

# Responsible Care Activities

**Responsible Care is the chemical industry's global voluntary initiative, representing a commitment to work together to continuously improve the health, safety, and environmental performance of chemicals over their entire life cycles, namely, their development, production, distribution, use, final consumption, and disposal.**

Showa Denko has been performing its Responsible Care activities since 1995, when it established action guidelines to implement the program.

The Showa Denko Group's Responsible Care activities are conducted within our 13 business divisions/departments, 15 operation sites, 3 branches, the Business Development Center, and 14 subsidiaries/affiliates, based on voluntary, specific action plans prepared in line with the CSR Committee's basic plan. The following are some examples of our RC activities:

## **Reduction of Greenhouse Gas Emissions and Energy Conservation**

In order to contribute to the prevention of global warming and the preservation of natural resources, we are making our best efforts to conserve energy, including revision and optimization of manufacturing processes, and conversions of facilities.

In 2013, the Showa Denko Group's greenhouse gas (GHG) emissions were equivalent to 2,645kt of CO<sub>2</sub>, up 6% from the previous year. Among that number, our GHG emissions resulting from energy consumption in 2013 were equivalent to 2,484kt of CO<sub>2</sub>, up 7% from the previous year. The main reasons of these changes were the increases in production volumes and worsened GHG emission coefficient of purchased electricity.

We have hydroelectric power plants in our four operation sites, and utilize them as sources of clean energy. Approximately 19% of our total electricity requirements are now met by our hydroelectric power plants, resulting in reduction of 150kt of CO<sub>2</sub> emissions per year, compared to the case in which we assume all the electricity we consume is purchased from outside sources.

## **Contribution to a Recycling-Based Society**

We are committed to effectively using industrial waste and to reducing the volume of its discharge. As a result, the final volume of landfill disposal in 2013 was reduced by 94% from the 1990 base level, due partly to the use of inorganic sludge (in cement, for example). We will continue working to reduce industrial waste.

A large number of employees within the Group are engaged in the recycling of aluminum cans. At our Kawasaki Plant, waste plastic is used to make synthesis gas for ammonia production. Thus, we are contributing toward a recycling-based society.

## **Development of Technologies and Products**

Fully utilizing its core technologies, the Group continues developing new products and technologies to contribute to sustainable growth of society. For example, we are accelerating our developing and marketing efforts in the business field of plant factories. The market size of plant factories is expected to increase because plant factories have many advantages, including realization of stable food production not affected by weather and farming without insecticides due to their insect-damage-free environment. To stimulate the market growth of plant factories, we have developed various materials, components and solution packages for LED-based plant growth facilities, including ultra-bright red LED chips that emit red light of optimum wavelength for accelerating the growth of plants, lighting apparatus utilizing these LED chips, new fast-track plant cultivation method utilizing this LED lighting apparatus (*SHIGYO*<sup>TM</sup> method), aluminum shelves for plant cultivation that realizes an optimum environment for LED-based plant growth facilities, peripheral components for aluminum shelves, CO<sub>2</sub> gas, and heat-insulating walls for clean rooms.

In the field of eco-friendly plastics, we developed and commercialized biodegradable polyester resin *Bionolle*<sup>TM</sup> before the rest of the world. This plastic can be fully decomposed at normal temperature, as time goes by, into water and carbon dioxide by microbial action, and therefore, imposes little damage to the environment. *Bionolle*<sup>TM</sup> and its compound resin *Bionolle Starcla*<sup>TM</sup>, in which bio-derived starches and polylactic acids are mixed with *Bionolle*<sup>TM</sup> to attain less CO<sub>2</sub> emission and environmental impact, have been certified compostable, biodegradable and safe by certification authorities in Japan, Europe, and the United States. We will continue to contribute to global environmental preservation through further development of new applications of these biodegradable plastics, including packaging materials and films for farming.

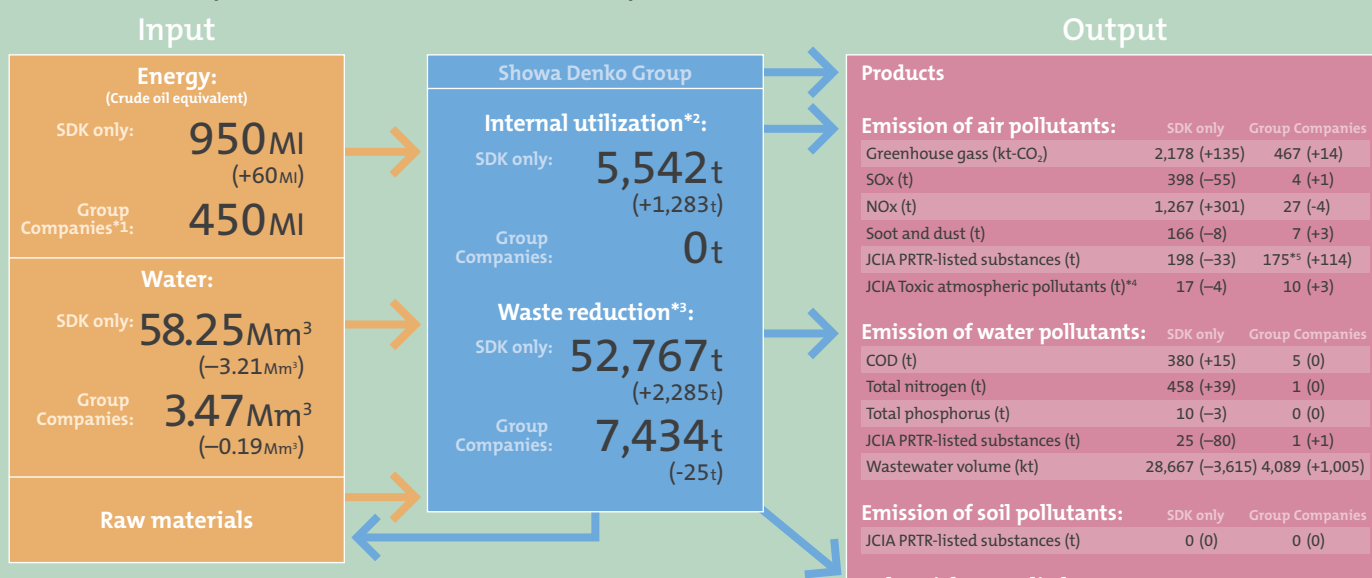
## Commitment to Chemical Safety

We are taking part in the Japan Initiative of Product Stewardship (JIPS), the new voluntary chemical management initiative by the Japan Chemical Industry Association (JCIA) to enhance risk assessment and risk management with consideration for the supply chain. Through this initiative, the Showa Denko Group is strengthening its chemical product stewardship in various ways, including collection of information and safety assessment at each stage of manufacture, sales, and use/consumption.

We have conducted risk assessments for substances from the higher order of priority in the Group, and we published Safety Summary Sheets of 41 substances on the Global Product Strategy (GPS) portal site of International Council of Chemical Associations (ICCA) in 2013.

For more information on our Responsible Care activities, please visit our website:  
<http://www.sdk.co.jp/english/csr/rc.html>

### Showa Denko Group's resource use and environmental impact in 2013



\*1 Scope of the Showa Denko Group: Total for the 11 consolidated manufacturing subsidiaries in Japan: Showa Denko Gas Products Co., Ltd., Showa Denko Ceramics Co., Ltd. (Toyama), Showa Aluminum Can Corp., Showa Denko Packaging Co., Ltd., Showa Denko Kenzai K.K., Niigata Showa K.K., Nippon Polytech Corp., Showa Denko Kenso Co., Ltd., Tohoku Metal Chemical Co., Ltd., Showa Denko HD Yamagata K.K., and Nagoya Kenmazai Kogyo K.K. (currently Showa Fine Ceramics Co., Ltd.), GHG emissions include those for Showa Denko Electronics K.K. and Tsurusaki Kyodo Doryoku Co., Ltd. and exclude those for Niigata Showa K.K., Nippon Polytech Corp., Showa Denko Kenso Co., Ltd., and Nagoya Kenmazai Kogyo K.K., which are not required to report emissions as emitters designated under the Act on Promotion of Global Warming Countermeasures.

\*2, \*3 Here "internal utilization" means reusing or recycling materials that would be disposed if they were left as they were, and "waste reduction" means reducing the volume or weight of generated waste by dehydrating, drying, incinerating, etc.

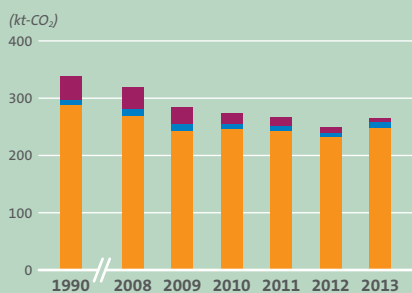
\*4 Emissions of toxic atmospheric pollutants are included in emissions of PRTR-listed substances.

\*5 We expanded the scope of this number from PRTR-listed substances defined by PRTR Law to PRTR-listed substances defined by Japan Chemical Industry Association.

\*6 The figures given for final landfill disposal cover only waste generated by production activities in the respective years.

The figures in parentheses represent increases or decreases relative to the previous year.

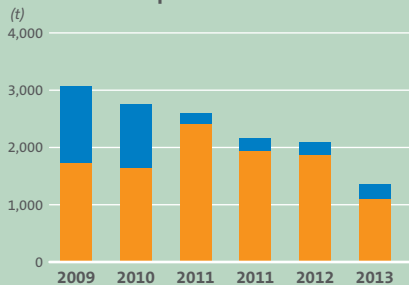
### Trends in Greenhouse Gas Emissions



Legend:  
 ● CO<sub>2</sub> (Energy source origin)  
 ● CO<sub>2</sub> (Non-energy source origin)  
 ● 5 GHGs other than CO<sub>2</sub>

Base: 1990  
 Aggregate calculation in each fiscal year  
 (Showa Denko K.K. and 9 Consolidated Subsidiaries in Japan)

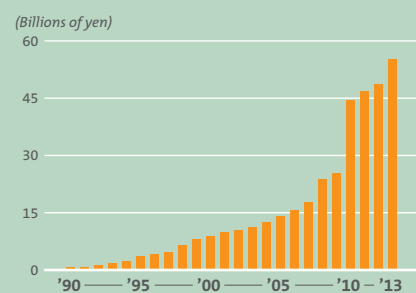
### Trends in the Final Volume of Landfill Disposal



Legend:  
 ● Showa Denko K.K.  
 ● Consolidated Subsidiaries in Japan

(Showa Denko K.K. and 11 Consolidated Subsidiaries in Japan)

### Environment-Related Investment



Cumulative value since 1990  
 (Showa Denko K.K.)