



Response to Circular Economy

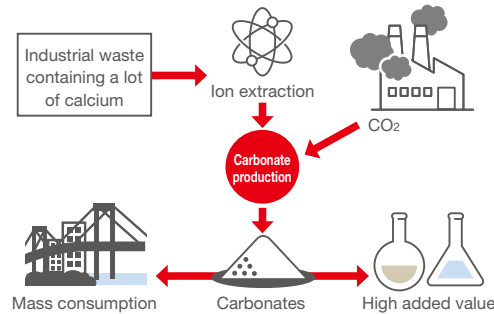
Carbon Recycling

Considering CO₂ as a carbon resource, we promote carbon recycling by producing various carbon compounds from CO₂ and reusing them for chemicals, fuel, minerals, etc.

Idemitsu is a member of the Working Group on the Roadmap for Carbon Recycling Technologies organized by the Japanese government, and is engaged in research and development of carbonation, artificial photosynthesis, and other technologies.

● Carbonate production

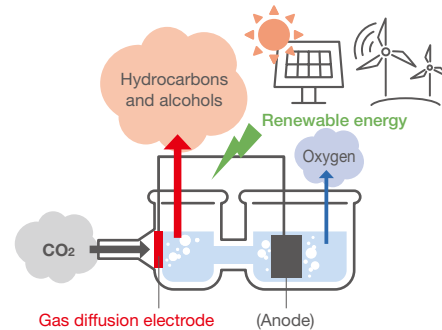
Our company, with the participation of Ube Industries, Ltd., JGC Corporation, and several universities, established the "CCSU (Carbon dioxide Capture and Storage with Utilization) Study Group" as an industry-university collaboration to develop new technologies that convert CO₂ emitted from thermal power plants and factories into resources by utilizing industrial waste containing a large amount of calcium. As the Japanese government promotes the development of technologies for CO₂ recovery and other measures to combat global warming, we are working on the development of new technologies that utilize industrial waste containing high levels of calcium and other substances to react with CO₂ for production of carbonate and added-value materials.



● Artificial photosynthesis

We have succeeded in the direct synthesis of methane and other hydrocarbons from water and CO₂ using a gas diffusion electrode loaded with our original catalysts.

We will continue developing the gas diffusion electrode to advance research on artificial photosynthesis. By 2030, we will establish technology to produce valuable materials such as hydrocarbons and alcohols from water and CO₂ using renewable energy sources with high efficiency. Through the reuse of CO₂, we will contribute to realizing a sustainable society.



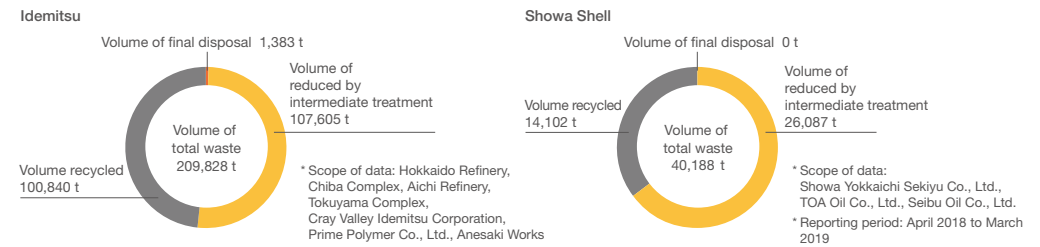
Waste Reduction

Concept of Waste Reduction

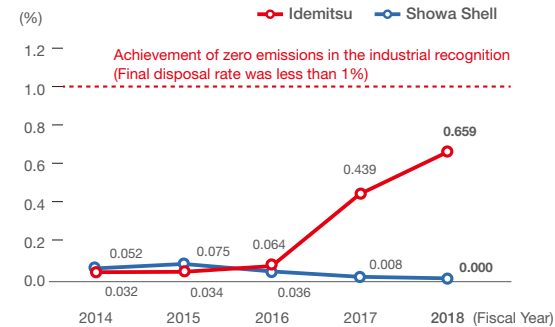
Idemitsu Group works on reducing environmental impact by reducing the volume of industrial waste generation and by promoting the reuse of raw materials and the utilization of recycled raw materials from the perspective of the effective use of resources.

Major wastes generated by our businesses include waste catalysts used in refining processes at refineries, sludge from tank cleaning, and sludge from wastewater treatment facilities. On the other hand, we reduce the volume of these wastes and make them harmless through intermediate treatment such as incineration, dehydration and dissolution, and promote their reuse as raw material for cement, continuing "zero emissions" to reduce the final disposal volume of wastes to 1% or less.

■ Breakdown of industrial waste disposal (FY2018)



■ Final disposal rate at group refineries



* The final disposal rate at Idemitsu increased significantly since FY2017. This was mainly due to the disposal of materials generated by the removal of the oil refining equipment (suspended in March 2014) and others in Tokuyama Complex. The disposal is scheduled to be completed by FY2020.

* Scope of Idemitsu's data: Hokkaido Refinery, Chiba Complex, Aichi Refinery, Tokuyama Complex, Cray Valley Idemitsu Corporation, Prime Polymer Co. Ltd., Anesaki Works

* Scope of Showa Shell's data: Showa Yokkaichi Sekiyu Co., Ltd., TOA Oil Co., Ltd., Seibu Oil Co., Ltd.