

## Worksites

### Takaoka Plant

#### Introduction to the Takaoka Plant

Toyama Prefecture was ranked second in a 2011 survey of the “happiest” places to live in Japan (conducted by Hosei University), and is widely considered to be one of the most livable prefectures in the country. The prefecture is commonly referred to as the “Home of Manyo” after the poet Otomo no Yakamochi, an 8th century statesman-poet who famously penned the poetry collection “Manyo-shu (Anthology of a Myriad Leaves).” The founder of Takaoka was Toshinaga Maeda, a 16th century samurai lord, and the area has been known for its unique Takaoka copperware and lacquerware. Along with its arts, the city has been the center of a thriving commercial area in the Hokuriku District along the Sea of Japan.



Aerial view of the Takaoka Plant

The Takaoka Plant is situated along the Oyabe River, which runs north-south through the city. The plant was established in 1956 to manufacture polyvinyl chloride resins and expanded as the mass production site for the product over a half century until the company exited the business in 2008. During that time, the plant began producing such current mainstay products as hydrogenated nitrile rubber Zetpol<sup>®</sup> and semiconductors etching gas ZEORORA<sup>®</sup>. The plant also became home to the Precision Optics Laboratory and a medical laboratory, establishing itself as the center of cutting-edge research at ZEON.

The plant is adjacent to a residential community and strives to ensure the security of the local community through daily safety-assurance activities and regular emergency-preparedness training. ZEON was the organizer of the 6th Toyama-Takaoka District Responsible Care Community Dialogue conference held in fiscal 2011 to foster deeper dialogue with the local community through an introduction of safety initiatives and a plant tour. The conference was highly regarded among the participants.

In 2012, the plant turns 56 years of age, but it is still well in its prime and all employees continue to strive towards excellence with the spirit that the future of ZEON will be born in Takaoka. The plant will continue to listen carefully to the needs of the local community to ensure the sustainment of an environment rich in harmony and co-prosperity.

#### CSR Efforts at the Takaoka Plant

The Takaoka Plant has evolved from a mass producer of polyvinyl chloride resins to an R&D-style plant focused on the development of cutting-edge technologies. The fact remains, however, that a quiet residential community sits just a step outside the plant gate. With this in mind, ZEON takes into consideration the possible impact of new products tests and newly introduced product materials on the local community from the R&D phase of product development, as it has done with the manufacturing of its current products. Each and every employee of the plant understands the CSR Policy, and based on this policy they strive to ensure ZEON has a reason for being from the perspective of the local community and can continue to make contributions to that community and society as a whole.

## Environmental and Safety Activities

### 1. Reducing toxic chemical emissions

The plant terminated the manufacture of polyvinyl chloride resins in March 2008, and therefore the amount of release and transfer of PRTR<sup>\*1</sup>-regulated substances declined in fiscal 2008 to less than one-tenth the amount of the previous year. As part of the initiative to achieve zero emissions<sup>\*2</sup>, the plant has newly installed equipment to collect organic solvents used in the manufacturing process and plans to reduce the amount used in stages going forward.

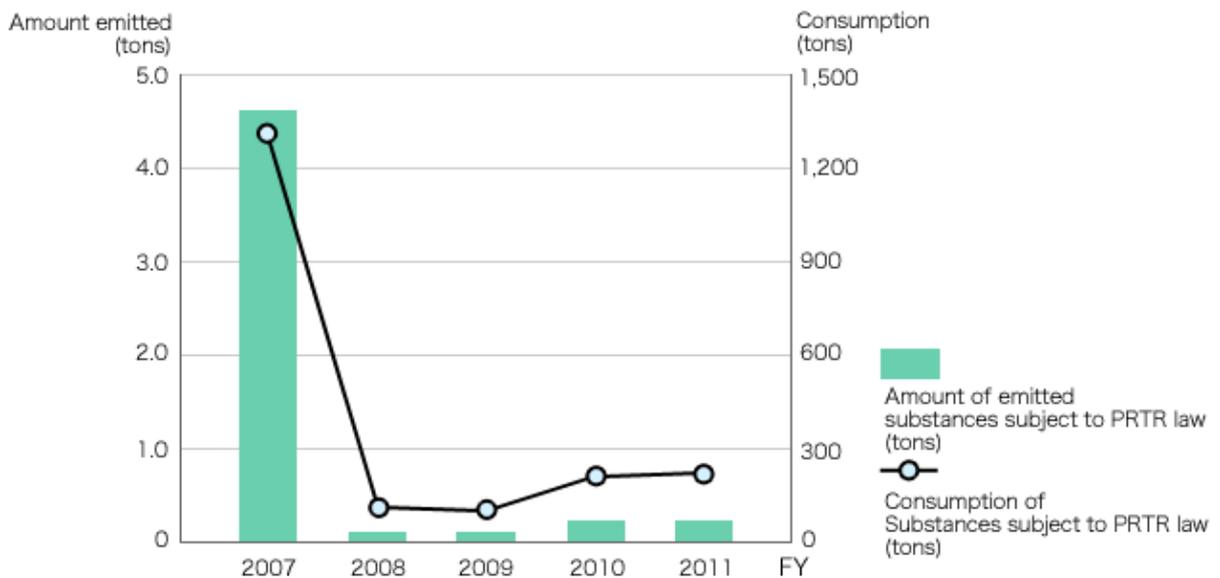
\*1. Pollutant Release and Transfer Register

A database of hazardous chemical substances released into the environment and transferred off-site in waste. It provides the public with important information such as where and how much pollutants are being released and transferred.

\*2. Zero emissions

The establishment of systems that discharge no emissions into the natural world, and the fundamental idea behind such establishment.

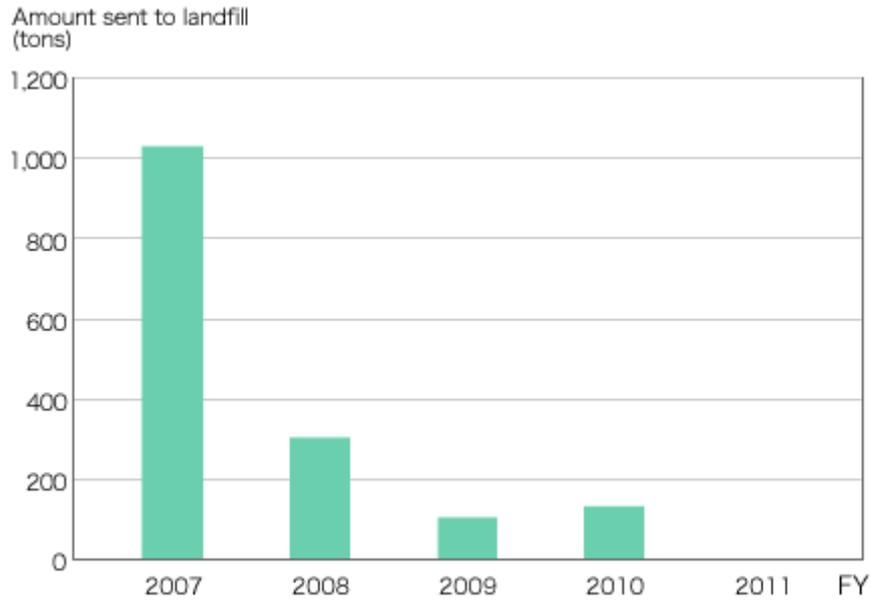
### Substances subject to PRTR law



### 2. Reducing industrial waste

In fiscal 2011, the Takaoka Plant achieved zero emissions of industrial waste by recycling all of the waste plastics, rubber, and sludge emitted from wastewater processing facilities, which were previously disposed of at external landfills. In fiscal 2012, though the amount and type of industrial waste are expected to change as the plant begins operation of new facilities and conducts new testing, the plant will study new ways to achieve 100% recycling and maintain zero landfill waste.

### Amount of Waste to Landfill



### 3. Reducing air and water pollution

Substances emitted into the air by the plant's boiler, which uses heavy fuel oil A<sup>\*1</sup>, is one of the environmental issues the plant has been dealing with. Until fiscal 2011, the plant has controlled boiler emissions by creating appropriate operating conditions collectively with steam emissions inside the plant. From fiscal 2011, however, the plant plans to switch from heavy fuel oil A to liquefied natural gas (LNG)<sup>\*2</sup>, which will help to significantly reduce CO<sub>2</sub> in the near future.

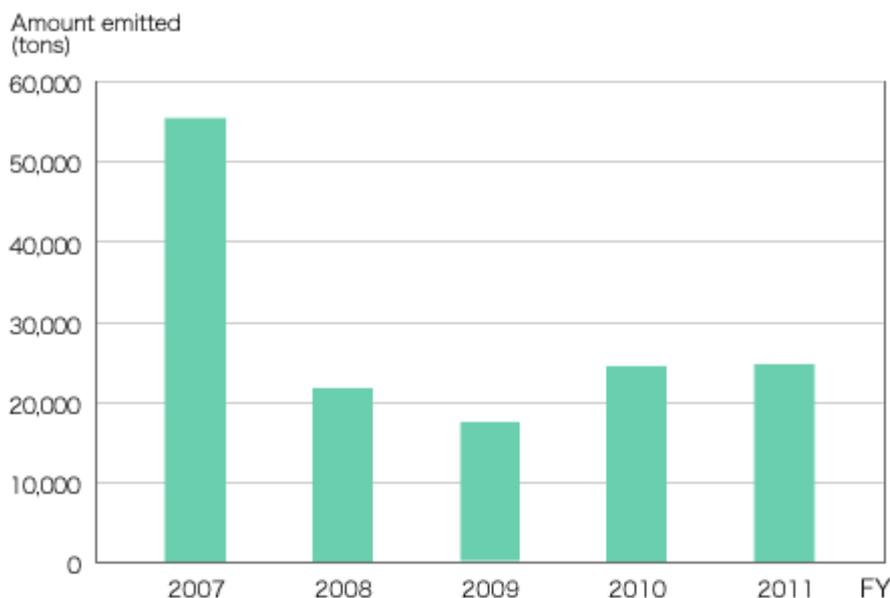
\*1. Heavy fuel oil A

A heavy oil classified as type 1 heavy viscosity under JIS standards.

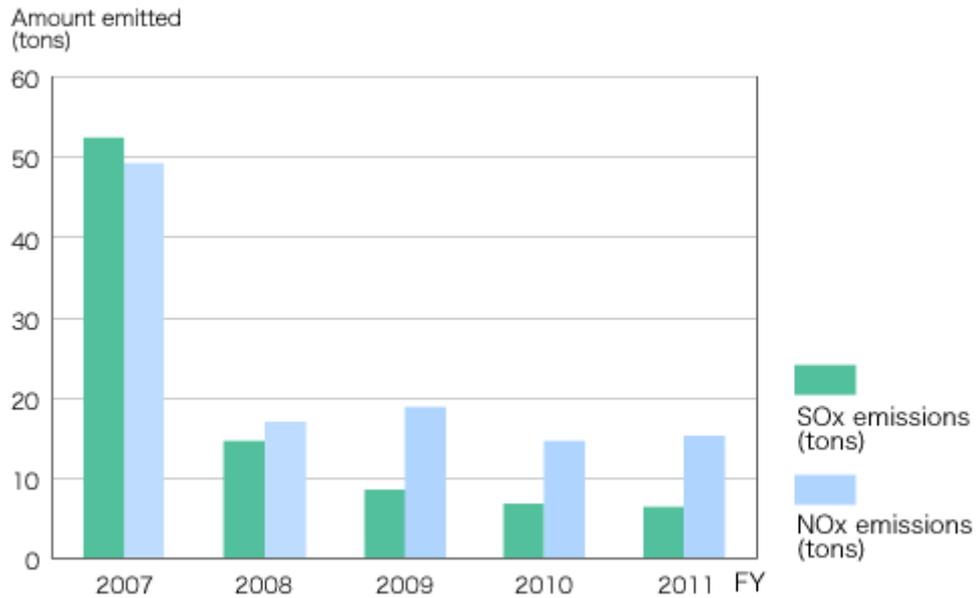
\*2. LNG

Liquefied natural gas. Emits less CO<sub>2</sub> than many other fossil fuels when combusted and therefore is seen as a more environmentally friendly fuel.

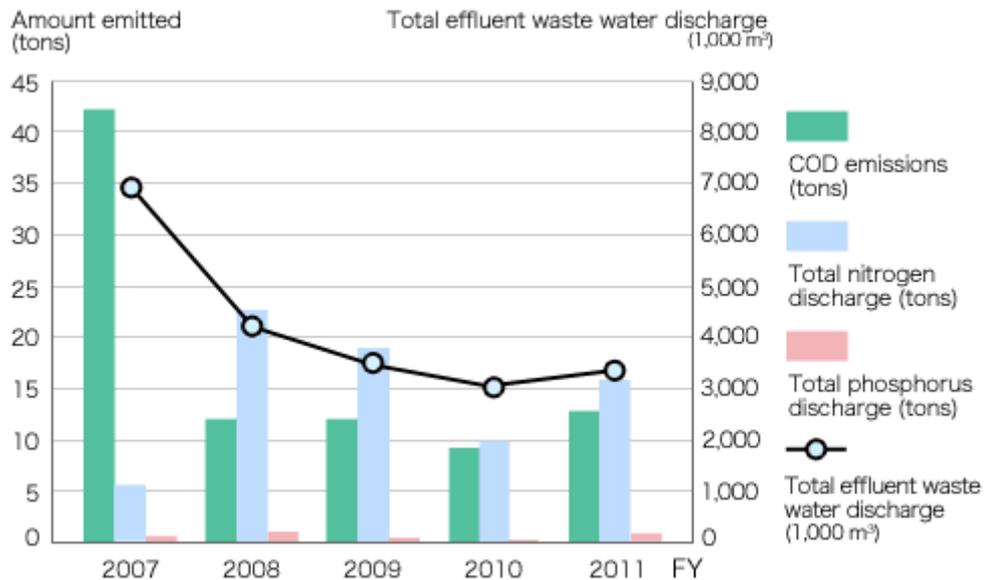
### CO<sub>2</sub> emissions



### SO<sub>x</sub> and NO<sub>x</sub> emissions



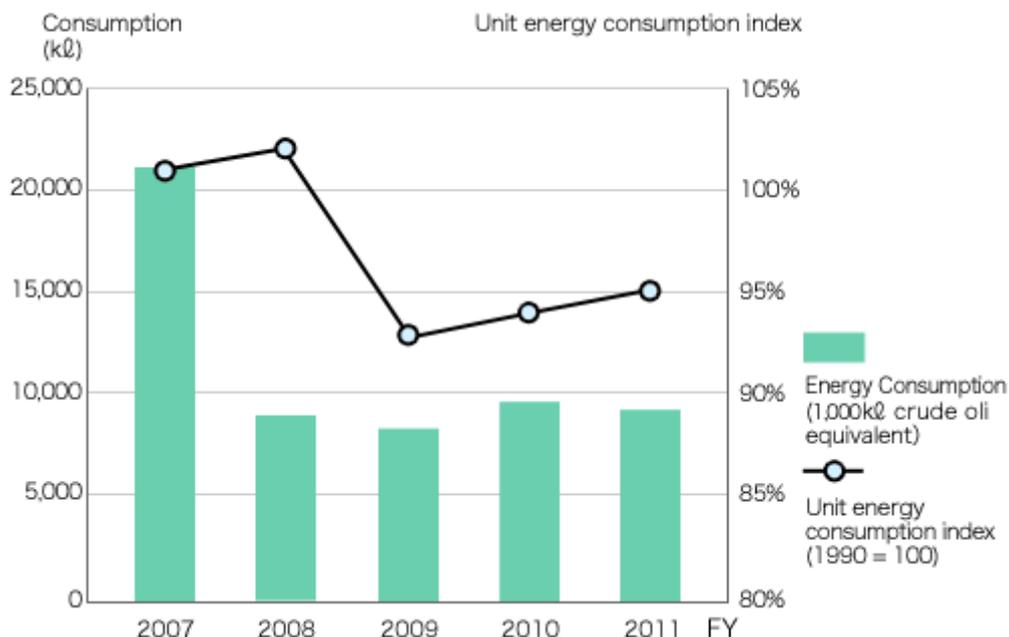
### Total effluent waste water discharge, COD emissions, total nitrogen discharge and total phosphorus discharge



### 4. Saving resources and energy

The plant takes conservation measures through meticulous efforts to efficiently use energy, including the minimization of steam used in drying rubber. In fiscal 2011, amid concerns about electric power shortages during the summer months, the Takaoka Plant smoothed electricity consumption by shifting the operation of equipment using large amounts of electricity to earlier, off-peak hours. The plant plans to enhance energy efficiency even further by getting all employees involved in conservation efforts.

### Total amount of energy and Unit energy consumption index



### 5. Environmental Data

Takaoka Plant		FY2007	FY2008	FY2009	FY2010	FY2011
Toxic substances	Vinyl chloride monomer consumption (tons)	759	0.0	0.0	0.0	0.0
	Vinyl chloride monomer emissions (tons)	1.0	0.0	0.0	0.0	0.0
Substances subject to PRTR law	Consumption (tons)	1,277	116	114	210	223
	Amount emitted (tons)	4.3	0.1	0.1	0.2	0.2
Industrial waste	Amount generated (before volume reduction) (tons)	3,751	3,199	2,130	3,458	4,730
	Amount generated (after volume reduction) (tons)	1,522	764	388	671	529
	Amount sent to landfill (tons)	1,016	312	129	174	0
Atmospheric emissions	CO <sub>2</sub> emissions (tons)	55,114	20,981	17,817	24,208	24,427
	SO <sub>x</sub> emissions (tons)	52	14	8.7	7.0	6.8
	NO <sub>x</sub> emissions (tons)	49	17	19	14	15
Water resources (Industrial water + Ground water + Waterworks) consumption (1,000m <sup>3</sup> )		-	-	-	3,732	3,799
Waste water	Total effluent waste water discharge (1,000m <sup>3</sup> )	6,919	4,284	3,516	3,050	3,398
	COD emissions (tons)	42	12	12	9.2	13.0
	Total phosphorus discharge (tons)	0.5	0.9	0.4	0.2	0.7
	Total nitrogen discharge (tons)	5.6	23	19	10	16
Energy	Total consumption (crude oil equivalent, kL)	20,983	8,465	8,112	9,750	9,015
	Unit consumption index (1990 = 100)	101%	102%	93%	94%	95%
Production of PDR equivalent (tons)		10,762	4,337	4,523	5,419	4,866

## Quality Assurance Initiatives

To support the realization of ZEON's Mid-Term Management Plan, SZ-20, and the enterprise blueprint for 2020, "ZEON creates the future today through the power of chemistry," the Takaoka Plant is aiming to achieve a 100% yield rate\*. To achieve this goal, the plant will rely on science to analyze and visualize the underlying causes of quality anomalies as well as to devise measures to address the problems.

\* Yield rate

The percentage of products rolling off the production line that pass quality inspections. A 100% yield rate means that no defective products were produced.

### VOICE Stabilizing processes starts with visualizing processes quantitatively

Chemical companies rely on science to perform work. We abide by the following policies in order to stabilize the manufacturing processes and deliver products with consistent quality.

1. We analyze and visualize manufacturing technologies quantitatively based on accepted scientific standards.
2. We determine management values and ranges and standardize work processes based on accepted scientific standards after a discussion of various quantitative data.
3. We aim to realize and sustain a 100% yield rate by using the Quality Assurance Conference as the primary organization for quality enhancement measures, along with management reviews of quality, technology, and safety by various committees.
4. We develop new manufacturing technology and incorporate it into our products to achieve a 100% yield rate immediately after product commercialization by building deep bonds between the R&D organizations and the plant from the product development stage.

Based on the above policies, we will ensure that we operate a stable and safe plant.



Hiroshi Fujisawa, Corporate Officer and Takaoka Plant Manager

## Living Together with the Local Community

### 1. Contributing to the community through volunteer work

On June 5, 2011, some 180 employees and family members representing the entire ZEON Takaoka Group, not just those from the Takaoka Plant, took part in the Himi Waterfront Cleanup organized by a local environmental organization. In July as well, about 180 members of the Group took part in the Fushiki-Kokubu Waterfront Cleanup organized by the Takaoka-Fushiki Beautification Volunteer Group and put their hearts into cleaning up the beach.

The Takaoka Plant has also carried out Group blood drives and promoted blood donations since 1971. The plant's contribution was recognized on July 24, 2011 at the 47th national blood drive convention held in Toyama City with a citation from the Minister of Health, Labour and Welfare. The citation was presented by Toyama Prefecture Governor Takakazu Ishii at a special ceremony. Taking pride in the award, the entire ZEON Takaoka Group will strive to expand blood drives in the future.



Himi Mayor Shigeru Douko at the Himi Waterfront Cleanup

## **2. Interaction with the local community**

### **ZEON Takaoka Group Summer Festival**

The annual ZEON Takaoka Group Summer Festival was held on July 22, 2011. This year, the festival featured an indoor banquet instead of outdoor activities to prevent rain from canceling the occasion. Members of the local community were invited to join in the festivities. Neighborhood children enjoyed special games while the adults were offered sake brewed in the northern Tohoku region as a token of support for areas recovering from the Great East Japan Earthquake. Altogether, some 450 people attended the lively festival, which ended with a prize drawing.

### **Futagami Manshou Kai**

Employees from the Takaoka Plant actively take part in the Futagami Manshou Kai, an industry-academia-government association in the Futagami district as a way to deepen ties to the local community.

### **Takaoka Manyo Festival**

Takaoka City holds an annual Takaoka Manyo Festival. The Takaoka Plant takes part in the annual main event, the recitation of all 20 volumes of the “Manyo-shu (Anthology of a Myriad Leaves).” In 2011, the event was held on October 7, and 19 plant employees—well over the five employees who participated last year - took part in the festivities, awakening their feelings of bygone days to recite many a Japanese poem at the gathering.



Employees taking part in the recitation of “Manyo-shu”