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1. Executive summary

A series of trends are disrupting recycling and waste management conversations worldwide. The first is a growing awareness that plastic waste is polluting even the far reaches of our planet. Scientists have determined that plastic waste including litter is leaking into the oceans at a rate of a garbage truck per minute, and forecast there will be more plastic in the ocean than fish by 2050 (by weight).¹ This has led researchers to review how much plastic has actually been recycled given current recycling systems in place. Scientists have determined that of all the plastic ever produced, only 9% has been recycled.²

The second trend is concerns raised by the Basel Convention* and the associated rising costs of collection, processing and recycling for parts of the world that used to rely on China, India, and many other Asian countries to buy and sort through mixed recyclables.

A third trend is a growing aspiration to shift the industrial model away from “take-make-waste” to a “circular economy”, where resources are captured and utilized at their highest material value for as long as possible. This is most evident in the European Union’s Circular Economy Package, which established legally-binding collection and recycling targets for common materials.

Motivated by this confluence of trends, policymakers, environmental organizations and businesses are actively evaluating solutions such as a deposit return system (DRS) for the sustainable management of single-use beverage containers.**

Deposit return systems add a small but meaningful deposit to the sale of each beverage, which is repaid when consumers return the empty containers for recycling. DRSs are typically established through legislation passed by state or national governments. The policy is known for its effectiveness, with leading systems routinely recovering in excess of 90% of deposit containers sold.³



* During the United Nations Conference of the Parties in Basel, Switzerland in May 2019, the UN agreed to require consent from importing countries before exporting of mixed, unrecyclable and contaminated plastic waste can proceed.

** Deposit return systems are also known as container deposit schemes, “bottle bills”, container deposit legislation, or beverage container deposit and refund programs.

Figure 1:

Principles and elements of high-performing deposit return systems

All of the elements – when applied together – will address global waste challenges and advance a circular economy.

PERFORMANCE



1. Broad scope of beverages and containers
2. Minimum deposit value
3. Return-rate target

CONVENIENCE



4. Convenient redemption system for consumers
5. Separately charged and fully refundable deposits
6. Container deposit markings for consumers and manual returns, barcodes for accurate accounting

PRODUCER RESPONSIBILITY



7. Extended producer responsibility financing
8. Reinvestment of unredeemed deposits and material revenue within the system
9. Recycled content requirements

SYSTEM INTEGRITY



10. Centralized, non-profit administration and operations
11. Government reporting and consumer communication
12. Government enforcement

In 2019, the European Union adopted the Single-Use Plastics Directive, mandating that its member states collect 90% of plastic beverage containers by 2029. Experts say this will be difficult⁴ to impossible⁵ to achieve without a deposit return system in place, and these programs are on the rise.

In the past three years alone, 22 states or countries have committed to update existing deposit systems or develop new systems.⁶ In addition to this group, at least 12 states or countries are currently working on updating existing systems or developing new systems.⁷ In 2019, nine US states proposed adopting deposit policies, which is “way more interest than we have seen in the past”, according to the Container Recycling Institute, a non-profit that monitors deposit systems.⁸

TOMRA has over 45 years of experience working in deposit return systems, today working in 40 deposit markets, in every part of the value chain. TOMRA has unique first-hand insights based on its global experience in the field. Now is the right time to understand what makes some programs more successful than others. After analyzing global deposit systems and reflecting on its experience in those

markets, TOMRA identified a series of “best practices”. Principles shared among high-performing deposit return systems include:

- **Performance:** A collection target for all beverages plus a meaningful deposit delivers strong results.
- **Convenience:** A redemption system that is easy, accessible and fair for all users.
- **Producer Responsibility:** Producers finance and invest in the system using the unredeemed deposits, commodity revenues, and an eco-modulated EPR fee.
- **System Integrity:** Trust is built into the system’s processes through transparent management, a data-driven clearinghouse, and reliable redemption technology.

In practice, these design principles are brought to life through 12 key policy or program elements. All of the elements – when applied together – will address global waste challenges and advance a circular economy. Prioritizing one but not the other will disrupt a deposit system’s performance and cost effectiveness. As with all policies, local culture, infrastructure, and politics need to be factored in to shape the system that works best for each market.



The 12 key elements of high-performing deposit return systems include:

PERFORMANCE

1. Broad scope of beverages and containers: The legislation clearly defines which beverages, material types and sizes will be included in the program. Leaving out one beverage category could mean millions of recyclable cans or bottles are wasted and potentially littered. When New York expanded its DRS to include water in 2009, it doubled the amount of Polyethylene Terephthalate (PET) plastic containers captured by the system. Water containers now make up about 25% of all the containers that New Yorkers redeem for recycling.

In addition, including more beverage types reduces consumer confusion at the redemption point, and leads to better economies of scale for the system.

2. Minimum deposit value: Providing a financial incentive to recycle is what separates deposit return systems from other collection programs. Decades of redemption data show that meaningful deposit levels effectively drive more containers into the program. For example, Michigan uses a 10-cent deposit to achieve a return rate around 90%.⁹ By contrast, Connecticut’s 5-cent deposit has not changed since 1978, when it was an engaging value. The return rate has dropped from 88% in 2002 to 50% in 2018, making it tied for the lowest return rate in the world.¹⁰ High-performing systems establish a minimum deposit value at a meaningful level and allow producers to raise it as needed to reach performance targets.

3. Return-rate target: Setting a collection target establishes the policy’s objective, and aligns producers to set incentives and provide convenient redemption options. For the purposes of this paper, “producer” means the company first selling the deposit container in the market (e.g. producer, importer or distributor).

Regulators then measure performance and enforce provisions. (See Key Element #12: Government enforcement). Setting expectations through targets also grants a license for businesses to design the program with flexibility and responsiveness in mind. For example, Oregon’s stakeholders agreed to incorporate a performance target in a 2011 legislative update. By 2016, the return rate had fallen below the target of 80% for two consecutive years, and triggered an automatic increase in the deposit value from 5 to 10 cents.* The return rate rose from 64% in 2016 to 86% in 2019.¹¹

CONVENIENCE

4. Convenient redemption system for consumers:

High-performing deposit systems make redemption easy for the consumer. Consumers have a right to easily recoup their deposit money, and producers and retailers have an obligation to make that possible. High-volume redeemers and the informal economy also should be accommodated in the design of the redemption network. The most common and effective redemption model is known as “return to retail”, where retailers who sell beverages must take back the empty containers. Nine out of 10 of the world’s best-performing deposit return systems

* April 2017



employ return-to-retail collection, achieving an average return rate of 91%.¹² Germany, which has the highest-performing deposit system in the world with a return rate of 98%, leverages retailers in this way.

5. Separately charged and fully refundable deposits:

Effective deposit systems label the deposit value separately on receipts and store shelves, and ensure deposits are fully refundable. A true “deposit”, in any context, is designed to be returned in full when the payor completes a given action. This maintains the strong financial incentive and delivers higher return rates than those with partial refunds (known as “half-back” models). The top-five performing deposit systems in the world (Germany, Netherlands, Finland, Denmark and Lithuania) all offer fully refundable deposits. Together they average a 94% return rate.¹³ Listing the deposit value separately from the sales price on both the store shelf and receipt helps educate the consumer and avoids unnecessary confusion.

6. Container deposit markings for consumers and manual returns, barcodes for accurate accounting:

For consumers to easily identify containers

eligible for a deposit, high-performing systems require standard text or a logo to be printed on each beverage container. A visual marking also allows redemption locations that process containers manually to easily recognize containers eligible for deposit. Barcodes serve a similar purpose in that they enable automated redemption technology to recognize and count each deposit container. This provides accurate payments to consumers, a baseline level of security, and fair, transparent financial accounting by keeping track of each brand. Unique deposit marks and market-specific barcodes prevent fraudulent redemption of non-deposit containers, and reduce costs. Before the deposit system was launched in New South Wales, Australia, beverages sold together in what is known as “multi-packs” did not have individual barcodes. This would have created a situation where one container sold individually would be accepted by an automated reverse vending machine (RVM), whereas those sold in “multi-packs” would be rejected in many cases. Due to concerns about consumer confusion, the government updated labeling requirements to add individualized barcodes before the deposit system was implemented.



PRODUCER RESPONSIBILITY

7. Extended producer responsibility financing:

Incorporating the principles of Extended Producer Responsibility (EPR), successful deposit return programs engage producers and retailers to manage the environmental impact of a product back into the packaging production cycle. Producers cover the net costs and influence the design of their package for recyclability. See also how they can utilize several cost-saving measures (Elements #8 and #10).

8. Reinvestment of unredeemed deposits and material revenue within the system:

A “license to operate”^{*} is granted to producers in exchange for using the unredeemed deposits to reinvest in the system, and with the additional commodity income reduce their own net costs. Norway, with its 89% return rate, provides a notable example. In 2019, the unredeemed deposits and material revenue were enough to cover more than 90% of Norway’s DRS costs: 49% of system costs were offset by unredeemed deposits, 35% from material sales, and 8% from other revenues (mainly interest) – only 8% needed to be covered through an Extended Producer Responsibility (EPR) fee from producers.¹⁴



In the case of aluminum beverage cans, those income streams are even high enough to avoid any additional EPR fee from producers. In fact, the EPR fee per aluminum can was negative, meaning NOK 0.08 was actually rebated to producers (€0.007 / US\$0.008).¹⁵

9. Recycled content requirements:

Since high-performing systems allow deposit system operators to retain revenue from the sale of containers collected, high and stable commodity values reduce overall system costs. Like many commodities, recycled materials experience volatile market prices, which creates risk for invest-

ments in collection, processing and recycling. For example, in January 2018 the price of food-grade recycled PET in the US was 7% cheaper than virgin PET, but by mid-2020 it was around 35% more expensive.¹⁶ While brand owners have recently set ambitious commitments to source more recycled content, companies have set similar targets in the past only to make minimal progress.¹⁷ Mandates for beverage producers to use recovered materials, such as the EU’s requirement that PET bottles utilize 30% recycled content by 2030, will stabilize recycled commodity values, thereby incentivizing high-quality recycling.¹⁸

^{*} Refers to the permission from governmental authorities and more generally from the public at large to conduct business in a specific jurisdiction.

SYSTEM INTEGRITY

10. Centralized, non-profit administration and operations:

Deposit systems provide a platform for producers and retailers to responsibly manage the take-back and recycling of product packaging. Given there are typically hundreds of producers, importers, distributors and retailers operating in each market, if every regulated organization provides their own compliance service, overall system costs increase. High-performing systems address this by encouraging the beverage industry to centralize some common DRS responsibilities under a non-profit entity. This “Central System Administrator” (CSA) facilitates cross-industry problem solving and realization of cost efficiencies. Common responsibilities that a CSA manages include (among others) product registration, managing the deposit and fee “clearinghouse”, and establishing fraud-mitigation protocols*. But making sure redemption is easy for consumers (including the design of the redemption infrastructure and its management) is not left solely to the CSA, because of the potential for conflicts of interest. System design is designated in legislation in most programs as “return-to-retail” redemption or delegated

to an independent “network operator”, who is responsible for delivering certain pre-requisites such as a certain number of collection points per capita.

11. Government reporting and consumer communication:

Reporting keeps regulators and the public informed about the performance of the program, to measure progress towards goals. Education raises awareness among the public about how to participate in the deposit program, which improves the public’s confidence and the system’s integrity and performance.

12. Government enforcement:

While much of a high-performing DRS allows private-sector companies to implement and manage the system, government plays an important role as a regulator to maintain performance, arbitrate violations and maintain a competitive “level playing field”. Clear penalties that are higher than the cost of non-compliance reliably motivate stakeholders to comply, and also invest in making the system more efficient. Legislation also defines auditing protocols and the agency with enforcement authority.



THE UN CALLS FOR CONTAINER DEPOSIT SYSTEMS

As leaders grapple with the extent of the challenges ahead to address waste and transition to a circular economy, it’s evident the ambition of public policies will need to grow to meet the moment. Scientists estimate there is already more than 150 million tons of plastics in the ocean today¹⁹ and this is expected to triple by 2040 if no action is taken.²⁰ The UN is rising to the challenge. In 2017 the UN Environment Assembly passed a resolution encouraging members to adopt “innovative” approaches to marine pollution, like container deposit systems.²¹

As the world enters the sixth decade of deposit systems for one-way (non-refillable) containers, there are areas for improvement. No public policy can be established and expected to meet its objectives indefinitely. Changes in consumer products, packaging, inflation and innovation are encouraging system designers to consider “modernizing” traditional deposit return models. By moving ahead with a thoughtful approach – one based on the principles of Performance, Convenience, Producer Responsibility and System Integrity – more high-performing deposit return systems can become a reality.

* See “Clearinghouse” definition, pg. 65.