



MODERN VINYL

PART 1: RESPONSIBLE VINYL MANUFACTURING



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PRESENTATION DESCRIPTION

- Vinyl products are an essential building material. With their unique performance characteristics, they are often the best selection for applications where durability, aesthetics, and value are vital.
- Modern vinyl production is a closely controlled and regulated process with an exceptional record of safety in the chemical industry.
- This presentation is part one in a four-part series on today's modern vinyl.
 - Part One - Modern Vinyl - Demystifying today's responsible PVC manufacturing.
 - Part Two - Evaluating Hazard & Risk - Understanding the importance of multi-attribute product specification.
 - Part three - Resource Efficiency - How to use life cycle analysis, embodied carbon and circularity to tell the story of today's modern vinyl.
 - Part four - Manufacturer Responsibility - How industry sustainability standards verify responsible manufacturing and help drive business success.

LEARNING OBJECTIVES

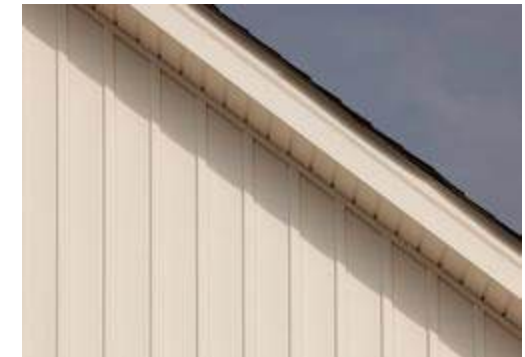
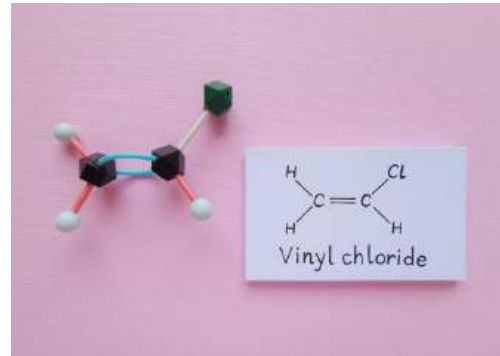
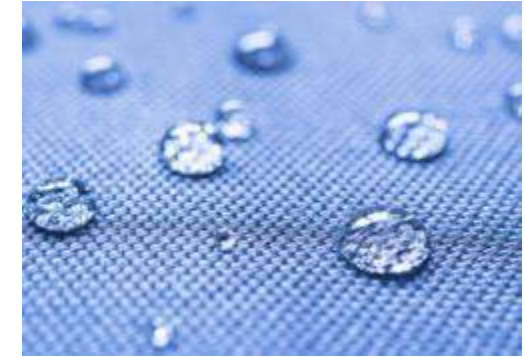
1. Gain an understanding of the basics of vinyl material production, regulations that govern vinyl production, and improvements in emissions performance
2. Explore the many uses and applications of vinyl products
3. Explore programs that govern and verify sustainability compliance parameters, simplifying the specification of sustainable vinyl products



MODERN VINYL

What is Vinyl?

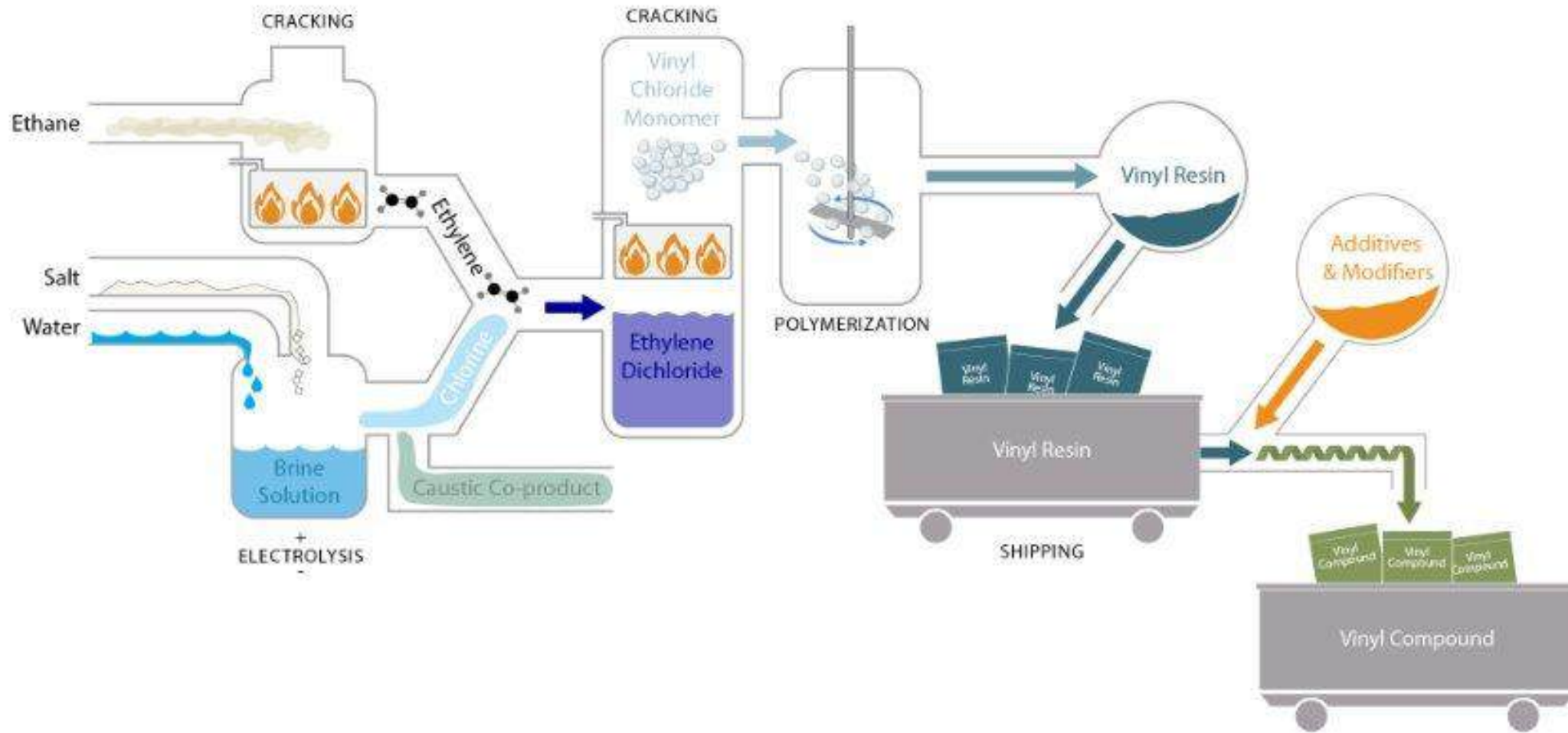
- **Polyvinyl chloride**, known as PVC, or vinyl, is a synthetic thermoplastic material made by polymerizing vinyl chloride
- Discovered in the 19th century and commercialized in the 1920s
- Vinyl is the 3rd largest plastic produced in the world by volume
- Today's vinyl manufacturers are committed to a high standard of health, safety and environmental performance



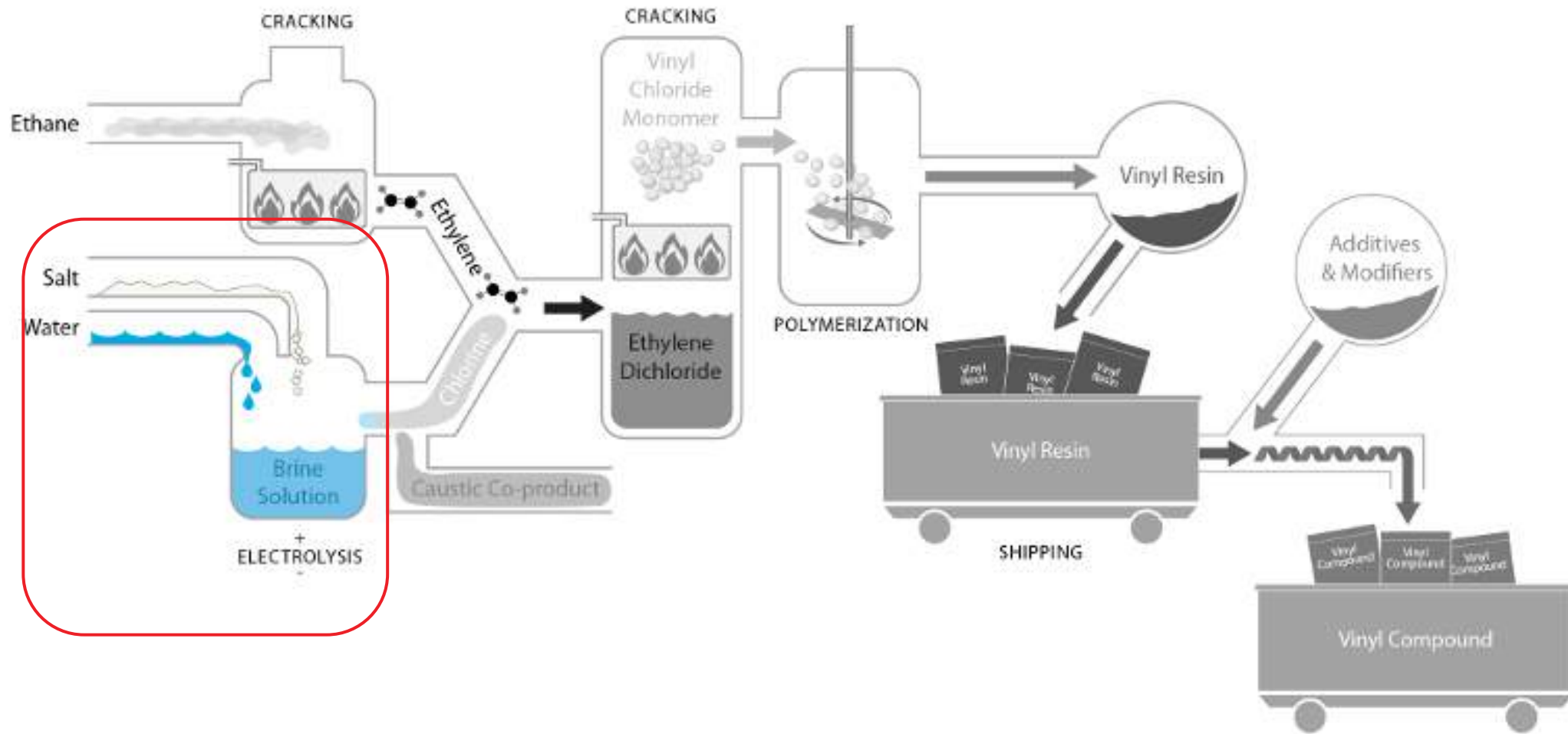


VINYL MATERIAL COMPOSITION, PRODUCTION, & REGULATION

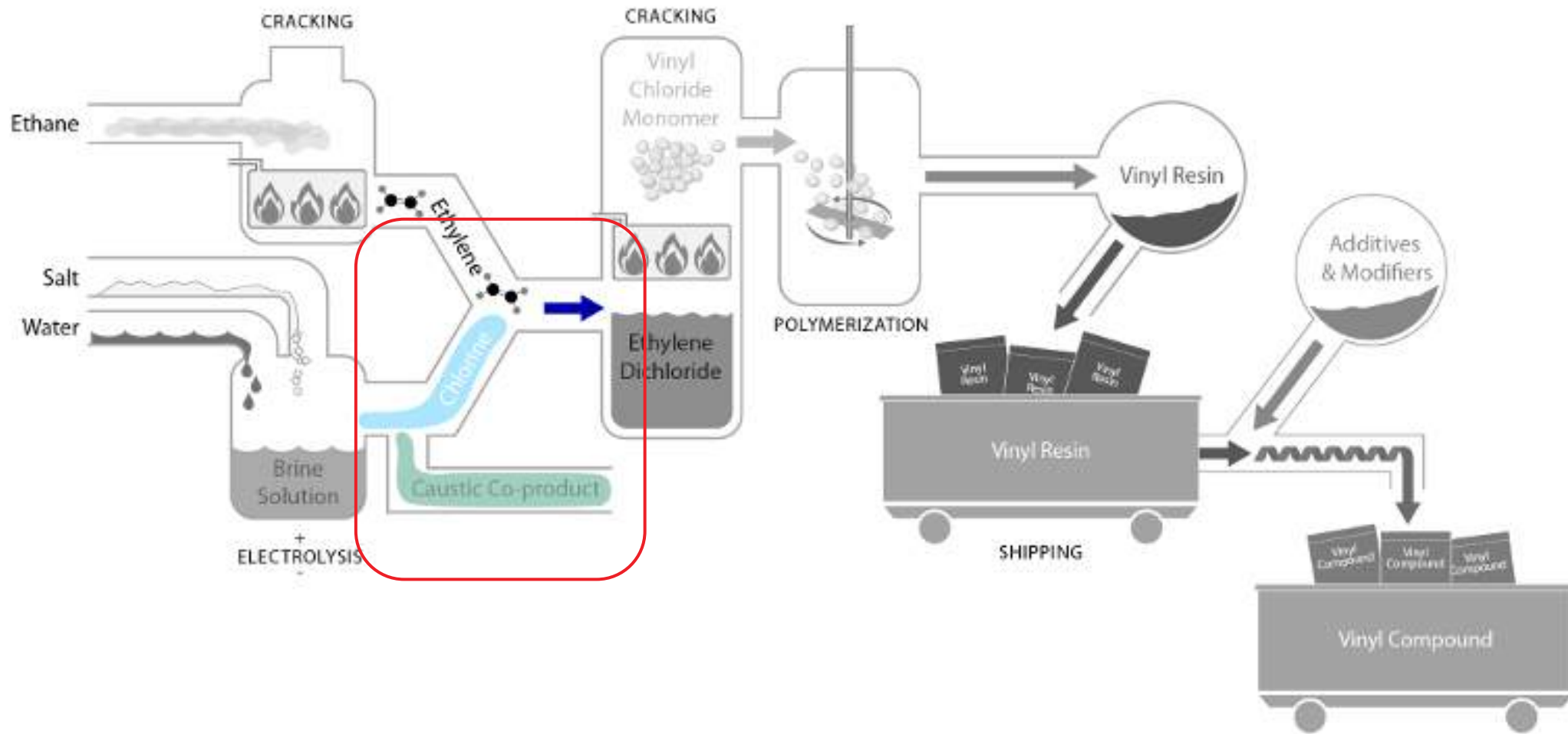
VINYL PRODUCTION PROCESS



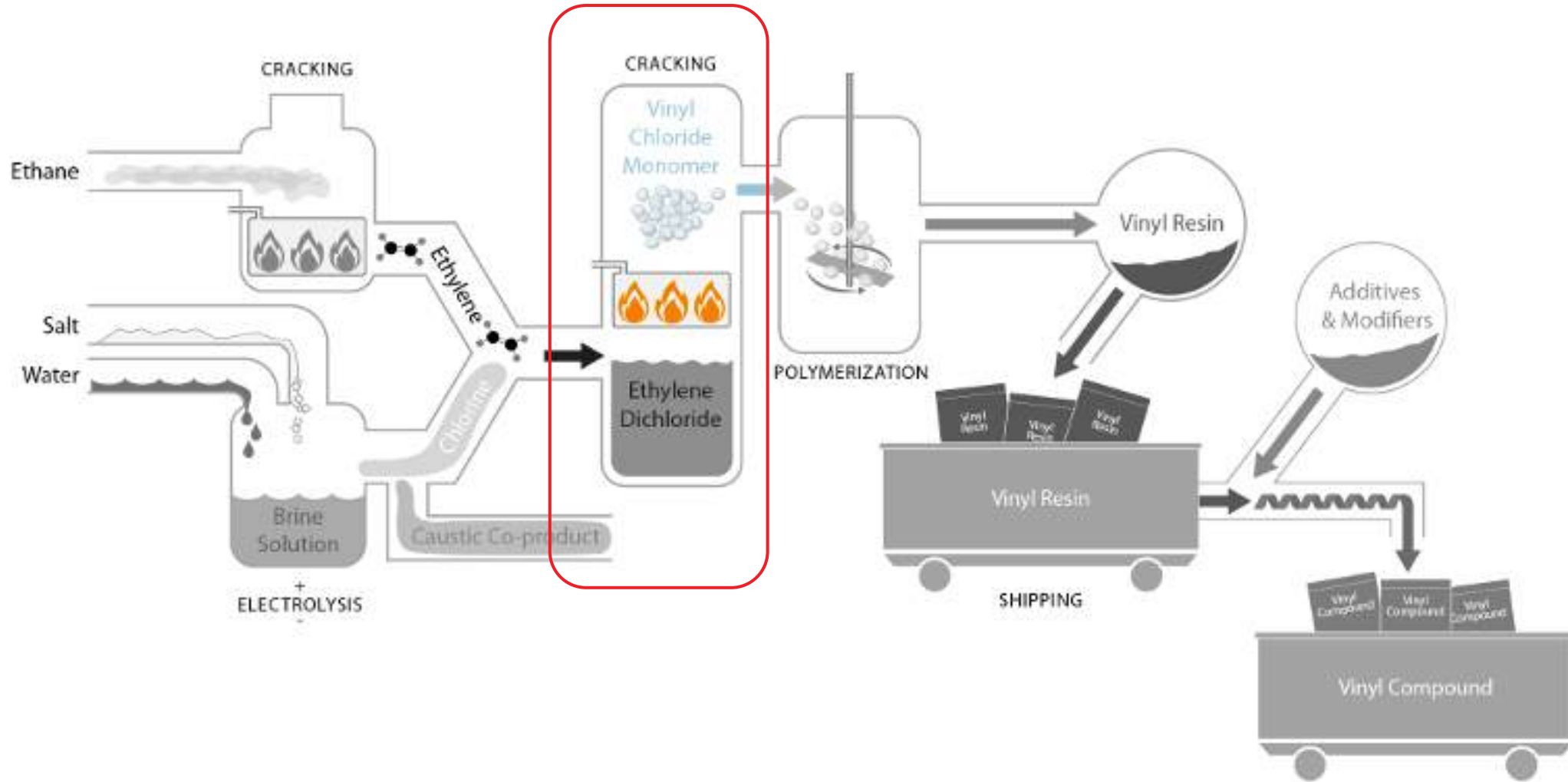
VINYL PRODUCTION PROCESS



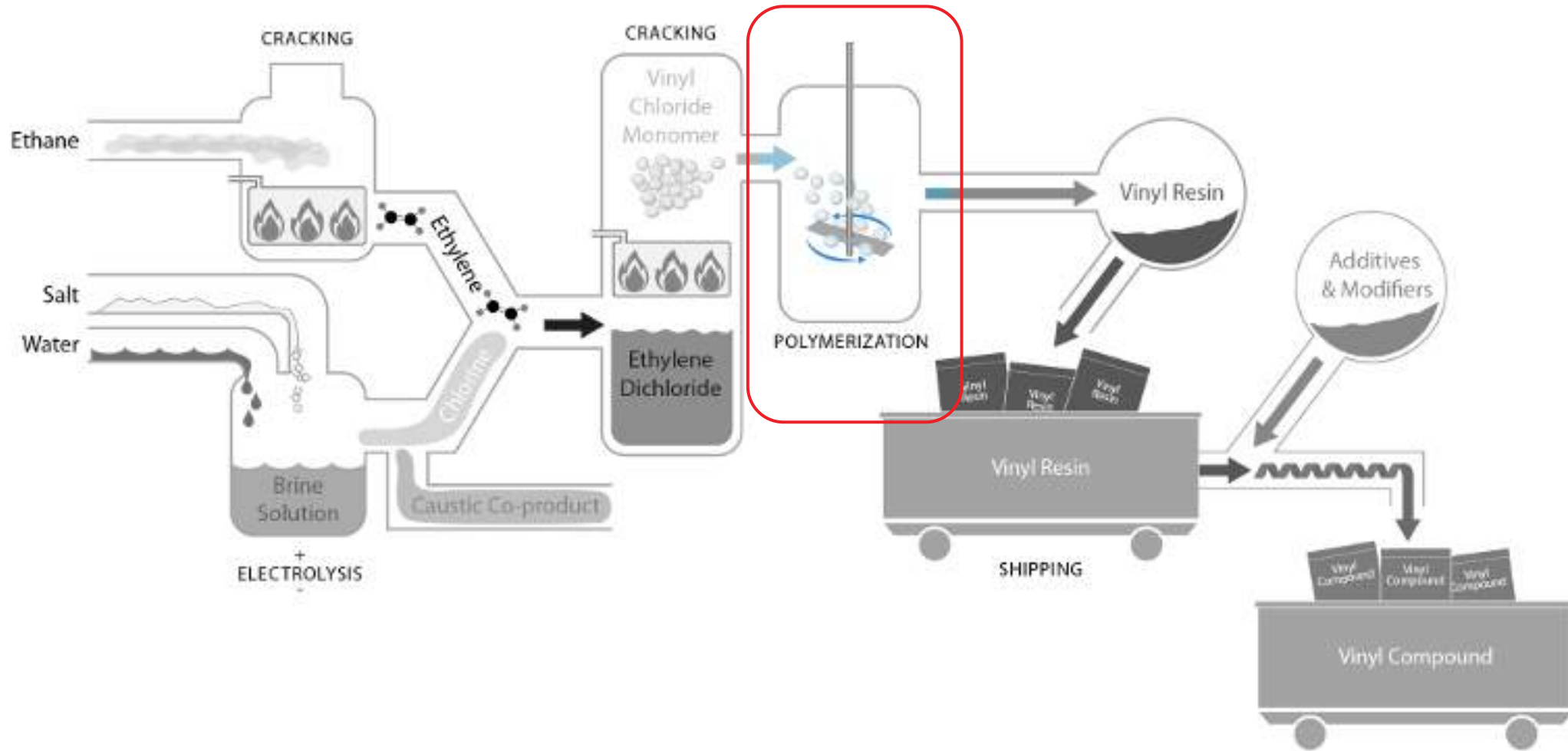
VINYL PRODUCTION PROCESS



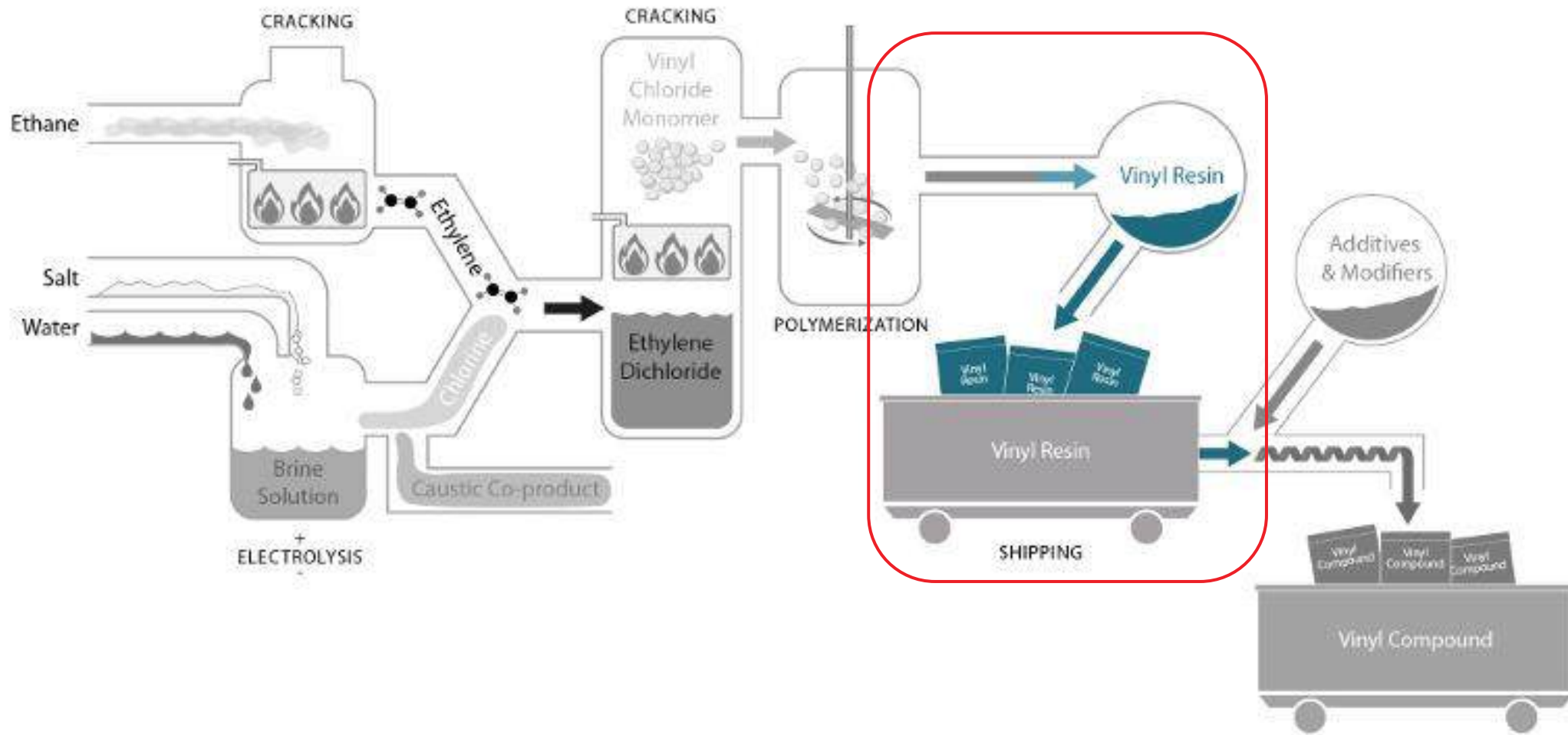
VINYL PRODUCTION PROCESS



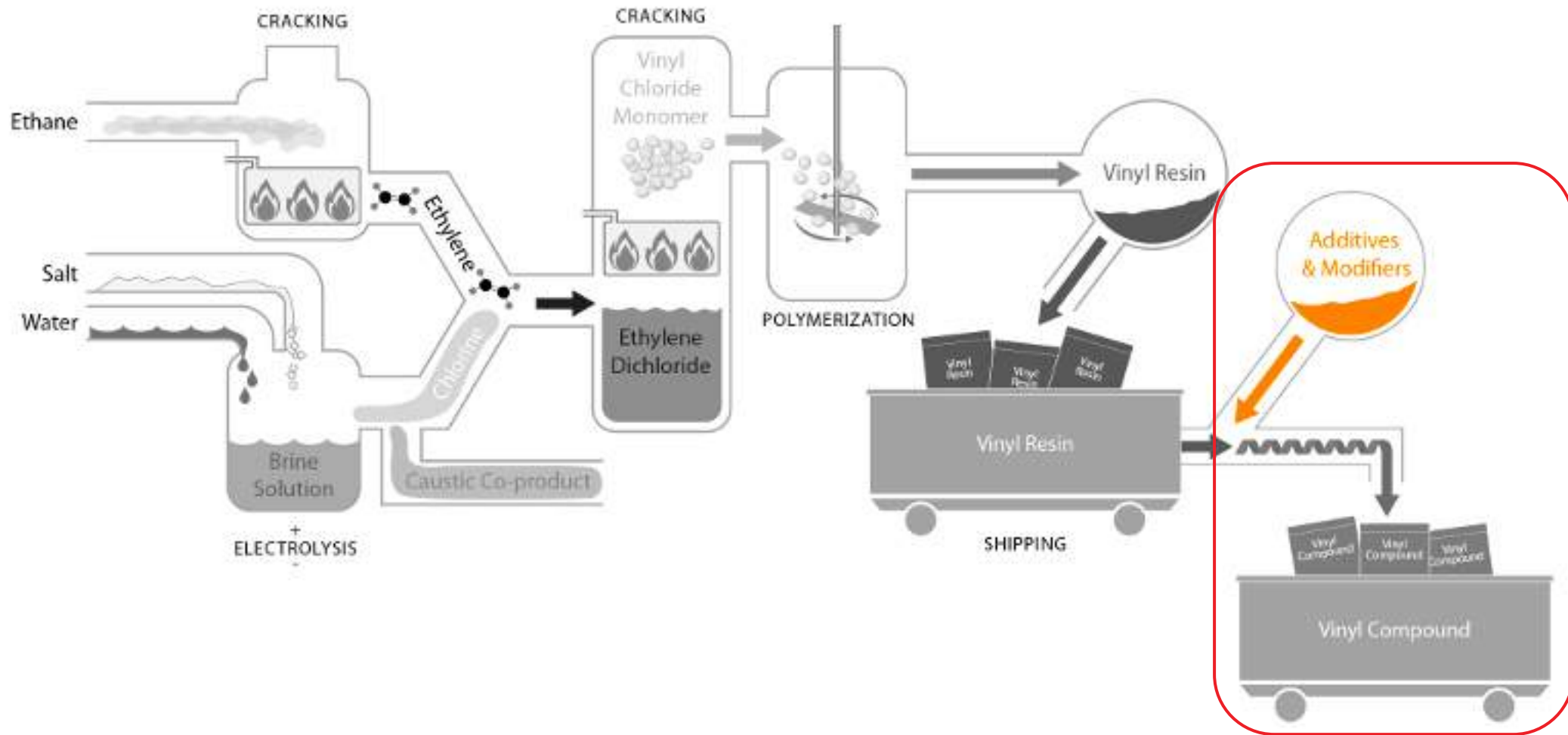
VINYL PRODUCTION PROCESS



VINYL PRODUCTION PROCESS



VINYL PRODUCTION PROCESS



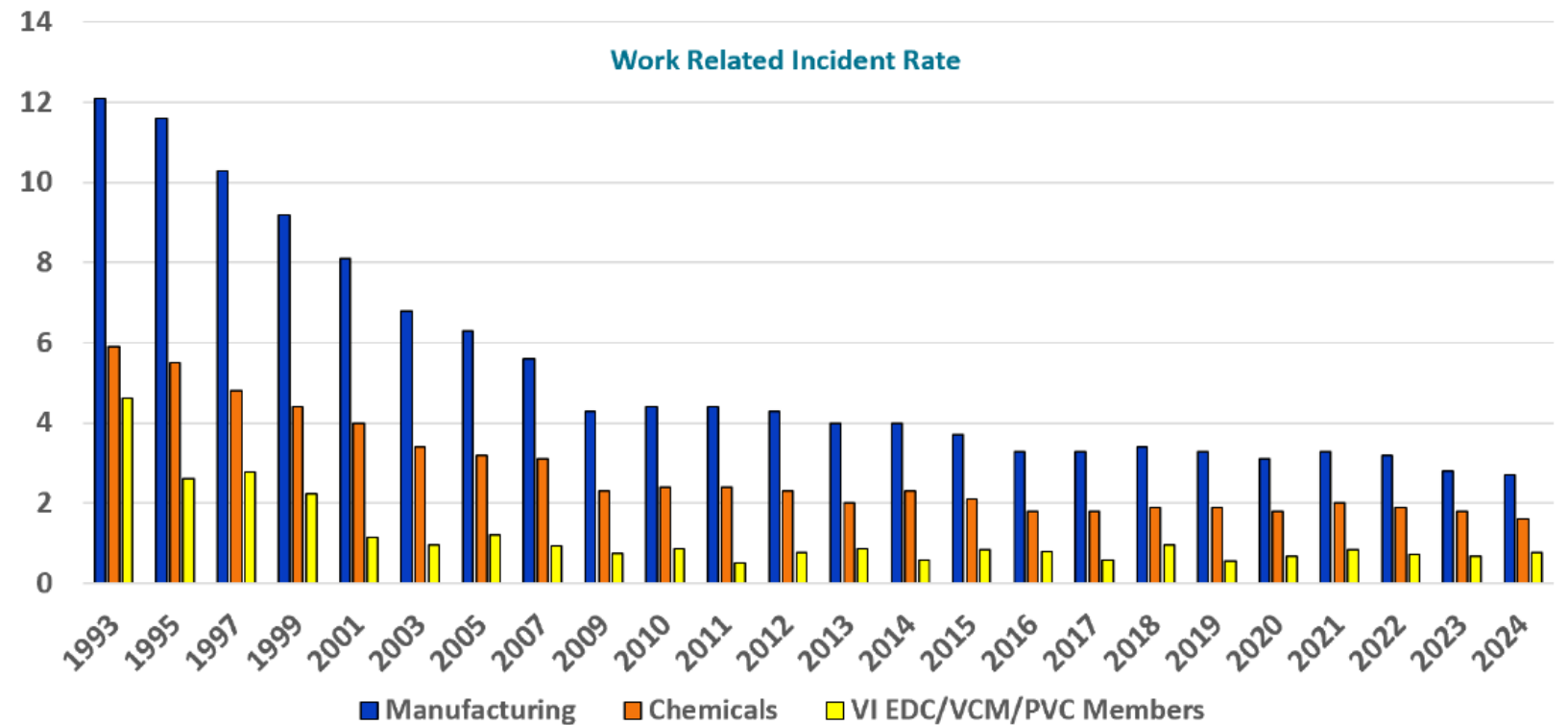
VINYL PRODUCTION SAFETY PERFORMANCE

In 2024, 28 production facilities manufacturing EDC, VCM, PVC resin or PVC/CPVC compounds received 41 safety and environmental performance awards, including:

- Zero OSHA recordable injuries or illnesses
- Zero OSHA recordable incidents for more than 5 years

U.S. Vinyl Producers OSHA Recordable Rates per 200,000 Employee Hours

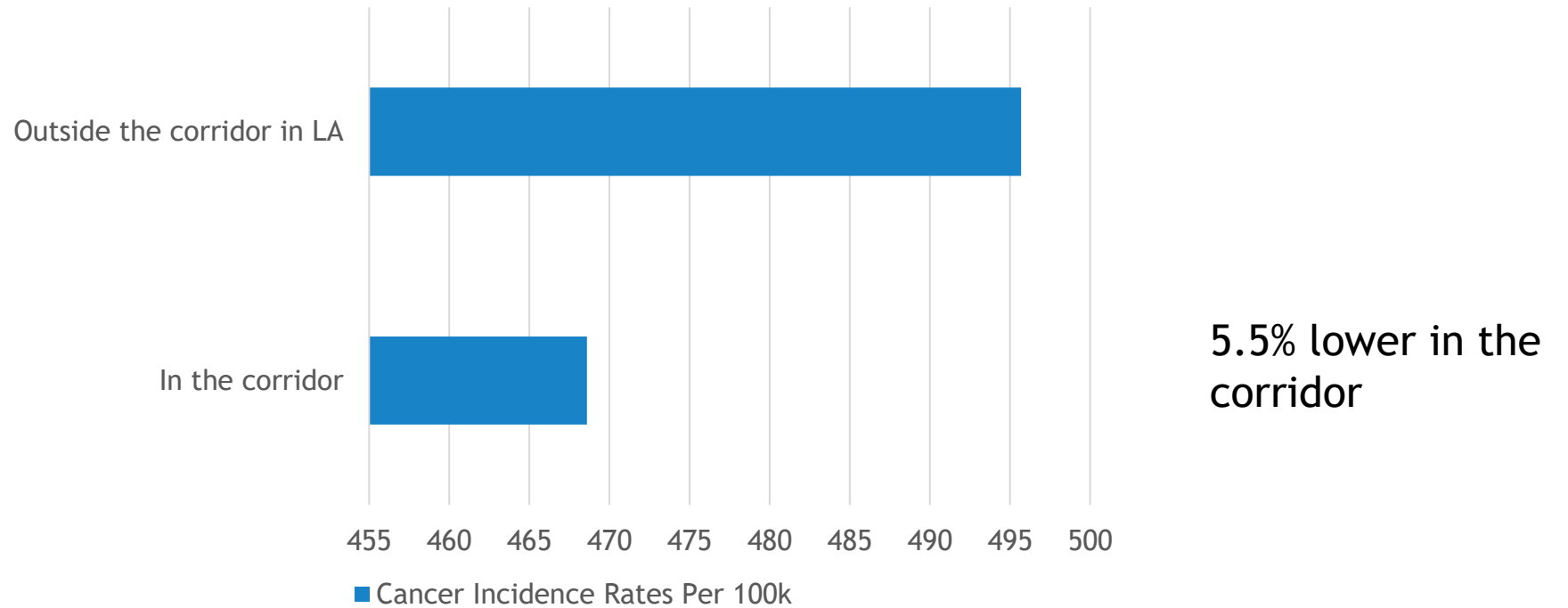
Vinyl Producer rate is 1/3 rate for all chemicals, 1/5 rate for all manufacturing



PVC production sites are significantly safer than the national manufacturing average

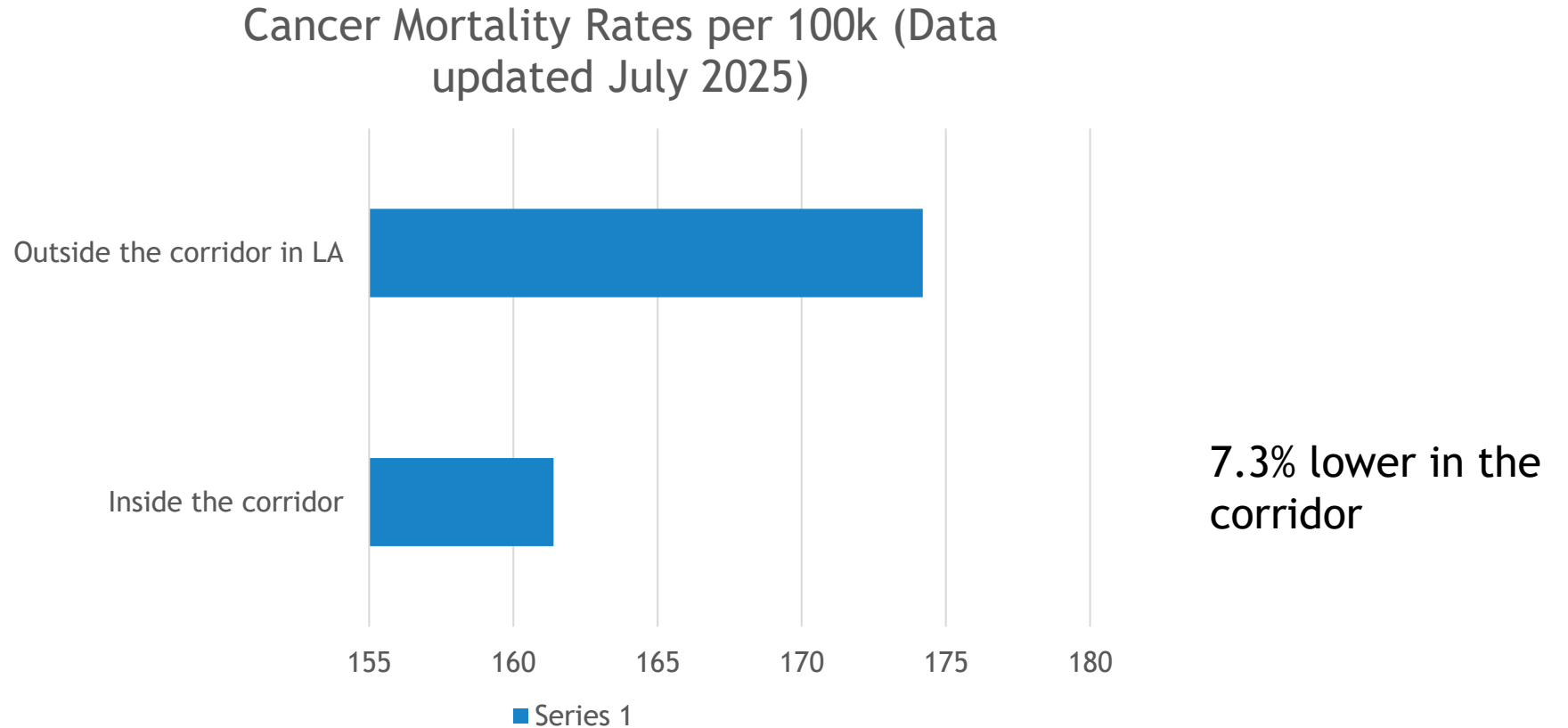
CANCER RISKS IN THE LOUISIANA INDUSTRIAL CORRIDOR

Cancer Incidence Rates Per 100k (Data updated July 2025)



Source: <https://louisianahealthfacts.com/how-we-compare/>

CANCER RISKS IN THE LOUISIANA INDUSTRIAL CORRIDOR



Source: <https://louisianahealthfacts.com/how-we-compare/>

VINYL PRODUCTION REGULATIONS

Vinyl production has been highly regulated since the 1970s



Employee Safety Standard 1910.1017 - VCM

- Exposure less than 1 ppm averaged over any 8-hour period
- Exposure no greater than 5 ppm averaged over any period not exceeding 15 minutes



Clean Air Act Standard

- Emissions of hazardous air pollutants from PVC production are regulated under the Clean Air Act via the National Emission Standard for Vinyl Chloride 40 C.F.R. Part 61 Subpart F and the National Emissions Standards for Hazardous Air Pollutants for Polyvinyl Chloride and Copolymers Production 40 C.F.R. Part 63 Subparts DDDDDD and HHHHHHH.

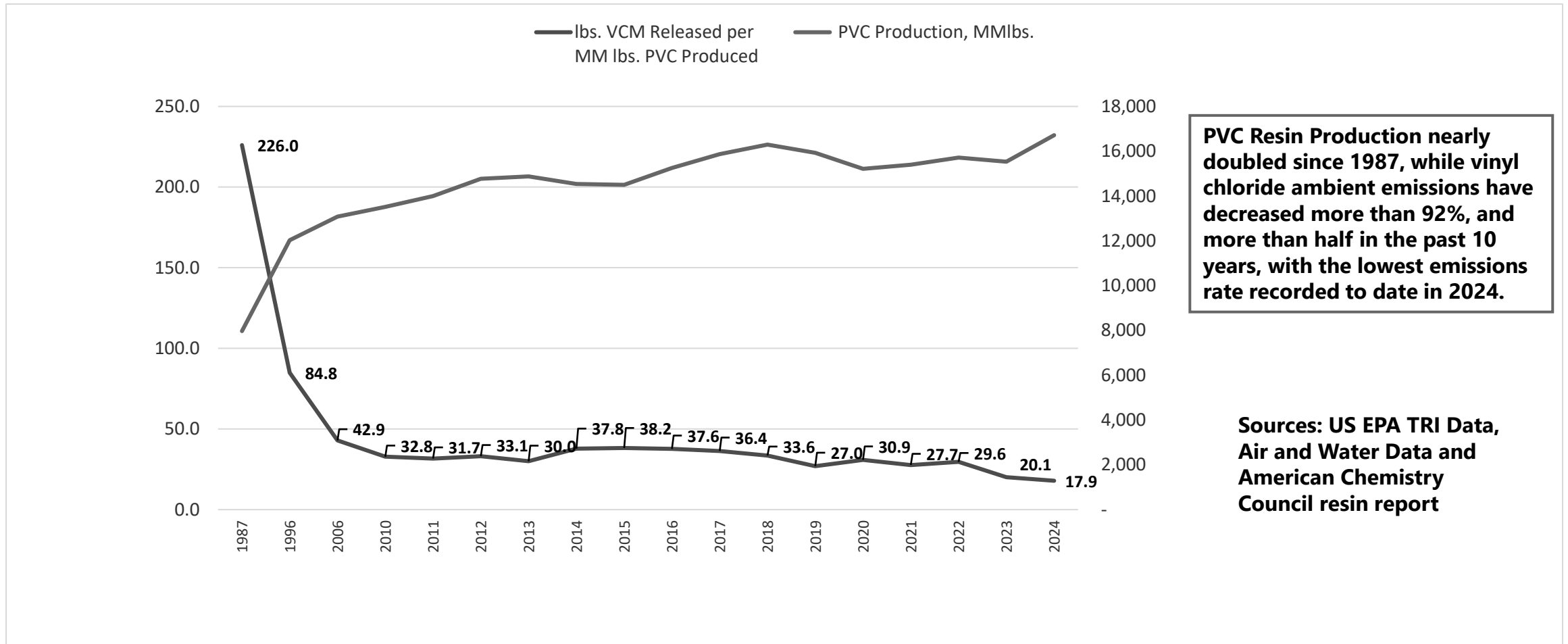


Transportation Standard

- Special packaging and labeling stating hazardous materials
- Detailed shipping paperwork with hazardous properties outlined
- Special training for transporting material
- Rigorous reporting on spills or incidents during shipping

US Vinyl Chloride Ambient Emissions

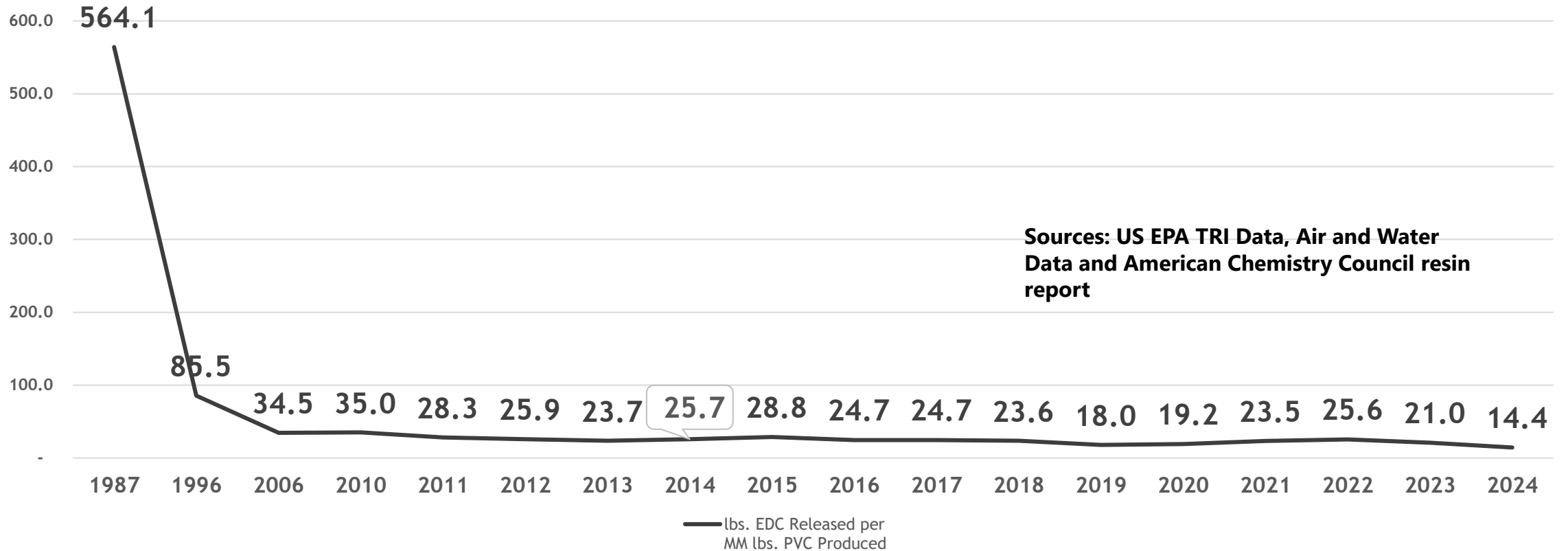
On Unit Basis, Down 92% Per Lb. Produced Since 1987



US Ethylene Dichloride Ambient Emissions

On Unit Basis, Down 97.4% Per Lb. Produced Since 1987

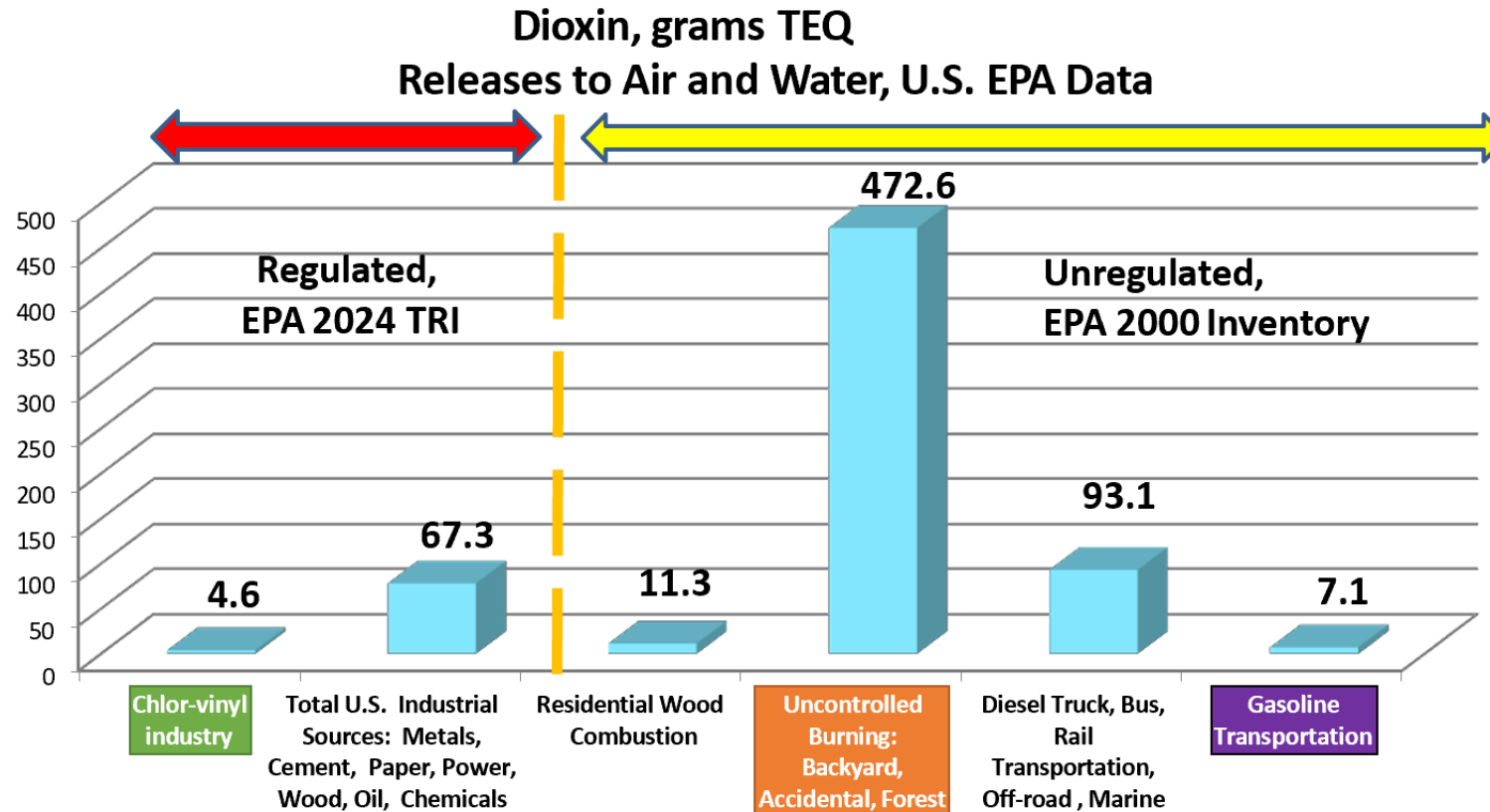
Pounds EDC Released per
MM Pounds PVC Produced



VINYL PRODUCTION EMISSIONS PERFORMANCE

Dioxin in Perspective

(Chlor-Vinyl Dioxin Ambient Emissions
Amount to 6.8% of All 2024 Regulated Sources)



TEQ + Toxic equivalent potency

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U.S. EPA Toxic Release Inventory data air and water from all regulated sources in the U.S.



VINYL USES AND APPLICATIONS

VINYL IS ESSENTIAL TO EVERYDAY LIFE

- Healthcare
- Aerospace
- Automotive
- Packaging
- Building construction



VINYL AND THE SUSTAINABLE DEVELOPMENT GOALS



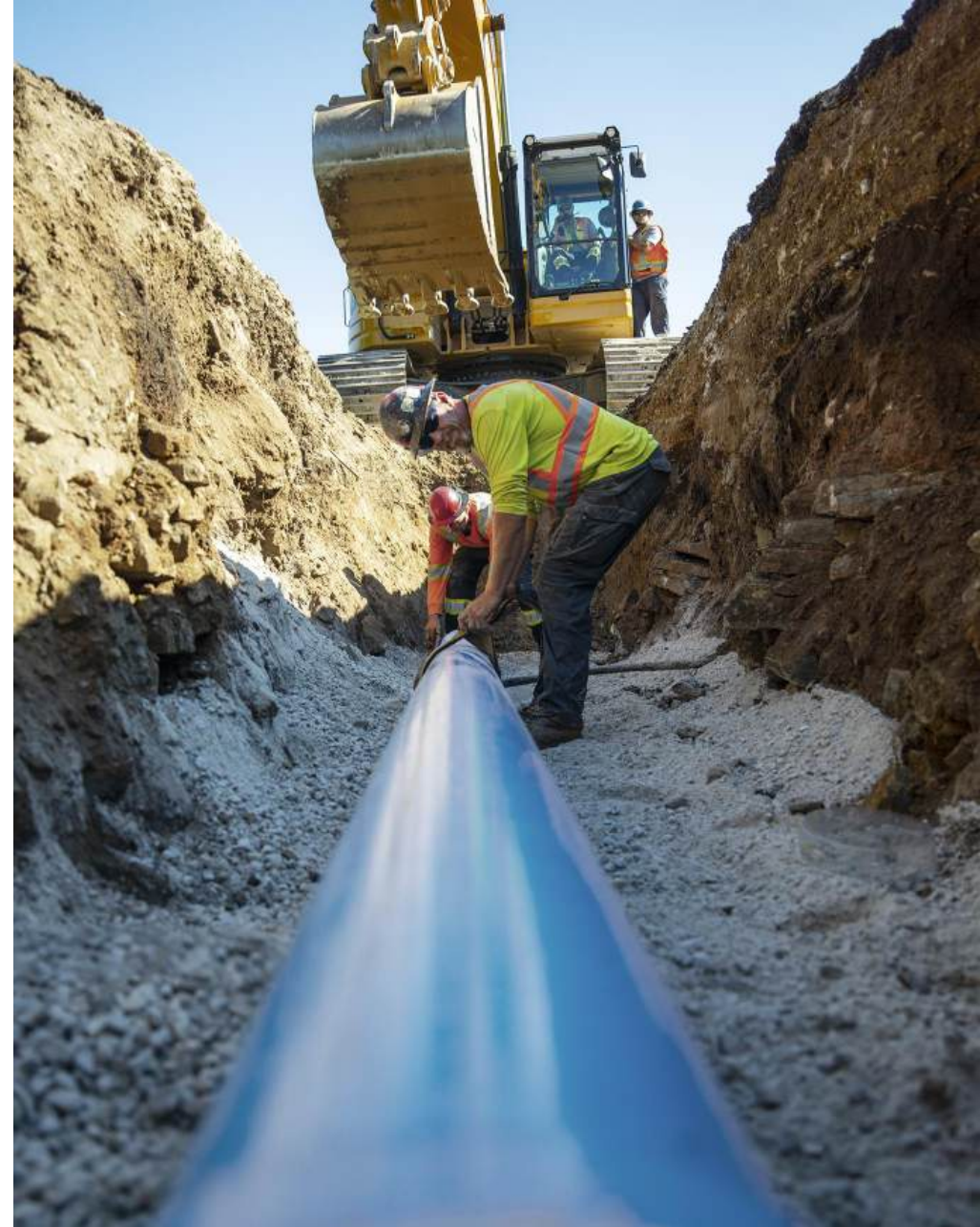
VINYL AND SDG 3: GOOD HEALTH AND WELL-BEING

- One-quarter of all medical devices use PVC due to its performance and cost-effectiveness.
- PVC blood bags preserve blood for up to 42 days
- PVC flooring, wall protection, and coated fabrics help prevent the spread of infectious bacteria
- PVC medical applications protect healthcare professionals and caregivers from serious contagions



VINYL AND SDG 6: CLEAN WATER AND SANITATION

- PVC pipes safely deliver clean water and wastewater.
- NSF standards in the United States ensure that PVC and CPVC safely deliver clean drinking water.
- 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.



VINYL AND SDG 11: SUSTAINABLE CITIES AND COMMUNITIES

- PVC pipes are a lower carbon solution for infrastructure.
- PVC pipe can remain in operation for 100 years and has an extremely low failure rate.¹
- PVC piping systems require less energy to pump water resulting in cost, energy, and carbon savings.²
- PVC pipe is easy to install and cost effective.
- PVC is cost effective - up to 70% less in some cases.³

1 Folkman, S. (May 2014): "PVC Pipe Longevity Report: Affordability and the 100+ Year Benchmark Standard." Mechanical and Aerospace Engineering Faculty Publications. Paper 170. p 7

https://digitalcommons.usu.edu/mae_facpub/170

2 Sustainable Solutions Corporation (April 2017): "Lifecycle Sustainability of PVC Water Pipe and Sewer Pipe and Comparative Sustainability Analysis of Pipe Materials." p 60

3 Anderson, R. (March 2013): "Municipal Procurement: Procurement Process Improvements Yield Cost-Effective Public Benefits." U.S. Conference of Mayors. p 12-13

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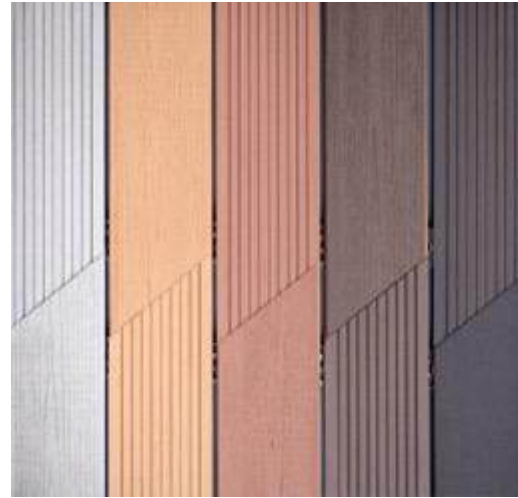


VINYL AND SDG 12: RESPONSIBLE CONSUMPTION AND PRODUCTION

- 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.



AN IDEAL BUILDING MATERIAL



System Performance

- Resists moisture, chemicals and corrosion
- Can last 50+ years
- Easy to Install

Design

- Numerous colors textures and styles available
- Offers customization and creative freedom

Building Performance

- Cost effective
- Meets building code requirements
- Helps reduce building energy consumption
- Minimal maintenance

Environmental Performance

- Low relative embodied carbon
- Low VOCs
- Recyclable
- Durable



FIRE SAFETY

- Vinyl is inherently flame resistant, waterproof, and flexible
- Chlorinated vinyl pipe is used for fire suppression in homes, multifamily housing, hotels, dormitories, and schools
- Chlorinated vinyl is slightly different than standard vinyl

FLOORING & SPECIALTY FLOORING

- Vinyl is widely used in commercial and residential flooring applications
- Used for carpet tile backing and vinyl flooring
- Sold in tiles, sheets, and planks
- Appropriate for retail, hospitality, and healthcare segments
- Vinyl resilient flooring is available in sheet, composition tile and “luxury vinyl” categories
- Stylized woven cushion flooring is designed for stadiums and gymnasiums
- Appropriate for K-12 multipurpose spaces





FABRICS AND FURNITURE FOR INFECTION CONTROL

- Vinyl materials offer cleanability critical to infection control in healthcare applications
- Vinyl's wide range of design options and durability make it the best choice for flooring, upholstery fabrics, and wall protection for healthcare settings

CEILINGS

- Vinyl ceilings resist damage from moisture and chemicals
- Appropriate for natatorium spaces, hospitality spaces, and other spaces that require resistance to chemicals and the elements





WALL COVERINGS

- Cost-effective paint alternative
- Stain-resistant, cleanable wall protection
- Custom designs are easy and affordable with digital images and film technology

VINYL ROOFING MEMBRANE

- Single-ply vinyl roofing membrane offers water-tight performance and long-term durability with clean aesthetic looks
- Many vinyl roofing membrane systems last for 30+ years



WINDOWS & CLADDING

- Vinyl window frames now come in larger sizes thanks to new bending capacity similar to aluminum extrusions
- Vinyl film technology allows for more color options on window frames to coordinate with designs
- Vinyl window frames exhibit energy savings due to lower thermal conductivity compared to metal





CLADDING & TRIM

- Easy to Install
- Maintenance-free
- Available in a wide range of aesthetic and stylistic effects
- Cellular vinyl trim components are lightweight, colors are integral throughout, and the material requires essentially no maintenance



VERIFYING RESPONSIBLE VINYL MANUFACTURING

RESPONSIBLE VINYL MANUFACTURING

SUCCESSFUL SOLUTIONS



**PERFORMANCE
REQUIREMENTS**



**VERIFIED
COMPANIES**



**PRODUCT
CERTIFICATIONS
& DECLARATIONS**

+VANTAGE VINYL

- Annual sustainable performance reporting
- Re-verification every three years
- Improved industry performance
 - Three material impact categories
 - Resource efficiency, emissions, and people & community
 - Sustainability efforts are verified by GreenCircle Certified, an independent third-party
- People, planet and governance criteria includes 5 pillars

+VANTAGE FOR A
VINYL SUSTAINABLE
FUTURE.®



THE +VANTAGE VINYL PROGRAM'S FIVE PILLARS



Human Health



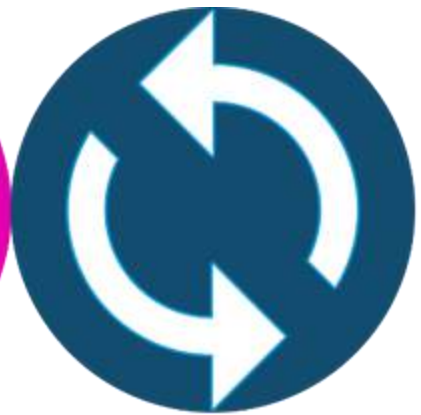
Climate Responsibility



Ecosystem Protection



Social Health & Equity



Circular Economy

+VANTAGE VINYL: THREE LEVELS OF VERIFICATION



Find verified companies at vantagevinyl.com/vantage-vinyl-verified-companies/

IN SUMMARY

1. Vinyl manufacturing is highly regulated and has best-in-class safety records
2. Vinyl is a safe and versatile building material, and for many applications, the best solution
3. Vinyl products from manufacturers that have undergone third-party verification for sustainability performance to get best-in-class performance



JOIN THE VINYL MOVEMENT

Stay Informed

Signing up for the Vinyl Institute newsletter keeps you updated on industry trends, news and innovations.

Commit to Sustainability

Becoming a +Vantage Vinyl Verified company highlights dedication to sustainable practices and environmental responsibility.

Participate

Participations connects you with a network of professionals shaping the future of the vinyl industry.

Email jarmstrong@vinylinfo.org or visit vantagevinyl.com to learn more!

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