COMING FULL CIRCLE

The Past and Proposed Future Impact of Recycling-Refunds on Reducing Mismanaged Solid Waste in the 21st Century. A Research and Policy Report Prepared by Clean Virginia Waterways.

CLEAN VIRGINIA WATERWAYS

Coming Full Circle:

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Acknowledgements

Funding for this literature review was provided by the Virginia Coastal Zone Management Program through Grant# NA23NOS4190255 (FY 23 Task 93) of the National Oceanic and Atmospheric Administration (NOAA), Office of Coastal Management, under the Coastal Zone Management Act of 1972, as amended.

The authors sincerely appreciate Rachel Schwind's valuable contributions to the research, drafting, and overall development of this report.









For reference purposes, this document can be cited as

Huntington, Z. & Register, K. (2025). Coming Full Circle: The Past and Proposed Future of Recycling-Refunds on Reducing Mismanaged Solid Waste in the 21st Century. A Research and Policy Report Prepared by Clean Virginia Waterways.

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About Clean Virginia Waterways

Founded in 1995, Clean Virginia Waterways (CVW) is dedicated to decreasing plastic pollution, litter and marine debris through research, cleanup events, building collaborations, and advocating for effective public policies. CVW is affiliated with the Ocean Conservancy in Washington D.C. CVW is a fiscally sponsored program of United Charitable, a 501(c)3 non-profit organization. CVW is funded through grants, gifts, sponsorships, and workshop fees.

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Publication design by Ampersand Design Co., Richmond, Virginia • ampersandva.com

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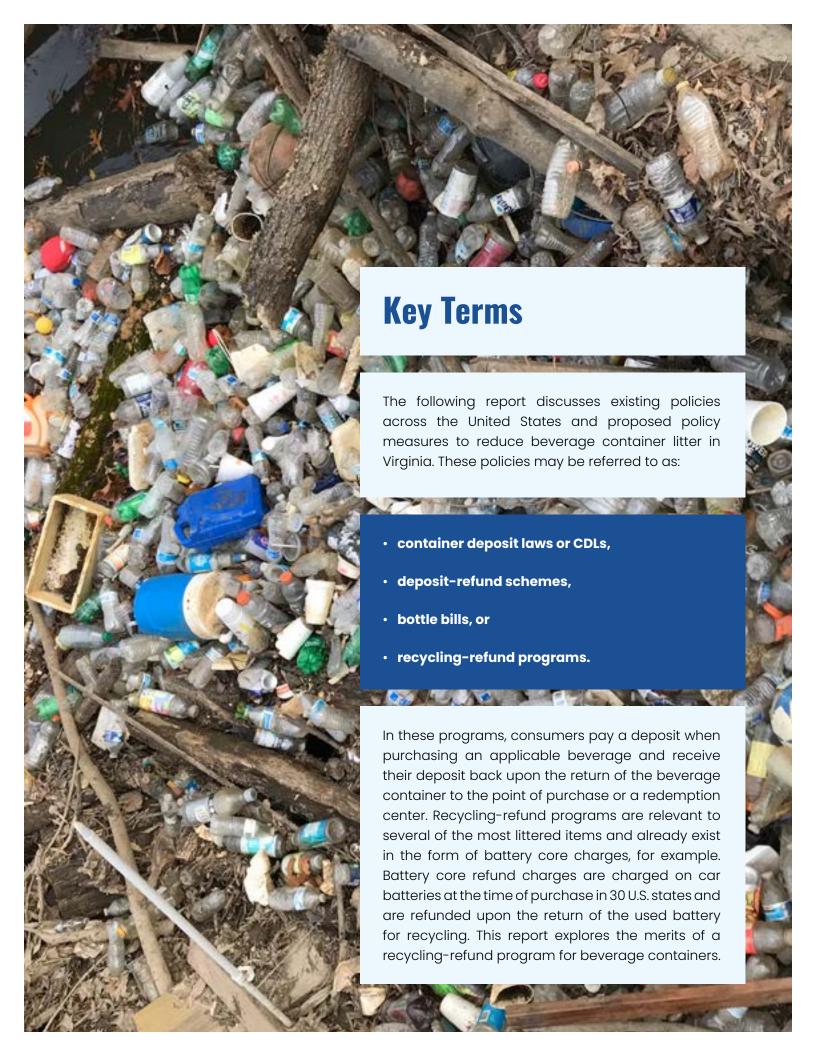
This report analyzes existing beverage container recycling-refund programs across the United States and provides recommendations based on best practices from established programs in the United States.

Beverage container recycling-refund programs are market-based solutions to decreasing pollution from litter while increasing recycling. This research examines the merits, successes, and past failures of recycling-refund programs to generate awareness about these programs and identifies how one may be relevant to the state of Virginia, especially in such a pivotal time in which beverage-related litter is a growing issue across the state.

This problem is compounded by the fact that the petrochemical industry is committed to increasing virgin plastic production to protect profits as the need for fossil fuel-based energy decreases. Taxpayers are supporting expanded plastic production in the United States. During the last ten years, over 60% of the 50 constructed or enlarged plastic production facilities analyzed

in a study by the Environmental Integrity Project have been provided tax breaks and subsidies to the tune of almost \$9 billion . This same playbook is used in Virginia. Since 2020, new plastic production facilities in the Commonwealth have received at least \$1.3 million from taxpayer supported funding sources, according to Virginia government records.

Currently, taxpayers responsible are the expenses associated with waste from packaging including glass, plastic bottles, and aluminum cans. Beverage container recyclingrefund programs can transfer expenses onto the producers and reduce the financial burden faced by taxpayers and localities pullout quote. This report reviews existing literature, and analyzes current programs and litter data, as well as previously proposed legislation in Virginia. In addition, a recent statewide survey of voters is reviewed, and their support for public policies to reduce litter-including enactment of a recycling-refund program in Virginia for beverage containers.



Key Findings



Reduce litter: Recycling-refund programs associated with beverage containers (plastic and glass bottles, as well as aluminum cans) are effective at reducing litter. This is shown through comparisons of litter data between states with recycling-refund programs and states without them. In states with recycling-refund programs, excluding lowa and Vermont, beverage containers make up an average of 6.29 percent of litter. In states highlighted in this study without recycling-refund programs, beverage containers make up an average of 14.89 percent of litter. Most importantly, however, in Virginia 16.78 percent of litter came from plastic bottles, glass bottles, and beverage cans in 2022. Therefore, reducing this category of litter is attainable using a market-based policy approach.



Increase recycling: Deposits on frequently littered items provide an economic incentive for people to return containers for recycling, and provides recycling companies a consistent, predictable, clean, and ongoing "input" for their business. Increasing recycling also provides more post-consumer material for manufacturers so they can meet their goals of increasing recycled materials in their products.



Job creation: There is evidence that recycling-refund programs are effective at creating jobs for communities. Michigan has seen upwards of 5000 new jobs as a result of the recycling-refund program thanks to the accompanying infrastructure and logistics required to run the program.



Positive impacts on climate: Recycling-refund programs are useful in reducing energy use and greenhouse gas emissions. Primarily, these programs promote the reuse of plastic, aluminum, and glass. The program provides a reliable source of scrap material, or post-consumer resin (PCR) for producers to use in the production of new goods.



Decrease burdens on local governments and taxpayers: Recycling-refund programs provide a new, effective, and organized waste stream for beverage containers, which are highly consumed and frequently littered. This new waste stream reduces burdens on local governments and taxpayers by decreasing the amount of solid waste going to landfills. Alleviating masses of beverage containers allows for better functioning of landfills, focusing on materials that have no other option than going to a landfill. It is important to note that recycling-refund programs place more of the economic burden of beverage container litter on consumers of these products, rather than taxpayers who are forced to clean litter up after the fact.

This report details that recycling-refund programs are effective at reducing litter, increasing recycling, creating jobs, decreasing burdens on taxpayers, and creating positive and necessary change for our warming climate. The following recommendations would enable Virginia to have one of the most effective recycling-refund programs in the United States. The recommendations are based on the evidence described in the detailed report below.

Recommendations

- Comprehensive Coverage of Container Types and Sizes: Include a wide range of every beverage container type, such as glass bottles, plastic bottles, aluminum cans, cartons, and nips. Include bottled water, with exceptions during a state of emergency. Drink pouches and juice boxes whether made from glass, plastic, cardboard, paper, or metal. Covering various materials ensures a significant reduction in litter and promotes recycling across different types of beverages. Large beverage containers including, but not limited to, 2-liter bottles and jeroboam wine bottles.
- **Deposit Amount:** Set a substantial deposit amount that incentivizes consumers to return containers for recycling. A 15-cent refundable deposit on plastic beverage containers because plastic is more difficult to recycle and are especially harmful in the environment. A 10-cent refundable deposit on metal and glass beverage containers. Higher deposit amounts lead to increased participation rates.
- **Convenience:** Establish a convenient redemption system with an extensive network of collection points using bottle drop stations, point of sale return options, reverse vending machines and other new technology to make the system convenient for consumers. Accessibility plays a crucial role in encouraging consumers to return their containers. There should be a beverage container drop-off locations for every 355-1600 residents depending on population density.
- **Consumer Awareness:** Launch a comprehensive public awareness campaign to inform consumers about the benefits of recycling and the deposit refund process. Education initiatives can increase participation rates and reduce contamination in the recycling stream.
- **Integration with Existing Systems:** Coordinate the container deposit system with existing recycling programs to streamline collection and processing efforts. Integration minimizes operational costs and maximizes resource efficiency.
- Continuous Evaluation and Adjustment: Regularly evaluate the effectiveness of the legislation through data collection and analysis. Adjust the deposit amount, collection infrastructure, and outreach strategies based on performance metrics and stakeholder feedback.
- **Collaboration with Stakeholders:** Foster collaboration between government agencies, industry stakeholders, environmental organizations, and community groups to ensure the successful implementation and continuous improvement of the legislation.

Regulatory Framework

 Beverage Container Stewardship Organization: This organization would represent all beverage producing industries that operate in Virginia. A Virginia government agency will provide significant oversight, including approving stewardship plans and annual reports. This organization would be responsible for setting the programs' convenience standards and handling fees for redemption points. An Advisory Council of stakeholders including beverage producers, nonprofit organizations, the recyclingindustry, local government representatives, and state government representatives would advise the government agency and the Beverage Container Stewardship Organization on plan approval, implementation, and performance. The program would be self-financing from fees paid by producers, revenue from the sale of raw materials, a portion of unclaimed deposits, and penalties.



- **Startup costs:** Initial funding for this program should be the responsibility of beverage producers and distributors and not passed onto Virginia's taxpayers
- Open Transparency: The performance metrics should be publicly available. These metrics should include how many containers of each material type have been collected, revenue generated from collection, the location where the containers were collected, and where collected containers are sent for recycling or downcycling.

• **Unclaimed Deposits:** Unclaimed deposits should fund this program with excess (or no less than 10%) earmarked for the Virginia Litter Control and Recycling Fund.



- Rural Support: Revenue generated in high population regions of Virginia should be used to support necessary infrastructure in rural and low population centers to create an equitable and economically sustainable Program.
- Material Recovery Facility (MRF) Support: A portion of beverage container scrap revenue should be shared with MRFs to help mitigate the loss in revenue at MRFs as a result of fewer beverage containers being processed at the facilities.
- **Guardrails:** Plastic beverage containers returned by consumers cannot be used for plastic to fossil fuel, fossil fuel additive, or fossil fuel substitutes. This process, known as advanced recycling, is a false solution promoted by the petrochemical industry and has been proven to be environmentally damaging, economically unsustainable, and dependent on taxpayer funding support.

1. Litter is mismanaged solid waste

Litter is mismanaged and escaped solid waste which are becoming increasingly difficult problems to control especially as plastic production and single-use packaging continue to increase. Fossil fuel industry financial growth is dependent on increased plastic production as demand for fossil fuels as energy declines, causing plastic production to accelerate (Figure 1). The UN Environmental Programme projections suggest that by 2050 plastic production will be greater than 1100 million metric tonnes, up from more than 413.8 million metric tonnes (Figure 2) in 2023.

"The UN Environmental
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Production of PlasticGlobal annual plastic production in million tonnes

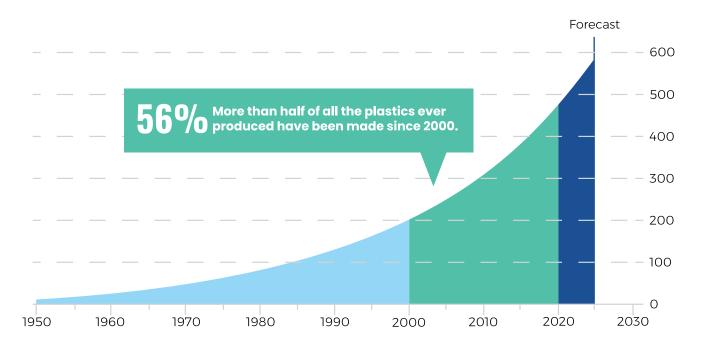


Figure 1: Global annual plastic production in million tons. Image adapted from the Plastic Soup Foundation: https://www.unep.org/interactives/beat-plastic-pollution/#:~:text=If%20 historic%20growth%20trends%20continue,after%20a%20single%20short%20use

Global annual plastic production in metric tonnes

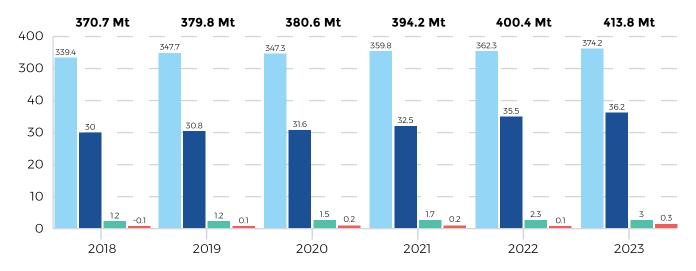


Figure 2: Global annual plastic production in metric tonnes. Image adapted from Plastics Europe "Plastics – the fast Facts 2024" https://www.unep.org/interactives/beat-plastic-pollution/#.~.text=If%20historic%20growth%20trends%20continue,after%20a%20single%20 short%20use





The Cost of Litter & Who Pays

Community and beach litter cleanups over the last five decades have demonstrated that additional action is required to solve the plastic pollution crisis. The cost of picking up litter and mismanaged waste continues to grow for localities, while traditional recycling has become prohibitively expensive for many communities. As exemplified in Table 1, 13 municipalities in Virginia have ended their curbside recycling programs as of 2024. Most cite the cost of the program as the main reason for needing to end the program .

Number	Municipality	Effective date program ended	Reason for ending program
1	Town of Abingdon	June 2019	Cost
2	Town of Broadway	June 2018	Cost
3	City of Chesapeake	July 2022	Cost + Contractor Change
4	Chesterfield County	July 2023	Cost
5	Town of Dayton	Dec. 2018	Contractor Change
6	City of Franklin	May 2021	Cost
7	City of Lexington	July 2020	Cost + Pandemic
8	Town of Mount Crawford	Nov. 2018	Contractor Change
9	Town of Smithfield	Jan. 2021	Cost
10	Town of Stephens City	July 2020	Cost
11	Town of Strasburg	June 2020	Contractor Change
12	Town of Timberville	Nov. 2018	Contractor Change
13	City of Staunton	April 2021	Cost + Contamination

Table 1: Municipalities in Virginia that have ended curbside recycling programs, including the date of cancellation and reason for ending the program. Adapted from Waste Dive Curbside Recycling Cancellation Tracker https://www.wastedive.com/news/curbside-recycling-cancellation-tracker/569250/

However, this is not only a problem within human or land-based ecosystems, but one that overwhelmingly plagues marine environments. Marine litter is not just a local problem because by the very nature of tides and currents, it reaches every ocean on the planet. It is estimated that 6300 of the 8300 million metric tons of plastic ever produced has become waste, and of that 6300 million metric tons, only 9 percent were recycled, 12 percent were incinerated, and 60 percent are in landfills or have been left as litter in the environment.

Complicating these issues, none of the commonly used plastics are biodegradable. ["Plastics are made of fossil fuels. Every stage of plastic production–from extraction of fossil fuels to creation of plastic polymers– contributes to the climate change crisis."] PULLOUT QUOTE What makes plastic integral in some industries is exactly what makes it deadly in our natural environment. Due to their chemical composition, plastics persist in the environment for decades or centuries.

To complicate matters, the economics of plastics is preventing recycled plastics from being used to their fullest extent in the plastic beverage industry. Due to low oil and natural gas prices, as well as an increase in demand for recycled materials and the costs associated with recycling plastics, virgin plastics have been less expensive to produce than recycled plastics. As long as the economics of plastic production lend themselves to the generation of new single-use plastics, recycling plastics alone will never be enough to solve the waste crisis the world faces.



Marine litter is considered a 'public bad' by economists because the negative outcomes are considered non-excludable and nonrival. In other words, no one person can exclude themselves from experiencing the litter, nor does one person's actions affect the outcome for another. Marine litter and debris have not always been a major issue, but it became one in tandem with the rise of plastic production, which heavily shaped the beverage industry. Beverages were packaged in reusable glass bottles for much of the 20th century. These beverage containers were collected, cleaned, refilled, and redistributed for sale. By the 1980s, 80 percent of individually packaged sodas and 92 percent of beer were sold in single-use packaging, whether bottles or cans . This one-way packaging was supported by the rise of plastic production, and the ease of life via single-use materials that was marketed by plastic producers.

This phenomenon is magnified when analyzing beverage-related litter data in the state of Virginia from 1990 to 2022 (Table 2). Aggregated beverage-related litter has remained steady over the three decades analyzed, but plastic bottle litter alone has increased dramatically. On the other hand, the percentages of glass bottles and aluminum cans have steadily decreased.

Percentage of All Litter Made Up of Plastic Bottles, Glass Bottles, and Cans

Year	Plastic Bottles	Glass Bottles	Cans	Total
1988	5.68%	8.34%	10.18%	24.2%
1989	5.18%	6.07%	10.43%	21.68%
1990	1.98%	3.56%	5.2%	10.74%
1991	2.04%	5.22%	6.27%	13.53%
1992	3.02%	5.81%	6.72%	15.55%
1993	2.9%	4.3%	5.87%	13.07%
1994	7.07%	11.49%	10.3%	28.86%
1995	5.67%	8.15%	8.1%	21.92%
1996	8.66%	8.49%	9%	26.15%
1997	6.22%	5.58%	6.12%	17.92%
1998	7.91%	6.73%	5.83%	20.47%
1999	7.4%	7.17%	11.31%	25.88%
2000	9.67%	9.37%	8.13%	27.17%
2001	14.79%	11.77%	8.66%	35.22%
2002	9.21%	9.43%	8.2%	26.84%
2003	24.62%	8.01%	12.22%	44.85%
2004	15.57%	14.42%	9.97%	39.96%
2005	12.65%	9.25%	8.6%	30.5%
2006	13.51%	10.28%	10.3%	34.09%
2007	16.78%	6.73%	7.59%	31.1%
2008	12.32%	9.64%	10.8%	32.76%
2009	12.6%	7.5%	12.26%	32.36%
2010	13.73%	7.11%	8.35%	29.19%
2011	11.76%	6.23%	5.92%	23.91%
2012	15.17%	7.44%	8.92%	31.53%
2013	10.16%	4.6%	7.92%	22.68%
2014	9.46%	3.96%	6.12%	19.54%
2015	10.03%	10.51%	5.98%	26.52%
2016	9.34%	3.4%	4.67%	17.41%
2017	10.16%	5.08%	4.7%	19.94%
2018	12.48%	4.08%	5.12%	21.68%
2019	11.48%	3.72%	6.66%	21.86%
2020	11.68%	3.76%	5.8%	21.24%
2021	7.13%	2.6%	4.8%	14.53%
2022	8.49%	3.04%	5.34%	16.87%



2. How Recycling-Refund Programs Work



There is a proven and pre-existing policy solution that aids in litter reduction and increases recycling rates. This solution comes in the form of a statewide recycling-refund program that requires a refundable deposit on beverage containers to facilitate recycling or reuse of beverage bottles and cans. These programs are not new; the first states adopted such a policy over 50 years ago. Oregon passed the first recycling-refund program in the United States in 1971, requiring refundable deposits on all beer and soft drink containers. The Oregon beverage container recycling rate in 2023 was 90.5 percent.

By 1986, nine states, home to about 25% of the U.S. population, had enacted some form of beverage container deposit law. Oregon, Vermont, Michigan, Maine, Iowa, and Connecticut were the first to

adopt container deposit laws to combat litter and increase recycling. Massachusetts, New York, and California soon followed suit, with Hawai'i as the last state to enact a recycling rebate program in 2005. Despite only ten states in the country having implemented this policy measure, recycling-refund programs have achieved high return rates, resulting in decreases in litter on an international scale.

This policy relies on deposits to incentivize consumers and retailers to participate as a means to increase recycling, reduce energy use and greenhouse gas emissions, and decrease litter. Customers pay a deposit when they purchase a beverage, then return the empty bottle or can to redeem the deposits at the point of purchase, redemption center, or reverse vending machine. States vary on the type of beverages that are covered and the amount of the deposits. All states have either a \$0.05 or \$0.10 deposit currently. In the process, retailers often receive handling fees of about 1-3 cents. In some states, retailers are involved in the collection of beverage containers and receive the full deposit back through that process. However, other states handle collection measures through the creation of independent redemption centers. Ultimately, each existing state policy is unique in their method of collection and preferred redemption infrastructure. This funding is necessary to address the costs incurred by those who collect beverage containers.

Importantly, "bottle bills create a privately funded collection infrastructure for beverage containers and make producers and consumers (rather than taxpayers) responsible for their packaging waste." Such a deposit system encourages consumers to return the containers, ensuring they don't remain in the environment as litter. However, if consumers

do not return their containers, the deposit paid at the time of purchase becomes revenue for the program. According to the Waste Diversion & Recycling Task Force in Virginia, this means "those that don't recycle pay for those that do recycle."

In existing programs, there is a logistical question of what to do with deposits that are never claimed by consumers after they have made a purchase. These deposits are referred to as unclaimed, abandoned, or unredeemed. Ultimately, while these bottles are not returned to the retailer or redemption centers, the bottles could have been recycled independently, but the consumer forfeits getting the deposit back.

Currently, there are two most commonly used systems for allocating the revenue generated by unclaimed deposits: state-managed (the state manages the program and keeps all unclaimed deposits) and beverage industry-managed (the industry manages the program and either keeps all unclaimed deposits or they are escheated by the state). For clarity, an escheat is a legal term

describing "the transfer of unclaimed property to the state or government." Naturally, distributors and bottlers commonly argue in favor of being allowed to keep any abandoned deposits as a means of helping offset the management costs of the recycling-refund program. Historically, distributors and bottlers in states with bottle bills have generated revenues amounting to millions of dollars a year. For example, the Oregon program, which is run by a specially created nongovernmental organization, had \$26.8 million in unclaimed deposits in 2022 . Furthermore, Hawai'i, which struggles with business enforcement of the program and proper accounting for the program, had revenues of almost \$33 million in fiscal year 2021. Others believe in the escheat argument, saying unclaimed deposits should be property of the state, helping to fund programs for the public benefit, similarly to other types of abandoned property. In Virginia, unclaimed deposits not required to fund the recycling-refund program could be dedicated to supporting the Virginia Litter Control and Recycling Fund.





Ultimately, there is variability in the economics of individual state programs based on the composition of recyclables and the market available to sell them, as well as how beverage containers are collected and handling fees are charged. For example, certain distributors may be making a profit off these programs depending on their structure, because their claims to unredeemed deposits and sale of recyclables are greater than what they owe in handling fees to retailers. Other aspects of individual programs must be considered as well, given that redemption rates vary across states based on the amount of the deposit and consumer access to redemption sites, and dealing with more plastic and less aluminum is more costly for a program. In California in 2022, for example, aluminum had a refund value of \$1.68 per pound, whereas the popular #2 HDPE plastic had a refund value of only \$0.59 per pound. According to the Northern Virginia Regional Commission which represents

Varying recyclability between glass, aluminum, and plastic has led to varying industry support for recycling-refund programs. Manufacturers of aluminum cans are very supportive of recycling-refund programs as they help provide a constant source of useful scrap material for producers. The aluminum can life cycle is the perfect candidate for a recycling-refund program. Much of the same can be said for glass, despite not all glass being thick enough for infinite recycling. Plastic, however, is a more complicated matter. Most plastic bottles can only be downcycled, which remakes the bottle into an item of lower quality than in its previous life. This further complicates matters with the economics of the plastic industry, as discussed above.

3. Here's why they work

"Refundable deposit programs are proven to increase beverage bottle and can return rates, decrease the amount of solid waste going to landfills which reduces the burden faced by taxpayers, boost employment, increase access to post-consumer material for manufacturers, and most importantly decrease one of the most prevalent sources of litter and marine debris."

Most market prices of goods do not account for the costs of disposing of the throwaway containers used as packaging. Instead, consumers of these goods are paying their waste haulers and paying again, as taxpayers, to clean up litter in the environment. Refundable deposit programs are proven to increase beverage bottle and can return rates, decrease the amount of solid waste going to landfills which reduces the burden faced by taxpayers, boost employment, increase access to post-consumer material for manufacturers, and most importantly decrease one of the most prevalent sources of litter and marine debris.

There are several reasons recycling-refund programs are effective, many of which are attributed to the economic foundation of the policy. It is well documented that economic incentives are effective ways to control waste, i.e., plastic bag fees or recycling-refund programs. Additionally, the Virginia Waste Diversion & Recycling Task Force, which is made up mostly of industry representatives, notes that "a bottle bill would produce the highest volume of clean valuable material."

Generally, there are two types of economics-based policies used for waste reduction: command and control and market-based. Command and control legislation is defined as "direct regulation of activities or unwanted items by legislation, such as bans on plastic microbeads in facial products or prohibitions

on single use plastic bags." . On the other hand, market-based legislation is an "economic instrument that sets financial incentives or disincentives aimed at influencing human behaviors."

A recycling-refund program falls under this market-based approach. Incentives can be more expensive, but they have fewer potential negatives than disincentives. Disincentives aim to discourage certain behaviors, and if they don't work, they facilitate fundraising that the state can then use to rectify certain behaviors and outcomes after the fact. Schuyler et al. (2018) found that "refund schemes or positive incentives can substantially increase the recovery of materials, whether they are beverage containers, printer cartridges, or old cars."

Recycling-refund programs create rewards for consumers that return packaging to manufacturers. Importantly, they encourage recycling and reuse in the process, and are useful in conjunction with an existing recycling program. Increasing recycling rates will serve as an asset as more manufacturers commit to design their beverage containers for circularity. The goal is for beverage containers to be reused or easily recycled again and again without the need for false solutions like the industry-promoted advanced recycling, which is simply plastic to fossil fuel manufacturing, along with other false solutions that have been proven to be untenable.

4. Evidence

There is overwhelming evidence supporting the success of and satisfaction with recycling-refund programs both across the ten U.S. states currently utilizing these programs, as well as internationally. It is well documented in the literature that these bills have achieved their goals of reducing litter and the amount of solid waste going to landfills, as well as being helpful at increasing recycling rates. For example, according to the Container Recycling Institute, "seven states reported a reduction of beverage container litter ranging from 70 to 83 percent, and a reduction in total litter ranging from 30 to 47 percent after implementation of the bottle bill."



Recycling-refund programs have resulted in important economic outcomes, including job creation and lower disposal costs due to waste diversion from landfills to recycling. Furthermore, in a survey of Michigan consumers, "substantially more consumers were found to be satisfied than dissatisfied with the deposit law." Additionally, 75 percent of those surveyed also said they would vote to keep the bottle bill rather than return to a system without a deposit law, and most survey respondents also maintained that they believed the law led to reduced amounts of litter. However, ultimately, the data-based evidence tells the story most clearly.

A 2020 Clean Virginia Waterways report found that "plastic bottles, glass bottles, and aluminum cans are approximately two and half times more frequently littered in Virginia (a state without a bottle bill) than in states with bottle bills." The report's findings highlighted several discrepancies in litter composition in Virginia versus in states with bottle bills in place. Importantly, bottles and cans (i.e., items which could have been recycled instead of ending up in the litter stream) in Virginia accounted for 22% of all litter recorded by volunteers in the 2019 International Coastal Cleanup (ICC) in Virginia. On the other hand, states with container deposit laws had an average of 8.69% of total litter from bottles and cans from 2019 ICC data. Additional findings highlighted from 2019 ICC data include:

Plastic bottles made up 11.49% of litter in Virginia, and only 1.99% to 8.27% of all littered items in states with bottle bills

On average, **8.64% of litter** in states without a bottle bill were plastic bottles, and only 3.93% in states with a bottle bill

Beverage cans made up 6.66% of litter in Virginia, and only 0.79% to 5.47% of all littered items in states with bottle bills

On average, **5.88% of the litter** in states without a bottle bill were beverage cans, and only 2.51% in states with a bottle bill

Glass bottles made up 3.73% of the litter in Virginia, and 2.25% of all littered items on average in states with a bottle bill

While the 2019 data provide a clear picture of the differences in beverage container litter between states with and without a container deposit law, the following tables show updated statistics on litter in the same states previously studied. The tables focus on three types of beverage containers: plastic bottles, glass bottles, and cans. The data gathered identify each container's ranking, with one being the most littered item in the state. Finally, aggregate percentages for beverage container litter are calculated, as well as averages across states in rank and percentage. The first table highlights eight out of ten U.S. states with recycling-refund programs, omitting those states with less available data, and the second table highlights a sampling of U.S. states without recycling-refund programs, chosen based on coastal geography and population size, primarily.

	Plastic Bottles		Glass	Glass Bottles		Beverage Cans	
State	Rank	% of Recorded Trash	Rank	% of Recorded Trash	Rank	% of Recorded Trash	% of Recorded Trash
California	8	2.48%	14	1.63%	11	2.05%	6.16%
Connecticut	6	4.94%	9	2.73%	8	2.97%	10.64%
Hawai'i	14	1.11%	16	0.92%	11	1.68%	3.71%
Maine	5	4.90%	22	0.62%	8	2.51%	8.03%
Massachusetts	5	3.96%	13	2.21%	11	2.77%	8.94%
Michigan	9	1.43%	21	0.32%	13	0.81%	2.56%
New York	5	4.52%	12	1.96%	9	2.99%	9.47%
Oregon	16	0.31%	24	0.17%	15	0.33%	0.81%
Averages	8.5	2.96%	16.38	1.32%	10.75	2.01%	6.29%

Table 3: Percentage of all recorded litter coming from plastic bottles, glass bottles, and beverage cans in eight of the U.S. states with recycling-refund programs in 2022. Rank of littered items is 1 for the most littered item in the state. Source: 2022 ICC Top Ten Items Data

	Plastic Bottles		Glass	Bottles Bevero		ge Cans	Combo of All
State	Rank	% of Recorded Trash	Rank	% of Recorded Trash	Rank	% of Recorded Trash	% of Recorded Trash
Florida	10	1.85%	23	0.79%	14	1.35%	3.99%
Georgia	2	10.11%	4	6.58%	3	9.57%	26.26%
North Carolina	6	3.25%	16	1.31%	9	2.25%	6.81%
Pennsylvania	4	11.52%	11	1.64%	2	13.11%	26.27%
Texas	5	4.45%	15	1.95%	12	2.90%	9.30%
Virginia	3	8.49%	9	3.04%	5	5.34%	16.87%
Averages	5	6.60%	13	2.55%	7.50	5.75%	14.89%

Table 4: Percentage of all recorded litter coming from plastic bottles, glass bottles, and beverage cans in six U.S. states without recycling-refund programs in 2022. Rank of littered items is 1 for the most littered item in the state. Source: 2022 ICC Top Ten Items Data

In Virginia, a state without a recycling-refund program, bottles and cans accounted for nearly 17 percent of all litter recorded by volunteers in the 2022 ICC in Virginia. In contrast, in states with recycling-refund programs, bottles and cans accounted for 8.17 percent, on average, of the total debris recorded. Further, plastic bottles accounted for 8.49 percent of all the litter recorded in the 2022 ICC in Virginia. In states with recycling-refund programs, plastic bottles account for smaller percentages: from 0.31 percent (Oregon) to 4.94 percent (Connecticut). On average, states with recycling-refund programs had 2.96 percent of the litter made up of plastic bottles, compared to 6.60 percent for the states that do not have a recycling-refund program.

Likewise, beverage cans are more frequently littered in states without recycling-refund programs than in states with them according to 2022 ICC data. Recycling-refund program states had anywhere from 0.33 percent (Oregon) to 2.99 percent (New York) of their litter made up of beverage cans, for an average of 2.01 percent. On the other hand, in states without recycling-refund programs, beverage cans accounted for 1.25 percent (Florida) to 13.11 percent (Pennsylvania) -- for an average of 5.75 percent of the litter. In Virginia, beverage cans accounted for 5.34 percent of all recorded litter.

Finally, glass bottles accounted for 3.04 percent of all the litter recorded in the 2022 ICC in Virginia, the second highest percentage of all states without recycling-refund programs studied, behind Georgia. In states with recycling-refund programs, glass bottles accounted for 1.32 percent of all littered items on average. In states without recycling-refund programs, glass bottles accounted for 2.55 percent, on average.

Another way to see the difference in the frequency of littered items between states is to look at the Top Ten lists produced by ICC data. This list ranks littered items by prevalence, and each state's Top Ten can help provide very important context to their largest litter issues. In states with recycling-refund programs, bottles and cans were consistently found littered less frequently, and often were not in the Top Ten list. In Virginia, however, plastic bottles, glass bottles, and beverage cans were all in the Top Ten list of litter items in 2022. In fact, plastic bottles were the third most frequently identifiable type of litter recorded in Virginia, with beverage cans being fifth, and glass bottles ranking ninth (Table 5).

Rank	Littered Items	% of all Litter
1	Cigarette butts	12.40%
2	Food wrappers (candy, chips, etc.)	10.38%
3	Beverage bottles (plastic)	8.44%
4	Bottle caps (plastic + metal)	6.46%
5	Beverage cans	5.31%
6	Grocery bags (plastic)	4.94%
7	Cups, plates (plastic + paper + foam)	4.40%
8	Foam packaging	3.20%
9	Beverage bottles (glass)	3.03%
10	Other bags (plastic)	2.57%

Table 5: Top Ten littered items in Virginia in 2022. Source: 2022 ICC Top Ten Items Data

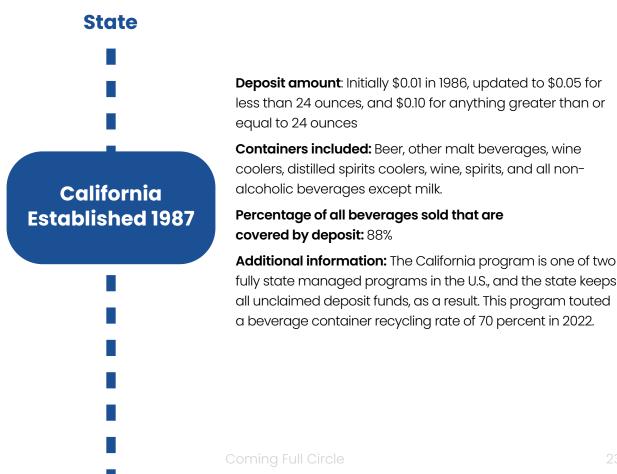


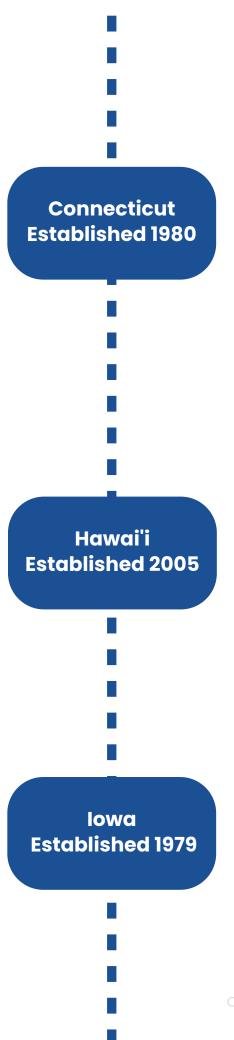
5. What states have bottle bills and how do their programs work?

As mentioned above, ten U.S. states have recyclingrefund programs in place: Maine, Vermont, New York, Massachusetts, Connecticut, Michigan, Iowa, California, Oregon, and Hawai'i. It can be challenging to analyze recycling rates and compare different programs directly because states use a variety of formulas and methods to calculate annual recycling rates. However, outside of the different calculation systems, there is evidence that recycling-refund programs reduce litter and drive increases in recycling.

The table (Table 6) below provides information about the structure and successes of each state's container deposit law in greater detail. Unfortunately, there is limited transparency about the revenue generated from these programs for most states, despite large sums of money being kept and used by states to fund programs for litter cleanup or general environmental wellbeing. There is great variability in the amount and type of information being published by states about these programs. The information below aims to shed light on the unique nature of each state's program, understanding that information is limited.

The chart below utilizes information from the individual state pages of the Container Recycling Institute's Bottle Bill Resource Guide unless otherwise specified.





Deposit amount: \$0.05 before January 1, 2024 and \$0.10 after January 1, 2024

Containers included: Beer and malt beverages, hard seltzer, hard cider, carbonated beverages (including mineral and soda water), non-carbonated water (including flavored and plant-infused water), juice, tea, coffee, kombucha, plant-infused drinks, sports drinks, nips, and energy drinks

Percentage of all beverages sold that are covered by deposit: 77%

Additional information: Retailers facilitate this program, with either 2.5 cents or 3.5 cents handling fees allocated to retailers from distributors for each beverage container redeemed. Distributors are required to pay \$0.05 to the state for every unclaimed deposit, but a portion is returned to the distributor at the beginning of a new fiscal year.

Deposit amount: \$0.05

Containers included: Water, juice, soda, tea, coffee, drink mixers, sports drinks, beer, malt beverages, mixed spirits (<15% alcohol), mixed wine (<7% alcohol), and alcohol-free wine

Percentage of all beverages sold that are covered by deposit: 88%

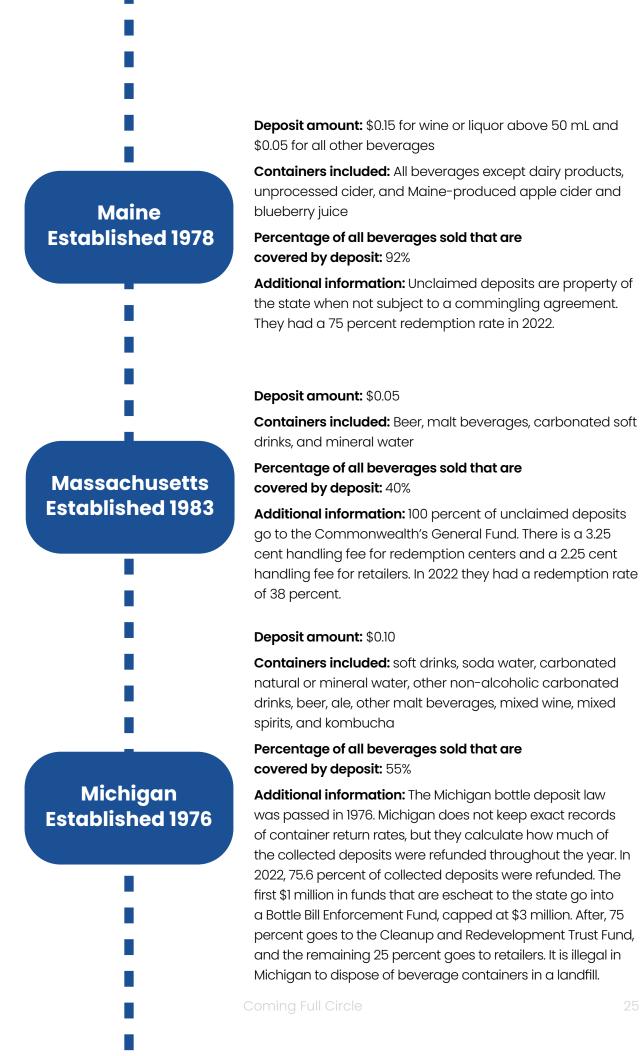
Additional information: The Hawai'i program is the only other fully state managed program in the U.S., aside from California, and the state keeps all unclaimed deposit funds. The program is overseen by the Hawai'i Department of Health, and it was established in 2002. The program had almost \$33 million in revenues in fiscal year 2021. There are, however, concerns over the self-reported tracking of funds.

Deposit amount: \$0.05

Containers included: Beer, carbonated soft drinks, mineral water (carbonated and non-carbonated), wine coolers, wine, and liquor

Percentage of all beverages sold that are covered by deposit: 63%

Additional information: The lowa program is different from many others, and the only one in which distributors keep all unclaimed deposits. The state of lowa does not record data on the program. In 2023, they changed their handling fee from \$0.01 to \$0.03.





Deposit amount: \$0.05

Containers included: Carbonated soft drinks and soda water, beer, other malt beverages, wine coolers, and carbonated and non-carbonated water that does not contain sugar

Percentage of all beverages sold that are covered by deposit: 78%

Additional information: New York maintains that their redemption rate has averaged 65 percent, with a reduction in beverage-related litter of 70 percent. The program includes a 3.5 cent handling fee for retailers and redemption centers for each beverage container returned.

Deposit amount: \$0.10

Containers included: Water, flavored water, soda water, mineral water, beer, other malt beverages, carbonated soft drinks, hard seltzers, kombucha, tea, coffee, hard cider (8.5% ABV and less), juice, non-alcoholic wine, beverages containing marijuana or hemp, energy drinks, sports drinks, coconut water, oral electrolyte replacements, ready to drink cocktail mixers, muscle milk, and dairy or plant-based beverages where milk is not the first ingredient

Percentage of all beverages sold that are covered by deposit: 88%

Additional information: This program is operated by an entity separate from the state and distributors, called the Oregon Beverage Recycling Cooperative, and this organization keeps all unclaimed deposits. In 2022, they had a redemption rate of 88.5 percent, with \$205.5 million paid in refunds to consumers, and \$26.8 million in unclaimed deposits. Unclaimed deposits are put directly into funding the program, which operated with about a \$55 million budget in 2022.

Deposit amount: \$0.15 for liquor and spirits bottles over 50 mL and \$0.05 for all other beverages

Containers included: Beer, other malt beverages, carbonated soft drinks, sparkling water, liquor and spirits over 50 mL, and canned cocktails containing liquor

Percentage of all beverages sold that are covered by deposit: 46%

Additional information: Overseen by the Vermont Department of Environmental Conservation. Retailers are required to take returns from customers.

6. Concerns

There are a number of concerns about the implementation of a recycling-refund program with varying levels of value.

A common point of discussion is whether recycling-refund programs would be most effective as a nationwide program, rather than state-by-state. In individual state programs, there are concerns about people bringing redeemable beverage containers across state lines. However, containers brought in from out-of-state would have to be greater than the gap between refunds granted and remaining unclaimed deposits for the programs to lose money. Additionally, there is variation in what items are recyclable in individual programs. Given the evidence highlighting the success of these programs, it would be beneficial to have a uniform nationwide program as these policies progress. This reality should not prohibit Virginia from implementing a recycling-refund program.

Can community-run recycling systems co-exist with container deposit law?

Some voice concerns that community-run recycling systems and container deposit laws may be in direct conflict, as every bottle returned to a drop-off location is a bottle not given to the recycling program which is funded by either states, localities, or individual communities. Michigan has experienced a vast increase in recycling rates throughout the state since 2019. Recycling rates have increased statewide from 14.25 percent prior to 2019, to 21 percent in 2023, according to data from the Department of Environment, Great Lakes and Energy . This has been accomplished in conjunction with a recycling-refund program.

Furthermore, almost 75% of US residents now have access to recycling services, which is the highest it has ever been. Despite this improvement, recycling rates are ultimately not as high as they could be, as discussed above in the litter section, as well as evidenced through the number of recyclable items found in International Coastal Cleanup data. However, funding from the Michigan refund-deposit program has allowed for the expansion of curbside recycling programs, providing a case study for the successes of two programs working together to reduce waste most effectively.

Inevitably, those consumers not interested in participating in the refund program can continue to utilize their current recycling program without change. The revenue generated from their unclaimed deposits will further benefit waste management through state-funded programs. The recycling-refund program is not intended to work against the current recycling program but complement it to further reduce the amount of waste entering the natural environment and causing major harms. The data showcase the success of recycling-refund programs both in the United States and internationally, and these programs should not be overlooked for fears of recycling program viability, as a result. The two systems can, and should, coexist. A well-designed recycling-refund program would ensure no undue burden to rural communities, by providing adequate funding for necessary infrastructure and program implementation.



Cost effectiveness concerns

Additional concerns include the cost effectiveness of supporting two systems, instead of just one. Further cost-benefit analysis, specified to individual communities and including the intrinsic costs associated with environmental harms will be necessary to better understand this concern. A recycling-refund program also generates revenues for improving waste management programs, in which curbside and other recycling programs should be included.

Another concern of the National Waste & Recycling Association is that "consumers who elect to utilize the more convenient curbside recycling option are penalized twice: first by not receiving back their deposit and second by potentially facing higher costs curbside." It is important to mention that curbside recycling is only convenient when it is provided to residents. As noted above, 13 localities in Virginia have ended their curbside recycling programs and more curbside programs

in the Commonwealth are under threat of cancellation. Ensuring individuals have the most convenient return process possible is important. Equally important is educating consumers on the environmental, economic, and human health harms that plastic waste causes in the environment, and a small fee funding community cleanup and waste management is a program all citizens would benefit from, and most would support. In localities without curbside recycling, it would be more convenient for beverage containers to be returned using an extensive network of drop-off locations rather than taking bottles to a transfer station.

Increased Financial Burden on Low-Income Individuals

A common argument against recycling-refund programs is that the deposit would increase the cost of beverages for low-income individuals. It is important to remember, the deposit is refundable. It has been documented in states with recycling-refund programs that they provide opportunities for individuals and organizations supporting low-income individuals to supplement their income through collecting littered beverage containers and returning them to claim the deposit.



The authors of this report hold the position that recycling and solid waste programs should be seen as not-for-profit entities in which taxpayers



are being provided with a service, as they are necessary for a healthy and functioning society. There are countless examples of services that exist for maximizing the public good, such as police departments and emergency services. Energy utilities are also regulated to provide an equitable service to consumers, without profiting heavily off of citizens. As recycling has evolved, it has created a massive industry alongside it supported by a concerted effort from the petrochemical industry and consumer goods industry to shift the financial responsibility for the end-of-life solutions for their products away from industry and on to taxpayers. It is important to consider the restructuring of recycling and waste

It is important to consider the restructuring of recycling and waste management to be purely for the benefit of the public because these services are necessary for a functioning society. management to be purely for the benefit of the public because these services are necessary for a functioning society. The liability of dealing with mismanaged solid waste in the form of inadequate recycling infrastructure is always borne by localities and taxpayers, never the industry creating the products.



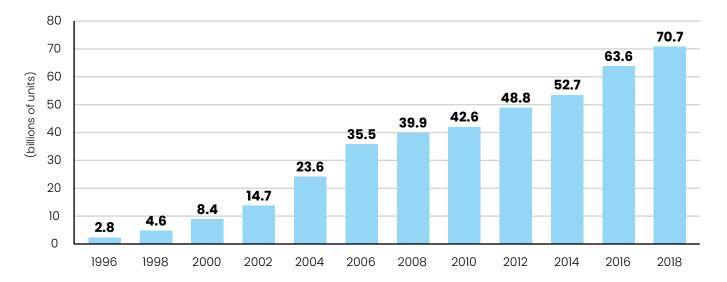
Updating Recycling-Refund Programs

Existing programs have faced challenges of little to no updating since their inception over 50 years ago. For example, deposits must be updated with inflation to be continuously persuasive incentives, something that has not happened in the United States, with the exception of California and Connecticut. Solutions are available, with price elasticity being very useful in developing the correct level of charge or tax on a good. Designing effective legislation that is updated with the times is necessary for tackling the ever-changing problem of increasing waste generation. There are important benefits to not being the first state to enact one of these programs; if Virginia were to adopt a recycling-refund program, it would be able to build upon previous programs and overcome some of the problems existing programs have faced.

New sources of single-use bottles have also arisen over the last few decades. According to a 2023 report by CVW, there are many beverages that

are now popular, but did not exist in the 1970s including bottled water (sparkling, flavored, and still), sports drinks, teas, coffee, energy drinks, and other common beverages. Most states that have deposits do not include all these beverage containers because they did not exist when the legislation was created. Not only have these new beverage types been created, but they have increased dramatically in popularity since their creation. For example, a 2022 public perception survey of registered voters in Virginia found that 38 percent of people surveyed had increased their consumption of bottled water compared to a few years ago . Further, it is important to consider the implications of the COVID-19 pandemic on increased waste generation, and the changed world in which humans now live. Figure 3 below visualizes the increase in consumption of singleuse plastic water bottles over time.

Figure 3: U.S. Plastic Water Bottle Sales in Billions of Units from 1996-2018. Adapted from: The Container Recycling Institute https://www.container-recycling.org/index.php/issues/bottled-water



7. History of bottle bill policy in Virginia

Legislation similar to the recycling-refund programs in ten other U.S. states has been proposed four times before in the Virginia legislature. None of the proposed legislation passed out of its designated committee. The details of each are provided below:

SB 1335 (1999): Proposed a \$0.10 redemption value on beverage bottles and cans, with a \$0.02 handling fee for retailers from distributors upon their collection of the waste material. The Virginia Department of Environmental Quality would receive the unclaimed deposit funding in an "Unredeemed Container Fund," which would be allocated as follows: 90 percent to the Recycling Trust Fund for improving waste management and recycling in the Commonwealth, and 10% to the Game Protection Fund. Left in the Senate Committee on Agriculture, Conservation and Natural Resources.

HB 659 (2000): Proposed a \$0.10 redemption value on beverage bottles and cans, with a \$0.02 handling fee for retailers from distributors upon their collection of the waste material. The Virginia Department of Environmental Quality would receive the unclaimed deposit funding in an "Unredeemed Container Fund." All generated funds would be released annually to the Virginia Recycling Trust Fund for improving waste management and recycling in the Commonwealth. Passed by indefinitely by House Committee on General Laws

HB 1759 (2017): Proposed a \$0.05 redemption value on beverage bottles and cans, with a \$0.02 handling fee for retailers from distributors upon their collection of the waste material. The Virginia Department of Environmental Quality would receive the unclaimed deposit funding in an "Unredeemed Container Fund," with the funds to be released annually to the Litter Control and Recycling Fund. Passed by indefinitely by the House Committee on General Laws.

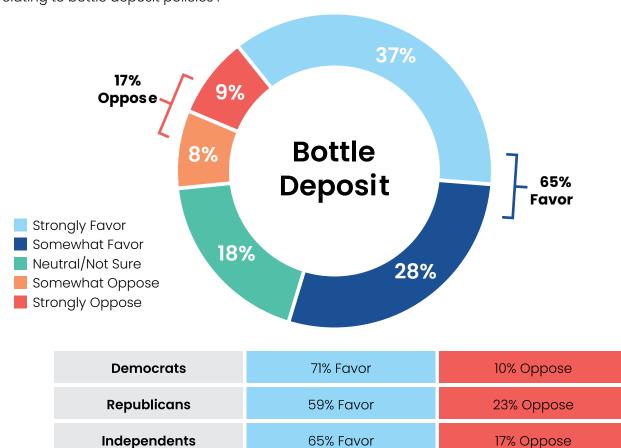
HB 826 (2022): Proposed establishing "a beverage container deposit, refund, and redemption program involving distributors, retailers, and consumers. The program would be run by a Producer Responsibility Organization under the Department of Environmental Quality. The bill creates an advisory committee, requires reporting, and imposes civil and criminal penalties for violation." Left in the House Committee on Agriculture, Chesapeake, and Natural Resources.

8. Public Support of Container Deposit **Legislation in Virginia**

These bills failed to become laws, but there is a growing interest in many sectors in Virginia that may be efficiently solved by a recycling-refund program. In 2022, Clean Virginia Waterways, the Virginia Coastal Zone Management Program and OpinionWorks undertook a public perception survey involving 901 randomly sampled registered voters in Virginia. This survey highlighted the need for new and innovative solutions to growing problems. Further, when asked directly about a bottle deposit law, 65 percent of voters sampled said they would be in favor, demonstrating bipartisan support. The graphic below comes from this report and helps visualize survey outcomes relating to bottle deposit policies.

Importantly, after clarifying that this is only a deposit in which consumers can get their money back, and not a tax, support increased. 17 percent were opposed, and the final 18 percent were neutral or unsure. 59 percent of voters who selfidentified as Republicans, 71 percent of Democrats, and 65 percent of Independents surveyed were in support (Figure 4).

Figure 4: Registered Virginia Voter support for a recycling-refund program. Adapted from Plastic Pollution: Virginia's Voters Support Action: 2022 Public Perception Survey https://www. cleanvirginiawaterways.org/research-publications



65% Favor

9. Proposed Legislation in the United States

As of March 2024, there are multiple states and Washington DC that have proposed legislation to implement a container deposit program. Washington state has a proposal in their general assembly that is based on the Oregon bottle bill described above. New Jersey has a proposed bottle bill that would require a 10-cent refundable deposit on a wide range of containers including: glass and plastic bottles, cans, cartons, pouches made of glass, plastic, cardboard, paper, and metal. Maryland has a comprehensive proposal that contains many of the recommendations listed at the beginning of this report. This proposed legislation is being discussed by the Maryland General Assembly during the writing of this report. Washington DC's proposed legislation aligns closely with Maryland's proposal . If these bills were

to pass, Virginia would have the opportunity to create a unified DMV and significantly reduce the accumulation of beverage container debris in the Chesapeake Bay watershed.

Washington state has proposed legislation that would require a 10-cent deposit on most plastic, glass, and metal beverage containers from four ounces to one gallon. This proposed legislation is using the framework developed by Oregon's longstanding recycling-refund program . Washington, like Virginia, has a litter tax that operates in a similar manner to Virginia's. If this legislation is signed into law, it is more evidence that litter taxes and recycling-refunds can complement each other.



10. Conclusion

"Solving the urgent plastic pollution and marine debris crisis calls for source reduction commitments, cleanups, voluntary and mandated approaches, improving recycling, and solutions that target the most common and harmful types of debris that are polluting our waterways and landscapes"



Recycling-refund programs have a well-documented history of success and are an important component in the toolbox of solutions.

Ultimately, recycling-refund programs are not new-it was common practice before single-use containers were invented for producers to sell their goods in reusable bottles, charging a deposit for refund upon the bottle's return. According to the Container Recycling Institute, "The deposit-refund system was created by the beverage industry as a means of guaranteeing the return of their glass bottles to be washed,

refilled and resold." A recycling-refund program, as evidenced through this report, is an effective policy measure for waste reduction. The data highlight the prevalence of beverage containers in total litter, and the need for a practical solution to combat this issue.

This report finds that recycling-refund programs are effective at reducing litter, increasing recycling, creating jobs, decreasing burdens on taxpayers, and promoting and maintaining positive and necessary change for our warming climate.

A Plan to Reduce Marine Debris and Litter

The Virginia Marine Debris Reduction Plan (VMDRP) is centered on the development and maintenance of strategic partnerships to address marine debris in Virginia, and is structured into goals, strategies, objectives, and actions. The first goal of the VMDRP is to, "Understand, Prevent, and Mitigate the Impacts of Consumer Debris and Singleuse Plastics." There are 60 actions in the plan, 22 of which are dedicated to reducing consumer debris including food- and beverage-related litter, cigarette butts, plastic bags, balloons and other common and deadly debris items .

This report helps meet several Actions in the VMDRP

Near-Term action identified by stakeholders of the plan

Analyze existing legislation and policies and provide recommendations to support waste minimization of the most common and harmful items found as marine debris (e.g., single-use plastic bags, food and beverage packaging, cigarette butts).

Action 1.1.1.1: By the end of 2025, collaborate with Mid-Atlantic partners to create or adapt and disseminate at least five (5) outreach products on consumer debris, that is relevant or could be replicated across the region, including fact sheets, public displays, infographics, one pagers, tool kits, templates, and manuals of best practices about consumer debris items, and make them available online for diverse audiences.

Action 1.5.1.4.: By the end of 2025, inform the development of at least five (5) new local and state policies, ordinances, and management plans that are aimed at source reduction, prevention, and interception practices using available data and information. This could include:

- · Local ordinances regarding dumpster management and hauling
- Local ordinances on bulk trash disposal options
- Implementation of 5-cent fees on single-use plastic bags
- Statewide bottle bill
- Extended producer responsibility laws
- Local governments and private colleges' adoption of EO 77 actions to reduce their use of single-use plastics
- Adoption of policies and laws to reduce specific forms of marine debris

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Coming Full Circle

Policy Recommendations & Best Practices for the Virginia Litter Fund