

# Minimizing Environmental Impacts

Hanmi Pharm identifies and attempts to rectify all environmental issues that arise during its production processes. We adopted ISO 14001, an environmental management system, in 2012, and have since established a firm direction for our environmental management, and an environmental management system at the global level, in order to minimize environmental pollution and adverse effects.

We establish our environmental objectives according to each specific area of environmental management, such as greenhouse gases, energy, water, waste, air pollutants, water pollutants, etc., and periodically report them to the board of directors for approval at least once a year. In addition, to prevent accidents due to environmental risks, we operate a system for preventing environmental accidents according to risk management regulations. Hanmi Pharm will further strengthen its environmental management by responding to climate change with practical and enhanced environmental management practices.

## Major Achievements in Minimizing Environmental Impacts in 2023

Classification	2023 Goals	2023 Achievements	Achievement rate
Strengthen pollutant management	<p>Manage the amount of air/water pollutants below 50%/30% of legally permissible levels.</p> <p>Reduce major air/water pollutant emissions/discharge by 30% compared with 2018 (9 tons/12 tons).</p>	<p><b>Managed the level of air/water pollutants to below 50%/30% of legally permissible levels.</b></p> <p><b>Reduced major air/water pollutant emissions and discharge by 59%/68% compared with 2018 (5.4 tons/5.5 tons).</b></p> <p>[Paltan] Replaced the TOC instrument for measuring water quality TMS equipment and equipment of dehydration facility in wastewater treatment plant / Improve the MLSS concentration through replacement from manual batch processing to automatic continuous system.</p> <p>[Pyeongtaek] Established one environmental pollutant leakage prevention measure.</p> <p>[Fine Chemical] Reduced emissions by installing chemical feeders for removing VOC (THC) / Installed IoT in the air pollution prevention facility.</p>	<p>100%</p> <p>100%</p> <p>100%</p> <p>100%</p>
	<p>Reduce the amount of hazardous chemical substances used by 2% compared with 2022 (189 tons).</p>	<p><b>Reduced the amount of hazardous chemical substance used by 8% compared with 2022 (178 tons).</b></p> <p>[Paltan] Used a new liquid disinfectant instead of CIP and reduced the amount of NaOH used by 38% by adjusting the concentration of the chemical treatment tank for wastewater treatment.</p> <p>[Pyeongtaek] Completion of 6 cases of safety improvement for workers in facilities handling hazardous chemical substances / The amount of chemicals used in the wastewater treatment plant increased by 11% compared with previous year (Target: 2% reduction).</p> <p>[R&amp;D Center] Installed a sealed cabinet in the reagent storage room.</p> <p>[Fine Chemical] Proceeded with business licensing for hazardous chemicals (ACN substance added) / Notified the local community of the harmfulness of hazardous chemical substances.</p>	<p>100%</p> <p>100%</p> <p>100%</p> <p>100%</p>
Minimize nature capital and increase recycling	<p>Reduce the volume of water intake by 7.5% compared to 2018 (720,864 tons).</p> <p>Achieve a water reuse rate of 5% or more.</p>	<p><b>Reduced the volume of water intake by 32% compared with 2018 (531,964 tons) &amp; water reuse rate of 10.1%.</b></p> <p>[Paltan] Reused wastewater effluent in the cooling tower: Reduced by approx. 19,000 tons / Reused 100% of daily R/O concentrated water (approx. 70 tons) as coolant.</p> <p>[R&amp;D Center] Installed water-saving orifice and water-saving pedal on the laboratory sinks.</p> <p>[Fine Chemical] Performed activities aimed at reducing the amount of water used, and wastewater reduction activities: The amount of water used increased by 4.2%, and the amount of wastewater generated increased by 8.1% (Target: reduce each by 3%).</p>	<p>100%</p> <p>100%</p> <p>0%</p>
	<p>Reduce the treated amount of general/Hazardous wastes by 7.5% compared with 2018 (650 tons/211 tons).</p> <p>Achieve a waste recycling rate of 70% or more.</p>	<p><b>Reduced the treated amount of general/Hazardous wastes by 45%/43% compared with 2018 (385 tons/129 tons) and achieved a waste recycling rate of 76%.</b></p> <p>[Paltan] Recognize eye drop packaging scraps as a circulating resource (postponed to 2024).</p> <p>[R&amp;D Center] Engaged in activities aimed at improving the separate disposal of medical wastes (conducted training &amp; attached posters, etc.).</p> <p>[Fine Chemical] Increased the separate disposal of recycled waste solvents and implemented natural circulation performance management.</p>	<p>100%</p> <p>0%</p> <p>100%</p> <p>100%</p>
Spread ecofriendly corporate culture	<p>Reduce CO<sub>2</sub> emissions by 3,000kg through social contribution activities.</p> <p>Maintain an eco-friendly literature ratio of more than 90%.</p> <p>Use 100% eco-friendly packing boxes for medicine products.</p>	<p><b>Reduced CO<sub>2</sub> emissions by 3,989kg through social contribution activities &amp; eco-friendly literature ratio 93.8% / Used 100% ecofriendly packing boxes for medicine products.</b></p> <p>[Company-wide] Donated 441kg of coffee grounds; and 735 obsolete IT assets; used green products for printed materials; and conducted an energy-saving campaign.</p>	<p>100%</p> <p>100%</p>

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## Plans for Minimizing Environmental Impact in 2024

Classification	2024 Goals
Strengthen pollutant management	<p><b>Manage air/water pollutant emissions/discharge below 50%/30% and reduce major air/water pollutant emissions/discharge by 30% compared with 2018 (9 tons/12 tons).</b></p> <p><b>[Paltan]</b> Proceed with the installation of new air emission and pollution prevention facilities / Conduct training on the laws and regulations related to air equipment handlers and methods of maintaining said equipment.  <b>[Pyeongtaek]</b> Increase the use of organic carbon sources (100%), amount of molasses used within 30% compared with previous year. / Establish and execute a measure for preventing leakages of environmental pollutants.  <b>[Fine Chemical]</b> Reduce air pollutant emissions by changing the method of replacing cleaning water / Install IoT in air pollution prevention facilities (and install the remainder in production buildings A,B,C).</p>
	<p><b>Reduce the amount of harmful chemical substances used by 2% compared with 2023 (174 tons).</b></p> <p><b>[Paltan]</b> Establish and proceed with the patrol system for 40 harmful chemical handling facilities. / Use new liquid disinfectant instead of CIP and maintain the adjustment of the concentration of chemical treatment tanks for the treatment of wastewater.  <b>[Pyeongtaek]</b> Reduce the amount of chemicals (sulfuric acid, sodium aluminate by 9%) used in the wastewater treatment plant by 2% compared with previous year.  <b>[R&amp;D Center]</b> Install additional sealed reagent cabinets (laboratory, reagent storage room).  <b>[Fine Chemical]</b> Proceed with business licensing of harmful chemicals, add reagent storage facilities.</p>
	<p><b>Reduce the volume of water intake by 9% compared with 2018 (709,174 tons) / water reuse rate of 7% or more.</b></p> <p><b>[Paltan]</b> Reuse wastewater effluent in the cooling tower by more than 2 times (approx. 40,000 tons) compared with the previous year. / Reuse 100% of daily R/O concentrated water (approx. 70 tons) as coolant.  <b>[R&amp;D Center]</b> Save water by installing water supply timers on restroom urinals.  <b>[Fine Chemical]</b> Retrieve approx. 10 tons of RO concentrated water and use it as scrubber influent in production building C.</p>
Minimize nature capital and increase recycling	<p><b>Reduce the treated amount of general/Hazardous wastes by 9% compared with 2018 (640 tons/207 tons) and achieve a waste recycling rate of 72% or more.</b></p> <p><b>[Paltan]</b> Recognize eye drop packaging scraps as circulating resources.  <b>[R&amp;D Center]</b> Conduct periodic inspections of medical waste.  <b>[Fine Chemical]</b> Increase the separate disposal of recycled waste solvents and implement natural circulation performance management.</p>
	<p><b>Maintain an eco-friendly literature ratio of more than 90%. / Use 100% eco-friendly packing boxes for medicine products.</b></p> <p><b>[Company-wide]</b> Engage in donation of coffee grounds and obsolete IT assets and establish green purchase guidelines. / Increase the use of green products in product manuals and cases  <b>[Paltan]</b> Introduce E-labels to replace three types of paper user manuals.</p>
Spread eco-friendly corporate culture	

Investments related to Minimizing Environmental Impacts in 2023

**2023 Plan: KRW 810 mil. / Use: KRW 910 mil. (Execution rate: 112%)**

Investments related to Minimizing Environmental Impacts in 2024

**2024 Plan: KRW 840 mil.**

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## Efficient environmental management

### Pollutant management

Hanmi Pharm has successfully carried out diverse activities aimed at minimizing pollutant emissions/ discharge and has achieved our goal of limiting air pollutants to below 50% and water pollutants below 30% of the maximum legally permissible level. Especially in the case of dust emissions, we have reduced them by 69% compared to 2018. In addition, we monitor and manage water pollutant discharges by using the TMS (automatic measuring instrument) and share the data with the Ministry of Environment. We plan to continue various activities by establishing the goal for 2024 of maintaining discharges at levels below 30% of the maximum legally allowable level. Furthermore, the Paltan Smart Plant's indoor storage for dangerous materials has been designated as a facility subject to the control of specific soil contaminants, including pollutants such as acetone, glycerin, etc. Accordingly, we have established soil management guidelines, and are conducting periodic self-inspections to prevent the occurrence of soil pollution.

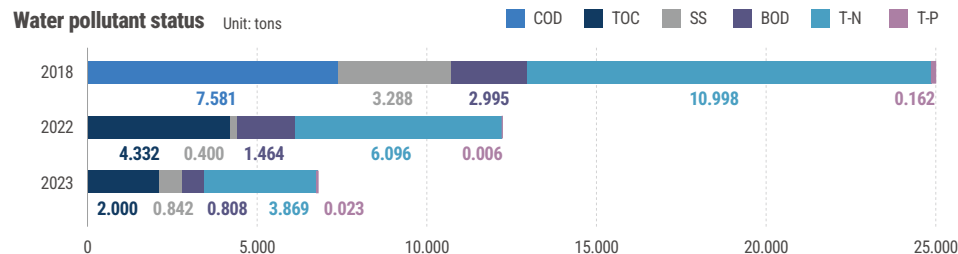
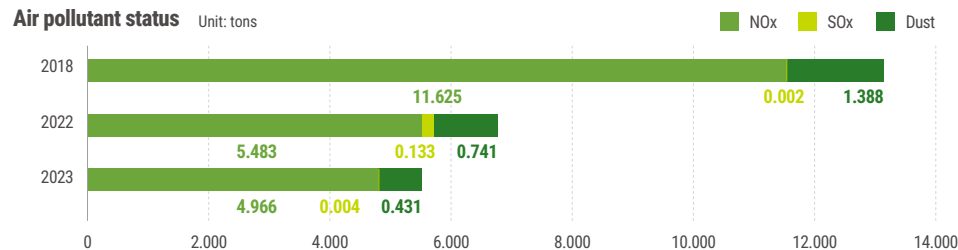
Risks	Financial Impact (KRW 100 mil./year)				Countermeasures
	Details	Short-term (2024)	Mid-term (2025-29)	Long-term (2030-40)	
Increase of pollutants due to increase of yield	Increase in the cost of managing pollutants	KRW 300 mil.	KRW 340 mil.	KRW 480 mil.	Manage below the legally acceptable level. Strengthen management of the filter medium of the air quality pollution prevention system. Monitor water pollutants constantly via the TMS.

Air Pollutant Reduction Performance

**NO<sub>x</sub>-57%** reduction compared with 2018.  
**Dust-69%** reduction compared with 2018.

Water Pollutant Reduction Performance

**BOD-73%** reduction compared with 2018.  
**SS-74%** reduction compared with 2018.



### Management of Harmful Chemical Substances

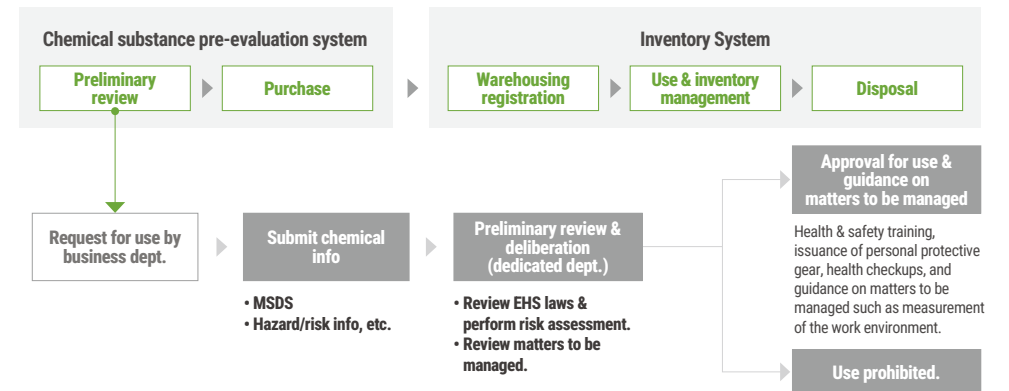
As laws and regulations related to chemical substances, such as the Chemical Substances Control Act and the Act on the Registration and Evaluation of Chemical Substances, are being strengthened day by day, the importance of managing chemical substances safely is growing. In 2019, Hanmi Pharm established a company-wide integrated MSDS management system in order to protect the health of employees and prevent damages due to accidents related to chemical substances, and we are striving to strengthen our capacity and processes for securing MSDS materials every year. In addition, we have established and begun operating an internal medicine raw material management system to strengthen the harmful chemical purchasing process and the MSDS management system.

In addition, Hanmi Pharm has eliminated the human and environmental impacts of harmful chemicals at the source, and has adopted and begun operating a system for pre-evaluating harmful chemical substances to prevent various risks related to the environment, health, regulations, etc. Notably, we are making efforts to prevent accidents from diverse aspects by actively conducting chemical substance risk assessments of the substances used at each business site, accepting periodic inspections of our facilities for storing and handling harmful chemicals, and conducting education and training on chemical leakage risks according to the worst-case/alternative scenarios.

Furthermore, the Paltan Smart Plant began using a new liquid disinfectant instead of CIP in 2023 in order to reduce the amount of harmful chemicals it uses, and has reduced the amount of NaOH used by 38% by adjusting the concentration of the chemical treatment tanks for the treatment of wastewater.

\* MSDS: Material Safety Data Sheet. A document that explains the precautions to take when handling chemical substances with regard to health and safety, health hazards, and physical danger.

#### Chemical Substance Management Process



#### Overview of usage of hazardous chemical substances

Classification	2020년	2021년	2022년	2023년
Amount of chemical substance used	114	106	193	178

Unit: tons

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## Expansion of Upcycling

### Management of Waste

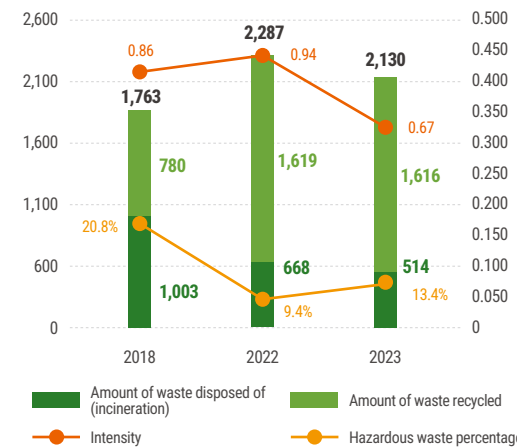
Waste Policy ▶

Hanmi Pharm fully complies with waste management regulations prescribed by laws such as the Waste Control Act, and makes it a general rule to transparently disclose the entire process encompassing the generation, transportation, and processing of hazardous waste, including general waste and harmful substances, through Allbaro (Legitimate Waste Treatment System). Especially in the case of medicines, because they must be disposed of and treated as hazardous waste, they are strictly managed by a qualified waste management company. We are seeking and performing various activities to check the amount of waste generated and recycled, and to raise the waste recycling rate. Since 2021, we have treated waste acids and waste alkalis - previously disposed of as hazardous wastes - as substances for controlling the pH of the wastewater treatment plant, and have been reducing the amount of waste generated every year. In addition, in 2023, Beijing Hanmi Pharm began purifying experimental waste fluids that used to be incinerated and recycling them. In 2024, we will strengthen the management of waste throughout the production process by applying to recognize eye-drop packaging scraps as circulating resources, increase the recycling rate via the separate collection of medical waste, and increase the separate disposal of recycled waste solvents to be converted into resources at Hanmi Fine Chemical.

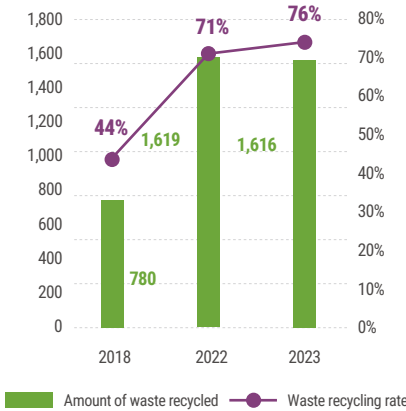
Risks	Financial Impact (KRW 100 mil./year)				Countermeasures
	Details	Short-term (2024)	Mid-term (2025-29)	Long-term (2030-40)	
Increase of pollutants due to increase of yield	Increase of cost of managing pollutants	KRW 260 mil.	KRW 450 mil.	KRW 480 mil.	Improve the waste recycling rate and increase recognition of circulating resources. Implement the upcycling performance management system.



### Waste Management Status

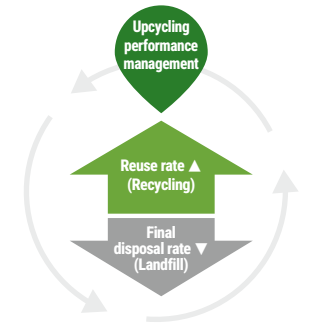


### Waste Recycling Rate Status



### Waste Management Status

Hanmi Pharm's Pyeongtaek Bio Plant and Hanmi Fine Chemical are businesses subject to the upcycling performance management system to achieve the national mid- to long-term upcycling targets, which are set and monitored every year. The relevant business sites manage the final disposal rate and the reuse rate according to the amount of indirect landfill under the upcycling performance management system, and there is no disposal direct to landfill.



Classification	Reuse rate	
	Goal	Performance
Pyeongtaek	Over 52.74%	86.73%
Fine Chemical	Over 49.3%	90.17%

**Reuse rate (%)**  

$$\frac{\text{Amount actually recycled} + \text{amount of circulation resources recognized}}{\text{Amount of waste generated} + \text{amount of circulation resources recognized}} \times 100$$

Classification	Reuse rate	
	Goal	Performance
Pyeongtaek	Below 25.73%	2.81%
Fine Chemical	Below 21.61%	1.57%

**Final disposal rate (%)**  

$$\frac{\text{Amount of final disposal}}{\text{Amount of waste generated} + \text{amount of circulation resources recognized}} \times 100$$

### Major Waste Impacts

Classification	Occurrence	Impact
Paltan, Pyeongtaek	Wastewater treatment sludge	Wastewater treatment Discharge into sea results in marine pollution.
	Waste synthetic resin	Product production & disposal Incineration results in the generation of microplastics and emission of dioxins.
Paltan, Pyeongtaek, Fine Chemical	Waste organic solvents	Waste fluid after experiment/culture process, etc. Results in chemical leakages.
	Halogenated waste organic solvents	Product production Incineration generates endocrine disruptors.

### Overview of Major Waste Recycling Efforts

Classification	Details of recycling	
	Wastewater treatment sludge	Used in agricultural production.
Paltan	Waste synthetic resin	Used to manufacture intermediate processed wastes.
	Waste plastic	Converted to raw materials after crushing/pulverization
	Wastewater treatment sludge	Used in agricultural production. Used to improve soil quality.
Pyeongtaek	Waste synthetic resin	Used to manufacture fuel, solid fuel products. Used to manufacture raw materials.
	Waste absorbents	Used to manufacture intermediate processed wastes.
Fine Chemical	Halogenated waste organic solvents	Direct product manufacturing
	Other waste organic solvents	Direct product/fuel & solid fuel product manufacturing

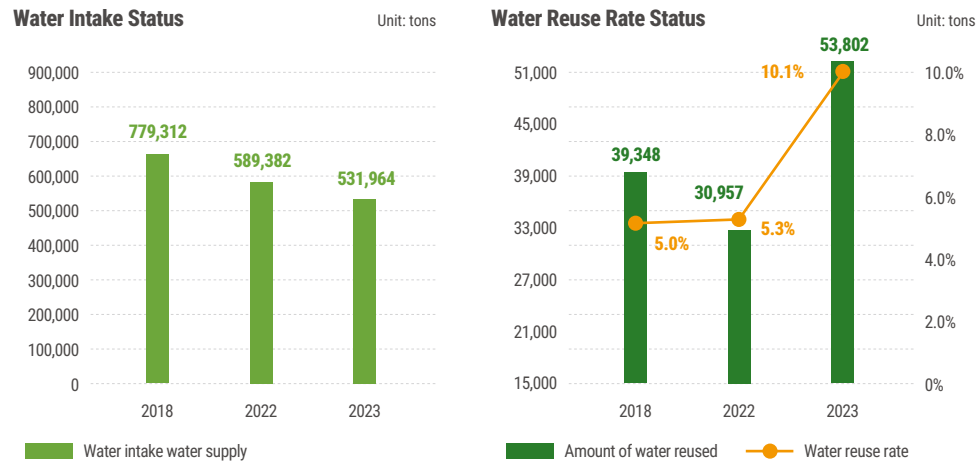
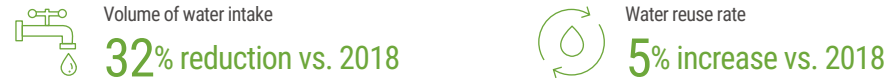
\* Waste generated at business sites is recycled and incinerated by a designated disposal company.

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### Water Resource Management

Hanmi Pharm is doing its utmost to minimize the amount of water used in its manufacturing processes and to raise the reuse rate. In 2023, Hanmi Pharm reduced its water intake by around 32% compared to 2018 and reused 53,802 tons of water at the same time, thus recording a water reuse rate of 10.1%. Now, the Paltan Smart Plant is using 100% R/O concentrated water to top-up the water for the coolant in the cooling tower, and, since August 2023, we have been reusing discharged wastewater as water for the cooling tower.

The Pyeongtaek Bio Plant continues to carry out improvement activities throughout its operations, including daily reduction activities such as converting the coolant of the WFI/PS manufacturing device of Bio Plant 1 and retrieving the coolant from the Autoclave. Hanmi Fine Chemical is doing its best to save 300 tons of water per month by using R/O water as scrubber water.



### Water Reuse Process



### Examples of Water Saving

The Pyeongtaek Bio Plant has improved the piping of the EDI and RO condensate of the PW device on the 2nd floor of the administration building to reduce the amount of water used. Instead of discharging the EDI rinsing water and the RO condensate generated by the existing PW device to the wastewater storage tank, they are now sent to the recycled water tank to reduce the cost of water by being used as supplementary water in the cooling tower and other utilities. Through this, we aim to reduce our water use by about 5,256 tons per year and lower the cost of wastewater treatment.

Major details	Annual saving	Annual reduction of water
[Paltan] Recycling of wastewater effluent as water for the cooling tower.	KRW 77 mil.	40,000 tons
[Pyeongtaek] Improvement of the piping of the EDI and the RO condensate of the PW device on the 2nd floor of the administration building.	KRW 16 mil.	5,256 tons
[Pyeongtaek] Conversion and minimization of the use of coolant for the WFI/PS manufacturing device at Bio Plant 1.	KRW 48 mil.	16,100 tons
[Pyeongtaek] Retrieval of coolant from the Autoclave in Bio Plant 1.	KRW 26 mil.	8,760 tons

