BUSAN

An Eco-Friendly Waterfront Smart City Leading the Global Market

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An eco-friendly waterfront of the future is being created in Busan. The Busan Eco Delta Smart City includes a Smart Village, a living lab where people meet advanced technologies for a first-hand experience of future living.

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Artist's impression of the Busan Eco Delta Smart City.
Image: Korea Water Resources Corporation

By preserving the valuable ecological resources and maximising the value of waterways, Busan Eco Delta City aims to create an ideal urban habitat for both people and nature.

Busan, the largest port city in South Korea, has successfully transformed into a digital-centred economy to rank as one of the top smart cities in Asia according to the World Smart Centres Index. Busan Eco Delta City (EDC), a project initiated by governmental agencies such as the Korea Water Resources Corporation (K-water), Busan Metropolitan Corporation, Busan Metropolitan City, is pushing boundaries as the new frontier for a smart and eco-friendly waterfront city.

Busan EDC is located at the convergence of three rivers on land that is a rich habitat for migratory birds and designated as a Natural Monument. The riparian zone (or river bank) earmarked for the development of the Busan EDC possesses valuable ecological resources. This raises the question: how can conventional city development models be challenged to ensure that a haven for migratory birds with rich ecological resources can co-exist with urban development to achieve harmony between nature and humans?

Co-Existing in Harmony: Nature, People, Technology

The total area of Busan EDC is approximately 11.7 km^2 with a planned population density of 64.5 people per hectare (10,000 m^2). This is relatively low compared to other new cites in the country. By preserving the valuable ecological resources and maximising the value of waterways, Busan EDC aims to create an ideal urban habitat for both people and nature.

Plans for the city include the development of the largest wetland ecological park in the country (630,000 m^2) and safeguarding of migratory bird-feeding grounds that take up around 66,000 m^2. The building heights for the surrounding areas, especially along the key migration routes, are to be restricted to low-rise.

To maximise the use of water space to create an attractive waterfront living environment, the city plans to minimise artificial structures within a radius of 600 m of the main waterway street. In addition, the city is actively monitoring and carrying out trials using state-of-the-art technologies such as eco-filtering systems to manage the water quality of the rivers to make it suitable for water-friendly activities. Low Impact Development techniques, such as water-sensitive urban design and permeable pavements, will also be adopted to minimise environmental impact from the adjacent built environment.

Smart Water Solutions for a Climate-Resilient City

One of the key challenges in planning for a waterfront city is to ensure that the city is resilient to the impact of climate change and extreme weather conditions like heavy rainfall and flooding. For example, in 2023, Typhoon Khanun's heavy rainfall was the third-highest in the country since 1973.

To testbed and implement multiple smart water management techniques, Busan EDC has been leveraging innovative technology and working in collaboration with K-water which has 50 years of experience in water management and urban development. For example, the city is operationalising high-precision small-scale precipitation forecast radars and integrating the data using the city-level Water Disaster Management and Response System.

This system constantly monitors water levels, water gates, and drainage facilities across the city. The aim is to provide a real-time monitoring system using augmented reality to predict and prevent water-related disasters in urban areas. At the same time, small-scale decentralised water purification plants and smart water-metering technologies are being introduced to provide consumer-centric water services.

Artist's impression of waterfront living at Busan EDC.
Image: Korea Water Resources Corporation

Advancing National Smart City Goals as a Living Lab

In early 2018, the government initiated the National Pilot Smart City project to identify vacant pieces of land for a trial of innovations to support the building of intelligent future cities. The objective was to incorporate the technologies of the Fourth Industrial Revolution (the trend towards automation and data exchange in manufacturing technologies and processes) into daily life, thus creating a fundamental shift in the way people live, work and interact with one another. The pilot project was implemented through collaboration by the public and private sectors, with the public sector being responsible for the quality of services and the private sector taking charge of urban innovation and the building of the business ecosystem.

Selected as one of the National Pilot Smart City projectst, Busan EDC unveiled its first Smart Village in December 2021. Consisting of 56 households ranging from single-person units to three-bedroom homes, the village is a living lab where residence is on a voluntary basis. Besides getting to experience the various advanced technologies that will be implemented in the Busan EDC, residents live rent-free for three years, with an option to extend their stay for two more years, in exchange for feedback and data collection. The data collected will play an important role in assessing and validating the usability of the Fourth Industrial Revolution technologies while the validated innovations from the Smart Village will be expanded for application throughout the Busan EDC.

First residential complex of the Smart City—drone view of the Smart Village.
Image: Korea Water Resources Corporation

Examples of innovative technologies being piloted at the Smart Village.
Image: Korea Communication Agency (KCA)

The Smart Village introduced innovative technologies across five categories. Some examples include:

1. **Water and Environment**—installation of sensors in each household to forecast water usage and provide real-time water quality information to improve the reliability of tap water usage data.

2. **Energy**—development of a Zero Energy House that reduces energy consumption and produces energy on its own using solar power, hydro and geothermal systems, heat storage and Energy Storage Systems to achieve 100% self-reliance rate.

3. **Healthcare**—provision of a smart health monitoring system for each household to offer physical activity care services, and telemedicine services.

4. **Smart Life**—Use of AIs and robots for complex management operations, running of unmanned cafes, and undertaking of security patrols.

5. **Smart Homes**—smart appliances integrated with Internet of Things (IoT) technologies to provide a data-based platform to meet the needs and preferences of various household members.

By creating a new lifestyle with smart technologies and integrating them into daily living activities, Busan EDC is poised to be a model smart city offering a more convenient way of life for future generations.