WHITEPAPER

toscatalks

The Business Case for Reusable Transport Packaging & Pooling

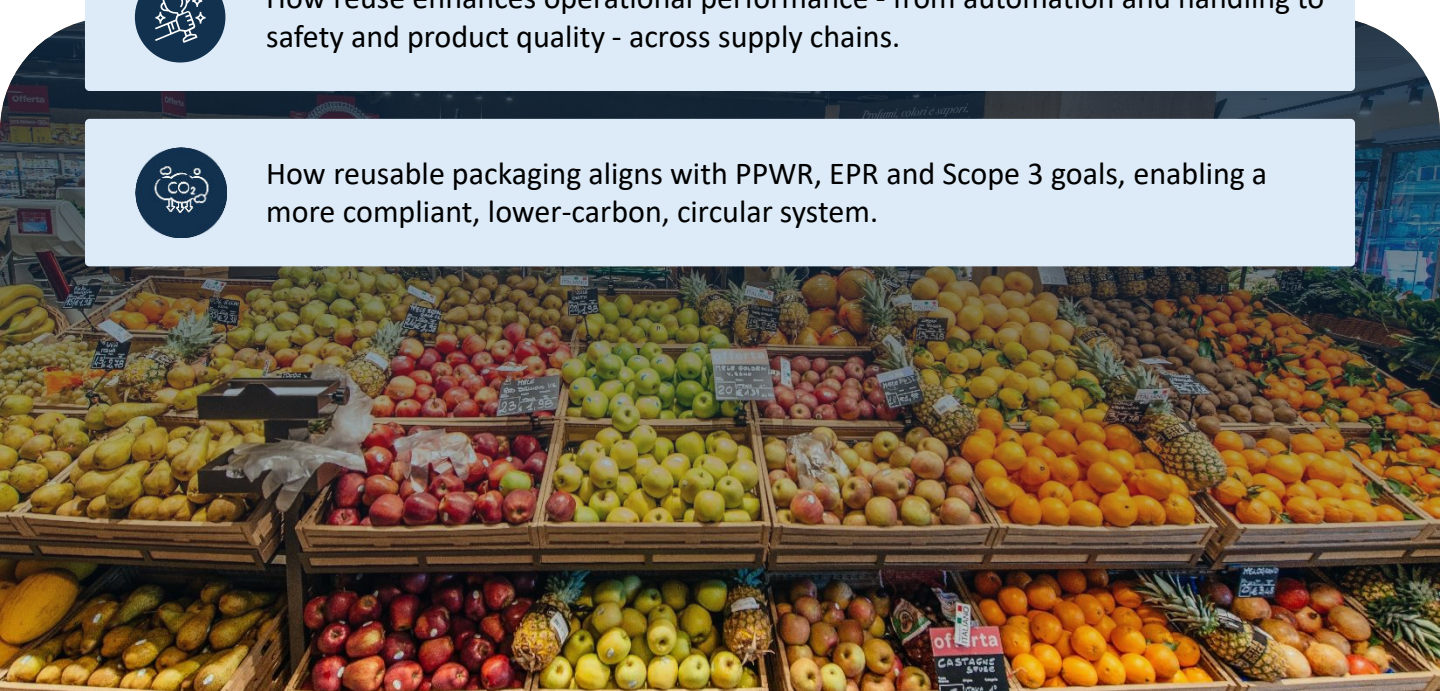
How reusable packaging enables smarter, more efficient and more sustainable supply chains

Purpose of this whitepaper

This whitepaper sets out the **business case for reusable plastic packaging and pooling** as strategic supply chain infrastructure. It examines the financial, operational and regulatory pressures shaping packaging decisions across Europe and explains how reusable plastic packaging can reduce cost volatility, improve operational performance and safety, support automation and scalability, meet emerging regulatory and sustainability requirements and strengthen supply chain resilience.

What will you learn?

- How cost, labour and regulatory pressures are reshaping packaging decisions across Europe.
- Why single-use systems create rising financial, operational and compliance risk.
- How reusable packaging and pooling shift organisations from cost-per-unit to cost-per-use, delivering predictable economics and lower TCO.
- How reuse enhances operational performance - from automation and handling to safety and product quality - across supply chains.
- How reusable packaging aligns with PPWR, EPR and Scope 3 goals, enabling a more compliant, lower-carbon, circular system.



What do we mean by reusable packaging & pooling?

Reusable packaging refers to durable assets such as crates, pallets and bulk containers that are designed for multiple cycles across the supply chain. These assets protect products in transportation and handling, then re-enter circulation rather than being discarded. In this whitepaper, reusable packaging refers specifically to reusable plastic packaging solutions.

Pooling is the service model that enables reuse at scale. Instead of purchasing, owning and managing packaging assets in-house, companies access them through a shared network. A pooling provider supplies the assets and manages collection, cleaning, inspection, repair and redeployment – ensuring hassle free OTIF throughout the supply chain.

A circular logistics system

Together, **reusable packaging and pooling create a circular logistics system:** durable plastic assets circulate through supply chains as a service, replacing the linear "buy–use–dispose" model with a predictable cost-per-use.

This model:

1. Reduces cost volatility in in packaging materials and waste
2. Strengthens operational performance and service levels
3. Supports automation through standardisation
4. Aligns with tightening regulatory requirements such as PPWR and EPR
5. Improves sustainability outcomes without compromising efficiency

Reusable packaging is the infrastructure, and pooling is the operating model that makes it scalable and operationally efficient.

Why material choice matters

Reuse only works when packaging is designed to perform consistently over hundreds of cycles. That requires durability, dimensional stability and hygiene - areas where high-quality plastic outperforms alternative single-use materials.

Well-engineered plastic assets:

Maintain precise dimensions for reliable stacking, automation and load stability

Withstand repeated washing and sanitisation without degrading

Resist moisture, warping and splintering, ensuring food safety and consistent performance

Remain 100% reusable and fully recyclable, enabling true circular use at end of life

PART 1

What are the drivers behind the move to reusable packaging?

Supply chains are under sustained, multi-directional pressure. Businesses are simultaneously managing rising material and energy costs, persistent labour shortages in warehousing and transport, growing waste and EPR fees, accelerating regulatory change (including PPWR and national EPR schemes), and increasing ESG scrutiny from customers, retailers and investors.

These pressures expose the fragility of disposable, single-use packaging models and are driving a structural shift toward reusable packaging systems.

Rising paper and packaging costs

Monthly data, indicies euros (2022-01 = 100)

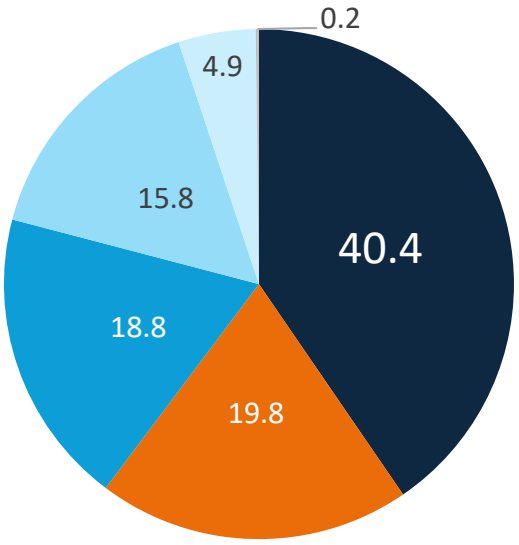
Source: PricePedia

Paper and paperboard - core materials in single-use packaging such as cardboard boxes and displays- have experienced prolonged cost inflation. European prices in these materials increased by **8.6% between March 2024 and November 2025**[1], following sharp volatility since the COVID-19 period.

[1]*Source: PricePedia https://www.pricepedia.it/en/magazine/article/2025/12/15/packaging-paper-prices-rise-in-2025/#:~:text=After%20more%20than%20two%20years,higher%20than%20pre%2DCovid%20values.*

Escalating waste and EPR fees

Packaging waste generated, by packaging material, EU, 2023



Note: Eurostat estimates. Percentages do not add up to 100 due to rounding.

Source: Eurostat – eny-waspac

Source: Eurostat

The financial burden of packaging waste is rising rapidly across Europe. **Extended Producer Responsibility (EPR)** frameworks are shifting waste management costs directly onto producers and retailers, with fees increasingly modulated by recyclability, material choice and lifecycle impact. This structurally disadvantages single-use packaging, where costs recur with every cycle.

The scale of the challenge is significant. **In 2023, the EU generated 79.7 million tonnes of packaging waste,** of which **paper and cardboard accounted for 40.4% (32.3 million tonnes)** and **plastic packaging for 19.8% (15.8 million tonnes)[2].**

Persistent labour shortages

In a recent study, **76% of** supply chain and logistics leaders reported **active labour shortages,** with **37% describing the situation as 'extreme'[3]**. These shortages are felt most acutely in **transport operations (61%)** and **warehousing (56%)** - the stages where single-use packaging drives the most manual handling and waste processing.

Long-term demographic trends suggest this pressure will intensify. The Centre for Global Development projects that Europe will have **95 million fewer working-age people by 2050 compared with 2015[4]**, creating lasting structural challenges for labour-intensive supply chain models.

[2] https://ec.europa.eu/eurostat/statistics-explained/index.php?title=Packaging_waste_statistics
[3] https://engage.descartes.com/descartes-insights/items/how-bad-is-the-supply-chain-and-logistics-workforce-challenge
[4] https://www.cgdev.org/sites/default/files/can-africa-help-europe-avoid-looming-aging-crisis.pdf

Why single-use performs poorly under pressure

Single-use packaging amplifies these pressures because it relies on constant material inputs, heavy manual handling and ongoing waste management. When costs rise or labour is constrained, these dependencies become vulnerabilities.

In volatile markets, disposable packaging quickly turns into an unpredictable cost centre: raw-material prices fluctuate, waste processing consumes scarce labour, packaging variability drives higher damage rates, and EPR fees continue to climb. Recycled material revenues are also unstable, with availably expected to decrease as EPR schemes increase.

These challenges are driving a shift toward packaging models designed for resilience and predictability.

Reusable packaging as a strategic lever

Forward-looking organisations are reframing packaging as part of their supply chain infrastructure rather than a consumable. Reusable packaging systems deliver structural advantages including:

Greater efficiency through standardised, automation-ready assets

Higher resilience with consistent asset availability and predictable flows

Lower labour dependency by reducing handling, repacking and waste management

Reduced regulatory exposure as reusable packaging aligns with PPWR and EPR

Consistent protection through durable, automation-ready assets

By treating packaging as a durable, reusable asset, organisations optimise for lifecycle value instead of unit price - unlocking long-term efficiency, waste reduction and cost stability across the supply chain.

Strategic insight: *Reusable packaging solutions reduce exposure to volatility and enables predictable, scalable circular systems.*

PART 2

Financial value: the economic case for reuse

From cost per unit to cost per use

Packaging decisions have traditionally been evaluated at unit level, where single use materials like cardboard and timber appear inexpensive on a per-item basis. However, this masks the true financial footprint, which includes handling, storage and disposal across operations.

Because replacement frequency is rarely accounted for, businesses unintentionally lock into a recurring cost cycle: every shipment requires new packaging to be manufactured, transported, handled and discarded or recycled.

Reusable plastic packaging breaks this cycle by shifting evaluation from unit price to lifecycle cost. Assets circulate across many cycles, reducing cost-per-use as utilisation increases.

Pooling models strengthen this logic by removing ownership entirely. Packaging becomes a reliable service, freeing capital, limiting exposure to price swings and improving forecasting accuracy.

Strategic insight: *In volatile markets, cost-per-use translates into greater cost stability, improved forecasting and clearer ROI.*

TCO (total cost of ownership) and hidden costs

To fully capture these dynamics, finance and procurement teams are moving beyond unit price towards a **Total Cost of Ownership (TCO)** approach. This view captures the full lifecycle including: procurement, handling, product damage & shrink, waste management, replacement, admin & compliance.

TCO Area	Hidden Cost Pressure of Single Use Packaging	Value Delivered by Reusable Plastic Packaging
Storage & Space	High space demand for empty packaging	Space-efficient, nestable and foldable reusable assets reduce storage
Operational Efficiency	Extra handling and process time needed due to variability	Standardised, automation-ready assets reduce handling time
Asset Lifespan	Frequent replacement and inconsistent performance	Long-lasting reusable plastic assets deliver predictable performance and durability
Loss & Damage	Shrinkage, product damage and assets replacement costs increase	Durable, consistent plastic assets protect products and can be used up to 100 times
Supplier Complexity	Fragmented sourcing, price volatility and availability risk	Integrated reusable systems simplify procurement and stabilise costs
Risk	Exposure to loss, damage and theft with assets that are difficult to trace	Improved visibility across supply chain with IOT of RFID traceability
Admin & Claims	Damaged products or lost assets increases admin burden	Reduced damage and trackable assets cut admin time for claims and rework
Compliance & End-of-Life	Disposal costs, EPR fees and regulatory burden	Reuse reduces waste at source and complies easily with packaging regulations

Transport efficiency as a cost lever

Transport can represent 10–25% of total supply chain costs. Fuel price swings, labour shortages and regulatory changes all contribute to variability, but packaging design is one lever businesses can actively control.

Reusable packaging improves transport performance by enabling:

Standardised footprints for higher pallet and vehicle fill

Consistent stacking for safer, more predictable loading

Higher volumes per trip, lowering fuel use, emissions and transport spend

Foldable and nestable designs extend these benefits to reverse logistics by reducing the volume of empty assets, enabling consolidated returns and lower return costs. And across multi-route networks, small utilisation gains compound into **material transport savings.**

Tosca's Reusable plastic crates (RPCs) deliver:

+25%	more merchandise per truck
>6%	higher stacking enabled by rigid, interlocking designs
2x	stacking efficiency when combined with pallets

Strategic insight: *Transport efficiency compounds at scale. Standardised reusable assets turn every mile into a lower-cost, lower-carbon mile - a structural advantage that single-use formats cannot deliver.*

PART 3

Scaling operations through reusable packaging and pooling

In modern supply chains including retail and FMCG, efficiency hinges on predictable flows, consistent handling and reduced dependency on manual labour. Reusable packaging supports these operational priorities directly - improving consistency, resilience and scalability across networks and supply chains.

This includes:

Consistent operations

Reusable plastic packaging provides consistent dimensions and delivers predictable performance with fewer stoppages and interventions. This results in smoother throughput and fewer operational interruptions.

Predictable supply through pooling

Pooling provides high-quality assets on demand, managing collection, cleaning, inspection and redistribution without internal asset management. This headache-free approach ensures availability during seasonal peaks, delivering OTIF.

Faster, safer handling

Uniform dimensions, stable stacking and ergonomic features increase throughput, safety and productivity, enabling faster returns with fewer accidents and less product damage.

Lower labour dependency

Truck-to-shelf replenishment, simpler picking and minimal waste handling reduce labour exposure and improve resilience in peak demand or staffing shortages.

Automation-ready assets

Automation depends on consistency. Variations in packaging dimensions, weight or durability increase error rates, trigger stoppages and erode automation ROI. Additionally, inconsistent sizing can cause equipment jams.

Standardised, durable reusable packaging -crates, pallets and trays- integrates reliably with automated handling systems, reducing exceptions and improving throughput without costly retrofits.

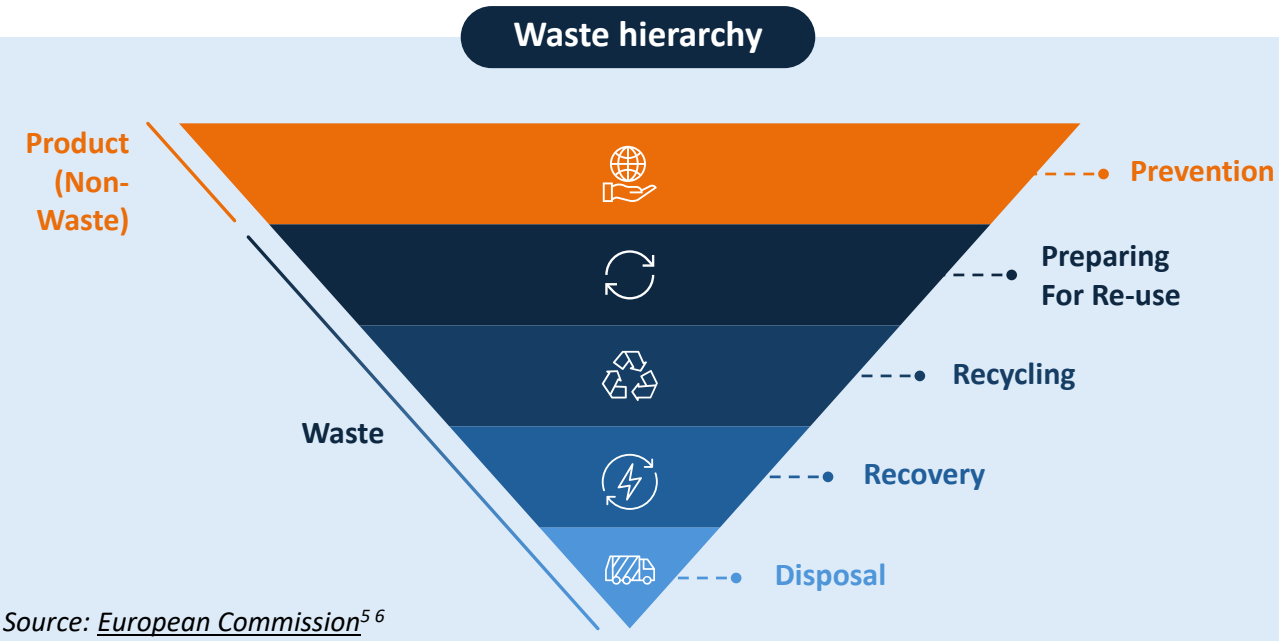
Packaging choices also influence future automation. Reusable systems provide a stable, long-term platform for evolving technologies.

Strategic insight: *By standardising assets and flows, reusable packaging reduces operational friction and labour risk while enabling automation and scale.*

PART 4

Regulation & sustainability: compliance by design

PPWR & EPR



Source: European Commission[5] [6]

Policy across the EU is increasingly aligned with the **waste hierarchy, prioritising waste prevention and reuse over recycling and disposal.** This shift is now being formalised through regulation, including the **Packaging and Packaging Waste Regulation (PPWR)** and expanding **Extended Producer Responsibility (EPR)** schemes, which reflect a growing recognition that recycling alone cannot manage rising packaging volumes or deliver the emissions reductions required.

As PPWR and EPR frameworks more closely link compliance costs to material choice, position in the waste hierarchy and real-world environmental performance, packaging systems designed for reuse gain a clear structural advantage. Durable, trackable and 100% **reusable plastic packaging in a pooling model** supports circular flows, reduces waste at source, and limits exposure to escalating compliance and disposal costs.

[5] https://environment.ec.europa.eu/topics/waste-and-recycling/waste-framework-directive_en

[6]

What is PPWR?

The **PPWR** is the EU's new regulatory framework intended to reduce waste across all member states.

- Specific reuse and waste reduction targets
- Design and recycled content requirements
- Requirements for return, collection and refill systems
- Labelling and traceability rules
- Harmonisation across member states

For businesses, PPWR increases pressure to cut single-use formats where practical and to adopt durable packaging that supports reuse systems at scale.

What is EPR?

EPR schemes make producers financially and operationally responsible for the end-of-life of packaging placed on the market.

EPR frameworks generally include:

- Fees based on material type, weight and recyclability
- Ecomodulated fees
- Reporting and data disclosure
- National compliance schemes

As EPR systems mature, **waste becomes a cost centre**, particularly for disposable materials such as cardboard, timber and mixed plastics. Recyclability alone no longer guarantees low fees or earned income - **prevention and reuse** are increasingly recognised in fee modulation and policy design.

Strategic insight: *Reusable packaging supports regulatory compliance today and reduces exposure as requirements tighten and EPR fees increase.*

Emissions & Circularity

Reusable packaging reduces emissions by tackling carbon at source, not just at end of life. Manufacturing impacts are spread across more than 100 trips, significantly lowering per-use emissions and supporting **Scope 3 reduction** targets.

Reusable systems also improve transport efficiency through better cube efficiency, stable stacking and lower reverse-logistics volume, reducing emissions per shipment.

Life cycle assessments consistently show that once a modest number of reuse cycles is reached—reusable packaging outperforms single-use alternatives on total carbon emissions impact. At end of life, durable plastic assets are fully recyclable, reinforcing circularity and aligning with regulations that prioritise material efficiency, longevity and waste prevention.

Carbon reduction through reuse, not replacement

Up to 80% lower carbon emissions with reusable plastic crates (RPCs)[7]

Around 20% lower carbon emissions with reusable pallets[7]

Fewer production cycles, better transport utilisation, lower emissions per unit basis

One of the most scalable levers for Scope 3 emissions reduction

Strategic takeway: *Regulation is moving toward systems that use less packaging and lasts longer. Adopting reusable packaging now reduces regulatory risk, protects investment and strengthens long-term sustainability credentials.*

[7] *Tosca Data*

PART 5

Safety & risk reduction: protecting workers and consumers

Reusable systems reduce risk across warehouses, transport and retail by improving **handling safety, hygiene control and product integrity.**

Safer handling and reduced injuries

In the Transportation and Storage sector, approximately 40,000 workers reported a workplace non-fatal injury, and nearly a quarter (24%) of these cases led to absences exceeding seven days*.

Approximately 2.4% of workers in Transportation and Storage experienced a workplace non-fatal injury, a rate that is statistically significantly above the cross-industry average of 1.8%.[8]

Manual-handling injuries are often driven by variability. Reusable packaging reduces this risk by providing standardised footprints, consistent weights and defined stacking limits, supported by ergonomic features that make handling safer and more predictable.

Reusable plastic assets do not splinter, warp or shed debris, reducing a common source of workplace injury. Over time, this consistency supports safer workflows helps reduce absenteeism, labour disruption and associated costs.

[8] *Source: LFS, average estimate over 2022/23-2024/25 https://www.hse.gov.uk/statistics/assets/docs/transportation.pdf*



Improving safety on the line
RPCs deliver up to an 80% reduction in hand and finger injuries[9]

Hygiene, protection and traceability

In food, beverage and pharma, materials that absorb moisture or degrade can harbour bacteria and allergens. Reusable plastic assets enable controlled washing and sanitisation to defined standards, with only compliant assets returning to circulation. This strengthens hygiene control, supports audits and improves traceability.

Protecting product quality

Damaged or contaminated packaging increases the risk that compromised products reach consumers, creating safety concerns and reputational exposure.

The scale of this risk is growing. According to the latest Product Safety Database annual report from the **Office for Product Safety and Standards**, UK consumer product recalls rose by 22% in Q1 2025 compared with the same period in 2024. With average recall costs now estimated between £2.5m and £5m, the financial and reputational consequences can be severe.

Reusable packaging systems are designed to protect products consistently across multiple handling stages. By reducing failure rates and improving traceability, robust reusable packaging systems help limit the likelihood—and impact—of large-scale recalls, protecting both consumers and brand value.

[9] Tosca

Safer retail environments

At the retail level, packaging choices directly affect store safety. Shelf-ready and display-ready reusable formats reduce manual repacking, cutting repetitive handling and associated strain. Stable, uniform units are also less likely to tip or collapse, reducing risk for both staff and customers.

Reusable systems eliminate this step entirely, preventing waste at source and supporting cleaner, safer retail and back-of-house environments:

- **Reduce shelf stocking time by 50%**[10]
- **Better traffic flow** in busy retail and back-of-house areas
- **Less clutter and obstruction,** improving visibility
- **Reduced risk of slips, trips and collisions** for staff and customers

Quality control through pooling

When pooled, assets are part of a controlled service loop. Each cycle they are:

- **Inspected** for damage or non-compliance
- **Repaired** to extend useful life
- **Cleaned** to defined hygiene and safety standards
- **Removed from circulation** when they can no longer meet specification

Because pooled assets are tracked through technology such as **RFID or IoT sensors**, operators gain full visibility over their supply chain, including:

- Asset location and utilisation
- Damage and loss rates
- Dwell time and bottlenecks
- Hygiene and maintenance history, as well as understanding what products have been exposed to

This traceability supports **incident investigation** and **continuous improvement**, turning packaging into a **managed operational asset** rather than a **disposable risk.**

Strategic takeway: *Reusable packaging reduces safety risks by providing consistency, hygiene control, exposure history, product protection and cleaner retail environments.*

[10] *Tosca*

PART 6

Applying reuse across the supply chain

Reusable packaging delivers the greatest value when it operates as a connected system across suppliers, manufacturers, distribution, transport and retail. Applying reuse end-to-end removes hand-offs between incompatible formats, enabling smoother planning, higher utilisation and consistent quality standards throughout the network.

When combined with pooling, this becomes a unified packaging ecosystem. The result is greater visibility, fewer points of failure and a platform that supports continuous improvement at scale.

Conclusion: reuse as strategic supply chain infrastructure

Reusable packaging has evolved from a sustainability tactic into strategic supply chain infrastructure. It delivers predictable cost-per-use economics, smoother operations and stronger resilience at a time when material volatility, labour shortages and regulatory pressure are accelerating.

Reuse removes waste at source, reduces handling, minimises content and product damage, supports automation and cuts emissions - all while aligning naturally with PPWR, EPR and the EU's shift toward waste prevention.

The risk of staying with single-use packaging is clear: rising costs, higher compliance exposure and systems that become harder to scale. Reusable packaging and pooling offer a **future-proof alternative** — a model already proven in high-volume, time-critical supply chains across Europe.

For organisations looking to improve performance today and stay ahead of tomorrow's regulatory and operational demands, reuse is no longer a 'nice to have'. It is the foundation of a smarter, more efficient and more resilient supply chain.

WHO IS TOSCA?

Tosca is a global leader in reusable plastic packaging and pooling, with over 60 years of experience across multiple industries. Our end-to-end portfolio and in-house R&D enable us to optimise supply chains for cost, efficiency, sustainability and performance.

Find out more www.toscaltd.com