

Water & Environment



1 Kamitsubo Water Purification Plant panorama and central monitoring room

1 Renewal Construction of Hitachinaka City Waterworks Utility, Kamitsubo Water Purification Plant

The Kamitsubo Water Purification Plant is capable of supplying 38,100 m³ of water per day and accounts for 70% of the demand for the entire city of Hitachinaka, Ibaraki Prefecture. The plant entered use in 1965, and a project was launched to build a new water purification plant due to deterioration and seismic resistance measures.

With this new construction, roughly 200 high-voltage panels, power control panels, auxiliary relay panels, local panels, controller panels, and remote-monitoring units were delivered for the central monitoring facility, receiving and transforming/non-utility generation facility, sedimentation basin facility, filtration facility, dosing facility, water distribution pump facility, wastewater treatment facility, instrumentation facility, and the remote monitoring facility, with operation started in February 2022. The key features are as follows.

- (1) In order to directly distribute water within the city with the water distribution pump at the new water purification plant, a control circuit was built to be able to promptly restart during a momentary power failure, and the decrease in water distribution pressure was minimized.
- (2) Reliability was increased by setting up redundancies for the controller and control local area network (LAN).
- (3) The number of cables has been reduced by using FL-net[®] for signal transmission and reception with

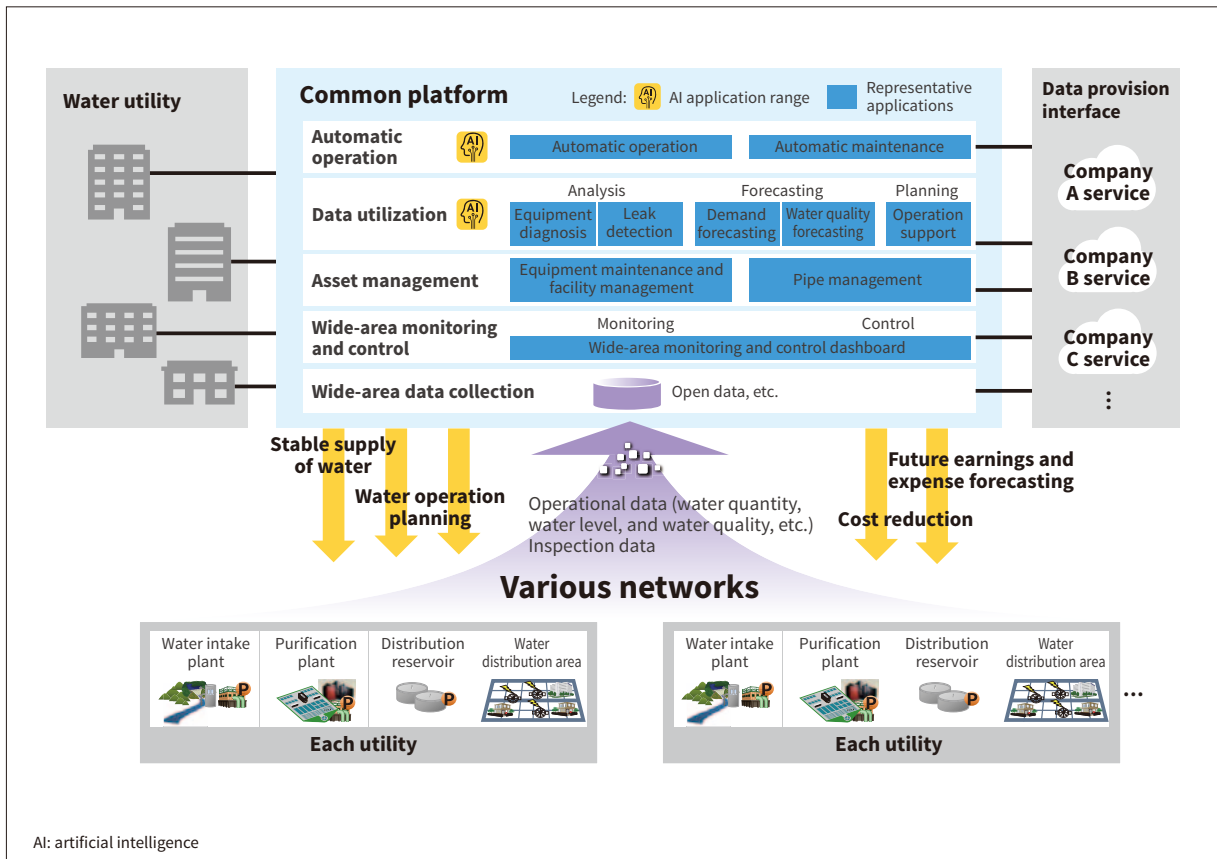
the machinery panels and implementing input-output devices in the auxiliary relay panels to conserve resources.

* See the list of "Trademarks."

2 Comprehensive DX Solution that Helps Streamline Wide Area Operation Monitoring and Control Systems for Waterworks

Water and sewage utilities in Japan are primarily operated by prefectural governments and local municipalities. Renewal costs for deteriorating facilities are expected to increase while the number of staffers working at such utilities is declining. In reality, the operation monitoring and maintenance tasks rely on the experience and know-how of these staffers, which has become a major issue. Promoting wide-area expansion that links the systems of each facility and carries out integrated utility operation streamlines utility operations and is expected to strengthen the management base.

Under these conditions, Hitachi developed a common platform as a comprehensive digital transformation (DX) solution that standardizes the interfaces between systems with different specifications and enables lateral data utilization by conforming with the water supply standard platform specifications. This platform uses a structure that enables it to be deployed to other fields such as industry, the environment, civil engineering, and disaster prevention.

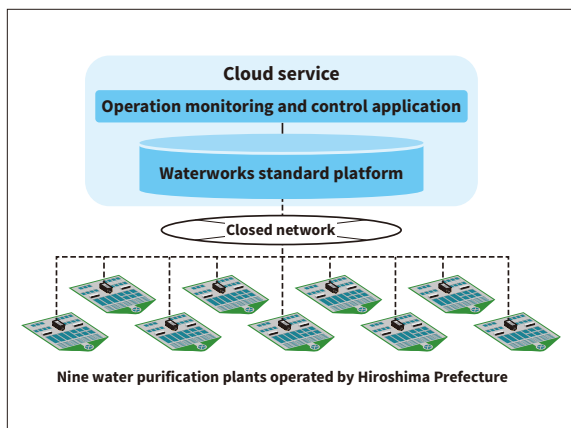


2 Wide-area expansion utilizing a common platform

Hitachi will continue to contribute to the resolution of various issues, including wide-area expansion, and the realization of resilient social infrastructure through co-creation with customers and other companies.

3 Wide-area Operation Monitoring and Control System for Nine Water Purification Plants in Hiroshima Prefecture

A joint enterprise consisting of Hitachi, Ltd. and Mizu Mirai Hiroshima Corporation received an order from

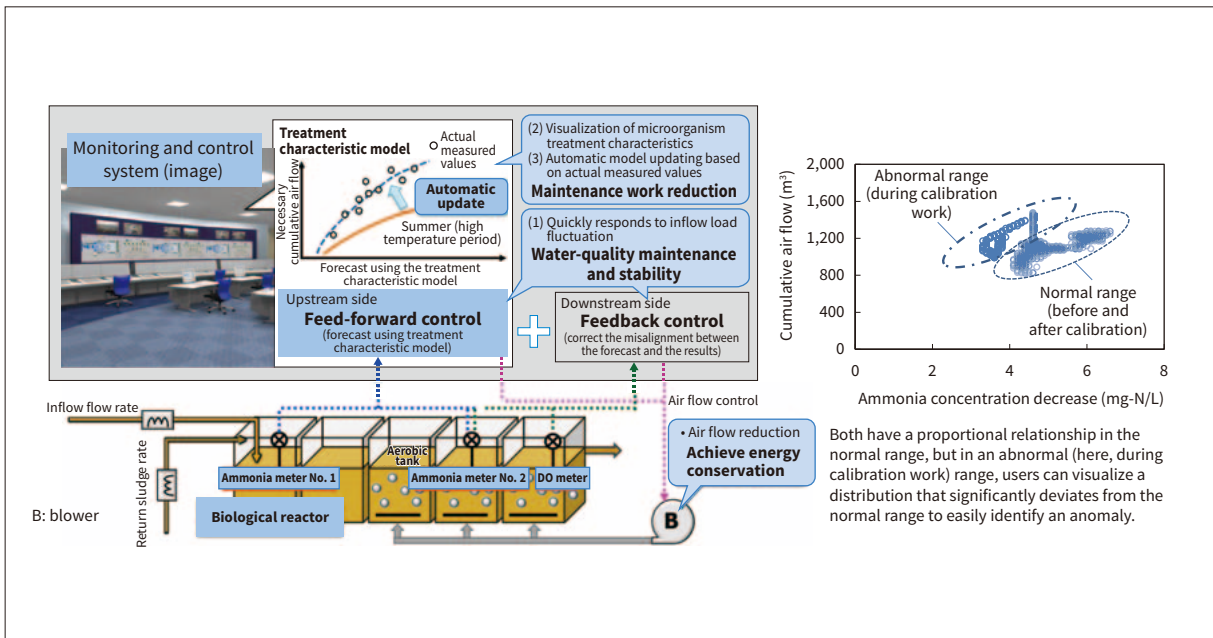


3 Conceptual diagram of Hiroshima Prefectural Waterworks wide-area operation monitoring and control system

Hiroshima Prefecture to construct a waterworks wide-area operation monitoring system. This work covers the nine water purification plants operated by Hiroshima Prefecture including the Senogawa water purification plant and involves the design and construction of a system that centrally monitors and controls the operating conditions of all facilities through a common platform in the cloud that can laterally utilize data even between systems with different vendors and specifications, and an application utilizing Hitachi's Lumada solutions.

This project combines Hitachi's products, operational technology (OT), and IT track record cultivated over many years as a comprehensive water provider, and the Lumada solutions with the technology and knowhow of Mizu Mirai Hiroshima, with its extensive track record of facility management and servicing/maintenance at water purification plants within Hiroshima Prefecture, to introduce advanced digital technologies in step with the pace of the promotion of waterworks utility DX by Hiroshima Prefecture.

This system will realize the wide-area expansion of waterworks utilities while also significantly improving efficiency and helping to save labor in the operation monitoring and maintenance that relies on the experience and knowhow of staffers.



4 Nitrification control technologies contribute to nutrient salt control and decarbonizing

4 Sewage Treatment Control Technologies Contribute to Nutrient Salt Control and Decarbonization

With the accelerating transition to a decarbonized society in recent years, the importance of energy conservation in sewage systems is further increasing. Moreover, as a new role for sewage treatment plants, it is expected that they will contribute to the maintenance of beautiful and bountiful oceans by appropriately maintaining the cyclical balance of nitrogen, phosphorus, and other nutrient salts according to the region. At the same time, from the perspective of decarbonization, it is thought that this will also lead to the immobilization of carbon dioxide (CO₂) (blue carbon) through the ecosystems of coastal zones.

In response, Hitachi has modeled the operation of a sewage treatment plant to develop a simulator for advanced sewage treatment that can estimate nutrient salts and other treatment water quality and energy-conserving operation as well as a nitrification control technology that maintains the level of ammonia nitrogen at or below the target water quality and reduces blower power consumption. Moreover, based on these technologies, Hitachi is developing a hybrid operation support system that combines the sewage treatment knowledge possessed by people with AI.

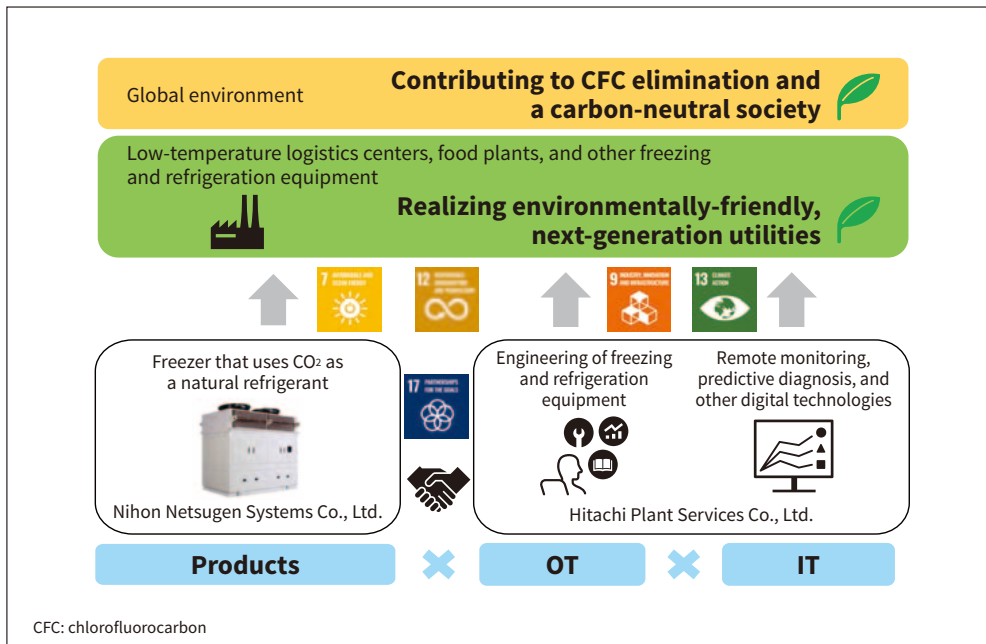
The Hitachi Group will continue to support sewage works that contribute to building a society capable of sustainable development based on its long track record of products, systems, services, and other results over many years in the water infrastructure field.

5 Decarbonization Solution Utilizing CO₂ Refrigerant Freezers

To achieve carbon neutrality by 2050, greenhouse gases must be reduced. The fluorocarbon refrigerant used in many freezers has a high greenhouse effect, and with some exceptions, the future reduction of its use is mandatory. Freezers that use CO₂ as a refrigerant have a lower greenhouse effect compared to fluorocarbon-refrigerated products, and they are attracting attention as environmentally-friendly products due to their energy-saving performance of 20% or more.

Hitachi Plant Services Co., Ltd. initiated a collaboration with Nihon Netsugen Systems Co., Ltd. regarding the large-sized freezing and refrigeration equipment business. By combining the engineering technologies as well as remote monitoring, predictive diagnosis, and other digital technologies of Hitachi Plant Services with the CO₂ refrigerant freezers of Nihon Netsugen Systems, Hitachi will provide environmentally-friendly bulk solutions.

Going forward, the company will continue to meet the broad needs of customers while also aiming to improve social, environmental, and economic value and to contribute to a carbon-neutral society. (Hitachi Plant Services Co., Ltd.)



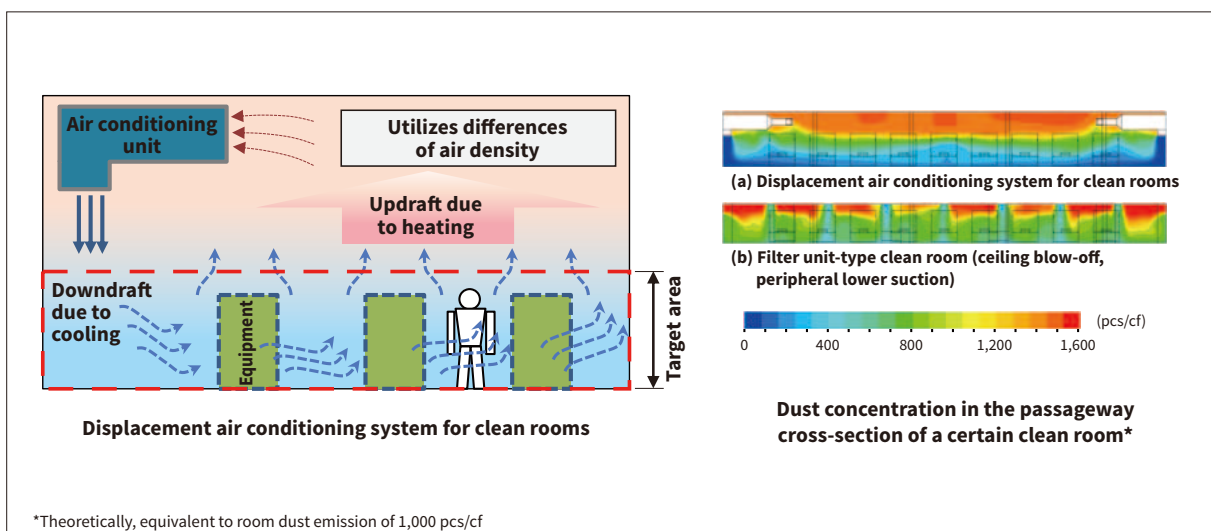
5 Image depicting the realization of the decarbonizing solution

6 Displacement Air Conditioning System for Clean Rooms

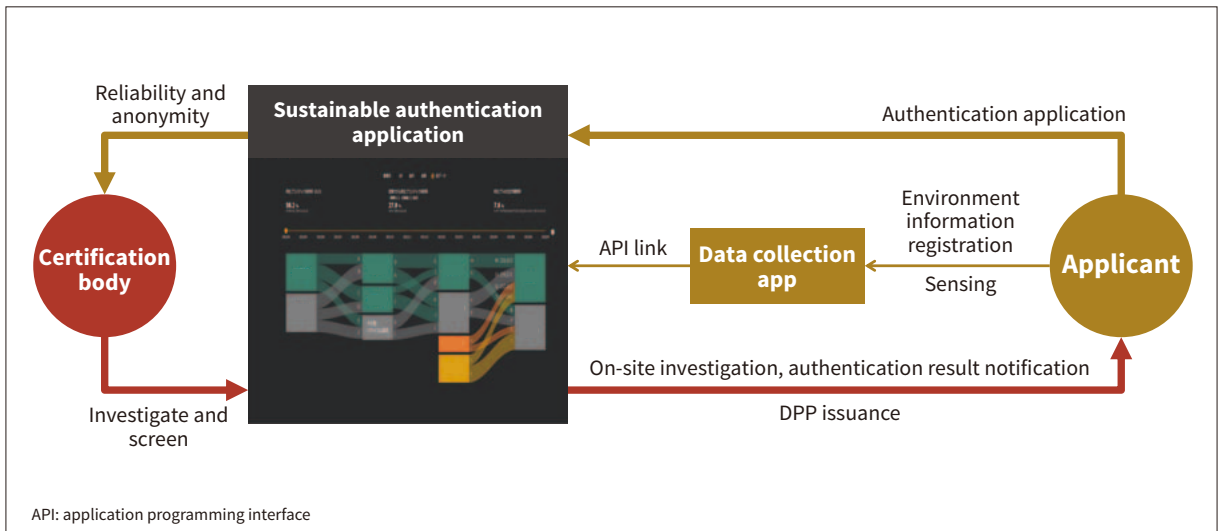
Because of the growing demand for semiconductors in recent years, there has also been an increase in requests for the construction and renovation of clean rooms. In this context, the accelerating trend toward improving the performance of manufacturing equipment, Sustainable Development Goals (SDGs), and a decarbonized society calls for proposals focusing on low costs and saving energy for clean rooms that do not require a high level of cleanliness.

Due to the energy that can be saved through localized cleaning of the clean room, Hitachi has focused on

a displacement air conditioning system that targets the working area in the lower part of the clean room for air conditioning. With the goal of increasing the footprint of the clean room floor, the company built a bottom-blow-out displacement air conditioning system that installs the air conditioner in the upper part of the clean room, supplies cool air to the lower working area, and air conditions/removes dust from the working area. Compared to the model case of a typical filter unit system, the displacement air conditioning system is estimated to reduce the initial cost by 50% and the running cost by 44% by reducing the circulating airflow rate. Currently, Hitachi is working on applying this system to actual projects.



6 Displacement air conditioning system for clean rooms



7 Sustainable authentication application

7 Developing a Platform to Realize the Transformation to a Sustainable Society

The transformation to a sustainable society, including support for decarbonization and resource recycling, requires cooperation and collaboration between stakeholders across industries. Accordingly, Hitachi conceived of a platform to connect these stakeholders and is working to realize it. This activity consists of three layers, a vision layer that forms an ecosystem and rules, a digital layer that distributes information and value, and a physical layer that provides physical equipment and solutions.

As one feature of the digital layer, the company developed a sustainable authentication application that visualizes resource recycling in supply chains and connects companies with certification bodies.

Companies register the resource transaction information and other environment-related information and apply for sustainable authentication of their business through this application. The reliability and anonymity of this information is guaranteed and delivered to the certification body. In addition to screening this information, the certification body registers the certification result in the application after performing an on-site and physical investigation as needed. A digital product passport (DPP) is issued, and the applicant is notified of the result.

Through this platform, companies can easily comply with the European Ecodesign for Sustainable Products Regulation (ESPR), which can be expected to promote the transformation to a sustainable society.