SUMMER 2025

SOCIETY OF PLASTICS ENGINEERS CADNEWS

RETEC 2025
PRELIMINARY SCHEDULE & GOLF OUTING

TECHNICAL ARTICLE
MITIGATING DISCOLORATION IN MECHANICALLY-RECYCLED PLASTICS

SUSTAINABILITY UPDATE

spe

COLORING THE WORLD OF PLASTICS

spe CAD NEWS®

CHAIRMAN'S MESSAGE

Hot Fun in the Summertime! (RIP Sly Stone)

Welcome to the 2025 Summer edition of CAD News!

As we all look forward to the season's warm days, BBQs, and vacation time, our RETEC Committee is busy putting final touches on this year's event – LONG LIVE COLOR! located at the Hotel Cleveland, Autograph Collection September 15-17 in Cleveland, OH. We are really excited about this year's location and all that Cleveland has to offer. Our Technical Program Committee is putting together an excellent program with two full days of papers and a panel discussion as well as a dynamic group of speakers. I look forward to what is going to be a spectacular conference.

Registration is open so please visit our website for more information and the registration process. There are still sponsorship opportunities as well as booth space available, so please reach out to any board member for details.

We are very pleased to announce that the 2025 elections for SPE CAD Board are complete. Re-elected directors: Ann Smeltzer, Jim Figaniak, Alex Prosapio and Scotty Boy Aumann. I am also pleased to announce our new BOD members Eric Duncan. Mike Manley, Lisa Clapp and Michelle Claeson.

As my term as CAD Board Chair concludes, I would like to give special thanks to the entire Board of Directors team and companies who sponsor them for their hard work and support this year. It was a rewarding experience and happy to be succeeded by Kimberley Williamson who will drive this organization forward. I wish Kim a successful term as Chair for 2025-2026.

Please enjoy the newsletter and look forward to seeing you in the birthplace of Rock and Roll!

GEORGE IANNUZZI
Color and Appearance Division Chair
george@koelcolours.com

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RETEC 2025

SAVE THE DATE

HOTEL CLEVELAND
CLEVELAND, OH
SEPTEMBER 15-17, 2025

PRE-REGISTRATION ONLINE
CAD RETEC® 2025 Homepage

ONSITE REGISTRATION
Hotel Cleveland | Autograph Collection

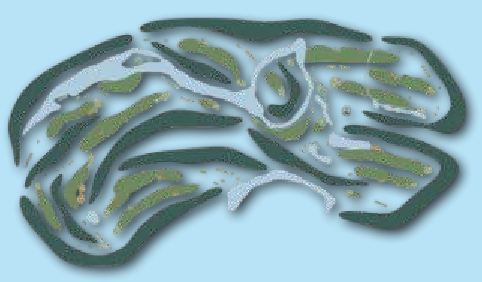
Monday, September 15 1:00 PM – 7:00 PM
Tuesday, September 16 7:30 AM – 5:00 PM
Wednesday, September 17 7:30 AM – 3:00 PM

CAD RETEC® 2025 GOLF OUTING
September 15th, 2025 | Valley of The Eagles

Registration and lunch 7:30am–9:00am
Awards (hole prizes), scramble format

Price: $ 95 per golfer
Includes: the range, green fees, cart fee, lunch

For more details, visit CAD RETEC® 2025



PRECONFERENCE TUTORIAL
COLORING OF PLASTICS
Presented by Bruce Mulholland, SPE Fellow

Monday, September 15, 2025
8:00 AM – 4:30 PM

FEE: $550
must pre-register for event. extra fee not included with CAD RETEC® 2025 registration

Welcome Reception
Monday, September 15, 2025
8:00 pm – 11:00pm
Sponsored by Milliken

Breakfast
Tuesday, September 16, 2025
7:30 am – 9:00 am
Sponsored by The Shepherd Color Company

PlastiVan®
Tuesday, September 16, 2025
For more information visit SPE Plastivan

Network Reception
Tuesday, September 16, 2025
5:45pm – 7:00pm
Sponsored by Liberty Specialty Chemicals

CAD RETEC® 2023 Fun Run/Walk
Wednesday, September 27, 2025
Chroma Specialty Chemicals
Sponsored by Chroma Specialty Chem
$25 Registration fee
SPE CAD will match every $25 donation

Awards Lunch
Wednesday, September 17, 2025
12:00pm – 1:30pm
Sponsor TBD

spe

PRELIMINARY PROGRAM

NAME	COMPANY	TITLE
Dr Jun Tian	Birla Carbon	*High Gloss and High Color Performance in PP Resin System for Automotive Applications*
Chris Ahmer	US Silica	*Pigment for Partial TiO_2 Independence in White, Yellow, and Red Low-Density Polyethylene Compound"*
Paul Martin	Krauss Maffei	*Recycling Polymers & L* A* B* Color values*
Bonnie Piro	Sudarshan	*The Balance of Color and Polymer Selection for Coloration of Plastics*
Eve Vitale	Plastivan	*SPE Positive Plastics Education™ programs: Plastivan®*
Scott Brewer	Orion Carbons	*The Good Property Retention of Treated Carbon Blacks Compared to Untreated Carbon Blacks in PA 6.6*
Galen Rende	Keller and Heckman	*How the Regulatory Landscape has Changed Since the Onset of 2025 for Plastics and Specifically the Color and Additive Industries for Plastics.*
Doug Brownfield	Ampacet	*Closed-Loop In-Line Color Correction Automation When Using PCR & PIR Resins.*
Kevin Lucero	EMD Performance Materials	*Laser Marking of Plastics: Essential Factors for Successful Implementation*
Mark Ryan	The Shepherd Color Company	*AI & How it Impacts Our Industry*
Krish Iyer	Paramount Colors	*The Impact of Oxygen Scavengers on Dyes used in Food Packaging*
Breeze Briggs	Sun Chemical	*Beyond Color- Harnessing Functional Pigment for Additional Properties*

KEYNOTE SPEAKERS

KIMMEE SCHENTER
UnderArmour
Building Strong Color Partnerships between Design and Marketing: a Perspective from UnderArmour
Tuesday, September 16, 2025

BRAD NEUFARTH
Procter & Gamble
Paralysis by Analysis: Is Packaging CMF Dead…Or Caged…Or "fill in the blanks" ?
Wednesday, September 17, 2025

ALEX ROM-ROGINSKI
Supply Chain Opportunities created by Tariffs
Tuesday, September 16, 2025

BRUNO STORTINI
Alliance to End Plastic Waste
The Value of Manufacturers collaborating with Organizations like AEPW
Wednesday, September 17, 2025

MERCEDES LANDAZURI
Ampacet Corporation
Color, Material & Finish Insights for 2027 and Beyond
Tuesday, September 16, 2025

PANEL DISCUSSIONS

A Glimpse of the Global Supply Chain for Colored Plastics

Moderator and panel to be finalized
Tuesday, September 16, 2025

Future Careers in the Plastics/Color/Science Industry

Moderator TBD and Case Western Reserve students
Wednesday, September 17, 2025

CONFERENCE REGISTRATION

(SELECT ONLY ONE TYPE OF REGISTRATION)

SPE Member	**2025**
☐ Advance	$480
☐ Late / Onsite (After 8/16/24)	$580

SPE Non-Member:

☐ Advance	$740
☐ Late/Onsite (After 8/16/24)	$840

OTHER Registration Types:

☐ RETEC Committee	$225
☐ CAD BOD member	$335
☐ Speakers/Moderator	$225
☐ Student (w/ Valid Student ID):	$100
☐ Emeritus:	$200
☐ Tabletop advanced registration	$1,650
☐ Tabletop late reg (After 8/16/24)	$1,850

EXTRA CONFERENCE LITERATURE:

☐ Extra RETEC 2025 papers	$150 x ___ = $____
☐ Archive DVD (1961-2007) (available on site)	$100 x ___ = $____

OTHER EVENTS REGISTRATION/RSVP

☐ Golf Outing (Monday):	$95
☐ 5K Fun Walk (Wednesday):	$25
☐ "Coloring of Plastics" Tutorial (Monday):	$550

* Full refunds available thru August 15, 2025
* Refunds less a $100 fee August 18 to September 5, 2025
* No refunds after September 6, 2025

COLORING OF PLASTICS TUTORIAL

The Color and Appearance Division of SPE has been presenting the "Coloring of Plastics" tutorial at the start of the CAD RETEC® conference for many years. Many SPE members and non-members have benefited from this program. The tutorial is a great starting point for those just beginning a career, or an excellent continuing improvement opportunity to those who wish to add to their base knowledge of coloring of plastics. The course is full of practical information which is embellished and enlightened by the active participation of all the attendees.

The tutorial runs a full day on Monday prior to CAD RETEC® and does require a separate registration and fee. The attendance is limited to 20 persons, so register soon. Attendees receive a full-color manual to use as a reference when they return home.

Who might benefit from attending the tutorial?

- Executives needing to better understand their company's coloring issues
- Managers newly appointed and/or desiring to communicate more effectively with peers and subordinates
- Color formulators/matchers to better understand the theory behind their work
- Color specifiers/approvers to understand limitations in coloring of plastics
- Sales personnel hoping to gain more technical knowledge to better serve their customers
- Product designers wishing to better understand the technology behind the coloring of plastics, to make better and more informed decisions
- Color manufacturing personnel to understand the impact of compounding on color
- Color processors (injection molding, extrusion, etc.) to better understand the technological ways they can impact the final color

Attendees will leave the course with a better understanding of color technology and should be more effective in their careers around color.

For more information about Color of Plastics Tutorial, please contact the Conference Chair and Tutorial Instructor Bruce Mulholland @ captcolour@aol.com or call 859-982-5256

To register for this opportunity please visit the SPECAD Website

THE SOCIETY OF PLASTICS ENGINEERS 2025 CAD RETEC®

GOLF OUTING

MONDAY 09.15.2025

WELCOME TO VALLEY OF THE EAGLES

The only Nicklaus Design daily-fee course in Northern Ohio, designed to fully capture the beauty of the Black River Valley lined with the massive sheer black shale cliffs, tranquil surroundings of the majestic trees, and breathtaking elevation changes. The course meanders through Black River Valley and along the Black River, with mature elm, oak and ash trees lining the fairways, and intriguingly positioned island tees to island greens.

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When registering, input your Handicap typical 18 hole score. Please be honest to make this fair.

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QUESTIONS CONTACT:
Mark Tyler (570) 952.5255 or
Alex Prosapio 845-641-0596

ELECTION RESULTS

CONGRATULATIONS TO OUR NEW & INCUMBENT MEMBERS

INCUMBENTS

Scott Aumann	Chroma Color
Jim Figiniak	LehVoss NA
Alex Prosapio	Sudarshan
Ann Smeltzer	Sudarshan

NEWLY ELECTED

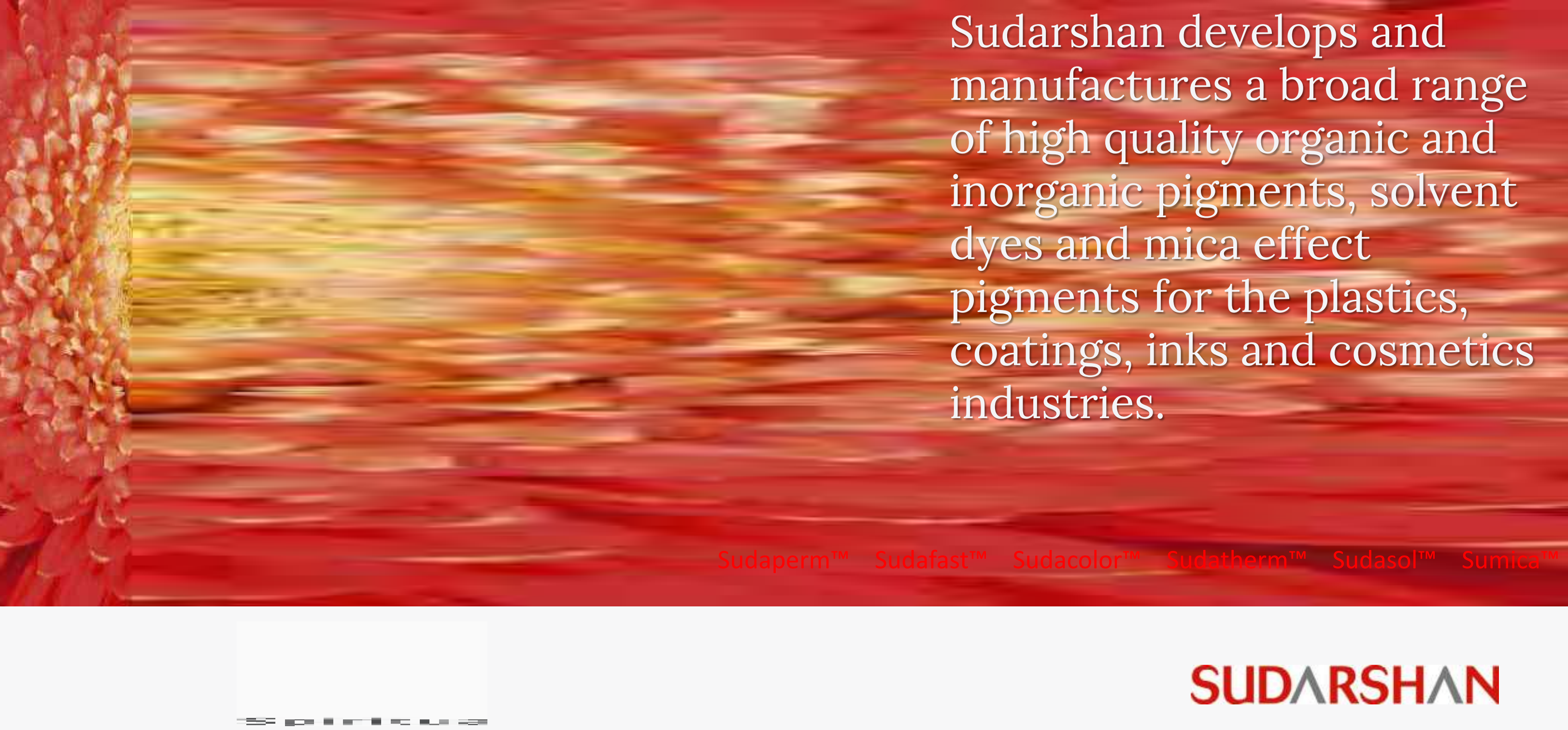
Michelle Claeson	Trust Chem
Lisa Clapp	Sun Chemical
Eric Duncan	Akrochem
Mike Manley	Holland Colors

SPE COLOR AND APPEARANCE DIVISION MISSION STATEMENT

The Color and Appearance Division of SPE strives to educate, train, inform and provide professional interaction opportunities to the global community involved in visual performance and aesthetics of plastics.

INVITATION TO ATTEND CAD BOARD MEETING

The Color and Appearance Division (CAD) holds 4 Board of Directors (BOD) meetings each year, either in person or virtually. Any CAD members in good standing with in SPE and has Color and Appearance as their selected division are welcomed to attend these meetings. If interested in attending these meetings, please contact the current CAD Chairperson or any BOD for more information.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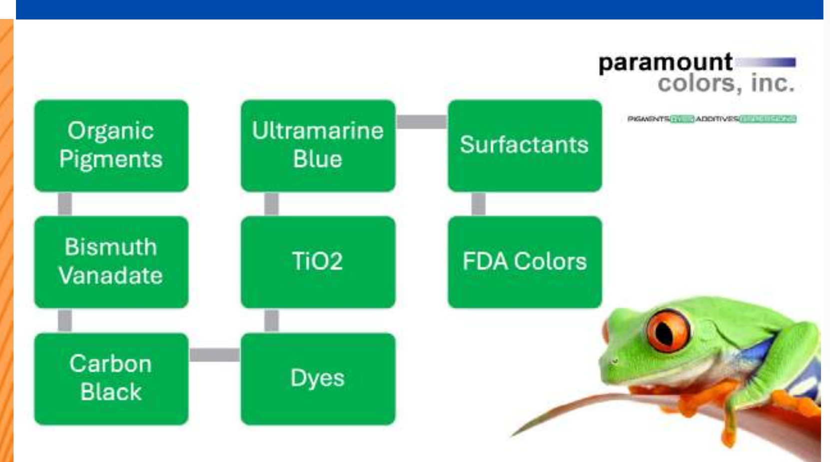
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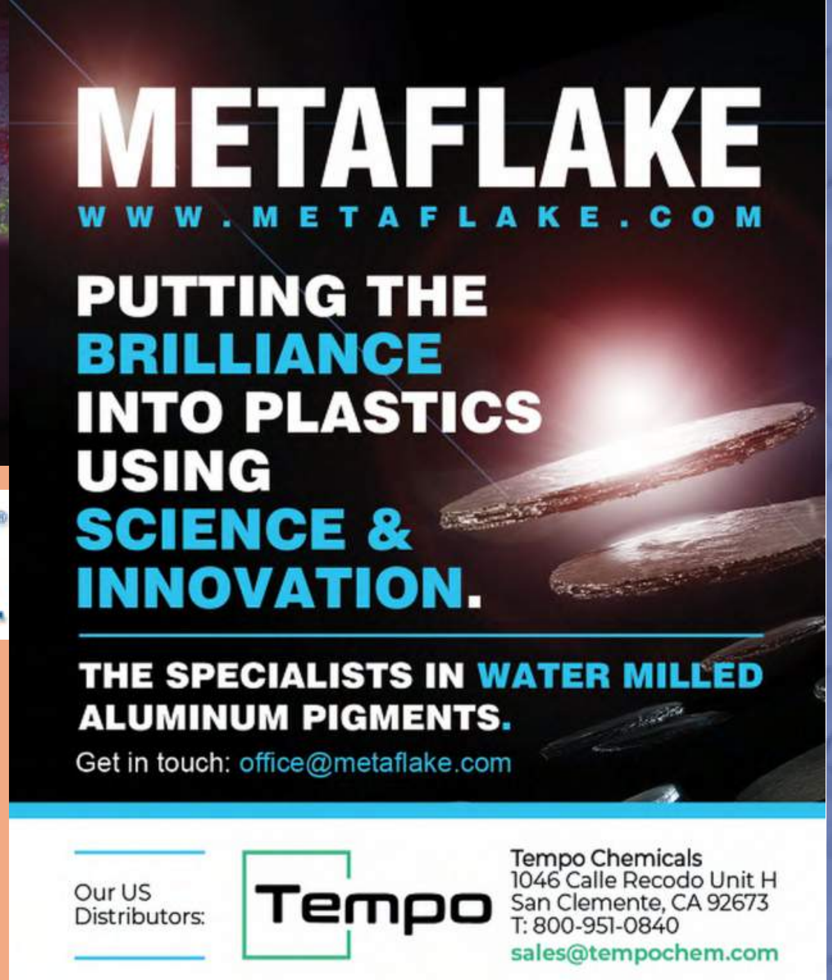

TECHNICAL ARTICLE INTRODUCTION

CADNEWS TECHNICAL CONTENT

The Technical Content portion of our Summer 2025 edition of CADNEWS. This issues Technical article is titled Mitigating Discoloration In Mechanically-Recycled Plastics by Tad Finnegan, Irfan Huda and Edward Malits. If you have questions after the read drop, it to Color Notes and we will get back to you with answers from the committee.

CADNEWS COLOR NOTES

Welcome to CADNEWS® Color Notes. Do you have a question regarding color and effects? Don't miss your opportunity to anonymously ask our team of experts. We can help create discussion as well as provide answers. Color, appearance, color measurements, and colorants in general are all in our scope. Use the link below to submit your questions. Our SPECAD Color Notes committee will provide a response in the upcoming CADNEWS®.

HTTP://SPECAD.ORG/COLOR-QUESTIONS-FOR-CAD/

TECHNICAL ARTICLE

MITIGATING DISCOLORATION IN MECHANICALLY-RECYCLED PLASTICS

Tad Finnegan, Irfan Huda, and Edward Malits
BASF Corporation, Tarrytown, NY

ABSTRACT

The mechanical recycling of plastics is an essential component of strengthening the circular economy, but one that comes with technical challenges. Issues such as discoloration and loss of mechanical properties degrade the value of recycled plastic by limiting its usefulness in more demanding applications. Antioxidants and process stabilizers have been shown to address similar issues virgin plastic, but these additives often fall short when working with recycled materials. Newly developed stabilization systems are presented here that can improve issues related to discoloration and property loss in recycled resins, leading to higher quality recyclates.

INTRODUCTION

While plastics are one of the most useful and versatile materials ever developed, the pressure on the plastics industry to address the problem of waste has increased dramatically in recent years. This pressure is driven largely by the public, but brand owners legislatures, and financial investors are responding by demanding more circularity in the plastics value chain[1,2]. Moving towards a circular economy requires a multifaceted approach, starting with rethinking product design, facilitating recovery and recycling of products, and avoiding waste at every step in the process[3].

The mechanical recycling of plastics is one tool to improve the circularity of plastics. It is estimated that less than 10% of plastics are recycled globally. To impact this number, it is helpful to look to the largest markets and types of polymers used. The United States Environmental Protection Agency (EPA) estimates that 40% of plastics go into packaging, and four polymers make up 85% of packaging and food service items: polyester terephthalate (PET), high-density polyethylene (HDPE), low density and liner low density polyethylene (LDPE, LLDPE), and polypropylene (PP)[4]. Figure 1 illustrates the breakdown of the use of these polymers.

Several challenges limit the utility of recycled polymers, including:

- Reduced processability
- Poor durability
- Poor weatherability
- Poor mechanical properties
- Odor
- Discoloration

While these challenges come from a variety of sources (e.g., contamination, residues, or incomplete sorting), autoxidation plays a role in all of them.

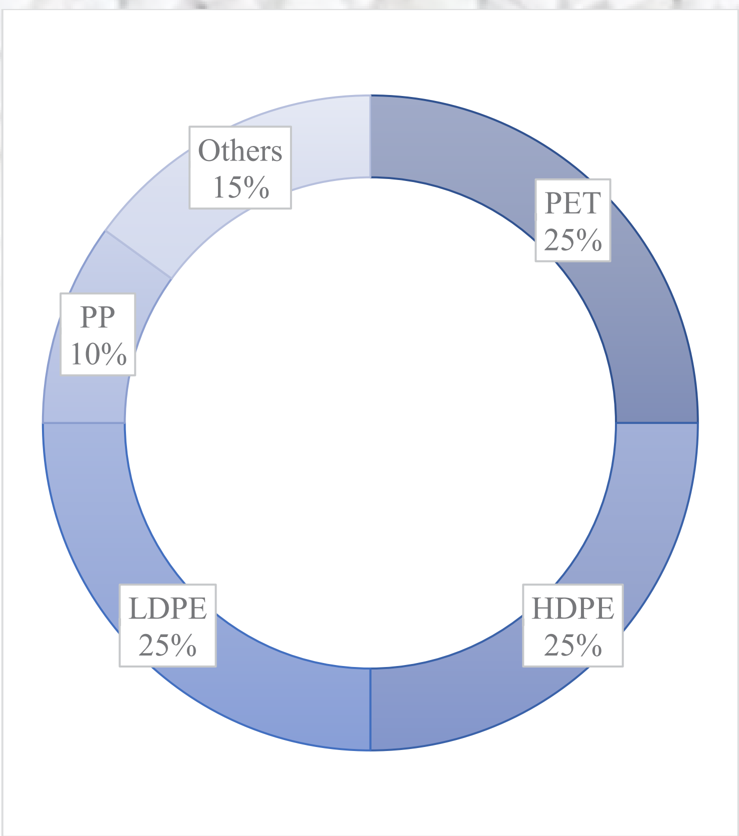

Figure 1. Breakdown of polymers used in packaging and food service items.

DISCUSSION

Polymers undergo autoxidation at each processing step that can negatively impact their molecular weight, physical properties, and appearance. Additionally, polymers slowly undergo autoxidation at ambient conditions during storage and use. Figure 2 illustrates the autoxidation process[5]. Cycle I of the process shows the generation of hydroperoxides from a free radical and oxygen. Cycle II of the process shows the decomposition of hydroperoxides to generate additional free radicals that accelerate the process.

In Cycle I, a highly reactive, carbon-centered free radical (R•) is formed by the abstraction of hydrogen from the polymer chain. The free radical rapidly interacts with oxygen to form a peroxy radical (ROO•). This peroxy radical can then abstract a hydrogen from the polymer or another molecule to form a hydroperoxide (ROOH) and a new free radical. The newly generated free radical can then interact with oxygen and repeat Cycle I.

In Cycle II, the unstable hydroperoxide undergoes homolytic cleavage to form an alkoxy radical (RO•) and hydroxy radical (HO•). These radicals then abstract a hydrogen from the polymer or another molecule to form new chemical species (such as an alcohol, ROH) while perpetuating a free radical that then can participate in Cycle I. The breakdown of hydroperoxides in Cycle II increases the radical flux and accelerates the autoxidation process.

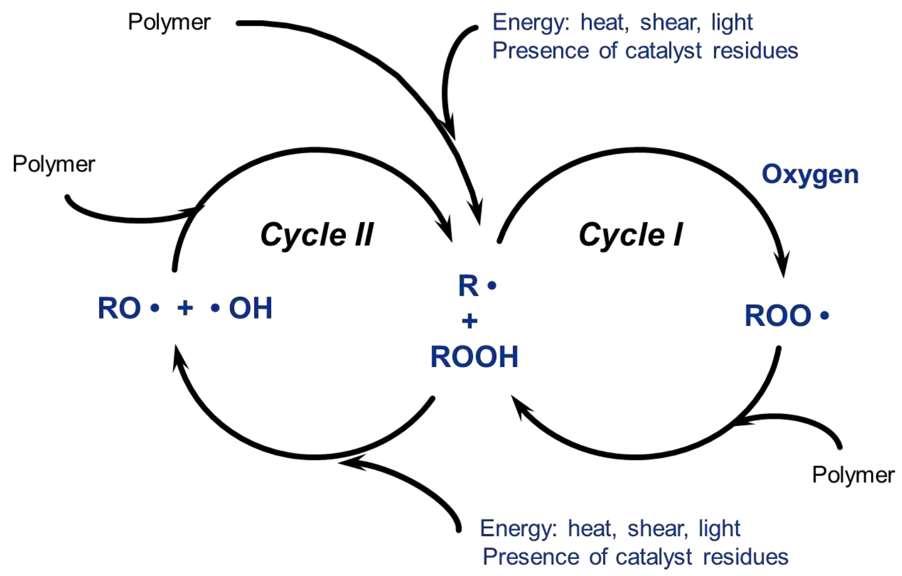

Figure 2. The autoxidation cycle

Ultimately, the autoxidation process introduces defects into the polymer, leaves behind pro-oxidative species (*e.g.*, undecomposed hydroperoxides), and potentially changes the polymer architecture.

To inhibit the autoxidation process, polymer stabilizers are used[5]. Primary antioxidants, such as hindered phenols, act as hydrogen donors and free radical scavengers, protecting the polymer and slowing the formation of hydroperoxides in Cycle I. Figure 3 illustrates the mode of action of the hindered phenol antioxidants. Secondary antioxidants, such as hindered phosphites, act to decompose the hydroperoxide without forming additional free radicals, reducing the radical flux in Cycle II. Figure 4 illustrates the mode of action of the hindered phosphite stabilizers.

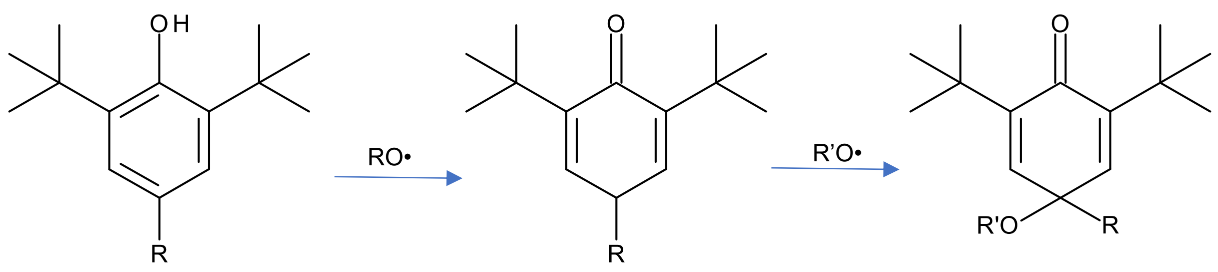

Figure 3. Neutralization of free radicals by hindered phenols

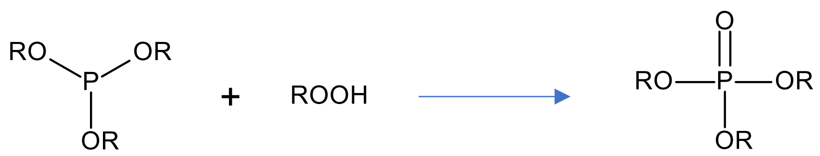

Figure 4. Decomposition of hydroperoxides by phosphites

Hindered phenolics, such as 2,6-di-t-butyl-4-methylphenol (BHT), on average will neutralize two to four free radicals per functional group before becoming deactivated[6]. A hindered phosphite will neutralize one hydroperoxide per phosphite group. Thus, as polymer is subject to autoxidation as it is processed and used over time, the concentration of active stabilizers will decline.

The concentration of stabilizers in polymer today has been optimized by the producers with a strong focus on cost and performance in the intended application for a given lifespan. Mechanical recycling, however, extends the polymer's life beyond its intended lifespan. As a result, most polymer today is not sufficiently stabilized to provide protection during further processing and additional use. The remaining or partially consumed stabilizers can become over-oxidized, leading to conjugated structures with strong color[7]. To prevent discoloration and ensure performance of recycled polymer, additional stabilization (or restabilization) is required. This stabilization must replenish the antioxidants, but may also require additional chemistries to address contaminants, pro-oxidative species, and precursors to chromophores present in the recyclate.

The primary purpose of restabilization is to preserve the processability and properties of the polymer by minimizing changes to the polymer molecular weight and architecture. Historically, color control has been considered secondary, and often non-critical, to the performance of a recycled polymer. However, as demand for high-quality recycled resin increases, so do the performance and appearance requirements. Understanding how the selection of different components of a stabilization blend influence the quality-critical parameters will be key to the successful formulation.

To illustrate this point, Figure 5 shows the melt flow performance (determined at 190°C with a 2.16 kg weight) in HDPE of three different stabilization blends in multipass extrusion. Extrusion pass 0 denotes the polymer after compounding on a twin screw extruder at 210°C, while extrusion passes 1, 3, and 5 are the number of passes through a single screw extruder at 240°C. Blend 1 contains a hindered phenol antioxidant, phosphite process stabilizer, and additional ingredients commonly used to stabilize HDPE for recycling. Blend 2 differs from Blend 1 only in the hindered phenol selected for the composition. Blend 3 uses the same ingredients as Blend 1 but at reduced concentration and supplemented with a high-performance additive.

In Figure 5, one can see that Blend 1 maintains the melt flow well, with some decrease in melt flow (corresponding to molecular weight increase) starting at the third extrusion pass. Blend 2 offers less robust stabilization, with a larger decrease in melt flow observed in the third and fifth extrusion passes. Blend 3 offers the best control of the melt flow, even at lower concentration, compared to Blend 1 and Blend 2.

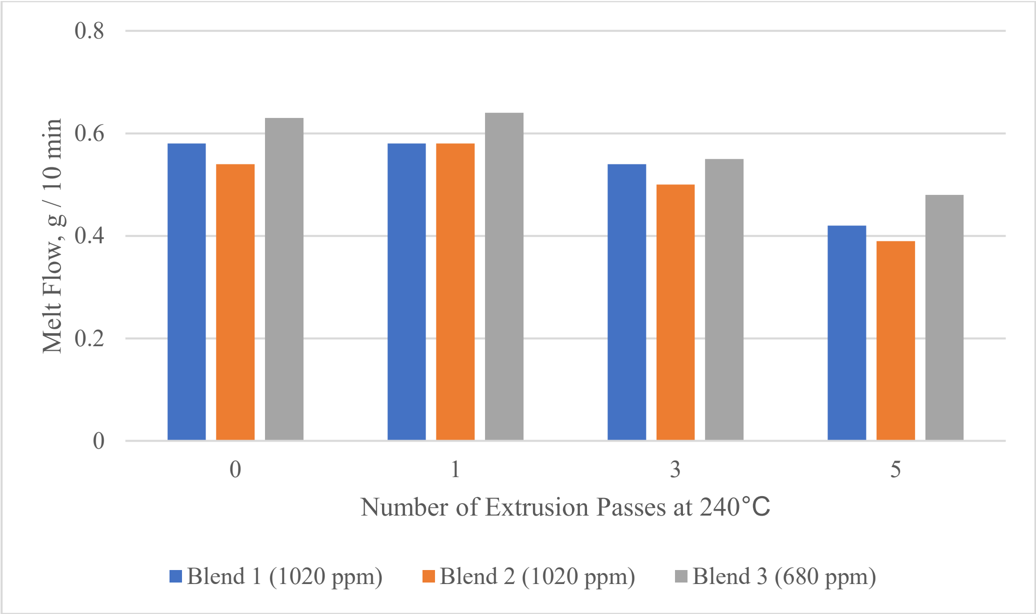

Figure 5. Melt flow comparison of HDPE in multipass extrusion

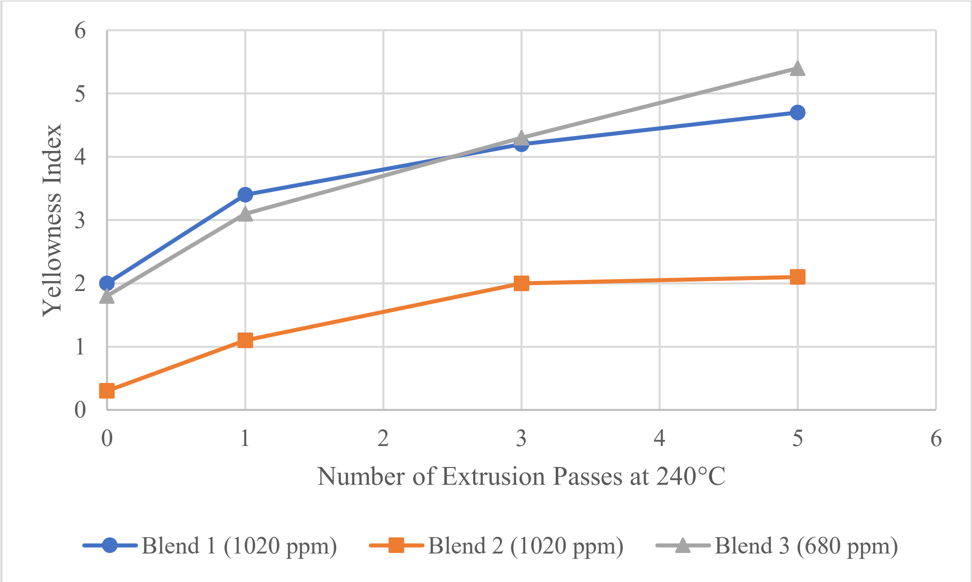

Figure 6. Yellowness index of HDPE in multipass extrusion

Figure 6 shows the color performance of the three blends through multipass extrusion. Color was determined as a yellowness index (YI) in accordance with ASTM E313-96. Blend 1 starts with a YI value of 2.0 and increases to a YI value of 4.7 by the fifth extrusion pass. In contrast, Blend 2 starts with a YI value of 0.3, noticeably lower than the starting color for Blend 1. Additionally, the color at the fifth extrusion pass for Blend 2 is about equivalent to the starting color for Blend 1, showing lower color development. Blend 3 offers color performance similar to Blend 1, with slightly higher color developing after the fifth extrusion pass.

Selecting ingredients for a recycling stabilization formula will inevitably require trade-offs in terms of melt flow control, appearance, and cost in use.

An optimized blend (Blend 032) of polymer stabilizers and supporting chemistries was developed for recycling PP. A commercial grade of post-consumer recycled PP with a nominal melt flow of 4 was selected for this study. The PP was compounded on a twin-screw extruder at 230°C (extrusion pass 0), and then subjected to multiple passes through a single-screw extruder at 240°C. The melt flow rate for the polymer was determined at 230°C using a 2.16 kg weight. The CIELAB color of the samples was determined on compression molded plaques with a thickness of 0.40" using the D65 illuminant and 10° Standard Observer.

The melt flow results are shown in Figure 7. PP without restabilization ("Control") exhibits an increase in melt flow rate with each extrusion pass, indicating reduction in the molecular weight and the loss of mechanical properties. PP restabilized with 0.2% of Blend 032 shows a consistent melt flow rate over multiple extrusion passes, indicating preservation of the molecular weight and mechanical properties.

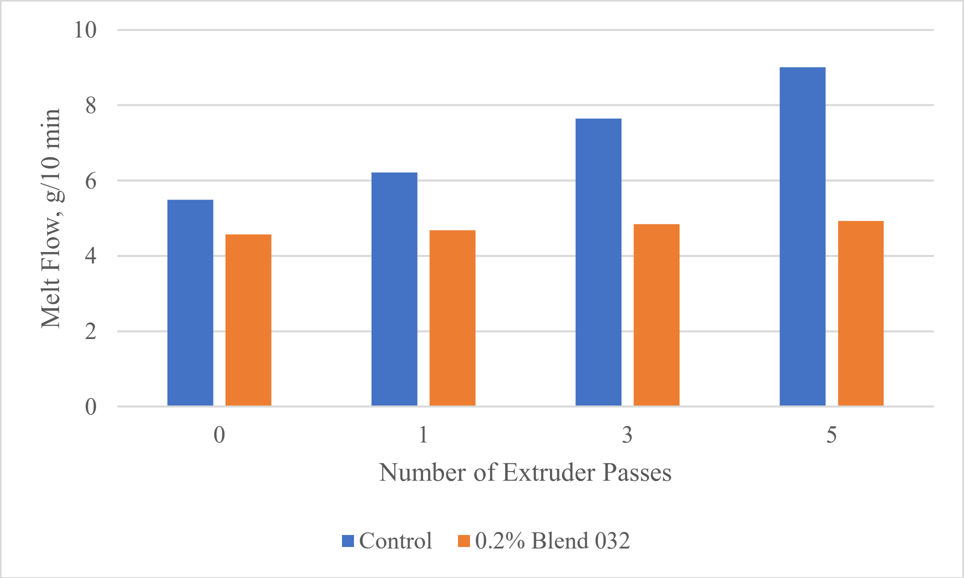

Figure 7. Melt flow index of recycled PP with and without restabilization in multipass extrusion

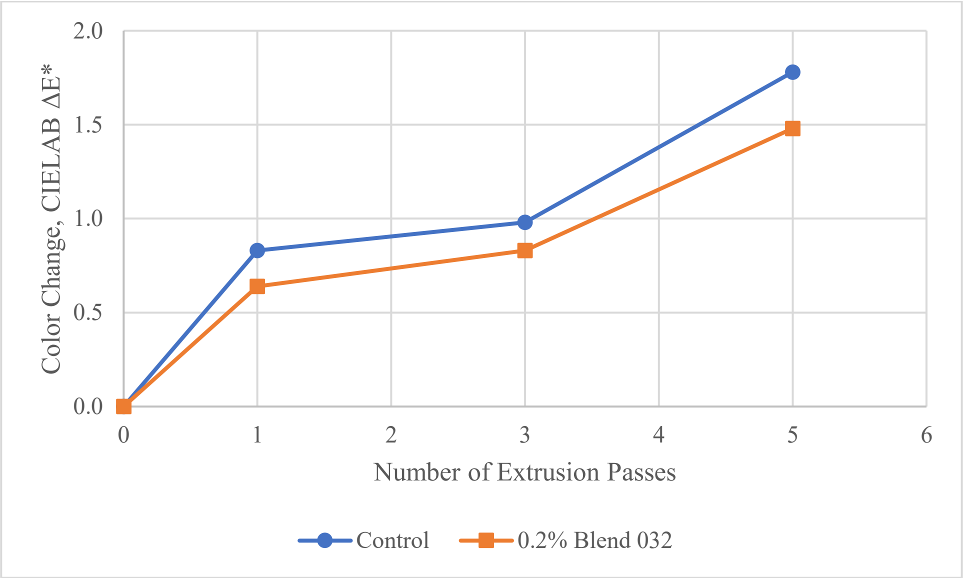

Figure 8. Color change of recycled PP in multipass extrusion

Figure 8 shows the color change (CIELAB ΔE*) with each extrusion pass. The color change at each extrusion pass is approximately 20% higher for the Control compared to the sample restabilized with Blend 032. In combination with the melt flow data, Blend 032 looks like an attractive option for restabilization for this source of PP.

The color change data warrants a closer examination. While the total color change for the two materials track closely together, it is interesting to note the *cause* of the color change is different in each sample. Figure 9 shows the change in lightness (ΔL*) at each extrusion pass. Here, we see both samples undergo initial rise in lightness at the first extrusion pass (ΔL* ≈ 0.5), followed by a decrease in lightness at subsequent extrusion passes. At the fifth extrusion pass, the decrease in lightness is greater for the Control (ΔL* = -1.6) compared to the restabilized PP (ΔL* = -0.5).

Figure 10 shows the change of the color through color space with each extrusion pass. (The dotted line arrows denote the direction of the change moving from extrusion pass 0 to extrusion pass 5.) For the Control, there is little chroma development but there is a shift in hue towards redder tones. Combined with the change in lightness, the appearance of the Control could be described as becoming more brown. In contrast, the restabilized PP shows a larger increase in chroma and a smaller shift in hue. In this case, the sample is becoming more yellow.

In this experiment, the selection of the components of Blend 032 offer strong melt flow control, but some compromises in terms of color development. While the total color change is better than the Control, the increase in yellowness and slightly higher initial color may limit the application space for the PP.

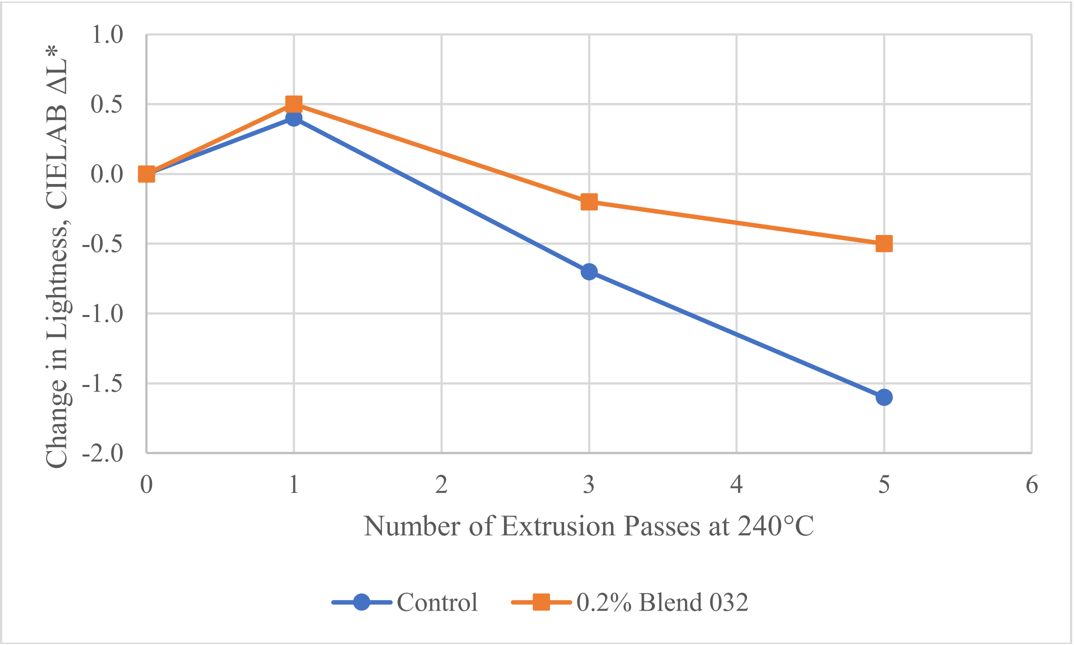

Figure 9. Change in lightness (L*) in multipass extrusion

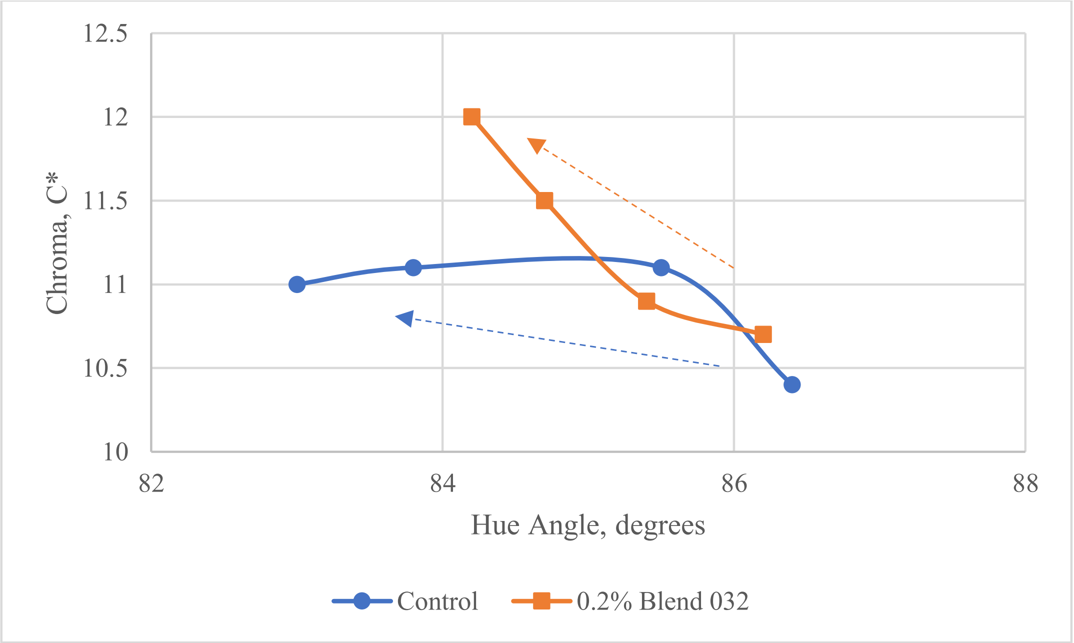

Figure 10. Change in chroma (C*) and hue (h) in multipass extrusion

Mechanical recycling of polymers is an important tool to improve the circularity of plastics. However, oxidation of plastics during processing and during its intended lifetime consume polymer stabilizers that protect the molecular weight and appearance of the plastic. In order to improve the quality of recycled plastic, supplemental polymer stabilization is required. The stabilization system should include components to mitigate further oxidation (*i.e.,* antioxidants and process stabilizers), as well as to address the chemistries that can accelerate degradation, discoloration, and loss of mechanical properties due to incompatibilities within the polymer. Understanding the intended use of the recycled plastic will help guide formulation of the stabilization system and identify the trade-offs that may be required.

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SUSTAINABILITY UPDATE

NINE MYTHS ABOUT PLASTICS

1. Plastic packaging is toxic?

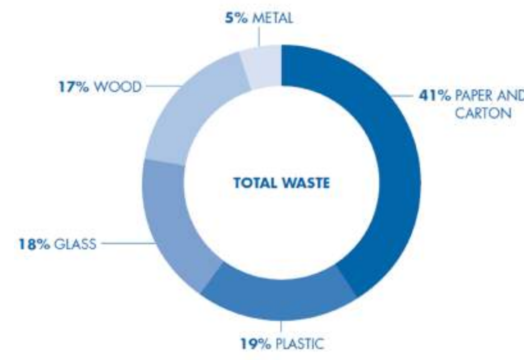
False: plastic packaging is inert & can save lives. Contaminated water can be purified in transparent PET bottles with UV rays. This helps those in regions where there is no access to clean drinking water. Plasticizers such as BPA have been identified as being harmful to health. These substances aren’t used in PET bottles, caps or in plastic packaging used for personal care and household products.

Ref: Eurostat (env_waspac)

2. Majority of packaging waste is plastic?

False: plastic packaging is only a small portion of packaging waste. Across Europe, plastic packaging is only 19% of the total packaging waste. Most packaging waste, is from paper and carton and that has risen significantly since 2007.

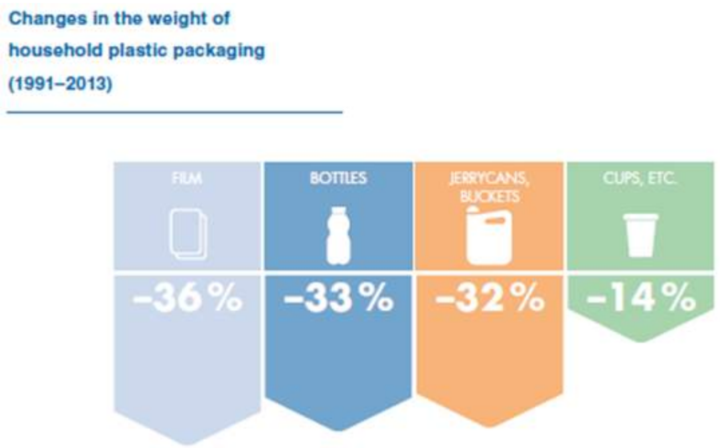
Ref: Eurostat (env_waspac)



3. The industry isn’t doing anything to reduce the use of plastic?

False: new designs yielded an annual reduction of 6.2 million tons of plastic in Western Europe. Packaging made of plastic has become 25% lighter since 1991 while still retaining performance, safety and hygiene standards.

Ref: German Association for Plastics Packaging and Films (IK):‘Daten & Fakten –„Ressourceneffizienz von Kunststoffverpackungen’; PlasticsEurope: ‘Plastics – the Facts 2019

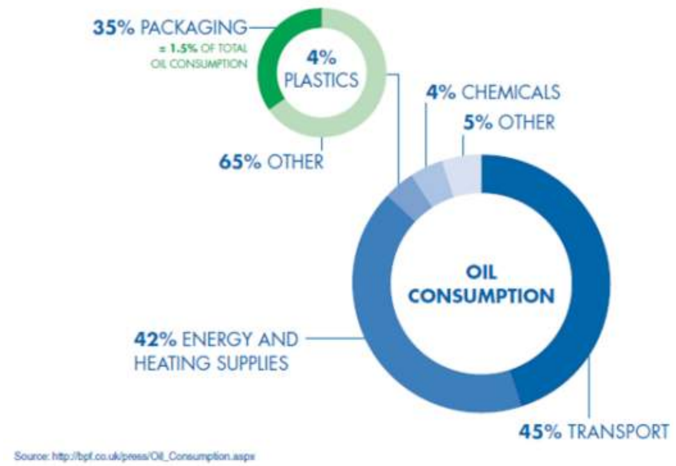


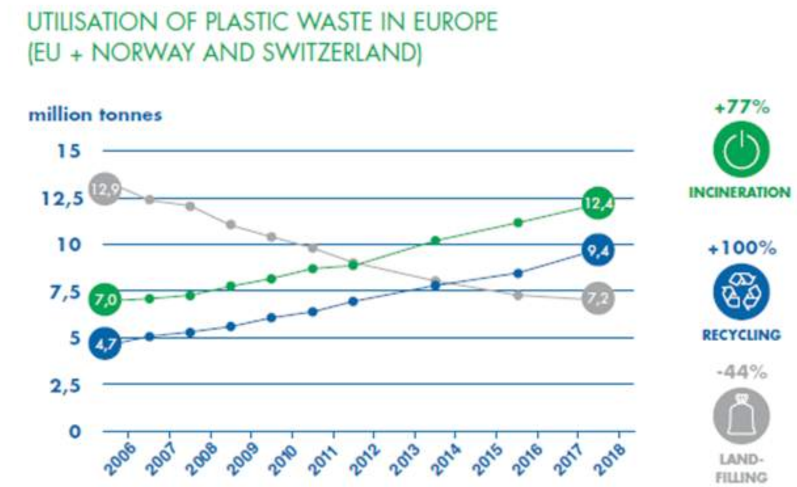
SUSTAINABILITY UPDATE

NINE MYTHS ABOUT PLASTICS

4. Plastic packaging consumes extreme amounts of oil.

False-only 1.5% of crude oil produced globally is used for manufacturing plastic packaging. Plastic packaging can be recycled 4-7 times without the need for new oil. ref: https://lnkd.in/eHjva9mE





7. Most plastic packaging still ends up in landfill.

False: there has been a significant reduction of plastic packaging in landfill in recent years. Higher plastic packaging collection resulted in higher recycling and waste-to-energy rates.

Ref: PlasticsEurope: 'Plastics – the Facts 2024')

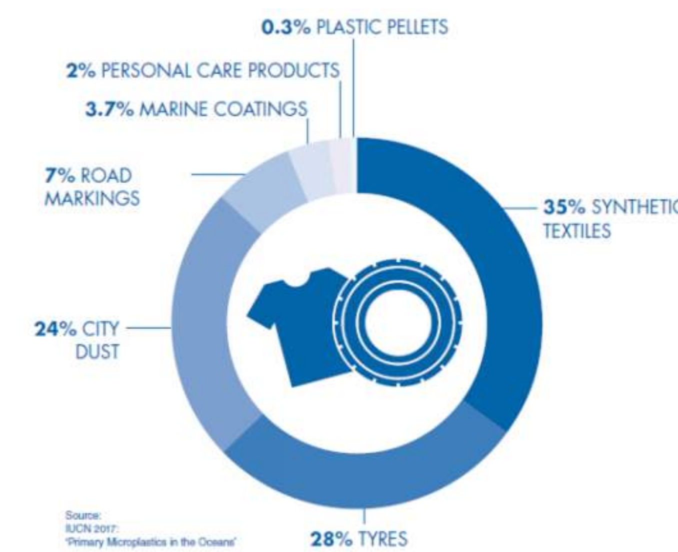
5. Plastic packaging prevents us from achieving carbon goals?

False: plastic packaging generates small amount of carbon emissions (0.6%) compared to transportation, food production and energy generation. ref: European Environment Agency 2017; CO2 equivalent, myclimatecalculator.

8. Majority of Microplastics in oceans are from plastic packaging.

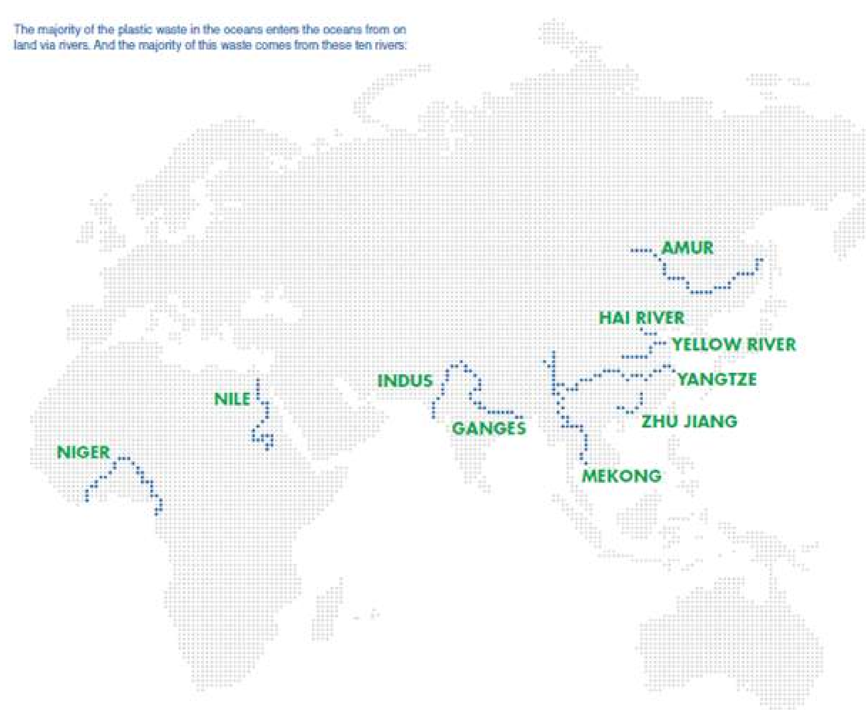
False: most microplastics are from clothing, tires and city dust. If plastic waste is managed correctly, through reuse, recycling and reduction then less will become microplastics,

Ref: IUCN2017, 'Primary Plastics in the Oceans'



6. Oceans are full of plastic from the US & Europe?

False: marine litter is a waste disposal problem not a plastic packaging problem. 80% of plastic waste comes from developing countries that lack proper waste collection systems. Most ocean plastic waste is from fishing gear. Ref: European Commission: 'A European Strategy for Plastics in a Circular Economy'



9. Plastic companies are spreading misinformation about plastics?

False: Misinformation is actually being spread by organizations who either don't know the facts about plastics or manipulate statistics to mislead the public.

Life without plastics would be catastrophic, in particular medical durable and single-use plastics can prevent infections, reduce tampering, create devices that weren't previously possible and reduce medical costs.

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