



A delivery robot makes its rounds at Fujisawa Sustainable Smart Town in Japan.

YOSHIO TSUNODA/AFP/ALAMY

WHY JAPAN IS BUILDING SMART CITIES FROM SCRATCH

Purpose-built sustainable communities can boost energy efficiency and support an ageing population. **By Tim Hornyak**

By 2050, nearly 7 out of 10 people in the world will live in cities, up from just over half in 2020. Urbanization is nothing new, but an effort is under way across many high-income countries to make their cities smarter, using data, instrumentation and more efficient resource management. In most of these nations, the vast majority of smart-city projects involve upgrades to existing infrastructure. Japan stands out for its willingness to build smart communities from scratch as it grapples with

a rapidly ageing population and a shrinking workforce, meaning that there are fewer people of working age to support older people.

In 2021, the proportion of Japan's population aged 65 and over hit 29.1%, the highest in the world. By 2036 it will be 33%. Regional cities, especially, face a long, slow economic decline.

As a resource-poor, disaster-prone country, Japan has also had to pursue energy efficiency and resilience following the 2011 Tohoku earthquake and the tsunamis it triggered.

The resulting meltdowns at the Fukushima Daiichi nuclear power plant initially encouraged a shift away from nuclear power, which accounted for less than 4% of Japan's energy use in 2020. However, there are growing calls, led by Japan's ruling Liberal Democratic Party, for some reactors to be reopened to provide energy security and tackle rising fuel prices.

Smart cities can improve quality of life for older people while also increasing energy efficiency and climate resiliency. Japan has a long history of creating towns from nothing.

Evidence of the reclamation of coastal areas – to increase the amount of flat land in what is a mountainous country – dates back to at least the nineteenth century in Tokyo Bay.

Some of the companies that powered Japan’s remarkable economic growth in the twentieth century are at the forefront of the smart-city movement. Panasonic, for example, the industrial conglomerate founded in Osaka in 1918 to manufacture light-bulb sockets, now creates ‘sustainable smart towns’ (SSTs) in existing cities.

In April, the company opened its latest SST in Suita, a city in central Japan. Home to some 500 people, Suita SST is designed to address Japan’s demographic shift by creating a community where people from all age groups mix. It has housing complexes, a nursing home, a nursery school and a ‘cram school’ that prepares students for examinations, plus a shopping centre and park, all managed by Panasonic and partner companies. What makes it visibly ‘smart’ are features such as monitoring cameras that can detect falls at the nursing home, outdoor digital signage and high-voltage electricity-distribution equipment that allows for redundant power lines, making the community less vulnerable to outages.

The town also has facial-recognition security cameras “capable of storing and analysing image data to detect falls, congestion, wheelchairs, white canes, and the like,” says Masaki Yabuuchi, a Panasonic manager in charge of planning for the community. Elsewhere in the world, facial recognition has raised concerns about privacy. Panasonic says they are an opt-in system and used only with residents’ consent.

The company aims to source all of Suita’s power sustainably in five years’ time, and for it to have an independent supply of electricity for up to three days in the event of a disaster, using storage batteries, home fuel cells, solar panels and electric-vehicle charging stations.

Yabuuchi says Suita SST and towns like it can help to solve the challenges facing Japan. For example, smart towns can provide an environment that supports intergenerational social connections, and detect cognitive decline in older people through their use of household devices fitted with sensors. This also allows for prompt treatment of cognitive decline, meaning that such towns can use data to promote health and well-being.

Panasonic’s first smart town, Fujisawa SST, was launched in 2014 on the site of one of its factories that closed five years earlier.

“At the time, financial unrest was triggered by the 2008 financial crisis, so it was a difficult market even for the simple sale of former factory sites,” says Takeshi Arakawa, president



Houses equipped with solar panels in Fujisawa Sustainable Smart Town.

of Fujisawa SST Management Company. Japan’s smart-city initiatives were influenced by green policies promoted by the US government, namely efforts to use digital technology to improve efficiency in power grids, Arakawa adds.

Panasonic worked with the Fujisawa municipal government and other partners to turn the 19-hectare site into a suburb of Fujisawa, a city of 442,000 inhabitants. The SST has become a community of more than 2,000 people, mostly living in single-family, high-tech houses, with solar panels, storage batteries and a home energy-management system

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for efficient power use. Residents can use the town’s online portal to book shared electric cars, bicycles and scooters, or check deliveries from an on-site logistics centre, which are made by bicycle courier or robot. The experimental robots slowly and autonomously rove around the town on a wheeled base, looking like oversized supermarket shopping trolleys with features resembling eyes and eyebrows.

The carefully planned community has also served as a collaborative test bed, resulting in the commercialization of about ten technologies by Panasonic and partner companies. For instance, residents participated in the development of sensors that can monitor people to improve their quality of sleep by adjusting smart-air-conditioner settings. The sensors

can monitor sleep state by detecting body movements, and adjust temperature and air flow accordingly.

Fujisawa was the template for Tsunashima SST, the company’s second smart city, that opened in the port city of Yokohama in 2018. Tsunashima looks much like any other part of the city, but boasts a wealth of technology: hydrogen fuel cells to power cars and commercial facilities, a hydrogen refuelling station for vehicles, and housing units with home-management apps for controlling appliances and intercoms, as well as monitoring residents’ water and power use.

The future of smart cities, says Arakawa, lies in their ability to address global warming by being carbon neutral, and in their ability to improve people’s well-being, which has come into focus amid the coronavirus pandemic and lifestyle changes, as well as declining birth rates and ageing societies.

“Facilities, housing and infrastructure become obsolete over time, even in smart cities with the latest technology,” says Arakawa. “To achieve sustainable development, we must constantly evolve and have flexible resilience in response to changes in society and technology.”

Japan has ambitions to export smart-city projects to other countries, according to a 2021 report by the consultancy PwC Japan Group (see go.nature.com/3bkpbpe). Although it’s by no means appropriate for all cities, the approach of creating smart communities from scratch could be quicker and more comprehensive than retrofitting existing neighbourhoods, one technology at a time.

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