

Unwrapped: Plastic packaging matters



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Geopolitics and legislation

The escalating Iran conflict is beginning to reverberate through global plastic supply chains, tightening feedstock availability and pressuring resin markets across key transit corridors.

At the same time, global tariff volatility – driven by recent US tariff reversals and reimpositions – continues to reshape plastic and plastic machinery trade flows, heightening uncertainty and shifting cost structures for manufacturers.

Concurrently, California's extended producer responsibility (EPR) rulemaking has been temporarily paused, as CalRecycle withdrew its proposed SB 54 packaging regulations for further clarification. A major point of contention remains the scope of the food and agriculture packaging exemption, which stakeholders argue requires more precise definition before implementation.

In parallel, the US Packaging and Claims Knowledge Act has emerged in Congress as a federal solution to harmonize recyclable, compostable, and reusable packaging claims, replacing a growing patchwork of state-level labeling requirements.



Iran conflict: Strait of Hormuz closure and global plastic packaging supply chain risks

The strait is a critical chokepoint for plastic feedstocks and resin trade.

After Israel and the US launched joint strikes on Iran on February 28, Iran declared the Strait of Hormuz closed, saying it would fire on any ship trying to pass. The strait is a critical chokepoint for both energy and petrochemical feedstocks. Any disruption would rapidly constrain naphtha and polyolefin supply, with immediate implications for global plastic packaging markets.

Strait of Hormuz: key facts

~20%	~20m barrels
of global petroleum liquid shipments transit daily	Crude oil and condensate flow per day
~1.2m barrels	27%
Naphtha shipments per day	Of global LPG feedstock exports
~USD 23bn	13%
Plastic packaging and resin export value shipped annually	Global seaborne trade volumes of chemicals

There are no easy options to bypass the strait, which is 33km at its narrowest. If blocked, it could take weeks or months to clear. Alternative routes that could help mitigate effects of a closure include the Saudi Aramco and UAE pipelines.

Impact on naphtha and polyolefin

Naphtha – primary cracker feedstock

- The Middle East currently supplies ~35% of global naphtha exports, making the market highly exposed to any disruption in the Strait of Hormuz.
- Past disruptions have shown that supply interruptions trigger spot-market price spikes. For example, following the January 2020 US drone strike on Qasem Soleimani in Baghdad, the delivered price of naphtha rose 12% within five days.
- The EU has become increasingly dependent on Middle Eastern naphtha after banning Russian crude and refined products in late 2022 and early 2023, further tightening exposure to Hormuz-related risks.
- Asia remains the largest demand center, with over 60% of its seaborne naphtha imports sourced from the Middle East in 2025, making the region especially vulnerable to any export disruption.
- A closure or impairment in the strait tends to drive freight rates sharply higher, as the higher oil prices feed into fuel costs, insurers raise premiums for transiting high-risk waters, and long-range tanker availability tightens.

Polyolefins – finished resin

- Polyethylene (PE) exports face significant disruption, with shipments from Qatar and Iran delayed or suspended. This affects large volumes of HDPE and LDPE.
- Polypropylene (PP) markets may tighten rapidly, as reduced Middle Eastern supply pushes regional prices higher and limits availability in key importing regions across Asia, Africa, and Europe.
- Converters face supply insecurity, prompting pre-buying, inventory building, and temporary substitution (e.g., LLDPE for LDPE where technically feasible).
- With Middle East volumes impaired, global price volatility increases, as disrupted flows tighten markets already sensitive to ethane/naphtha feedstock swings and changes in refinery operating rates.

Strait of Hormuz closure: Who is exposed and what are the impacts?

Exposure to a Strait of Hormuz closure varies by region, but the cost and supply impacts are felt across the entire value chain.

Disruption at the Strait of Hormuz exposes every segment of the polyolefin value chain. Regions most reliant on Middle Eastern PE and PP face immediate supply risk, while resin producers, converters, brands, and consumers will feel cascading consequences as shortages tighten and costs rise. The impacts spread quickly from upstream resin availability to packaging production, product pricing, and ultimately consumer markets.

Most exposed regions

Strait of Hormuz exposure	Top polyolefin import markets
High	Europe Heavy PP importer Feedstock and resin disruptions hit simultaneously
Medium	China Heavy PE importer Largest single PE/PP import market
Medium	Broader Asia Heavy PP and naphtha importer
Low	North America Net resin exporter 45% of US PE production exported each year

Downstream value chain impact

Resin producers

- **Margin pressure:** higher feedstock and logistics costs.
- **Supply risk:** force majeure risk and shipment disruptions.
- **Market volatility:** thinner spot market liquidity and price swings.

Packaging converters

- **Cost pressure:** resin typically accounts for 50% to 70% of PE and PP cost of goods sold.
- **Pass-through constraints:** fixed price or lagged contracts delay cost recovery.
- **Operational risk:** lower capacity utilization and planning uncertainty.

Brands and consumers

- **Cost inflation:** higher packaging input costs (every USD 100/metric ton of resin increase adds ~USD 0.0025-0.010 per unit).
- **Portfolio pressure:** SKU rationalization pressure on margin-challenged products.
- **Price transmission:** rising costs passed through to the consumer.

US tariffs shifted costs in plastic trade in 2025

Total US plastic product import volumes fell 12.8% to USD 4.9bn, but machinery imports rose 5.3% to USD 100m. The EU is pursuing its own competitive edge.

In 2025, the US imposed tariffs on its biggest plastic trade partners:

10% to 34%



Current baseline: 10% reciprocal rate. Items under Section 301 of the US Trade Act: 25% to 34%.
Machinery exclusions are extended through November 2026 for essential equipment.

0% to 35%



USMCA-compliant goods: 0%.
Non-compliant: 25% to 35%.
Only 39.5% of Canadian plastics now meet USMCA requirements, a sharp drop from 98.3% in 2024, driven by stricter criteria and a significant rise in products failing the updated "rules of origin" test.

15% to 24%



Japan: 15% baseline. Germany: No broad exemptions.
Germany's VDMA warns of existential threat. EU machinery could gain tariff-free access to Mercosur versus US competitors.

How US plastics import patterns shifted (YTD Aug 2025 vs. 2024)

Category	Value change (USD)	Value change (%)	Price index change	Volume/quantity change
Plastic resins	-1bn	-6.9%	-2.8%	-4.2% (lb)
Plastic products	-4.9bn	-12.8%	+0.6	-13.3% (units)
Plastics machinery	+100m	+5.3%	-1.7%	+7.1% (units)
Molds	+100m	+7.1%	+61.5% (steel tariffs)	-33.7% (units)

Trade ambitions on hold: Court rulings stall EU-Mercosur progress and reshape US tariff strategy

- The EU signed the Mercosur trade agreement with the South American bloc on January 17, 2026, but implementation was immediately paused for a European Court of Justice review. Meanwhile, the US Supreme Court struck down the Trump administration's so-called Liberation Day tariffs, forcing Washington to reformulate its global tariff strategy.
- The EU deal would remove 20% machinery tariffs across the Mercosur market of 260m people, potentially giving EU machinery manufacturers a clear cost advantage over US competitors in Brazil, Argentina, Paraguay, and Uruguay.
- Covering more than 90% of tariffs and forming what would be the world's largest free-trade zone (780m people), the EU-Mercosur agreement could reshape global industrial supply chains. By 2040, it is expected to lift EU annual exports by 39%, particularly in manufacturing and services, and redirect more European machinery production toward fast-growing markets in South America.

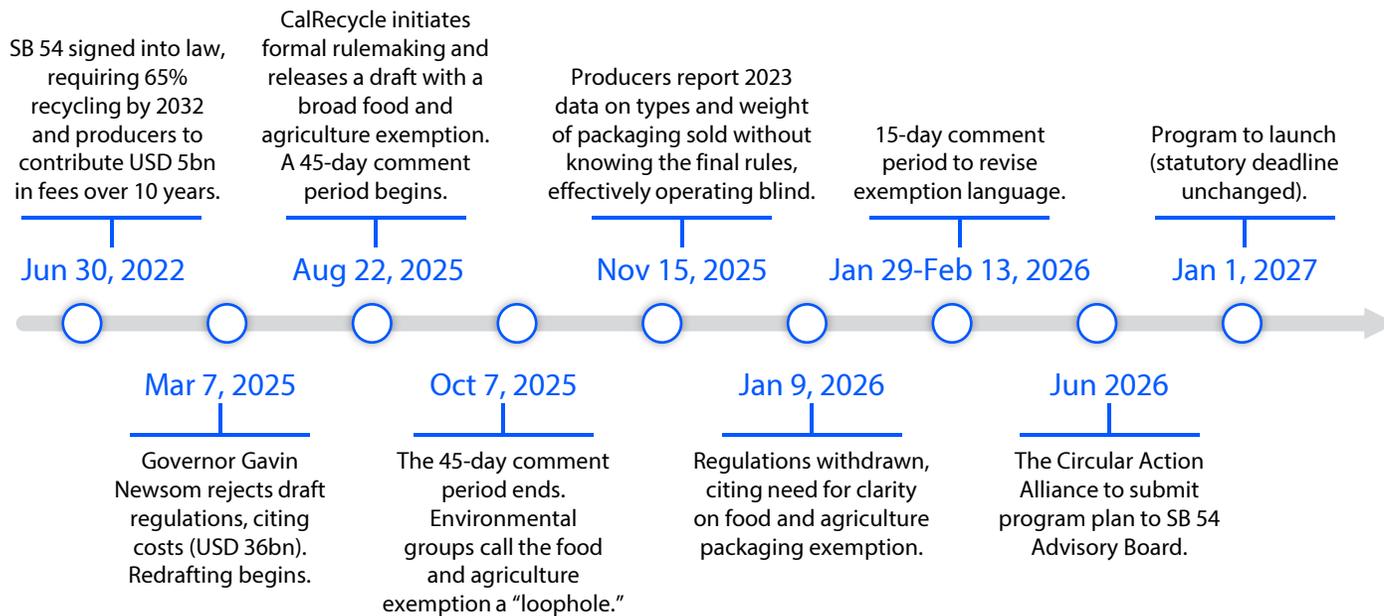
A moving target: California's EPR rules to shift again

CalRecycle's January withdrawal has delayed clarity, but statutory deadlines remain unchanged.

State of play

On January 9, 2026, CalRecycle pulled back SB 54's proposed regulations from final review to revise and clarify requirements – particularly those affecting food and agriculture packaging. Despite the pause, the statute's deadlines remain unchanged, and the program is still slated to launch in January 2027. The outcome of the food and agriculture exemption debate will be pivotal, determining which packaging categories fall under SB 54's obligations – a potentially decisive factor for producers whose portfolios are heavily tied to these materials. At the same time, even as regulatory details continue to shift, it's increasingly clear that industry readiness may lag behind the law's ambitious performance metrics.

Key milestones and current status



High costs, higher expectations

Current US plastic recycling rate(2021)	5%-6%
SB 54 target by 2032	65%
A 7 -13 x increase is required. Most material categories are currently below 20% recyclability (CalRecycle, December 31, 2025).	

Economic reality

Total cost to state projected over 10 years	USD 36bn
Cost per household/year	USD 300+

Example

California banned expanded polystyrene foodservice ware in 2025 after producers could not achieve 25% recycling with potential penalties of USD 50,000 per day. If the industry could not reach 25% for one material, SB 54's 65% target may be too ambitious.

California SB 54's food and agricultural packaging exemption debate

Exemption design will decide how much plastic packaging ultimately falls under the law.

What the August 2025 draft proposed

The August regulatory language contained an exemption for packaging used for food or agricultural commodities in cases **where it was not reasonably possible to use alternative packaging that complies with rules or guidelines issued by the FDA or USDA.**

Environmental groups interpreted this as a categorical exclusion – meaning if packaging touches FDA/USDA-regulated products, it might be exempt entirely from SB 54 requirements.

Why this matters

The August regulatory language contained an exemption for packaging used for food or agricultural commodities in cases where it was not reasonably possible to use alternative packaging that complies with rules or guidelines issued by the FDA or USDA.

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The competing arguments

Food and agriculture industry's position

- FDA/USDA regulations dictate specific packaging requirements for food safety, shelf life, and pathogen prevention.
- The technical feasibility of shifting to recyclable/compostable materials while maintaining safety standards is “unproven at scale.”
- Modified atmosphere packaging, barrier films, and antimicrobial coatings often cannot be replicated with currently recyclable materials.
- The industry needs flexibility to comply with federal regulations first and state packaging mandates second.

Environmental groups' position

- Categorical exemptions create loopholes that exempt most plastic packaging.
- CalRecycle exceeded its authority by creating blanket exemptions not in the statute.
- SB 54 already includes pathways for materials facing compliance challenge. There is no need for permanent exemptions.
- The food industry has six years (until 2032) to innovate – exemptions eliminate the incentive to redesign packaging.

Uncertain exemptions amid ongoing regulatory debates

Regulators, environmental advocates, and industry groups continue to debate the scope of potential exemptions. For now, however, the law remains in effect for all “packaging producers.” Once the final rulemaking is complete and the revised regulatory language is published, stakeholders should gain clearer guidance on which entities may qualify for exemptions and how to apply for them. Navigating this and other state-level packaging laws will remain challenging, particularly as ongoing legal disputes continue to test how much authority individual states have to dictate requirements for national producers operating across multiple jurisdictions.

The Packaging and Claims Knowledge (PACK) Act

Pro-business harmonization or federal preemption that undercuts state momentum?

What is the PACK Act?

On December 17, 2025, Representative Randy Weber (R-Texas) introduced the Packaging and Claims Knowledge (PACK) Act, a federal bill that could establish a federally administered framework for environmental terms like “recyclable,” “compostable,” and “reuseable.” This standard would be voluntary but would preempt state provisions (like California’s SB 343) and could significantly influence the fee structures applied under state-by-state extended producer responsibility (EPR) programs.

What is the PACK Act?

While the PACK Act aims to establish a unified national framework, some stakeholders have raised concerns about its implications:

- **Federal preemption:** Some policymakers oppose overriding state rules. California’s SB 343 author expressed concern that weakening standards could increase contamination and waste.
- **Voluntary vs. mandatory:** Unlike SB 343, which includes mandatory compliance and penalties starting in October 2026, the PACK Act relies on voluntary participation.
- **Risk of lower standards:** States with strict EPR rules (e.g., California and Oregon) worry that a federal framework could limit their ability to set stronger recyclability thresholds.
- **Bad timing:** EPR programs in states like Oregon and Colorado are already rolling out. A new federal system could disrupt implementation.
- **Federal Trade Commission capacity:** The FTC’s Green Guides haven’t been updated since 2012, raising questions about whether the FTC can manage a national labeling program.

Why industry supports it

Industry groups, packaging producers, and leading consumer packaged goods companies have rallied behind the PACK Act with near unanimous support. Why?

- **Simplified compliance:** Seven states have packaging EPR laws with different definitions and reporting rules; a federal standard would reduce complexity.
- **Interstate commerce protection:** A nationwide framework prevents differing state rules from slowing or blocking product flows.
- **Leveled playing field:** A federal standard would reduce environmental claim distortions from state-by-state variability.

Extended producer responsibility conflict in the states

Progressing the PACK Act requires understanding the scale of state EPR expansion happening simultaneously.

- **Seven states** (and nine Canadian provinces) now have EPR laws: Maine, Oregon, California, Colorado, Minnesota, Maryland, and Washington
- **2025 compliance deadlines create real penalties:** Oregon charges up to USD 25,000/day for non-compliance; California fines can reach USD 50,000/day for SB 54 violations.
- **Reporting deadlines** are upon us (May 31) through the Circular Action Alliance.
- **Additional states are advancing legislation in 2026:** New Jersey, New York, and Massachusetts, among others.

If the PACK Act preempts state EPR labeling requirements, it could create a fundamental conflict: States require producers to fund recycling systems and meet their recyclability standards, but the federal government determines what is considered recyclable. This jurisdictional clash is sure to create legal uncertainty throughout 2026. We expect more details to come from the House Energy & Commerce Committee in Q1/Q2 2026.

Environmental concerns

Global chemical regulations are becoming increasingly fragmented, creating uneven compliance demands for packaging and materials suppliers. Europe's plastics recycling sector is also under pressure from high energy costs, questionable recycled inputs, and mounting plant closures.

Meanwhile, prospects for flexible packaging recyclability are improving. Advances in monomaterial designs are strengthening the path toward more recoverable flexible plastics. These developments may offer renewed hope for advancing circularity in flexible materials.



Navigating chemical safety in a fragmented global market

PFAS. Phthalates. Bisphenols. Chemical risks are becoming market access risks.

Regulatory scrutiny of packaging chemicals is intensifying on both sides of the Atlantic, linking material composition directly to market access. For packaging producers, chemical risk is now translating into enforcement risk, recyclability constraints, and commercial exclusion.

The toxic triad

PFAS – highly persistent chemicals that bioaccumulate, causing long-term environmental and health concerns.

- **Regulatory trigger:** EU PPWR (2026) and state-level US bans.
- **Shift:** Food-contact phaseout.
- **Risk:** Immediate EU market exclusion without reformulation.

Phthalates – often in plasticizers, known to cause reproductive and environmental harm.

- **Regulatory trigger:** EPA risk finalization and the FDA’s post-market acceleration.
- **Shift:** Cumulative exposure scrutiny.
- **Risk:** Regulation pressure and retailer pushback.

Bisphenols (BPA) – chemical compounds known to migrate to food and cause hormone disruption and developmental risks.

- **Regulatory trigger:** EU ban (effective 2025, transition ends 2026).
- **Shift:** Changing chemical safety regulation (EU vs. US).
- **Risk:** Dual-SKU complexity and supply chain complexity.

Shifting standards for packaging materials

FDA systematic review (2025)

- Moving beyond one-time GRAS approvals.
- Testing for non-intentionally added substances in finished packaging.
- Prior compliance ≠ future protection.

Translation: Food-grade compliance approvals are no longer permanent.

EU PPWR – “Recyclability by Design” (2026)

- Substances of concern that impair recycling must be removed.
- Chemical safety is now embedded in recyclability compliance.

Translation: If it can’t be recycled cleanly, it can’t be sold.

What plastic packaging industry leaders are doing now

1. Digital product passports (DPP) | This is a structured digital file attached to every SKU that shows:

- Full material and additive disclosure.
- Regulatory status by geography.
- Recyclability performance.

Translation: A DPP is a full compliance balance sheet for every packaging product. It is mandatory in the EU under the PPWR and increasingly required by CPGs.

2. Reformulate proactively | Leading packing companies are:

- Adopting PFAS-free barrier alternatives.
- Redesigning plasticizers.
- Eliminating BPAs ahead of mandates.

3. External validation | Strategies include:

- Seeking third-party chemical and recyclability certifications.
- Shifting the burden of proof upstream.
- Strengthening brand-owner contracts.

The EU steps in: Emergency measures for struggling plastic recyclers

The US is two to three years behind Europe's plastic crisis timeline.

Europe's plastics recycling market is collapsing – recycled resin can't compete with virgin, operating costs are high, and cheap imports have displaced demand. Nearly 1m metric tons of EU recycling capacity shut down in two years. The US is on the same path. Recycling rates remain minimal, major recyclers have scaled back, and billions of pounds of capacity sit idle due to poor economics and weak feedstock supply. The pattern is clear: Both regions have capacity *on paper*, but without stronger markets and policy incentives, the US risks replicating Europe's rapid loss of domestic recycling capacity.

European capacity

-1m metric tons

Estimated net recycling capacity lost between 2023 and 2025 –equivalent to nearly 60 recycling plants across Europe.

EU capacity growth

Falling fast

Loss of established recycling capacity more than doubled from 2023 to 2024, falling short of the trajectory needed to meet PPWR targets.

US parallel

Already here

US plastics recycling has contracted sharply, with multiple closures in the past two years as weak PCR demand and unfavorable economics apply pressure.

Why recyclers are bleeding

- **Virgin plastic pricing:** When oil prices drop, virgin resin becomes cheaper than recycled. Recyclers' costs (energy, labor, sortation) don't drop – they are fixed or rising.
- **Fraudulent imports:** [Virgin plastic entering EU labeled as "recycled"](#) is undercutting legitimate recyclers on price while bypassing quality standards.
- **Energy costs:** European recyclers face electricity prices three to four times higher than competitors in Asia. No amount of efficiency gains can close that gap.

EU's regulatory response (December 23, 2025)

- **New customs codes:** Separate tracking for virgin versus recycled plastics to identify mislabeling and strengthen trade protection.
- **EU audits:** Inspections of overseas recycling facilities and lab testing of imported "recycled" material to verify authenticity and detect fraud.
- **Trade measuring:** Import surveillance task force to monitor plastic flows through 2026. Commission ready to launch trade defense actions and potential duties if unfair import pressures persist.
- **Other measures:** Approval of mass-balance allocation rules for chemical recycling output to count toward EU recycled content targets, starting with PET bottles, among other measures.

Europe's circular reality check

EU plastic recycling output (2023 vs. 2024)	-2.6%
EU collected and sorted plastic (of 58m metric tons produced in 2023)	50%
LDPE/HDPE recycling capacity change (2023 vs. 2024)	-5% to -10%
Waste exports (2022 vs. 2024)	+24%
Material actually recycled into new plastic (2023)	13%
Circularity growth rate* (2010-2024)	+1.5%
Target circularity rate by 2030	24%

* Share of recycled materials in the EU economy.

Is there recyclability hope in future flexible materials?

Breakthrough barrier materials aim to solve packaging's hardest problem.

For decades, packaging has faced a trade-off: High-barrier materials protect food but are nearly impossible to recycle, while recyclable options often can't deliver required performance. This has left producers caught between rising recyclability mandates and strict brand performance needs. Recently, real breakthroughs have emerged, with several technologies offering both performance and recyclability. The question is shifting from "Can it be done?" to "Which solutions can scale, and will infrastructure accept them?"

The core challenge: Recycling

Flexible multilayer packaging (pouches, wraps, films) represents ~100m metric tons globally each year, yet it is nearly impossible to recycle because it combines incompatible materials. A typical snack pouch blends PET for stiffness, aluminum for barrier properties, and PE for sealing – layers that mechanical recycling cannot separate. As a result, less than 5% of flexible packaging is recycled, and many EPR systems classify it as "unrecyclable."

Even nominally recyclable PE films face challenges. Materials recovery facilities struggle with film that tangles machinery or gets missorted into paper due to its low weight. And although 70% of US consumers are within three miles of a PE film drop-off site, these programs still suffer from contamination, inconsistent reporting, and uncertain alignment with EPR requirements.

What this means for flexible film producers

Most new technologies target the material science problem – but not the infrastructure acceptance problem. Evaluating these innovations means betting on both the technology's viability and the future development of collection and recycling systems.

Flexible material innovations

Biaxially oriented polyethylene (BOPE) films

- **What it is:** PE stretched in both directions to create strength and clarity similar to BOPP/BOPET while remaining 100% PE-recyclable.
- **Why it matters:** 30% to 50% downgauging, strong puncture resistance, excellent clarity.
- **Cost expectation:** 25% to 45% above traditional multilayer.

Monomaterial polyethylene with machine direction orientation (MDO)

- **What it is:** PE stretched to boost stiffness and barrier properties that once required multilayer laminates. Helps maintain EVOH below the <5% recyclability threshold.
- **Why it matters:** Works as a drop-in upgrade – MDO units retrofit onto existing lines without replacing equipment.
- **Cost expectations:** 15% to 25% above traditional multilayer.

Michigan State University's breakthrough

- **What it is:** A polyester-based multilayer structure (80% to 100% polyester) combining PET for strength, PBAT/PBS for sealability, and EVOH/PGA for barrier performance.
- **Why it matters:** Staying mostly within one polymer family enables compatibility with mechanical and advanced recycling.
- **Cost expectations:** Projected to match commercial films cost and performance

The bottom line

Innovation has no guarantees. Many companies invest due to regulation rather than end-of-life certainty, but early engagement builds capabilities, partnerships, and readiness for the industry's shift toward recyclable flexible packaging. Those who lean in now can help shape the system and broaden their technical portfolio.



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