Driving Circularity in the Beverage Container Market through High Performance Recycling Policies

PREPARED BY:

RRS | recycle.com

COMMISSIONED BY:

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EXECUTIVE SUMMARY

Every year in the US, $5.1 billion in recyclable beverage containers — glass, metal, and plastic — are lost to litter, incinerators, and landfills.[1] High Performing Recycling Policies (HPRP) combine the best of Extended Producer Responsibility for Packaging and Paper Products (EPR for PPP) and Recycling Refunds (RR) programs for beverage containers. Many of the highest performing packaging recycling programs in the world combine EPR and RR and are achieving recovery and recycling rates up to 95%[2]. Pairing these two recycling programs allows for greater consumer convenience, higher quality recyclables, and an increased supply of recycled content. These programs have been proven to drive high capture and recycling of beverage containers, ensuring that they are reclaimed and recirculated in the economy, creating tremendous economic and environmental benefits. These include stronger domestic manufacturing and more resilient supply chains, decarbonization and greenhouse gas reductions, more convenient and effective recycling infrastructure, greater availability and quality of secondary commodities (i.e., recycled content), advanced circular infrastructure, and directing reclaimed materials to responsible end markets.

BENEFITS OF HIGH PERFORMING RECYCLING POLICIES (HPRP)

	**Increased supply of recycled materials:** High performing recycling policies can achieve **greater than 90% beverage container recycling rates.**
	**Faster and more efficient:** RR can **ramp up beverage container recycling rates quickly** while synergies with EPR programs **maximize material collection in the long run.**
	**Cost effective:** Synergies between the two programs **can result in the lowest per unit cost for material tons recovered.**
	**Increased quality of recycled materials:** RR programs are shown to deliver high quality material, **doubling or more than tripling supply suitable for container-to-container manufacturing** which directly enables more post-consumer recycled (PCR) content.
	**Enables decarbonization:** Enables **US manufacturers to reduce their energy use and** delivers **significant Scope 3 greenhouse gas emission reductions.**
	**Build strong regional supply chains**: Strong regional markets feeding domestic supply chains help to **mitigate exposure to geopolitical fluctuations, provide steady supply and create local jobs and economic growth.**
	**Fosters investments in education and infrastructure:** Provide the steady material supply and support needed to **encourage investment and educate consumers.**
	**Supports material circularity:** RR infrastructure **facilitates reverse distribution necessary to operationalize reuse.**
	**Enhance equity and wellbeing:** Promotes equitable participation to benefit all brands as well as shared community benefits such as **reduced litter, equitable access** and **economic development.**

[1] Reloop (2021). *By the Numbers: A National Beverage Container Program. Reloop.* Retrieved from https://www.reloopplatform.org/wp-content/uploads/2021/10/ByTheNumbersFactSheet.pdf

[2] Eunomia Research & Consulting. *(2023).* 50 States of Recycling 2.0: National key data policy insights. *Retrieved from https://www.ball.com/getmedia/134935d7-93bb-4491-a61c-4d1dc45bcc3b/50_States_of_Recycling_2_Summary-Deck_FINAL_2.pdf*

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INTRODUCTION

Consumers and governments are increasingly putting pressure on consumer-packaged goods (CPG) companies to sustainably manage resources, reduce waste, and decarbonize. Many brands have set ambitious sustainable packaging goals, but achieving these targets remains challenging without policy interventions. **High-Performance Recycling Systems (HPRS)** offer a powerful solution by integrating **Extended Producer Responsibility (EPR)**[3] for Packaging and Paper Products and **Recycling Refunds (RR)** to boost both the quantity and quality of recovered recyclables. Effectively designed HPRS offer complementary benefits to efficiently maximize recycling and recovery rates for both beverage containers and other consumer goods packaging.

Given the increasing policy momentum for Extended Producer Responsibility programs, this white paper provides essential insights for brands and policymakers on how HPRS can foster more resilient, efficient, and sustainable supply chains that support stronger domestic manufacturing and US competitiveness.

EXTENDED PRODUCER RESPONSIBILITY (EPR)

Definition of Terms	**Extended Producer Responsibility** Extended Producer Responsibility (EPR) is a policy approach and practice in which producers must take responsibility for management of the products and/or packaging they produce at end-of-use. A producer's responsibility may be financial, operational, or a combination of the two. In EPR for Packaging and Paper products, the producer is typically the brand. They commonly work through a producer responsibility organization to provide funding for convenient residential recycling programs.

Extended producer responsibility programs for packaging and paper products are broadly adopted in most of the industrialized world. The primary concept requires brands to provide funding for the operational, infrastructural, and educational costs of recycling. EPR programs have gained momentum in the US as a policy tool to improve recycling programs that lower cost to local governments and taxpayers, divert materials from disposal, incentivize more environmentally friendly product design choices, and increase domestic recycled content back into manufacturing. Five US states have adopted EPR for Packaging and Paper Products since 2021.

EPR programs as part of HPRS include the following key attributes:

Provide residents with easy access to recycling services, aiming to make recycling as convenient and widespread as trash collection.

Target investment into recycling infrastructure, including collection and logistics, material recovery facilities, and sorting and processing technologies to improve capacity and efficiency.

Inform the public about proper recycling practices and the importance of waste reduction to boost participation and improve the quality of recyclables collected.

Require producers and program operators to report activities, data, and progress against performance standards to ensure transparency, track waste management performance and ensure responsible materials processing.

[3]Throughout this paper the term Extended Producer Responsibility and the acronym EPR is used as shorthand for Extended Producer Responsibility for Packaging and Paper Products (EPR for PPP).

RECYCLING REFUND (RR) PROGRAMS

Definition of Terms	**Recycling Refunds** A Recycling Refund (RR) policy, also known as a Deposit Return System (DRS), container deposit law or bottle bill, is a policy that requires payment of a small consumer deposit (typically 5 to 10 cents per container) when purchasing a beverage. The deposit is refunded when the container is returned to a designated collection point for recycling, such as a redemption center, reverse vending machine, or retailer. Recycling Refunds are a type of Extended Producer Responsibility.

Recycling Refund (RR) programs have been widely used in the US since the 1970's and can cover beverage containers used in commercial and institutional settings, along with household beverages. RR programs are distinguished in their ability to drive higher quality and quantities of beverage containers for recycling. RR programs are effective at mitigating litter and are quick to scale and achieve peak recycling rates.

RR programs as part of HPRS include the following key attributes:

Cover a variety of beverage containers.

Incentivize container recycling by offering meaningful consumer refund (>=$0.10).

Allow beverage producers to operate and finance a centralized system.

Achieve maximum container return rates quickly.

Enable reinvestment of unredeemed deposits in the recycling system.

Create convenient consumer-driven return points beyond residential collection.

HIGH PERFORMING RECYCLING POLICY(HPRP)

Many of the highest performing packaging recycling programs in the world combine EPR and RR. Pairing these two recycling programs allows for greater consumer convenience, higher quality recyclables, and an increased supply of recycled content. A high level of coordination between EPR and RR systems through a common program operator (the Producer Responsibility Organization, or PRO), or coordinated system operators, maximizes convenience, program effectiveness, and cost efficiency. Importantly, HPRP's are structured to support the recycling of both beverage containers and other packaging in a mutually beneficial way, enhancing recycling rates and cost efficiency.

CURRENT SYSTEMS FALL SHORT TO DELIVER NEEDED PROGRESS ON PACKAGING

Lack of progress to meet decarbonization targets reflects the challenges of achieving the task at hand. Many major brands have committed to using post-consumer recycled (PCR) materials in their packaging as well as set targets related to end-of-use management including commitments to being recyclable, compostable,

biodegradable, or reusable (Figure 1). However, achieving these commitments has proven daunting, given the lack of availability and consistency in recycling programs – only about half of American households have automatic access to curbside recycling, and the programs vary widely in what materials they collect and how they are processed and prepared for market. Policy intervention and industry collaboration are required to make progress.

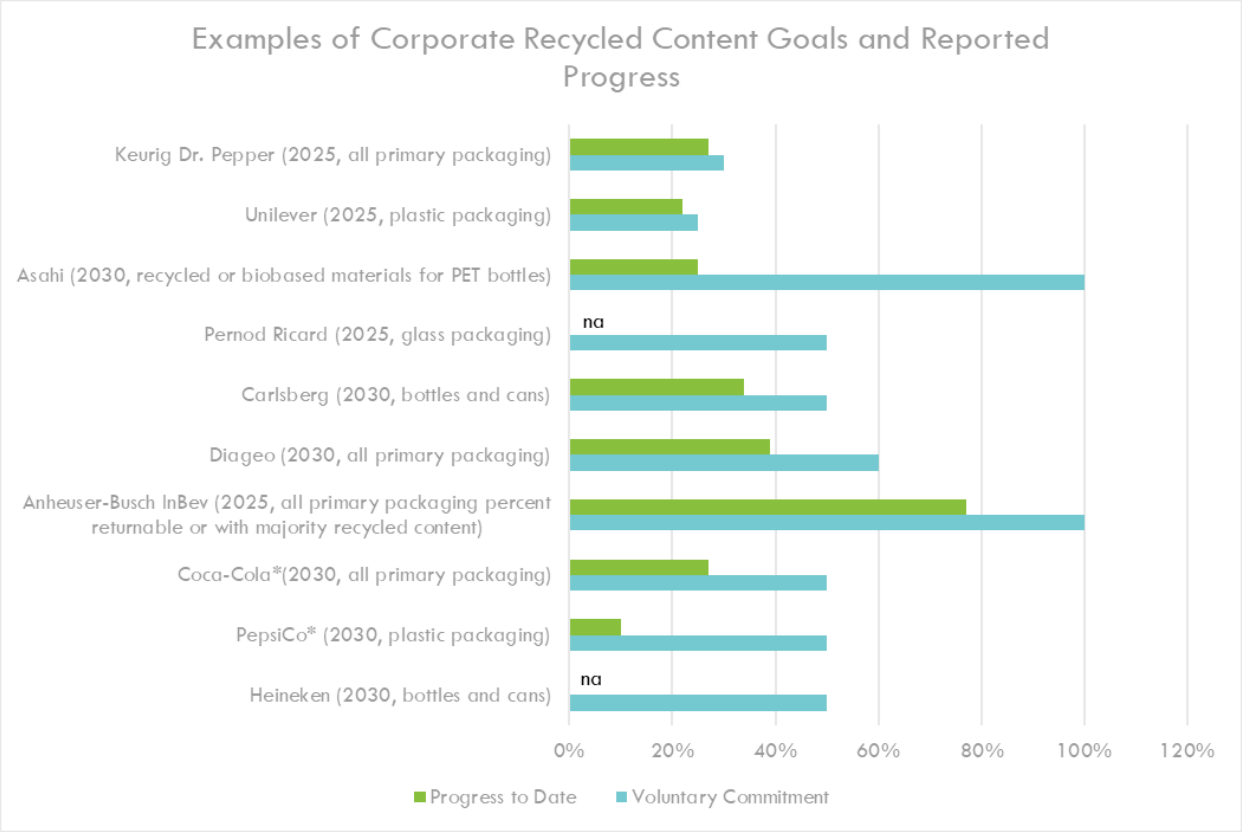

Figure 1: Examples of global corporate voluntary packaging commitments and progress reported (Brand (target year, materials effected))[4,5,6,7,8,9] *na= progress not available. *Commitments have been revised going forward. (Compiled by RRS)*

RECYCLED CONTENT AND DECARBONIZATION

Using recycled content to make a new beverage container is a key tool for the decarbonization of CPG company supply chains. Recycled content reduces the need for virgin material production, lowering lifecycle energy consumption and reducing greenhouse gas emissions more effectively than lightweighting or several other

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[4] Keurig Dr Pepper, (2023) *Corporate Responsibility Report,* Keurig-Dr-Pepper-Corporate-Responsibility-Report-2023.pdf

[5]Unilever, (accessed Nov 2024) We're aiming for greater impact with updated plastic goals | Unilever

[6]Just Drinks. *The Net-zero emissions pledges of the world's drinks Giants. (2024, October 8*). https://www.just-drinks.com/features/the-road-to-net-zero-the-emissions-targets-of-the-worlds-drinks-giants

[7] ABInBEv, 2022 Environmental, Social and Governance Report, (2023), assets/2e5c7fb020194c1a8ee80f743d0b923e/6ecda8873aa943709a7108a0d91e97d2

[8] The Coca Cola Company, *(2030), Environmental Update 2023,* The Coca-Cola Company 2023 Environmental Update; Rachel, M. (2024, Aug). *Coca-Cola 'on track' for packaging recyclability goal, 'behind plan' on recycled content target* Packaging Dive. Coca-Cola 'on track' for packaging recyclability goal, 'behind plan' on recycled content target | Packaging Dive

[9] *Pyzyk, K. (2024, June). (2024). PepsiCo anticipates missing 2025 sustainability goals, ESG report shows*. Packaging Dive. Retrieved from https://www.packagingdive.com/news/pepsico-anticipates-missing-2025-sustainability-goals-ESG-report/719441/

approaches.[10,11] This is especially relevant since packaging can account for up to 30% of a product's total lifecycle emissions.[12] Using more recycled content is essential to reaching manufacturing goals to reduce greenhouse gas emissions. For example, Ball Corporation, as part of their Climate Transition Plan, estimates 50% of their carbon reduction goals for 2030 will be achieved by increasing the use of recycled aluminum.[13] Due to the significant reductions in carbon emissions, the focus on incorporating higher percentages of recycled content is a critical component to helping solve reported shortfalls on decarbonization targets (Figure 2).[14,15]

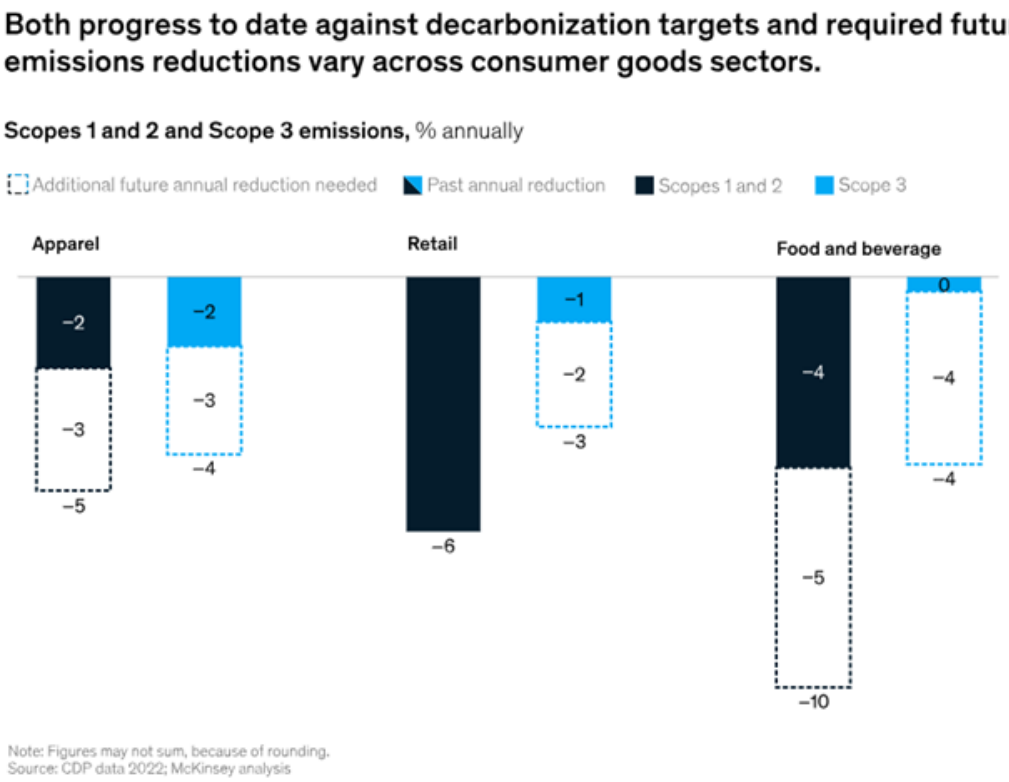

Figure 2: Corporate decarbonization targets (% annual reduction) for Scope 1 and 2 (dark blue) and Scope 3 (light blue) along with future required emissions reductions (%) by sector (dashed lines). (Source: McKinsey & Company)[16]

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[10] Valdre, P., & Hawkins, J. (2023, September). Scope 3 emissions are key to decarbonization – but what are they and how do we tackle them?, World Economic Forum. https://www.weforum.org/agenda/2023/09/scope-3-emissions-are-key-to-decarbonization-but-what-are-they-and-how-do-we-tackle-them/

[11] Weight reduction in packaging is often viewed as a sustainability strategy, but life cycle assessments (LCAs) by Sphera and Ball Corporation show it has minimal impact on reducing greenhouse gas emissions.
Comparative Life Cycle Assessment: North America. Ball Corporation. (2020, July). https://www.ball.com/getattachment/334d5de9-d11e-4e18-bf36-be278d9aac51/LCA-presentation-US.pdf

[12] Second to raw materials ;Rocha, G., Kirste, A., Dittmar, F., & De Asua, I. (2023, August). Achieving net zero in beverages. Kearney . https://www.kearney.com/documents/291362523/297594320/Achieving+net+zero+in+beverages.pdf/63a387e0-df17-84dd-d985-6271bab55fbf?t=1689015048000

[13] Ball Corporation. (2023). *Climate Transition Plan*. Retrieved from https://www.ball.com/getmedia/c40fe912-662a-4ce1-9cef-e1c3f96822a0/Ball-Climate-Transition-Plan-FINAL-March-2023.pdf

[14] Rocha, G. et. al. (2023, August)

[15] Valdre, P., & Hawkins, J. (2023, September).

[16] Bricheux, C., Gatzer, S., Lehr, J., & Ponbauer, L. (n.d.). *Most consumer companies are not on track to meet their decarbonization targets*. McKinsey & Company. https://www.mckinsey.com/capabilities/sustainability/our-insights/sustainability-blog/most-consumer-companies-are-not-on-track-to-meet-their-decarbonization-targets

CHALLENGES THAT HIGH PERFORMING RECYCLING POLICIES ADDRESS

SUPPLY OF RECYCLED MATERIALS LAG BEHIND REQUIRED DEMAND

Figure 3 shows how the current recycling rates are falling far short of 2030 industry recycling goals of 50% recycled content for PET packaging,[17] 70% for Aluminum beverage containers,[18] and 50% for glass packaging.[19] One of the biggest challenges is the lack of supply, meaning companies cannot access enough recycled containers because US recycling programs are not collecting enough containers. Causes includes inadequate infrastructure, limited consumer participation, challenging market dynamics, and a lack of coordination and cohesion among recycling programs. Ultimately, scaling infrastructure and closing the supply-demand gap requires policy to shift recycling market forces and create business incentives for the use of more recycled material in packaging products. The best policy pathway to generate this needed supply is through HPRP systems. Modeling by RRS estimates that high performing recycling policies can generate more than enough supply to meet industry targets.[20]

[17] NAPCOR, (2023),*2022 PET Recycling Report*
[18] CMI, (2021) Aluminum *Beverage Can: Recycling Primer and Roadmap*, Recycling Rate Roadmap.ai
[19] GPI, *A Circular Future for Glass*, A Circular Future of Glass | US Glass Recycling Target Goals | GPI
[20] Based upon HPRP RR redemption rates for PET (87%), Aluminum (89%) and Glass (78%) with an additional 5-7% of beverage containers captured via expanded EPR.

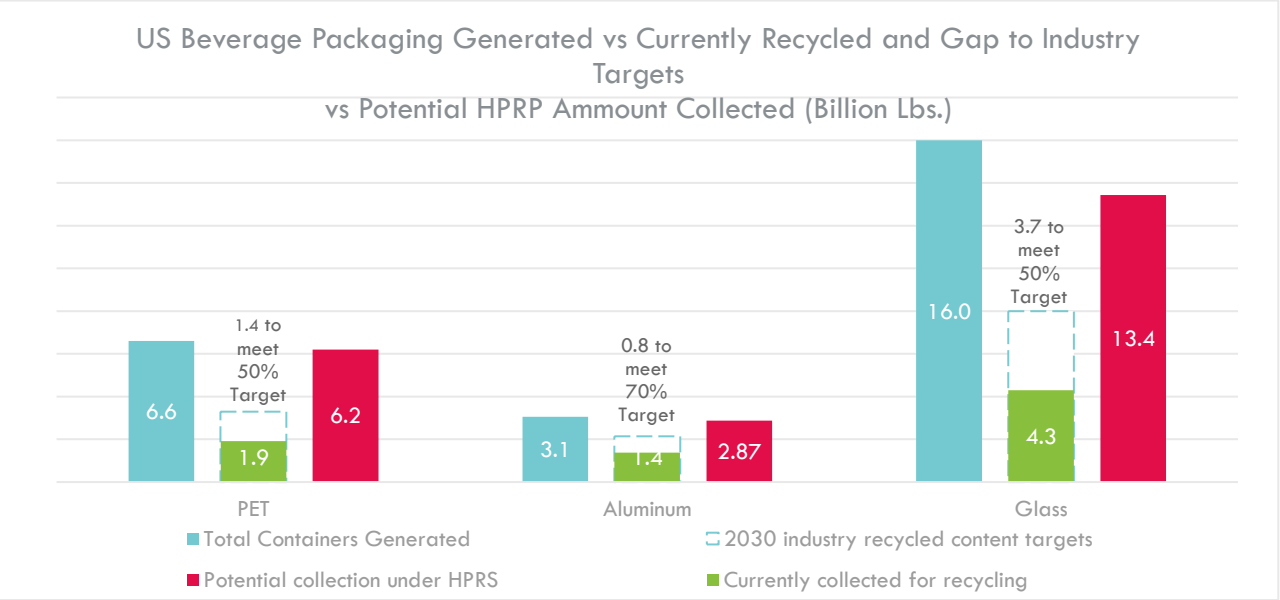

Figure 3: US Beverage packaging Generated. (Blue Bar) and Currently Collected (Green Bar). [21,22] [23] *Quantity Required to Reach 2030 Industry Targets*[17,18,19] *(Dashed) and Potential Material Collected/Redeemed under HPRP (Red Bar) for PET, Aluminum, and Glass Packaging.*[24] *(Source: RRS)*

ECONOMIC FORCES DO NOT ALWAYS FAVOR RECYCLING

Today's market forces and heavy subsidization of virgin raw materials extraction can create dynamics that make it difficult for recycled materials to compete. Overall, the economics of recycling are challenged by limited supply and high and relatively fixed collection, sorting, and processing costs. Fluctuating commodity prices and limited recycling infrastructure strain profitability, while transportation costs and the need for consumer and industry participation add to the challenges. These factors can make it hard for recycling operations to achieve economies of scale or financial sustainability without policy support or incentives.

RR programs provide a financial incentive for recycling and promote segregated streams to facilitate higher quality recycled commodities. Combining these policies with high performing EPR programs provides resources to expand access to recycling, to get more material into the recycling system, and to improve sorting and processing.

MATERIAL-SPECIFIC CHALLENGES

Brands seek to balance various lifecycle tradeoffs when selecting packaging materials including costs functionality, environmental performance, and consumer acceptance. Similarly different substrates and product applications present unique challenges as they move through the recycling system, requiring tailored approaches for effective recovery and reuse.

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[21] NAPCOR (2023) *2022 PET Recycling Report.*
[22] CMI, *The Aluminum Can Advantage: Sustainability Key Performance Indicators*, (2021, November), KPI_Report_Nov2021
[23] *The Recycling Partnership (2024, January) State of Recycling, The Present and Future of Residential Recycling in the U.S.* The Recycling Partnership. (2024, January). https://recyclingpartnership.org/wp-content/uploads/2024/01/SORR-ByTheNumbers-1.31.24.pdf
[24] RRS modeling of HPRP recycling/redemption. RR policy mature program redemption target of greater than 85% aggregated for all material plus additional beverage containers collected via EPR.

Current Recycling Rates. The recycling rate for aluminum beverage cans in the U.S. has hovered around 45% for the past 15-20 years, falling short of high-performance recycling system targets and global leaders like Brazil and Germany, with near 100% recycling rates. Much of the current recycling rate can be attributed to RR programs which account for two thirds of the beverage containers recycled in a closed loop in the US despite representing less than 30% of the population.[25] As consumer preference shifts toward aluminum for a variety of beverage types, demand for aluminum cans and recycled aluminum inputs is expected to grow, further straining recycled material supply chain.[26]

Sourcing and Supply Chain Constraints. Recycled aluminum supply constraints are caused by insufficient collection infrastructure and exacerbated by mis-sorting at material recovery facilities (MRFs), which can reduce yield of used beverage can (UBC) bales. Gaps in supply are being filled by imported virgin aluminum, creating dependencies that can affect national security and market stability. With U.S. primary aluminum production capacity limited, the best way for the U.S. to mitigate some of the costs and challenges of the global commodity market is to source more scrap domestically through increasing recycling rates thereby reducing reliance on virgin raw material and imported scrap aluminum.

Scrap aluminum sells at a discount to virgin aluminum, where the spread refers to the price of scrap as a percentage of the price of virgin. For UBCs, more scrap supply results in more cost-effective inputs to make new can sheet with the lack of scrap supply made up with virgin aluminum. This follows the expected economic model of increasing supply affecting a decrease in cost. As shown in Figure 4, as the supply of UBC increases the cost of scrap UBC relative to virgin decreases.

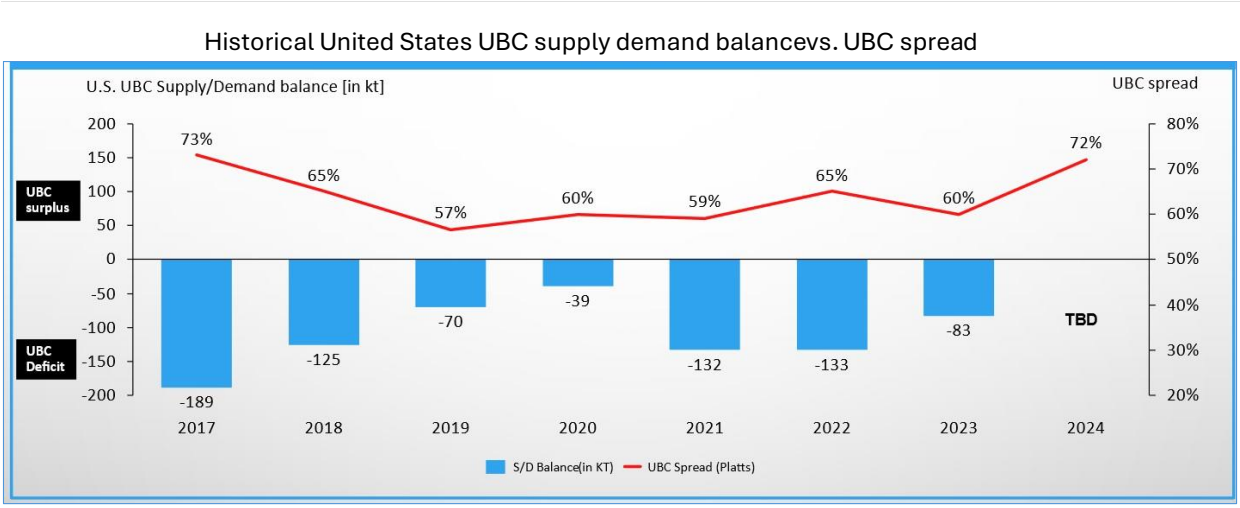

Figure 4: UBC surplus/deficit (supply-demand) in kilotons versus UBC spread (UBC cost as a percentage of virgin Aluminum cost). (Source: Aluminum Association, 2024). [27]

[25] *Eunomia,* 50 States of Recycling 2.0: National key data policy insights
[26] The Aluminum Association, (2024, October), *Domestic Aluminum Demand Up 5.2% Through first half of 2024,* Domestic Aluminum Demand Up 5.2% Through First Half of 2024 | The Aluminum Association
[27] Provided by the Aluminum Association. UBC supply spread taken from Platt's public data. US UBC consumption (demand) and US UBC supply public data tracked by the Aluminum Association.

Opportunities for Improvement. The well-established can-to-can recycling loop in the U.S. offers a foundation for improvement. Achieving higher recycling rates will require expanding collection networks and segregating high-grade UBC from other aluminum streams less suitable for recycling into new beverage cans, which can be most efficiently achieved through high performing recycling policy.

PET PLASTIC

Current Recycling Rates. U.S. postconsumer recycling rates for PET bottles and jars was 29% in 2023 and has hovered around 30% for the past decade. Recycling Refund systems (RR) are partly responsible for the relative success of the PET bottle and jars recycling rate, compared to other plastic packaging recycling rates, which average 13%. Over 50% of the rPET in the US & Canada is used in Food and Beverage bottles.[28]

Sourcing and Supply Chain Constraints. The U.S. rPET market faces supply constraints due to insufficient collection infrastructure, lack of widespread refund programs, lightweighting, and contamination from curbside recycling, which lowers the quality of recycled PET available for food-grade applications. Competition from low-cost virgin PET and growing imports of cheaper rPET from Latin America and Asia, make it difficult for domestic rPET to gain market share.

Opportunities for Improvement. PET beverage containers collected via an RR network can maintain food grade quality with minimal contamination. PET reclaimers report higher yields of usable rPET from recycling refund bales as compared to curbside bales. The higher value of RR PET bales is recognized in the marketplace with a price premium.[29]

GLASS

Current Recycling Rates. Recycling rates for glass are currently around 31% and have been stable over the past several years[30] whereas some European countries have achieved up to 70-90% recovery and recycling rates due to more efficient collection and RR programs.[31] In the US, beverage container recovery and recycling rates are usually 5-10 % higher than overall glass rates due to the substantially higher recycling rates in ten existing state beverage container deposit return systems[32].

Sourcing and Supply Chain Constraints. Glass recycling's sourcing and supply chain constraints impact market viability. Some communities have eliminated curbside glass recycling due to broader recycling commodity market issues (such as China National Sword initiatives) and high transportation costs, opting instead for more limited drop-off or subscription models. MRF contamination impacts whether glass can be used for bottle production, which requires high-quality cullet, or for lower-grade applications, which can tolerate more impurities. Although in many

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[28] NAPCOR, 2022 PET Recycling Report.
[29] Closed Loop Partners (2017), *Cleaning the rPET Stream: How we scale post-consumer recycled PET in the US.* https://www.closedlooppartners.com/wp-content/uploads/2020/02/CLP-RPET-Report_Public-FINAL.pdf
[30] US Environmental Protection Agency. *Glass: Material-Specific Data*. EPA. https://www.epa.gov/facts-and-figures-about-materials-waste-and-recycling/glass-material-specific-data#:~:text=EPA%20combined%20data%20from%20the,recycling%20rate%20of%2031.3%20percent
[31] Sensoneo. (2024, August). *Overview and results of the deposit return schemes in Europe*. Retrieved from https://sensoneo.com/waste-library/deposit-return-schemes-overview-europe/#:~:text=Foto:%20Eesti%20Pandipakend-,Slovakia,in%20Slovakia%20is%20already%2093%25
[32] Information provided by Glass Packaging Institute (GPI)

regions, cullet can be up to 20% cheaper than virgin glass, cullet prices are highly dependent upon regional factors (e.g. transportation, contamination levels, processing efficiency, etc.). Competition from virgin cullet can further complicate market dynamics in some areas.

Opportunities for Improvement. RR programs are particularly effective at producing high-quality recycled glass, or cullet, with contamination rates much lower than MRFs. Diverting glass to the RR network not only enables a higher quality cullet stream but it also improves MRF efficiency by limiting glass contamination in other recyclables (like paper, plastics, and aluminum) and reducing wear and tear on equipment. EPR supports investment in glass clean up equipment to improve yield and increase processing capacity. EPR also promotes steady supply to incentivize increased processing capacity.

Together EPR and RR promote robust supply chain development and partnerships to optimize collection, sorting, and processing systems tailored to material streams to maximize both the quantity and quality of the materials recycled.

HIGH PERFORMING RECYCLING POLICIES PROVIDE A COMPREHENSIVE SOLUTION

HPRP DRIVES HIGHER RETURNS

By providing inclusive and overarching access through EPR and seizing the demonstrated performance capability of beverage container RR, HPRP recover more beverage containers for recycling. Eunomia's analysis stated that HPRP could increase national beverage container recovery/recycling rates up to 95% from the current rate of 27%.[33]

Current EPR programs in states where it has been adopted are projected to raise recycling rates from around 34% to 69%.[34] Drivers of the strong recycling rates for high performing EPR programs include: (1) universal residential access, which provides recycling service at a convenience level equal to waste removal even in low population areas; (2) an expanded list of materials collected, which drive MRFs to maximize recovery of materials that may be underperforming today (like non-UBC aluminum and PET thermoforms); and (3) education and outreach to reduce contamination and build consumer confidence.

RR programs provide many of the same benefits as EPR with additional benefits related specifically to beverage containers. RR programs are highly effective at reclaiming beverage containers for recycling. Data compiled by CRI comparing recycling rates for beverage containers sold with a refund versus those not sold with refunds show greater than a 2-3X increase in recycling rates[35] (Figure 5). High performing RR programs are expected to achieve greater than 85% redemption rates because of meaningful refund values (e.g. ten cents or greater) and comprehensive coverage of beverages container types. RR programs also expand access beyond residential collection to capture more commercial and away from home containers.

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[33] Eunomia, 50 States of Recycling 2.0: National key data policy insights
[34] *The Recycling Partnership, State of Recycling, The Present and Future of Residential Recycling in the U.S.*
[35] Container Recycling Institute, U.S. Nominal Recycling Rates by Deposit Status, 2019

HPRP combines the meaningful incentive, additional reach and effectiveness RR for beverage containers with the expanded material coverage and curbside convenience of EPR programs. This combination provides synergistic efficiencies and bolsters progress towards closing the supply/demand gap for recycled material. It helps achieve the recycled content commitments put forward by the beverage industry, build the steady supply required to increase strong circular markets for beverage containers, and provides the additional material streams to keep MRFs operating efficiently in the face of reduced beverage container tonnage, with the potential to optimize costs.

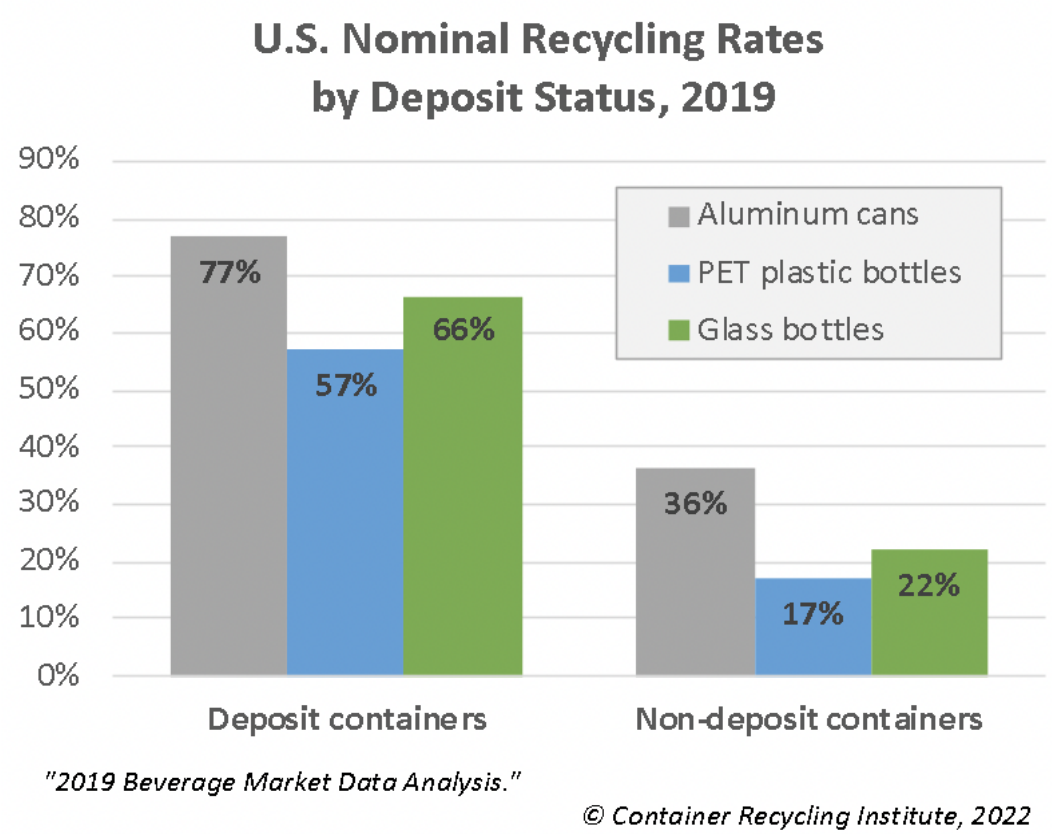

Figure 5: U.S, Recycling rates for beverage containers covered by deposit refund vs those without deposit refund (Source: CRI)[36]

HPRP CAN BE FASTER

HPRP delivers a robust solution faster. Packaging EPR programs can require 5-10 years to achieve peak recycling rates of 50-65%. Well-designed RR programs for beverage containers can reach higher rates in a shorter amount of time (typically 2-3 years after legislation enactment), achieving greater than 90% recycling of beverage containers by year 7.[37]

HPRP CAN BE CHEAPER

[36] Provided by the Container Recycling Institute.
[37] Eunomia, 50 States of Recycling 2.0: National key data policy insights

HPRP can also result in lower system costs through complementarity and increased efficiency. For example, modeling done by RRS for the Coalition for High Performance Recycling (CHPR) of one EPR program fee setting methodology applied to the State of Washington demonstrated that a well-coordinated HPRP (EPR+RR Coordinated) had the potential to deliver lower system operating costs per ton of beverages collected than either EPR or RR alone and potentially significantly reduce the fees paid by beverage producers per ton of containers recovered (Figure 6).[38]

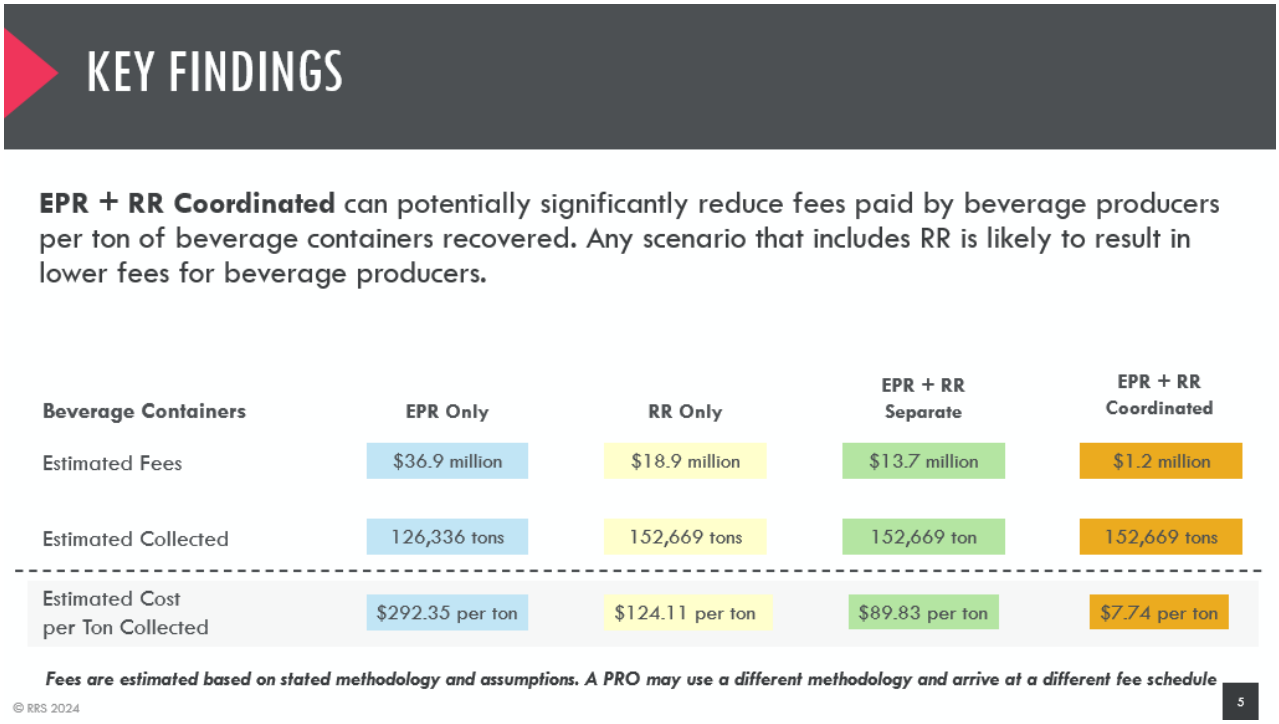

Figure 6: Summary of results for beverage collection under EPR only, RR only and combined EPR and RR with separate and coordinated PROs based upon modeling of Washington State and methodology to assumptions developed with CHPR (source: RRS).

High performing RR programs efficiently reclaim high-quality beverage containers benefiting from focused material streams and avoiding the curbside collection costs. Combining EPR with RR supports MRF stability by increasing overall material volumes and encouraging investments to boost efficiency.

Well-designed, coordinated EPR and RR can also provide operational synergies that are key to helping reduce overall program costs. For example, beverage redemption centers can serve as collection points for materials that are not conducive to curbside collection (e.g., flexible films, expanded polystyrene (EPS) and bulky rigid packaging) enhancing collection efficiency and consumer convenience. HPRP facilitate the coordination of all the players in the supply chain, from residents and municipalities to collectors and processors, to end users and brands. Coordinating recycling efforts under a common producer responsibility organization (PRO) or highly coordinated PROs can further improve program efficiency and effectiveness, reducing administration costs. In the analysis

[38] RRS estimated net system cost using the best available data on RR and residential recycling programs, using Washington specific information where possible. RRS calculated program fees using a methodology developed in consultation with their client. A PRO may use a different methodology and arrive at a different fee schedule.

conducted by RRS for CHPR based on the state of Washington this synergy could save up to 42.3 million per year of total net system costs.

HPRP INCREASES THE QUALITY OF RECLAIMED MATERIAL SUPPLY

One of the greatest advantages that HPRP enables to US manufacturers and recyclers is the higher quality of the recycled materials and increased potential for closed-loop container-to-container recycling. HPRP are estimated to increase the amount of beverage containers recycled into new beverage containers from 13% to 77%.[39]

Under RR programs, beverage containers are collected separately from other recyclables, which lowers the amount of contamination that must be removed in the recycling process. Source separation by the user facilitates lower contamination rates for RR programs enabling recycled aluminum, PET, and glass suitable for use in food and beverage containers. This is critical to building and supporting strong container-to-container supply chains. This is supported by data which shows that the10 states with RR programs are responsible for 66% of all beverage containers that are recycled into beverage containers nationally[40].

Greater quantities of recycled material from high performing EPR also enables segregation of material into higher and lower grade commodity streams to match quality to end use.

Building robust container-to-container supply chains and fostering markets for lower-grade materials are essential for advancing a circular economy and increasing the utilization of recycled materials.

HPRP REDUCES PACKAGING RELATED SCOPE 3 GHG EMISSIONS

The increased quantity of recycled material and development of circular container-to-container loops maximizes Scope 3 GHG savings and reduces dependency on virgin raw materials. Achieving the recycling and reclamation targets possible with HPRP can provide an additional 11 million MTCO2e in Scope 3 reductions (Figure 7), that's equivalent to the GHG emissions from powering 1.4 million US homes.

[39] Eunomia, 50 States of Recycling 2.0: National key data policy insights
[40] Eunomia (2023), 50 States of Recycling, A State-by-State Assessment of US Packaging Recycling Rates, retrieved from 50-STATES_2023-V14.pdf

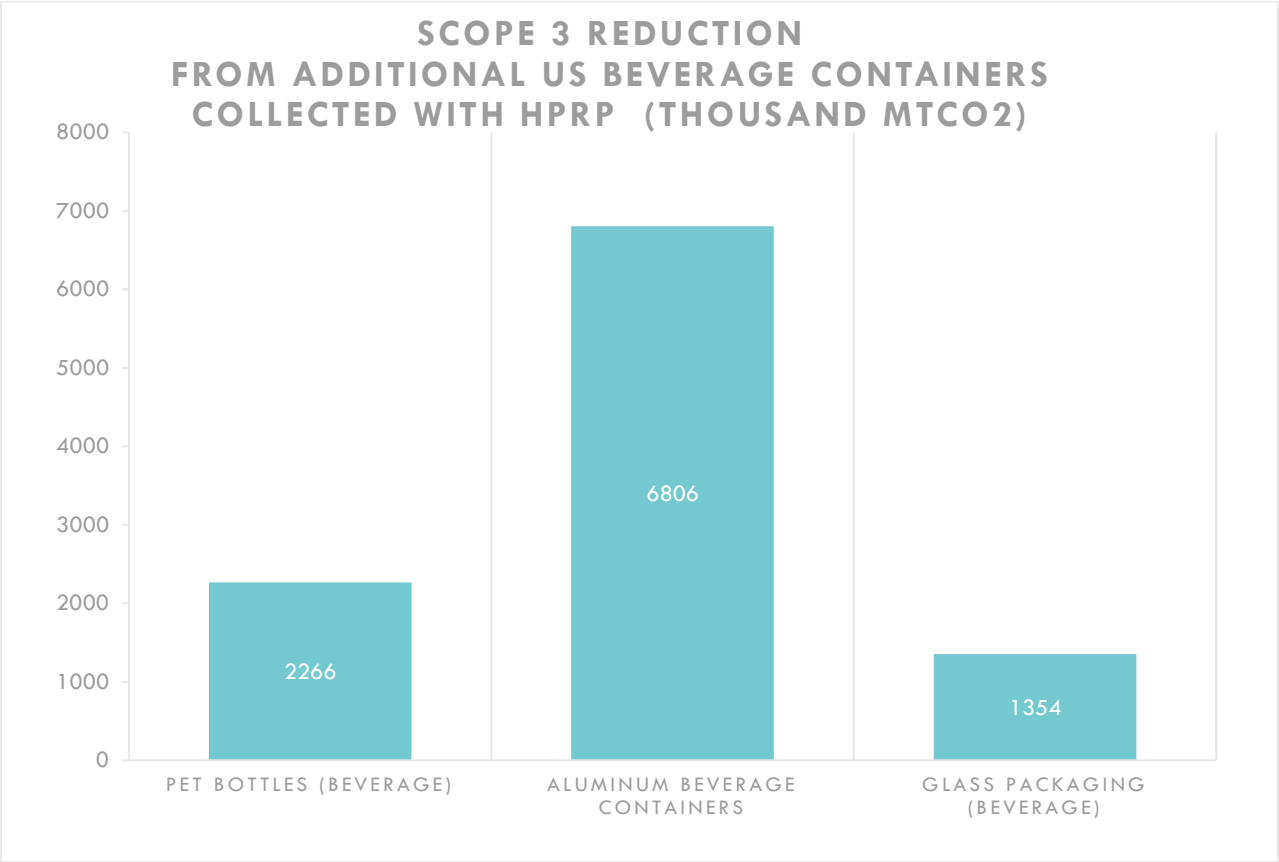

Figure 7: Greenhouse Gas benefit of recycling additional US beverage contains collected with national High Performing Recycling Policies. (Source: RRS)[41]

HPRP BUILDS RESILIENT, LOCAL, SUPPLY CHAINS

Strong regional markets for recycled materials generate additional material to feed domestic supply chains. The recycling facilities and collection networks to support HPRP deliver economic value to communities by creating local jobs and economic growth. HPRP have the potential to increase recycling related jobs by nearly 2.5X, adding an additional 266,000 local circular economy jobs[42].

HPRP also enable stability and risk reduction for firms. Local supply reduces exposure to geopolitical fluctuations and increases self-sufficiency and resiliency. HPRP frameworks reduce long-term risks related to shifting regulatory landscapes and growing consumer demand for sustainable products. Shared accountability through HPRP fosters industry-wide collaboration, further mitigating financial and operational risks while driving innovation in packaging design and recycling infrastructure

[41] RRS calculation using U.S. Environmental Protection Agency. "Waste Reduction Model (WARM)." Available at: https://www.epa.gov/warm- based on high performing RR reclamation targets (87% for PET beverage containers, 89% for Aluminum beverage containers and 78% for glass containers) plus an additional 5-7% captured through the MRF.
[42] Eunomia, 50 States of Recycling 2.0: National Key Data Policy Insight, PowerPoint Presentation

HPRP FOSTERS INFRASTRUCTURE IMPROVEMENTS

High performing EPR programs invest in consumer education which boosts overall participation and reduces contamination in recycling. High performing EPR also incentivizes companies to invest in collection, sorting, and end-market infrastructure to meet performance recycling requirements. Lost beverage container material due to mis-sorting at MRFs reduces material reclaimed. It is estimated that only 85% of the recyclable material received by MRFs result in outbound commodities, whereas processing and sortation in an optimal MRF system are expected to achieve 95%.[43] Investment in sorting infrastructure can reduce losses and increase MRF efficiency and profitability.

Diversion of certain RR materials can also reduce MRF contamination rates because beverage containers are largely self-segregated by the consumer for refund return and never enter the MRF, while greater overall material volumes through high performing EPR policy still enable economies of scale. Beyond collection and sorting, a steady material supply enables the development of strong end markets which in turn feeds further investment, creating a positive feedback loop to build out robust supply chains.

HPRP SUPPORTS MATERIAL CIRCULARITY AND THE DEVELOPMENT OF PACKAGING REUSE

Consumers, governments, and consumer brands are increasingly setting targets to use more refillable and reusable packaging.

Another advantage of recycling networks built through HPRS is their ability to support the growth of reusable and refillable packaging. While reuse programs retain more material value by extending product lifecycles, they face significant challenges, including the need for new infrastructure such as collection points and reverse logistics. Reverse logistics are already a key component of RR systems, offering an opportunity to share infrastructure. When combined EPR and RR recycling networks are in place, companies can achieve cost savings and accelerate the scale-up of reuse systems by leveraging logistics and collection frameworks.

HPRP BENEFITS BUSINESSES AND COMMUNITIES

HPRP provide significant benefits to consumers and communities by reducing litter which lowers cleanup costs for municipalities and promotes cleaner public places. By providing access to recycling at no cost, HPRP fosters equity. Additionally, the development of circular infrastructure through these programs stimulates economic growth by creating green jobs in collection, sorting, and recycling industries.

Communities and consumers benefit from reduced litter lowering cleanup costs to municipalities. Access to free recycling services increases equity. More green jobs from circular infrastructure and economic development present employment opportunities.

CONCLUSION

High Performance Recycling Systems have the potential to yield an optimally performing system along the fastest implementation timeline. HPRS creates a stable system with reinforcing feedback loops, achieving high recycling rates for packaging material. The investments and market conditions that HPRS enable drive the development of

[43] The Recycling Partnership. (2024). *SORR Methodology*. https://recyclingpartnership.org/wp-content/uploads/dlm_uploads/2024/05/SORR_Methodology-1-1.pdf.

container-to-container supply chains that are critical to meeting corporate recycling and recycled content commitments. Recycled content and the benefits of circularity are fundamental to achieving Scope 3 emission targets which are central to achieving consumer goods company GHG reduction commitments.