



**Reuse use
cases in packaging
with GS1 standards**

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Disclaimer

This document was created by the group of GS1 experts under the GS1 in Europe Packaging Activity - Workstream 3 Reuse. The working group was active between March 2025 and October 2025. The goal of the document is to describe the already existing use cases for GS1 standards and reuse. However, this other use of GS1 standards can be included as well as long as they are in line with the rules set in the GS1 General Specifications.

At the time of the production of this document, work is still ongoing around the European regulations for packaging. For up-to-date information or specific inquiries, individuals are encouraged to connect with local experts in the field of reuse at GS1 Member Organisations or relevant local regulatory authorities.

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1. Introduction

As a reply to the increasing European level interest towards the packaging topic, GS1 in Europe decided to launch an activity on several topics related to packaging, with the involvement of GS1 Member Organisation experts throughout Europe in the first quarter of 2023.



The activity initially launched two workstreams, one on identification and data model for packaging, one around Deposit Return Schemes. In early 2025, the packaging activity entered a new phase and launched the third workstream focusing on reuse use cases for packaging. In this workstream a group of experts examined how GS1 standards are used in already existing reuse use cases and developed a generic approach on how the standards can be used to support initiatives for reuse of packaging.

The major goals for the activity are:

- Collect best practices from already under pilot or implemented in market environment.
- Develop a generic recommendation on how to use GS1 standards for reuse use cases to support GS1 Member Organisations in Europe in engaging with their local stakeholders.
- Create useful materials and make them available for GS1 Member Organisations to drive future work and international expert collaboration.

This document is the structured collection of all the inputs and best practices that were shared during the work of the group. Thanks to all the GS1 colleagues who contributed to this guideline by sharing their knowledge.

2. Regulatory background and reuse in the Packaging and Packaging Waste Regulation

The European Union is accelerating its transition to a circular economy through key policy initiatives such as the **European Green Deal**, the **Circular Economy Action Plan (CEAP)**, and the **EU Plastics Strategy**. In this context, the European Commission proposed the **Packaging and Packaging Waste Regulation (PPWR)** in November 2022 to address the full life cycle of packaging. The regulation aims to reduce packaging waste and promote sustainability, with binding requirements for all EU member states.



A critical element in this shift is the **Extended Producer Responsibility (EPR)** principle, which transfers responsibility for packaging waste from public authorities to producers. EPR incentivises sustainable product design and funds recycling through material-specific fees.

Complementing these efforts, the **Ecodesign for Sustainable Products Regulation (ESPR)** introduces life-cycle-based requirements and the **Digital Product Passport (DPP)** to improve transparency, traceability, and data sharing. Although packaging is not ESPR’s primary focus, it applies to packaged products and supports harmonised sustainability data exchange.

Ecodesign for Sustainable Products Regulation	New Single Market Strategy	Empowering consumers for the green transition and Green claims
<p>The ESPR and PPWR share the goal of promoting circularity and sustainability by improving product and packaging design, increasing resource efficiency, and reducing waste across the EU. ESPR sets horizontal ecodesign requirements for a broad range of products, PPWR applies these principles specifically to packaging, with targeted rules on recyclability, reuse, and recycled content.</p>	<p>Published in May 2025, the new Single Market Strategy identifies “Fragmented rules on packaging, labelling and waste” as one of the Terrible ten Single Market barriers. Digital labelling relying on a data carrier such as a QR code is the solution for simplifying access to labels for consumers and for easing compliance for economic operators.</p>	<p>The Empowering consumers for the green transition directive and the future Green Claims Directive also regulate unfair commercial practices and substantiation of claims. While the interplay between PPWR and the Green Claims Directive is to be clarified (pending the Directive’s approval) Recital 73 of PPWR already mentions that the Empowering consumers for the green transition directive complements the requirements of the PPWR.</p>

The Packaging and Packaging Waste Regulation (PPWR) is a key part of the European Green Deal’s strategy for a circular economy and sustainable growth. The Packaging and Packaging Waste Regulation (PPWR) replaces the older Packaging and Packaging Waste Directive (PPWD). It aims to harmonise packaging regulations across the EU, promote circularity, and reduce packaging waste. It sets more stringent and uniform requirements for packaging compared to the previous directive.

To fulfil PPWR requirements—particularly around digital labelling and consumer transparency—efficient cross-sector data exchange is essential. **GS1** provides global standards to facilitate this, ensuring a common language for sharing packaging-related data across the supply chain.

Why it’s a Regulation?	Applies to	Objectives of
<p>Ensures uniform application across all EU Member States</p> <p>Member States must not restrict packaging that complies with PPWR</p> <p><i>(Reference: Article 4)</i></p>	<p>All packaging components placed on the EU market.</p> <p>To B2B and B2C packaging, and related packaging waste</p>	<p>Reduce packaging waste generation.</p> <p>Promote a circular economy for packaging in a cost-effective way</p> <p>Encourage the use of recycled content in packaging materials</p>





Reuse targets in PPWR

*Article 11 in the PPWR*¹ regulation focuses on reusable packaging setting ambitious goals for economic operators to achieve in the coming years. The Regulation also sets requirements for packaging to be considered reusable. Some, but not all, of these requirements are listed below:

- It has been conceived, designed and placed on the market with the objective to be re-used multiple times.
- It can be emptied or unloaded without being damaged in a way that would prevent its further function and re-use.
- It allows for affixing of labels and the provision of information on the properties of that product and on the packaging itself, including any relevant instructions and information for ensuring safety, adequate use, traceability and shelf-life of the product.
- It can be emptied, unloaded, refilled or reloaded without risk to the health and safety of those responsible for doing so.

By 30 June 2027, EC to adopt implementing acts establishing detailed calculation rules and methodology regarding the reuse targets. The attainment of the targets shall apply from 1 January 2030 or 18 months after the date of EiF of the implementing acts, whichever is the latest.

Article 29 of the PPWR sets ambitious reuse targets for economic operators. The image below summarises these targets.

 <h3>Transport Packaging</h3> <ul style="list-style-type: none"> • 2030: At least 40% of transport packaging (including pallets, foldable plastic boxes, crates, intermediate bulk containers, pails, drums, and canisters) must be reusable within a re-use system. • 2040: This target increases to 70%. 	 <h3>Grouped Packaging</h3> <ul style="list-style-type: none"> • 2030: At least 10% must be reusable. • 2040: This target increases to 25%.
 <h3>Beverage Packaging</h3> <ul style="list-style-type: none"> • 2030: At least 10% of alcoholic and non-alcoholic beverages in sales packaging must be available in reusable packaging. • 2040: This target increases to 40%. 	 <h3>Takeaway F&B</h3> <ul style="list-style-type: none"> • By 12 February 2028: Final distributors in the HORECA sector must offer consumers the option of obtaining hot or cold beverages and ready-prepared food in reusable packaging. • From 2030: They must endeavor to offer 10% of products for sale in reusable packaging.

¹ https://eur-lex.europa.eu/legal-content/EN/TXT/HTML/?uri=OJ:L_202500040#enc_1

Obligations of economic operators

The PPWR also sets several obligations that the economic operators will need to comply with.

Economic operators shall report to competent authorities' data concerning the attainment of the reuse targets for each calendar year. The report shall be submitted within six months after the end of the reporting year for which the data are collected, and it should be first done for the year starting on 1 January 2030. The competent authorities mandated to establish electronic systems for the reporting and allowed to request additional information to prove the reliability of reported data.

The Regulation also highlights the importance to make packaging truly reusable and support sustainability, and the relevance of preventing situations where packaging is labelled as reusable but never actually reused. Businesses using reusable packaging should be required to have a proper re-use system in place, so the packaging can be collected, circulated, and used multiple times. These systems—whether small and local or large and spanning multiple countries—should meet minimum standards, and proof of compliance should be included in the packaging's technical documentation.



3. What is reuse in packaging?

Defining Reuse and Understanding its Infrastructure



According to the Ellen MacArthur Foundation 2023 study 'Unlocking a reuse revolution: scaling returnable packaging', there are clear scopes and definitions for this circularity approach: "Reuse schemes, or 'packaging reuse', refers broadly to delivery models in which a single package achieves multiple 'rotations', 'cycles', 'loops', or 'uses' for the same purpose for which it was originally used. This is distinct from, and complementary to, recycling. Reuse models circulate a product or packaging as a whole, whereas recycling reprocesses the materials into a new product or package."²

² Page 19, Ellen MacArthur Foundation, Unlocking a reuse revolution: scaling returnable packaging (2023)

While reuse, multiuse, and refill are terms often used interchangeably when discussing reusable packaging, there are important logistical distinctions. Reuse or multiuse typically refers to packaging that is used multiple times over its lifecycle - for example, a coffee cup or detergent bottle that consumers 'lease' and return to participating retailers, cafes, or restaurants when re-purchasing similar products. These containers are often washed offsite and returned to participating locations for reuse. Refill operates through parallel infrastructure, involving bulk logistics of drinks, food, detergents, or other items dispensed into reusable containers at point of sale, such as supermarket detergent dispensers.

The infrastructure for mature reuse projects involves durable containers, a reverse logistics network with customer-facing interfaces (physical stores, facilities, cafes, or online takeback systems), washing facilities, and distribution networks. Currently, most pilots are small and store-specific, with services typically delivered by single providers who establish integrated software tracking tools, washing facilities, and logistics takeback partnerships. However, as reuse scales up, these services will likely become specialised, separate offerings, making interoperability absolutely essential at data, standards, packaging quality, systems, and business process levels.

It's important to distinguish reuse from similar approaches like Deposit Return Schemes (DRS). While DRS encourages recycling through financial deposits that are redeemed when consumers return containers, these containers are immediately crushed and transported to recycling facilities for material reprocessing. In contrast, reuse schemes may also involve financial deposits, but containers remain intact, are washed, and circulated for multiple uses before eventual recycling.

Regulatory Drivers and Economic Case

Understanding why reuse has become a trending topic requires examining recent regulatory developments. As part of the EU Packaging and Packaging Waste Regulation (PPWR) and the UK's packaging Extended Producer Responsibility (EPR) scheme, packaging manufacturers and brands face fees for placing packaging on the market, with modulation based on recyclability. EPR aims to make packaging producers responsible for correct disposal through recycling, creating significant financial burden and driving the search for cost-effective alternatives.

Reuse has emerged as a key strategy that delivers both EPR fee savings and environmental benefits complementary to DRS schemes, but at much lower implementation costs. This economic driver is supported by compelling research findings. A recent UK study, 'A 30+% Reuse Future for the UK' by consultancy GoUnpackaged, provided stark contrast between the costs and environmental benefits of well-run reuse schemes versus Deposit Return Schemes.

According to the study, moving to 30% reuse delivers substantial benefits: £136m annual savings in pEPR costs with an average 94% reduction in pEPR per item switched to reuse; £314m-£577m (12-22%) annual savings in end-to-end system costs; 95% reduction in CO₂e emissions and in packaging materials and waste; and 13,000 net new jobs. Critically, the study emphasises that "Reuse at scale requires an interoperable reuse offer across multiple grocery retailers that is accessible to as many citizens as possible."³ These regulatory and financial drivers are pushing reuse models to the forefront of industry circularity strategies, highlighting the essential enabling role of standards in ensuring the interoperability necessary for successful scaling. This context underscores why addressing the barriers identified earlier - from retail space constraints to consumer behaviour and infrastructure investment - becomes not just an operational challenge, but a strategic imperative for businesses seeking to capitalise on the regulatory and economic opportunities that reuse systems present.

³ GoUnpackaged, A 30+% Reuse Future for the UK (2025)

Headline Results per scenario

Table Key

	Increase compared to Sc1: Single-Use (> 10%)
	Marginal increase compared to Sc1: Single-Use (< 10%)
	Decrease compared to Set Single-Use

Scenario Headline Results (30% Reuse)

		Total cost (£)	Total cost per Case (£)	% Cost Change vs Scenario 1(SU)	Total pEPR cost (£)	% pEPR Change vs Scenario 1(SU)	Total CO ₂ e (Tonnes)	Total Packaging Materials/waste (Tonnes)
Single-Use (SU)	Sc 1: SU	£2.66bn	£3.07	-	£144m	-	912,376	356,985
	Sc 2: SU-DRS	£3.01bn	£3.47	+13%	£144m	0%	716,060	356,985
Reuse	Sc 3: Citizen Return	£2.79bn	£3.22	+5%	£8m	-94%	44,356	16,694
	Sc 4: Online	£1.89bn	£2.19	-29%	£8m	-94%	49,630	16,694
	Sc 5: 3PL Kerbside	£2.08bn	£2.40	-22%	£8m	-94%	50,023	16,694
	Sc 6: LA Kerbside	£2.35bn	£2.71	-12%	£8m	-94%	49,977	16,694
Reuse In-Store	Sc 7: Refill In-store	N/A	£2.27	-26%	£7m	-	36,885	11,677

Source: GoUnpackaged, A 30+% Reuse Future for the UK (2025)

All single-use and reuse scenarios are based on a total volume of 866,745,790 cases. Refill in-store scenario is based on a total volume of 393,964,579 cases is.

Therefore, whilst GS1 would not comment on the merits of the modelling or undertake a similar exercise as part of this paper, it is important to understand these key regulatory and financial drivers pushing the reuse model at the forefront of industry circularity, and the enabling role of GS1 standards in ensuring interoperability.

4. Industry engagement

Despite growing interest in reuse models, businesses face several barriers that have been noted in industry press and research reports over the years. Studies have identified significant industry barriers that could impede the scale-up of reuse systems.



The most critical challenge is **retail space constraints**. Research indicates that keeping a substantial portion of packaging whole for reuse represents enormous spatial demands - potentially requiring storage equivalent to multiple large buildings worth of packaging annually, or significant weekly storage volumes per average store. This spatial demand is particularly problematic for smaller store formats, which represent a fast-growing retail segment, and could result in small and medium enterprises being locked out of reuse systems unless their specific needs are addressed. Analysis acknowledges that modelling often doesn't account for the opportunity cost of lost retail space and sales, which is likely to be significant given that retail space is highly constrained in many markets.

Consumer behaviour presents another substantial barrier, with research indicating that only a minority of consumers would make the effort to return packaging to stores, while refill systems require significant behaviour change from citizens, who must remember to bring their own containers to fill. Additionally, the **infrastructure investment requirements** are considerable, with transitions to higher reuse percentages requiring substantial investment over multiple years for packaging production lines, filler factory lines, wash plants, and collection vehicles.

Finally, the **need for industry coordination and standardisation** presents ongoing challenges. Successful reuse systems require convergence to create coherent and interoperable offerings for consumers, with coordination needed to enable supply chains to deliver in the most cost-effective way.

Standards Solutions for Reuse Challenges

Industry standards can help address many of these challenges, particularly around digital asset tracking, labelling, and interoperability - all necessary for scale. GS1 standards, as evidenced by numerous case studies, help overcome these barriers by providing a **common framework for identifying, capturing, and sharing data** on reusable packaging. Tracking reusable packaging across supply chains requires robust identification and data-sharing systems that can operate seamlessly across multiple stakeholders.

Beyond GS1, additional standards are being developed to cover other aspects of the reuse value chain, such as container sizes and quality, washing facilities, and logistics. Organisations like PR3 are developing comprehensive standards frameworks for reuse that incorporate GS1 specifications and recommendations for labelling and digital standards, with input from various European market organisations and the GS1 Global Office.

However, the industry also acknowledges barriers to adopting these global standards. Significant prior investments in proprietary internal systems present a major hurdle, as these systems were often not designed for interoperability or reuse, focusing instead on product tracking rather than packaging. Additionally, there can be a perception of complexity around migration, especially in sectors where labelling, coding, or logistics processes are highly automated and customised.

To address these challenges, forward-thinking companies are designing flexible architectures that can accept multiple identification standards with the ability to map and translate between them depending on the use case and partner involved. This approach allows organisations to commit to applying global standards while maintaining the flexibility needed to accommodate the operational needs of different contexts and stakeholders.

Industry Perspective on Standards Adoption

Companies operating in the reuse space recognise three major benefits of adopting global interoperable standards for reusable packaging. First, **interoperability between systems and brands** becomes possible when global standards like GTIN, GRAI, and Digital Link are adopted, ensuring that different stakeholders in the supply chain - retailers, manufacturers, and logistics operators - can share information consistently and in a scalable way. This reduces friction and accelerates integrations, which are critical factors in multi-stakeholder reuse models.

Second, **common standards enable significant scalability and operational efficiency**. Inventory management, tracking systems, and packaging management can operate with less customisation, resulting in lower integration and maintenance costs - especially important when managing thousands or millions of units in circulation.

Third, **global standards enhance transparency and consumer trust** by allowing consumers to easily access information about packaging composition, lifecycle, and prior use, regardless of brand or sales channel. This transparency is key to strengthening the value proposition of circularity and encouraging user adoption.



SCAN SUCCESSFUL - REWARD APPLIED



5. GS1 standards for reuse use cases

In this workstream, the group addressed both B2B and B2C use cases. We gathered best practices from existing pilots and real-world implementations that have already demonstrated feasibility in the market. Building on these practical examples, the group developed a shared approach for applying GS1 standards to reuse and refill scenarios. The methodology outlined below is not an exhaustive list of all possible ways to implement GS1 standards in reuse systems; alternative approaches are also valid, provided they align with the rules defined in the GS1 General Specifications.

Therefore, the goal is to create new packaging from old packaging, achieving a closed-loop system.

As the value network in the plastic packaging sector is very complex and many stakeholder groups are involved, cross-company collaboration is a prerequisite for the transition to a circular economy. In this context, the role of standardisation becomes even more important. Only if information is structured and standardised, it can be shared between all stakeholders in the value network, allowing interactions and cooperations. Standardised data help to optimise processes that extend the life cycle of materials and products. Using a common language is the only way to obtain the level of efficiency needed in the circular economy. And finally, because this data will mostly be processed by machines, interoperability of IT systems using a common language is crucial.

This common data framework enables all involved stakeholders to act in the interests of the circular economy, enabling product data to be shared among all entities with the focus on resource efficiency and the consideration of a low carbon footprint.

5.1. Basics of GS1 standards in reuse use cases

GS1 standards form the world's most widely used system of business standards, supporting stakeholders across all sectors in making their processes more streamlined, efficient, and transparent. The GS1 system is built on three core pillars—Identify, Capture, and Share—which work together as a flexible toolbox. This modular approach allows companies to adapt the standards to their specific business needs while ensuring interoperability across the value chain.

1. Identify:

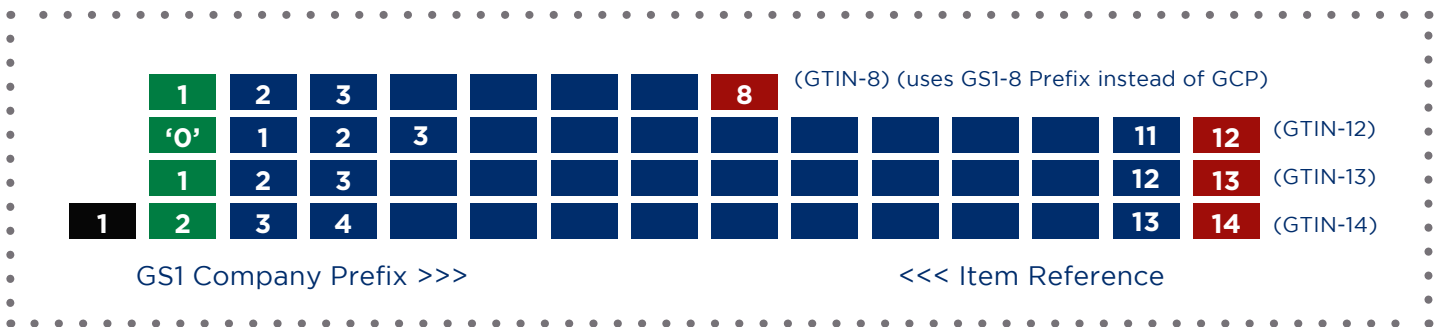
The identification of products, locations, assets, and other key elements is a critical first step toward achieving regulatory compliance. The GS1 system provides globally unique identifiers—numbers and character strings—that support stakeholders in making their business processes more efficient and flexible. Each identifier begins with a GS1 Company Prefix, which ensures global uniqueness and allows any stakeholder to trace the identifier back to the company that originally allocated it. Because GS1 ID keys are globally unique, they can be shared between organisations in open value chains thus increasing the visibility for trading partners.

Today the GS1 system has 12 identifiers with different purposes. In this document we are going to focus on the ones that are essential to implement a standard based process for reuse use cases. You can learn more about GS1 identifiers on the GS1 Global Office website⁴ and you can reach out to any local GS1 Member Organisation in your country for more details.⁵

Global Trade Item Number (GTIN)

*Global Trade Item Number (GTIN)*⁶ is the most commonly-used GS1 identifier and can be used by a company to identify all of its trade items. GS1 defines trade items as products or services that are priced, ordered or invoiced at any point in the supply chain. This is the number that we as consumers see every day on the products we buy at the supermarkets and other stores.

GTIN is a numeric string that consist of a GS1 Company Prefix and can be 8, 12, 13 or 14 digits long. The most commonly used format is the GTIN-13 which is used over retail point-of-sale check out processes.



Legend:

- Red box: Check Digit
- Green box: start of GS1 Company Prefix
- Blue box: numeric
- Grey box: Extension Digit
- <<< variable start position
- >>> variable length

What is the role of GTIN in reuse use cases?

At the point of sale, each product must be uniquely identified so that essential information, such as its price, can be retrieved. While the reusable container is treated as an asset with its own identifier, the product inside still requires a distinct product identifier.

⁴ <https://www.gs1.org/standards/id-keys>

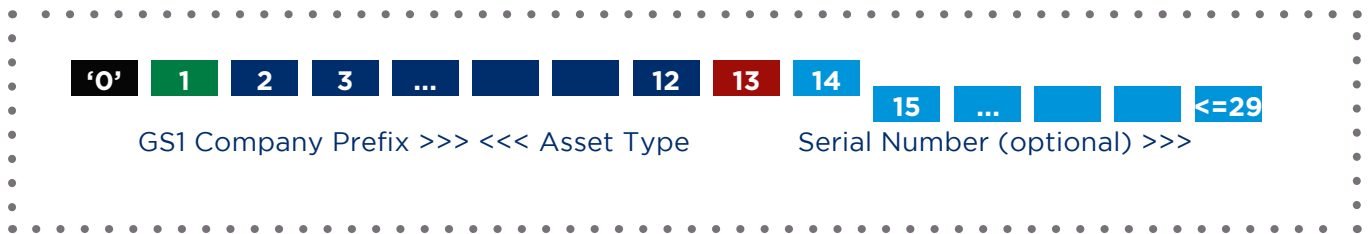
⁵ <https://gs1.eu/gs1-in-europe-member-organisations/>

⁶ https://www.gs1.org/docs/idkeys/GS1_GTIN_Executive_Summary.pdf

Global Returnable Asset Identifier (GRAI)

The *Global Returnable Asset Identifier*⁷ is one of two GS1 Keys for asset identification.

This GS1 Key is especially suitable for the management of reusable transport items, transport equipment, and tools and can identify these returnable assets by type and if needed also individually for tracking and sorting purposes.



 Check Digit	 start of GS1 Company Prefix	<<< variable start position
 numeric	 Extension Digit	>>> variable length
 alphanumeric	 filler digit	<= less than or equal to

What is the role of GRAIs in reuse use cases?

The GRAI is the most commonly used GS1 identifier in reuse use cases to identify the boxes, containers or pallets due to its flexibility of the granularity of identification. The asset owner can decide to identify only an asset type (e.g. big plastic container or small plastic container) but if the business need is instance level identification for more accurate traceability reasons, the GRAI can include an optional serial component to facilitate this. This makes it the ideal tool for tracking and tracing plastic containers and collecting information on the number of usages, the specific locations and status of the assets.

Global Location (GLN)

*Global Location Number (GLN)*⁸ can be used by companies to identify their locations, giving them complete flexibility to identify any type or level of location required.



What is the role of GLNs in reuse use cases?

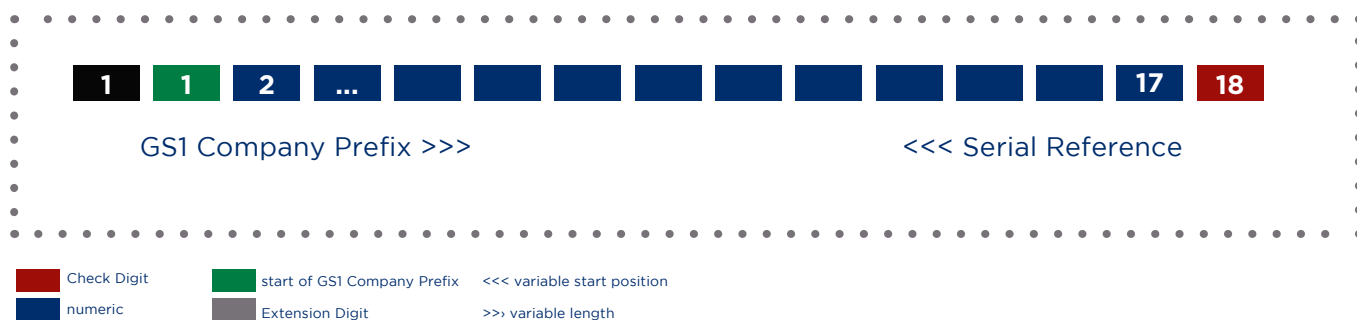
The use of GLNs is essential for identifying locations and parties within a reuse system, enhancing visibility and enabling effective track and trace. GLNs can be applied to collection points, vending machines, and other locations or parties in open environments, providing a neutral identification method that works seamlessly across multiple retailers and stakeholders at the same time.

⁷ https://www.gs1.org/docs/idkeys/GS1_GRAI_Executive_Summary.pdf

⁸ https://www.gs1.org/docs/idkeys/GS1_GLN_Executive_Summary.pdf

Serial Shipping Container Code (SSCC)

*Serial Shipping Container Code*⁹ can be used by companies to identify a logistic unit, which can be any combination of trade items packaged together for storage and/ or transport purposes, - for example a case, pallet or parcel.



What is the role of SSCCs in reuse use cases?

The SSCC plays an important role in the logistic processes around reuse project. With the help of the SSCC companies can track each logistic unit for efficient order and transport management.

2. Capture:

The second major step in implementing a standards-based solution is to connect the allocated identifiers to the physical world. This establishes a reliable link between digital information and the corresponding product, asset, location, or logistic unit.

The GS1 system provides multiple types of barcodes and data carriers that can encode the GS1 identifier and any further necessary information in a structured standardised way.

In the majority of the reuse use cases either **2D barcodes** or **RFID tags** are used to track and trace the reusable assets while in cases where the actual product needs to be scanned at point-of-sale, traditional linear barcodes are used adjacent to the 2D barcodes.

One of the most recent technological improvements is the implementation of **GS1 Digital Link (QR code powered by GS1)** which is a structured, standardised syntax embedded in a QR code. GS1 Digital Link connects a product's GS1 identifier (such as a GTIN) to the web, turning it into a gateway to trusted, up-to-date information and digital services. It enables opportunities such as improved consumer engagement, product authenticity, regulatory compliance, circularity and reuse systems, as well as more efficient supply chain operations.

3. Share:

The third pillar of the GS1 system builds on both identification and the identifiers encoded in data carriers. It ensures that trusted data can be exchanged seamlessly between stakeholders, enabling transparency, interoperability and more efficient collaboration across the supply chain.

In terms of reuse use cases, EPCIS is the most commonly used standardised way of sharing data about the "what, when, where, why and how" of products and other assets, enabling the capture and sharing of interoperable information about status, location, movement and chain of custody.

⁹ https://www.gs1.org/docs/idkeys/GS1_SSCC_Executive_Summary.pdf

5.2. Implementation of GS1 standards in reuse use cases

In this document, we are going to focus on two perspectives of reuse use cases: B2B reuse cases cover the usage of packaging in the logistic processes. Some examples for this could be reusable pallets and boxes with standardised dimensions used to ship goods from the manufacturer to the retailers' warehouses. For the B2C relation, a typical use cases are reusable cups, takeaway boxes or refillable cans and containers.

5.2.1. Reuse in B2B

In business-to-business relation there are already a number of implemented and working solutions for the standardisation of reusable containers and pallets in logistic processes. Based on the examples implemented in Norway, Germany, France, Belgium, and Luxembourg, the following general learnings can be identified.

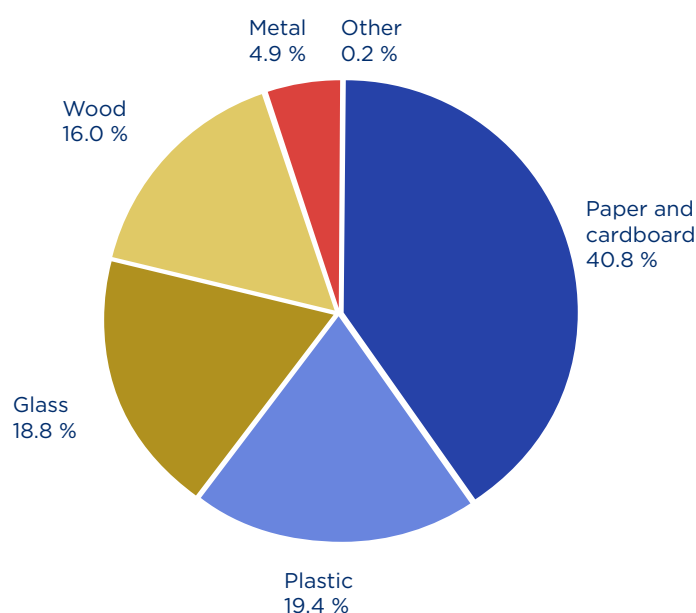
In a **B2B perspective, reuse** refers to packaging models where durable transport packaging—such as pallets, crates, kegs, intermediate bulk containers (IBCs), or totes—is used multiple times in supply chains between companies instead of being discarded after a single delivery. The goal is to cut costs, improve efficiency, and reduce packaging waste in logistics operations.

Typical examples for B2B reusable assets are:

- **Reusable pallets, crates or roll cages** for transporting goods between manufacturers, distributors and retailers.
- **Reusable industrial containers** like drums, IBCs, or barrels for liquids and chemicals.
- **Pooling systems** where a third party manages, collects, cleans and redistributes standardised packaging assets.

There are some main drivers behind reuse initiatives for packaging in logistics such as the large amount of generated packaging waste. This waste mostly consists of cardboard boxes. Although these are potentially biodegradable and might have good recycling rates, they still contribute to deforestation, water and energy consumption during production/recycling.

Packaging waste generated, by packaging material, EU, 2022 (%)



Note: Eurostat estimates.

Source: Eurostat (online data code: env_waspac)

¹⁰ https://ec.europa.eu/eurostat/statistics-explained/index.php?title=Packaging_waste_statistics

There are numerous challenges facing industry today in terms of the packaging materials used while shipping their products. Packaging must be robust enough to protect goods during transport and handling, while at the same time being cost-efficient, space-saving, and compliant with regulations. Additionally, with the upcoming European regulations, businesses are under pressure to reduce packaging waste and adopt reusable or recyclable solutions.

The lack of a standardised approach across different markets, partners, and transport modes further complicates the picture, often resulting in fragmented systems that limit visibility, traceability, and efficiency. Furthermore, the packaging design directly affects supply chain efficiency—inefficient shapes, sizes, or materials can lead to higher transport costs, lower truck fill rates, and greater environmental impact.

In some countries, there are already successful initiatives based on the strong collaboration between market stakeholders to implement standard-based solutions to support logistic processes.

Smart reusable packaging solutions use GS1 identifiers and data-sharing systems to make transport packaging—such as boxes, crates, or containers—visible and traceable across the entire supply chain. Each packaging unit can be uniquely identified, monitored, and linked with relevant product or logistics information.

By capturing and sharing this data in real time, companies can improve asset utilisation, reduce losses, optimise return flows, and increase overall efficiency. At the same time, these solutions support circular economy goals by enabling multiple reuse cycles and reducing packaging waste.

How does it work?

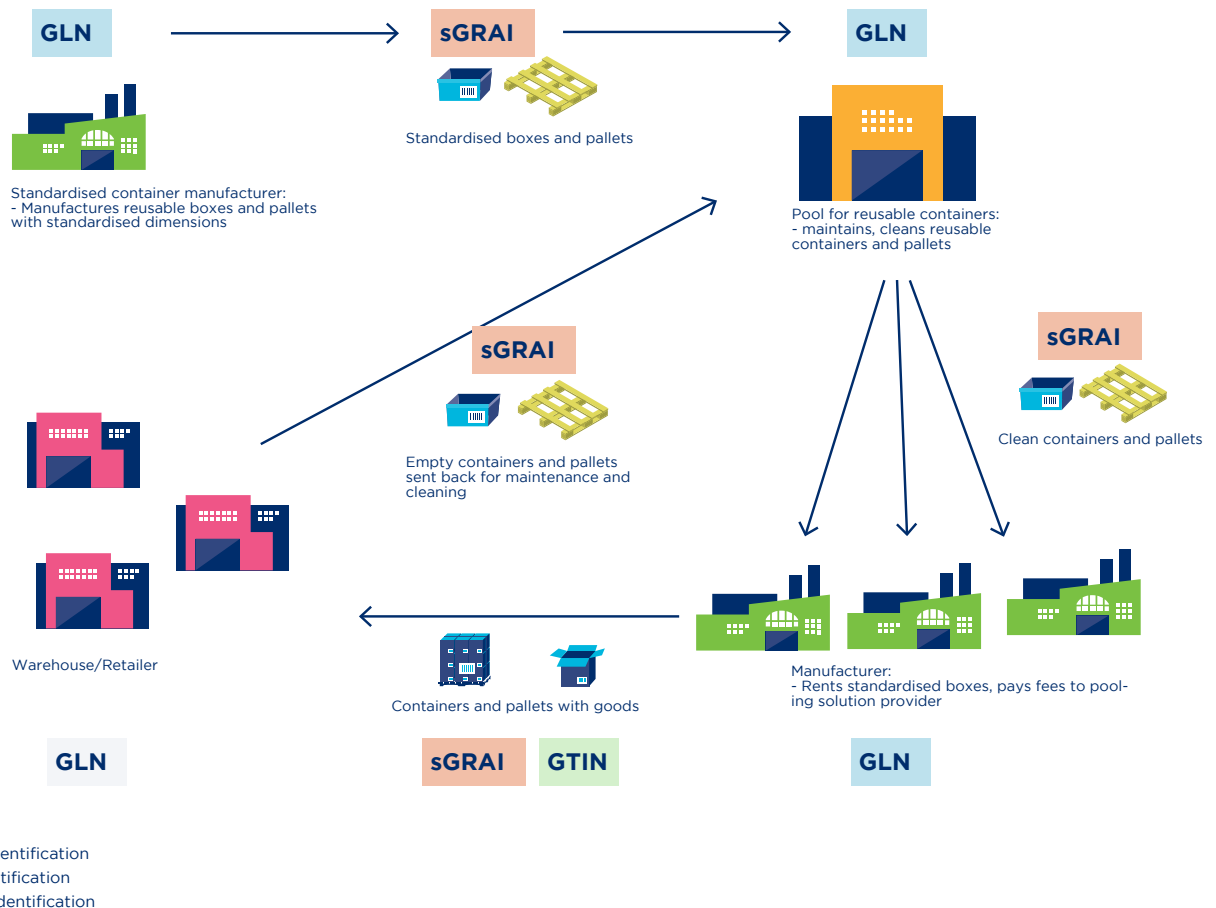
There are in general some steps that are present in all the examined use cases:

1. Containers, pallets and boxes are manufactured with standardised measurements and following ISO standards regarding multiple parameters.
2. Reusable assets are identified with sGRAI (serialised Global Returnable Asset Identifiers) and data carriers are placed on the asset in a permanent way (RFID tags or barcodes).
3. A pooling solution provider is responsible for the cleaning and maintenance of the assets (in case the solution is based on a pooling model).
4. Clean containers arrive empty to the manufacturer and filled with products.
5. Products shipped to the retailers' warehouses.
6. Empty containers are shipped back to the pooling solution provider for cleaning and maintenance, and the cycle starts again.

As each step in the loop is tracked and traced, the status, location and condition of the assets are recorded and captured. The flow below shows a generic approach towards a B2B reusable asset system for boxes and pallets in logistics. In case the system is designed with an integrated pooling provider, the maintenance and cleaning of the assets are taken care of by a third party. In case the system is in place without a pooling provider, the cleaning and maintenance are usually taken care of by one of the companies directly involved in the supply chain (asset owner, receiving party, logistic provider or maintained in closed-loop systems). Without a pooling provider, the key challenge is ensuring standardised hygiene, quality, and traceability, which requires investment in infrastructure and clear agreements between trading partners. The use of open global standards enables stakeholders to create solutions that work across companies, sectors, and even borders.



Flow of reusable assets (example)



Find some of the challenges for B2B reuse below and how global standards can support:

Challenges today	Benefits of using global standards
Empty trucks or no filling rates, no precise data about the truck load factors	By increasing transport efficiency and truck fill rates, freight emissions can be cut back by 15-20% according to estimates by the EU
Proprietary box-systems in closed, company-owned cycles	Cross border and cross-stakeholder collaborations become possible via using global identifiers enabling interoperability within systems
High level of generated packaging waste without returnable cycles between industry and retail	Reduced CO2 emission rates via increased efficiency achieved by reusable packaging and precise track and trace of assets. Enabling stakeholders to achieve reuse targets.
Too much diversity in containers used by the retailers makes container management complex	Simplified packing-unpacking-repacking process due to standardised boxes and containers, less damaged products during the shipping process
Inefficient wooden pallet system with short life span	Fewer losses, better hygiene, improved automation , easier maintenance for pallets and containers and longer lifecycle of reusable plastic pallets and containers

In the table below there's a summary of most commonly used **GS1 standards in B2B** reuse projects. For more information and in-depth discussion on the possibilities around the standard use, contact the local GS1 Member Organisation.

Identification	Data Capture	Data Sharing
<p>GRAI</p> <ul style="list-style-type: none"> to identify the containers, pallets and boxes preferably with serialised component for instance level track and trace of the asset <p>GLN</p> <ul style="list-style-type: none"> to identify the locations <p>GTIN</p> <ul style="list-style-type: none"> to identify the products shipped 	<p>2D barcodes (GS1 QR, GS1 Data-Matrix)</p> <p>QR code powered by GS1 (QR code with GS1 Digital Link)</p> <p>Linear barcodes (GS1-128)</p> <p>RFID tags</p>	<p>EPCIS</p>

5.2.2. Reuse in B2C

In a **B2C (business-to-consumer) context, reuse** refers to packaging models where consumers use the same container multiple times instead of it being disposed of after a single use. The goal, as in the other use cases as well, is to reduce packaging waste, save resources, and support circular economy principles.

Typical examples for B2C reuse are:

- **Reusable cups and food containers:** Customers buy or borrow them (sometimes with a deposit) and return them for cleaning and reuse.
- **Refill systems:** Consumers bring their own packaging or purchase a durable container, which can be refilled at a store or through home delivery.

In the B2C context, reuse relies on consumer participation and behaviour change, as well as infrastructure from businesses (cleaning, logistics, return points, incentives). It aims to balance **convenience for the consumer** with **sustainability benefits**, by keeping packaging in circulation for as long as possible. In this chapter we will have a look at both perspectives for B2C reusable asset projects.

5.2.2.1. Reusable cups and containers:

In this context, the scope includes use cases such as reusable cups for immediate consumption or takeaway or reusable containers and boxes for supermarket purchases.

Reusable cups (e.g. coffee or beer)

How does it work?

In general, there are some simple steps for the process:

1. Packaging manufacturer produces the reusable cup or container which are either marked with a QR code or embedded with an RFID tag encoding a GRAI and serial component (sGRAI);
2. Empty containers are shipped to location of consumption (either installed in a vending machine or stored behind the counter);
3. Customer buys drink and pays deposit for the cup (can be a hold of certain amount of money without transfer);
4. QR code on the cup is scanned or RFID tags embedded in the cup is read;
5. Customer consumes the drink;
6. Customer returns the cup and retrieves the deposit;
7. QR is scanned or RFID tag is read;
8. Number of usages and cup status is tracked;
9. Cups are collected at collection points and washed.

Graphically this process looks like the following:



In case of coffee cups or beer cups, the product is bought either over the counter or from a vending machine. This also means that the product's identifier, the Global Trade Item Number (GTIN) is not necessarily encoded in a barcode and printed on the cup or container as usually the personnel take care of the point-of-sale (PoS) administration. However, the product itself is still should be identified by a GTIN in the PoS system. Sometimes GTINs are scanned from a list by the counter personnel.

5.2.2.2. Reusable containers in retail stores (e.g. supermarkets)

In some cases, reusable containers are available directly in supermarkets or shops, where customers select the product themselves. At checkout, the product's barcode must be scanned to register the purchase. This task is carried out either by the customer or by PoS staff, which requires a barcode format compatible with PoS systems—typically EAN-13, though in certain cases 2D barcodes are also used.

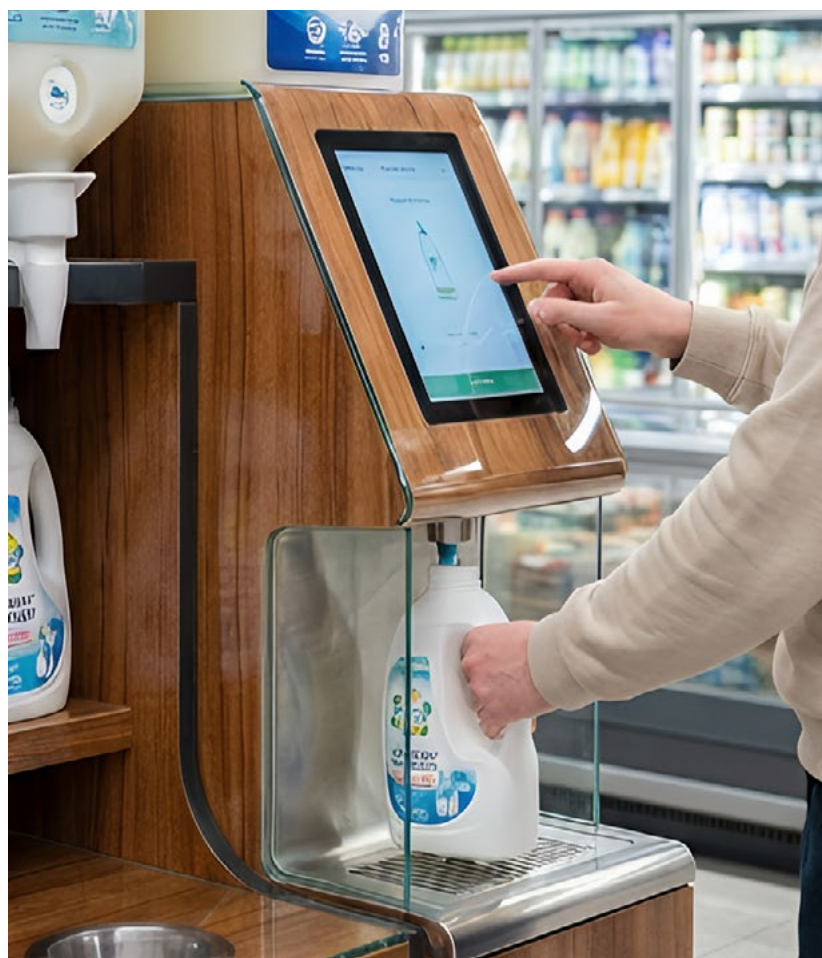
How does it work?

1. Reusable boxes are produced by the box manufacturer, identified by Global Returnable Asset Identifiers and serial components (sGRAI) on an instance level which are marked on the box in a 2D barcode or RFID tag;
2. The boxes are shipped to the store (e.g. supermarket) and filled with products;
3. The part of the box that is going to be peeled away after consumption is marked with a barcode suitable for retail scanning (e.g. EAN-13 or 2D barcodes at some places) with the filling product's GTIN encoded;
 - E.g. a thin sealer on the top of the box;
 - Note: the barcode encoding the container's identifier and the barcode containing the product's identifier should be visibly separated to avoid conflicts at PoS scanning.
4. The consumer uses the product and returns the empty container to the retailer or other collection points where the container's identifier is scanned;
5. The empty containers are shipped to the washing facilities for maintenance and then returned to the store and the cycle starts again by scanning, collecting and washing cups for reuse.

5.2.2.3. New trends in B2C reusable packaging

While for many years use cases for reusable packaging mainly focused on containers, boxes and cups, the trend is now expanding into new areas. One of the fastest-growing opportunities lies in e-commerce and shipping, which generate vast amounts of disposable packaging with a significant environmental footprint.

As consumers increasingly demand sustainable alternatives, new initiatives are emerging to address the packaging of products purchased online. Through dedicated applications and networks of drop-off points, consumers can "hire" the packaging for their orders by paying a deposit. Once they receive and unpack their goods, they simply return the reusable packaging to a collection point and have their deposit refunded, creating a circular and more sustainable system for online shopping.



Another strong example comes from the e-commerce sector. Since the pandemic, online ordering has increased significantly, and consumers have become much more comfortable purchasing all types of products online. Grocery deliveries, in particular, have become part of everyday life. However, each order often involves excessive use of single-use plastic or paper bags to ensure safe delivery, leading not only to unnecessary resource consumption and environmental impact but also to consumer frustration.

A promising solution lies in retailer collaboration and the introduction of deposit-based reusable bags, which move the system one step closer to circular packaging models. By leveraging global standards from GS1 for product and packaging identification—through barcodes, RFID tags, and standardised data sharing such as EPCIS—interoperability becomes achievable, while precise tracking and tracing of packaging flows can support transparency and efficiency. These insights can then be used to scale and continuously improve such systems. Ultimately, the retailers’ efforts to provide greener, more sustainable packaging solutions align with growing consumer demand for environmentally responsible options.

Find some of the challenges for B2C reuse below and how global standards can support:

Challenges today	Benefits of using global standards
Different systems are not interoperable , creating closed loops tied to one operator.	Interoperability across systems and stakeholders enables cross-retailer, cross-brand, and cross-border reuse.
Difficult to track individual cups and ensure proper return and reuse.	Unique identification (via barcodes, QR codes, or RFID) allows efficient tracking, traceability, and loss prevention.
Lack of a common language for data exchange between retailers, cafés, and logistics providers.	Standardized data sharing improves transparency, collaboration, and consumer trust.
Pilot projects often remain small and fragmented, making it hard to scale reuse solutions.	Standards provide a scalable backbone for expanding reuse systems beyond pilots to regional or global levels.
Duplicated infrastructures and siloed IT systems increase costs and reduce efficiency.	Standardized processes reduce complexity, improve sustainability, and lower operational costs.

Main learnings during the B2C reuse projects

Pilot projects with reusable packaging showed that introducing a **financial incentive was crucial** for successful returns. When comparing deposits with penalty charges for non-returns, consumers clearly preferred deposits, as they provided a positive motivation rather than a punitive measure. Without such a deposit, users were not sufficiently incentivised to bring cups back, leading to lower return rates.

Another important insight was that when the **design of the reusable cups** was too attractive, return rates actually dropped because many consumers chose to keep them as collectibles. The pilots and projects also highlighted that active consumer engagement was essential for the system to function effectively, as participation and awareness directly influenced outcomes. Overall, these initiatives demonstrated that well-designed deposit schemes not only support operational success but also help drive long-term behavioural change towards more sustainable practices.

5.2.2.4. Refill in retail packaging:

These use cases refer to systems where consumers bring their own containers or use reusable ones provided in-store to refill products, instead of purchasing new single-use packaging each time. This can take the form of refill stations for liquids like detergents, beverages, or personal care items, or bulk dispensers for dry goods such as cereals, pasta, or coffee. The aim is to reduce single-use packaging waste, promote resource efficiency, and encourage more sustainable shopping habits.

The main drivers behind refill projects in retail are **sustainability, cost efficiency, and consumer demand for greener choices. Refill systems significantly reduce single-use packaging waste**, helping retailers and brands meet environmental targets and regulatory requirements. They can also lower long-term packaging and logistics costs by cutting down on disposable materials. At the same time, growing consumer awareness and preference for sustainable shopping options make refill solutions an attractive way for retailers to strengthen customer loyalty and brand image. There are also use cases where product containers, despite being made from high-value materials, are not recovered or reused after consumption. A good example is aerosol cans, which could serve as a suitable basis for refill solutions.

How does it work?

1. Empty can be identified by a GRAI and serialised component and marked by a 2D code or RFID tag is placed into machine where it is read and the use is registered;
2. Product is chosen and the machine fills up the container;
3. The GTIN of the product filled into the container is printed on a barcode that is readable at point-of-sale, customer places the label on the container;
4. Product's GTIN is scanned at the point-of-sale;
5. The product is consumed and returned to the collection point after use.

In the first generation of refill solutions, products were stored in bulk at retail locations, and customers refilled their containers manually. While practical, this approach often led to challenges such as spillage and hygiene concerns, as accidental spills could create messes or risk contamination. Staff also faced additional cleaning and maintenance tasks, since containers needed to be thoroughly sanitised between uses to ensure safety. Nevertheless, for certain product categories, this model proved effective and is still successfully used in many stores today.

In the current generation of reuse use cases, refill stations—similar to vending machines—are installed in retail stores, allowing consumers to purchase products at the push of a button. These automated stations provide convenience for customers while reducing the mess and hygiene challenges for store staff.

However, this solution also brings challenges for retailers: sufficient space is needed on the shop floor for the stations, as well as in storage areas for the returned empty containers. Moreover, depending on the type of vending machine, replacing or refilling the stations may still require manual intervention.

New trends in refill seek other opportunities for standardisation. To make the process even simpler, standardised sized branded or non-branded bottles could show the way forward. The limits on shapes and sizes of bottles or pouches also makes refilling the machines easier, this has been already proved to be feasible with aerosol aluminium cans.

Refill is a rapidly growing area that supports sustainability and encourages a shift in how we think about consumption. Every day, new initiatives emerge, and innovative technologies are being developed to make refill use cases practical and scalable in the market.

These innovations range from smart dispensing systems and automated refill stations to new materials and container designs that enhance convenience, safety, and hygiene. At the same time, growing consumer awareness, supportive regulatory frameworks, and the use of global standards for product identification and traceability are creating favourable conditions for adoption.

Together, these elements make refill a promising pathway toward reducing packaging waste, improving system interoperability, and promoting circularity.

Find some of the challenges for B2C refill below and how global standards can support:

Challenges today	Benefits of using global standards
Containers need to be safely refilled without cross-contamination or misuse.	Unique identification ensures correct product matching, safety checks, and quality assurance
Retailers and refill stations may operate with different systems , limiting interoperability	Standards enable cross-retailer and cross-brand compatibility of refill stations and packaging.
Hard to track the lifecycle of containers (number of refills, cleaning cycles, end-of-life).	Standardized identifiers allow traceability , monitoring usage, and managing container lifespans
Data exchange between producers, retailers, and refill operators is fragmented	Shared data standards create transparency , simplify operations, and improve collaboration
Scaling refill solutions across markets is complex due to differing regulations and systems	Global standards provide a harmonized framework , making scaling across regions and borders easier

In the table below there's a summary of most commonly used **GS1 standards in B2C reuse or refill projects**. For more information and in-depth discussion on the possibilities around the standard use, contact the local GS1 Member Organisation.

Identification	Data Capture	Data Sharing
<p>GRAI</p> <ul style="list-style-type: none"> to identify the containers, pallets and boxes preferably with serialised component for instance level track and trace of the asset In many cases today internal number is used to track the bottles <p>GTIN or serialised GTIN</p> <ul style="list-style-type: none"> to identify the products for PoS selling Or identify the cup in case if over-the-counter selling 	<p>2D barcodes (GS1 QR, GS1 DataMatrix)</p> <p>QR code powered by GS1 (QR code with GS1 Digital Link)</p> <p>QR code is used for internal identifiers</p> <p>RFID tags</p> <p>EAN-13 linear barcode (or 2D in case it can be scanned in the retail store)</p>	<p>EPCIS or other data sharing solution</p>

Closing thoughts

Standardisation, particularly through GS1 standards, plays a vital role in packaging by supporting regulatory compliance, advancing sustainability, and safeguarding consumer safety. GS1 identifiers ensure that product and packaging data can be uniquely and consistently captured, shared, and accessed across the value chain.

This visibility allows consumers to make informed choices based on reliable product information, while at the same time providing the transparency needed to track and measure packaging flows against sustainability goals.

By creating a common, interoperable language for businesses, regulators, and consumers, GS1 standards enable trust, efficiency, and progress toward circular packaging systems.

At this moment, a gap assessment is being made on the readiness of GS1 standards for reuse (also based on the use cases described in this document). If needed work requests will be launched to update the GS1 General Specifications in line with the business needs.

6. Links & Sources

Challenges today	Benefits of using global standards
Packaging and Packaging Waste Regulation	https://eur-lex.europa.eu/legal-content/EN/TX-T/?uri=OJ:L_202500040&pk_campaign=todays_OJ&pk_source=EUR-Lex&pk_medium=X&pk_content=Environment&pk_keyword=Regulation
GS1 Member Organisations in Europe	https://gs1.eu/gs1-in-europe-member-organisations/
GS1 Member Organisations worldwide	https://www.gs1.org/standards/get-barcodes
Overview of GS1 identifiers	https://www.gs1.org/standards/id-keys
GTIN	https://www.gs1.org/standards/id-keys/gtin
GRAI	https://www.gs1.org/standards/id-keys/grai
GS1 Digital Link	https://www.gs1.org/standards/gs1-digital-link
2D barcodes	https://www.gs1.org/standards/barcodes/2d
RFID	https://www.gs1.org/standards/rfid
GS1 General Specifications	https://www.gs1.org/standards/barcodes-epc/rfid-id-keys/gs1-general-specifications
Reusable beer cups @RAFC (video)	https://www.youtube.com/watch?v=ohmrh__NJVY
Ellen MacArthur Foundation, Unlocking a reuse revolution: scaling returnable packaging (2023)	https://www.ellenmacarthurfoundation.org/scaling-returnable-packaging/overview#:~:text=systems%20need%20to%20be%20significantly,to%20reach%20high%20return%20rates.
A 30%+ REUSE FUTURE FOR THE UK - A data-driven view of the commercial and environmental benefits of reuse at scale	https://static1.squarespace.com/static/64f87d1ca3b62218f953f0c8/t/68557b025be3d06cb083511a/1750432514856/30percent-reuse-future-for-UK-report-GoUnpackaged.pdf



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