expertise of the City of Yokohama

Waste Separation and Recycling Promotion

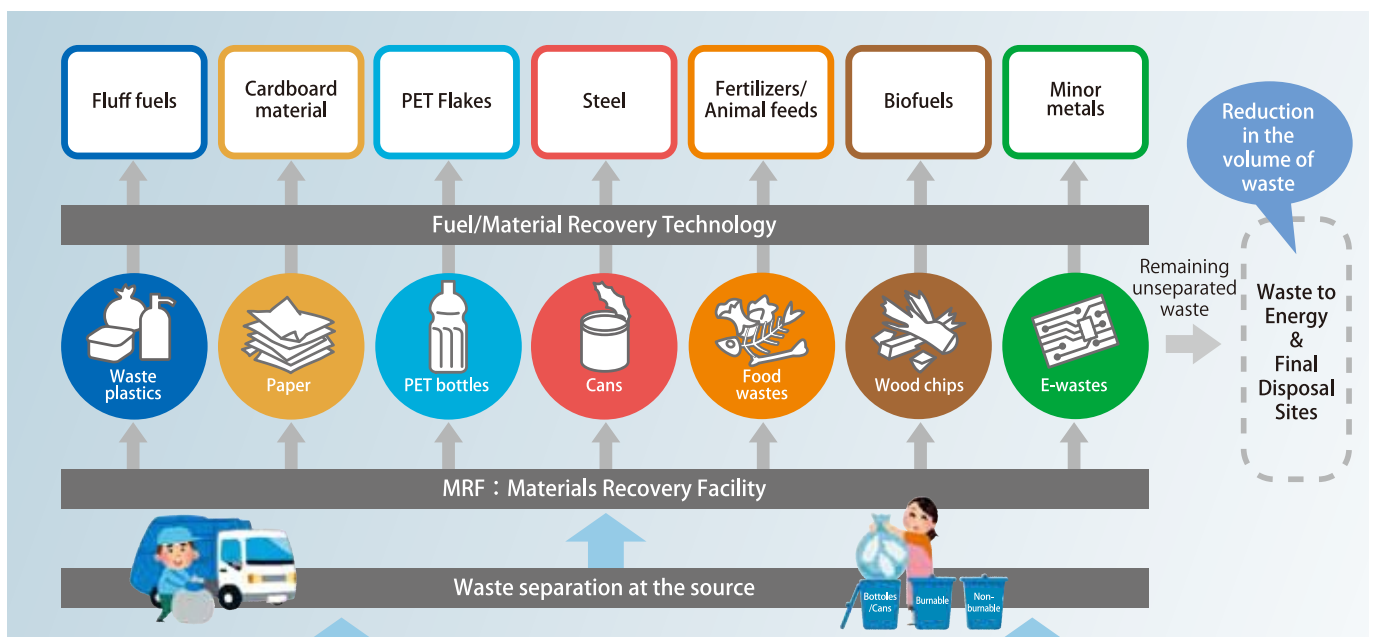
Urban Issues

In many cities in emerging economies, waste is being disposed of in final disposal sites with minimum separation, which leads to short life span of sites. Fostering consensus among local authorities and citizens concerning waste separation is an important first step and citizens' awareness towards environment causes and waste reduction through separation at the source need to be raised.



Materials Recovery Facility (MRF)

Promoting waste separation at the source, recovering valuable materials through recycling, and producing fuel from waste in intermediate treatment facilities will lead into establishing vein industries in the solid waste management sector.



Technologies / Products / Service of Private Firms in Yokohama

Target	Examples of Technologies/Products/Service
Waste plastics	Crushers, conveyors, washers, wastewater treatment equipment
Paper/Cardboards	Pulpers, screens, mixers, flotators, papermaking machines
PETs	Bale breakers, conveyors, crushers, washers, dehydrators
Bottles/Cans	Crushers, conveyors, magnetic separators, pressing machines
Food wastes	Biomass boilers/energy generators, methane fermentation systems/energy generators, biodiesel generators, composts
Wood chips	Incinerators (stoker, fluidised bed, gasification and melting furnaces), dioxin thermal decompositions, energy generators, heat recovery systems
Medical wastes	Sterilizers (high-pressure steam, dry-heat), incinerators (vertical, kiln, gasification furnaces)
Home appliances	Crushers, classification machines, fluorocarbon recovery machines

Expertise of the City of Yokohama

- Yokohama is constantly improving its waste reduction schemes by working together with its citizens and business sector. Through the "Yokohama G30 Plan", substantial waste reduction was achieved. The following scheme, the "Yokohama 3R Dream Plan", focuses on reducing production of waste.
- Yokohama's 4 Recyclable Resources Separation Centers not only separate recyclable waste, but also offer citizens facility tours as well as classes on recycling and activities to raise awareness on the importance of recycling.
- Waste that cannot be recycled is treated at the Waste to Energy (WtE) incineration plant, where waste is used to efficiently produce energy and further reduce waste volume with minimum emissions.



Midori Recycle Resources Separation Center



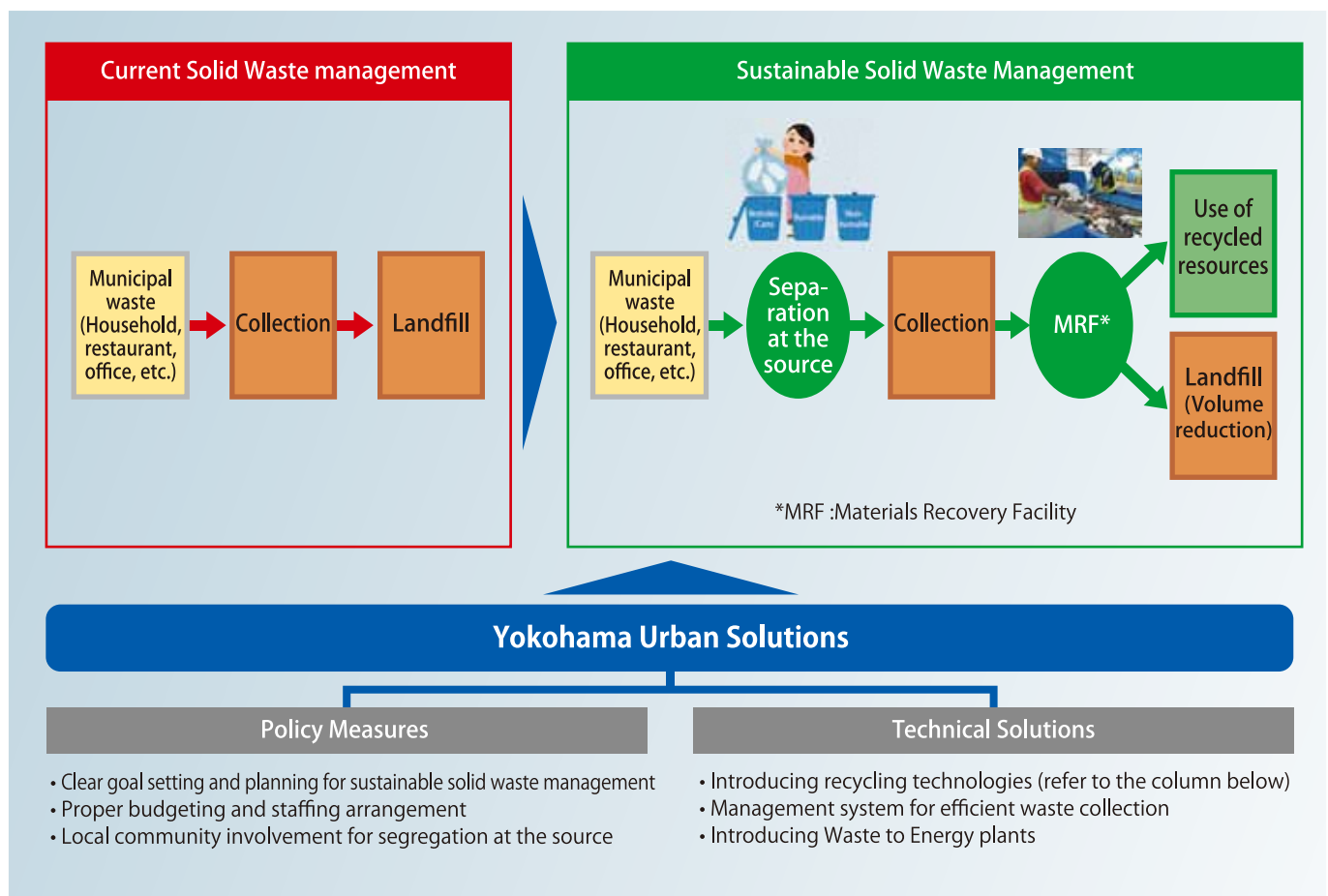
Kanazawa Incineration plant

Transition to sustainable waste management

Urban Issues and Proposed Solutions



The local governments of Metro Cebu, the Philippines are invoking a slogan “Let’s dispose the way of thinking of landfilling garbage into landfill sites”. The City of Yokohama has responded urban issues through international cooperation with the local governments and by integrating technologies of private sector firms and City’s expertise towards promotion of sustainable solid waste management.



Waste Plastics Recycling Plant in Metro Cebu, Philippines

Case

GUUN Co., Ltd. (based in Yokohama) conducted feasibility studies and demonstration projects (JICA projects) since 2012 in collaboration with the City of Yokohama, and opened a waste plastic recycling plant in May 2017. This plant manufactures fluff fuel from collected waste plastic, which is mainly used by cement companies. By accepting household waste plastic in addition to industrial waste, the plant contributes to further reducing the amount of solid wastes delivered to landfill. The City is proposing to municipalities to co-create and to establish efficient institutional framework towards this end.



Installation of Wastewater Treatment Systems

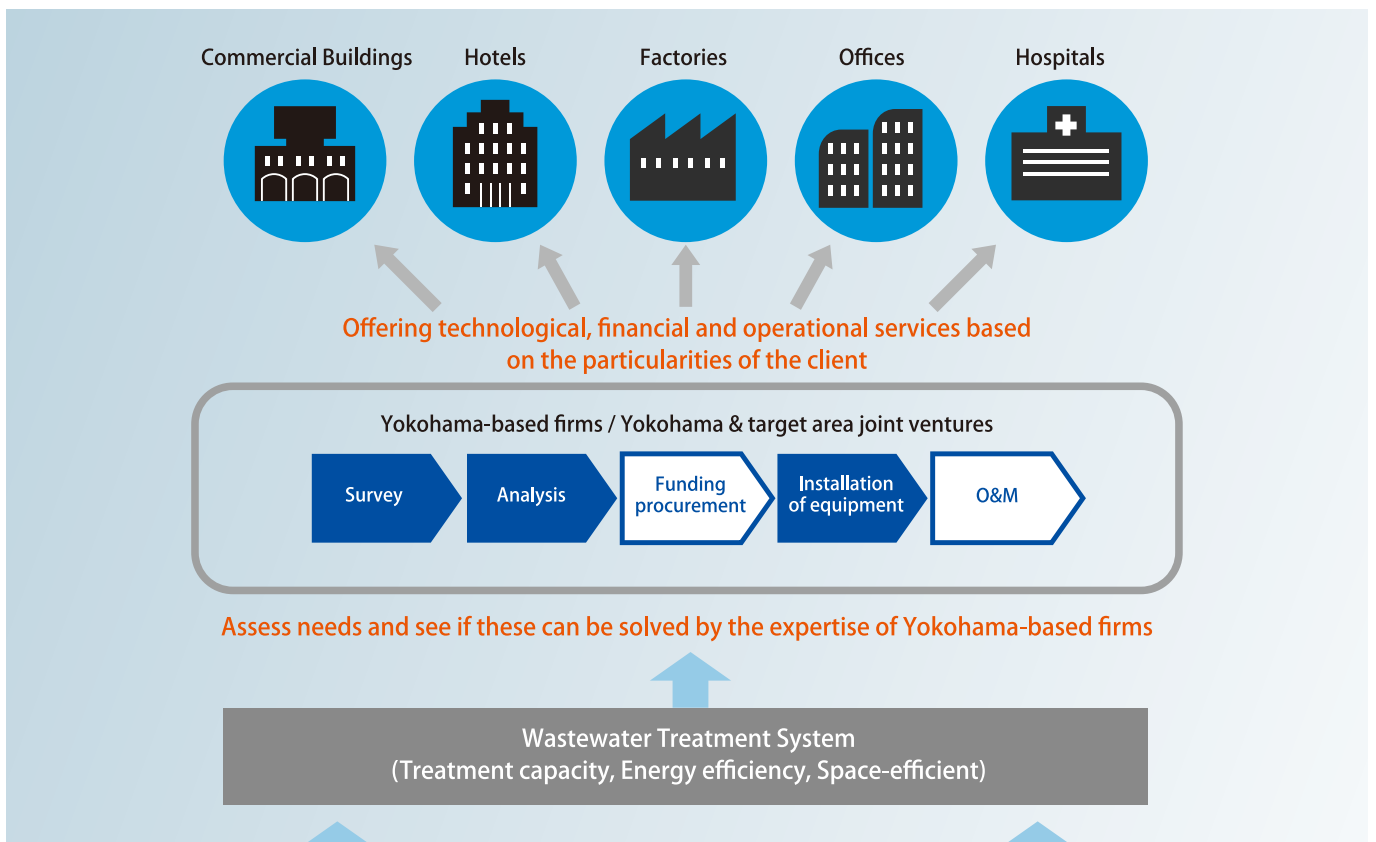
Urban Issues

In many cities in emerging economies, wastewater systems are yet to be provided adequately. Hence private companies such as hotels, shopping malls and factories have had to deal with wastewater with their own individual facilities, yet these facilities tend to be old and do not meet adequate standards. As a result, the wastewater is often discharged directly into rivers from these obsolete facilities. Proper sludge treatment from these facilities is another urgent issue which needs immediate attention.



Domestic Wastewater Treatment System

These cities need affordable, efficient, compact domestic wastewater treatment systems with water quality data collection and analysis. Industrial parks are also keen to install an efficient and comprehensive industrial wastewater treatment system.



Technologies / Products / Services of Private Firms in Yokohama

Target	Technologies/Products/Services
Domestic wastewater treatment system	Wastewater treatment tank, water quality analysis equipment, grease traps, septic tanks, activated sludge treatment facilities, agents, filters, sterilizers, remote monitoring systems, disposers, sludge dewatering machines
Industrial wastewater treatment system	Pipes, wastewater treatment tank, water quality analysis equipment, grease traps, septic tanks, activated sludge treatment facilities, agents, filters, sterilizers, remote monitoring systems, disposers, sludge dewatering machines

Expertise of the City of Yokohama

- Establishment of wastewater treatment regulations, leak detection, factory inspection to monitor wastewater treatment and raise awareness on pollution control.
- Fukuura wastewater treatment plant treats water contaminated by metal plating and coating produced by the industries in the Kanazawa Industrial Complex.



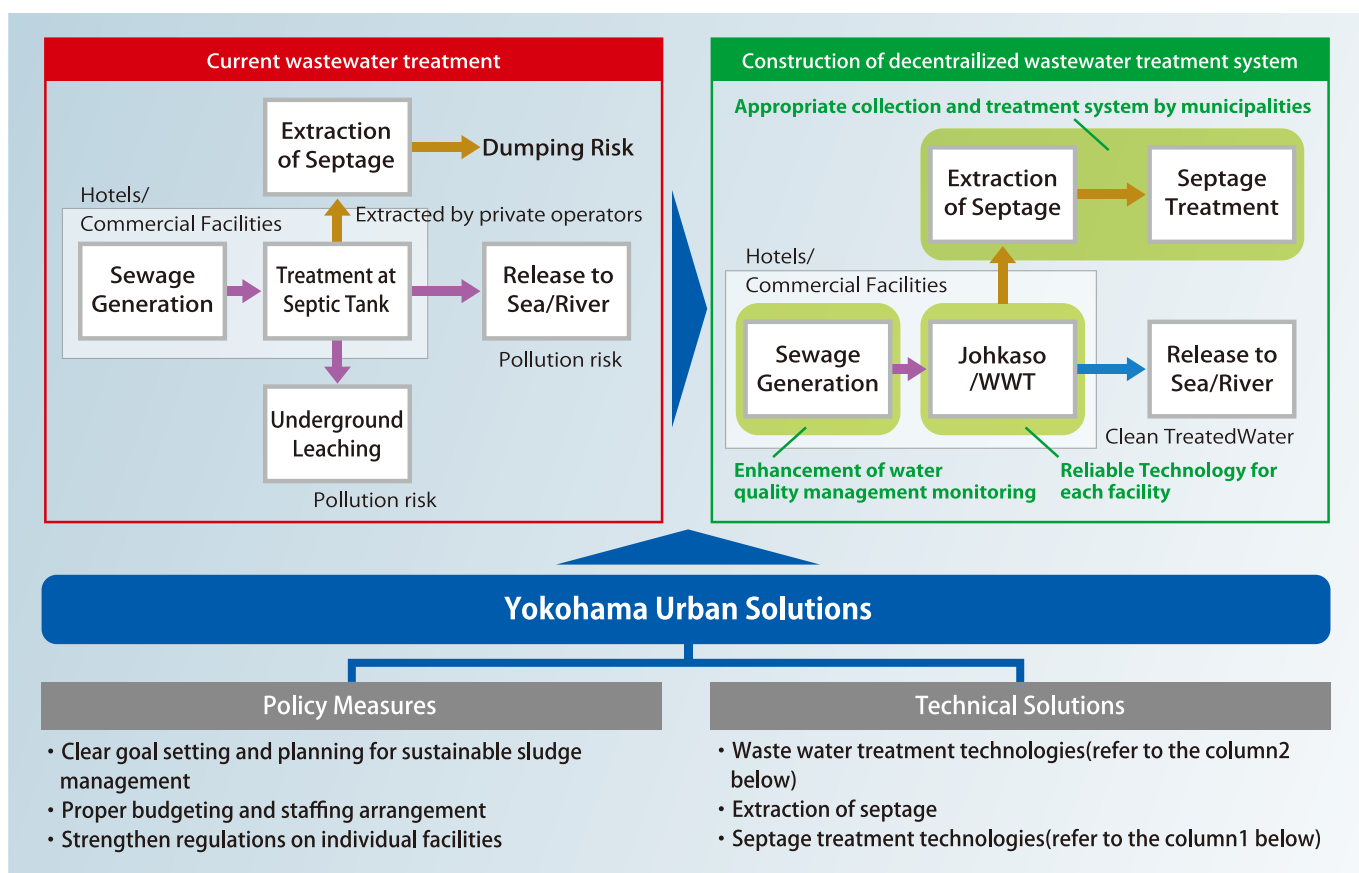
Fukuura wastewater treatment plant

Transition to sustainable wastewater management

**Urban Issues
and Proposed
Solutions**



The septic tank is commonly used as a means of wastewater treatment in Southeast Asia. If not properly managed many urban issues could arise from this system: illegal dumping of sewage sludge after extraction, contamination of underground water due to infiltration of wastewater from tanks, or contamination of sea or river water due to incomplete treatment. The City, in collaboration with its private sector, is cooperating internationally to introduce appropriate sewage treatment facilities and to install appropriate management system for extracted septage.



Case

1. Introduction of Dewatering Equipment for Septage Management in Cebu city, Philippines

Amcon, INC. (based in Yokohama) conducted a JICA pilot survey for disseminating SME's technologies for applicability of dewatering equipment for septage management. This sludge dewatering equipment is easy to operate and has reduced the water and power usage for local sludge treatment. This contributed to the establishment of ordinances concerning septage management in Cebu City, and the cities of Tarlac and Baguio have introduced the dewatering equipment to their sewage and septage treatment plants.



2. Technology for Waste Water Management in Cagayan de Oro, Philippines

Hinode Sangyo Co., Ltd (based in Yokohama), in collaboration with the City of Yokohama, is undertaking a feasibility study (JICA project) on a microbe dispersal treatment system. This project aims at achieving local assembly and manufacturing of the system as well as local development and production of the microbial agent. By introducing wastewater treatment facilities in large installations such as hotels, markets and factories, the project aims at improving the environment as well as public awareness on sanitation.



Green Buildings and Factories

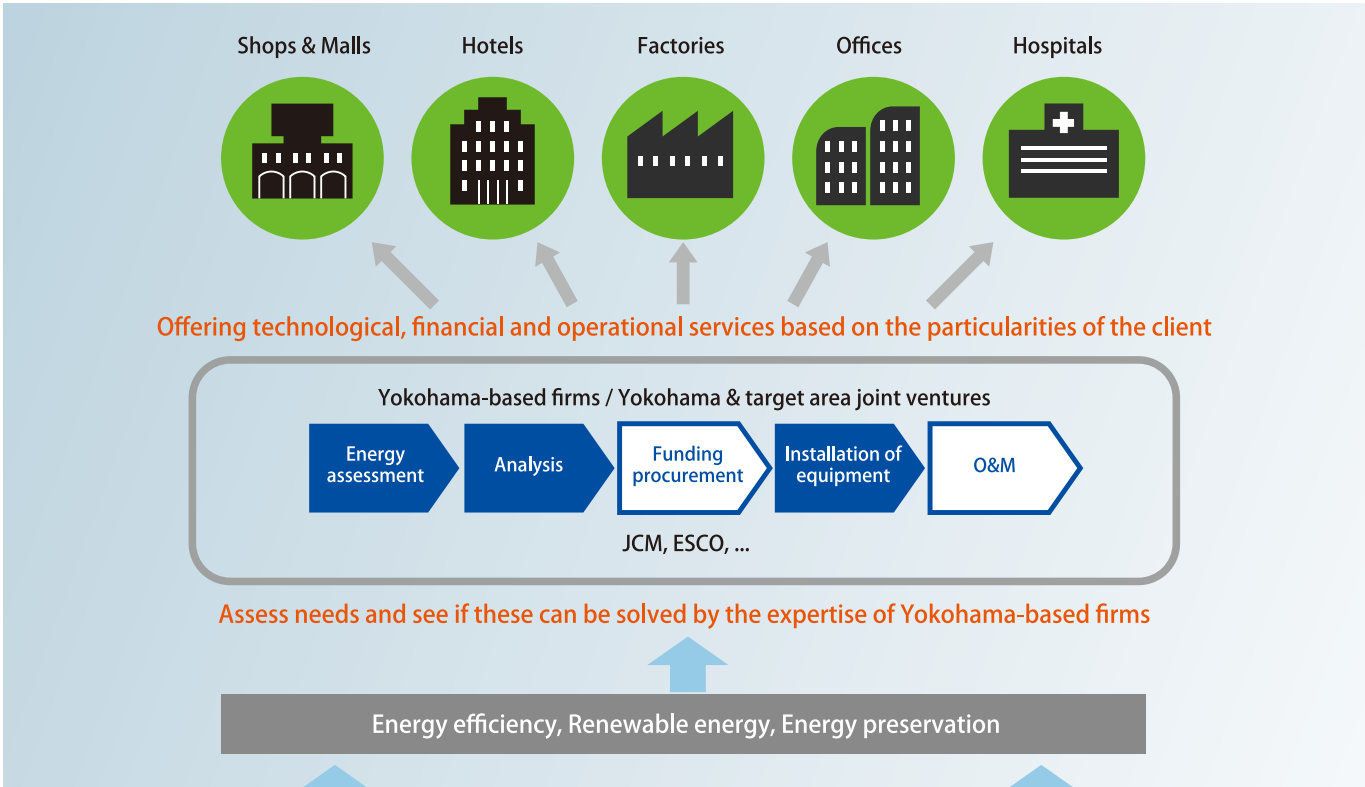
Urban Issues

Global warming is an issue that can only be solved through global action. Energy consumption and greenhouse gas emissions are expected to increase rapidly in emerging economies cities due to rapid urbanization and the large scale construction of shopping malls, office buildings, hotels, hospitals, and factories.



One-Stop Service for Green Buildings and Factories

These cities are in need of full on-site support in energy saving diagnosis and analysis, installation energy saving equipment and energy management systems, as well as monitoring and maintenance services.



Technologies / Products / Service of Private Firms in Yokohama

Target	Technologies/Products/Services
Improved energy efficiency in hotels, public and commercial buildings	Energy efficiency assessments, energy management systems, energy efficiency equipment (AC, LED), insulated windows, sashes, exterior walls, heat shield paints/films, emergency energy generators
Improved energy efficiency in industrial park / factories	Energy management systems, co-generation systems, more efficient boilers, energy efficiency in production lines, distribution automation systems, Uninterruptible Power-supply, voltage regulators, monitoring and controlling systems
Installation of renewable energy equipment	Solar power, biomass boiler, biomass energy systems, storage battery systems

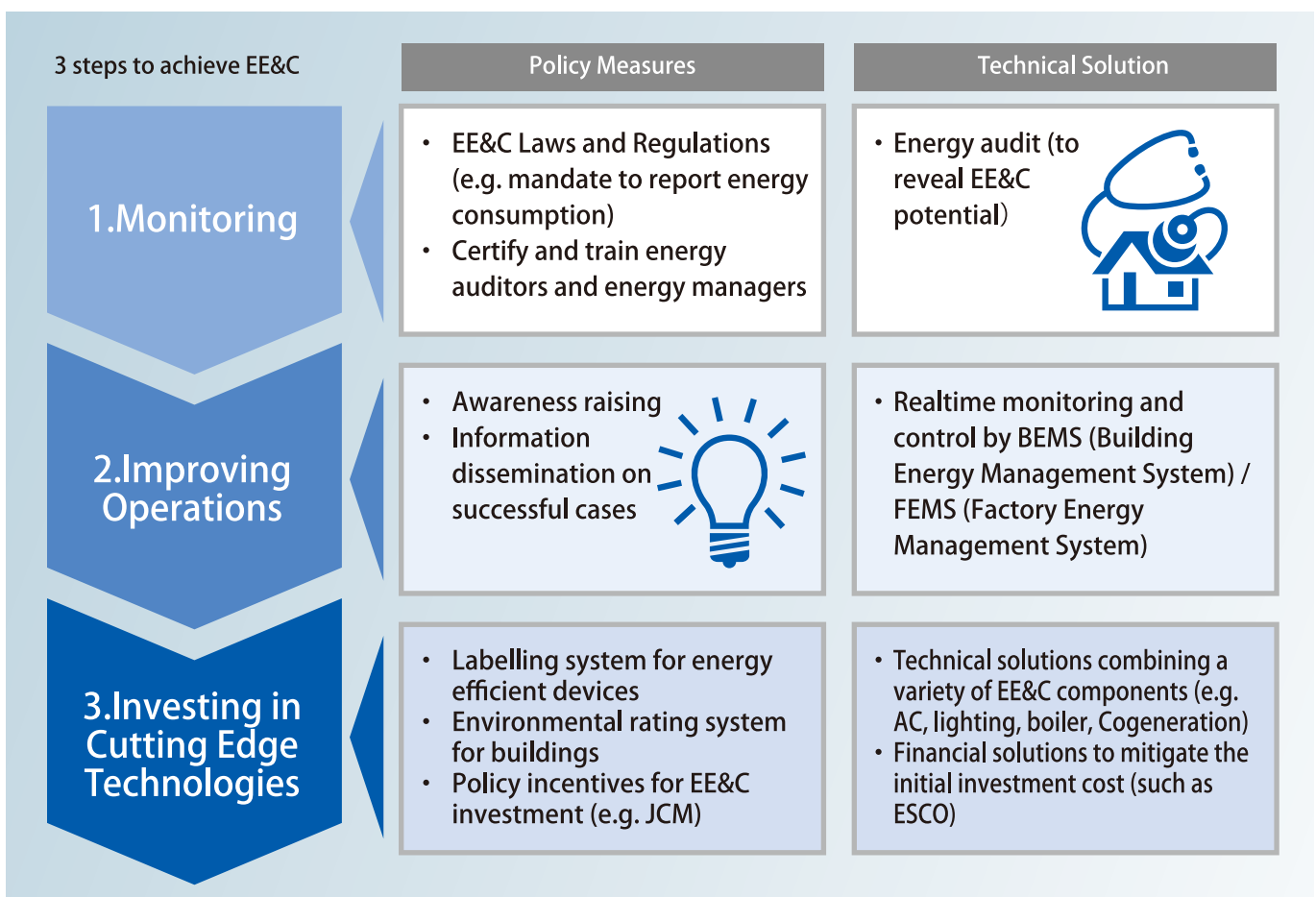
- ### Expertise of the City of Yokohama
- ESCO (Energy Service Company) : Renovation of public buildings such as ward offices, hospitals and community centers (In FY2014, had worked on 26 buildings for 18 projects). Since 2017, it has also been undertaking the "Yokohama small/medium ESCO project", aimed at small and medium-sized facilities, with simplified methods and procedures.
 - YSCP (Yokohama Smart City Project): The City of Yokohama has been collaborating with 34 energy-related companies to introduce energy supply and demand optimization systems in existing urban areas.
 - CASBEE (Comprehensive Assessment System for Built Environment Efficiency): Provides comprehensive building environmental impact assessments with the aim of promoting energy conservation and longer-lived buildings. Building over a certain size are required to advertise their CASBEE rating.

One-stop solution for energy efficiency and conservation



Energy efficiency and conservation (EE&C) measures bring multiple benefits to cities, especially in emerging economies where energy demand is rapidly increasing. EE&C not only reduces energy use and CO2 emissions, but also leads to lower energy costs and improved productivity and quality, thus benefiting the industry as a whole.

The City of Yokohama engages in international cooperation by packaging the highly energy efficient services and technologies of its private sector with its administrative expertise. Support is offered on all steps toward attaining EE&C (1. Monitoring energy consumption, 2. Improving operations towards efficient use of energy, 3. Introducing cutting-edge energy efficient technologies).



Energy Audits for Hotels in Da Nang City, Vietnam

OSUMI Co., Ltd. (based in Yokohama) conducted energy audits for hotels and factories in Da Nang City, in collaboration with the City of Yokohama and JICA. Osumi opened a representative office in Da Nang and provides one-stop services to customers from diagnosis to verification, including on-site energy audits, recommendations for various EE&C measures, as well as designing, engineering and monitoring the effectiveness of introduced measures.

Case

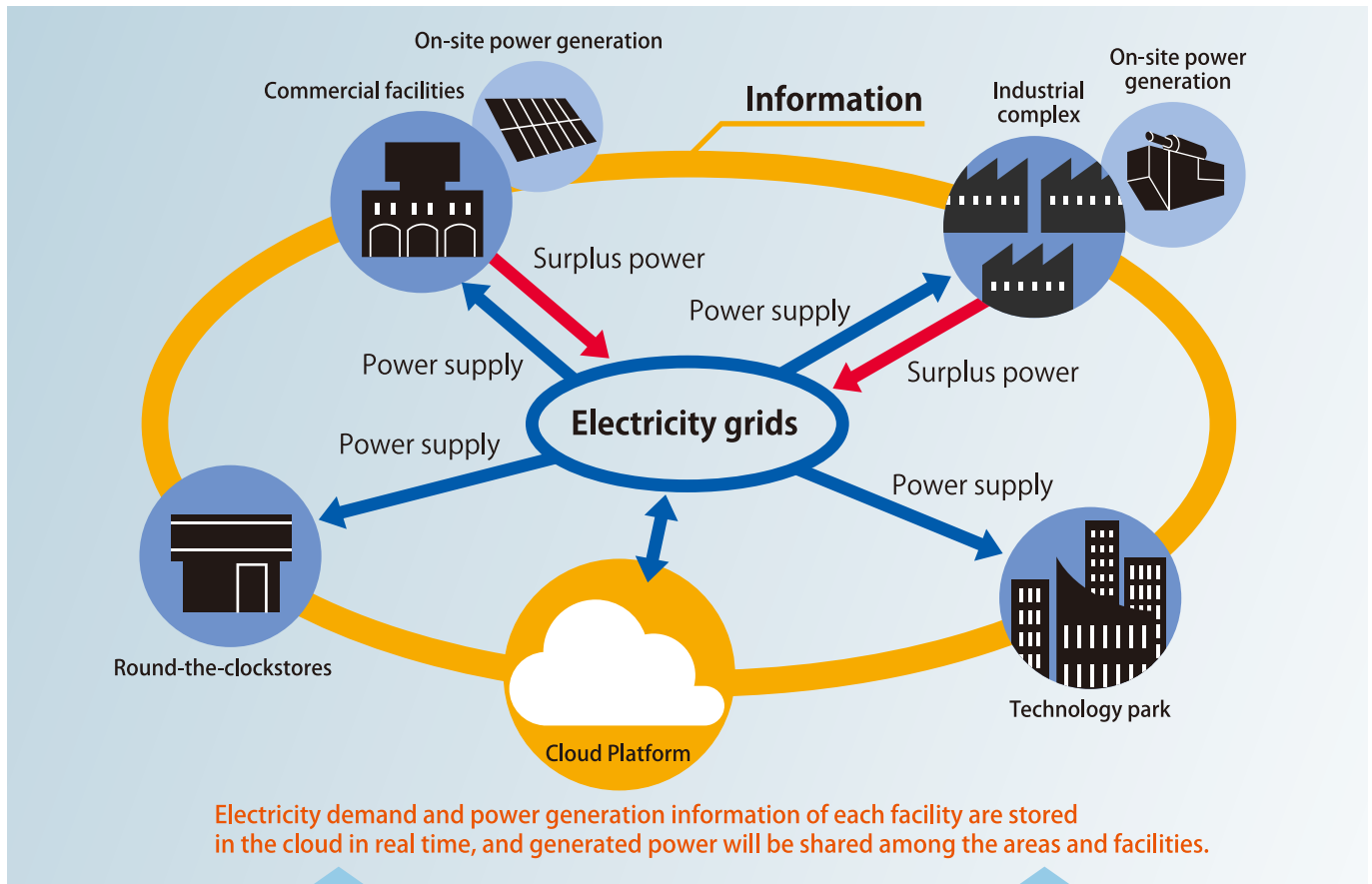


Urban Issues

In many cities in emerging economies, following a wave of rapid industrialization, power consumption and the cost of electricity have increased in recent years. Therefore, it is necessary to create efficient power supply and energy consumption mechanisms.

Energy Management System at Community Level

Recently, technological innovations and pilot application are being conducted to build energy management systems (EMS) at community level and facilities. EMS is a system that aims at improving the efficiency of electrical supply and power saving through provision of power usage tracking capabilities, and a comprehensive management system for power generating equipment. Demonstration projects are also being conducted in Japan to develop new power grid technologies called "digital grid", using internet architecture.



Technologies / Products / Services of Private Firms in Yokohama and YSCP member firms

Target	Technologies/Products/Services
Renewable energy	PV power system, biomass power generation, etc.
Building (BEMS)	Clustered BEMS, smart BEMS, negawatt aggregation, etc.
Factory (FEMS)	Smart FEMS, Redox flow (RF) battery, co-generation system(CGS), etc.
Residence (HEMS)	HEMS(for demand response and visualization), forecasting of PV power generation, smart meters, etc.
Community (CEMS)	Demand response system, customer registration function, incentive calculation, SCADA batteries, etc.
Common technology	Cloud technology, digital grid, wireless communications, batteries, etc.

Expertise of the City of Yokohama

- Yokohama Smart City Project (YSCP)
The City of Yokohama and 34 companies including energy-related companies, electric manufacturers, and construction companies collaborated to introduce systems for optimizing the balance of energy supply and demand in urban areas. The Yokohama Smart Business Association (YSBA) was established to realize energy efficient city based on YSCP.



Urban Issues

In many cities in emerging economies, severe traffic congestion, noise, and air pollution are becoming serious problems due to increased automobiles. Traffic congestion does not only deteriorate the urban environment and has negative impacts on the entire economy, but also slows down services to citizens which require the usage of roads, such as emergency medical transportation.

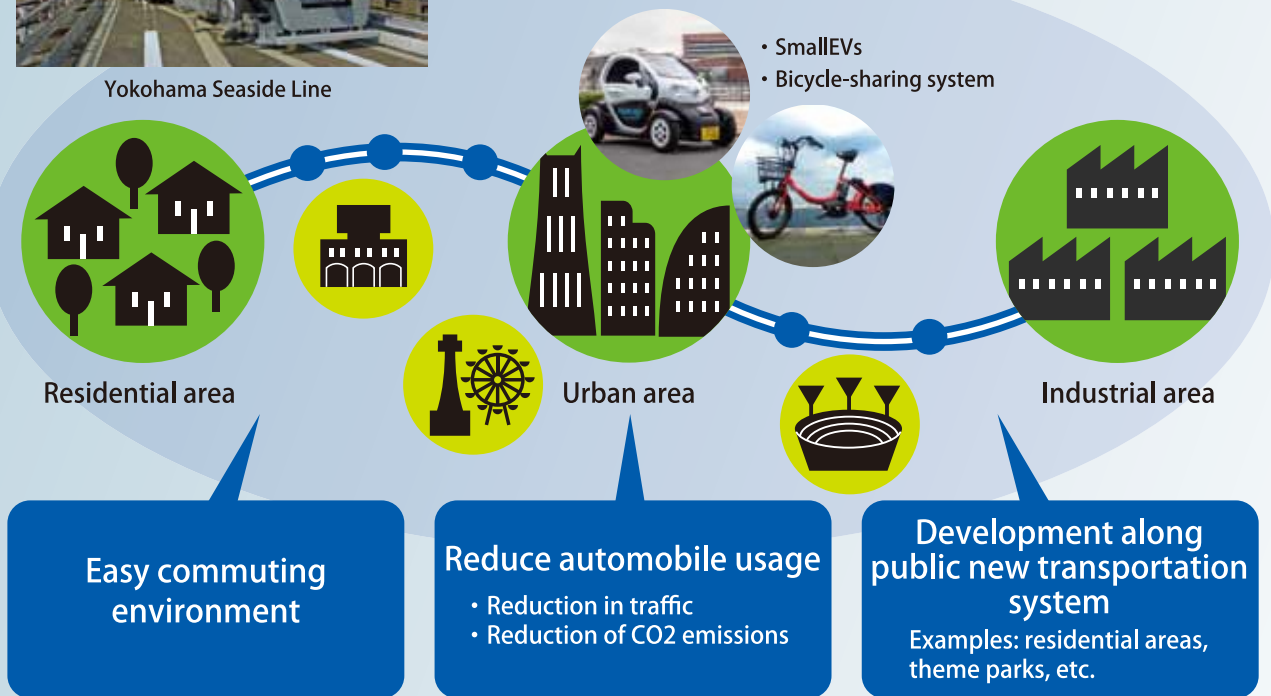
Development of Public Transportation and Next-Generation Traffic Systems

To counter population inflows into urban areas, a comprehensive transportation system which includes a public transit system is needed. In addition, new solutions are gaining in popularity, such as the introduction of environmentally-friendly next-generation transportation systems or the use of ICT technologies to optimize existing transportation networks.



Yokohama Seaside Line

Provide efficient mobility and harness urban development potential by developing an integrated transportation system and transit oriented development (TOD)



Technologies / Products / Services of Private Firms in Yokohama

Target	Technologies/Products/Services
Public transportation system	Metro railway, Light Rail Transit (LRT, AGT), public bus service, etc.
Transportation inside the communities	Small EVs called "Choi Mobi" , bicycle-sharing service, car sharing lanes, etc.
Traffic management	Control center, automated driving, railway system design, traffic monitoring camera, traffic network, big data analytics, etc.

Expertise of the City of Yokohama

- The Yokohama Seaside Line is an elevated LRT also known as AGT (Automated Guideway Transit) running through the industrial park and housing complex development areas in the southern part of Yokohama City, contributing to the economic activities in those areas. It is a medium-scope elevated railway that runs for 11kms, has 14 stations, and connects two MRTs (Mass Rapid Transit). The compact vehicles and rubber tires of the AGT enabled highly flexible route planning within the city, which lead to low construction costs.
- Environmentally-friendly next-generation transportation systems were introduced in the central urban area, such as the "Choi Mobi" small EV sharing system, "Baybike" bicycle-sharing, etc.

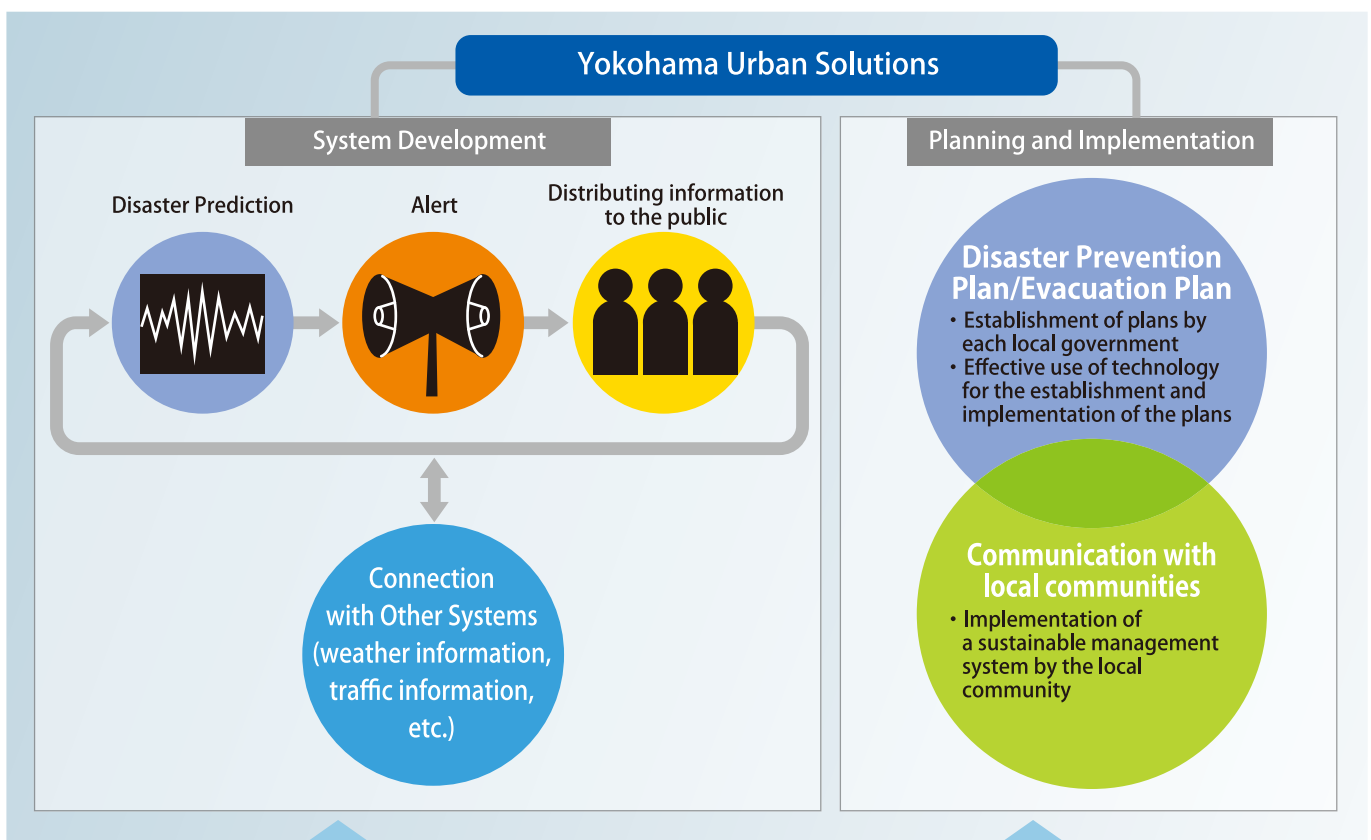
Urban Issues

Although natural disasters caused by climate change are getting worse in many cities in emerging economies, development and maintenance of disaster prevention systems remain inadequate. Comprehensive disaster prevention plans and systems are essential for resiliency.



Introduction of Disaster Prevention Plan and System

Japan has experienced and handled many natural disasters such as earthquakes, typhoons, floods and landslides. The City of Yokohama has developed and implemented a comprehensive system based on both the disaster prevention plans formulated by the City and technologies developed by private sector firms. Development and implementation of a comprehensive disaster mitigation and prevention system in emerging cities is urgently required. The system would need to be developed in collaboration with citizens and include disaster prediction and alert systems, evacuation systems during the disaster and information-sharing platforms for the affected.



Technologies / Products / Services of Private Firms in Yokohama

Target	Anomaly Detection & Disaster Prediction
Anomaly Detection & Disaster Prediction	Water level indicator, rain gage, monitoring camera, flood and landslide simulation system, forest fire monitoring system, etc.
Alert	Alert system during heavy rainfall, tsunami prediction system, etc.
Information Sharing	Command center, emergency broadcasting equipment, backup wireless communication system, information distribution service through SNS, etc.

Expertise of the City of Yokohama

- The City of Yokohama formulated disaster prevention plans to respond to both natural disasters, such as earthquakes and typhoons, and man-made disasters. The plans are divided according to three phases: prevention, emergency, and restoration.
- Infrastructure-level: Seismic retrofitting, emergency transport routes, river channel widening, drainage, water retention pond, etc.
- Administration-level: Hazard maps, information dissemination system, disaster response drills, etc.



Proposed Functions of Y-PORT Center

Formulating the market for environmental technologies through institutional development in emerging economies

- Supporting Master Plan formulation for cities in collaboration with JICA, ADB, etc.
- Building appropriate regulation and human resources in cities by leveraging Yokohama's urban development experience
- Incorporating upstream approaches into the master plan policies

Creating smart urban solutions through co-creation among cities and private firms

- Fine-tuning business plans through arranging feasibility studies and demonstrations
- Developing comprehensive package solutions for cities
- Co-creating "Best Available Solution" proposals with diverse affiliated organizations

Understanding emerging urban needs and providing information for technical development and assistance

- Providing comprehensive information on the needs of cities in emerging economies to private firms
- Recognizing local needs and conducting joint field studies
- Creating business matching opportunities through Y-PORT Workshops, local seminars, etc.

Introducing technology of private firms in Yokohama to cities in emerging economies

- Promoting technologies possessed by private firms in Yokohama to cities
- Creating business matching opportunities through Y-PORT Workshops, local seminars, etc.
- Collaborating with private firms to dispatch smart infrastructure solutions

Establishing an international network through enhancing and capitalizing on Yokohama's global brand

- Sharing with the international community through gatherings such as the Asia Smart Cities Conference
- Publicizing information proactively to raise Yokohama's name recognition and strengthen its widely praised brand value
- Encouraging ongoing inter-city cooperation through the Asia Smart City Alliance

Establishing a Collaborative Network among Cities



5th Asia Smart City Conference (2016)

Asia Smart City Conference

International conference organized by Yokohama attended by leaders of emerging Asian cities and experts from international organizations gather under one roof to share knowledge concerning sustainable urban development.

Asia Smart City Alliance

Platform to share knowledge and encourage discussion on smart city development among various stakeholders. Adopted the Yokohama Declaration at the 4th Asia Smart City Conference.

Currently promoting information exchange on the ASCA Facebook page.
<https://www.facebook.com/AsiaSmartCityAlliance/>



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