



Special Feature Initiatives of the Clean Eco Technology Project



Establishing Wastewater Treatment Technologies in Advance of Environmental Regulations and Developing Engineers

Given the stricter environmental regulations and demands from society in recent years, this project was launched on October 12, 2012 with the goal of improving the Nippon Kayaku Group's wastewater treatment technologies and developing engineers, in order to operate safe and secure chemical plants that are also environmentally friendly and address future concerns before they happen.

This project was named the Clean Eco Technology (CET) Project with the hope of fulfilling the expectations of new business development and the realization of future dreams. Persons in charge from each business site have been selected to assist in implementing the project.

Project Background

The environment surrounding our business continues to grow stricter with each passing day. In particular, outside of Japan there are already many high hurdles to sustaining existing businesses and pursuing new business ventures.

Specifically, these include the following:

1. Stricter wastewater emission regulations (both in Japan and other countries);

- Restrictions on the location of plants with large environmental impacts (chemical plants can only be constructed in special zones in China, etc.);
- Conventional chemical plants that use large amounts of water and produce large amounts of wastewater are nearly impossible to build today in India or ASEAN;
- Wastewater and waste matter treatment costs in Japan are on the rise and are expected to continue increasing in the future; and
- The Nippon Kayaku Group has not focused sufficient attention on developing wastewater treatment engineers and technology succession.

End Goal of Wastewater Treatment Technologies

The CET Project envisions the establishment of wastewater treatment technologies to be as follows:

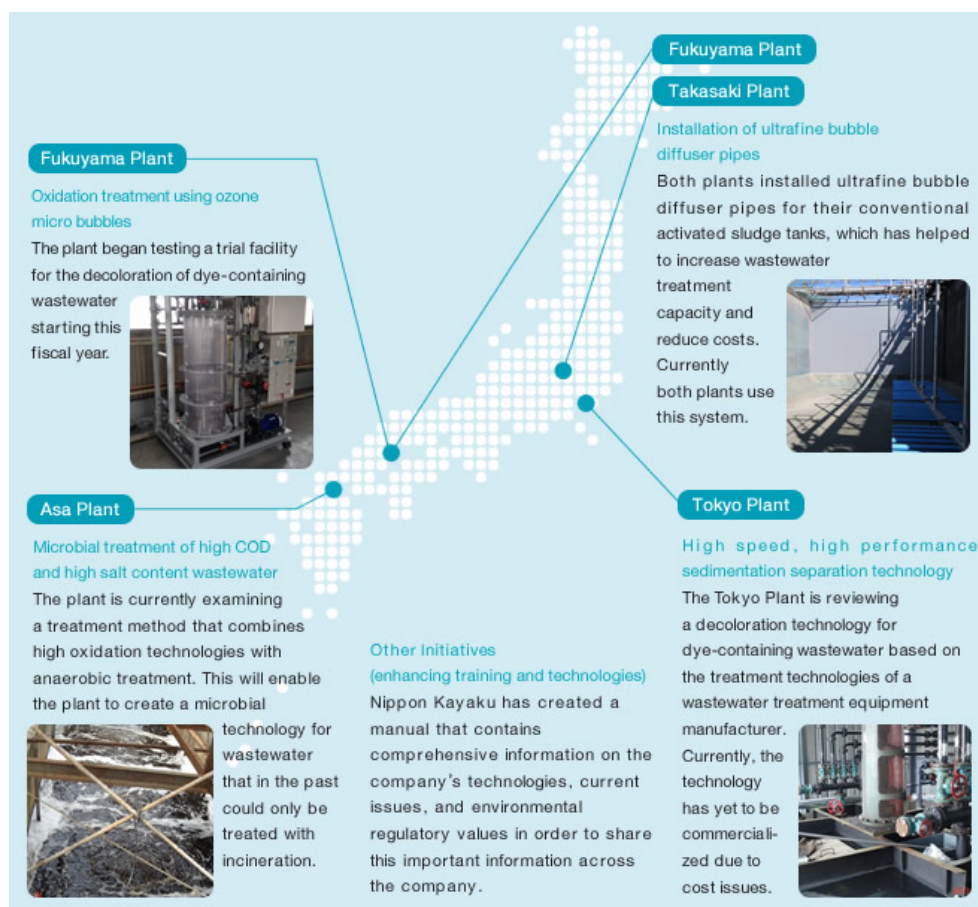
- Minimize the occurrence of plant wastewater where possible. When wastewater must be discharged, establish technologies that make discharged wastewater clean enough to see fish swimming below the surface.
- Promote initiatives to achieve zero emissions of wastewater to make it possible to construct plants in areas without plentiful access to water. Additionally, ensure that plants can operate in a stable manner even under strict environmental regulations.
- Be the first among peers to develop excellent treatment technologies and utilize these technologies in the development of core businesses.

Action Plan

- Develop and commercialize cutting edge wastewater treatment
- Established advanced decoloration technologies
- Accelerate the speed of reviews for resolving current issues by making changes to organizations and structures
- Achieve stable plant operations by improving the skill level of engineers

Current Themes Underway (Main Treatment Methods)

Nippon Kayaku carries out joint research with universities at all of its business sites in Japan. Additionally, there are also themes where we conduct joint research with other companies engaged in the water treatment business or equipment manufacturing, among other sectors. This demonstrates the diverse range of partners involved in the CET Project.



Glossary

Chemical Oxygen Demand (COD): One type of indicator for measuring water quality, COD indicates the amount of oxygen needed to oxidize a substance in water.

Colored wastewater: Wastewater that has a high concentration of color from the manufacturing of pigments. Provides a strong sense of pollution

because even extremely low concentrations of color can be seen by the naked eye.

Anaerobic treatment: A method of wastewater treatment that uses an anaerobic state with low oxygen levels to separate pollutants using anaerobic microorganisms that are active in such conditions, breaking the pollutants down into mainly methane and carbon dioxide.

Ultrafine bubble diffuser pipes: Oxygen transfer efficiency is high when aeration is used to treat wastewater with microorganisms in aerobic conditions with ultrafine bubble diffuser pipes, making it possible to reduce the amount of air sent through the system, resulting in greater energy efficiency.

Ozone micro bubble treatment: A treatment method that creates micro bubbles using ozone, injecting them into the wastewater to oxidize and breakdown substances efficiently at low concentration levels.