



**2021**

Sustainability  
Report

# Report Preparation Instructions

- Wanhua Chemical Group Co., Ltd. has issued an annual Responsibility Care Report in 2009 and a Sustainable Development Report prepared according to GRI standards for the first time in 2017. The report aims to present to our stakeholders the sustainable development work and performance of Wanhua Chemical Group Co., Ltd. in 2021 in three economic, environmental and social dimensions.
- This report has been prepared in accordance with the "core protocol" of the Global Reporting Initiative (GRI) Sustainable Reporting Standards (GRI Standards) and in conjunction with the Disclosure Requirements of the Environmental Information Disclosure Guidelines for Listed Companies on the Shanghai Stock Exchange and the United Nations Sustainable Development Goals (SDGs).
- The sustainable development data disclosed in this report cover the period from January 1, 2021 to December 31, 2021, with minor calendar year data disclosures. The financial data included in the report were obtained from the Annual Report of Wanhua Chemical Group Co., Ltd., 2021, which was independently audited by Deloitte Young Accounting Firm (Special General Partners). Unless otherwise specified, the amounts indicated in this report are presented in Renminbi. Other non-financial information will be provided by functional departments and branches of the headquarters of Wanhua Chemical Group Co., Ltd.
- This report is available in both Chinese and English print and online electronic formats, which can be accessed and downloaded on our website at DIPMASK001. If not necessary, please try to use the electronic version of the report to save resources and protect our planet.

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## Address by Chairman



In the past 2021, facing the complex situation in the post-epidemic era, Wanhua Chemistry upholds the great mission of "Advancing Chemistry, Transforming Lives!" and all the Chinese people face difficulties, face difficulties, bathe in rain and thorns, and cross hundreds of billions of dollars of revenue; at the same time, Wanhua's innovation ability is constantly improved, the management base is constantly consolidated, the team's cohesion and fighting power are constantly enhanced, which lays a solid foundation for the world's 500 strong enterprises to become the world's first-class competitiveness.



**This year, we have achieved fruitful results.** The output of Yantai Industrial Park and Ningbo Industrial Park has reached new high again, and the devices in Baoside Industrial Park continue to operate steadily and under high load.; sales of polyurethane, petrochemical, ADI, aqueous resins, TPU, PC and other products have all reached historical records, and the industry influence of Wanhua Chemical continues to increase.

**This year, Wanhua Chemical Excellent Operating Capacity is constantly enhanced.** The talent training system is improving day by day; new methods and strategies of energy saving and efficiency are emerging, and the ability of organization and control is further strengthened; innovation of safety management strategy, cross-audit, in-depth audit and external audit strongly promote the improvement of HSE management level; successfully completes the digital transformation and establishes the intelligent enterprise platform that supports the rapid expansion of hundreds of billions of scales; won the first international EcoVadis gold medal certification, showing Wanhua Chemistry in the sustainable development of the continued pursuit of excellence.

**This year, Wanhua has made new progress in research and development of new chemical technology.** Pilot-scale breakthroughs of degradable plastics have been made, POE pilot-scale technology has been continuously improved, the development of electronic chemicals has been significant, the development of battery material ecosphere has been steadily advanced, and the optimization effect of polyolefin products has been shown initially. The company is constantly exploring in the field of high-tech, high-value-added chemical new materials, and contributes Wanhua strength to the better life of mankind.

**This year, all Wanhua chemical builders and the participating units fight hand in hand, fighting the severe cold, fighting heat, fighting epidemic situation, robbing time, created one construction miracle after another.** Several projects in Yantai Industrial Park were put into operation smoothly, and the construction of PO/SM device created a new benchmark for Wanhua Project construction; fujian Project Quicken the Whip, MDI device construction is changing day by day; sichuan PBAT, Sanyuan Anode and HPM, etc. were successfully put into production.

In the future, we should further strengthen risk awareness, break complacency, find shortages, lift capacity, and brave change; we should strengthen the concept of "safety as the first priority", implement the production management system of "safety as the core", and continuously improve the level of safety management; we should strengthen the consciousness of struggle, "break ice" in thought, "break through" in action, meet new challenges and achieve new breakthroughs.

**We must always put social responsibility first.** Continuous research on new technologies of carbon reduction, optimization of energy structure, construction of low-carbon, zero-carbon industrial parks, has become the pioneer of the era of carbon reduction; continuously R&D more good products "for the benefit of the country, for the people" to achieve new technology, new business breakthroughs, and contribute to sustainable development!

— Chairman, Wanhua Chemical Group Co., Ltd.

Zengtai Liao

# Enter Wanhua



## Mission

Advancing Chemistry,  
Transforming Lives



## Vision

To become an innovative, world-class  
chemical company, admired by our  
employees and respected by the community.



## Core values

Pragmatism & Innovation  
Commitment to Excellence  
Customer Orientation  
Responsible Care  
Gratefulness & Dedication  
Teamwork



## Regarding us

Wanhua Chemical Group Co., Ltd. is a new chemical materials company operating globally, relying on constantly innovative core technology, industrialized devices and efficient operation mode to provide customers with more competitive products and solutions.

### Product Category

Polyurethanes

Petrochemicals

Performance chemicals

Emerging materials

### Product Application



Homeware and furniture



Sports and leisure



Automobiles and transportation



Building and  
construction



Electronics and  
electrical appliances



Personal care



Green energy

### Financial Index

**190.3**

billion yuan  
Total asset

**68.5**

billion yuan  
Net asset

**145.5**

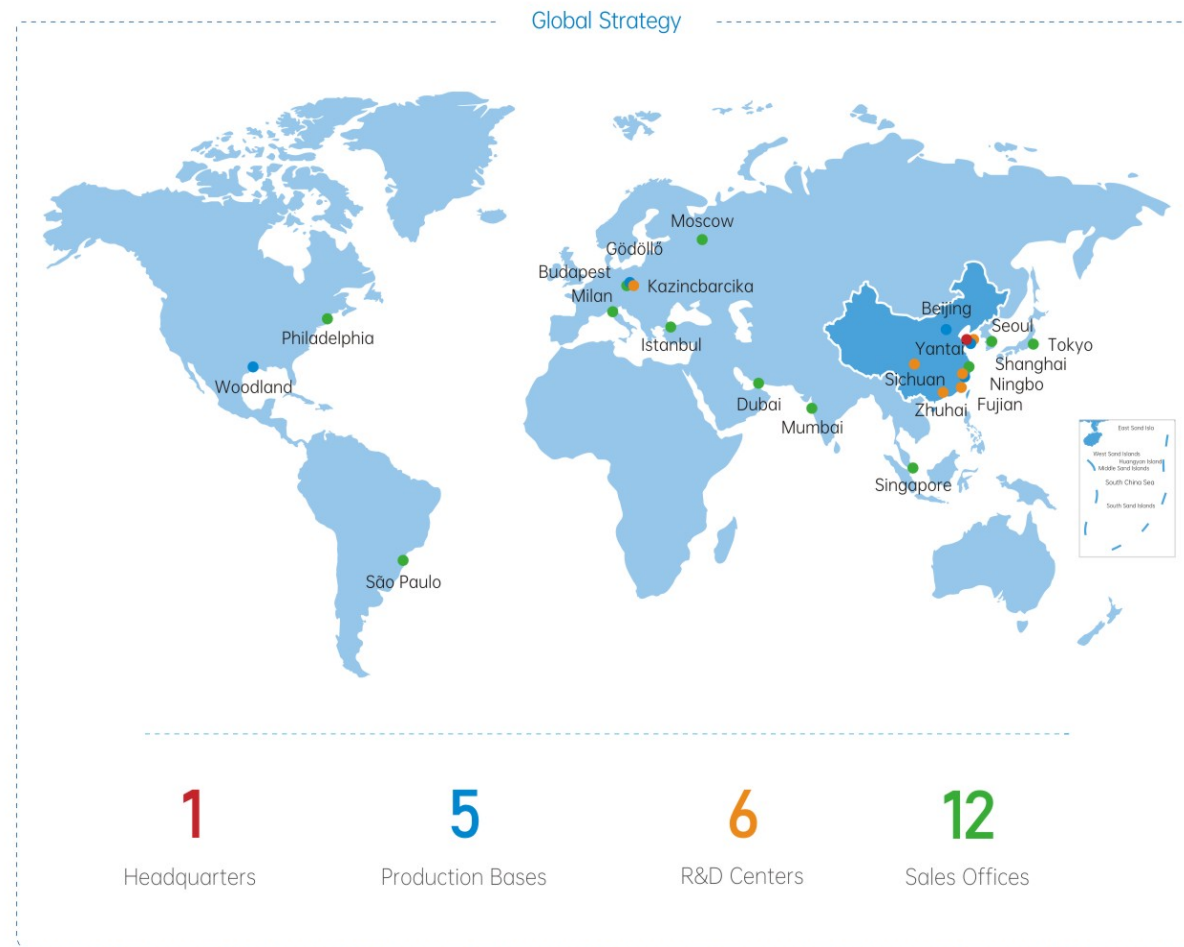
billion yuan  
Annual revenue

**24.6**

billion yuan  
Net margin

With the mission of "Advancing Chemistry, Transforming Lives!", Wanhua Chemistry will continue to innovate in the field of new chemical materials, lead the development of the industry and create beauty for human beings.

## Regarding us



## Organization Introduction



### Polyurethane Business Unit

The Polyurethane Business Unit is mainly responsible for the domestic and overseas sales of MDI and TDI, the R&D, production and sales of modified MDI and its system materials, soft and rigid foam polyether and EOD.



### Performance Materials Business Unit

It mainly includes thermoplastic polyurethane elastomer (TPU), polymethylmethacrylate (PMMA) and film materials.



### Emerging Technology Business Unit

Committed to the R & D, production, sales and service of environmentally friendly surface materials & new energy materials. Eleven R & D technical platforms have been formed for aqueous polyurethane (PUD), aqueous acrylic acid (PA), modified polyurethane (PUA), aqueous photocurable (UV), aqueous bicomponent (2K), aqueous epoxy (EP), rheological aids (HEUR and HASE), silicone, Soft Bioderived Beads, superabsorbent resin (SAP) and cathode materials for lithium ion batteries.



### Performance Polymers Business Unit

With engineering plastics and biodegradable materials as the business core, we are committed to becoming a world-class supplier of high-quality polymers and solutions with industrial chain advantages, including engineering plastics (PC, specialty PC, PA12), biodegradable materials (PBAT, PBS, PLA)



### Advanced Material Solutions Business Unit

The application and development platform of Wanhua Chemical High Performance Modified Materials continues to provide customers with stable and high quality customized material solution business including modified polypropylene (PP), modified polycarbonate (PC), modified silicon copolymerized polycarbonate (Si-PC), modified polymethyl methacrylate (PMMA), modified long chain nylon (PA12), and modified all-biodegradable plastics.



### Performance Chemicals Business Unit

Mainly responsible for the investment, production and marketing of fine chemicals; with hydrogenation, phosgenation and industrial chain integration as the core competitiveness, it provides high value-added raw materials for the chemical materials industry, coatings and adhesives industries, perfumes and nutrients industries.



### Petrochemical Sales Co., Ltd.

Wholly owned subsidiary of Wanhua Chemical Group Co., Ltd. Mainly responsible for the construction and operation of Wanhua Petrochemical Industrial Platform, and responsible for purchasing, production, sales and operation management of major raw materials of petrochemical products.

## Sustainable Development | Management System

We take the SDGs of the United Nations sustainable development goals as the direction of our efforts, and work with all relevant parties to promote sustainable development around six major aspects: industrial innovation, environmental protection, health and safety, energy efficiency, sustainable procurement, employees and society.



Industrial innovation	Energy efficiency	Environmental protection	Health and safety	Sustainable procurement	Employees and society
Recycling of resources	Energy saving	Pollutant discharge	Chemical safety	Supplier management	Labour human rights
Green chemistry process	Carbon footprint	Noise contamination	Safe working conditions	Procurement digitization	Business ethics
Green material protocol	Water footprint	Soil contamination	Employee health protection	Raw material recycling	Information security
		Biodiversity			Harmonious community

## Sustainable Development | Development Process

By constructing and perfecting the sustainable development index system, Wanhua Chemical provides guidance for sustainable development management practice and information disclosure. Over the years, the work of sustainable development has achieved remarkable results and has been unanimously recognized by the industry and the public.



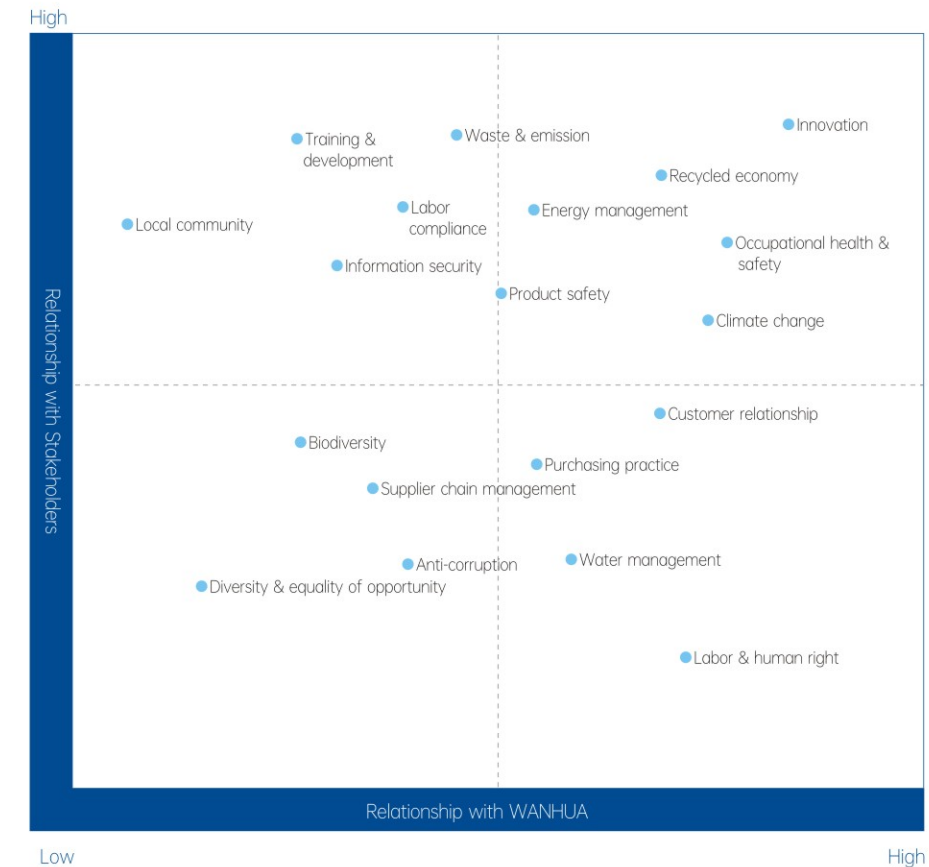
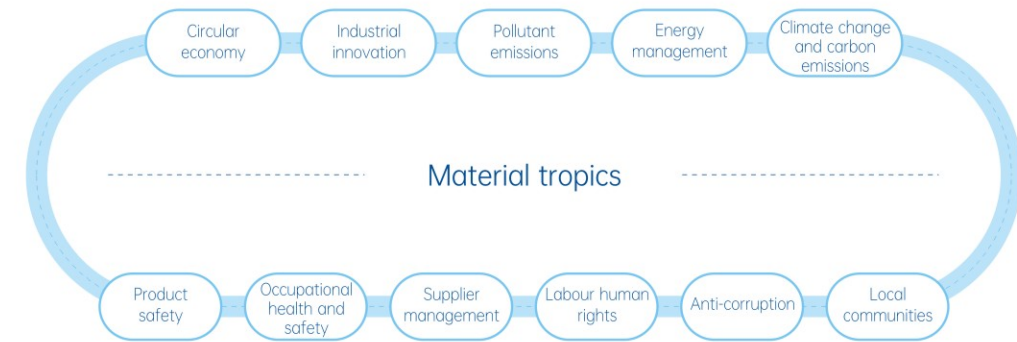
## Sustainable Development | Mechanism of Participation of Relevant Parties

The sustainable development management system of Wanhua Chemical is a co-construction system covering all stakeholders. We understand the demands of all parties by establishing communication mechanisms with customers, suppliers, employees, shareholders and investors, governments and regulatory agencies (including exchanges), communities and the public, scientific research institutions, industry associations and other relevant parties, and timely revise and adjust our sustainable development work.

Stakeholders	Communication channel	Primary Focus	Action
Customer	Customer satisfaction survey Customer meeting Review and assessment	Customer relationship Recycling economy Product safety	Annual customer satisfaction survey Annual review and assessment
Supplier	Vendor assembly Review	Supply chain management Procurement practice	Annual vendor assembly
Employees	Employee congress Coffee time Team building activities Family day Internal mailboxes, forums	Health and safety Training development Labour human rights Diversification and equal opportunities	Employee congress Coffee time Team building activities Annual family day
Shareholders and investors	General meeting of shareholders Annual financial report	Recycling economy Climate change and carbon emissions	General meeting of shareholders Annual financial report
Government and regulatory agencies	Supervision and Inspection Periodic reports	Health and safety Waste discharge Climate change and carbon emissions	Sustainable development report Periodic reports
Communities and the public	Open day activities	Waste discharge Green products	Sustainable development report
Scientific research institution	Scientific research forum Academic exchanges	Innovative R&D Product safety	Forum for Co-construction of Schools and Enterprises Global conference on process safety
Industry associations	Industry meetings Standard setting	Energy management Green products	Industry association meeting Participate in standard setting

## Sustainable Development | Substantive Issues

Through adequate research and exchange with various stakeholders, the substantive topics of sustainable development of Wanhua Chemistry have been identified around the main concerns of various links and relevant parties in the industrial chain, including:




## Sustainable Development | Key Performance

Wanhua Chemistry has made continuous efforts for the long-term goal of sustainable development, and regularly inspected the implementation results, and proactively disclosed the results to the public.

Sustainable Development Goal 2025		2025 Target	Progress in 2021		
			Value	Decrease ratio	
Energy	 	20% reduction in energy consumption per unit product Based on 2016 kgce/t	≤271	312	-7.91%
	 	20% reduction in water consumption per unit of product Based on 2016 m <sup>3</sup> /t	≤7.35	8.33	-9.36%
	 	20% reduction in carbon intensity Based on 2016 tCO <sub>2</sub> e/t	≤1.94	2.19	-9.79%
Environment	 	15% reduction in COD emissions from 10,000 tons of products Based on 2016	≤1.02	0.15	-87.5%
	 	30% reduction in solid waste rate of 10,000 tons of product Based on 2017	≤9.16	13.13	+0.3%
Safety	 	Number of major accidents	0	0	—
	 	The number of work-related injuries leaving the post per 200,000 man-hours shall not exceed 0.04	≤0.04	0.02	—
Procurement	 	New supplier social responsibility assessment rate increased to 70%	≥70%	100%	—
	 	TFS Supplier Purchase Amount NLT 30%	≥30%	67%	—
Labour	  	Employee turnover rate below 5%	<5%	4.05%	—
	  	Increase in the proportion of female employees to 16%	≥16%	13.76%	—

Note 1: carbon emission data for 2021 need to be published after government carbon verification in 2022.  
Note 2: the amount of solid waste increased significantly in 2021 due to overhaul of the device.

## Sustainable Development | Honors and Awards


  
2021

- Wanhua Chemistry is ranked 29th in the Top 50 Global Chemical Industry
- Wanhua Chemistry has been appraised as a model enterprise for sustainable development at CFS Finance and Economics Summit
- Wanhua Chemistry has been awarded the "Thirteenth Five-Year Plan" Innovative Model of China's Petroleum and Chemical Industry
- Wanhua Chemical Advanced Polymer National Engineering Research Center selected the first batch of new sequence National Engineering Research Center
- Wanhua Chemical Company Won the Tenth China Public Welfare Festival 2020 Outstanding Contributor to Anti-epidemic
- Wanhua Chemistry ranked No. 1 on the list of leading enterprises in Shandong Province in 2021
- Successfully passed IATF16949: 2016 Quality Management System Certification
- Wanhua Chemistry Won the Enterprise Award for Contributing to Sustainable Development of the Fourth Social Responsibility Congress
- Wanhua Chemistry Won the "Thirteenth Five-Year Plan" Coatings Industry High-quality Development Enterprise Evaluation
- Wanhua Chemicals Won the Top 100 List of ESG of A-share Company
- Won the first prize for scientific and technological progress in Shandong Province for three consecutive years, and the ADI technology breakthrough was selected as the top ten scientific and technological achievements of Shandong Province in 2020
- HCL cycle technology is included in Chemical Week 2021 Best Cycling Practice for Sustainable Development
- Wanhua Chemistry Won the Gold Medal of Ecovadis
- Validation Certificate of UL Green Change Statement Obtained to Biotechnology-based TPU
- "High Efficiency Green Asymmetric Catalytic Technology for Preparation of L-Menthhol" Developed by Shanghai Jiaotong University
- Wanhua Chemistry Awarded by Chinese Red Cross Association



# Industrial Innovation

Wanhua Chemistry always takes technological innovation as the core, closely surrounds the needs of human social development, actively explores the social development trend and the scientific frontier, unswervingly promotes the research and development direction closely related to carbon neutralization and recycling economy, and provides fundamental solutions for the medium- and long-term problems of human society and contributes to human sustainable development.

Research cost **3.168** billion yuan  
R&D staff **3100+**



## Green Material Solutions

### Biological Based Products

Wanhua Chemical is actively utilizing biomass raw materials, developing C1-C10 platform molecules and key monomers through innovative technologies, and further making polyester materials, polyol materials, degradable plastics and aqueous resins for the production of terminal products.

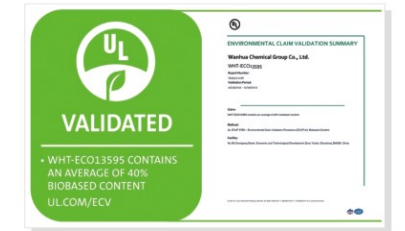


Wanhua Chemistry will gradually enrich the biotechnology-based product lineage, promote the development process of biotechnology-based products, effectively promote carbon emission reduction, reduce the carbon footprint of products, and help more partners to achieve carbon neutralization!

### Bio-based TPU

WHT-ECO13595, a Wanhua Chemical Biotechnology-based TPU product, was awarded the UL Green Environment Statement Validation Certificate, which is the first UL-certified biologically based TPU product in the industry.

WHT-ECO13595 is made from biomass materials, and its biomass content can be as high as 40%. Compared with the traditional TPU, it has the characteristics of environmental friendliness, renewable raw materials and low carbon environmental protection without sacrificing any comprehensive properties. According to statistics, each ton of biologically based TPU used can reduce carbon emissions by 20-40%, contributing significantly to the achievement of the dual-carbon target.



### Bio-based inner wall emulsion

Wanhua Chemical Archsol<sup>®</sup> 8177 and Archsol<sup>®</sup> 8179 are high-end latex paint emulsions made from plant-based raw materials. The biomass content in the emulsion reaches 30% and 50%, respectively, which greatly reduces the dependence on petroleum resources.

The two emulsions have the characteristics of ultra-low odor, excellent film formation and freeze-thaw stability. No film-forming aid and low boiling point antifreeze agent are required in the coating formulation, which greatly reduces the odor in the coating tank/during construction/long-term use, and significantly relieves the release of VOCs. In addition, both products have highly effective aldehyde removal functions, which can eliminate the formaldehyde adsorbed to the coating through chemical reactions, improve the quality of indoor air and protect the health of residents.

### Biopolyols

Wanhua Chemical has introduced biologically based raw materials such as sucrose, palm oil, glycerin and sorbitol as the starting agent, and has independently developed more than ten kinds of biological-based polyether polyol monomers, which can effectively replace the petrochemical raw materials. Compared with petroleum-based polyols, some bio-based polyether monomers can reduce energy consumption by 20% and carbon emission by 30%.



Wanhua chemical and biological based rigid foam polyol products have good flowability, demoulding, endowing foam with excellent compressive strength and dimensional stability; the biological-based soft foam and CASE products have a complete variety, low unsaturation, excellent molecular weight distribution, and fully meet the requirements for tensile, tear, rebound and other properties of the products.

### Optical Grade PMMA Products

After many years of independent research and development, Wanhua Chemical has built a world-class PMMA device using advanced continuous bulk polymerization process with the advantages of integration of the park. High quality PMMA products were awarded the 2021 Annual Innovation Products Award for New Chemical Materials published by the China Federation of Petroleum and Chemical Industries.

Four domestic pioneering optical PMMA products (OD01, HD01L, HD08L and HD01A) are mainly used in the optical display industry. The four innovative products meet the comprehensive requirements of the optical display industry for processing fluidity, special light efficiency, high transmittance and heat resistance while ensuring excellent optical effects.

### New Energy Materials

New energy fields such as photovoltaic wind power play a significant role in carbon reduction, and Wanhua has a full-material solution for the photovoltaic industry, which can promote the upgrading and development of the industry.

#### Wind turbines materials

Blade	Handpiece	Tower
Epoxy curing agent IPDA/HMDA/PEA	Lubricating pipe PA12/TPU	Polyurethane coating HEMA
Epoxy structural adhesive IPDA/HMDA/PEA	Hose PA12	HDI
Polyurethane coating HEMA/HDI	Dust extraction pipe TPU	<b>Cable</b> Cover buried cables TPU
Girder Polyurethane composites	Sealing Silicone	The tooth layer PA12
Vacuum membrane Pa12		
Glass Fiber IPDI		

#### Solar cell materials

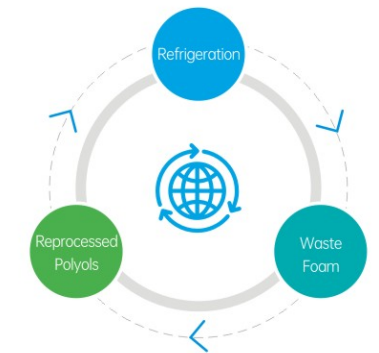
Glass Panel PC/PMMA
Wrap film POE
PV Panel Isocyanate/long chain nylon
Frame/junction box Modified PC
Connector Modified nylon/modified PC
Cable coating TPU



## Resource Recycling

### Polyurethane Rigid Foam Full Lifecycle Solutions

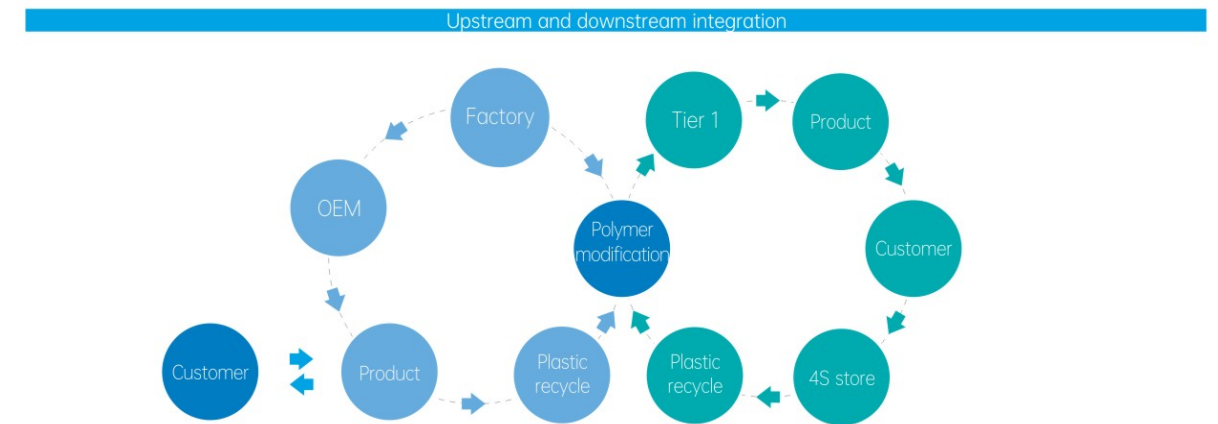
Wanhua Chemistry has innovatively put forward the whole life-cycle solution of polyurethane rigid foam to create a closed-loop cycle model of green materials, green production and green recovery. The chemical recovery method of polyurethane rigid foam is developed for the insulation layer of household appliances. New foaming raw materials are obtained by chemical treatment of the waste foam, and the recycling of the insulating layer of household appliances is realized.



### PCR "Black Science and Technology", Reconstructing Cycle New Vitalization

The introduction of PCR materials by Wanhua Chemical helps plastic products achieve the cycle development of the whole life cycle, and help relevant industries to save energy and reduce emissions. Through continuous exploration and innovation, plastic bucket resources can be regenerated and recycled by upgrading technology, and carbon footprint is effectively reduced, and the bucket is endowed with "secondary life".

In the future, Wanhua Chemistry will explore the product cycle route hand in hand with the upstream and downstream, continue the high-quality whole industrial chain growth stimulated by the demand of multiple industries, and continue to develop towards greener, lower carbon and sustainable ecological changes.



### Full Material Sole Cycle Protocol

The recycling scheme of Wanhua Chemical Full Material sole is to reprocess the broken waste midsole material and make a new midsole by using the reaction molding technology of polyurethane material. At present, only a small proportion of plastic wastes can be recycled, and the worn shoes will be directly discarded and incinerated in most cases. This scheme fully utilizes the excellent adhesion and foaming properties of polyurethane materials and the reaction technology of high-efficiency integrated molding, and realizes the unification of the waste material treatment process with the production process of new products, making the material 100% recycled again and again, and the whole process is efficient and convenient.

# Energy Efficiency

As early as 2016, Wanhua Chemical established an energy-saving and low-carbon committee led directly by senior executives. In 2021, facing the dual-carbon goal, the company formed a carbon emission management team to carry out all-round energy-saving and low-carbon work. Optimize energy structure, save energy and reduce consumption, strengthen carbon footprint and water footprint management, improve energy and resource utilization efficiency, promote energy conservation and emission reduction, and achieve harmonious development between human beings and environment.

Product energy consumption **312** kgce/t  
 Product water consumption **8.33** m<sup>3</sup>/t  
 Carbon emission **2.19** tCO<sub>2</sub>e/t



## Optimization of Energy Structure

In 2021, Wanhua Chemical purchased 716 million kWh of green power within and outside the province through market transaction, accounting for 13% of the company's total annual electricity consumption, exceeding 12.5% of the non-aqueous renewable energy consumption target in Shandong Province. At the same time, Wanhua Chemistry actively explores new energy power, builds a clean, low-carbon, safe and efficient energy system to maximize economic, ecological and social benefits.

### Wind power project

Wanhua Chemical and Huaneng Group jointly set up Huaneng (Laizhou) New Energy Technology Co., Ltd. to jointly build a 93MW decentralized wind power project in Laizhou City, Yantai, Shandong Province. **Annual online power supply of 200 million degrees, carbon dioxide emissions reduction of more than 200,000 tons.** The wind power project makes full use of local high-quality wind energy resources, convenient transportation conditions and better access conditions of power system, which can effectively improve the single structure of the local power grid dominated by thermal power, provide clean and renewable energy for the urban power grid, reduce atmospheric pollution, protect the local ecological environment, especially play a positive role in promoting the sustainable development.



### Photovoltaic item



- Xin'an Town, Haiyang City, Yantai, Shandong Province, is planning a 600MWP fishing-light complementary photovoltaic power station project. **Annual online power supply of 700 million degrees, annual carbon dioxide emissions reduction of more than 700,000 tons.**
- Zhaoyuan 140MWp agricultural-light complementary photovoltaic power station project in Yantai, Shandong Province, **produces 170 million degrees of electricity and reduces carbon dioxide emissions by 170,000 tons per year.**

### Nuclear power project

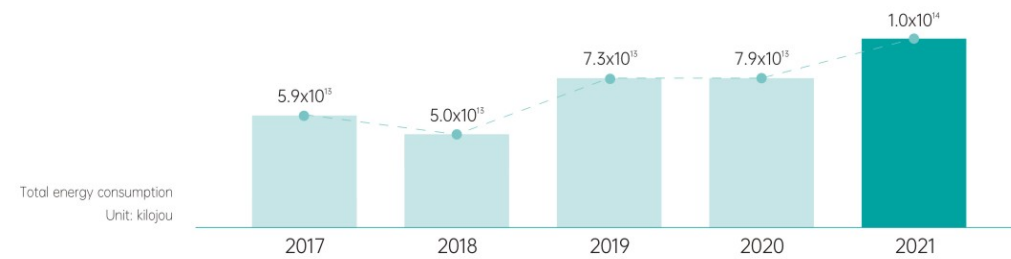
Wanhua Chemical, in cooperation with China Nuclear Industry Group, has built a high temperature gas-cooled reactor and Hualong No. 1 in Haiyang, Yantai, with a clean energy layout. **The total annual power output can reach 66 billion degrees, and the annual carbon dioxide emissions are reduced by more than 39 million tons.** At present, the Haiyang project in Shandong Province has been set up in the China Nuclear Group. The first phase is expected to be put into production in 2027, and the second phase is expected to be put into production in 2030.



## Saving and Reducing Consumption

In accordance with the requirements of the energy management system, Wanhua Chemical sets clear energy-saving targets for energy consumption consumables such as coal, natural gas, liquefied petroleum gas, gasoline, diesel and electricity and steam, establishes energy consumption indicators for each link and each product. Through energy efficiency logistic analysis, the potential of energy saving is explored, energy-saving technology transformation is implemented to reduce energy consumption, and an on-line energy consumption monitoring system is established to supervise and control the energy consumption and target completion, and energy utilization efficiency is continuously improved continuously.

Total energy consumption 2017-2021



Note 1: the conversion coefficient is derived from the conversion coefficient in the annex to GB/T 2589-2020 General Chapter for Comprehensive Energy Consumption Calculation  
 Note 2: the increase in energy consumption in 2021 was mainly caused by the expansion and transformation of MDI unit in Yantai and the normal operation of ethylene project, as well as the energy consumption of Fujian and Meishan bases in Sichuan.

In 2017-2021, the energy-saving and consumption-saving project consumed 254,000 tons of standard coal, reducing 660,000 tons of carbon dioxide emissions. In 2021, a total of 277 energy-saving and consumption-saving projects were solicited, with energy saving of 110,000 tons of standard coal, reducing nearly 300,000 tons of carbon dioxide emissions.

Project Name	Project Introduction	Project results
1 Optimize reflux ratio to reduce steam consumption	The reaction system and refining system of a certain plant are optimized to further reduce the reflux ratio of the product column, reduce the steam consumption and realize energy saving and consumption under the premise of ensuring the product quality.	Energy saving <b>6082 tons</b> of standard coal, <b>16000 tons</b> of carbon dioxide reduction
2 Optimization of energy saving for compressor	The oxidation compressor needs to consume 40 kg of steam. Under the condition that the normal operation of the system is not affected, the pressure at the outlet of the compressor is reduced, the amount of steam is reduced, and the energy consumption is saved.	Energy saving <b>2357 tons</b> of standard coal, <b>6000 tons</b> of carbon dioxide reduction
3 Reactive heat utilization item	The unit recovers the reaction heat of hydrogenation by the by-product steam of the boiler. By developing the comprehensive utilization scheme of the reaction heat, the utilization ratio of the reaction heat is increased by 13%, the steam production is increased and the energy consumption of steam generation is saved.	Energy saving <b>2194 tons</b> of standard coal, <b>5700 tons</b> of carbon dioxide reduction
4 Optimization of fuel gas consumption	Optimize the oxygen content of the heating furnace, finely adjust the combustion condition of each nozzle, and control the oxygen content to 2-3% as a whole, and realize the reduction of fuel gas unit consumption.	Energy saving <b>1433 tons</b> of standard coal, <b>3700 tons</b> of carbon dioxide reduction

## Carbon Footprint Management

In 2021, Wanhua Chemistry fully started carbon emission management, updated and published the "Wanhua Chemical Carbon Emission Management Procedure" and "Wanhua Chemical Carbon Emission Calculation Guidelines" to explore and formulate carbon peak, carbon neutralization pathway planning, actively promoting carbon emission reduction in the supply chain while paying attention to its own emission reduction and reducing the carbon footprint of products.

At present, Wanhua chemically identifies two types of greenhouse gas emissions, carbon dioxide and nitrous oxide. According to the requirements of GB/T 32151.10-2015 Guidelines for the Accounting of Greenhouse Gas Emissions, annual data on direct and indirect greenhouse gas emissions are counted, emission reports and monitoring plans are compiled, and relevant government departments are actively cooperated in carbon verification work, and all have passed the verification smoothly.

Total greenhouse gas emissions 2017-2020

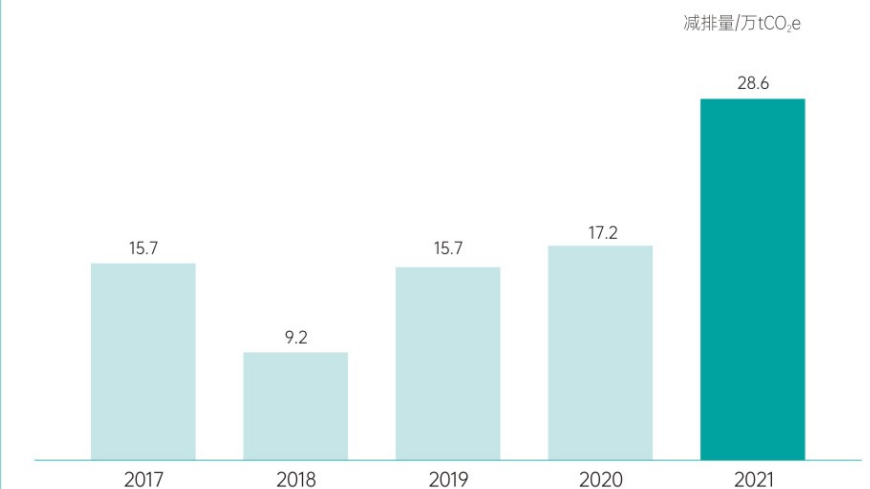
Content	Category	2017	2018	2019	2020
Total greenhouse gas emissions tCO <sub>2</sub> e	Direct (scope1)	9339145	10137301	12151498	12949081
	Indirect (scope2)	5275678	5519508	5998461	6908910
	Total	14614823	15656809	18149959	19857991
Intensity of greenhouse gas emissions tCO <sub>2</sub> e/t		2.20	2.30	2.24	2.19

Note: carbon emission data for 2021 need to be published after government carbon verification in 2022.



In recent years, the company has continued to implement low-carbon emission reduction, lean management and other projects, energy-saving and emission reduction effect is significant. In 2021, the company implemented its low-carbon commitment by continuously developing low-carbon technology and improving the level of green power in the office area.

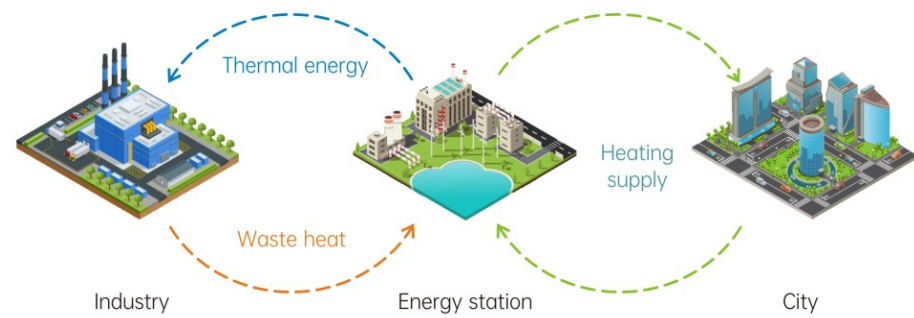
Carbon dioxide emission reductions 2017-2021



Wanhua chemical-river-sea integrated intelligent energy project

It can save about **2.6 million tons** of coal annually, reduce **6.7 million tons** of carbon dioxide emissions, save more than **20 million square meters** of water, and ensure **110 million square meters** of urban heating in Yantai

The comprehensive intelligent energy project of Wanhua Chemistry and Hehai New Energy Co-construction combines a variety of innovative technologies to recycle and reuse the waste heat from production in Wanhua Chemical Yantai Industrial Park to supply high-grade heat energy for the production of the park and provide a clean heat source for winter heating in the urban area of Yantai. Through this technology, the perfect combination of energy-saving technology of chemical plant and low-grade thermal energy technology for civil use is realized.



Phase I photovoltaic project of wanhua chemical headquarters successfully connected to grid

The photovoltaic project of Wanhua Chemical Headquarters (Phase I) was successfully connected to the grid. The project fully utilizes the solar energy resources of Wanhua Chemical Headquarters to achieve green power consumption in the office area by distributed photovoltaic power generation.

The photovoltaic power project of Wanhua Chemical Headquarters is located on the roof of the R & D building and is divided into two phases. Among them, the first phase of the project consists of 7 buildings, which can achieve a total installed area of 7050 m<sup>2</sup>, an installed capacity of 705.6 kWp, an average annual power generation capacity of 840,000 degrees, which can save about 110 tons of standard coal and about 520 tons of CO<sub>2</sub> emission reduction. After the completion of the two-phase project, the resource consumption and carbon emissions will be reduced to a certain extent, and Wanhua Chemistry will be helped to build "low-carbon" and "zero-carbon" parks.

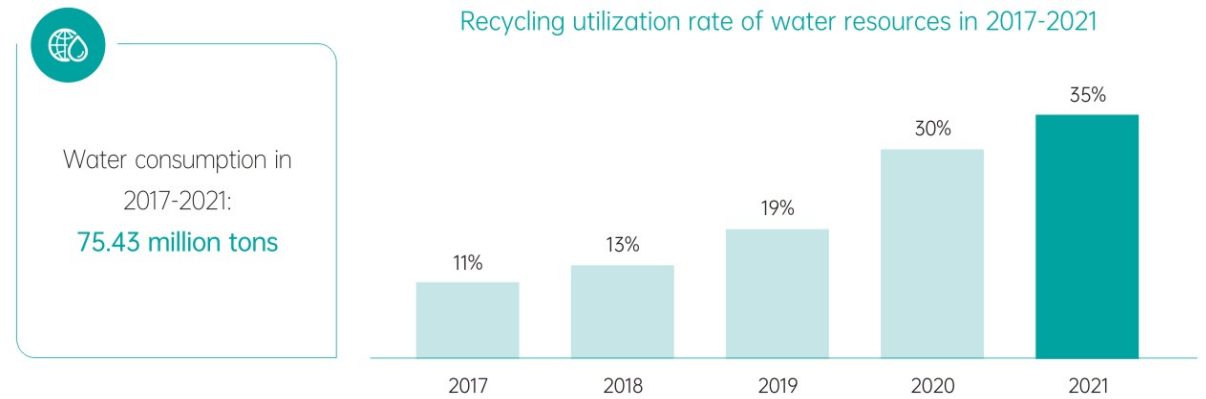
After the completion of the construction, the total installed capacity can reach **3810 kWp**, **4.34 million** degrees per year, and **2700 tons** of carbon dioxide emissions per year



Water Footprint Management

Wanhua Chemical has established a water resources consumption monitoring and management system, formulated water-saving planning and water-consuming objectives, controlled the water consumption per unit, and realized the optimization and rational utilization of water resources through water balance control in the park. Meanwhile, advanced technical methods were actively adopted to increase the amount of reused water and continuously improve the recycling utilization rate of water resources. In 2021, Wanhua Yantai Industrial Park was successfully selected as a water-saving benchmark unit in the Industrial Park.

Wanhua Chemical has established a perfect water recycling system, and has taken a series of measures to save water and reuse water. The water resources recycling utilization rate was 35% in 2021, which is 17% higher than that in 2020.



Project name	Project introduction
1 Brine reuse	The brine produced by MDI unit is discharged after simple treatment within the industry. After continuous exploration and experiment, Wanhua purifies the brine and sends it to the chlor-alkali plant for use to reduce waste water discharge.
2 Utilization of circulating wastewater	Replacing the reuse water with circulating water drainage water, it is used for replenishing the spraying water of the alkali washing tower and the water washing tower of the odor treatment unit and the rinse water of the sludge dehydrator, which not only saves the consumption of the reuse water, but also reduces the amount of waste water treatment.
3 Utilization of PW water circulation for pump seal	PW (demineralized water) is used as mechanical seal water in the effluent pump, and the water enters the pump into the efflux pool for efflux. The machine sealing water circulation system was added, and the cooling water was recycled to reduce PW waste.
4 Temperature differential control of circulating water	Regularly measure the temperature difference of each heat exchanger. When the temperature difference is $\leq 5$ °C, the heat exchanger timely turns off the circulating water to return water to save the amount of circulating water.

# Environmental Protection

Wanhua Chemical has always adhered to the Global Charter of Responsible Care and the Global Compact for Sustainable Development of the United Nations, and is committed to the construction of green ecological modern chemical enterprises. Through pollutant control, noise control, soil treatment and protection of biodiversity. Protect the natural resources and ecological environment, and realize the harmonious symbiosis between man and nature.

COD Emission **0.15**  
 Waste rate **13.13**  
 Qualified emission rate **100%**



## Pollutant Treatment

Pollutant discharge is the main cause of negative environmental impact, resource and energy consumption. Reducing pollutant emission is the only way to achieve sustainable development. Wanhua Chemical continues to carry out pollution prevention and control strategy, establish the whole life cycle management process of pollutants, deepen the concept of "3R" in the process package, design, production operation and decommissioning stage of the project, actively promote the measures of source emission reduction, strive to achieve the essential environmental protection of the production process, and further reduce pollutant discharge through high standard design and high standard operation of pollution control facilities.

## Wastewater Management

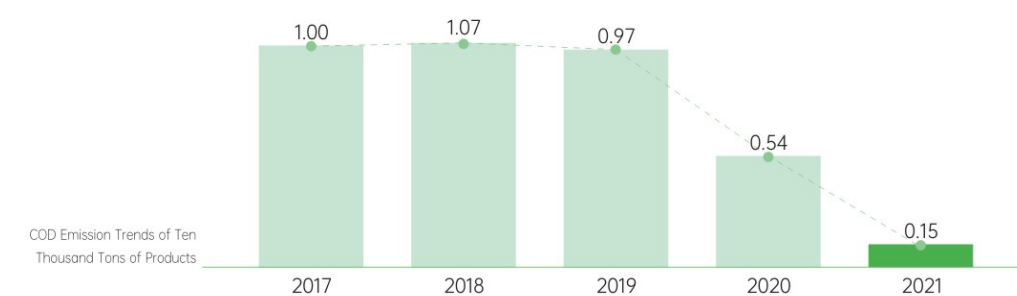
Water is the source of life. Facing the severe situation of water resources becoming more and more tense, Wanhua Chemistry continuously strengthens water resources management in the stages of R & D, production operation and process optimization, standardizes the whole process management of the production, collection, treatment, reuse and discharge of the company's wastewater, promotes the reduction of waste water discharge at the source, enhances the comprehensive utilization ratio of waste water, saves water resources and reduces the pollution of water environment. Wastewater pollutants were stable and discharged up to the standards in 2021, and COD emissions of 10,000 tons of products were continuously reduced.

Wastewater pollutant discharge by region in 2021

		Yantai	Ningbo	Fujian
Category	Name of contaminant	Total emissions (tonnes)		
Municipal sewage	COD	112.31	125.86	47.19
	Ammonia nitrogen	12.35	4.56	1.06
		Sichuan	Guangdong	
Category	Name of contaminant	Total emissions (tonnes)		
Industrial wastewater	COD	0.56	16.91	
	Ammonia nitrogen	0.06	0.05	

Note: sichuan data period is April to December 2021.

Trend of COD emission from 2017-2021 million ton products



**Reuse of acrylic acid wastewater**

Wanhua Chemical is used to replace desalted water as absorbent to reuse some of the waste water produced in the production of acrylic acid. The reuse rate of waste water in this project reaches 30%, which reduces the amount of effluent and total COD while saving the consumption of desalting water.

**Reclaimed water reuse project**

Wanhua Chemistry cooperates with Yantai municipal sewage treatment plant to construct multiple reverse osmosis treatment facilities to greatly improve the production capacity of urban recycled water. In 2021, through the treatment of municipal domestic sewage, and then partially used in industrial park production, the return amount of 24 million tons was achieved, and the water-saving effect was significant.



**Exhaust Gas**

Wanhua Chemical has long been committed to transforming unorganized exhaust gas into organized exhaust gas and supporting the construction of high-efficiency waste gas recovery and treatment facilities to reduce the emission of atmospheric pollutants while realizing material recycling and utilization. In order to further fulfill its social responsibilities, while doing well in the management of exhaust gas in the production site, the company continuously strengthens supply chain coordinated exhaust management, by optimizing the transportation structure, improving vehicle standards, reducing the exhaust emissions from transportation links, and making a "Wanhua contribution" to the improvement of atmospheric quality. In 2021, all the pollutants in the exhaust gas were discharged according to the standards.

Exhaust pollutant emission by region in 2021

	Yantai	Ningbo	Fujian	Sichuan	Guangdong
Name of contaminant	Total emissions (tonnes)				
SO <sub>2</sub>	9.82	0.39	-	-	-
NOx	158.95	62.25	0.32	-	-
Particulate matter	15.74	-	-	0.47	-
VOCs	77.61	81.72	6.39	0.14	0.45

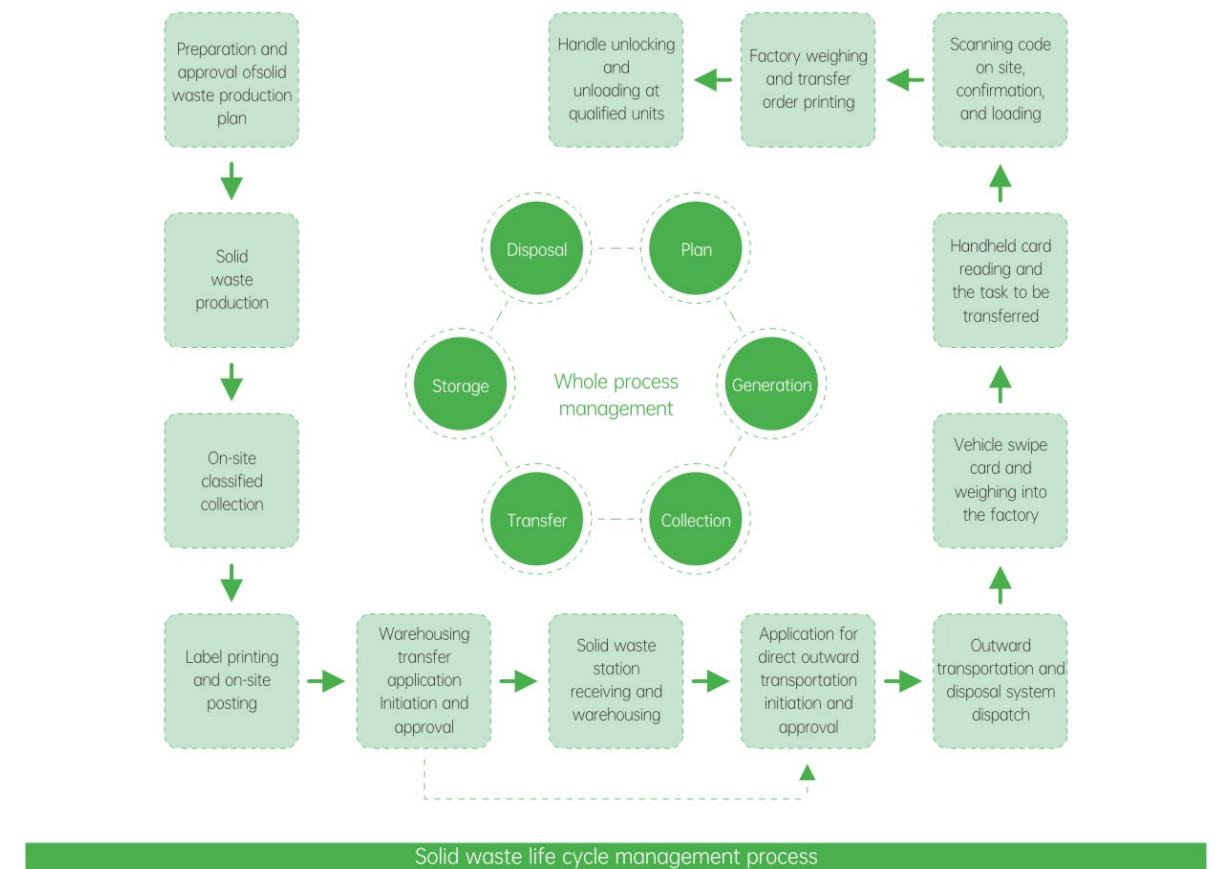
Note: sichuan data period is April to December 2021.

**Oil and Gas Recovery Project**

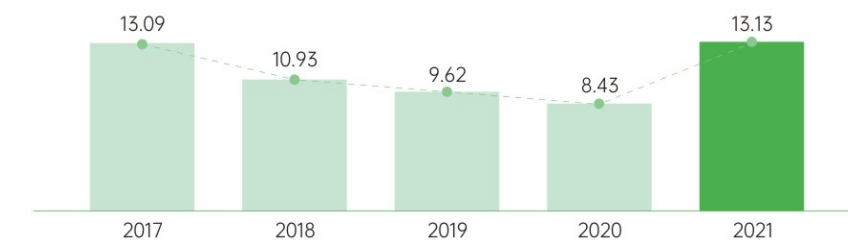
In order to further reduce the oil and gas in the benzene tank area, Wanhua Chemical adopts a new oil and gas recovery process. By changing the recovery process, innovating the recovery process, and adopting a series of methods such as adsorption and condensation, the benzene gas adsorption is more efficient, collected and fixed more, and the recovery rate reaches 99%.

**Solid Waste**

Wanhua Chemical prevents solid waste from polluting the environment and endangering human health in the process of generation, storage, transportation and disposal by continuously deepening the reduction, comprehensive utilization and harmless management of solid waste. Since the establishment of the hazardous waste information management system in 2007, the system optimization and upgrading have been continuously carried out in combination with the information technology update and management requirements, and the whole life cycle traceability management of hazardous waste has been realized.



Trend of solid waste production rate of wanhua chemical products in 2017-2021



Note: the amount of solid waste increased significantly in 2021 due to overhaul of the device.

Main solid waste types and production amounts in 2021

Yantai Ningbo				Guangdong			
Type of solid waste		Total emissions (tonnes)		Type of solid waste		Total emissions (tonnes)	
General solid waste	Gasification slag	230785	81125	General solid waste	Empty drums for general chemicals	329.92	
	Waste lubricating oil	187.39	50.84		Waste empty drums	239.15	
Hazardous solid waste	Waste drum	681.32	490.78	Hazardous solid waste	Organic resin sludge	829.64	
	Spent catalyst	1555.50	132.86		Waste acid solution	123.87	
	Waste chlorobenzene	135.25	168.65				

Sichuan				Fujian			
Type of solid waste		Total emissions (tonnes)		Type of solid waste		Total emissions (tonnes)	
General solid waste	Talc	32		General solid waste	Slag	50786.08	
	Waste paint drums	99.44			Hazardous solid waste	Waste packaging	104.56
Hazardous solid waste	Waste drum	12.43		Spent catalyst		15.82	

Note: sichuan data period is April to December 2021.

Hazardous solid waste innocuous treatment items

In 2021, the Wanhua Chemical Solid Waste Treatment Unit was officially operated. The annual solid waste amount of the project design was 35,000 tons. The chimney discharge index met the environmental protection requirements of the state and the EU 2010. The by-product S30 steam was 31 t/h. As an important three-waste disposal facility in Wanhua Yantai Industrial Park, the project can realize harmless disposal of hazardous solid waste and help the company to build green, non-waste and recycling economic park.

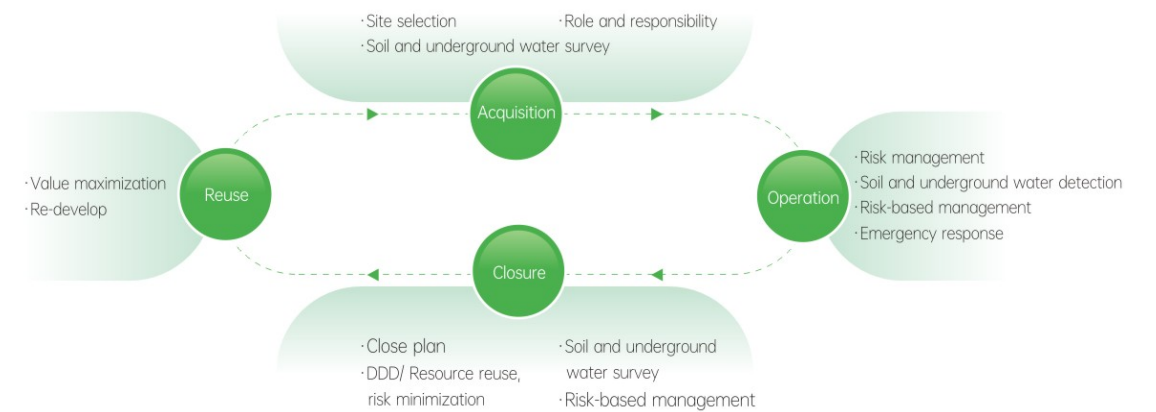
Comprehensive utilization of solid waste

Wanhua Chemistry cooperates with Hebei Cement to build industrial solid waste comprehensive utilization facility. Relying on the comprehensive advantages of both sides in solid waste management and recycling, solid waste is disposed of through cement kiln, and the waste is converted into energy and ultrafine powder. At the same time, the process does not use incineration and landfill, while realizing industrial solid waste "turning waste into treasure", at the same time, alleviate land occupancy and air pollution. The project comprehensively utilizes about 870,000 tons of industrial solid waste annually, which helps to create a non-waste park, and achieves win-win economic, social and environmental benefits.

Soil Treatment

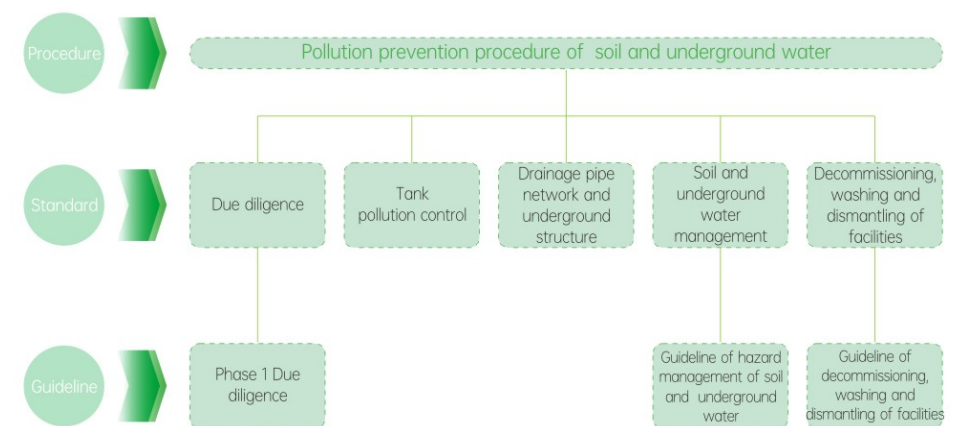
In view of the concealment, long-term and complexity of soil pollution, Wanhua Chemical has established a whole-life cycle management process for plots, ranging from land access assessment to exit assessment, and comprehensive control of soil and groundwater pollution risk to minimize the risk of contamination.

Life cycle risk management of soil and groundwater



In order to improve the management level of soil and groundwater environment, Wanhua Chemical established a management system for soil and groundwater pollution prevention and control. Based on the "Management Procedure for Soil and Groundwater Pollution Prevention and Control", supplemented by relevant standards and guidelines, the environmental risk of soil and groundwater throughout the whole life cycle was systematically assessed, dynamically monitored and effectively controlled to ensure that the activities of the whole life cycle of operation did not affect the soil and groundwater environment of the occupied site.

Framework of "1+5+3" system for soil and groundwater pollution control and management





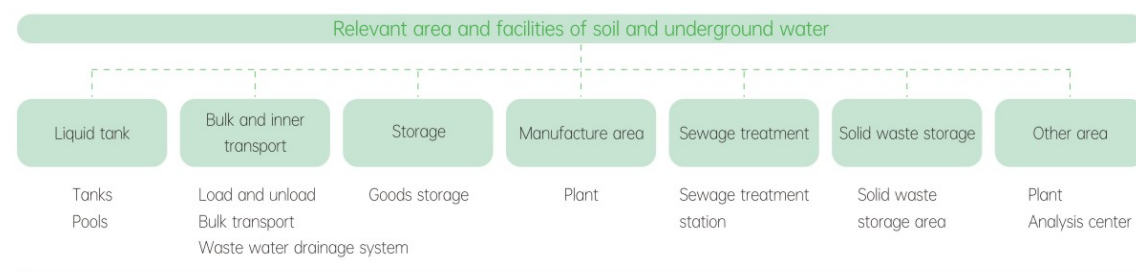
### Groundwater monitoring

In 2021, in order to master the situation of groundwater body in Yantai Park as a whole, all other groundwater wells were sampled separately in order to understand the situation of groundwater body, except that groundwater wells were sampled according to key facilities and regional locations for full analysis of monitoring items. The monitoring results showed that more than 30 test items, such as benzene, chlorobenzene, aniline, heavy metals, pH and COD, were up to the standard, and the groundwater was in good condition.



### Investigation of potential danger of soil pollution

In February 2021, Wanhua Chemical deeply interpreted the Guidelines for the Investigation of Hidden Danger of Soil Pollution in Key Regulatory Units (Trial) and the Guidelines for the Prevention and Control of Soil Pollution in Dutch Industrial Enterprises. According to the screening process of "Pollution Sources-Pollution Pathways-Pollution Receptors", Wanhua Chemical designed and developed the Soil Pollution Hidden Danger Screening Tools. The hidden hazards of key sites and facilities and equipment involved in toxic and harmful substances were investigated one by one. The results showed that the soil condition of the soil was good.



## Noise Control

Wanhua Chemical carries out the prevention and control of noise pollution from three aspects: noise source (S), transmission route (P) and noise receptor (R). Through preferential purchase of low noise equipment, a series of measures are taken to prevent and control environmental noise pollution and improve the environmental quality of factory boundary sound by adding shock absorbing pads, sound insulation room, sound insulation hood and muffler. In 2021, the day and night noise monitoring values all met the implementation standard.

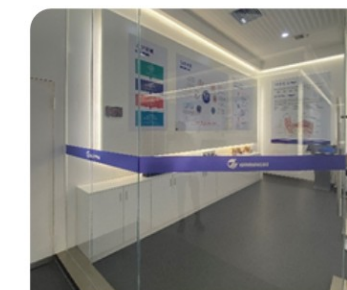
Monitoring value of factory boundary noise in 2021

Region	Yantai	Ningbo	Fujian	Sichuan	Guangdong	
Measured dB (A)	Daytime	55.64	58.86	57.48	55.75	53.83
	Nocturnal	48.1	52.86	50.48	49	45.55

Note: according to GB12348-2008 "Environmental Noise Emission Standards for Factory Boundaries of Industrial Enterprises", the limits of daytime noise in industrial production areas are 65 dB (A) and 55 dB (A) at night.

### Simulation training of noise in imitating reality training center

The training and practice area of noise knowledge was set up in imitation of the real training center. The lecturer popularized the theory of hearing loss, the influence and harm of noise, and introduced the theoretical knowledge of noise protection measures. At the same time, lead employees into a special soundproofing room, so that employees experience the different decibel value of noise brought about the feelings and impact. Therefore, employees' cognition of noise hazards is increased, noise pollution is minimized in the work, and the sound environment is protected.



## Biodiversity

Biodiversity is the basis for the survival and development of human society and one of the important goals of sustainable development. Wanhua Chemistry attaches great importance to the protection of biodiversity, and conducts research on gene diversity, species diversity and ecosystem diversity in the feasibility study phase of the construction project, and systematically conducts ecological and environmental biodiversity investigation at the site selection stage to fundamentally eliminate or reduce the impact of project construction on biodiversity.

### Arbor day activities

In 2021 Arbor Day, Wanhua Chemistry organized the theme activity of "concentric sowing, performing" planting "and doing our duty together to build a beautiful park". Professionals with experience in tree planting were invited to the site for guidance. A total of 600 trees were planted in this event. This tree-planting activity further improved the awareness of employees' ecological protection and formed a strong atmosphere of love, planting and protecting green.

### World environment day activities

On June 5, 2021, Wanhua Chemistry launched a number of eco-environmental protection activities on World Environment Day "Harmonious Coexistence between Human and Nature". Organize the production of the theme video "Starting from the heart, restarting, treating the environment, treating life well" and propagandizing and broadcasting within the company. "Harmonious symbiosis between man and nature" environmental commitment signature and "nesting for love, harmonious symbiosis" nesting activities of birds. Cishan headquarter nest for birds more than 20, in the protection of biodiversity at the same time to improve employees' awareness of ecological protection, call on all members to build a harmonious symbiosis of human and nature beautiful chemical park.



# Health and Safety

Safety is the eternal theme of Wanhua Chemistry, the bottom line of enterprise survival, and one of the core competitiveness of sustainable and high-quality development of enterprises. Wanhua Chemical adheres to the goal of "zero injury", deepening the awareness of HSE compliance, continuously promoting intrinsic safety, solidifying HSE cultural genes, improving the level of health protection, and realizing the health and safety of employees and communities.

Long-term strategy of safety management: take risk management as the core, take safety leadership and safety culture as the cornerstone, take ability upgrading and audit as the grasp, take the excellent execution ability and implementation as the basis, and improve Wanhua safety management ability and performance in an all-round way.

DAFW rate **0.02**

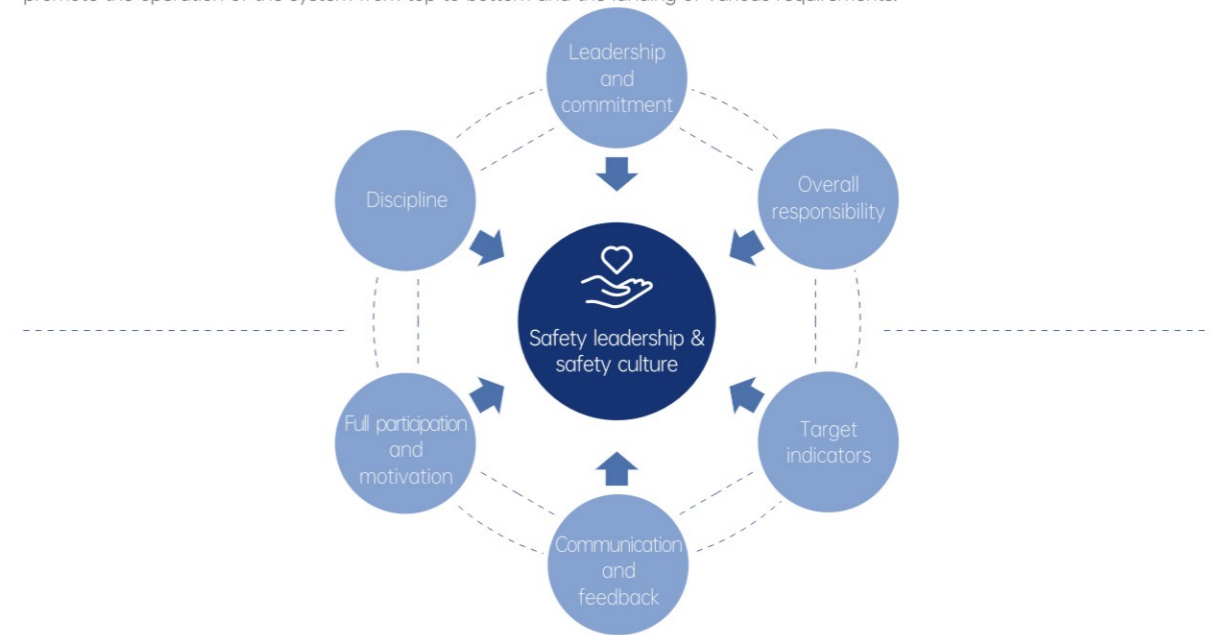
Recordable incident rate **0.04**

Process safety incident rate **0.11**



## Safety Leadership and Safety Culture

Safety leadership and safety culture are the cornerstone of Wanhua Chemical Responsibility Care System, and are the key factors to promote the operation of the system from top to bottom and the landing of various requirements.



### Leadership and Commitment

wanhua Chemical Management adheres to the contact point activities and continuously optimizes the contents of the activities. Wanhua has established safety activities and hazard screening specifications covering all levels of managers of the company. In 2021, 9 senior managers of the company traveled through more than 50 installations and non-production periods in each major base, and completed 108 contact point activities to investigate potential safety hazards and implement safety management.

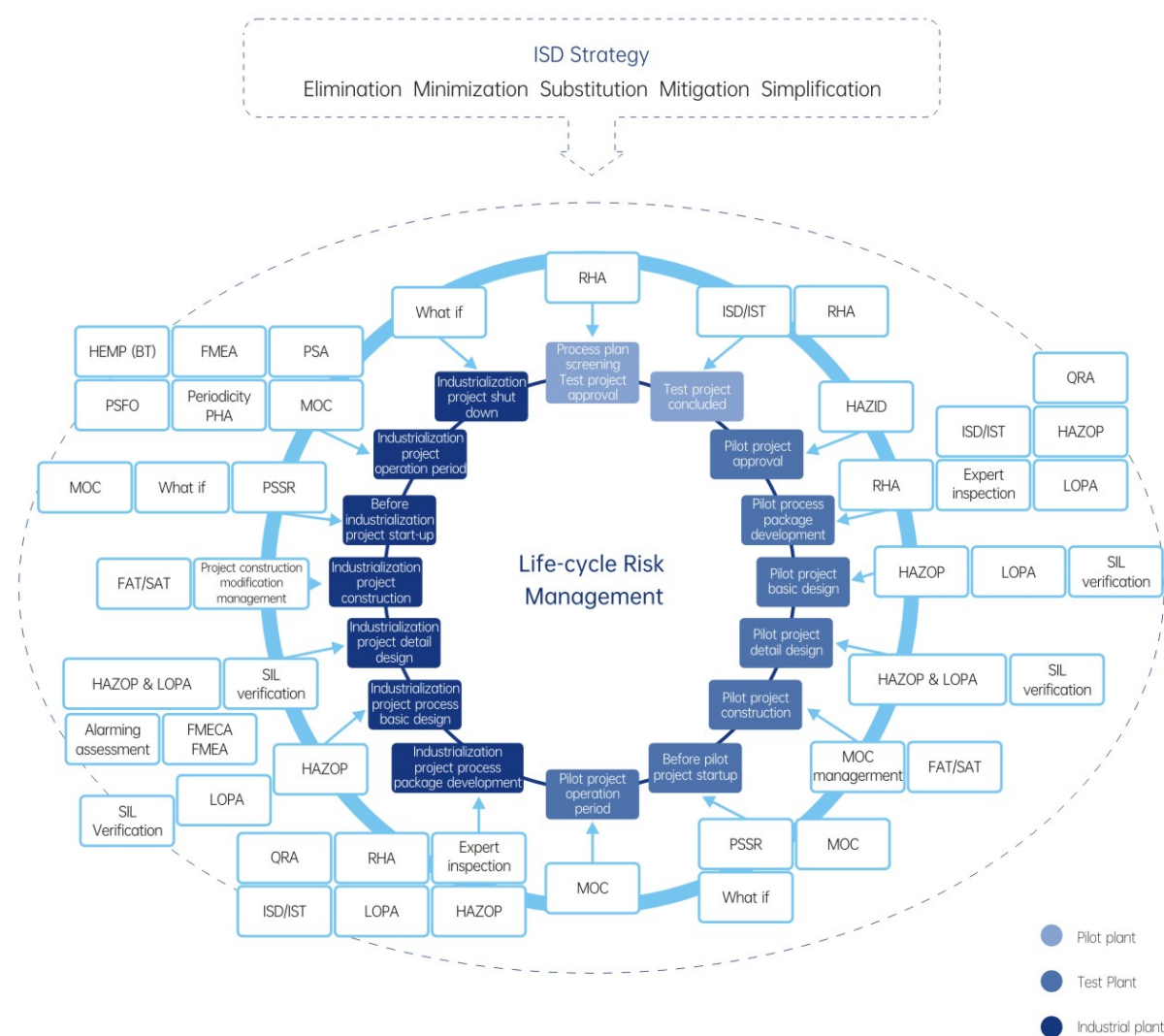


### Full Participation

in order to implement the safety concept that "every employee must be responsible for the safety of themselves and others" and promote the development of the safety culture to a mutually supportive style, in 2021, the online culture platform continued to carry out the "thank you for correct my unsafe behavior" campaign, calling for mutual supervision among employees to form a strong safety co-building atmosphere.

## Process Safety

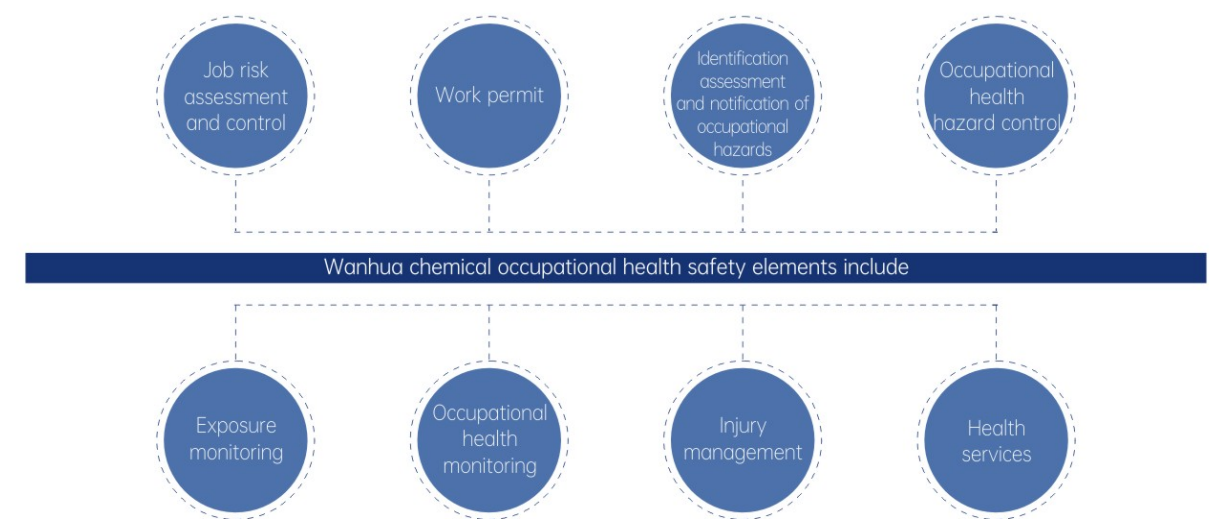
In order to improve the intrinsic safety level, Wanhua Chemical has established a life cycle process safety management system. In 2021, a team of process hazard analysis consultants was established to establish the process hazard analysis quality control process and standards, and to carry out the whole process hazard analysis including hazard and operability analysis (HAZOP), protective layer analysis (LOPA), safety integrity level (SIL) assessment with higher standards and better teams successively, and arrange expert resources to participate in the implementation of all risk assessment recommendations in the project acceptance process.



In 2021, Wanhua Chemical established a special system-asset integrity management system based on the element of the responsibility care system "Facility Management", which includes 67 sub-elements of 16 core elements such as "Asset Selection and Critical Equipment Determination", "Process Quality Management", "Inspection, Test and Preventive Maintenance (ITPM)", "Inspection and Maintenance Management", "Defect Management", covering the entire life cycle of asset integrity, promoting the design integrity, technical integrity and operational integrity of equipment and facilities, and establishing a firm physical barrier for the company's safety production performance.

## Occupational Health and Safety

Occupational health and safety is to standardize the management of safe production and occupational hygiene in the process of carrying out responsibility care, and standardize the safety behaviors of employees, outsiders and visitors and study personnel in order to prevent the occurrence of safety accidents and occupational diseases, and protect people's physical health.



### Occupational Health Hazard Control

Wanhua Chemical distributes flame-retardant working clothes according to the latest personal protective equipment specifications. On October 18, 2021, the first batch of more than 4000 sets of flame retardant overalls were equipped on demand, nearly 2 months earlier than the time of the new standard was officially implemented, and added new safeguards for the health and safety of employees.

### Health Services

In August 2021, the epidemic raided the headquarters of Yantai, Wanhua Chemical Quick Response. At the first time, all employees were organized for nucleic acid testing, hidden hazards were eliminated, and foreign construction workers, carriers, suppliers and other personnel were organized to carry out nucleic acid testing in an orderly manner. The cumulative number of tests was nearly 50,000 times, which relieved the pressure on public medical resources.



### Work Permit

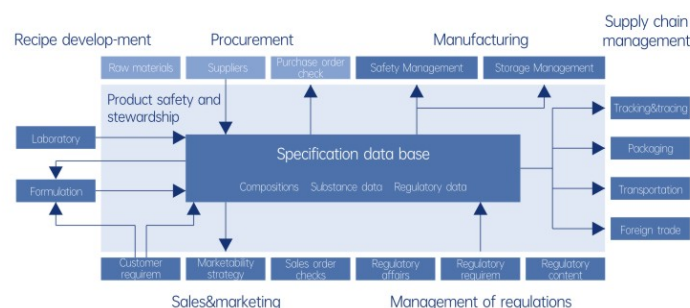
set up the goal of "zero defects" in PTW in terms of work safety, and special actions have been carried out to further improve the ability of applicants, approvers, guardians, dependency personnel and contractors in the PTW workflow, strengthen the implementation of their responsibilities, and effectively manage and control the risks of operational activities.

## Chemical Safety

Wanhua Chemical manages product safety throughout its life cycle, and wins customer trust by fully assessing and developing measures to ensure that the product does not pose any threat to human and environmental health during use.

### The product compliant PSS system Was successfully launched

Wanhua Chemistry has become the first company in China to use SAP system to implement the assessment of raw material access and product sales compliance assessment of chemicals, and will more vigorously guarantee product compliance in the future.



### Actively Respond to Global Customer Compliance Requirements

In Europe	In the UK	In South Korea
the registration and registration of relevant products in the poison centers of Germany, Italy, Portugal, Spain and other countries have been completed.	In response to the new compliance requirements brought about by Brexit, the product regulatory team has completed the DUIN registration in advance by formulating a response strategy.	Relevant chemical registration projects have been completed.

We quickly and professionally respond to compliance, and share the compliance registration information of Wanhua products with customers, provide more compliance support to downstream customers, and help downstream customers reduce the risk of compliance.

## Storage and Transportation Safety

Chemical storage and transportation management is to control the risks in the process of chemical transfer, storage and transportation by road, rail, water, aviation and pipeline, and to prevent and control the adverse effects of chemical release on public health, safety and environment. In 2021, Wanhua achieved zero logistics accidents throughout the year.

### Road Transport Safety

As a member of the organizing committee of CRSAS (China Road Transport Safety Assessment System), Wanhua Chemicals has actively carried out the construction of road assessment system, cooperated with the domestic public welfare training of chemical road transport, and contributed to the sustainable development of chemical road transport in China.



## Shipping & Terminal Safety

Through the continuous construction of specialization, standardization and internationalization of ship safety inspection, the results and pilot indicators of shipping safety have been continuously improved. The number of ship accidents decreased 95% in 2021 compared with 2017, the number of ship deviations decreased 89%, and the number of ship defects decreased by 50%.



Through the internationalization of the wharf security system, the best practices of CDI and OCIMF organizations are introduced, and the level of wharf management is continuously improved.

## Emergency Response

The purpose of emergency response is that once an accident occurs, the enterprise can respond quickly and effectively, and reduce the loss of the accident to a minimum. Such an emergency response includes within the enterprise, surrounding communities, and the public. Through the establishment of an emergency response management organization, the establishment of emergency response mechanism, the preparation of emergency rescue plan, the establishment of emergency plan, emergency drill, so as to establish a complete set of emergency rescue system, can really play its role in emergency rescue.



Through the "Three Understanding and Three Meetings" of fire emergency, the fire emergency consciousness and ability of the whole staff were further strengthened; 1146 certified "volunteer firefighters" were trained, and two teams were integrated with "full-time fire brigade", and the construction of "contractor emergency team" was carried out to enhance the professional ability of fire emergency response. Wanhua has preliminarily formed a vertical hierarchical and horizontal full-coverage fire emergency capacity-building system.



In 2021, Wanhua has completed the personnel positioning system in Ningbo area, and has been popularized in Yantai area in 2022. Through the personnel positioning system, the personnel position can be tracked in real time and the movement track is clear, which provides accurate data for the emergency evacuation organization and the wounded search and rescue, and greatly improves the emergency efficiency and effect.

## Capacity Enhancement

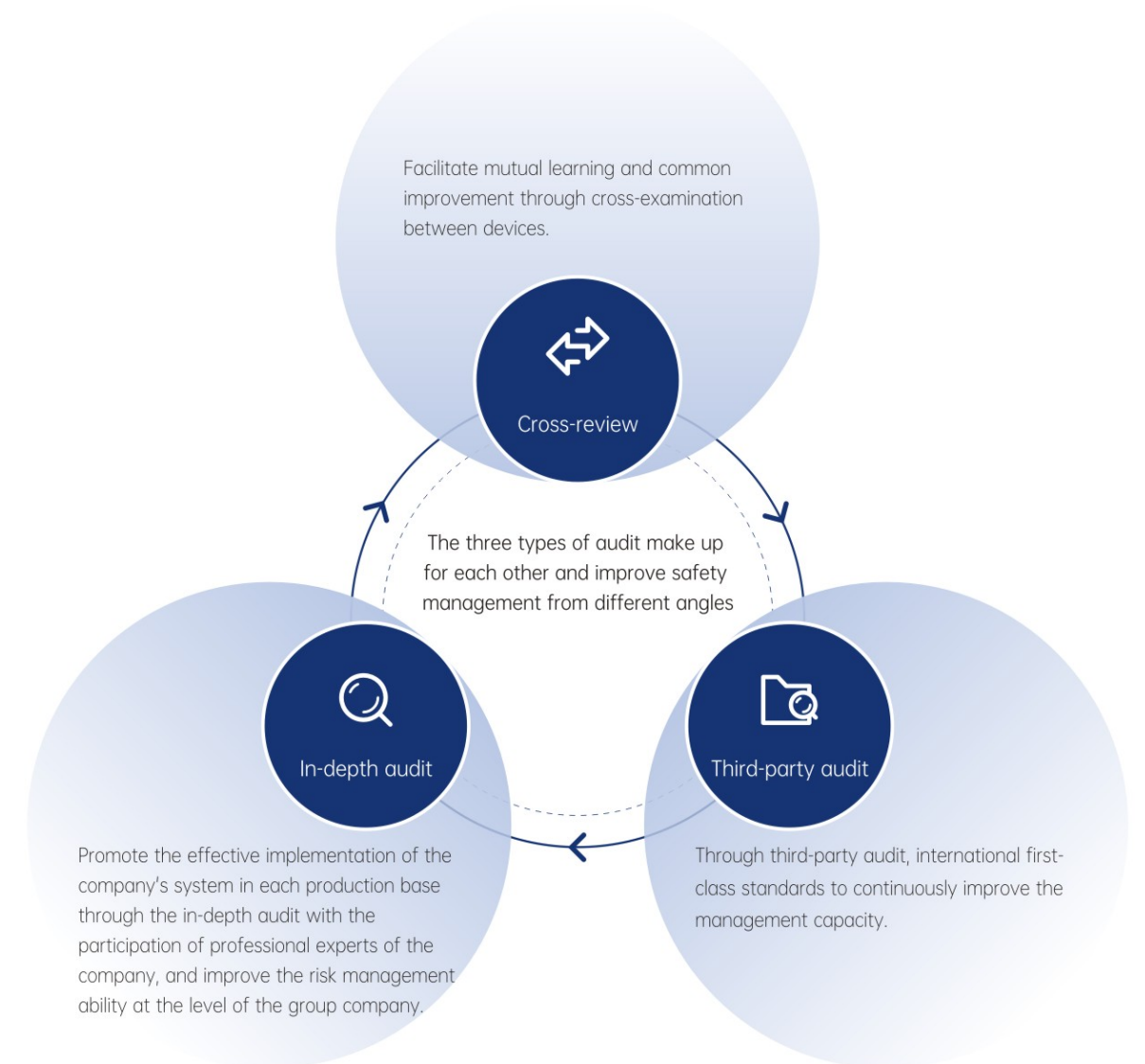
In Wanhua Chemistry, the production engineer is the core technical force of the device, and the front-line operators are the main force of the device, and their ability is the key to ensure the safe and smooth operation of the device. Wanhua Chemical Co., Ltd. provides technical strength and operational capability for the company's safety development by constructing an engineer training certification system and a post skill training certification system.

	Engineer training and certification system	Post skill training and certification system
<b>Object</b>	Engineer, Chief Engineer, Senior Engineer, Expert	Apprentices, Junior, Intermediate, Senior, Technician, Intermediate, Senior, Chief Technician
<b>Target</b>	With the improvement of post skills as the core, with the special abilities of automation and intelligence as the auxiliary, the team of professional engineers with safety, close to the front line and excellent technology should be molded in all directions	Based on the responsibilities of post safety production, the theoretical knowledge (knowledge) and operating skills (should be known) that employees need to grasp are clarified, and the post standards of different positions and grades are formed based on the core of ability improvement and career development as the guidance
<b>Content</b>	Four Major Parts-Certification Standard, Ability Model, Training System and Examination System Six Types of Work-Process, Machinery, Electrical, Instrument, Quality Inspection, HSE	Three parts: certification standards (including business list, notification and meeting, test points), training system and examination system Five major types of work: Process, mechanical, electrical, instrument, quality control
<b>Curriculum Setup</b>	Course and question bank for 89 positions, with a total of more than 50,000 questions)	Courseware and question bank in 92 positions, with a total of more than 100,000 questions
<b>Certification status</b>	304 engineers, 581 chief engineers, 59 senior engineers, 21 experts	2521 Senior Workers, 560 Technicians, 87 Intermediate Technicians, 10 Senior Technicians

## Assessment & Improvement

In 2021, Wanhua took cross-review, in-depth audit and third-party audit as the key to identify and solve problems. The three types of audit make up for each other and improve safety management from different angles.

It is worth mentioning that during the third-party audit in 2021, Wanhua tried to explore the capability assessment of the safety production system for independent production units, scientifically formulate the Wanhua chemical device-level safe production management promotion scheme, breakdown one by one, and then promote the modernization of the overall safety production management system and the improvement of safe production management level of the company.



# Sustainable Procurement

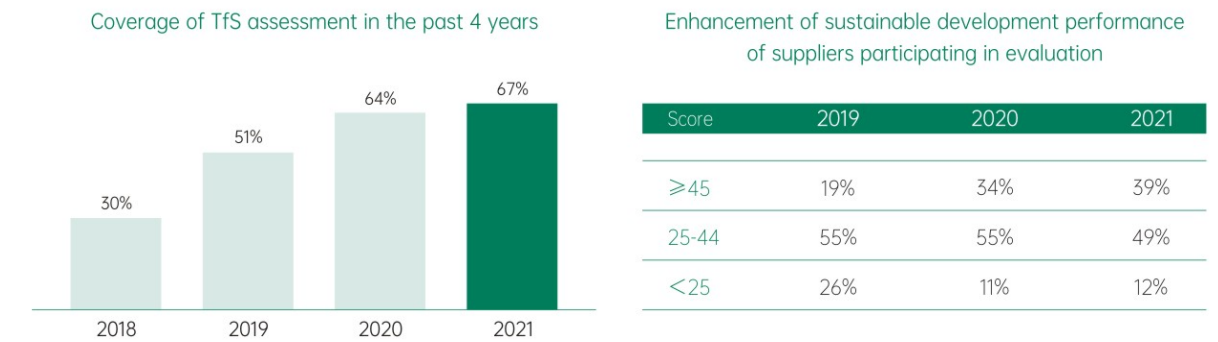
Wanhua Chemical is committed not only to carrying out and fulfilling the social environmental responsibilities of the enterprise itself, but also to the sustainability of the entire purchasing supply chain, and striving to improve the company's sustainable purchasing capacity.

As the first Chinese enterprise to join the Together for Sustainability initiative, it is the cultural consciousness of every 10,000 Chinese to build a green ecological modern chemical enterprise. Since joining TfS for more than two years, Wanhua Chemical has actively participated in various work of TfS, and has formed a perfect sustainable purchasing management system in long-term practice, and has continuously promoted the level of sustainable development from the aspects of sustainable supply chain, purchasing digitization and green circular purchasing.

Supplier CSR assessment rate **67%**  
 Signature rate of business ethics **100%**  
 CSR commitment of new suppliers **100%**

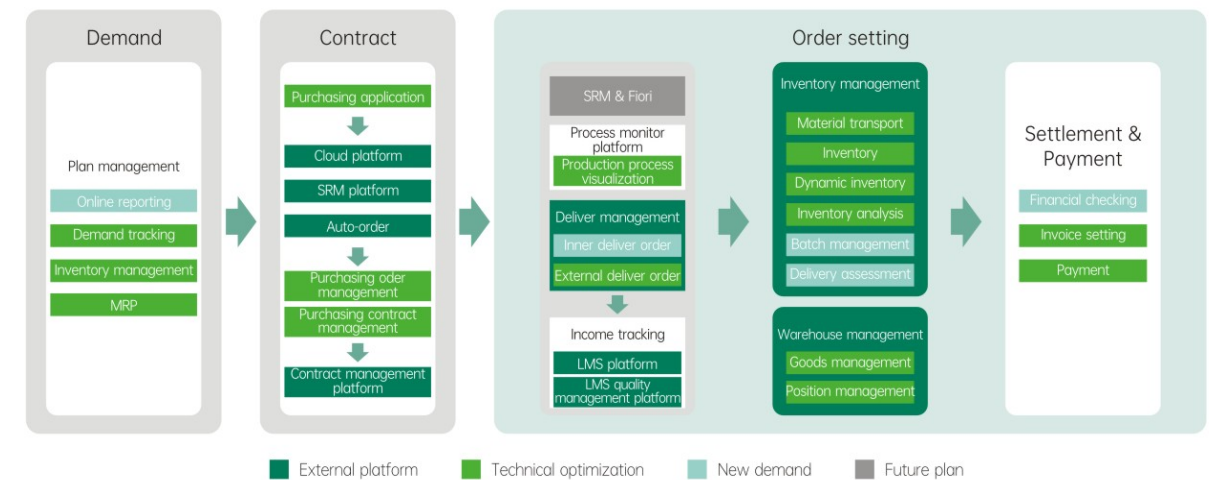
## Sustainable Supply Chain

In recent years, Wanhua Chemical has continuously strengthened the requirements of suppliers in terms of environmental and social responsibility, promoted the evaluation of supplier's sustainable development, evaluated and managed the supplier's performance in such aspects as environment, labor and human rights, business ethics, sustainable procurement, etc., gradually upgraded the sustainable development level of the entire supply chain and reduced the sustainable risk of Wanhua purchasing supply chain.



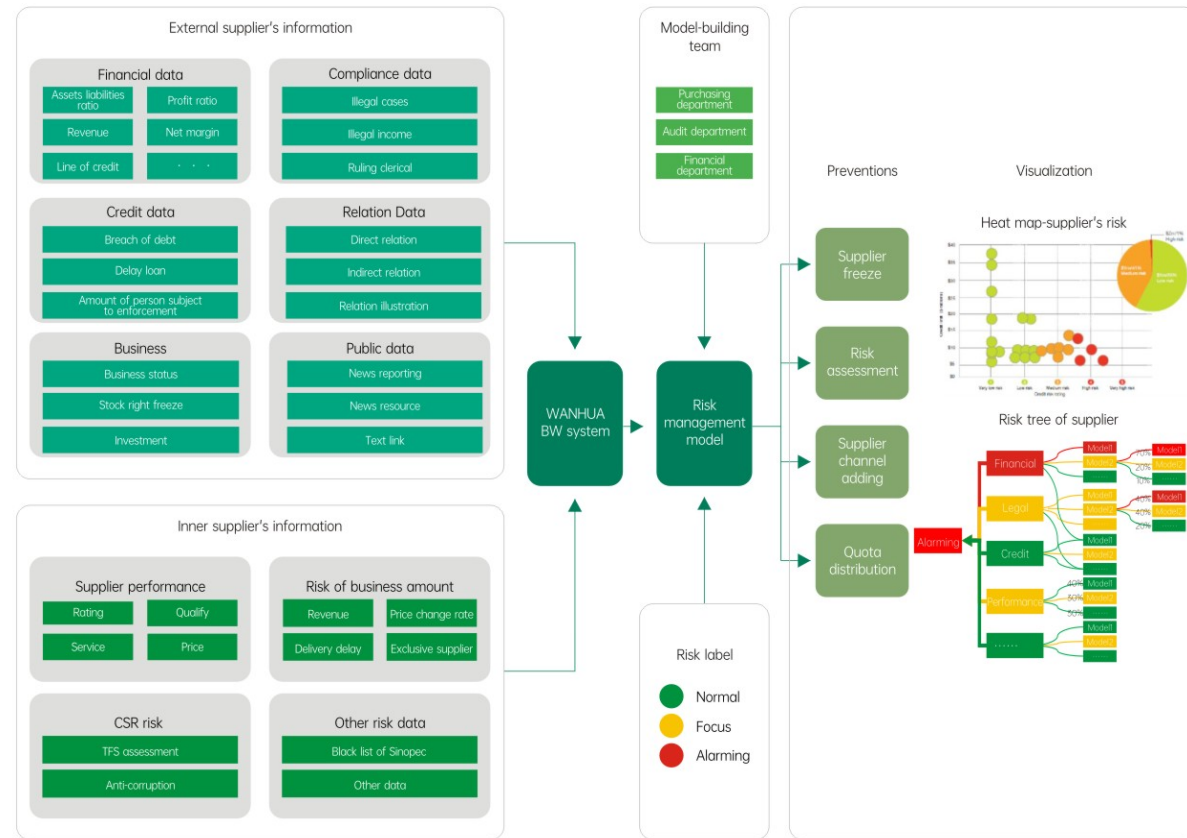
## Procurement Digitization

Through the construction of digital platform, Wanhua Chemical has extended its antennae to collaborative supplier, modular functions such as electronic signature, invoice prefabrication, supplier reconciliation, delivery note coordination, etc., and fully realized the transformation from offline operation, integrated system to synergistic system. With S4 HANA as the core, the new generation of intelligent enterprise digital platform fully complies with the needs of the new round of business growth of the company, better supports the flexible adjustment of the business, strengthens the global operation control, and helps Wanhua Chemical to realize "to be efficient to the digital, and the intelligence helps expand".



By establishing the risk early warning platform, establishing the whole business, whole process and non-blind spot monitoring system, the risk visualization, real-time monitoring, early warning automation and information integration of supplier risk are realized.

Risk management platform of supply chain



Subsequently, by building intelligent supply system, it will have high visualization, automation, intelligence and high risk adjustment ability, which will lay the foundation for the utilization of global information flow and create a new e-commerce model in the chemical industry.

## Green Circular Purchase

Adhering to the concept of "sharing and recycling", Wanhua Chemistry actively promotes green innovation in the field of packaging. With the use of shared trays, shared folding turnover boxes, steel barrel thinning applications, and steel drum recycling schemes, the packaging materials are saved from the traditional "acquisition-manufacturing-use-use-discard" mode to the "collection-manufacture-use-recovery-reuse" recycling mode to save resources, reduce the generation of solid waste and hazardous wastes, and contribute more power to mitigate environmental pollution, demonstrating Wanhua Chemical's strong sense of social responsibility.

Solid waste reduction/carbon reduction due to green packaging methods

Item	Packaging thinning	IBC cycle	Shared trays	Shared turnaround box	New packaging of steel drum	Recycled plastic packaging
Reduction of solid waste per ton	1200	5500	15000	2200	350	2300
Carbon reduction per ton	22000	17600	100000	6800	615	7360

### Shared trays

In 2021, Wanhua Chemistry joined hands with Shanghai Le Orange to launch a green recycling packaging tour to build a new trade ecology connecting factories, logistics enterprises and downstream customers with shared trays.



Sharing pallet is helpful to resource saving and emission reduction

Sharing pallet promote life-cycle safety and make chemical transport innovation



In the future, Wanhua Chemistry will also continue to promote the popularization of green recycling packaging system around raw material synergy, green carbon reduction, sharing mode and so on, to promote recycling economy and win a green future!

# Employees and Society

Open and transparent business environment, safe and efficient digital operation, stable labor relations and harmonious social relations are favorable conditions for sustainable development of enterprises. Wanhua Chemical is committed to safeguarding the labor rights and interests of employees, building a healthy and efficient business environment with partners, building harmonious community relations with the public, and jointly promoting a better life and social prosperity.

Separation rate **4.05%**  
 Female employee rate **13.76%**  
 Event closure rate **100%**

## Information Security

Wanhua Chemistry always takes digitization as the key element to form the unique strategic advantage of the enterprise.

-  **Objective** To form an international first-class digital competitive advantage characterized by intelligent manufacturing, global integration and control, and efficient cooperation of the ecosphere.
-  **Idea** To be efficient with data and expand with intelligence
-  **Path** Through the construction of standardization-automation-digitization-intelligentization, utilizing new technologies such as industrial Internet, 5G and cloud computing, digital transformation will be vigorously promoted.
-  **Six major platforms** Business management, intelligent manufacturing, internal coordination, ecosphere collaboration, intelligent decision-making, infrastructure and cybersecurity.

## Global Integration Controls



After many years of construction, Wanhua Chemical has formed a comprehensive management platform to unblock R & D, supply and sales. ERP system covers 33 molecular companies and all business domains such as finance, marketing, procurement, production, R&D, engineering, personnel, and becomes the "central nervous system" of Wanhua global integrated control.

In order to better support the company's strategic expansion and strengthen the global operation control. In 2021, Wanhua completed the implementation of the Group S/4 HANA system in only 10 months, and built a new generation of intelligent enterprise platform to support the high-quality development of the company in the future.



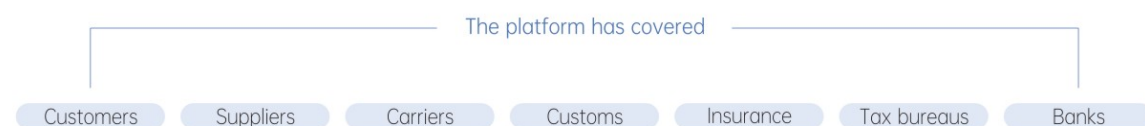
## Intelligent Manufacturing

Through the construction of real-time database PI, production technology management platform, global HSE platform, emergency command and management system, Wanhua Chemical has formed a pattern of fully unblocking production supply chain, integrated and efficient cooperation in the production and operation of the park, and the whole life cycle management of equipment. It is the first to try out 5G technology, realize the 3D map construction of the park and the integrated control of the vehicle personnel in the park through the construction of 5G dedicated network, which has become the "Shandong Province Intelligence Park Demonstration Project".

In 2021, Wanhua Chemical implemented projects such as product compliance management, asset integrity platform, precision prevention, integration of intelligent gate and entry and exit efficiency, to further improve the level of intelligent management in the park, promote the application of big data technology in production and operation, and enhance the level of intelligent manufacturing.

## Efficient Ecosphere Collaboration

In recent years, Wanhua Chemistry has focused on building a collaborative platform of ecosphere, integrating with ecological partners through cloud mining, e-commerce, logistics and other projects to build a synergistic ecological system of symbiosis and mutual assistance.



Among them, Wanhua Chemical Cloud Collection Platform has realized one-stop "four-way matching" and real-time tracking of purchase orders, receipts, payment orders, logistics and transportation sheets, and became the first ecological system in the field of chemical procurement based on Internet model in China.

In 2021, Wanhua Chemical accelerated the optimization and improvement of sales e-commerce and supplier ecological inventory platform, with emphasis on the intelligentization of wharf dispatch, and the overall cooperation efficiency upstream and downstream of supply chain increased by 30%.



**Wharf scheduling information system**

Cover the three terminals in Yantai, Ningbo and Fujian, and open the master data-planning-scheduling-tracking-berthing-job-analyzing the whole process, and predicting the time deviation

**2**  
hours



**Supplier ecological inventory platform**

Unblock Wanhua Chemical Purchase Order with Supplier Sales Order, Optimize Inventory Management and Supplier Quota, Cumulative Docking

**310 million**  
RMB

## Business Ethics

A good business ethical environment is a healthy soil for the growth of enterprises. Wanhua Chemistry should establish a working environment without nepotism, no hilltopism, no profit transmission, a positive air, a pure culture, and striving forward to form a fair, just and well-oriented cultural atmosphere.

Adhering to the compliance policy of "Prevention, supervision and control, zero tolerance for fraud, promotion of enterprise compliance management and healthy development", from the refinement of business compliance to the establishment of an integrity system, to the pre-warning of risk, Wanhua Chemical has set up various internal and external channels to discover and obtain problems, and professional personnel shall accept, investigate, report and feedback on the events, analyze the causes of the problems, and correct the existing management system vulnerabilities if necessary, to achieve continuous improvement of the management system.

In 2021, the company promptly investigated and handled the reported information collected, and 100% implemented the handling measures.

## Labor Relations

With lofty mission and magnificent goal, Wanhua Chemistry attracts talents with competitive compensation and incentive mechanism, trains talents with scientific system and method, retains talents with fine culture and fair and just environment, and accelerates the talented person gathering and development step of the company.

		Yantai	Ningbo	Fujian	Sichuan	Guangdong	Group (total)
Employment	New employee	1883	87	423	542	22	2957
	Employee employment rate	18%	5%	30%	65%	9%	20%
Employees	Official workers	10612	1641	1400	833	250	14736
	Dispatcher	1056	153	138	82	24	1453
Ethnicity	Han	10341	1597	1353	806	239	14336
	Minorities	271	44	47	27	11	400
Gender	Male	9179	1360	1207	767	197	12710
	Female	1433	281	193	66	53	2026
Separation	Discharged employees	432	122	99	11	38	702
	Including Retired, Retired and Retired Employees	4%	7%	7%	1%	15%	4.8%

Note 1: the total number of people in the group refers to the total number of five major bases in China.

Note 2: during the reporting period, there were no human rights violations of workers in Wanhua Chemistry and its supply chain.

## Systematic Personnel Training

Wanhua Chemistry attaches great importance to the systematic construction and practical effect of talent training. Leadership training system, engineer and operation technician training system, researchers and marketing personnel training system, so that employees feel the company's attention to talent.

In order to cultivate talents more efficiently, Wanhua University has been established, which carries the glorious mission of cultivating an ideal, professional, cohesive and combatable talent team for the company. With the motto of "Ideal Responsible, Cultural Consciousness", Wanhua University aims to serve as a learning platform for spreading culture, sharing practice and innovative ideas, building a talent echelon more systematically from three aspects: the leadership of cadres, professional spirit of employees and professionalism, and becoming an observation platform for talent evaluation and selection of talents.



## Diversified Employee Activities

Cultivate talents according to the standard of "six essentials" and establish harmonious labor relations. In 2021, the company's internal activities were rich and colorful. The company created a positive, healthy, optimistic and upward company atmosphere around culture cultivation and employee care, fostered a good teamwork spirit, enhanced employee's sense of belonging and mission, relying on the corporate culture, aroused employee's enthusiasm and creativity, so as to achieve the company's healthy and stable development.



"Ode to Heroes, Wanhua Feelings" recitation competition



"Carols Celebrate the Hundred Years and Tighten the New Journey" choral competition



Football game

In 2021, various cultural activities of Wanhua Chemistry were carried out in full swing. Through various activities such as choral contests, recitations, football matches, badminton matches, the enthusiasm of the staff was further excited, the enthusiasm and morale of the Wanhua team was displayed, and the young team was energized to make progress.



Dating meeting



Thanksgiving month



Badminton match

## Meet love

As the company's most concerned cultural brand activities, the annual collective wedding is of great significance, it is not only a pounding measure of care for employees, but also condenses the blessing of all Chinese to colleagues around, pride of the prosperity of the company, the expectations of a better life. Since 2006 to now, 757 couples have completed their life-long event in Wanhua's collective marriage. Generation of young people meet in Wanhua and become a family.



## Low carbon-we're in action

On Earth Cleaning Day 2021, Wanhua Chemistry held a "Zero Waste and Light Life" theme event at Yantai headquarters base to advocate employees to reduce the generation of crowding from the source, master the garbage classification method, and protect the environment with positive and correct behaviors. The application of environmental protection knowledge to practice, the campaign launched a card to reduce the burden of the earth 16 small things, so that employees strive for environmental protection, share low-carbon life every day!



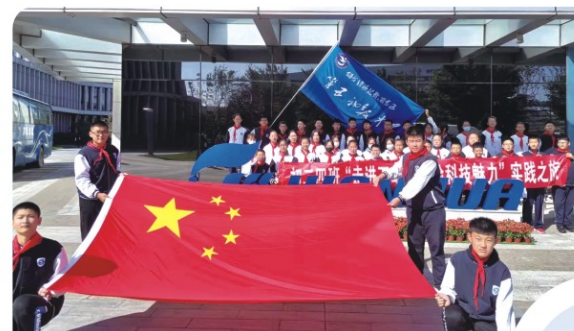
## Harmonious Society

Wanhua Chemistry has always taken the responsibility of corporate citizenship as its own responsibility. Through rich and colorful community activities and popular science programs, Wanhua Chemistry has made the public know the knowledge of chemistry, and formed correct scientific concept, and realized the harmony of chemistry with human beings and nature. Especially in 2021, under the background of frequent new coronavirus pneumonia and frequent natural disasters, Wanhua Chemistry dared to take the role and wrote a great love chapter of "Difficulty for One Party and Eight Support".

### Community Co-construction

In order to improve the public's understanding of Wanhua Chemistry, the company's bases regularly hold diversified interactions with surrounding communities every year. Invite people from surrounding communities to walk into Wanhua to understand the status of the enterprise, development process, business philosophy, product characteristics, production safety investment and hazardous source management, and to eliminate public concerns about chemical production. Actively enter the community, through participating in community activities, helping the community to build a good relationship with the surrounding masses.

Through the activities of public open day, the awareness of Wanhua among the community public was enhanced, and the risk of chemical production safety was preventable and controllable through efforts, which helped to dispel the psychology of the public to talk about discoloration and promote the public to support the safe development of the chemical industry.



Community activities in Yantai Industrial Park



Sichuan Industrial Park community open day



Community tree planting activities in Hungary



Community activities in Ningbo Industrial Park



## Popularization of Public Welfare Science

Wanhua Chemistry actively practiced the spirit of "humanity, fraternity and dedication", and practiced social responsibility with practical actions. Over the years, the public welfare science popularization activities have been continuously conducted to alleviate poverty and disaster relief to the social vulnerable groups, and make a sustainable contribution to the sustainable development of mankind.

### We are together

Under the repeated epidemic situation, several times of unpaid supply of disinfected drug substance and medical materials; support the affected people to rebuild their homes after heavy rainstorms in Henan Province; caring for the future of the motherland, for poor children to build a hope cabin. A sum of money, a piece of materials, cohesion of Wanhua Chemistry a part of affection, wrote the "difficult one party, eight-way support" the great love chapter.

Donation of disinfectant drug substance to heavy rainstorm in Henan Province



### To explore the secrets of chemistry

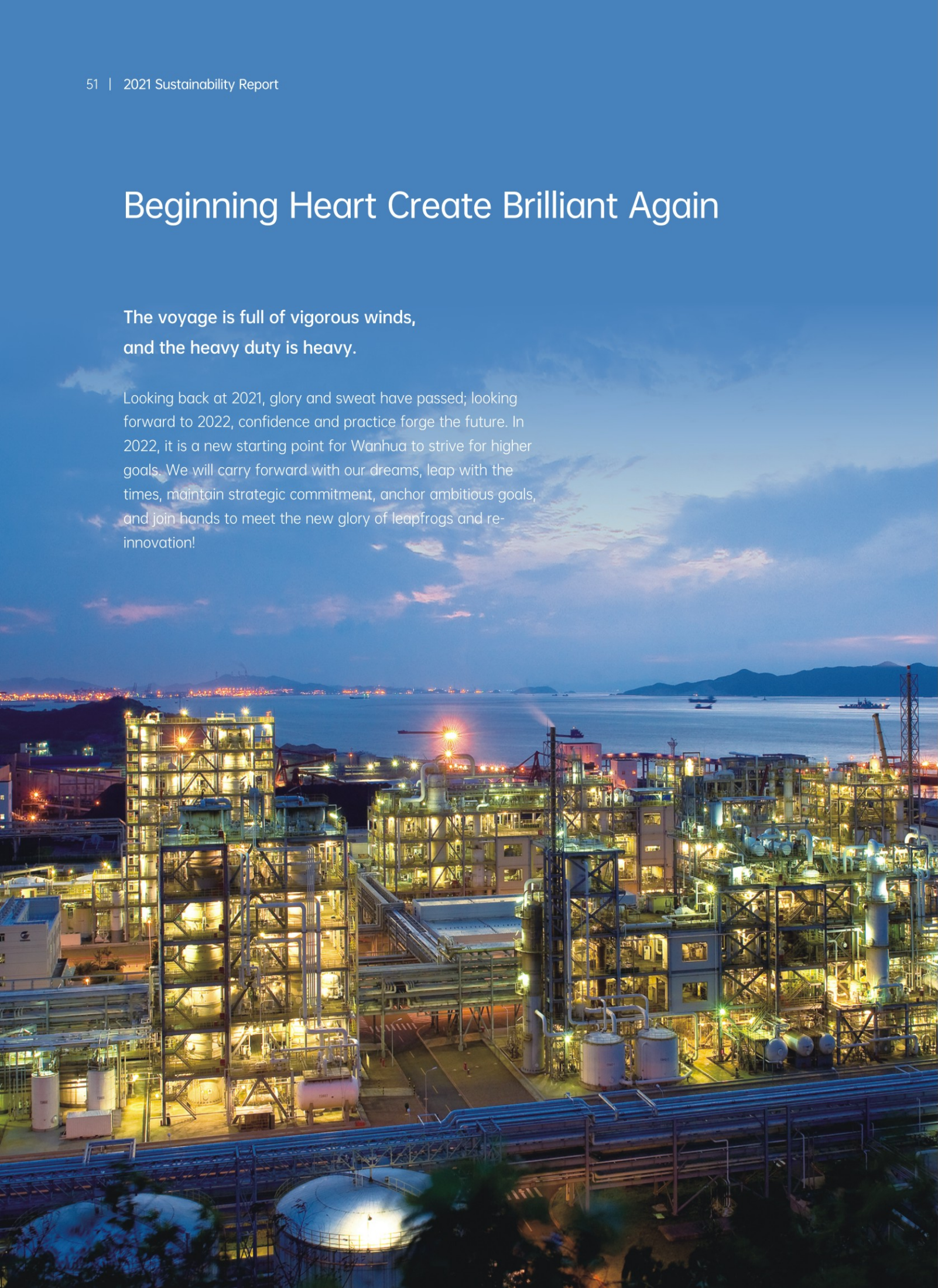


The 23rd station of the Magic Laboratory came to Meishan, Sichuan Province. The students from the middle and primary schools of Xiang'er Town, Sichuan, embarked on a marvelous journey of chemistry in Wanhua Chemical Sichuan Industrial Park. At the same time, through leading the students to visit the exhibition hall of the park and explain the popular science knowledge of the park, the students can understand the chemical park around them, and fully understand the common white smoke, fire and other phenomena in the park. At the same time, the problems concerning the three wastes disposal and the recycling and utilization of resources in the park are solved in detail.

# Beginning Heart Create Brilliant Again

The voyage is full of vigorous winds,  
and the heavy duty is heavy.

Looking back at 2021, glory and sweat have passed; looking forward to 2022, confidence and practice forge the future. In 2022, it is a new starting point for Wanhua to strive for higher goals. We will carry forward with our dreams, leap with the times, maintain strategic commitment, anchor ambitious goals, and join hands to meet the new glory of leapfrogs and re-innovation!



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## Feedback

Dear Reader:

Hello! Thank you for reading this report. In order to further improve the level of Wanhua's sustainable development and the quality of report preparation, we sincerely invite you to provide valuable comments and suggestions on this report to help us to improve continuously.

You are welcome to answer the following questions and return this questionnaire via email or other means to the contact person below:

Contact Person: Wanhua Commission on Sustainable Development

Tel: + 86 535 8203369

E-mail: jiangfei@whchem.com

Contact address: No. 59 Chongqing Avenue, Yantai Economic and Technological Development Zone, Shandong Province

Postal Code: 264000

### 1. Please tick "✓" the corresponding cell in the table

Questions:	Yes	No	Not sure
Do you think this Report mirrors the significant impact on the environment, economy and society, and the Company's achievements in these areas?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Do you think this Report discloses real, accurate and valid information?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Do you think this Report is clear and easy to understand in terms of its descriptions, content arrangement and graphic design?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

### 2. Open-ended questions:

Which part of this Report do you like best?

What other information do you think needs to be disclosed in this Report?

What are your expectations for the future sustainable development reports of Wanhua Chemical?

### 3. Please, if you may, leave your information, so that we can provide timely feedback on your comments and suggestions:

Name: \_\_\_\_\_ Company: \_\_\_\_\_

Contact number: \_\_\_\_\_ E-mail: \_\_\_\_\_

Contact address: \_\_\_\_\_



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