

Equipped with “Intelligence”

In the first article of a new series introducing Japan’s so-called smart cities, we asked Ishii Kisaburo, the former Vice Minister of Land, Infrastructure, Transport and Tourism and now Ambassador to Romania, for an overview of “intelligent” city design.

TJJ: What is a smart city?

Ishii Kisaburo: There is no clear definition for the term “smart city” in Japan or abroad. Roughly speaking, the term refers to “a city that controls a great variety of urban infrastructure, such as roads, railroads, electricity, hospitals and schools in a smart way through the use of ICT (Information and Communication Technology).” Smart cities can also refer to “smart communities” and “smart grids” for the efficient use of energy, “smart mobility cities” that utilize next-generation cars and traffic systems, and “smart wellness cities” that aim to create a society in which people enjoy health and longevity.

What events led to the development of smart cities?

The construction of taller buildings in recent years has caused the concentration of people, things and information to intensify in major cities in the world, such as Tokyo, London, Paris and New York. Faced with this situation, many cities are no longer able to make urban functions work properly with simply conventional infrastructure. A solution to this dilemma is a smart city. Cities equipped with “intelligence” can take new strides forward as smart cities.

We are also witnessing the influx of many people from agricultural areas moving into urban areas in emerging economies that are developing at a remarkably rapid pace. The development of infrastructure is unable to keep up with the increase in population in those cities. Here again, smart cities provide an effective means for addressing these issues and improving the situation.

Ishii Kisaburo, the former Vice Minister of Land, Infrastructure, Transport and Tourism and now Ambassador to Romania



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In addition, today's world faces the issue of global warming. If we continue to develop infrastructure in the same way we always have, we'll be unable to curb carbon dioxide emissions, the main cause of global warming. You have to make cities smart to limit the impact they have on the environment.

What kind of measures is the Japanese government implementing to promote smart cities?

The Low Carbon City Act came into effect in Japan in 2012. The purpose of this law is to concentrate the urban facilities needed for everyday life in areas closer to residential districts to reduce carbon dioxide emissions, as well as promote the development of compact cities in which people can live without being excessively dependent on cars.

In addition, in July last year the Ministry of Land, Infrastructure, Transport and Tourism (MLIT) announced the Grand Design 2050 initiative, which specifies the vision for national land development for 2050. The key concept of this initiative is "compact and networks." The current Japanese population of 120 million is projected to decline to 80 million in 2050. The populations of cities in rural areas will experience an especially rapid decline. In this situation, it is essential to efficiently provide residents with services, such as public administration, medicine, welfare and commerce, by concentrating all the necessary urban functions in a specified area. There is also a need to connect cities with transportation and communication systems and build networks.

The mechanisms of smart cities are required to realize the concepts laid out by the Low Carbon City Act and Grand Design 2050.

What specific technologies are needed to create smart cities?

One is energy technology, and for this we have the energy management system (EMS). There are different types of EMS, such as HEMS, BEMS and CEMS. HEMS is the system used to optimize electric power distribution for housing, while BEMS is the correspond-

ing system for buildings. For example, we can reduce dependence on system power supply by using the electricity stored in storage batteries in peak hours when the demand for power rises. When we have extra power, we recharge electric vehicles (EVs), and when the power supply is cut off or there is a decrease in the amount of stored power, we can use

power. The combined use of ICT and hydrogen is expected to bring about a technological breakthrough that will take smart cities to a new level.

Can you give us specific examples of smart cities in Japan?

One example is Kashiwa-no-ha Smart



Monitors in a community energy management system (CEMS) operations room in Higashida Ward, Kitakyushu, Fukuoka Prefecture display graphs and figures showing electric power supply and demand.

EVs as power supply sources. CEMS is a system that seeks to maintain the optimal balance between local energy supply and demand by using local renewable energy, such as solar power and wind power, as well as by exchanging information with HEMS and BEMS.

In addition, there has been a great deal of interest in the use of hydrogen for smart cities in recent years. Conventional cities consume large amounts of energy and emit large amounts of carbon dioxide. In contrast, hydrogen is a clean form of energy that does not emit substances that have a negative impact on the environment, such as carbon dioxide, even when it is used as fuel. Hydrogen also offers superb thermal efficiency and can be stored. Likewise, hydrogen can be created by electrolyzing water with the electricity generated by renewable forms of energy, such as wind power and solar

City, which is located just outside Tokyo in Chiba Prefecture. Kashiwa-no-ha Smart City seeks to control carbon dioxide emissions with the use of EMS, and is committed to developing a city that is extremely energy efficient. Mitsui Fudosan and many other companies in the fields of electrical machinery, electricity, and gas are involved in this project. The University of Tokyo, which has a campus right by Kashiwa-no-ha Smart City, is also carrying out various pilot projects. Many visitors from abroad come to see Kashiwa-no-ha Smart City.

Another example is Fujisawa Sustainable Smart Town (Fujisawa SST) in Fujisawa City, Kanagawa Prefecture. Fujisawa SST, in which the electronics company Panasonic Corporation plays a leading role, promotes smart town development through the total introduction of energy using solar power and storage batteries,



Hama Wing, the experimental wind power plant in Yokohama, Kanagawa Prefecture

security by surveillance cameras and lighting systems, and mobility with EVs and battery-assisted bicycles.

In addition, Yokohama City in Kanagawa is conducting a large-scale demonstration experiment in which they have installed solar panels on the roofs of more than 4,000 houses. With these panels, they optimally control the energy supply and demand for residential houses, office buildings, and local communities by using HEMS, BEMS, and CEMS in commercial, residential, and industrial districts.

Is the concept of “being smart” utilized in areas other than city development?

“Smart” technologies and systems using ICT are being introduced in areas that are hardly noticed by people. Dam management is one example in infrastructure development, an area in which I was involved for many years as an MLIT official. We monitored the water reserves of dams by using special communication channels, and managed the quantity of water drainage and the water reserves of dams by taking into account forecasted quantities of precipitation. This system is capable of both preventing water disasters and securing a supply of water. This is a good example of one founded

upon the idea of “being smart.”

In addition, we have the electronic toll collection system (ETC) for expressways. This system has significantly eased traffic congestion at tollbooths, and has also allowed for more flexible price settings. Now we have many different types of discounts, such as early morning and late night discounts, as well as discounts for particular sections of expressways. These have enabled us

to spread out traffic and reduce congestion caused by the concentration of traffic in a particular section.

What possibilities do you think exist for Japan’s smart city technologies and the use of these systems in other countries?

I visited many cities in Asian countries during my time as an MLIT official.



Fujisawa Sustainable Smart Town (Fujisawa SST) in Fujisawa City, Kanagawa Prefecture

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Many of those cities faced a host of problems, such as energy shortages and traffic congestion, and really struggled to fix them. For example, they could not solve traffic jams by simply building a large number of viaducts on the streets. The people I spoke with in many Asian countries and cities fully understood the need for introducing smart traffic con-

We cannot automatically assume that the advancement of technology will make smart cities the norm. There is a need for systematic platforms built on the basis of a deeper public understanding of smart cities. One example is the introduction of “dynamic pricing,” which is a system for adjusting electricity fees based on fluctuations in the

tional consensus is needed for this data to be used.

What significance do you think Japanese smart cities hold for the rest of the world?

Japan is grappling with a rapidly declining birthrate and aging population. Our



An ETC tollbooth on the Tokyo Wan Aqua-Line Expressway. The ETC (electronic toll collection) system has significantly eased traffic congestion at tollbooths on Japan's expressways and allowed for more flexible pricing.

trol, and hold high hopes for Japan's technologies and systems.

In addition, major Asian cities are plagued by water management problems. They cannot fully implement an efficient and sanitary means for providing water to residents, and are unable to maintain and manage water supply systems with the consumption fees paid by users. Major Asian cities expect support from Japan in constructing a smart system for total water management.

Cities where energy, traffic, and water are improperly managed cannot achieve sustainable development. In that respect, I think that smart cities and economic development will become increasingly intertwined as we head into the future.

What do you feel are the main points for promoting smart cities in Japan moving forward?

power supply and demand resulting from changes in the weather and temperature. This system prompts users to save electricity during hours when the demand is expected to exceed the supply by a substantial margin. Yahata-Higashi Ward in Kitakyushu City, Fukuoka, is carrying out a pilot test of dynamic pricing. We need to reach a national consensus before the same system is introduced nationwide.

In addition, the analysis of “big data” that has made rapid progress in recent years will serve as the technological base for smart cities. Railroad companies and communication companies have a huge amount of data about the movement of people and the communication tools they used following the Great East Japan Earthquake of March 2011. The analysis of this big data will greatly contribute to the crisis management of smart cities. Once again, a na-

country is also prone to many natural disasters, such as earthquakes and typhoons. Technologies and systems for smart cities are essential to tackle these challenges and further develop Japanese cities. In doing that, they will also provide a role model for solving the problems faced by cities all over the world.

Tokyo will host the Olympic Games and Paralympic Games in 2020. In preparation for the upcoming games, measures to introduce technologies and systems for smart cities are being taken all throughout Tokyo. The year 2020 will be a major milestone for smart cities in Japan. I hope that people from all over the world who come to Japan in 2020 for the Olympic and Paralympic Games will be equally delighted by their experience with Japanese smart cities. □

Interview by SAWAJI Osamu, *The Japan Journal*