



*Vinnolit*

# ENVIRONMENT & SAFETY REPORT 2020

VINNOLIT GMBH & CO. KG

# ACTING RESPONSIBLY



As a company, we combine economic success with social and environmental responsibility: safety, health and environmental protection are among our foremost corporate objectives. We adhere to high safety and environmental standards, operate our production facilities efficiently and conserve resources and sell products in whose safety and environmental compatibility we firmly believe. As an energy-intensive company, we focus in particular on improving energy efficiency. Vinnolit (since May 16, 2022 "Westlake Vinnolit") has made significant investments and achieved enormous success in this respect. Regular audits conducted by independent experts confirm our strict compliance with international management standards in the areas of quality, Occupational safety, environmental and energy management.

Some sustainability challenges can only be effectively solved by the PVC or plastics industry as a whole. This is why we are actively involved in a variety

of associations and initiatives and work together with other companies in the plastics industry, and in particular the PVC value chain, to achieve further improvements for the environment. Vinnolit is actively involved in VinylPlus, the voluntary commitment of the European PVC industry towards sustainable development, in EuroChlor's sustainability program and the global Responsible Care initiative of the chemical industry. The industry has achieved tremendous success in recent years, especially in PVC recycling, the more sustainable use of PVC additives, and the conversion to the more environmentally-friendly membrane cell process for the production of chlorine and caustic soda.

The social megatopics of climate neutrality and circular economy concern us all. Help us to acknowledge plastics as a valuable resource that is consistently managed in a closed loop and does not become waste.

*Dr. Karl-Martin Schellerer  
Managing Director*

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# THE COMPANY



As a leading manufacturer for PVC and reliable partner for caustic soda, Vinnolit offers individual solutions for customers from a wide range of industries, such as the construction sector, the automotive industry or medical technology. As a manufacturer of high-quality PVC specialties, Vinnolit is a global market leader. Vinnolit is a subsidiary of Westlake, a leading international producer of petrochemicals, polymers and downstream building products.

**Westlake**

[www.westlake.com](http://www.westlake.com)

Vinnolit produces and markets a wide range of PVC products covering all kinds of PVC applications, e.g. in the building and construction sector, in the automobile industry and in the medical sector. Whether the PVC is for flooring, wall covering, window profiles, pipes, rigid film, technical coatings, automotive sealants, cable sheathing or medical applications, Vinnolit is able to offer a suitable solution.

Additionally Vinnolit produces and markets intermediates such as caustic soda, vinyl chloride and tin tetrachloride, which are used in the chemical industry as well as in many other industries.

Vinnolit's production sites are located in Burghausen, Gendorf, Knapsack, Cologne and Schkopau (until the end of 2020); production in Hillhouse (UK) was shut down on August 31, 2019. The company's headquarters is in Ismaning near Munich. With 1,400 staff, Vinnolit has an annual turnover of around €900 million.

The company is upstream integrated from chlorine/caustic soda to PVC and is a technology supplier for the entire vinyl chain from EDC to PVC.

Vinnolit operates six sales or representation offices in Europe and works together with numerous sales partners worldwide.

# RESPONSIBILITY FOR PEOPLE AND ENVIRONMENT



Safety, health and environmental protection are key corporate goals and firmly anchored in the company's vision and values.

Through effective environmental management, we ensure that statutory regulations and the voluntary self-commitments of the industry are met, and we work continuously to achieve further improvements.

## Integrated management system

An integrated management system for quality, safety, environmental protection and energy management ensures the constant development and improvement of products and processes in the company. Vinnolit is certified in accordance with ISO 9001 (quality management), 14001 (environmental management) and 50001 (energy management); and according to BS OHSAS

18001 and OHRIS (both occupational safety). Regular audits conducted by independent auditors confirm compliance with relevant standard requirements. Current certificates are available at [www.vinnolit.com](http://www.vinnolit.com).



## Organization

Responsibilities relating to quality, safety, environmental and health protection and energy are clearly defined at Vinnolit and laid down in the company procedures. Regular training ensures that these instructions are familiar to and observed by all employees.

According to Section 52 b of the German Federal Emissions Control Act (BImSchG), a member of top management performs the duties and obligations as the operator of plants which are subject to government regulations. Immediate responsibility for environmental protection lies in the delegation chain including the Operations Director and the respective production area and plant managers.

## Idea management

Through the employee suggestion system, the company collects ideas from employees for ongoing improvement of our processes, occupational safety, environmental protection and energy management.



*Exercise of the plant crisis management team at the Chemical Park Cologne-Merkenich*

### **Emergency management**

Vinnolit is integrated into the emergency management systems at each of the sites. Primary contact in case of an emergency is the factory fire department, which is manned around the clock. At the Cologne location, responsibility for fire safety lies with the municipal Cologne Fire Brigade, which is supported by personnel, technical and organizational measures at the plant.

In addition to the fire brigade, various standby services at the plants are also provided if necessary as part of a graduated plan. On-site teams are capable of detecting possible immissions outside the plant perimeter.

Channels for reporting to the authorities and informing the public are precisely defined. Possible emergency scenarios are discussed regularly and simulated in practice-oriented exercises with emergency services from outside the plant and the involvement of representatives of the authorities.

Any deviations from normal operation are documented and investigated in order to avoid similar events in the future.

### **Incidents**

Incidents as defined in the German Incident Reporting Ordinance (12. BImSchV) are events associated with serious danger inside or outside the operating area or serious damage to material assets. No incident occurred at Vinnolit during the reporting period.



## THE GLOBAL GOALS For Sustainable Development



### Sustainable Development Goals

With its environmental activities Vinnolit contributes to many of the United Nations' goals for sustainable development. Here is a selection:



We operate all plants safely and environmentally consciously and avoid pollution and contamination of air, water and soil by chemicals. The protection of the health of our employees and our neighbours is our top priority.

[PVC is one of the most important plastics in medicine.](#)



Through various water-saving programs, we reduce our water consumption as much as possible, for example by recycling process water. Wastewater is purified.

[Durable and safe PVC pipes make a valuable contribution to the supply with clean drinking water and wastewater disposal.](#)



We operate our plants in an energy-efficient manner and are constantly looking for further optimization possibilities. Vinnolit's energy management system is certified according to ISO 50001.



In all production processes we ensure environmentally compatible handling of chemicals and waste, minimize emissions and waste and use natural resources responsibly. We report on our activities in our annual environmental report.



We make an active contribution to climate protection through a variety of measures that increase energy efficiency and protect the environment.

[Energy-efficient PVC window systems reduce energy consumption.](#)



We participate in the „Operation Clean Sweep“ initiative to prevent the release of PVC particles into the environment through closed handling and clean work. To this end, we regularly train our employees.



We are a member of the 'Naturnahe Alz' association, which supports the Bavarian government in the renaturation of the Alz. The aim is to sustainably strengthen the river's ecosystem.

# ENVIRONMENTAL TARGETS



Your energy for more efficiency









As part of the energy saving project „Vinnolit saves Energy (VinSavE)“, more than 260 measures with annual energy savings of 179 million kWh have been implemented since 2010; including 15 measures with annual savings of more than 4 million kWh in 2020. 13 measures with annual savings of a further 13 million kWh are in progress for 2021 – 2024.

| Target  | Measures   | Involvement | Target            | Completion status <sup>1</sup> |
|---|--|-------------|-------------------|--------------------------------|
| Reduction of energy consumption; climate protection | Saving energy according to the 'VinSavE' method  | all sites   | annually          | continuously                   |
|   | Reduction of specific natural gas consumption by 30% and specific electricity consumption by 3% in VC production                     | Gendorf     | 2021              | planned                        |
|   | Reduction of fuel gas consumption by about 3% in VC production   | Knapsack    | 2021              | 20%                            |
|   | Savings of 2,000 MWh/a steam and electricity   | Gendorf     | 2021              | 100%                           |
|   | Reduction of specific CO <sub>2</sub> emissions by 20% in VC production  | Gendorf     | 2021              | planned                        |
|   | Optimization of steam consumption in the SET plant, saving of 3.136t steam per year  | Gendorf     | 2021              | 100%                           |
|   | Energetic optimization of the brine process by reducing the stirring air by approx. 500 m <sup>3</sup> /h and approx. 430 kg/h steam | Gendorf     | 2020              | 100%                           |
|   | Reduction of natural gas consumption through optimizations in the bagging plant  | Cologne     | 2022              | planned                        |
|   | Reduction of product-related natural gas consumption by approx. 4000 MWh/a through optimization of recipes                           | Burghausen  | 2023              | 25%                            |
|   | Reduction of compressed air consumption by the equivalent of approx. 4,000 MWh/a in E-PVC production                                 | Burghausen  | 2022 <sup>2</sup> | 60%                            |
| Saving resources                                    | Cooling water recycling, reduction of specific cooling water consumption by approx. 100 MWh/a  | Burghausen  | 2020              | 100%                           |

<sup>1</sup> as at 12/2020

<sup>2</sup> The target is extended to 2022; operational tests show further need for optimization.



| Target                                | Measures  | Involvement | Target            | Completion status <sup>1</sup>   |
|---------------------------------------|---|-------------|-------------------|--|
| Improvement of wastewater quality     | Reduction of the AOX-value in waste water by at least 50%   | Gendorf     | 2021 <sup>2</sup> |   |
| Reduction in the use of raw materials | Reduction of the specific oxygen consumption by 2%  | Gendorf     | 2021              | planned  |
|                                       | Reduction of the specific ethylene consumption by approx. 1%  | Gendorf     | 2021 <sup>3</sup> |   |
| Reduction of emissions                | Reduction of emissions through closed sampling points   | Gendorf     | 2021 <sup>4</sup> |   |
|                                       | Optimization of monitoring of recooling water with regard to hydrocarbon input                      | Gendorf     | 2024              |   |
|                                       | Saving of truck transports, every 2 weeks a suction truck for special disposal of sludge            | Gendorf     | 2021              |   |
|                                       | Reduction of hydrochloric acid transports by rail: approx. 8-9 rail tank cars per week              | Gendorf     | 2024              | planned  |
|                                       | Reduction of ethylene emissions in waste gas for combustion by approx. 1,500 tons in EDC production | Knapsack    | 2020              |   |
|                                       | Development of measures to reduce noise emissions   | Burghausen  | 2021              |   |
|                                       | Reduction of PVC emissions by installing filters in S-PVC production                                | Knapsack    | 2020              |  |

<sup>1</sup> as at 12/2020

<sup>2</sup> The target is extended to 2021; in order to be able to carry out further optimizations during commissioning.

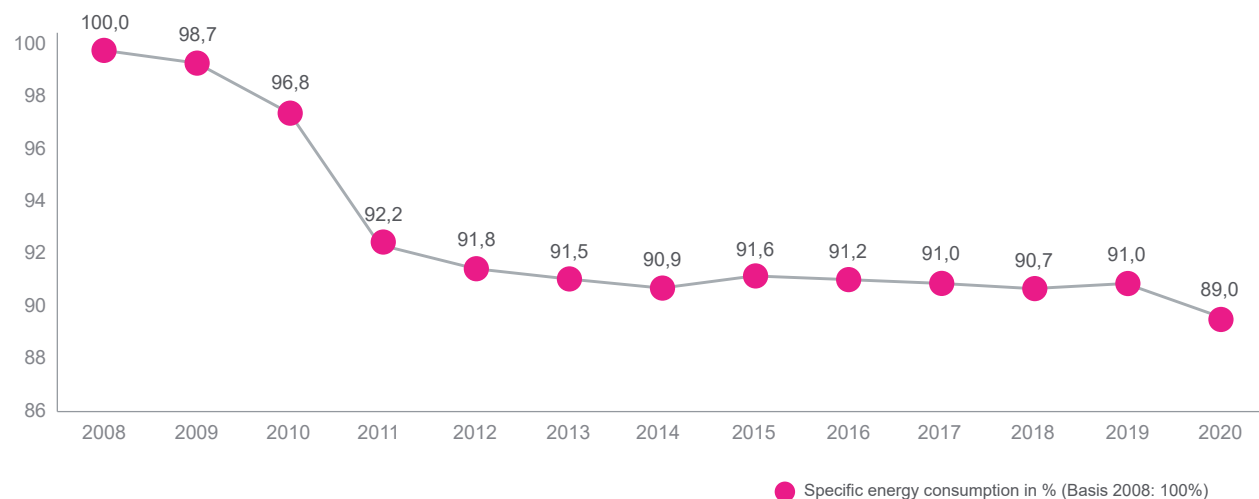
<sup>3</sup> The target is extended to 2021, as the commissioning of the plant components required for this is planned for 2021.

<sup>4</sup> The target is extended to 2021; the installation of the 10 still missing sampling points is to be completed in 2021.

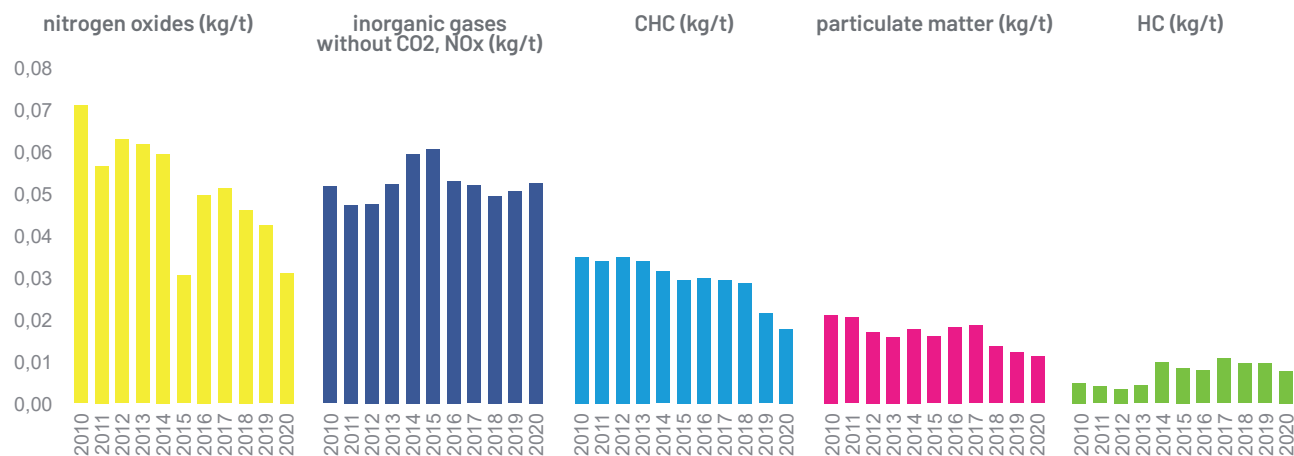
Since 2008, specific energy consumption has been significantly reduced and, consequently, energy efficiency has been significantly increased.

All large-scale consumers are state-of-the-art. Plants and processes are continuously reviewed for further energy-saving opportunities. In 2020, for example, the operation of the cracking furnace in Knapsack was optimized.

## Energy efficiency (steam, electricity, natural gas) 2008 – 2020 in GJ pro t Output



## Environmentally relevant emissions 2010 – 2020



A very high level has already been achieved in reducing emissions. All limit values were well observed.

# PRODUCTS



## PVC

Over 100 years ago, the German chemist Fritz Klatte received the first patent for the production of PVC. Today, PVC is a modern and innovative material which is constantly being developed.

Thanks to its quality and versatility, PVC is an ideal material for use in numerous applications. PVC flooring is particularly easy to maintain and available in many designs, decorative vinyl wallpapers are used to individualize rooms and PVC window profiles are ideal for energy-saving window systems. PVC is also used in the construction sector for long-life pipes, cable sheathing and robust tarpaulins. This versatile material is familiar to us in everyday life in forms ranging from credit cards, artificial leather, durable rainwear, automotive interiors and many other areas from

blister packaging for tablets to life-saving blood bags.

PVC performs well both economically and ecologically when compared to alternative materials:

- PVC consists of approximately 57% chlorine obtained through electrolysis from domestic rock salt. This means that PVC consumes comparatively less non-renewable fossil fuel raw materials than other polymers during production.
- Approximately 70% of the products manufactured from PVC (e.g. windows, flooring, pipes, etc.) are durable products with a life span of more than ten and in some cases up to 100 years.
- Products made of PVC are generally easy to clean and require less maintenance.
- Most PVC products are recyclable.
- Important ecological criteria (e.g. energy consumption or greenhouse gas emissions) can be quantified through life cycle assessments. PVC products tend to perform well in this respect, as a comparative EU eco-balance study published in 2004 has shown.
- PVC products are frequently more cost-effective than alternatives. The money saved can be used for other ecological or social improvements.

PVC is a well-researched and safe plastic which, having proven itself over many years, is used in medical technology, food packaging and drinking water pipes.

PVC is shipped to the customer in silo tankers, as palletized sacks or in big bags.





### **Caustic Soda**

Caustic soda is a co-product of the production of chlorine, the raw material for PVC. It is an important basic chemical and used among other things in the production of paper, glass and ceramics, aluminum, detergents, cleaning agents and viscose. Caustic soda is also used as a neutralizing agent, a precipitant, a cleaning agent and as a food additive.

The product is delivered to customers in tank wagons, tankers, ships and via pipelines.

*Our high-quality caustic soda lye is also used in food production, e.g. for lye bread and pastries.*

### **Hydrogen**

Hydrogen, also a co-product of chlor-alkali electrolysis, is used primarily as an CO<sub>2</sub> saving energy source replacing natural gas, but is also utilized in chemical processes or as an energy source for hydrogen stations.

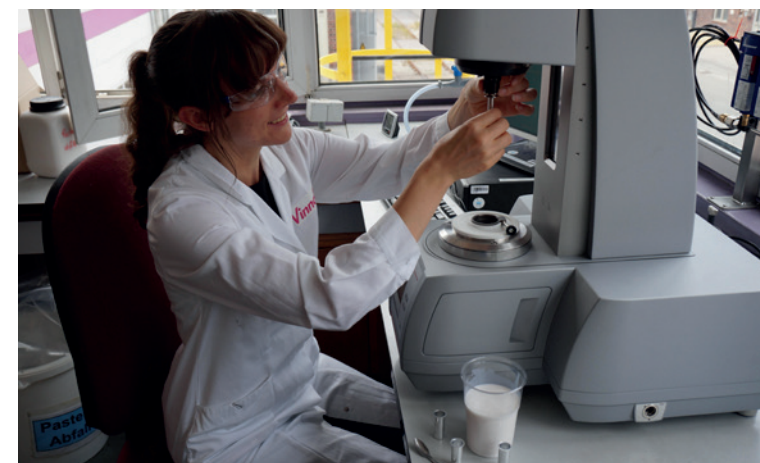
### **Tin tetrachloride**

Tin tetrachloride is produced from chlorine and tin and is the base product for tin-based special chemicals, especially tin stabilizers used in the processing of PVC. In addition, it is used for coating glass surfaces or as a hardener for polyurethane systems. Tin tetrachloride is shipped mostly in railroad tank cars.



*Left: In the application technology center in Burghausen all important PVC processing methods can be reproduced. Picture: Quality inspection for PVC film products.*

*Below: The research laboratory in Gendorf.*



### Research and development

Vinnolit regularly invests in research, development, and application technology. We work on the continuous improvement of our production technologies and are developing PVC materials to meet the demands of tomorrow's markets. We cooperate with customers and universities across international boundaries in this respect.

Vinnolit is one of the most innovative companies in our industry. The Research & Development department is located in Gendorf. Our employees develop new products for our customers in the laboratory and pilot plant.

The Vinnolit Application Technology Center in Burghausen can simulate all important PVC processing techniques. In close cooperation with Research & Development in Gendorf and with customers, we continuously work on the optimization of processing methods and products and develop solutions for special customer requirements.

# PROCESSES



## Production and technology

Vinnolit plants are subject to the German Federal Emissions Control Act (BImSchG) and further obligations of the Hazardous Incident Ordinance (12. BImSchV) which include compilation of a comprehensive safety report. All plants are subject to operating authorizations issued by the competent regulating authority.

All plants are regularly tested and maintained to ensure trouble-free operation. We operate our production facilities to high safety standards and continually develop them to further increase safety for employees, neighbors and the environment. Compliance with legal regulations, the lowest-possible environmental impact and best-possible state-of-the-art energy efficiency are a matter of course for us.

## Emissions

In the production of chlorine, dichloroethane and, ultimately, vinyl chloride as the raw material for PVC, technically unavoidable emissions occur in the air. Vinnolit uses cleaning and filtering systems to reduce such emissions. Process wastewater is purified in central biological sewage treatment plants at the sites. Emissions to air and water are monitored continuously to ensure observance of the permissible limits prescribed by statutory regulations, permits or self-commitments.

Production processes are largely realized in closed systems. Unreacted monomer is recycled to the manufacturing process to achieve high raw material efficiency. Correspondingly, these containers and pipelines must meet high requirements with regard to material and load-bearing capacity. The respective units are only freely ventilated during drying and reprocessing.

Low dust emissions occur on dedusting filters and cannot be completely avoided through any technical measures. New filter systems have enabled us to achieve significant reductions in these emissions. The actual emissions are regularly reported to government authorities in emissions statements and in the European pollutant register E-PRTR.

Vinnolit participates in the 'Operation Clean Sweep' initiative to prevent the release of PVC particles into the environment through closed handling and clean working. We regularly train our employees to the topic.





*The 'PVClean' ultrafiltration facility in the S-PVC plant Knapsack*

### **Raw materials**

The most important raw materials are supplied to Vinnolit plants via closed pipeline systems. Salt is delivered as bulk material by rail. This reduces the consumption of packaging material. Plastic packaging and plastics are recycled in cooperation with RIGK GmbH.

Raw materials are stored exclusively in containers or rooms approved for this purpose. Vinnolit assesses the environmental compatibility of raw materials and auxiliary substances during product development and regularly checks for more environmentally-compatible alternatives.

### **Waste**

The manufacture of PVC is a very low-waste process when compared to the amount of raw material used. All processes are optimized for raw material efficiency and waste prevention. Waste is recycled where possible, and process-related PVC waste is recovered.

### **Water and wastewater**

Water consumption is reduced as much as possible through various water conservation programs. At the Knapsack site, Vinnolit operates PVClean, the world's first large-scale system for recycling the process wastewater of a suspension PVC plant. Ultrafiltration and water recycling have reduced water consumption by 200,000 cubic meters per annum.

Wastewater generated during the polymerization process and cleaning of plants is collected in in-plant sewer systems and purified in sewage treatment plants.

### **Noise and odors**

All plants have sound insulation procedures. The noise level in workplaces is monitored using an operational noise register. We continually strive to reduce noise emissions. Sound insulation is an essential criteria when it comes to purchasing new systems.

Vinnolit plants generally do not emit any odors.



*Vinnolit uses exclusively the energy-efficient membrane process for the production of chlorine and sodium caustic soda.*

### Energy efficiency

Continuous modernization and optimization of plant equipment has considerably reduced the consumption of electricity, steam and cooling water in recent years. Especially the conversion of electrolysis systems from mercury to membrane technology significantly reduced specific energy consumption since 2009. Vinnolit therefore makes a significant contribution to increasing energy efficiency and reducing CO<sub>2</sub> emissions.

The further enhancement of energy efficiency remains an important corporate objective, which is why Vinnolit continuously invests in the modernization of its plants and improvement of processes. Employees developed ideas for saving energy in the company-wide VinSavE project which has reduced energy consumption in the enterprise by more than 10 percent. Many of the measures demonstrated have already been implemented, and others will follow in the coming years.

Vinnolit performs well with regard to energy consumption when judged against industry benchmarks. Shifts in the product mix can result in minor fluctuations in energy consumption.

### Soil

In cases of suspected contaminated sites, special soil or groundwater sampling is conducted and, if necessary, appropriate monitoring, containment or clean-up procedures are agreed to with the authorities. Checks for soil contamination are conducted during all excavation work.

All relevant filling/transfer facilities are equipped with liquid-tight floor trays, collecting pits, etc. Special floor coatings and collecting trays in the production facilities serve as protection against possible soil contamination.



*Delivery of salt by rail in Gendorf*

### Shipping and transportation

By using rail, ship and pipeline as much as possible for transportation, Vinnolit deliberately relies on more environmentally friendly logistics, both for the procurement of raw materials and shipping of its products. In order to minimize the environmental impact during transportation to the customer, the following principles are followed:

- Avoidance of packaging through use of silo vehicles, whenever the customers' facilities permit.
- Return transport of unsuitable rock salt to the mine by the same train.
- Use of railway silos and railway silo containers, whenever the customers'

facilities permit.

- Use of recyclable paper for sacking and participation in the Repasack model.
- Shrinking of sacks with recyclable shrinking hoods.
- Stacking of sacks on standardized pallets for which a circulating and repair system exists.

Environmental aspects are also taken into account during selection of forwarding agents.



### Environmentally relevant facilities

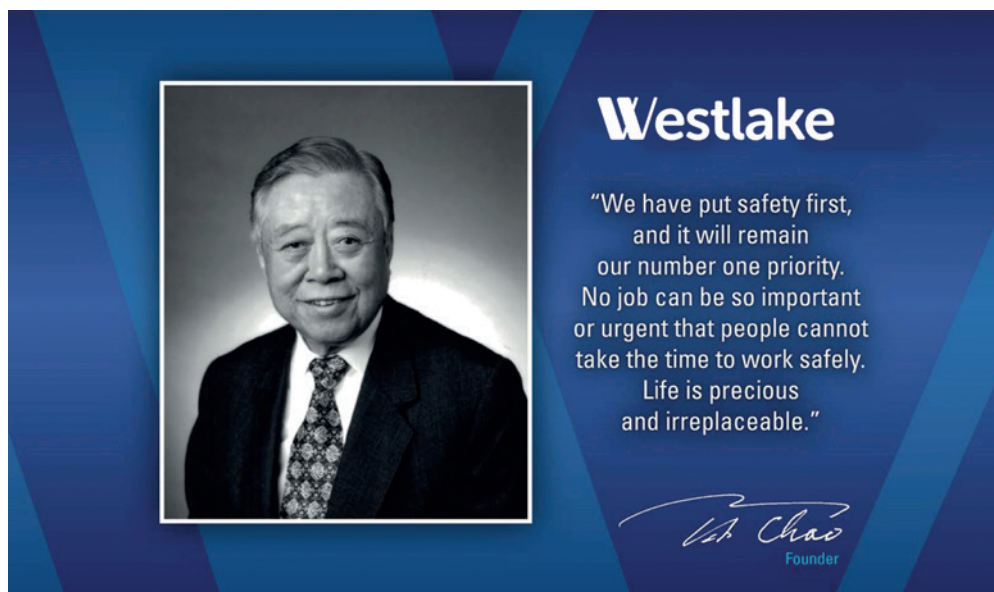
The Vinnolit plants make use of the extensive environmental protection equipment at the production sites, ensuring an environmentally friendly on-site treatment and disposal of waste water and waste that for the most

part does not require any transport. In addition, Vinnolit operates its own facilities for this purpose.

|   |  | Burghausen | Gendorf | Knapsack | Cologne | Schkopau |
|---|--|------------|---------|----------|---------|----------|
| Residue incineration                        | Incineration of solid, liquid, and gaseous waste   | ■          | ■       | ■        |         | ■        |
| Waste water stripper                        | Cleaning of process water containing VCM   | ■          | ■       | ■        | ■       | ■        |
| Flocculation                                | Separation of solids from process water  | ■          | ■       | ■        | ■       | ■        |
| Waste water cleaning                        | Mechanical, chemical, and/or biological cleaning of plant waste water with analytical testing                      | ■          | ■       | ■        | ■       | ■        |
| Water retention                             | Emergency basin for incidents/water for fighting fires   | ■          | ■       | ■        | ■       | ■        |
| Dumps                                       | Storage of construction rubble and similar waste, in some cases also industrial special waste (depending on class) | ■          | ■       | ■        |         |          |
| HCl recycling/central exhaust gas recycling | Thermal recycling of exhaust gases   | ■          | ■       | ■        |         |          |
| Recycling facilities                        | Utilization/recycling of by-products from VCM/PVC production, HCL recovery   |            | ■       | ■        |         |          |
| Exhaust gas cleaning plant                  | Recycling of VCM from exhaust gases  | ■          | ■       | ■        | ■       | ■        |
| Rain water utilization                      | Utilization of collected and cleaned rain water as cooling water   |            |         |          | ■       |          |
| Ultrafiltration facilities                  | Concentration of PVC latex and conservation of steam; Recycling of water   |            | ■       | ■        | ■       |          |

■ Facilities at the plant sites      ■ Vinnolit facilities

# SAFETY



## Occupational safety

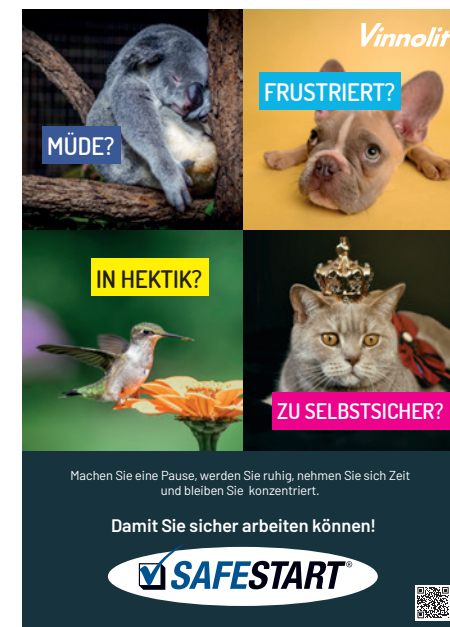
Vinnolit takes the necessary measures for occupational safety on the basis of extensive risk assessments pursuant to the Occupational Safety Act and the Hazardous Substances and Industrial Safety Regulations. Working resources and equipment are checked regularly to ensure they are in proper condition and safe to use. Employees receive operating instructions and directives, and observance of these is monitored by managers. Regular training is also provided. Where required, employees wear appropriate personal protective equipment.

Measurements are regularly conducted and options for optimization are sought to ensure observance of limits for hazardous substances and noise in the workplaces. In accordance with the Regulations for Occupational Health Screening, employees are regularly examined by the company doctor. Through the STOP™ (Behavioral Hazards Component) program, supervisors and employees are in regular contact to reduce or prevent unsafe conditions and behaviors..

In accordance with Vinnolit's motto „Drive to Zero“ (aim: no accidents), Vinnolit systematically and consistently processes all accidents and exchanges experiences in all units. The proportion of technical and organizational causes for accidents is very low. Vinnolit is constantly working on improvements in the area of „human factors“ and has started to introduce the "SafeStart™" program, which enables employees to recognize unsafe behavior at an early stage through training.

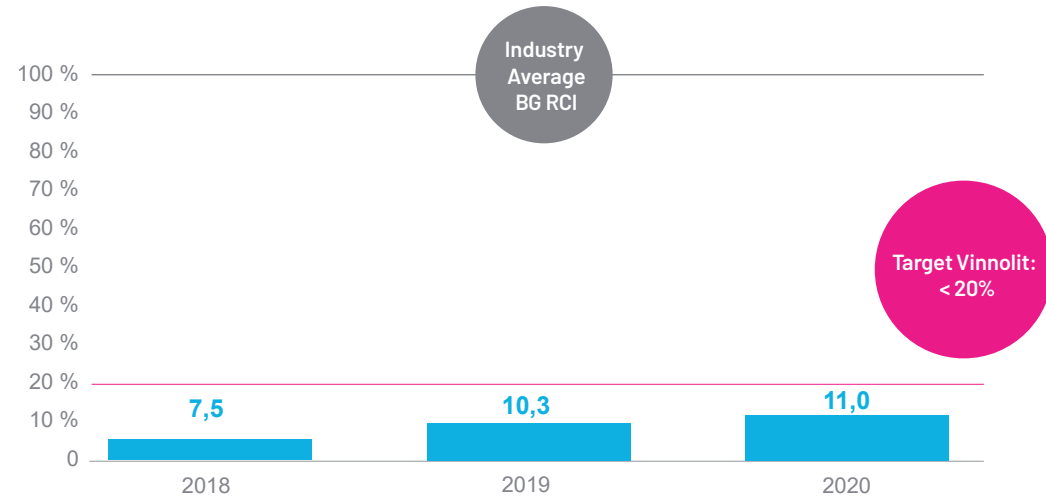
In the Corona pandemic, we succeeded in ensuring a high level of protection for our employees.

SafeStart™ Flyer  
at Vinnolit



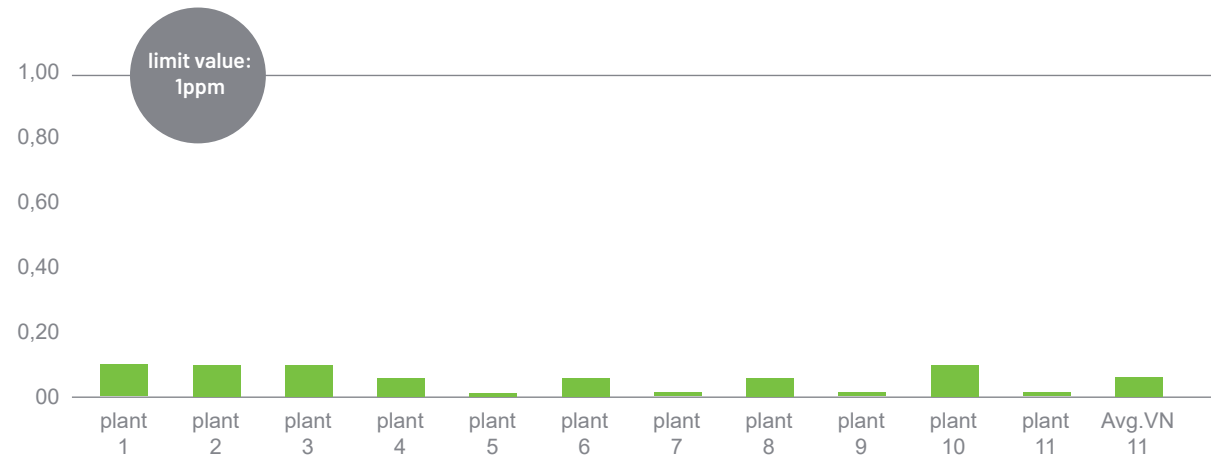
Vinnolit has a sustainably low accident rate of at least 80 percent below the industry average of the German Employers' Liability Insurance Association for Raw Materials and the Chemical Industry (BG RCI, Germany).

## Reportable occupational accidents at Vinnolit compared to industry average BG RCI



We are well below the maximum permissible workstation concentration of vinyl chloride (VCM).

## Workplace concentration VCM (in ppm) in the Vinnolit plants 2020





# ASSOCIATIONS AND INITIATIVES

PVC RECYCLED WITHIN THE VINYLPLUS FRAMEWORK



Since 2000, VinylPlus has recycled 6.5 million tons of PVC.

- Cables
- Pipes & fittings
- Flexible PVC and films (including roofing and waterproofing membranes, flooring, coated fabrics, flexible and rigid films)
- Window profiles & related products

## VinylPlus

As an „Official Partner“, Vinnolit supports VinylPlus, the voluntary commitment of the European PVC industry to sustainable development financially, through commitment to its principles, and through active participation.

Through VinylPlus, the PVC industry commits itself to:

- work towards the more efficient use of PVC throughout its lifecycle;
- help to ensure that persistent organic compounds do not accumulate in nature and that other emissions are reduced;
- move towards more sustainable additive systems;
- contribute to climate protection through reducing energy and raw material use;
- build sustainable awareness across the PVC value chain to accelerate resolving our sustainability challenges

The progress is documented in an annual report. In 2020, more than 730,000 tons of PVC were recycled across Europe under this sustainability program, representing 27.5 percent of available PVC waste in Europe.

## Responsible Care

Vinnolit participates in the Responsible Care program of the chemical industry for continuous improvement of safety, health and environmental protection.

## PlasticsEurope

Vinnolit is involved in „Operation Clean Sweep“ of PlasticsEurope, the association of European plastics manufacturers. The aim is to avoid the entry of plastic powders or pellets into flowing watercourses, lakes or seas („Zero pellet loss“). Operation Clean Sweep is part of the global „Marine Litter Solutions“ project.

## ECVM

Vinnolit is a member of the European Council of Vinyl Manufacturers (ECVM). An important focus of the association is sharing experiences related to environmental and safety issues.

## Euro Chlor

Vinnolit is a member of Euro Chlor, the association of European chlorine producers, and supports the Euro Chlor sustainability program. Vinnolit exceeded the voluntary commitment of Euro Chlor members by converting its chlorine production from the mercury process to the environmentally friendly membrane process in 2009 – ahead of the Euro Chlor target of 2020.

## AGPU

Vinnolit is an active member of the Working Group PVC and Environment (AGPU), an environmental initiative involving business and science which for the last 25 years has successfully dedicated itself to the sustainable development of PVC in Germany.

## Umweltpakt Bayern

Vinnolit is a founding member of the Umweltpakt Bayern (Bavarian Environmental Pact) for the continuous improvement of operational environmental protection.

# FIGURES

Core indicators according to EMAS III (EG) No. 1221/2009

The values are subject to inevitable fluctuations owing to changes in the utilization of plant capacities or the product mix, technological modifications, and fluctuations in weather conditions. t = metric ton of total output from production. The output is the sum of the production volumes of each production plant (chlorine, caustic soda 100%, hydrogen, sodium hypochlorite, tin tetrachloride, vinyl chloride monomer, PVC).

| Vinnolit Group   | 2020                   | 2019                   | 2018               | 2017                | 2016               | 2015                 | 2014     | 2013     | 2012     | 2011     |
|--|------------------------|------------------------|--------------------|---------------------|--------------------|----------------------|----------|----------|----------|----------|
| Energy efficiency (GJ/t)   | 4,14 <sup>1,2</sup>    | 4,23                   | 4,22               | 4,23                | 4,24               | 4,26                 | 4,23     | 4,25     | 4,27     | 4,29     |
| Water consumption (m <sup>3</sup> /t)                            | 1,04 <sup>2,3</sup>    | 1,17                   | 1,25 <sup>4</sup>  | 1,17 <sup>5</sup>   | 1,16 <sup>6</sup>  | 1,12                 | 1,10     | 1,11     | 1,18     | 1,20     |
| Biological diversity (m <sup>2</sup> /t)                         | 0,0657 <sup>2</sup>    | 0,0718 <sup>7</sup>    | 0,0646             | 0,0648              | 0,0664             | 0,0658               | 0,0627   | 0,0587   | 0,0597   | 0,0604   |
| Emissions  |                        |                        |                    |                     |                    |                      |          |          |          |          |
| Particulate matter (kg/t)  | 0,0125 <sup>2</sup>    | 0,0134                 | 0,014 <sup>8</sup> | 0,0177 <sup>9</sup> | 0,0172             | 0,0157               | 0,0170   | 0,0151   | 0,0162   | 0,0203   |
| Nitrogen oxides (kg/t)   | 0,0312 <sup>2</sup>    | 0,043                  | 0,0452             | 0,0505              | 0,0485             | 0,0295 <sup>10</sup> | 0,0583   | 0,0615   | 0,0630   | 0,0553   |
| Sulfur dioxide (kg/t)  | 0,000302 <sup>11</sup> | 0,000298 <sup>12</sup> | 0,000188           | 0,000199            | 0,000195           | 0,000171             | 0,000191 | 0,000141 | 0,000081 | 0,000097 |
| Carbon dioxide equivalents (kg/t)                                | 57,4 <sup>2</sup>      | 62,7                   | 63,5 <sup>13</sup> | 67,5                | 71,9 <sup>14</sup> | 62,4 <sup>15</sup>   | 68,2     | 66,0     | 63,8     | 65,5     |
| Inorganic gases without CO <sub>2</sub> , NO <sub>x</sub> (kg/t) | 0,0519 <sup>16</sup>   | 0,0499                 | 0,0486             | 0,0530              | 0,0533             | 0,0601               | 0,0595   | 0,0536   | 0,0465   | 0,0464   |
| CHC/HC (kg/t)  | 0,0245 <sup>2</sup>    | 0,0309 <sup>17</sup>   | 0,0369             | 0,0400              | 0,0368             | 0,0369               | 0,0410   | 0,0388   | 0,0386   | 0,0383   |
| Waste (kg/t)   | 6,20 <sup>18</sup>     | 9,86 <sup>18</sup>     | 8,93 <sup>18</sup> | 9,92                | 9,93               | 9,31                 | 9,45     | 8,49     | 8,28     | 13,31    |
| Waste water (m <sup>3</sup> /t)                                  | 0,91 <sup>19</sup>     | 1,03                   | 1,06               | 1,03                | 1,05 <sup>20</sup> | 0,98                 | 1,00     | 1,00     | 1,05     | 1,09     |

<sup>1</sup> Optimization of cracking furnace operation, product flow control, dryer temperatures

<sup>2</sup> Product transfer Hillhouse Burghausen

<sup>3</sup> Optimization of waste water plant in Schkopau

<sup>4</sup> Long hot summer; new production processes

<sup>5</sup> Takeover of a subsystem of a service provider

<sup>6</sup> Special cleaning work

<sup>7</sup> Increase in built-up areas in Burghausen (after expansion) and Schkopau (after takeover of ancillary facilities)

<sup>8</sup> Filter renewal in Hillhouse

<sup>9</sup> Filter runtime approaching end of lifetime

<sup>10</sup> Gas turbine shutdown and maintenance

<sup>11</sup> From 2019, higher sulfur dioxide levels in the fuel for the residue incineration plant.

<sup>12</sup> Fluctuations in sulfur content in district gas and fuels

<sup>13</sup> Low load gas turbine

<sup>14</sup> Normal operation gas turbine after shutdown and maintenance in 2015

<sup>15</sup> Gas turbine shutdown and maintenance

<sup>16</sup> Burghausen plant expansion, additional dryer

<sup>17</sup> Optimization of latex degassing in Schkopau; Hillhouse production shutdown on Aug. 31, 2019

<sup>18</sup> Values vary due to construction activities

<sup>19</sup> Optimization chamber filter press in Schkopau

<sup>20</sup> Restructuring waste water treatment and special cleaning works

# CONTACT

If you have any questions about this report, please contact us:



**Dr. Oliver Mieden**

Head of Environmental Affairs & Corporate Communications

Phone: +49 89 96103-282

Email: [oliver.mieden@vinnolit.com](mailto:oliver.mieden@vinnolit.com)



**Michael Süß**

STEM Sicherheit, Technik, Energiemanagement  
EHS Environmental Health Safety

Phone: +49 8679 7-5860

Email: [michael.suess@vinnolit.com](mailto:michael.suess@vinnolit.com)

In case of any incident you will receive information via the **community helpline**:

Burghausen site: +49 8677 83-6111

Gendorf site: +49 8679 7-6111

Cologne site: +49 221 31086-226

Knapsack site: +49 2233 48-6001

Brochures containing information for the general public required pursuant to Section 11 Incident Reporting Ordinance were prepared at all production sites and distributed to all households in the vicinity. They have been prepared in consultation with the relevant government authorities and contain information about proper conduct in the event of the occurrence of incidents.

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Westlake Vinnolit GmbH & Co. KG

Carl-Zeiss-Ring 25 | 85737 Ismaning | Germany

Phone: +49 89 96103-0 | E-Mail: [info@westlakevinnolit.com](mailto:info@westlakevinnolit.com)

**[www.westlakevinnolit.com](http://www.westlakevinnolit.com)**

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