Engine parts wrapped in world's first biodegradable, compostable static dissipative films and bags. *Photo courtesy of Cortec Corporation.*

Developing Next-Generation VpCI® Sustainable Films

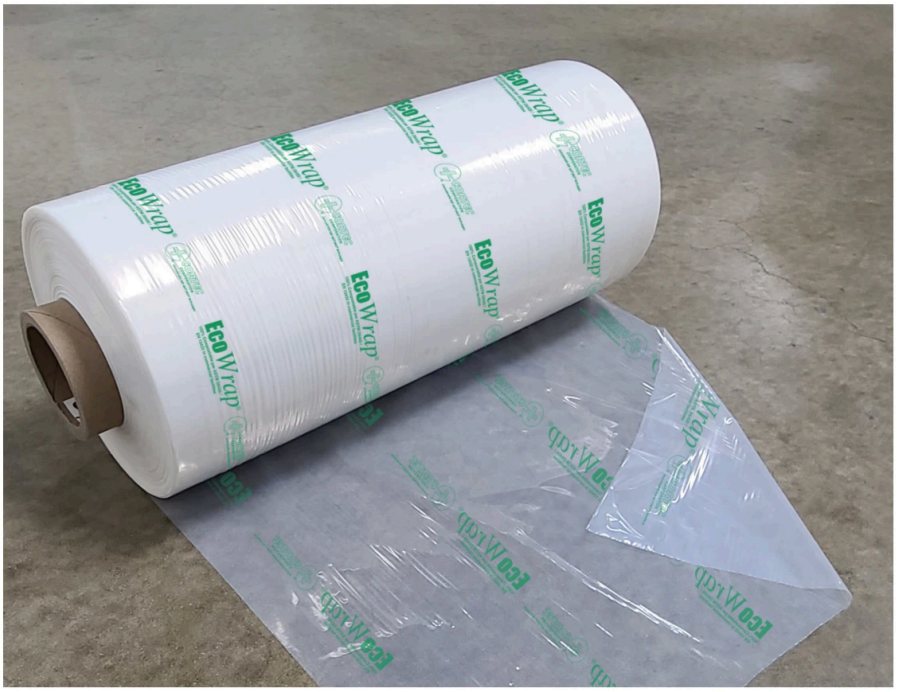
A Path to the Circular Economy in Corrosion Protection Packaging

By **Ana Juraga Oluic**, Content Writer at Cortec Corporation

The packaging world is at a very important point. It's under growing pressure to create less trash and pollution, all while keeping products safe. This problem gets even bigger for companies that need to protect delicate metal parts from rust. Old ways of stopping rust often use messy coatings or materials that just get thrown away, adding to landfills. However, a new generation of sophisticated packaging solutions uses special Vapor phase Corrosion Inhibitor (VpCI®) technology.

This new approach is becoming a key part of the circular economy. These innovations are not just about preventing rust; they are about designing materials for a sustainable future, emphasizing recyclability, compostability and biodegradability.

At the heart of this transformation is the commitment to the circular economy — a model that reimagines waste as a resource. Instead of a linear "make, use, dispose" approach, the circular economy focuses on keeping products and materials in use for as long as possible, extracting their maximum value, and then recovering and regenerating them at the end of their service life. For corrosion-inhibiting films, this translates into



The world's first compostable, industrial-strength, machine-grade stretch film. *Photo courtesy of Cortec Corporation.*

a dedication to material selection, product design and end-of-life solutions that minimize environmental impact.

Luckily, new developments in advanced VpCI® films offer solutions that fit perfectly with circular principles. These films protect many different metal parts from rust, tarnish and oxidation. They do this by letting out invisible, odorless and non-toxic vapors that stop corrosion. These vapors create a thin, protective layer on metal surfaces. What makes these next-generation films special is their strong dedication to being environmentally responsible, helping to solve worries about plastic waste.

The Power of Recyclability

One of the most significant advances in sustainable VpCI® film development is the emphasis on recyclability. Many VpCI films are made from polyethylene, which means they can be easily recycled using the systems we already have in place. Leading innovators in this field have ensured their VpCI® films are 100 percent recyclable, often containing a significant percentage of post-consumer or post-industrial recycled content.

This closed-loop approach drastically reduces the demand for virgin plastics, conserving valuable natural resources and minimizing the energy required for production. Some manufacturers have even established dedicated recycling programs to collect used VpCI® films from customers, processing them back into high-quality recycled pellets that are then used to produce new corrosion-inhibiting films. This not only diverts waste from landfills but also creates a truly circular system for anti-corrosion packaging.

Embracing Biodegradability and Compostability

Beyond traditional recycling, the development of biodegradable and compostable VpCI films represents a groundbreaking leap forward. These films are engineered from certified biopolymers, allowing them to decompose naturally into harmless substances like water, carbon dioxide, and biomass in industrial composting facilities. This addresses the challenge of plastic accumulation in the environment, offering an end-of-life solution that returns materials to the earth, enriching soil rather than polluting it.

Such innovations meet strict international standards for compostable plastics, providing industries with a truly eco-conscious packaging option. The ability of these films to break down completely eliminates concerns about microplastic formation, marking a significant advancement in environmentally friendly corrosion prevention.

Benefits Beyond Environmental Care

Adding these sustainable features to VpCI® films brings many good things, not just for the environment. For businesses, using these newer films makes their brand look better. It shows they truly care about sustainability, which customers who care about the environment will notice. It also helps with the stricter rules about going green.

Plus, it can save money over time! You'll pay less for throwing away trash and might even get rewards for using eco-friendly ways to make things. And the best part? VpCI® technology still works great. Your metal parts will stay clean and ready to use when they arrive. You won't need to deal with messy, often risky, old-fashioned rust stoppers like oils and greases anymore.

Responding to the EU's Packaging and Packaging Waste Regulation

The significant advancements in VpCI® sustainable films are particularly relevant given the European Union's ambitious Packaging and Packaging Waste Regulation (PPWR). This comprehensive regulation aims to drastically reduce packaging waste, boost recycling rates, and promote reusable packaging across all EU member states.

For VpCI film developers, the PPWR acts as a powerful driver, pushing for innovation in areas like minimum recycled content, design for recyclability, and the phasing out of certain problematic materials. The EU's rules say that

Regranulation machine to reprocess plastic scrap and waste onsite.

Corrosion inhibiting paper relies on patented biodegradable and compostable Vapor phase Corrosion Inhibiting Technology, which has revolutionized the way metals are protected in an enclosed package. *Photos courtesy of Cortec Corporation.*

by 2030, all packaging must be recyclable and use more recycled materials. This fits perfectly with these new VpCI® films because they are already easy to recycle and often contain recycled plastic.

Also, the rules encourage compostable packaging for certain uses. This opens up a clear path for more companies to use biodegradable VpCI films. It shows that this advanced technology isn't just keeping up with new rules, it's actually ahead of them.

Wider sustainability initiatives within the packaging industry are actively promoting a shift towards materials that contribute to a circular economy. Global directives and consumer demand are driving innovation in areas such as responsible sourcing, and

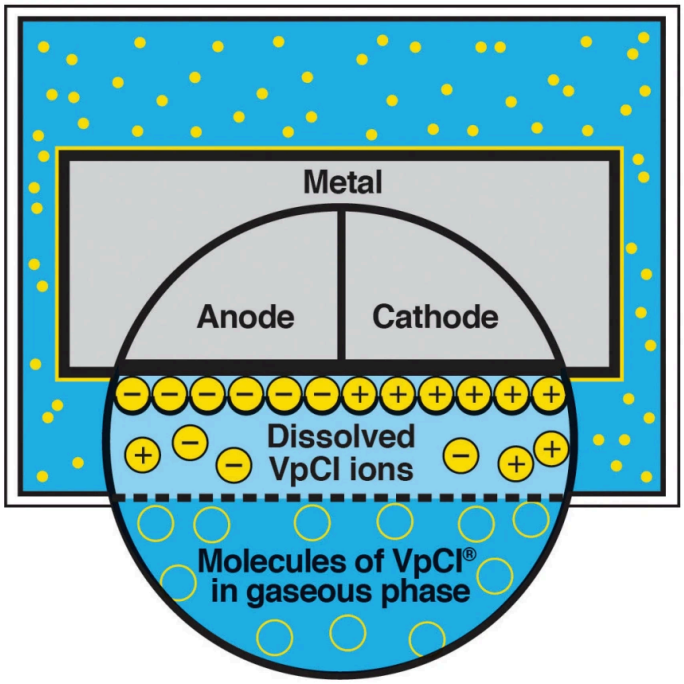


Figure 1 – VpCI technology in packaging protects metal parts from corrosion by releasing molecules that form a protective layer on metal surfaces within the package. These molecules are released into the air, creating a vapor-phase that coats all exposed metal, preventing rust and other corrosion-related damage.
Source: Cortec Corporation.

the development of renewable and compostable alternatives.

Next-generation VpCI® films fit perfectly into this landscape. These films are excellent for preventing corrosion, and they also help fix worries about plastic waste and using up too many resources. This makes them a very important part of moving towards an eco-friendlier industrial future.

Working towards sustainable packaging is a journey that never stops. The way VpCI® films have changed shows a smart and responsible way to innovate. Companies are always looking into and creating materials that not only work really well but are also good for the environment. This means making them easier to recycle, adding recycled materials or developing new types that can be composted.

By doing this, the industry is clearing a path for a future where packaging truly fits with the idea of a circular economy, keeping both products and our planet safe. This commitment to continuous improvement ensures that industries worldwide have access to packaging solutions that meet the highest standards of performance and environmental responsibility. ■

ABOUT THE AUTHOR

Ana Juraga has been a content writer at Cortec Corporation for 14 years. Besides media relations, she collaborates with Cortec's engineers and chemists in creating informative technical content. She is passionate about educating the engineering community about green corrosion-inhibiting technologies and numerous advances in this field.