



+VANTAGE VINYL FOR A SUSTAINABLE FUTURE™

ON THE FOREFRONT

2023 PROGRESS REPORT ▶

OUR PURPOSE

Connecting the vinyl value chain to continuously improve the sustainability of the industry.



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LOOKING AHEAD

MESSAGE FROM LEADERSHIP

2023 was a year of significant and continued growth for the Vinyl Sustainability Council (VSC) with 15 new VSC members and 5 additional companies verifying to the +Vantage Vinyl® sustainability standard.

The VSC remains on the forefront by providing a pathway through the +Vantage Vinyl® standard for companies to verify and communicate their sustainability commitments to the architects, engineers, building owners, municipalities and consumers that are making decisions about material choices.

Increasingly, specifiers and consumers of products are looking beyond product sustainability to company and supply chain sustainability commitments. +Vantage Vinyl® provides third party independent verification of conformance to 29 Guiding Principles aligned with five pillars of sustainability. Verification helps reduce the complexity of choosing companies that meet customer sustainability expectations.

Continued year-over-year improvement in scoring in each of the five +Vantage Vinyl® sustainability pillars demonstrates the progress the industry is making. Through growth in membership and the number of verified companies, VSC members are impacting sustainability improvement through actions and leadership.

The industry's commitment to sustainability is further highlighted through the VIABILITY™ recycling grant program. Initiated in 2023, the program committed \$3 million in funding over three years to develop and accelerate the growth of post-consumer vinyl recycling. In its first year, 16 projects were awarded \$1.674 million. Five of those projects have been successfully completed with an increase in capacity of 30 million pounds of additional recycled vinyl on an annual basis.

The United Nations 2030 agenda for sustainable development cannot be achieved without industry participation. The vinyl industry plays an important role in the developing and developed world providing products critical to the infrastructure for electrification, providing shelter, delivering safe drinking water, protecting against infectious diseases, maintaining food safety and delivering lifesaving medical treatments. We are proud of the progress that VSC members are making in delivering these important products while remaining on the forefront of improvements to the industry's sustainability performance.



JAY THOMAS

Executive Director,
Vinyl Sustainability Council



ERIC COTTERMAN

Chairperson,
Vinyl Sustainability Council



30

**+ VANTAGE VINYL®-
VERIFIED COMPANIES**
(as of August 2024)



05

**FIRST TIME
+ VANTAGE VINYL®-VERIFIED
COMPANIES**



88%

**THE AVERAGE
CONFORMANCE RATE OF
+ VANTAGE VINYL®-VERIFIED
COMPANIES**

CONNECTING THE VALUE CHAIN

The VSC is a consortium of more than 80 organizations from throughout the vinyl value chain with a common mission of advancing sustainability in the industry.

Supply chain collaboration is essential to achieving sustainability goals. VSC provides an organizational structure to facilitate needed collaboration.

Because the +Vantage Vinyl® program is open to any company in the value chain, it is now possible to verify supply chain sustainability from vinyl resin production through to the end product manufacturer.

The VSC Gold Level Sponsor companies featured on pages 8 through 11 contributed additional funds to the VSC communications outreach program and to this report. Here, you can read in their own words how they are making a difference by working to enhance sustainability in their business.



RESIN SUPPLIERS

Companies that make vinyl polymer



ADDITIVE SUPPLIERS

Companies that make or distribute chemicals that are added to vinyl polymer to improve processing or performance



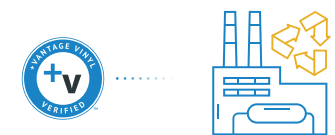
MATERIAL COMPOUNDERS

Companies that combine vinyl polymer with additives to create specific vinyl formulations



END-PRODUCT MANUFACTURERS

Companies that make products from vinyl formulations



RECYCLERS

Companies that process production scrap and end-of-life vinyl for reintroduction into product production



CONTRIBUTING TO A SUSTAINABLE FUTURE

The +Vantage Vinyl® sustainability initiative drives improvements by identifying the most relevant potential performance improvement areas for companies operating within the vinyl supply chain and having company commitments verified by an independent third-party program.

We report industry progress across five pillars of sustainable performance – environmental stewardship, social diligence, economic soundness, collaboration, and open communications.



ENVIRONMENTAL
STEWARDSHIP



SOCIAL
DILIGENCE



ECONOMIC
SOUNDNESS



COLLABORATION



OPEN
COMMUNICATIONS



Company verifications are performed by GreenCircle Certified, LLC, an independent third-party auditor that has issued over 2,000 sustainability certifications since 2009. Achieving +Vantage Vinyl® verification assures the public that a company is meeting the requirements of the program.



MATERIALITY ASSESSMENT

The work of the VSC is focused on priority areas identified in an assessment of issues material to the industry. Every five years an update to the original assessment is undertaken to recalibrate the priority areas as needed. The 2023 update reconfirmed our current focus with the addition of some new areas of interest.

MATERIALITY ASSESSMENT: 5-STEP PROCESS

Using the Sustainability Accounting Standards Board (SASB) five-factor test, the top material issues were identified and used to inform the impact category task forces and updates to the +Vantage Vinyl® Guiding Principles.



Putting Your Feedback to Use

SUSTAINABILITY ISSUE AND OPPORTUNITY	OVERALL RANK
Recycling & Reuse	1
Greenhouse Gas (GHG) Emissions	2
Supply Chain Management	3
User Health	4
Sustainable Product Portfolio Assessment	5
Waste & Hazardous Materials Management	6
Transparency	7
Board Engagement on Climate Risk	8

Results

The eight sustainability issues and opportunities listed above were identified as Level 1 priorities that inform the work of the Resource Efficiency, Emissions, and People & Community Task Forces and in turn shape the Guiding Principles of the +Vantage Vinyl® standard.



VSC GOLD LEVEL SPONSOR

BUILDING A BETTER TOMORROW

Cornerstone Building Brands is dedicated to Building a Better Tomorrow for our customers, communities, and future generations. We believe in working safely, responsibly, and ethically across our organization and communities to achieve this goal. We continue to enhance our sustainability program while delivering industry-leading building solutions.

BETTER RESOURCE EFFICIENCY

Building a better tomorrow requires careful stewardship of natural resources today. Cornerstone Building Brands is on a journey of continuous improvement, ensuring compliance with environmental regulations and requirements while developing new programs and strategies. Areas of focus include waste diversion and product circularity programs, reducing water and materials use and responsible sourcing and securing of supplies.

GIVING VINYL SIDING A NEW LIFE

Cornerstone Building Brands participates in Polymeric Exterior Products Association's (PEPA) recycling program to use scrap vinyl from house demolitions as source material in new vinyl siding. In FY 2023, over 400,000 pounds of vinyl was recycled in partnership with PEPA, diverting it from landfills and reducing the need for virgin plastic raw materials.

In 2017, Cornerstone Building Brands formalized a partnership with a national home builder to reclaim scrap vinyl siding, reduce packaging, and decrease the amount of wood needed for vinyl siding transportation by using bulk crates. In 2023, the program reclaimed more than 1.6 million pounds of scrap for recycling. Additionally, approximately 5,750 bulk crates were returned, repaired, and reused.

The +Vantage Vinyl®-verified company featured on this page contributed additional funds to the VSC marketing communications program so you can read in its own words how it is making a difference by working to enhance sustainability in its own businesses.



PRESERVING WATER

To manage water use responsibly, Cornerstone Building Brands routinely evaluates initiatives to treat, conserve, recycle, and reuse water where possible. Our vinyl extrusion process uses a closed loop system to minimize discharges and reduce the need for fresh water.

ABOUT CORNERSTONE BUILDING BRANDS

Cornerstone Building Brands is a leading manufacturer of exterior building products for residential and low-rise non-residential buildings in North America. Our market-leading portfolio of products spans vinyl windows, vinyl siding, stone veneer, metal roofing, metal and wall systems, pre-engineered metal buildings, and metal accessories. Corporate stewardship and sustainability are embedded in our culture. We are committed to contributing positively to the communities where we live, work, and play.

To learn more about Cornerstone Building Brands' sustainability initiatives, [read our 2023 ESG Report](#).



RAISING THE ROOF, PUTTING SUSTAINABILITY ON TOP



A +Vantage Vinyl®-verified company, Sika's commitment to sustainability is evident across our enterprise – in our product innovations and in our manufacturing operations.

A worldwide leader in thermoplastic, single-ply commercial roofing, Sika became the first manufacturer in our industry to complete cradle-to-grave declarations for single-ply roofing solutions with our Sarnafil roof membranes. Our company has published Environmental Product Declarations (EPDs) for Sarnafil® S 327 and G 410 single-ply PVC roofing membranes. The EPDs deliver detailed environmental impact data developed in a life-cycle analysis of the products. This traces the product's journey from raw material extraction to production, delivery to a job site, installation, maintenance, and end of service life. This level of detail empowers key construction stakeholders – architects, contractors, and building owners – to make more informed decisions about the environmental impact of the products they specify for a commercial roofing project. A key driver to Sika's ability to publish this cradle-to-grave EPD is our ongoing roof take back program which allows closed-loop recycling of our old PVC roofs. These materials are combined with pre-consumer recycled content in our plant to produce new roof membranes. Since the launch of the program, Sika has recycled over 99 million pounds of pre- and post-consumer material back into new roofing membrane.

“Sustainability has been a cornerstone of our operations,” said Bill Bellico, vice president of marketing and inside sales at Sika USA. “There has always been a belief in investing properly as a sustainable company and in offering sustainable products to the marketplace.”

To drive energy efficiency and reduce our carbon footprint as a manufacturer, Sika maintains a large solar park on the main distribution hub of our headquarters, enabling the operation to partially offset the facility's energy demand. Our company also partners with an off-site solar energy provider to supply energy to our production facility.

Learn more about our sustainability efforts [here](#).

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VSC GOLD LEVEL SPONSOR



VSC GOLD LEVEL SPONSOR

A LEADER IN SUSTAINABLE VINYL SOLUTIONS

Teknor Apex, a privately held, global leader in the development and manufacture of high-performance vinyl compounds, celebrated our 100th anniversary in 2024. With a century of innovation and industry expertise, the company has been a pioneer in sustainable plastics solutions, including the extensive use of PVC recyclate in the production of our garden hoses.

One of Teknor Apex's most notable contributions to sustainability in vinyl is our development of BioVinyl® Flexible PVC. This bio-based vinyl compound offers a more sustainable alternative to traditional vinyl products. By incorporating bio-based plasticizers and bio-attributed resin during the compound manufacturing process, BioVinyl reduces the reliance on fossil fuels and provides customers with a more sustainable option for various applications, including flooring, wire and cable, and automotive components.

Another key aspect of Teknor Apex's sustainability efforts in vinyl is evident in our Cycle-Tek® family of flexible PVC compounds. Cycle-Tek compounds are produced from post-consumer recyclate (PCR) or post-industrial recyclate (PIR), offering manufacturers a sustainable solution that performs equivalently to prime compounds. By incorporating recycled materials, Cycle-Tek compounds reduce the demand for virgin PVC, conserving resources and minimizing the environmental impact of production. This solution allows landfill avoidance and facilitates manufacturers in meeting their sustainability goals while maintaining the quality and performance of their products.

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Teknor Apex's dedication to sustainability is not limited to product development. We have also implemented various initiatives to improve our manufacturing processes and reduce our environmental footprint. These efforts include energy efficiency measures, waste reduction programs, and responsible sourcing of raw materials. By continuously striving to minimize our environmental impact, Teknor Apex is demonstrating our leadership in sustainable vinyl solutions.

Learn more about our sustainability efforts [here](#).





VSC GOLD LEVEL SPONSOR

DRIVING DOWN ENVIRONMENTAL IMPACT IN THE U.S.



Orbia's Polymer Solutions business, Vestolit, pursues its sustainability initiatives in close collaboration with Orbia's corporate sustainability team. Orbia Vestolit remains one of the most significant contributors to several of Orbia's sustainability metrics, and actions taken by Orbia Vestolit drive a large part of our organization's progress towards sustainability commitments. Over the last few years, one of our U.S. sites (Henry, Illinois) has taken a multi-pronged approach towards a more sustainable operation.

CLIMATE CHANGE

As of 2023, Vestolit contributes ~70% of the total Scope 1+2 emissions for all of Orbia. To meet Orbia's goal of a 47% reduction in Scope 1+2 emissions by 2030, deliberate and significant action is required on Orbia Vestolit's part.

Since 2019, our commitment to lowering carbon emissions has been consistent. The first major step in lowering Scope 1 emissions came in 2021 when the site phased out our coal-fed boiler and switched to a natural gas-fired boiler. This reduced the Scope 1 emission intensity of the plant by 35%. We also managed to improve the plant's energy efficiency, and by 2022 had reduced energy intensity by 28% compared to the 2019 baseline.

The facility has also begun the process of restoring power as a central pillar of sustainable site operations. This year, we initiated proceedings to obtain renewable power through both an onsite solar power purchase agreement (PPA) and community solar agreement. The onsite PPA will feature a 4.75 to 7.5 MW array installed onsite, providing both 6,000-9,000+ MWh/year of green power and variable cost savings through renewable energy credit (REC) arbitrage. The community solar subscription, when sized for maximum benefit, is anticipated to also provide cost savings alongside an additional 9,000+ MWh of green power. These are the first steps in achieving not only 100% decarbonization of the site's electrical load, but a net-zero operation by 2050.

Learn more about our sustainability efforts [here](#).

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THE FIRST LINK OF THE CHAIN

+ SHINING THE SPOTLIGHT ON +VANTAGE VINYL®-VERIFIED RESIN SUPPLIERS



Formosa Plastics Corporation, USA (FPC USA) is committed to sustainability initiatives locally and globally, and part of that commitment includes our membership in the Alliance to End Plastic Waste. Through this membership, FPC USA funded a waste management program on the island of Java in Indonesia. Unregulated waste management has the potential to cause countless health, environmental, and financial implications, most especially in a region of the world that is economically tied to the convenience and necessity of single-use plastics. The projects funded by Formosa in Indonesia

have the potential to collect 333 kilotons of waste, responsibly manage 52 kilotons of plastic waste, and create 3,200 jobs for local people. Formosa's initial commitment can be scaled up and replicated to include more regions of Indonesia. FPC USA has been proud to sponsor this impactful project, demonstrating our commitment to sustainability in the global community.



Occidental Chemical Corporation (OxyChem) is a proud member of the Corpus Christi Hooks Community Leaders Program and recently helped source and install artificial turf on the Youth Field at Whataburger Field in Corpus Christi, Texas. The Youth Field, used for both Miracle and Challenger Leagues, had deteriorated considerably, was deemed unsafe for the upcoming season, and was in need of repairs. OxyChem contributed \$125,000 for the new field construction and numerous other long-lasting, durable products for the field. OxyChem's PVC resin was used in several commercial applications

for field construction, such as field lighting, fencing, water and sewer piping, batting cages, and pitching machines. This project is a testament to the power of collaboration and shared vision in creating spaces that serve the community and inspire the next generation by promoting sports and teamwork among youth with disabilities.



Shintech, Inc., the U. S. subsidiary of the Japanese Shin-Etsu Group, operates under the same corporate guidelines as our parent company. These guidelines have been ranked #1 by Forbes Japan for Climate Change Ranking, exemplifying the Group's commitment to reducing emissions and lowering its carbon footprint. Shintech and the Shin-Etsu Group are committed to reduce GHG emissions (Scope 1 and Scope 2) to net zero and are actively targeting carbon neutrality by 2050. Together, we are achieving reduction of GHG emissions in terms of production intensity to 45% (i.e, down by 55%) of the FY1990 baseline by FY2025. At Shintech, we are

actively engaged with our parent company, customers, suppliers, and the VSC to improve recyclability. Shintech continually looks for new technology to reduce the water and energy resources used to make our quality product. Shintech supports the Texas and Louisiana communities where we operate plants.



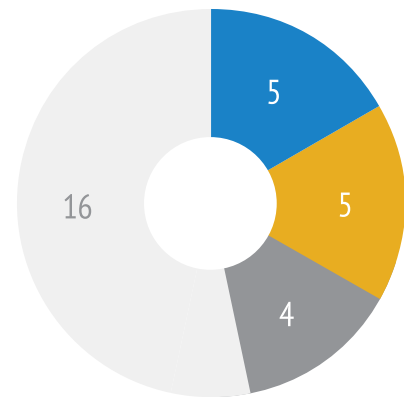
Westlake is continually improving our PVC products to provide further advantages, including those that improve the sustainability characteristics of our products and customers' applications, as well as overall operations in the value chain. In 2021, Westlake introduced production of PVCO, a molecular-oriented PVC pipe material with enhanced water flow, streamlined assembly, and a lower carbon footprint compared to traditional Westlake PVC pipe. During the manufacturing process, the PVC molecules are stretched and reorganized to increase material strength, making the pipe more flexible and lighter weight.

Less material per unit length provides secondary benefits for shipping the product. By reducing the weight of the haulage, vehicles can use less fuel, thereby reducing carbon emissions. PVCO is available in North America. In May 2024, Westlake announced plans to build a PVCO pipe plant at our manufacturing site in Wichita Falls, Texas.

2023 YEAR IN REVIEW

BY THE NUMBERS

INDUSTRY PARTICIPATION



- Resin Manufacturer
- Additive Supplier
- Compounder/Formulator
- Converter/End Product Manufacturer



30 +VANTAGE VINYL®-VERIFIED COMPANIES
(as of August 2024)



88%

AVERAGE CONFORMANCE RATE OF +VANTAGE VINYL®-VERIFIED COMPANIES



05 FIRST TIME +VANTAGE VINYL®-VERIFIED COMPANIES



1.8%

ON AVERAGE, +VANTAGE VINYL®-VERIFIED COMPANIES INCREASED CONFORMANCE BY 1.8% FROM 2023 TO 2024



94%

AVERAGE FIRST YEAR CONFORMANCE RATE OF 5 NEW +VANTAGE VINYL®-VERIFIED COMPANIES

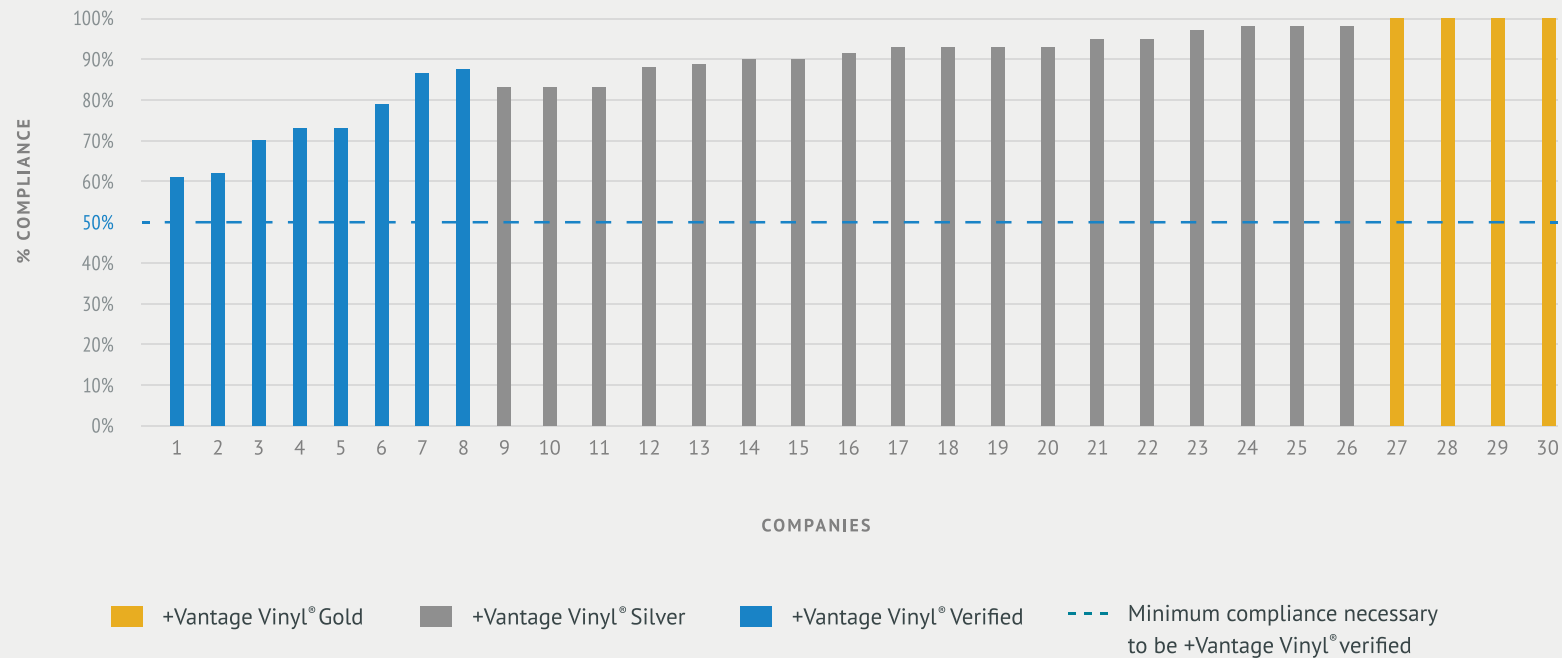


100%

OF PROGRAM PARTICIPANTS MET THE 50% COMPLIANCE MINIMUM FOR +VANTAGE VINYL® VERIFICATION

COMPANY COMPLIANCE

The +Vantage Vinyl® program is designed to recognize continuous improvements in different areas and to different degrees by participating companies. A commitment to continuous improvement allows verified companies to seize the available opportunities and never assume that today's performance is the best achievable. Companies achieving compliance with the Guiding Principles have provided documentation to support their achievement.



To receive +Vantage Vinyl® verification, companies must achieve at least 50% compliance with the Guiding Principles, including compliance with all mandatory Guiding Principles. Companies that go above the 50% threshold can qualify for the following silver or gold verification designations:



+Vantage Vinyl® Gold

A company has achieved 100% compliance with all applicable Guiding Principles and has implemented at least two Advanced Practices and one Innovative Practice Achievement.



+Vantage Vinyl® Silver

A company has achieved greater than 80% compliance with all applicable Guiding Principles and has implemented at least one Advanced Practice Achievement.

The Advanced and Innovative Practices highlight the industry's quest for continuous improvement. They provide a roadmap within the Guiding Principles that show how the industry is stepping forward and driving sustainability objectives at the company level. The +Vantage Vinyl® Gold and +Vantage Vinyl® Silver designations celebrate and recognize companies that are sustainability leaders in the vinyl industry.

All +Vantage Vinyl®-verified companies were above 50% compliance with the program's Guiding Principles. Twenty-five of the companies recommitted to the verification process and five companies verified for the first time.

INDUSTRY LEADERS



+VANTAGE VINYL-[®]
VERIFIED COMPANIES



PILLAR COMPLIANCE

The +Vantage Vinyl® program's Guiding Principles set the direction and parameters for what companies strive to achieve over time.

The Guiding Principles are organized within five pillars that serve as the guideposts for companies on their journey of continuous improvement.



ENVIRONMENTAL
STEWARDSHIP



SOCIAL
DILIGENCE



ECONOMIC
SOUNDNESS



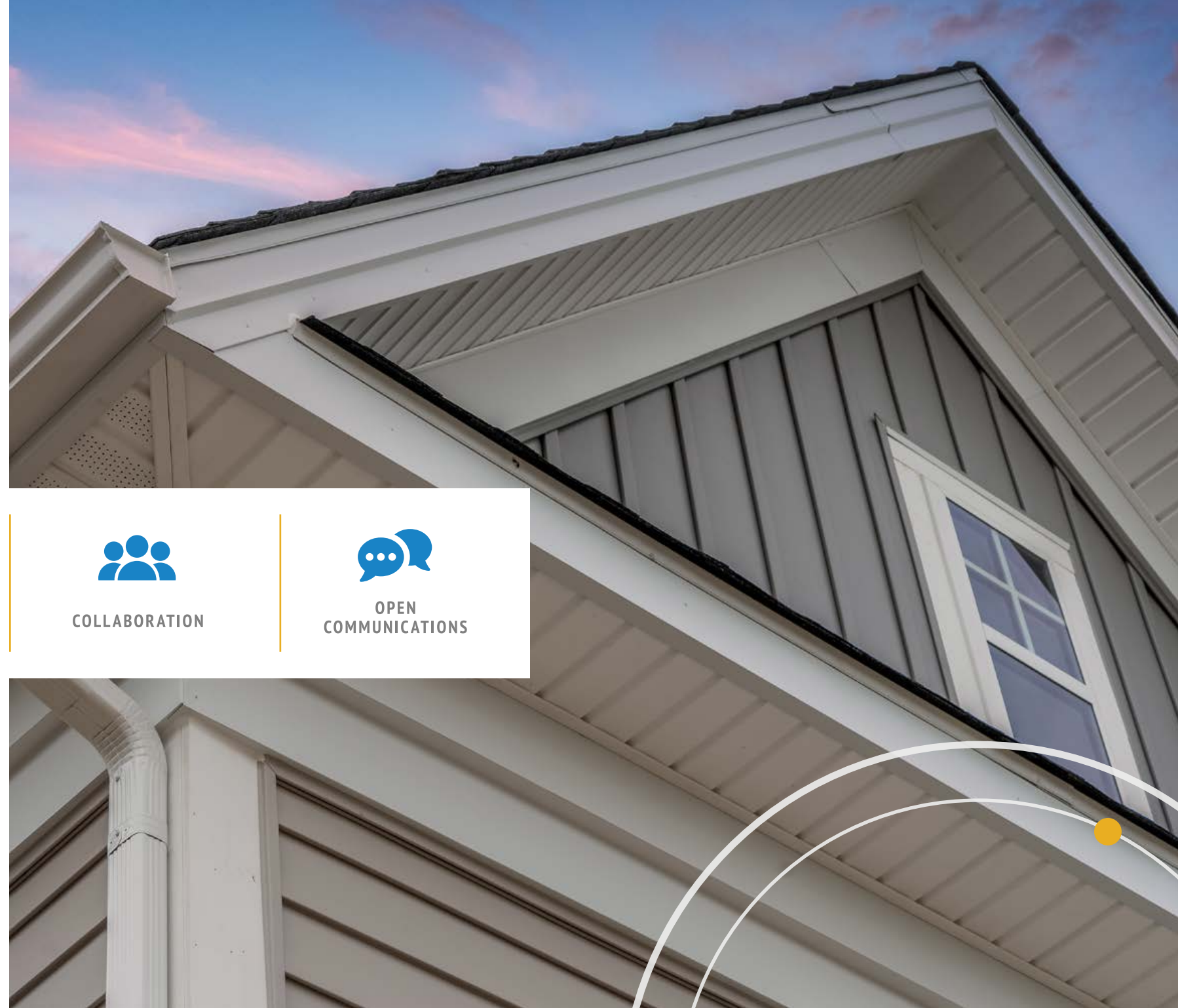
COLLABORATION



OPEN
COMMUNICATIONS

The relevance of each guiding principle is dependent on a company's position in the supply chain. If a company's participation in a specific guiding principle is not relevant to its operations, then the guiding principle is noted as "not applicable."

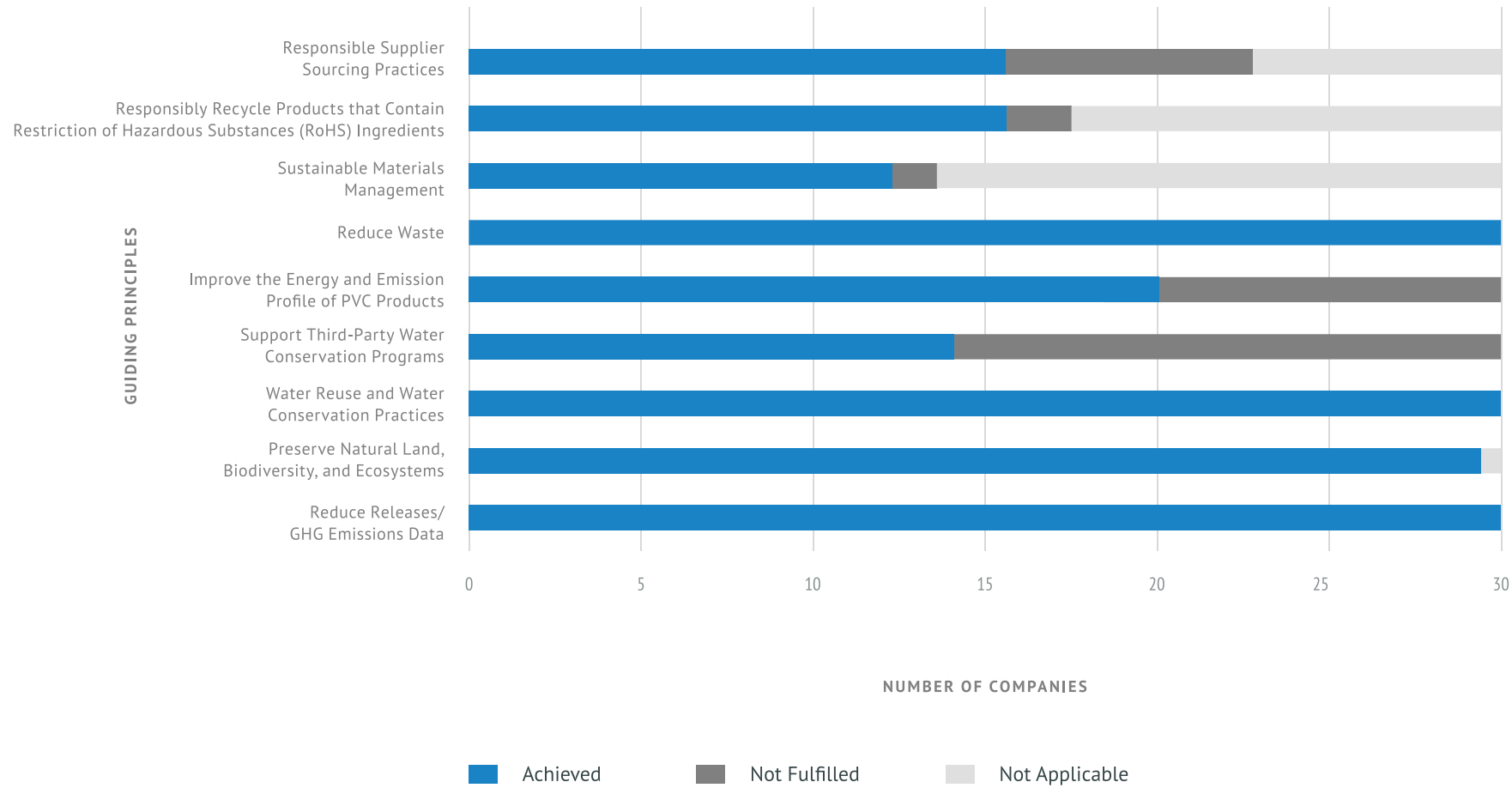
Additionally, where a company's participation is noted as "not fulfilled," this indicates that a company did not provide documentation to support the achievement of that specific guiding principle.





Environmental Stewardship

We strive to protect our natural environment, biodiversity, and ecosystems. On average 85% of the +Vantage Vinyl®-verified companies complied with all the Guiding Principles in this pillar.



Achieved: A company provided documentation to support the achievement of a particular guiding principle.

Not Fulfilled: A company did not provide documentation to support the achievement of a particular guiding principle.

Not Applicable: A particular guiding principle is not relevant to a company's manufacturing process.

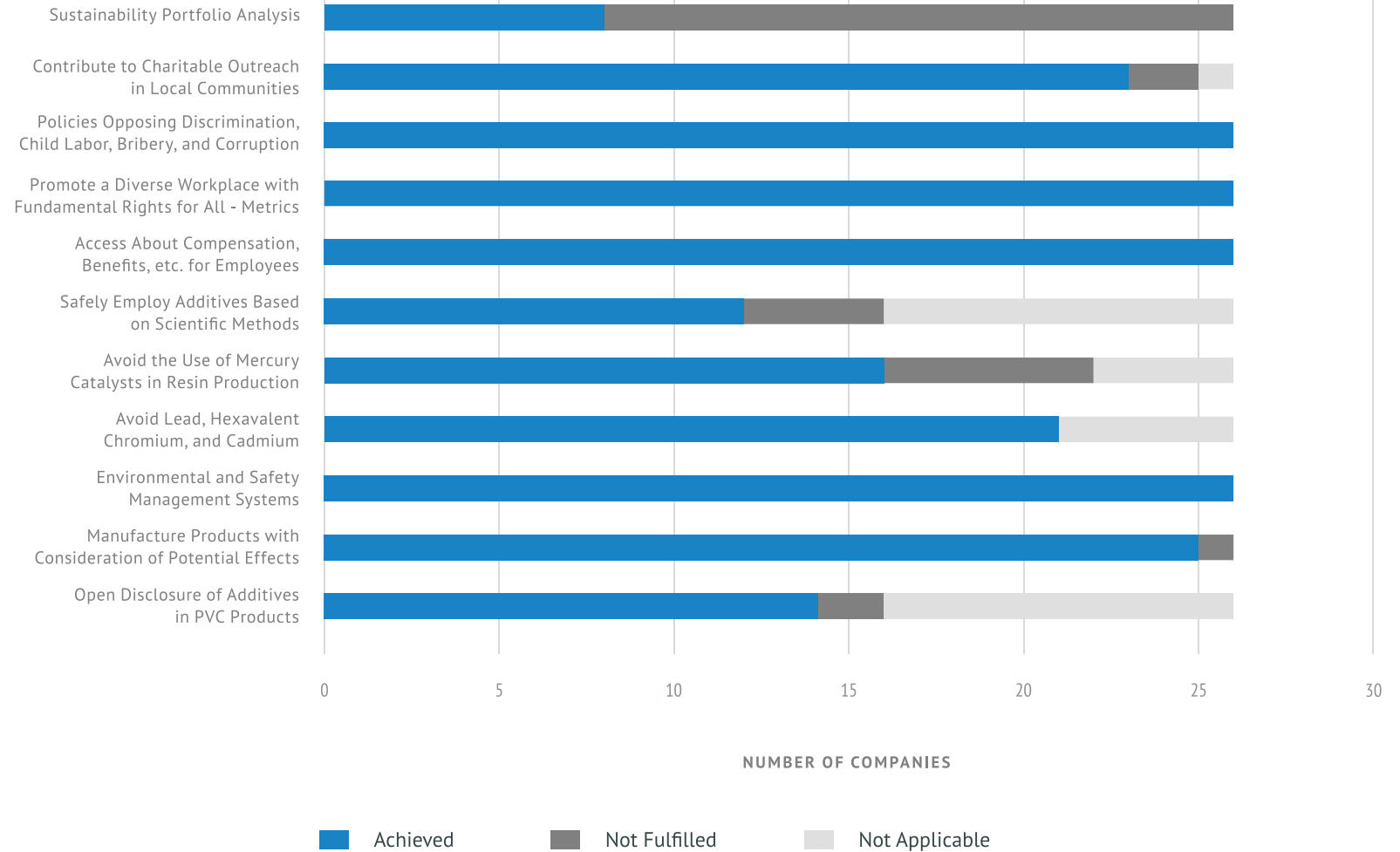




Social Diligence

We aim to manufacture safe and user-friendly products while taking care of our employees and communities. On average, 88% of +Vantage Vinyl®-verified companies complied with the Guiding Principles within this pillar.

GUIDING PRINCIPLES

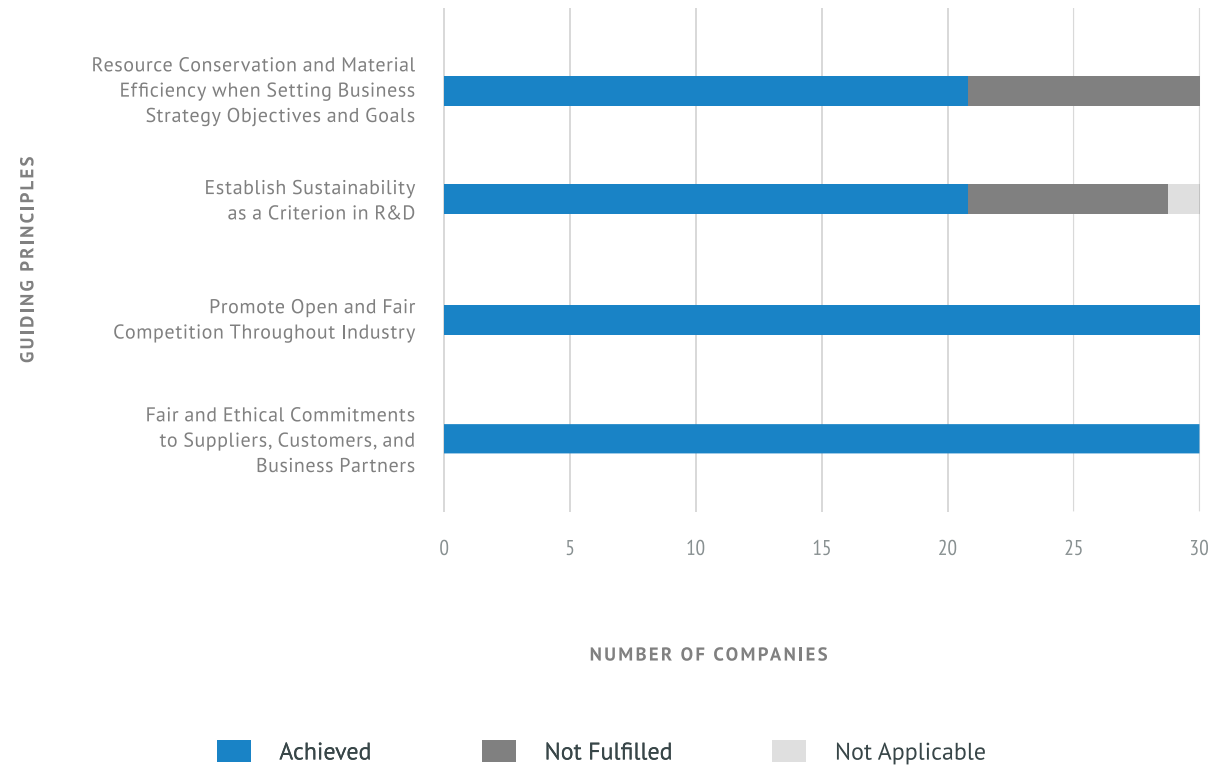


Achieved: A company provided documentation to support the achievement of a particular guiding principle.
Not Fulfilled: A company did not provide documentation to support the achievement of a particular guiding principle.
Not Applicable: A particular guiding principle is not relevant to a company's manufacturing process.



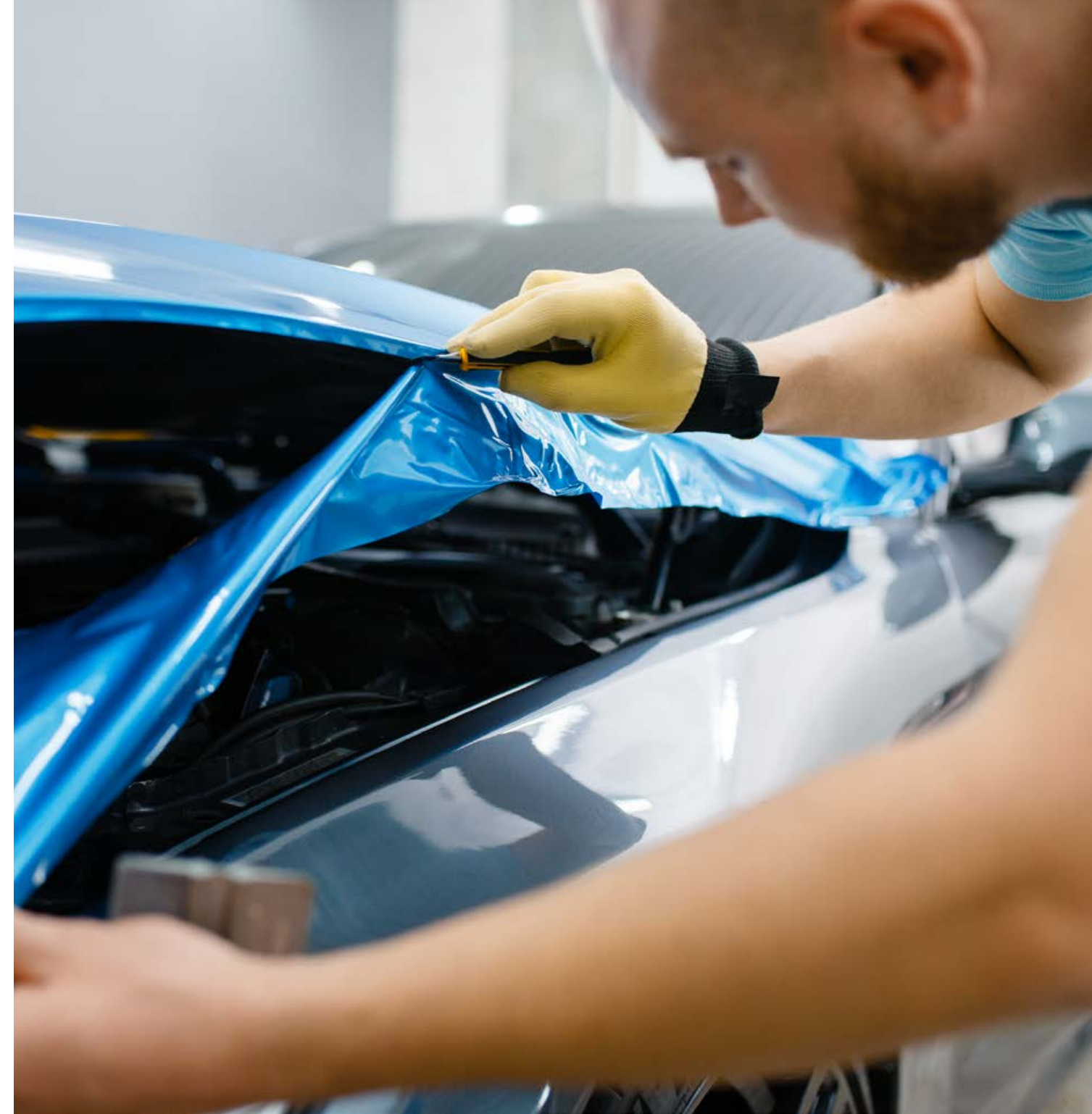
Economic Soundness

We promote open and fair competition, support sustainability education and research, and integrate resource conservation and efficiency into business planning. On average, 87% of +Vantage Vinyl®-verified companies complied with the Guiding Principles within this pillar.



Achieved: A company provided documentation to support the achievement of a particular guiding principle.

Not Fulfilled: A company did not provide documentation to support the achievement of a particular guiding principle.





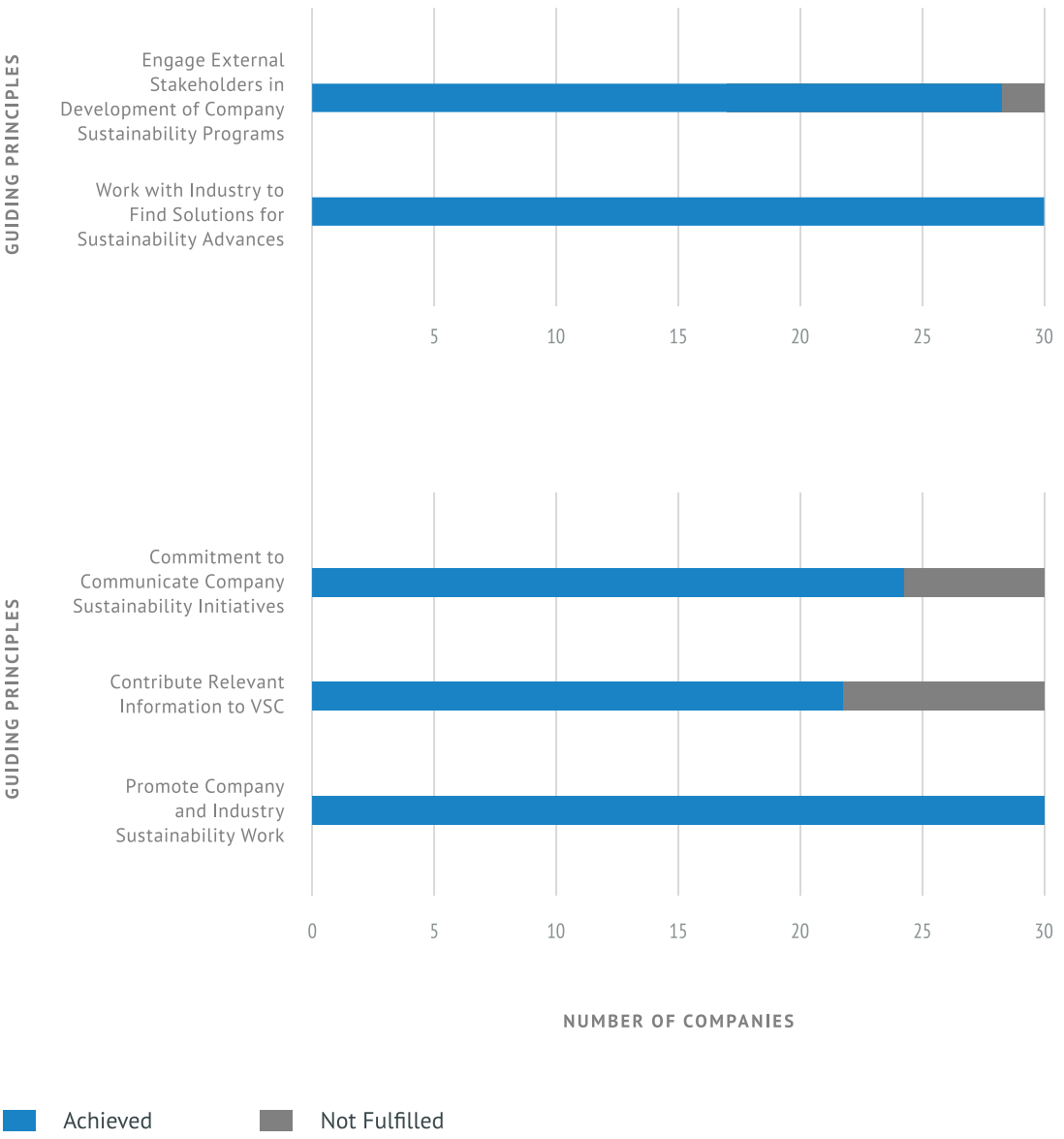
Collaboration

We work within the industry to find solutions and with external stakeholders to ensure we are on the right track. On average, 87% of +Vantage Vinyl®-verified companies complied with all the Guiding Principles in this pillar.



Open Communications

We value transparency and use data to communicate our progress when promoting the +Vantage Vinyl® program. On average, 91% of +Vantage Vinyl®-verified companies complied with all the Guiding Principles in this pillar.

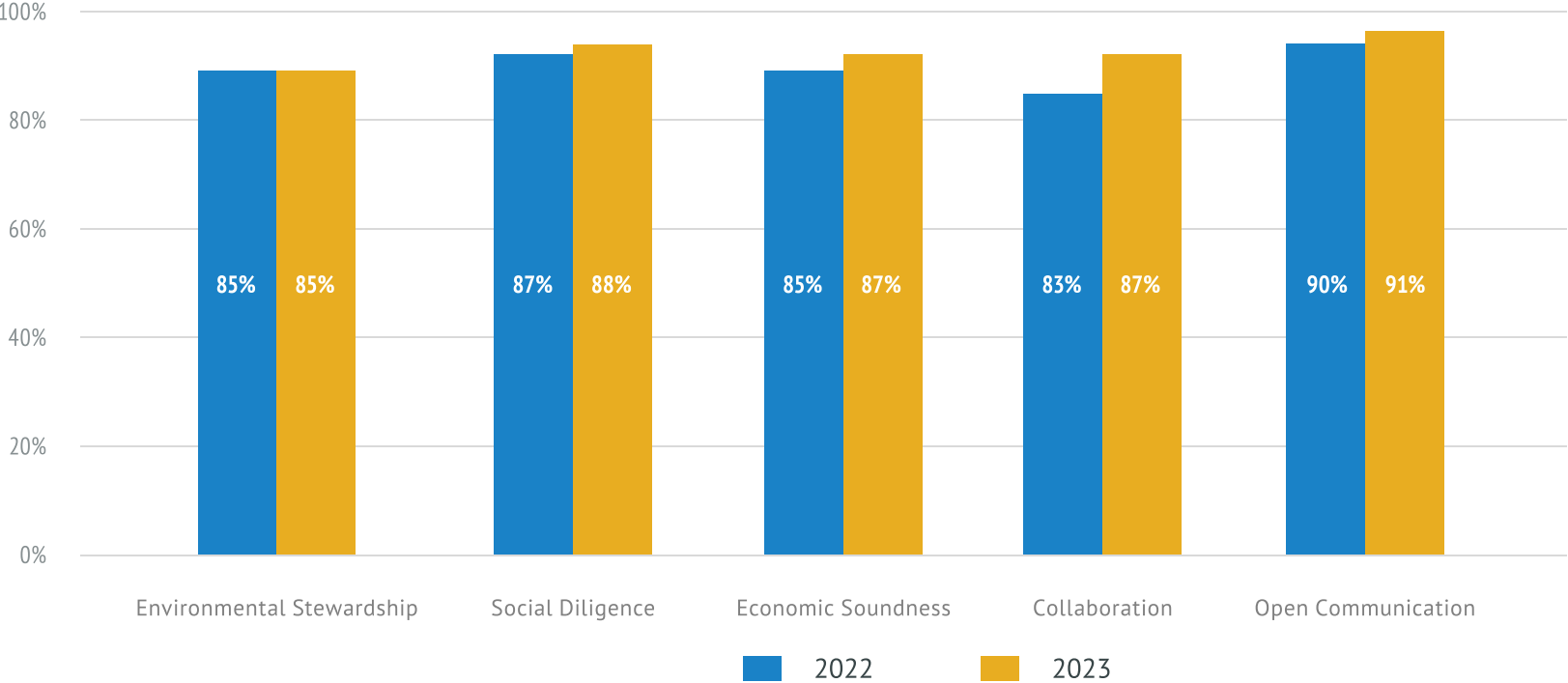


Achieved: A company provided documentation to support the achievement of a particular guiding principle.
Not Fulfilled: A company did not provide documentation to support the achievement of a particular guiding principle.

YEAR-OVER-YEAR COMPARISON

2023 marks the fourth year of measuring compliance with the program Guiding Principles. On average the Guiding Principles increased their conformance by 1.8%. All five pillars increased their performance, with Collaboration showing the largest improvement, from 83% in 2022 to 87% in 2023.

2022 VS 2023 GUIDING PRINCIPLES CONFORMANCE



CELEBRATING LEADERSHIP

INDUSTRY AWARDS

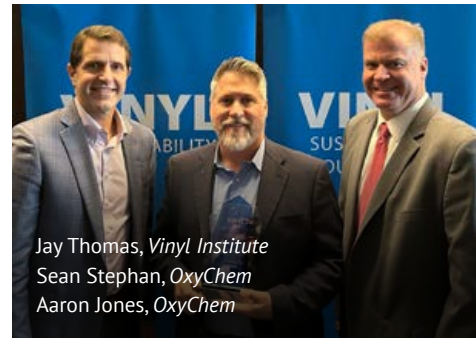


Alex Grover, *i2M*
Jay Thomas, *Vinyl Institute*

RECYCLING AWARD

The VSC Recycling Award recognizes the efforts of recyclers and product manufacturers with operations in North America that find new solutions and/or markets for PVC end-of-life or scrap materials, increase use of recycled vinyl content in their products, and/or engage in partnerships with companies in take-back programs. In 2023, the VSC recognized i2M for their design and development of a unique solution for preventing PVC pool liners from ending up in landfills once they were removed from pools.

i2M received the 2023 Recycling Award for its ReNew program, which is a full service take-back program. By working with ReNew Champions, which include pool liner fabricators, pool product distributors, and installers, they have made recycling pool liners an easy option. The recipient has proudly increased their ReNew Champions partner count by 196%. In 2023, they also increased their total bin count by 228%, with nearly 100 bins and counting along the East Coast. Additionally, they expanded their recycling offering to include both used vinyl liners and pool floats. The results of these efforts allow them to showcase the recyclability of vinyl, and they're anticipating continued growth of pickup points and material recycled in the coming years.



Jay Thomas, *Vinyl Institute*
Sean Stephan, *OxyChem*
Aaron Jones, *OxyChem*

SOCIAL IMPACT AWARD

The VSC's Social Impact Award recognizes the efforts of a VSC member that has demonstrated a strong commitment to community well-being and longevity. This annual award acknowledges an outstanding project or program that addresses a social concern using a company's resources to have a positive impact.

In 2023, this award went to OxyChem for their work giving back to local schools. Administrators had identified energy costs as the number two expense for the school district. Working with the Department of Energy, OxyChem used their expertise, performing free energy audits of school districts to help with energy conservation. Additionally, they donated over \$42,000 to assist schools in implementing improvements, such as installation of occupancy sensors; LED lightbulbs and light fixtures; and insulation of heating, ventilation, and air conditioning systems.

MAKING PROGRESS IN THREE IMPACT CATEGORIES

The VSC is focused on making industry advancements in three impact categories reconfirmed through an updated materiality assessment, as follows:



Resource Efficiency addresses the priority areas of end-of-life disposition, landfill avoidance, and recycling.



Emissions addresses the priority areas of emissions to air, water, and soil, emphasizing climate and biodiversity impacts.



People & Community (formerly Health & Safety) addresses the priority areas of community health and safety and user health and safety. In 2023, the VSC renamed this impact category “People & Community” to better reflect the activities being undertaken by the task force group.





RESOURCE EFFICIENCY

\$1.67 million dollars was awarded to 16 projects through the VIABILITY™ grant program in 2023.

VIABILITY™

In January 2023, the VI launched VIABILITY™, a first- of-its-kind, industry-wide vinyl recycling grant program aimed at accelerating post-consumer PVC recycling across the country. The grant program makes up to \$3 million in funds available over a three-year period from four PVC resin manufacturers in the U.S. (Formosa, OxyChem, Shintech, and Westlake). Individual recycling grants issued through VIABILITY™ are available to qualifying industry organizations such as trade associations, material recovery facilities, construction and demolition waste facilities, recyclers, or colleges and universities in amounts up to \$500,000. The funds may be used for the purchase of equipment, process investments, research and development, educational programs, and program management that supports long-lasting and sustainable recycling of vinyl products.

For more information, please visit: vinylinfo.org/recycling.



INCREASE POST-CONSUMER RECYCLING

The vinyl industry is committed to the responsible use of natural resources. We are extending the use of these materials through reusing, repurposing, recycling, and recovering the value locked inside vinyl materials at the end of their first useful life. Most vinyl products – like vinyl siding or PVC pipes – are durable and remain in use for decades.





RESOURCE EFFICIENCY

VIABILITY™ In Action

The Revynlize Recycling Collaborative is an initiative launched by the Polymeric Exterior Products Association (PEPA) with the goal of increasing the amount of recycled post-consumer rigid vinyl. Following a successful pilot program and with the assistance of a VIABILITY™ grant, the collaborative created the infrastructure to grow the recycling program nationally. As a result, 400,000 pounds of post-consumer vinyl siding have been collected, with a goal to recycle 5 million pounds by the end of 2025.

Auto Mats & Accessories (AMA) is a manufacturer of auto mats and other auto accessories made from post-consumer and post-industrial vinyl material. Through the assistance of a VIABILITY™ grant, the company was able to purchase a new injection molding machine to expand capacity. As a result of the new equipment, the company will be able to recycle up to one million more pounds of PVC per year.

Every Shelter is a non-profit organization that designs shelter solutions for displaced communities and refugees all over the world. The organization received a grant to develop the proof of concept to repurpose vinyl billboards at end of life into tarps for temporary roofing for disaster relief. During the grant period Every Shelter was able to repurpose 74,250 pounds of vinyl billboards bound for landfills into 1,650 emergency tarps. The future goal is to repurpose 450,000 pounds per year into 22,000 tarps.

TARNELL LENDS A HAND

In 2024, the VI worked with Tarnell Company to conduct a spot check of 100 companies (out of more than 200) that had participated in the 2023 Tarnell Vinyl Recycling Survey.

The spot check was intended to gauge the year-to-year fluctuations in recycling volumes. As expected, some individual companies reported higher volumes and others reported lower volumes. Overall, the spot check results give the VI a high degree of confidence in its previously reported industry recycling volume of 1.1 billion pounds in the U. S. and Canada. It's also important to acknowledge that macroeconomic factors such as high interest rates are contributing to a tightening of the construction and renovation markets, which could lead to reduced scrap generation and ultimately less material available for recycling. In future years the Vinyl Institute will seek to understand the extent to which these factors impact the industry recycling volumes. Additionally, the investments made by vinyl recycling companies have led to greater volumes specific to those programs due to increased capabilities to accept vinyl scrap material with higher levels of contamination than would have previously been accepted.

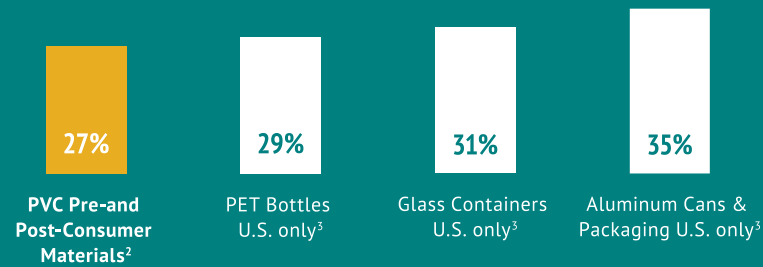




RESOURCE EFFICIENCY

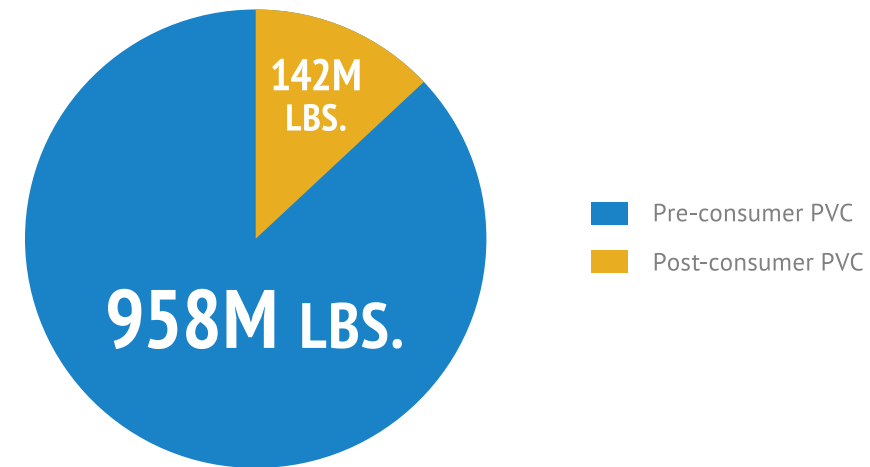
Industry Recycling Benchmarks

Recycling rates for all PVC materials is comparable to commonly recycled packaging. The VI assessed the recyclability of all PVC materials at the end-of-life, not just certain components. PVC compares favorably to EPA recycling rates for common post-consumer packaging materials.



Note: PVC recycling rate is estimated as Total Recycled Volume / (Total Recycled Volume + EPA Estimate for Municipal Solid Waste + VI Estimate for Construction & Demolition Waste)

1.1B lbs. of PVC materials are recycled annually in the U.S. and Canada¹



Note: Estimates are from a survey of 140 recyclers in U.S. and Canada, last completed in 2019. Totals exclude manufacturing scrap that is internally reused by the producer

¹ 2019 Tarnell Company Recyclers Survey (Amounts Sold)

² Krock, R., et al, "An Update on PVC Plastic Circularity and Emerging Advanced Recovery Technologies for End-of-Life PVC Materials." REMADE Institute Technical Conference, March 2023. Pre-consumer material includes scrap generated during production of materials which is being diverted from landfill, and excludes internally-consumed 'regrind' material.

³ 2018 U.S. EPA Plastics: Material Specific Data & Aluminum: Material Specifics Data & Glass: Material Specific Data



EMISSIONS

Life cycle assessment (LCA) is an analytical tool used to comprehensively quantify and interpret the environmental impacts of the entire life cycle of a product. A LCA takes a deeper look at each stage a of product's life, from raw material extraction to end-of-life management. The LCA provides valuable data that decision-makers can use in support of sustainability initiatives.

ASSESSING RESIN INDUSTRY PROGRESS

The 2024 VI LCA report considered data from four suspension grade PVC resin (S-PVC) manufacturers in the United States: Formosa Plastics Corporation, Westlake Corporation, Shintech Inc., and OxyChem. A total of 14 manufacturing facilities were considered, covering approximately 100% of the United States S-PVC resin production. The cradle-to-gate life cycle was considered for the chlor-alkali, EDC/VCM, and S-PVC resin production stages.

A summary of the 2024 and 2015 LCA data is provided in the table below. It is important to note that life cycle impact assessment data may differ due to variations within datasets, differences in vintage, and differences in cutoff criteria, all which can impact the results. Direct claims must be taken with that consideration.

Energy Category	Previous Report (2015 Data)	Current Report (2022 Data)	Percent Difference	Units
Total Energy	58	51	-11%	GJ
Non-Renewable Energy	57	51	-11%	GJ
Renewable Energy	0.5	0.6	20%	GJ
Total Solid Waste	83.5	49.9	-40%	Kg

Impact Category	Previous Report (2015 Data)	Current Report (2022 Data)	Percent Difference	Unit (per metric tonne)
Global Warming Potential	2.10E+03	1.86E+03	-12%	kg CO ₂ eq
Eutrophication	2.60E-01	1.29E+0	395%	kg N eq
Smog	1.31E+02	7.65E+01	-42%	kg O ₃ eq
Acidification	6.14E+00	1.08E+001	76%	kg SO ₂ eq
Ozone Depletion	2.50E-03	1.04E-04	-96%	kg CFC-11 eq
Cumulative Energy Demand	5.78E+04	5.02E+04	-13%	MJ
Water Consumption	1.43E+01	3.16E+00	-78%	m ³

The total global warming potential (GWP) from S-PVC resin was calculated to be 1.86E+03 kg CO₂ equivalent per metric tonne of S-PVC. This is a 12% decrease compared to the values calculated in a previous report based on 2015 data. This decrease in GWP aligns with the overall energy decrease and non-renewable energy decrease of 11% seen between the two studies.

For other impact categories, eutrophication shows an increase of nearly four times what was reported in the previous study. The increase is primarily the result of changes in measurement criteria for wastewater treatment and nitrogen use between the two study years. The previous study did not consider safety-related uses of nitrogen, used primarily for tank blanketing to ensure that the resin does not come into contact with oxygen. The difference in wastewater impacts were the result of manufacturing sites reporting higher values of discharge water compared to water intake.

The smog impacts decreased by 42%, while the acidification impacts have nearly doubled from the last study. By contrast, cumulative energy demand has decreased by 13% and water consumption has decreased by 78%, while ozone depletion has decreased by nearly half.



EMISSIONS

Celebrating Continuous Improvement

The PVC resin manufacturer's trade association, VI, proudly recognizes member facilities in the PVC, EDC/VCM, plasticizer production, additive production, and PVC and chlorinated PVC compounding categories that have achieved outstanding performance in Environmental Excellence and Environmental Honor.

The performance criteria for these awards are based on the U. S. Environmental Protection Agency's (EPA) National Emissions Standards for Hazardous Air Pollutants (NESHAP), other regulatory permit performance, and the EPA's Toxic Release Inventory (TRI) data for air and water during the previous calendar year.

The VI recognized 14 member facilities in 2023 that had outstanding environmental performance for five or more consecutive years.



EDC-only plant
Point Comfort, Texas
12 consecutive years of performance

PVC/CPVC Compounding Plant
Point Comfort, Texas
13 consecutive years of performance



PVC Plant
Pedricktown, New Jersey
8 consecutive years of performance



CPVC Compounding Plant
Louisville, Kentucky
9 consecutive years of performance



EDC-Only Plant
Convent, Louisiana
12 consecutive years of performance

EDC-Only Plant
Geismar, Louisiana
5 consecutive years of performance



LLC, PVC Plant
Addis, Louisiana
5 consecutive years of performance

PVC/CPVC Compounding Plant
Freeport, Texas
5 consecutive years of performance



PVC/CPVC Compounding Plant
Industry, California
6 consecutive years of performance

PVC/CPVC Compounding Plant
Jamestown, North Carolina
6 consecutive years of performance

PVC/CPVC Compounding Plant
Fountain Inn, South Carolina
8 consecutive years of performance



Plasticizer/Additive Manufacturing Plant
Aberdeen, Mississippi
11 consecutive years of performance

PVC/CPVC Compounding Plant
Aberdeen, Mississippi
11 consecutive years of performance

PVC Compounding Plant
Madison, Mississippi
8 consecutive years of performance



PEOPLE & COMMUNITY

The People & Community Task Force maintains various key focus areas – user health and safety; community health and safety; ingredient transparency; community engagement; supply chain transparency and responsibility; and diversity, equity, and inclusion. The group works on educating members, providing tools and resources, and sharing best practices on these topics.

The Occupational Safety and Health Administration (OSHA) regulates workplace safety in the United States. Production facilities are mandated to report any recordable work-related accidents to OSHA on a regular basis. The vinyl industry resin and monomer producers' record on OSHA recordable injuries is best in class compared to both overall U.S. manufacturing and chemicals production.

In 2023, the VI recognized 28 production facilities for members that achieved zero OSHA recordable accidents. Nine of these facilities reported zero OSHA recordable accidents for over 5 years in a row.



Plasticizer/Additive Manufacturing Plant
Louisville, Kentucky
7 consecutive years of performance



Formosa Plastics

PVC/CPVC Compounding Plant
Point Comfort, Texas
13 consecutive years of performance

OxyChem

EDC-Only Plant
Geismar, Louisiana
5 consecutive years of performance

PVC Plant
Pedricktown, New Jersey
5 consecutive years of performance

EDC/VCM Plant
Ingleside, Texas
7 consecutive years of performance



PVC Plant
Plaquemine, Louisiana
11 consecutive years of performance



Plasticizer/Additive Manufacturing Plant
Brownsville, Tennessee
10 consecutive years of performance

Westlake

Plasticizer/Additive Manufacturing Plant
Aberdeen, Mississippi
8 consecutive years of performance

PVC plant
Calvert City, Kentucky
5 consecutive years of performance



PEOPLE & COMMUNITY

Water Well Trust Partnership

Access to clean drinking water is something everyone deserves. PVC pipe helps make this a reality, and a partnership between the Water Well Trust (WWT) and the VI is having a real, measurable impact.

WWT was created by the Water Systems Council to provide a clean water supply to American families living without ready access to a resource so many of us take for granted. Their team serves Americans living primarily in rural, unincorporated areas, or minority communities that may be isolated and difficult to reach.

Since these projects are often carried out in rural and difficult to reach areas, they need a solution that is dependable and long-lasting. That's where PVC pipe comes in.

In 2023, 31 projects were completed around the country, utilizing 5,419 feet of PVC pipe. This pipe was sourced and donated by companies in the vinyl industry through a partnership between the Vinyl Institute and the WWT.

Learn more at waterwelltrust.org.

scoreWISE

In 2022, the People & Community Task Force worked with Sustainable Solutions Corporation to develop a sustainable scorecard tool, called scoreWise, to assist companies in the integration of sustainability thinking in the product development process. Using scoreWISE, companies measure product performance across five metrics of sustainability – raw materials, hazardous or restricted materials, circularity, customer value creation, and carbon footprint. scoreWISE provides users with both a visual and numerical representation of the tradeoffs and improvements of design decisions early in the process when it can have the most impact on product sustainability.

scoreWISE is an assessment tool designed to measure and communicate sustainable attributes. It is applicable anywhere in the vinyl supply chain from raw material manufacturing to finished product production. It can be used in myriad ways – comparing the sustainability profile of a product when using bio-based materials vs. non-bio-based materials in product creation, evaluating the production footprint of the same product across multiple facilities, or comparing the sustainability profile of a product over multiple generations.

During 2023, the VSC worked with member companies to develop case studies of the scoreWISE tool in action.

scoreWISE Testimonials

“The product development process requires a lot of testing and expensive scale up, so the earlier on that we can make our customers aware of the design tradeoffs or evaluate those for ourselves, the more time and money we can save. We like how scoreWISE provides us with new sustainability criteria to evaluate our products as well as a way to visually present this to our team and customers.”

– *Wes Wangerin, Achilles USA*

“We really appreciated that the scoreWISE tool was material and input agnostic and still allowed for a holistic look at sustainability. It reinforced our desire to ensure that our products were sustainable by design and not just by happenstance.”

– *Arthur Clarke, HMTX Industries*



CONTRIBUTING TO THE UNITED NATIONS SUSTAINABLE DEVELOPMENT GOALS

While the vinyl industry can contribute to each of the seventeen U.N. Sustainable Development Guides (or SDGs) to varying degrees, the four SDGs to which vinyl industry sustainability efforts contribute most substantially are:



One-quarter of all medical devices use PVC due to its performance and cost-effectiveness.

PVC Blood Bags Safely Preserve Blood for up to 42 Days¹

- A storage period of up to 42 days is crucial for preserving the more than 14 million units of blood transfused in the U. S. annually.²
- Patients' safety depends on a stable supply of blood, especially red blood cells that must meet the criteria of a low hemolysis rate without visible hemolysis in the supernatant.³

PVC Flooring, Wall Protection, and Coated Fabrics Help Prevent the Spread of Infectious Bacteria

- PVC interior applications have surfaces that are smooth and impermeable which helps them withstand frequent harsh cleaning, disinfection, and sanitation protocols in medical facilities.⁴

PVC Medical Applications Protect Healthcare Professionals and Caregivers from Serious Contagions

- PVC is one of the only materials that meet strict requirements for personal protective equipment (PPE) – face shields, goggles, and gloves – for doctors, nurses, and caregivers treating virulent diseases like Ebola.⁵
- PVC sterile tubing helps medical professionals administer basic care to people.⁶
- PVC sealant tape used in medical containment units creates an effective barrier for stopping the spread of infectious diseases.
- PVC sealants for medical bottles and containers keep contents fresh and free from bacteria.

¹ Carmen, R. (Jan. 1993): *The Selection of Plastic Materials for Blood Bags*, *Transfusion Medicine Reviews*, Vol. VII, No. 1

² Centers for Disease Control/Blood Safety https://www.cdc.gov/blood-safety/hcp/diagnosis-testing/?CDC_AAref_Val=https://www.cdc.gov/bloodsafety/basics.html

³ PVCMed Alliance <https://pvcmed.org/healthcare/applications/medical-bags/blood-bags/>

⁴ Interior and Sources, The Time for Upholstered Fabric Performance in Healthcare is Now (Aug. 8, 2022) <https://www.iands.design/products/textiles-fabrics/article/21066721/the-time-for-upholstered-fabric-performance-in-healthcare-is-now>

⁵ PVC Med Alliance, Fighting Ebola with PVC (Mar. 10, 2018) <https://pvcmed.org/fighting-ebola-with-pvc>

⁶ World Health Organization (WHO), Interim List of WHO Medical Devices for Ebola Care, Version 21 (Nov. 2014) https://cdn.who.int/media/docs/default-source/medical-devices/meddev-list-ebola-25nov-en.pdf?sfvrsn=61168871_4&download=true



PVC pipes safely deliver clean water and wastewater.

- NSF standards in the United States and some 10 million quality control tests conducted since 1965 ensure that PVC and CPVC safely deliver clean drinking water.
- PVC pipe has a smooth, non-corrosive surface that stays clean even after decades of use, unlike iron pipe, which suffers from tuberculation, a form of internal corrosion and bio-film contamination that can be a breeding ground for bacteria like E-coli⁷ and Legionella.⁷
- The durability and non-corrosiveness of PVC pipes make them critical components of desalination plants.
- PVC pipe is often used as a core component of water wells because they are long-lasting, easy to install, and cost-effective.
- The non-corrosiveness of PVC pipe prevents loss of clean water and seepage of sewage in regions with corrosive soil conditions, unlike metal piping materials.

⁷ PVC Pipe Association <https://www.uni-bell.org/About-Us/Public-Health>

⁸ National Academies, Stronger Policies Needed to Protect the Public from Legionnaires Disease (Aug. 2019) <https://www.nationalacademies.org/news/2019/08/stronger-policies-needed-to-protect-the-public-from-legionnaires-disease>

⁹ PVC Pipe Association Environmental Product Declaration https://www.uni-bell.org/communication/images/environmental_product_declaration_for_water_and_sewer_piping.pdf

¹⁰ McKinsey and Company, Climate Impact of Plastics (July 2022)

¹¹ 2022 cadeo Study Agriculture Energy Efficiency <https://www.vinylinfo.org/wp-content/uploads/2022/12/Ag-Efficiency.pdf>



11 SUSTAINABLE CITIES AND COMMUNITIES

PVC pipes are a lower carbon solution for infrastructure.

- PVC has a well-documented lower carbon footprint when compared to other piping materials like iron, copper, cement, or clay.⁹
- Durable PVC pipes are also proven as the longest-lasting (100+ year service life) of all pipe materials, meaning fewer replacements are needed, and therefore less embodied carbon is required to maintain system integrity over time.⁹
- PVC pipe is lightweight making it easier to transport and install resulting in less GHG emissions.⁹
- PVC pipes have significantly lower total GHG emissions during production than other pipe materials.¹⁰
- In sewer pipe applications, PVC has lower GHG emissions, approximately 45 percent lower than reinforced concrete pipes and 35 percent lower than ductile iron pipes.¹⁰
- PVC piping systems require less energy to pump water resulting in cost, energy, and carbon savings.¹¹



12 RESPONSIBLE CONSUMPTION AND PRODUCTION

PVC applications provide food safety and security, and stop waste.

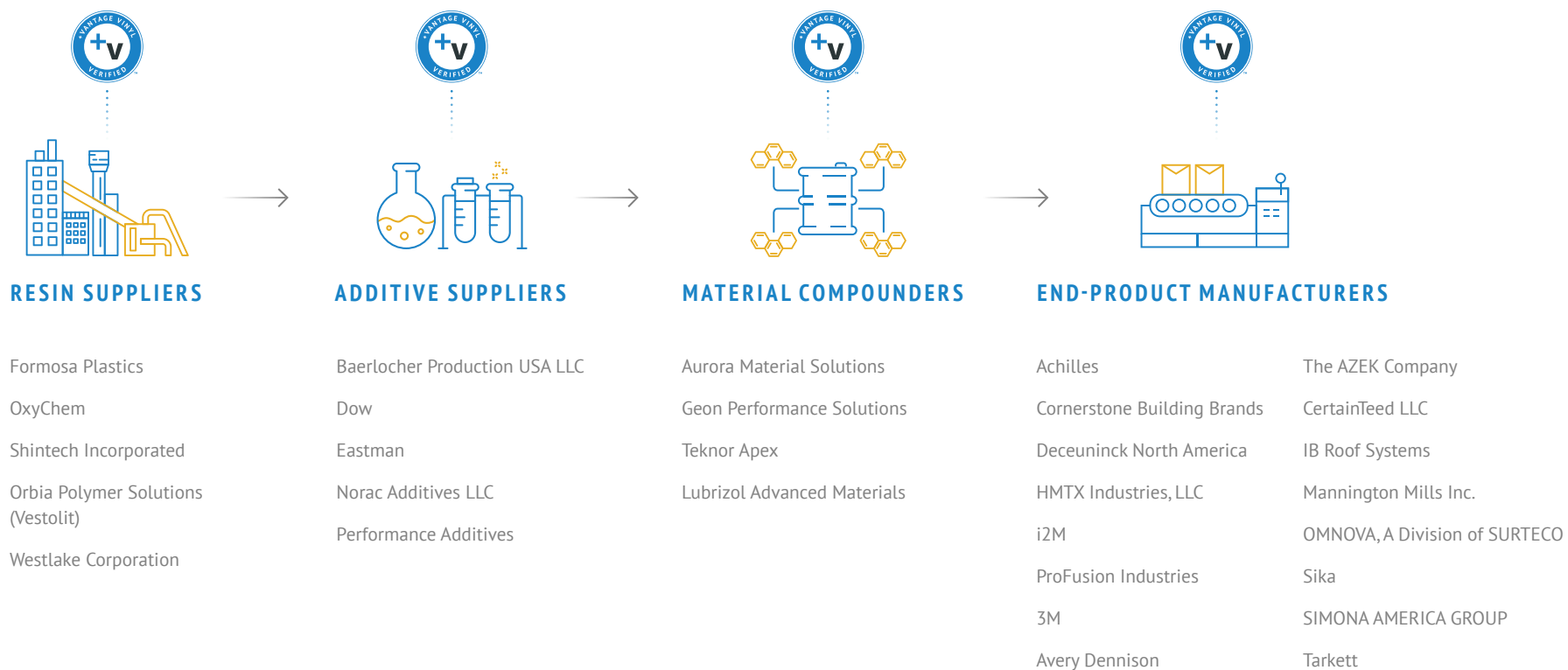
- PVC films protect food products from microorganisms that breed quickly on uncovered food and help prevent food waste.
- Used as an interior metal can liner, vinyl coatings protect the can contents and protect the can from corroding due to acids in the food or beverage thereby increasing product shelf-life.
- Vinyl sealants provide airtight seals for caps and closures on food and beverage bottles and jars keeping food fresh and bacteria out – also preventing food and beverage waste.
- Clear PVC tubes are vital for the construction of bioreactors which produce algae for food, aquaculture, pollution control, and natural carbon sequestration.



LOOKING AHEAD

Once every five years the +Vantage Vinyl® standard is reviewed and updated to reflect changes in the sustainability landscape and advances in company capabilities and commitments. In this way, the standard remains relevant and at the forefront of sustainability commitments in the industry.

This consensus-based process is underway and will conclude with an updated standard to which companies will be measured in 2026.




VINYL SUSTAINABILITY COUNCIL

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