

■ A feature of Urban Rig is its compact size and transportability

New Technology for the Processing of Marine Plastic Waste

It is said that each year between 10 and 20 million tons of trash are dumped into the oceans around the world, 80 percent of which consists of plastic waste. There are concerns about its adverse impact on the marine environment. Even if this plastic waste were collected, the difficulty of disposing of it safely poses a major challenge. We introduce a company that has successfully addressed this challenge through a novel technological development.

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In recent years, the damaging impact of marine plastic waste on ecosystems and the wider marine environment, the navigational hazard posed to vessels, and the impact on residential environments in coastal areas have generated worldwide concern. The problem is of such global proportions that it has become a matter for discussion at G7 and G20 summit meetings. In Japan's coastal areas too, large quantities of plastic bottles, styrene foam, plastic containers, and

other trash have been found drifting and washed up on the coast and are considered to have the potential to destroy the coastal marine ecosystem. Yet, even if this marine debris is collected, it is extremely difficult to dispose of. In particular, the incineration of untreated marine plastic waste that has been immersed in seawater and is covered in salt generates harmful substances such as chlorine and dioxin. In addition, the chlorine generated damages incinerators. The establishment of

a safe disposal method has therefore been a longstanding problem.

Oneworld Japan Corporation in Osaka Prefecture has developed a unique technology to solve this problem. The new device, called Urban Rig, uses pyrolysis to dispose of untreated marine debris containing plastics, stones, seaweed, metals and wood.

The key to this technology is superheated steam.

“Superheated steam is created by further heating high-temperature steam generated by boiling

water. Urban Rig renders the interior of a garbage decomposition furnace anoxic by filling it with superheated steam, thereby pyrolyzing the waste. In a regular incinerator, an oxygen reaction occurs, producing dioxins. When oxygen is absent, no oxygen reaction occurs, and neither dioxins nor carbon dioxide are produced. Chlorine is adsorbed by the catalytic converter, so it doesn't cause any damage to the device itself either," says Ito Tomoaki, Oneworld Japan Representative Director and CEO.

The device does not only decompose waste. It can also recover oil, charcoal and metals for recycling.

"Urban Rig is able to separate light diesel oil and other oil, methane gas, and so on from plastic, by cooling down gases that have been distilled in the pyrolysis process. In addition, since organic materials other than plastics disappear as water vapor or oxide gas, charcoal is the only solid matter that remains, and metals can be recovered unchanged. Of course, these too can be used as recycled materials," explains Ito.

In fact, 10,000 liters of light diesel oil and 50 cubic meters of charcoal can be recovered from 200 cubic meters (200,000 liters) of waste containing 10 percent plastic when processed by Urban Rig.

Another feature of Urban Rig is its mobility. The compact size of the device allows it to be transported on a 10-ton truck or large container for disposal at the refuse collection site. This does away with the need to transport the collected marine debris from the coast to the disposal facility, reducing the number of personnel required and



Each unit in the "continuous process" series of Urban Rig has a distinct temperature setting, enabling efficient extraction of light diesel oil and other products at different points along the line before cooling



The carbonized ash (charcoal) recovered after processing with Urban Rig can be used as fuel

the cost of disposal. What is more, since the light diesel oil, kerosene, fuel oil, and so on that is needed to run the equipment can be made from the waste collected, fuel costs too can be significantly reduced. And if mounted on a ship, the drifting trash collected at sea can be immediately processed on board.

"Our goal is to create a worldwide system through the spread of Urban Rig. Once we have a system in place to sell the recycled fuel and metals, the waste becomes a resource and creates jobs for those who work in recycling. By industrializing the cycle of recycling in this way, using waste to generate profit, we hope to create a sustainable business," says Ito.

The technology won the Nippon Foundation Prize in the Innovation category of the 2019 UMIGOMI Zero (eliminate marine debris) Awards, sponsored by the Ministry of the Environment, Japan and the Nippon Foundation. The device is already operating in China, and its introduction is currently being considered by Miyako Island, Okinawa Prefecture.

Urban Rig has great potential to improve the increasingly serious problem of marine debris. Japan has contributed to the improvement of global environmental problems through a variety of environmental technologies and, with the introduction of Urban Rig, those contributions continue. 