Dow Packaging & Specialty Plastics

DOW®

Design for Recyclability

EMEA

Seek Together™

Can we create a cleaner world?

Keeping plastic out of the environment is a great way to start. By designing for recyclability, reusing and repurposing, we can ensure plastic retains its value and contributes to a circular economy. With new products and emerging technologies, we're finding ways to make this possible.

Committed to sustainability

We believe that plastic should only be used when it offers the lowest environmental impact. Plastic waste should never end up in the environment.

That's why we're committed to accelerating the transition to a **circular economy** and to making plastic part of a circular world – a world where its value is retained, and the environmental impact is minimized.

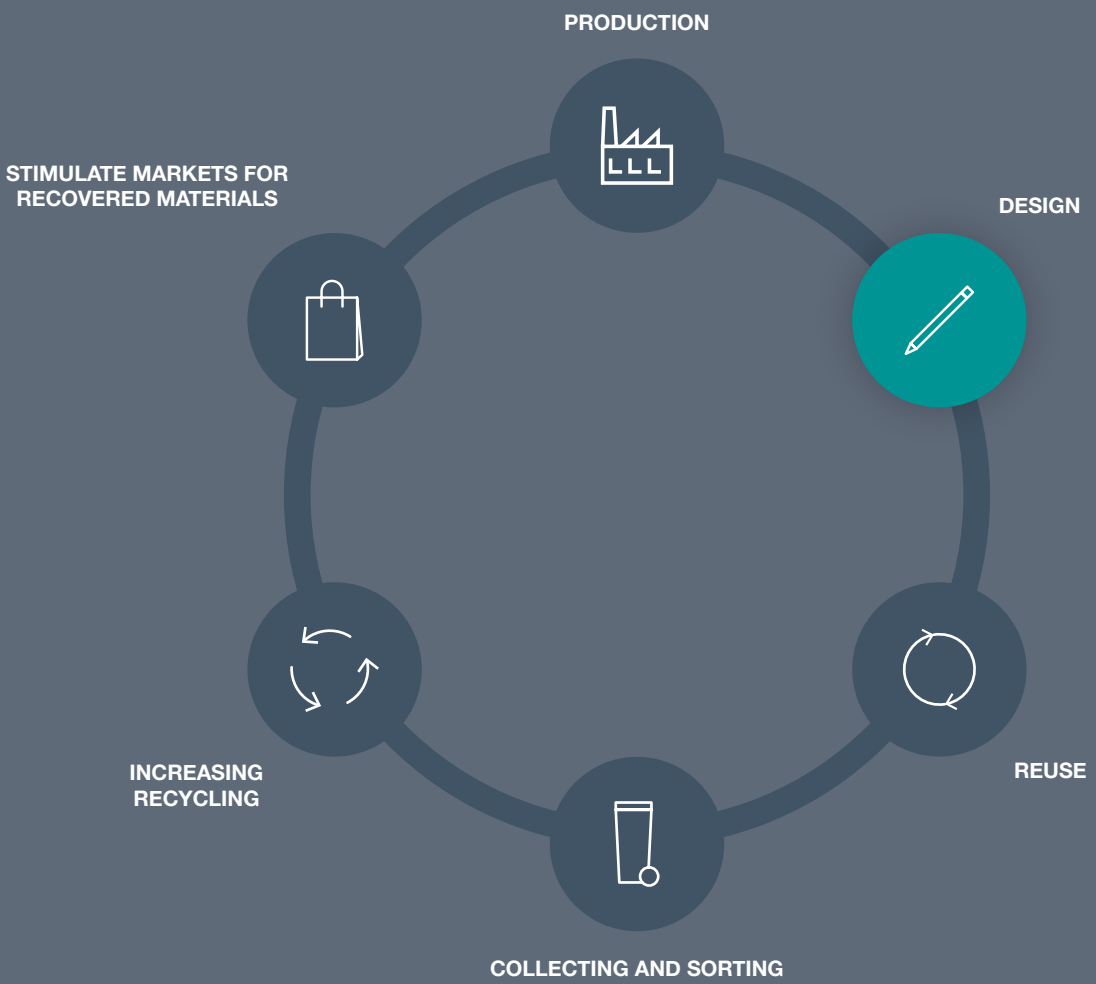
Working together with other businesses and organizations, we can continue to provide all the positives of plastic while ensuring that none of it ends up in the environment or is lost to landfills.

What action is needed?

Global desire for more **sustainable packaging** is steadily growing. Accelerators, markets and regulators are responding.

In Europe, the European Commission has made a political commitment that all plastic packaging must be reusable or economically recyclable by 2030. Major brands and retailers are targeting 2025 to be 100% recyclable.

In Dow, we are committed to ensuring that all packaging made from our resins is designed to be recyclable by 2025.



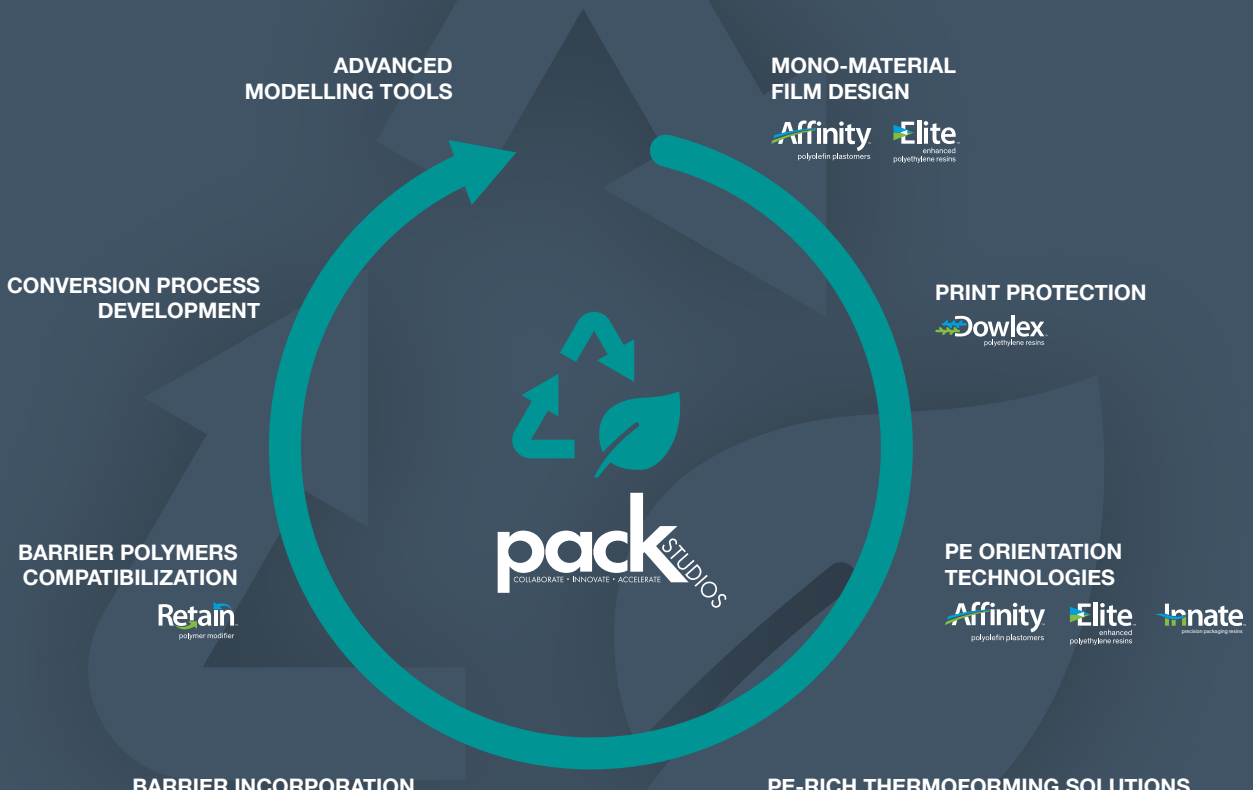
Design for recyclability

We're ready to help you. We want to work with you to design for recyclability right from the start, choosing materials that work together to create packaging that satisfies performance requirements throughout its lifecycle.

To make this possible, we offer a holistic portfolio of products, services, capabilities and strategic partnerships that support brand owners and converters to meet recyclability targets with their packaging structures.

And to complement our portfolio, we are offering a range of bio-based plastics from alternative feedstocks and exploring new technologies and partnerships to offer circular polymers made from plastic waste.

The possibilities are exciting, let's explore them together!



Technologies and services

We offer you expertise and a broad portfolio of technologies and solutions, from high-performance resins for toughness and sealability to specialty coatings and adhesives, which can help enable packaging recyclability and offer sustainability advantages.

Find a technology or service that interests you? Get in touch and let us show you how our technologies and services can transform your business.

Mono-material film design

Combining innovative high- and low-density PE resins can create mono-material films that deliver packaging integrity and stability for great shelf-appeal and exceptional conversion efficiency.

- DOWLEX™, ELITE™ and INNATE™ resins offer excellent combinations of stiffness, toughness, heat resistance and optical performance.
- DOW™ LDPE resins deliver enhanced optical properties, cuttability and film production efficiency.
- AFFINITY™ high performance sealants provide very low seal initiation temperatures, can seal through contamination and enable excellent packaging integrity in mono-material structures.

Print protection

Coating an additional layer on a film using PE-based resins protects the surface print on packaging and delivers a superior, glossy appearance.

- DOWLEX™ 2006G delivers an alternative form of print protection by extrusion coating a thin layer of high-density PE which also provides heat resistance and surface gloss.
- AGILITY™ EC high performance LDPE coating resins can be used for improved conversion efficiency.

PE orientation technologies

We offer leading solutions for machine direction oriented PE films (MDO-PE), tenter-frame bi-axially oriented polyethylene films (TF-BOPE) and blown, bi-axially oriented films (double and triple bubble). By incorporating oriented films in packaging solutions, exceptional stiffness, great optics and overall dimensional stability are provided.

MDO-PE films provide unique stiffness and optics properties for PE-based packaging. Collaborating with extrusion OEMs like W&H and Hokosawa Alpine, we've developed new structures based on ELITE™ and AFFINITY™.

- ELITE™ enhanced PE resins enable a high stiffness MDO-PE film with outstanding optics, without compromising on film processability.
- AFFINITY™ polyolefin plastomers serve as highly effective blocking agents for blocked-bubble films and can be incorporated into seal layers in asymmetrical films for a broader operating window on the packaging line.

TF-BOPE films designed for recyclability, developed in collaboration with OEM Brückner and converters, deliver high optics and outstanding stiffness-toughness balance for packaging.

- INNATE™ TF80[1] resins enable a broader processing window during extrusion and an excellent balance of properties.
- ELITE™ AT 6900[2] can be incorporated to provide higher stiffness and temperature resistance.

[1] formerly XUS 59910.08
[2] formerly XUS 59999.39

Triple Bubble® technology[3]

Traditionally used to produce shrink films for barrier shrink bags for fresh meat, triple bubble technology provides ultra-thin multilayer barrier films with superior optics and stiffness. We have been working with leading extrusion OEM Kuhne to redesign these films for recyclability using combinations of high-performance resins.

- DOWLEX™, ATTANE™, ELITE™, SURLYN™ and INNATE™ resins can be combined to achieve a robust combination of stiffness, toughness and processability during extrusion.
- BYNEL™ resins are used as tie layers between PE and barrier polar EVOH, and PA layers for excellent packaging integrity.
- AFFINITY™ polyolefin plastomers are ideal sealant layer resins providing the broadest possible operating window on the packaging line and good seal performance for final packaging hermeticity.

PE-rich thermoforming solutions

New high-performance PE resins enable the design of PE-rich thermoformed films, both for cast and blown conversion technologies, eliminating polyamide (PA) in the structure to design it for recyclability.

PE-based thermoformed films can be used for non-barrier applications including medical device packages, or barrier PE-EVOH structures for fresh food like meat or cheese.

Our cast and blown films solutions include:

- ATTANE™ resins provide excellent thermoformability and mechanical performance.
- ELITE™ and INNATE™ resins deliver improved stiffness-toughness balance.
- DOWLEX™ resins can improve heat resistance and stiffness, and deliver excellent release performance in packaging lines.
- AFFINITY™ plastomers deliver a superior seal performance for excellent packaging integrity.

In both cases, our BYNEL™ resins for barrier PE-EVOH structures are used to deliver excellent packaging integrity for bonding polar and non-polar layers.

In addition, our blown film solutions are enabled by new XUS 59910.11[4] resins for exceptional stiffness-toughness balance required for thermoformability and mechanics.

Barrier incorporation

Through collaborative projects, we have been able to achieve effective barrier coatings (metal and metal oxide deposition) of oriented PE films that provide medium to high barrier protection in pouches designed for recyclability.

Structures are enabled by technologies such as:

- ELITE™ enhanced PE resins to provide high stiffness films with outstanding optics.
- AFFINITY™ polyolefin plastomers to deliver exceptional bubble blocking.

Barrier polymers compatibilization

Using Dow's portfolio of compatibilizers can enable the incorporation of recycled barrier resins into packaging films with good optics and mechanics.

- RETAIN™ can be incorporated in the barrier film design for structures containing barrier polymers (PA or EVOH or both) with more than 5% for improved recyclability in the PE films stream.
- FUSABOND™ compatibilizers can also be used for PE barrier film compatibilization where improved mechanical performance is needed, while solutions exist for other polymer systems including PP barrier films.
- ELVALOY™ and ELVALOY™ AC resins enable compatibilization of other polymer blends such as PET and PE where this may be needed.

[3] Triple Bubble® is a registered trademark of KUHNE Anlagenbau

[4] Experimental resin of Dow

Our collaborative services supported through Pack Studios can accelerate new developments and shorten the time it takes to get to the market.

Conversion process development
Collaborating with Menschen, one of the world's leading manufacturers of caps, closures and single-serve capsules, we have jointly developed a new transformative Reverse Spout Sealing Technology that enables the production of spouted pouches made of mono-material films. The new process is designed to easily seal spouts in more heat sensitive, mono-material structures made from all polypropylene or all polyethylene packaging layers.

PE-rich structures machinability collaborations
In Pack Studios, we are working together with several packaging machine OEMs including Mespack, Bossar, SN Maschinenbau, Ulma and Syntegon. Together we are evaluating various mono-material packaging structures to optimize machine-packaging interaction and aim to deliver key machinability and multilayer film structure parameters to enhance productivity, optimize machine settings and enable next generation sustainable packaging.

Accelerating time to market with digital modelling
PacXplore™ is part of the Pack Studios digital services. Providing advanced predictive modelling to help accelerate the innovation process of new flexible packaging, it uses predictive intelligence to simulate innovative new systems. From optimized films to laminates, packaging geometry and drop height prediction, new concepts can be explored through PacXplore's™ machine learning algorithm.

pacXPLORE™
digital collaboration tool by DOW

Together we make things better faster

Dow Pack Studios is at the center of a network of key players in the packaging technology value chain. We collaborate in spaces tailor-made for the ideation of optimal solutions and provide the facilities to conceptualize, develop and test ideas on site in key global locations.

Together, our global reach and expert, local insight allow us to accelerate sustainable packaging and drive the circular economy.

www.dow.com/packstudios

pack STUDIOS
COLLABORATE • INNOVATE • ACCELERATE

Success stories

Making packaging that's suitable for recycling and offers high production efficiency while delivering superior consumer experience is no easy task. It's only by working together that the solutions needed can be found and the delivery of innovation to the market accelerated.

Together with industry, designing packaging for recyclability is focused equally on functionality and developing products with the lowest environmental impact throughout their lifecycle. The success stories shared here show the power of collaboration and how we can ultimately ensure plastic packaging plays its part in the circular economy.

Success stories like these inspire us. If they inspire you too, let us know.

Re-closable dishwasher pouch

Creating mono-material PE packaging that can be produced on existing equipment while also delivering extra functionalities does not happen overnight. Together, Dow, Drukpol and RB decided to take on this challenge. The result is a **re-closable pouch designed for recyclability**, offering optimal performance and consumer appeal. Enabled by Pack Studios, the new PE pouches were successfully piloted and commercialized with FINISH dishwasher tab packaging.

Affinity™ polyolefin plastomers

Dowlex™ polyethylene resins

Granola cereal packaging

This Recycle Ready Pouch, commercialized in the US, has been created by Berry and Dow for Kellogg's Bear Naked® granola brand. We've developed a barrier pouch designed for **recyclability that qualifies for the 'How2Recycle' label**, which is awarded by the US Sustainable Packaging Coalition (SPC). This label provides evidence of packaging recyclability to consumers, as well as clear instructions regarding the recycling process – in this case, a grocery store drop-off system.

Affinity™ polyolefin plastomers

Innate™ precision packaging resins

Retain™ polymer modifier

Spouted pouch for baby food, ketchup and detergent

Together with Menschen, we set out to find a simpler and more sustainable sealing process for spouted pouches. We discovered that reversing the traditional process itself could deliver exactly what we were looking for. A three-year collaborative effort resulted in the Reverse Spout Sealing Technology. Thanks to this technology and based on Dow's broad portfolio of resin and adhesives, it's possible to produce **mono-material pouches that deliver excellent spout sealing**, look good on the shelf and help to design PE-based mono-material packages for recyclability.

Affinity™ polyolefin plastomers

Innate™ precision packaging resins

Retain™ polymer modifier

Barrier MDO-PE pouch for fresh juice, beetroot and nuts

Responding to the industry trend to replace non-recyclable, multi-material barrier packaging structures with recyclable mono-material alternatives, BOBST, HOSOKAWA ALPINE, ELBA and Dow combined efforts to deliver a MDO-PE//PE film laminate. It provides the barrier needed for food preservation using specialty coatings and adhesives, and its multilayer design delivers excellent stiffness, toughness and sealability. It can help **enable packaging recycling for medium-to-high barrier applications.**

Affinity™ polyolefin plastomers

Elite™ enhanced polyethylene resins

Innate™ precision packaging resins

What kind of packaging do you need?

What sustainability endeavors are you undertaking? We'd like to help. The products and technologies presented are applicable to virtually any flexible packaging structure:

- Stand-up pouches including zippers or spouts
- Thermoformed packaging
- Flow wrap
- Lidding films

Interested to explore the latest developments and benefits together? Let us know.

Together for a circular economy

Let's move towards a world in which the practical and social benefits of plastic are matched by its environmental performance.

We're committed to playing our part, but we can't do it alone. As shown in the success stories, our technologies' and services' greatest value is their application in collaboration with industry to deliver customized packaging designed for recyclability.

We want to forge new relationships and start collaborations that will ultimately help transform businesses and society as we transition to a circular economy. We're here to listen, learn, discuss, and to be inspired by you.

Let's explore together.

About Dow

The Dow Chemical Company (Dow) combines science and technology knowledge to develop premier materials science solutions that are essential to human progress. Dow has one of the strongest and broadest toolkits in the industry, with robust technology, asset integration, scale and competitive capabilities that enable it to address complex global issues. Dow's market-driven, industry-leading portfolio of advanced materials, industrial intermediates, and plastics businesses deliver a broad range of differentiated technology-based products and solutions for customers in high-growth markets such as packaging, infrastructure, and consumer care. More information can be found at www.dow.com.

Dow Europe GmbH
Bachtobelstrasse 3
8810 Horgen
Switzerland

US

Toll Free	800 441 4DOW
	989 832 1542

International

Europe / Middle East	+ 800 36 94 63 67
Italy	+ 800 783 825
Asia / Pacific	+ 800 77 76 77 76
	+ 60 37 958 3392
South Africa	+ 800 99 5078

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Form No. 910-00133-01-0221 DOW