

Improving Recovery of Recyclable and Reusable Materials in Wisconsin: The Feasibility of a Bottle Bill and Other Policy Options

Prepared for the Wisconsin Department of Natural
Resources, Bureau of Waste and Materials Management

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Foreword

Concern with highway litter motivated many states to pass laws in the 1970s and the early 1980s to mandate beverage container deposits that are reimbursed to consumers when they return containers to bottlers or retailers. Since enactment of these “bottle bills,” highway litter has decreased but the consumption of bottled beverages and the variety of containers has increased, as has the emphasis on recycling. Recovery of used containers is increasingly seen as a means to recycle and recapture products made with high energy costs and to sustain landfill capacity. Wisconsin leads many states in materials recovery as a result of its statewide prohibition against the dumping of certain types of containers in landfills. However, its recovery rates are less than those of states with bottle bills. This report explores the recovery rates in states with and without bottle bills, examines the impact of Wisconsin’s recycling efforts and assesses the characteristics of what would be an effective bottle bill in Wisconsin.

This report is the product of a semester-long collaboration between the Robert M. La Follette School of Public Affairs at the University of Wisconsin–Madison and Wisconsin’s Bureau of Waste and Materials Management in the Department of Natural Resources. The La Follette School of Public Affairs offers a two-year graduate program leading to a master’s degree in public affairs. Students study policy analysis and public management and pursue a concentration in a public policy area of their choice. They spend the first year and a half taking courses that provide them with the tools they need to analyze public policies.

Although acquiring a set of policy analysis skills is important, there is no substitute for doing policy analysis as a means of learning policy analysis. Public Affairs 869, required in the program’s final semester, provides graduate students that opportunity. The authors were all enrolled in Public Affairs 869, Workshop in Public Affairs, Domestic Issues (section 2). They collaborate to improve their policy analysis skills while contributing to the capacity of public agencies to analyze and develop policies on issues of concern to Wisconsin residents.

The students in this workshop were assigned to one of five teams. One group worked on this report, while the others collaborated with the Wisconsin Joint Legislative Council, the U.S. Government Accountability Office, and the Wisconsin Department of Health and Family Services’ Office of Policy Initiatives and Budget, and its Bureau of Environmental and Occupational Health in the Division of Public Health.

Brad Wolbert, Hydrogeologist, and Cynthia G. Moore, Recycling Program Coordinator, both in the Recycling and Solid Waste Section of the Wisconsin Department of Natural Resources’ Bureau of Waste and Materials Management first suggested the topic of this report. Both generously gave their time, first to me in the development of potential topics and in the selection of this one, and then to the authors,

who met with them regularly throughout the semester. This report would not have been possible without their assistance. The acknowledgments section thanks other individuals who supported the students as they pursued data and policy insights. I add my gratitude to the appreciation expressed there.

Greater awareness of the environmental costs of not reusing recyclable materials of all types has increased in the more than 30 years since the first state passed a bottle bill to reduce litter. The greater interest in recycling may increase the acceptability of bottle deposits, but the growth of recycling centers and municipalities that benefit financially from their recycling programs complicates that process. Thus a bottle bill put forward in the first decade of the 21st century is likely have to be more carefully crafted than were earlier bills to account for the changed environment in which it would be introduced. This report describes lessons that can be learned from other states about bill provisions and a political process that could make a bottle bill widely acceptable in Wisconsin. We hope all interested parties review this report's findings and conclusions and find them to be valuable input into the continuing development of Wisconsin's recycling policies.

The conclusions herein are those of the authors alone. The topic they address is large and complex, and this report cannot provide the final word on the complex issues addressed by the authors, who are graduate students constrained by the semester time frame. Nevertheless, much has been accomplished, and I trust that the Department of Natural Resources has gained valuable insight as its staff considers the place of a bottle bill in Wisconsin's recycling policy.

The report also benefited greatly from the support of faculty and the staff of the La Follette School of Public Affairs, especially that of Publications Director Karen Faster, who edited and managed production of the report.

I am very grateful to Wilbur R. Voigt whose generous gift to the La Follette School supports the public affairs workshop projects. With his contribution, we can finance the production of the final reports, plus other expenses associated with the projects.

I hope that through this involvement in the tough issues state government faces, our students have learned a great deal about doing policy analysis and have gained an appreciation of the complexities and challenges confronting state and local governments in Wisconsin. I hope that this report will contribute to the work of the Department of Natural Resources and to the ongoing public discussions about the wiser use of resources in Wisconsin and elsewhere.

Karen Holden
May 2008

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Executive Summary

Wisconsin lags behind states with beverage container deposit laws in the quantity of containers recovered for recycling. To address how to reduce the amount of recyclable materials going to landfills, the 2006 Governor's Task Force on Waste Materials Recovery and Disposal recommended a study on the feasibility of a beverage container deposit law for Wisconsin. Container deposit laws or "bottle bills" require beverage bottlers and distributors to charge a refundable deposit on beverage containers. This deposit provides consumers a financial incentive to redeem containers and features the potential for a 100 percent recovery rate and significant material recycling (Governor's Task Force, 2006).

Wisconsin residents would benefit in many ways from increased recovery of recyclable materials. Recycling conserves natural resources, cuts down on waste going to landfills and reduces litter. Recycling also decreases energy use. This limits greenhouse gas emissions because most energy used in industrial manufacturing processes relies on fossil fuels. Failing to recycle one aluminum can, for example, wastes the energy equivalent of two ounces of gasoline in the production of a new can from new ore (Governor's Task Force, 2006).

Eleven states have laws requiring refundable deposits on certain beverage containers: New York, California, Connecticut, Delaware, Hawaii, Iowa, Michigan, Massachusetts, Maine, Oregon and Vermont (Governor's Task Force, 2006). The positive effects of deposit systems on recycling rates have been well documented. In 2001 states with bottle bills recycled approximately 78 percent of containers while states lacking bottle bill legislation recycled approximately 23 percent. Additionally, the percentage of container waste reduction in states with bottle bills has been consistently between 69 percent and 84 percent (U.S. Senate Committee on Environment and Public Works, 2002). However, despite their efficacy in improving the recovery rate and in reducing litter, bottle bills impose costs on beverage bottlers, distributors, retailers and recycling centers. Many of these stakeholders consider these costs unfair, and bottle bills often face significant political opposition as a result. Opponents also argue that bottle bills detract from more comprehensive recycling efforts that include other valuable recyclable products.

Despite these criticisms, several factors make it critical for Wisconsin to consider whether a deposit law could improve the recovery rate of beverage containers. Consumers are purchasing and discarding greater numbers of beverage containers, landfill space is increasingly scarce, and climate change is increasing the value of reusable and recyclable materials for which energy has been expended to produce.

This report examines the environmental impact, economic consequences, and political and administrative feasibility of a bottle bill. It considers whether pay-as-you-throw programs and comprehensive recycling efforts could increase recovery

rates if either were expanded. Both operate in Wisconsin communities, and both give consumers incentives to divert waste to recycling streams.

Wisconsin has used pay-as-you-throw and curbside recycling programs to achieve relatively high recycling rates compared to states without bottle bills, and we recommend the state assess whether these programs have achieved higher rates of recovery in recent years. The Wisconsin Department of Natural Resources should continue to give priority to improving current programs, as they can collect a wider variety of beverage containers than deposit laws typically cover. These recovery programs financially benefit municipalities and the private recycling industry.

If Wisconsin pursues a bottle bill, it should abandon the historic focus on prevention and reduction of roadside litter, which was the primary goal of most states' deposit laws. Since the 1970s and early 1980s when most of those bills were passed, the variety of beverage containers that use energy in their manufacture and are then deposited in landfills has grown. Municipalities and Wisconsin's recycling industry benefit from recyclables pickup and are invested in its continuation. A "modern" bottle bill pursued in Wisconsin must give careful consideration to which containers it would include, how a deposit would affect existing recovery and recycling institutions, and how a deposit system would be administered.

Thus, if further study concludes that Wisconsin cannot meaningfully increase recovery under existing programs, we recommend that the Wisconsin Department of Natural Resources explore the types of containers to include and the complex state-industry interactions that a successful bottle bill would have to take into account. A carefully crafted bottle bill that applies to a variety of containers and that complements Wisconsin's widespread recycling efforts may not meet the same resistance that previous attempts to pass a bottle bill encountered. A long-term effort would be needed to work with the sectors that would lose revenue under a "traditional" bottle bill, but a "modern" Wisconsin deposit law could be a major contributor to increased recovery of recyclable materials.

Introduction

Beverage container waste and litter became a public policy issue after World War II. Prior to the 1940s, beverages were sold largely in refillable glass bottles because it was cheaper at that time for bottling companies to collect and wash old bottles than to buy new ones (Saphire, 1994). Indeed, beverage industries originally administered and supported a deposit system to ensure that their glass bottles would be returned to be washed, refilled and resold. Bottlers and brewers shifted to aluminum cans after World War II with the aluminum production boom in the United States. Because aluminum cans were inexpensive to produce, beverage industries did not push for their reuse as they had for glass bottles. The convenience and disposability of the aluminum can helped to boost the sales of aluminum containers at the expense of refillable glass bottles. Disposable containers took over the beverage market by the 1970s (Moore & Scott, 1983). This rise in the one-way use of no-deposit cans during the 1950s and 1960s resulted in a tremendous increase in beverage container waste and litter.

The original intent of the nation's first bottle bills¹ passed in the 1970s and 1980s was to control this growing litter problem. Ten states representing more than one-quarter of the U.S. population had some form of beverage container deposit law by 1986, and bottle bills led to litter reduction in those states (Container Recycling Institute, n.d.c). Government-funded studies conducted before and after bottle bill enactment in seven states showed reductions in beverage container litter ranging from 69 percent to 84 percent, as Table 1 shows. These reductions are significant as beverage containers constitute 40 percent to 60 percent of litter along roadsides and in public places. Many studies have shown that beverage containers constitute the largest category of litter in states without a bottle bill. A study by the Solid Waste Coordinators of Kentucky found that beverage containers made up 43 percent of litter on urban streets, 42 percent on waterways and 54 percent on highways and rural roads for an average of 49 percent (Container Recycling Institute, n.d.d). A litter survey of Clark County in Virginia from September 1990 to December 1997 found that beverage containers made up 69 percent of litter (Container Recycling Institute, n.d.f). Other studies conclude that bottle bills reduce total litter by 30 percent to 65 percent (U.S. Senate Committee on Environment and Public Works, 2002).

¹ The term "bottle" bill is commonly used to refer to legislation that would require deposits on aluminum cans as well as glass and, sometimes, plastic bottles. The term "bottlers" includes firms that package beverages in cans.

State	Beverage Container Litter Reduction	Total Litter Reduction
New York	70-80%	30%
Oregon	83%	47%
Vermont	76%	35%
Maine	69-77%	34-64%
Michigan	84%	41%
Iowa	76%	39%
Massachusetts	N/A	30-35%

Source: U.S. Senate Committee on Environment and Public Works, 2002

While most bottle bills intend to reduce litter, today there is a great deal of emphasis on bottle bills' impact on recycling rates. Recycling beverage containers conserves energy and natural resources. This is important as the production of beverage containers has a substantial environmental impact and adds to the problems of pollution and global warming. Beverage containers (excluding milk containers) make up only 4.4 percent of all waste generated by households and businesses, but the environmental impacts of container wasting are disproportionately high (Container Recycling Institute, n.d.e). The production of new materials to manufacture aluminum cans and plastic bottles is particularly damaging to the environment.

Aluminum production causes significant environmental damage. The aluminum industry is the world's most energy-intensive industry, and aluminum production causes significant environmental damage. One ton of aluminum cans requires strip mining approximately five tons of bauxite ore. The ore is crushed, washed, and refined into alumina before being smelted, and these processes yield large quantities of toxic solid waste. The most visible of these toxic wastes is a caustic red mud that collects in surface and ground waters. In surface waters, this residue creates "red mud lakes" that pollute the surrounding ecosystem and present a public health danger.

Aluminum production has environmental effects beyond local or regional ecosystems. Aluminum refining and smelting use chlorine gas as a reagent, and these production processes release perfluorocarbons (PFCs), chlorofluorocarbons (CFCs) and other poisonous or environmentally damaging gases into the air. Primary aluminum smelting and beverage-can manufacture also use significant amounts of fossil-fuel-based energy. An estimated one-third of the aluminum produced worldwide uses coal-generated electricity, 10 percent relies on electricity fired by oil and natural gas, five percent is nuclear powered, and nearly half uses hydroelectricity. Aluminum smelters often acquire their electricity from hydroelectric dams, and the production of new dams harms river ecosystems and displaces indigenous peoples in many

regions of the world (Gitlitz, 2002). Aluminum mining and production also occur in many countries far from the United States, which increases the energy used to import the ore or the processed metal. Plunkert (n.d.) estimates Australia, Brazil, Jamaica and Guinea accounted for 70 percent of bauxite mined in 2000. Table 2 shows energy expenditures required to replace the number of aluminum, glass and plastic containers not recycled in 2005.

Table 2. Energy Impacts of Replacing Material Lost in Non-Recycled Containers in 2005					
Container Type	Energy per Ton Wasted (MBtu)^a	Containers Wasted, 2005^b		Energy Wasted Due to “Replacement Production”^c	
		Units (billion)	Tons (million)	Barrels (in millions) of Crude Oil Equivalent	Households’ (in millions) Total Annual Equivalent Energy Needs
Aluminum Can	206.9	55.0	0.8	29.0	1.5
PET Plastic Bottles (#1)	53.4	43.6	1.5	14.3	0.3
HDPE Plastic Bottles (#2)	51.4	6.8	0.4	3.7	0.1
Glass Bottles	2.7	28.8	6.9	3.2	0.1
TOTAL	N/A	134.1	9.6	50.2	2.0

Notes: (a): Million British thermal units (MBtu) per ton of replacement containers. This represents the difference in energy required to produce one ton of containers from 100 percent recycled materials as opposed to 100 percent virgin materials. Source: Choate, Pederson, Scharfenberg & Ferland, 2005.

(b): Source: Container Recycling Institute, 2006

(c): 5.8 MBtu/barrel crude oil. Source: Choate et al., 2005. Average annual residential energy use: 92.2 MBtu/household. Source: U.S. Energy Information Administration, 2001.

The environmental impacts of aluminum production make the waste of aluminum beverage containers a serious concern. Gitlitz (2002) estimates 7.1 million tons of aluminum cans were not recovered between 1990 and 2000. That amount of aluminum could replace the world’s commercial air fleet about 25 times.

Container deposits can mitigate the environmental effects of new plastic bottle production as well. Producing polyethylene terephthalate (PET) and high-density polyethylene (HDPE) plastic bottles is not as environmentally destructive as producing aluminum, but both processes consume a great deal of energy and generate pollution. Plastics production releases toxic chemicals such as acetone,

benzene, sulfur oxides, nitrous oxides, methanol and volatile organic compounds that can all contribute to air pollution and human health dangers. The pollution generated by producing plastic resin is another concern. When ethylene is polymerized to produce resin, the reactive mixture is scrubbed with caustic solutions that become high-volume pollutants. Manufacturing PET resin generates more toxic emissions than manufacturing glass. The production of one 16-ounce PET bottle generates more than 100 times the toxic emissions to air and water than making the same size bottle out of glass (Berkeley Plastics Task Force, 1996). Plastics are also stable compounds that take decades to biodegrade in the environment.

For these reasons, increasing the recovery rate of recyclable materials would have societal benefits. In this context, this report considers the most feasible way for Wisconsin to increase the recovery rate of recyclables. States with bottle bills often do well in recovering containers. While this suggests a bottle bill may increase Wisconsin's recovery rates, deposit systems impose costs on different interest groups. A bottle bill would enter a political environment in which there is already widespread recycling and a developing recycling industry. Aluminum beverage containers are a substantial source of income for Wisconsin's recycling processing facilities and for certain municipalities that share in revenues from recovered recyclables. Though prices are high for other recyclables, bottle bill opponents argue that these prices are less reliable and more cyclical than aluminum. Since most bottle bill legislation requires consumers to return beverage containers to retailers, a similar provision in Wisconsin harm recycling centers and municipalities.

Bottle bills intend to place the costs of disposal on consumers, distributors and retailers. Consumers bear costs if they do not return beverage containers and claim deposits. Unclaimed deposits may in turn fund recovery activities by other parties. For consumers to receive refunded deposits, bottle bills usually require collection by distributors and retailers. This imposition means retailers must allocate space and staff to count, sort and store empty bottles and cans. Newer deposit systems bypass such a requirement. Bottlers are often required to pay a surcharge or handling fee to retailers for each container returned, which offsets a portion of the costs the retailer incurs. Besides these direct costs, bottlers may face reduced sales of their products if consumer demand declines as the price of beverages increases to cover the deposit. These factors mean that policymakers should anticipate that the beverage industry, retailers and perhaps even recycling centers would resist a bottle bill in Wisconsin. Enacting a deposit law would require effort, money and political capital that might be used to increase recovery rates by other means.

Impact Categories

Recycling success can be achieved, but a critical barrier is apportioning the required incentives and burdens. An analysis of a bottle bill is insufficient if it estimates only whether a bottle bill would increase or decrease recovery rates of recyclables. An analysis must also consider whether the costs to achieve those results would be better spent elsewhere and whether those costs are borne by the appropriate parties. This study compares a bottle bill against policy alternatives for increasing recyclable recovery rates using the following impact categories:

- **Environmental:** The primary argument for implementing a bottle bill or any of its alternatives is to have a positive impact on the environment. Each policy option presented in this study would affect recovery rates, waste disposal and associated problems of increased energy use and pollution from byproducts of container production. This study examines each alternative in terms of its environmental outcomes.
- **Economic:** Improved recovery rates would have costs. There are two key cost considerations: the size of the costs and who would bear those costs. For instance, bottlers and distributors often lobby against bottle bills because they perceive new costs of recovery falling on them. Bottle bill proponents such as the Container Recycling Institute (n.d.e) argue the effect on distributors is overstated. While most bottle bills would increase costs for bottlers and distributors, a key issue is determining the size of those costs and whether they are fairly distributed across bottlers, distributors, consumers and government. Bottle bills and alternative methods for increasing recovery rates use economic incentives and inhibitors to reach their goals. Looking at who receives which type of incentive and their probable response is crucial to understanding the impact of any policy alternative on distinct groups and society as a whole.
- **Political:** A bottle bill is not politically feasible if it is unlikely to pass the Wisconsin Legislature and receive the cooperation from affected parties. This study assesses support and opposition each alternative engenders. It also considers how those attitudes affect the ability of each alternative to improve recovery rates.
- **Administrative:** Each policy alternative would have administrative costs and savings, and its structure would dictate the net costs. This study attempts to estimate the economic and personnel costs of governments administering each option.

Alternative Recovery Approaches

Wisconsin has taken steps attempts to address the problems of container waste. Wisconsin Statute § 287 explicitly bans aluminum, steel, plastic and glass containers from landfills, although the Wisconsin Department of Natural Resources (DNR) exempts plastics numbered three through seven due to a widespread lack of recycling facilities. The law requires responsible units to operate recycling programs in their jurisdictions (Wisconsin DNR, 2006). Responsible units are generally municipalities, counties, tribal reservations or solid waste districts. The law also provides a “hierarchy of preferences for solid waste management options,” which collectively guides the waste management policy of the state (Wisconsin DNR, 2006; Governor’s Task Force, 2006).

While this recycling requirement has reduced the percentage of containers sent to landfills, Wisconsin’s recovery rate does not match those of other states, particularly those with container deposit systems. Wisconsin recycles less than 55 percent of aluminum, steel and plastic containers, and, at best, less than 75 percent of glass containers through conventional curbside and drop-off collection (Wisconsin DNR, 2003). The recyclable recovery rates of Michigan and Iowa, two neighboring Midwestern states with deposit systems, are much higher— 95 percent and 92 percent respectively. The 11 states with container deposit laws each maintain recovery rates higher than Wisconsin’s (Governor’s Task Force, 2006).

Wisconsin’s solid waste management systems vary with each town and city, but most municipalities use variable-rate systems, commonly called unit pricing or pay-as-you-throw (PAYT), and curbside recycling to increase recovery rates for all recyclable products, including beverage containers. This section describes the main features of these two systems. A third policy alternative explained herein is a potential Wisconsin bottle bill. This alternative incorporates what we believe are the most critical provisions of some of the existing state deposit laws.

Pay-As-You-Throw

PAYT systems charge by weight or for each unit of refuse collected from households or businesses. By imposing a charge on consumer or business refuse, the PAYT approach provides an incentive for households to reduce the waste they generate. The most common reductions are through consumption of goods with less packaging and diversion of waste to recycling streams and reuse (U.S. Environmental Protection Agency, 2007b).

PAYT systems operate in two primary ways: by weight or by volume, as Table 3 summarizes. Seldom used in the United States due to high capital and operating costs, weight-based systems charge households for the mass of refuse collected at the curb. Collectors weigh refuse at the pick-up site using truck-mounted scales. Volume-based systems use several collection methods. In subscribed-can systems, participants use one or more garbage cans assigned by their waste collector on the

basis of estimated regular refuse amounts. Charges for refuse collection vary with the size of the can. Bag systems require households and businesses to purchase bags marked with the logo of a municipality or refuse collection agent. Bag fees vary with refuse collection costs of the community. Rather than requiring purchase of specific bags, a related alternative requires households and businesses to purchase tags or stickers to place on each refuse bag put out for collection. Households and businesses are free to use their own bags, and each tag or sticker counts for a specified amount of refuse. Some communities operate hybrid systems that use subscribed cans as a basis but offer bags, tags or stickers on a per-unit basis to allow households and businesses to dispose of excess refuse they might generate (Skumatz & Freeman, 2006).

Table 3. Summary of Weight-Based and Volume-Based Systems	
Volume-Based Systems	Subscribed Cans
	Pre-Purchased Bags
	Tags/Stickers
	Hybrid
Weight-Based Systems	Garbage by the Pound

Source: Skumatz & Freeman, 2006

Pricing schemes vary within volume-based PAYT systems, as Table 4 shows. Some systems, known as proportional or linear systems, operate on a simple per-container basis. Variable container systems distinguish among containers of different sizes, and offer lower collection fees for smaller containers and less waste (Canterbury, 1994). Other systems operate with two or more pricing tiers. Such multi-tier approaches charge a base flat fee for service. Households and businesses then pay for the level of waste disposal they require, on a per-container basis (two-tiered) or for various sizes of additional containers (multi-tiered) (Canterbury, 1994; Miranda, Bauer & Aldy, 1996).

Table 4. Pricing Schemes of Volume-Based PAYT Systems	
Type	Rate Basis
Proportional/Linear	Single rate for each container
Variable Container	Rates increase with size of waste container
Two-Tiered	Flat fee on an annual or monthly basis AND per-container rates for additional collection
Multi-Tiered	Flat fee on an annual or monthly basis AND additional rates based on size of waste container selected for household or business

Source: Canterbury, 1994; Miranda, Bauer & Aldy, 1996

A PAYT approach raises costs of waste disposal for those who put more waste into the system. Residents of many Wisconsin communities now pay for refuse collection through property taxes or periodic fees. Refuse collection schemes that charge a uniform rate to each user create little incentive for users to reduce their refuse, as incremental increases in waste create no additional private costs for the household or business. Consumers in one-time payment programs only have incentive to reduce household waste if they derive utility or satisfaction from such reductions.

Comprehensive Curbside

DNR administrative rules mandate curbside recycling programs in municipalities with populations of 5,000 people or more and an aggregate population density of at least 70 people per square mile. Such collection systems must collect newspaper, glass, plastics numbered one and two, corrugated cardboard, magazines and containers made of aluminum or steel. Collections must occur on at least a monthly basis, and collections must service single-family homes and multi-tenant properties of two to four units. These municipalities must also provide a means of gathering recyclable materials not collected at curbside. This drop-off collection applies to materials such as aluminum-steel composite containers, plastics numbered three through seven, tires and paper (Wisconsin Administrative Code, [1993, 2003, 2005]). Municipalities under the population requirements for mandatory curbside collection must provide curbside or drop-off collection for the same materials and must serve single-family and two- to four-unit residences (Wisconsin DNR, 2006).

Single-stream recycling is now a common feature of curbside programs. Single-stream recycling allows households and businesses to place all recyclables in a single container. Materials processing facilities later separate paper, containers and other recyclables (Solid and Hazardous Waste Education Center, n.d.). Single-stream recycling makes recycling more convenient for consumers, as it allows them to forgo sorting of glass, plastic, aluminum and paper materials. This convenience reduces the opportunity costs incurred by households in the time spent sorting recyclables. Comprehensive collection that accepts greater varieties of recyclable or reusable materials could increase convenience for consumers.

Bottle Bill

While bottle bills share some universal characteristics, there is also great variability among them. This section describes likely characteristics of what we call “a modern Wisconsin bottle bill” that is appropriate for the current political and administrative environment.

Deposit laws require that beverage bottlers and distributors charge a refundable deposit on beverage containers. The price charged to the consumer includes this refundable deposit. Retailers include the deposit to cover the deposits they in turn owe to a bottler or distributor upon purchase of beverages. As consumers return containers, retailers or container redemption centers repay consumers the deposit.

Bottlers or distributors reimburse retailers for the deposits repaid to consumers. Most deposit laws also require distributors to pay handling fees to retailers and redemption centers to offset costs of collection, but distributors can reclaim this cost by selling the collected scrap material and by making short-term investments with the initial deposits from retailers.

If Wisconsin were to implement a bottle deposit law, it would follow 11 states with such laws. These states offer lessons regarding what a bottle bill for Wisconsin could include to decrease economic costs while increasing its environmental, political and administrative feasibility. Mandates in a Wisconsin bottle bill should complement existing recycling centers rather than create competition for them. A complementary relationship is the case in California. A politically sound bottle bill offsets the costs imposed on retailers and the beverage industry, as the deposit systems in California and Oregon do. To maximize its environmental impact, Wisconsin's bottle bill should require a significant deposit as Michigan does with a 10-cent deposit. A Wisconsin deposit law should be comprehensive in the materials covered, mimicking deposit laws of Maine and Hawaii. Furthermore, Wisconsin can follow the lead of Hawaii in considering the lessons learned from more recent recycling studies. The primary lessons are discussed in the Multi-Stakeholder Recovery Project, a venture of Businesses and Environmentalists Allied for Recycling (Multi-Stakeholder Recovery Project, 2002). While the project attempted to produce impartial research by finding consensus within an alliance of businesses, recyclers and environmentalists, it continues to be controversial, and some stakeholders dispute its findings (City and County of Honolulu Department of Environmental Services, 2002). The Multi-Stakeholder Recovery Project nonetheless provides important guidance for modern bottle bill initiatives. For instance, stakeholders have used the project's data and concepts to design lists of "essential elements" of bottle bills (Grassroots Recycling Network, 2005).

Aluminum beverage containers generate considerable income for Wisconsin's recycling centers. The California deposit system shows that bottle bills can complement existing recycling programs rather than create competition for them. In 1982 California's first attempt at a bottle bill failed in large part due to opposition from private sector recyclers who feared that the bottle bill would undermine their growing businesses. The defeat of the 1982 bill led environmental groups, local government officials and private sector recyclers to develop legislation that accommodated existing private and non-profit recycling programs. California's deposit system ultimately passed in 1986 (Californians Against Waste, 2008).

Under traditional bottle bills, consumers return containers to retail stores and the stores sort containers by brand. The California system gives consumers several options. They can return containers to private recycling centers and claim the redemption value. They can donate containers to a non-profit recycling program that claims the redemption value. Consumers can leave the containers for curbside pickup, which allows the municipality to claim the redemption value, or they can return containers

to a supermarket-based recycling center, what is called a “convenience zone.” The California law requires that supermarkets with gross annual sales of more than \$2 million must ensure that a recycler is located within a half-mile convenience zone. If none exists, the supermarket itself must redeem containers or attempt to receive a waiver from the state (California Department of Conservation, 2007).

This approach saves time and money for many interests. California has about 40,000 beverage retailers, and a traditional bottle bill would require each retailer to redeem containers and sort them by brand. The California deposit system, however, distributes redemption operations among approximately 1,100 recycling centers in the state. A 1991 study by the accounting firm Ernst & Young concluded that the California system “is significantly more cost-effective than traditional deposit legislation, saving California consumers and business between \$245 {million} and \$390 million annually” (California Resource Recovery Association, n.d.). Systems that require retailers to handle redemptions had average administrative costs of 2.3 cents per container; a 1995 study commissioned by the U.S. Environmental Protection Agency estimated that California’s system reduces administrative costs to 0.2 cents per container redeemed (Anderson, 2001).

While California’s system addresses retailers’ costs, other systems attempt to alleviate the expenses incurred by beverage bottlers and distributors. Oregon’s system allows distributors or bottlers to retain unclaimed deposits. This feature contrasts with deposit systems in which unclaimed deposits revert to the state government, but Oregon’s law also keeps open the possibility that distributors and bottlers could realize additional revenues from unclaimed deposits (Oregon Department of Environmental Quality, 2007). The Oregon Department of Environmental Quality (2004) estimates that beverage distributors retain between \$11 million and \$13.5 million annually due to unredeemed containers.

A Wisconsin bottle bill also would have to strive to make an environmental impact by being comprehensive and offering a financially significant deposit. Maine has perhaps the most stringent deposit law in the United States, requiring deposits that range from 5 to 15 cents on containers of all beverages—including increasingly popular bottled water and sports drinks—with the exceptions of dairy products and unprocessed ciders. Michigan is an exemplar of a high-deposit state; its 10-cent deposit achieves an overall container recovery rate estimated at 95 percent, the highest in the United States (Anderson, 2001; Governor’s Task Force, 2006).

Evaluation of Alternatives

This section evaluates each of the three policy alternatives on the basis of the impact categories: environmental, economic and political feasibility. As this study examines the feasibility of a bottle bill that would apply statewide, it likewise evaluates PAYT and comprehensive curbside systems on the assumption that each system became more prevalent throughout Wisconsin. Our analysis of expanded comprehensive curbside programs assumes they would operate on a single-stream basis.

Pay-As-You-Throw

Environmental Impacts: As noted earlier, PAYT programs place a charge upon households and businesses for incremental increases in waste. This additional per-unit charge differs from traditional municipal refuse collection funded by a one-time fee included in annual property tax assessments. PAYT programs encourage participants to lower waste generation by recycling more and purchasing goods with less packaging. Skumatz & Freeman (2006) estimate that municipal solid waste tonnages drop by an average of 17 percent due to changes in consumer behavior spurred by PAYT. Diverted recyclable material saves energy and greenhouse gas emissions, and PAYT programs in the United States save between 7.4 million and 13.3 million metric tons of carbon dioxide equivalents each year. Estimated energy savings are between 6.1×10^{13} and 1.1×10^{14} British thermal units (Skumatz & Freeman, 2006). Although this amount only represents 0.11 percent of annual U.S. energy consumption (U.S. Energy Information Administration, 2007), lower waste volumes permit individual communities to devote less space to landfills.

PAYT systems create incentives for some scofflaws to dump their waste rather than recycle it, which would limit the environmental benefit (Fullerton & Kinnaman, 1995). Common forms of illegal diversion are littering, burning and dumping in others' waste receptacles. Some consumers place non-recyclable materials in recycling bins. Another undesirable disposal method is waste compaction. Consumers may try to maximize the value of their waste containers by forcing into a single receptacle as much refuse as it can hold. In this case, PAYT systems may reduce overall volumes of waste generated, but the weight of waste generated may not have a corresponding decrease. Communities can limit illegal diversion through preventive measures such as locks on waste containers and vigilant enforcement of violations coupled with significant fines (Miranda, Bauer & Aldy, 1996). Fullerton & Kinnaman (1995) suggest disposal fees coupled with rebates on certain products limit illegal diversion. Complementary programs such as recycling and hazardous waste pickups also encourage proper disposal (Miranda, Bauer & Aldy, 1996).

Economic Impacts: The major economic impact of introducing PAYT systems is on cost savings to municipalities from reduced waste volume and increased recyclable volume, leading to lower collection costs and higher revenues from the sale of recyclable materials. Additional costs of equipment, new billing systems,

public education, enforcement and increased collection may offset savings. Net savings may vary across localities (Miranda, Bauer & Aldy, 1996).

PAYT systems may raise equity issues in terms of the burden on low-income residents in communities that switch from a flat-fee refuse collection system funded by local taxes to a charge paid by waste-producing households. Low-income residents may spend a larger proportion of their income on waste disposal than wealthier residents and have fewer ways to reduce waste volume generated. Some studies show, however, that low-income residents generate lower volumes of waste than wealthier residents. This suggests that PAYT systems could be more progressive than flat-rate systems funded by local taxes, as low-income households would spend a lower proportion of their income on waste generation or be more responsive to PAYT incentives in reducing wastes (Miranda, Bauer & Aldy, 1996). Communities have also devised PAYT systems that address the ability of low-income households to pay for incremental trash services. For municipalities with a multi-tier system and a fixed-rate base collection fee, base fees can be reduced or eliminated for residents below a certain income threshold. Municipalities have also experimented with distributing free bags, tags and stickers to low-income residents. This can occur in conjunction with other forms of public assistance (Canterbury, 1994).

Political Feasibility: Public support for PAYT systems frequently depends on the local method of financing waste collection. Communities that fund waste collection through property tax assessments may encounter resistance. Residents using such flat-rate systems may perceive their waste collection as free. New PAYT systems could appear to be an additional tax, and a new PAYT system would be a new tax if municipalities do not adjust flat fees to account for unit pricing. Conversely, municipalities in which residents pay a regular bill for waste collection may find support for new PAYT systems. Unit pricing gives residents the possibility of lowering their individual costs of waste collection (Canterbury, 1994). Multiple studies since the mid-1980s show widespread approval of many communities' PAYT programs (Miranda, Bauer & Aldy, 1996).

Administrative Feasibility: PAYT systems present several administrative challenges. One barrier is incorporating multi-unit dwellings and businesses that use common waste receptacles. Tracking the waste contributions of each occupant may be difficult or impossible (Miranda, Bauer & Aldy, 1996). Even if landlords of a single property paid for all occupants' waste, landlords may have little incentive to pass along per-unit charges to each occupant for the actual amount of waste individually generated.

PAYT systems require supporting programs and infrastructure to limit illegal diversion. Supporting programs may include common services such as recycling and may also feature collections of yard waste, holiday greenery, appliances, furniture and reusable goods (Miranda & Aldy, 1996). Thus a PAYT cannot stand alone as an

effective recovery/recycling program. Implementing PAYT would introduce costs for some municipalities.

Disproportionate impacts may also fall on waste haulers, whether they are municipal collectors or private contractors. Uncertainty in the amount of trash generated by households and businesses can leave haulers with less trash and lower revenues than anticipated in their regular business planning (Miranda, Bauer & Aldy, 1996). Multi-tier systems attempt to address revenue uncertainty for all haulers by generating some fixed base income to complement additional per-unit collections.

The biggest administrative challenge in Wisconsin is the means of expanding PAYT systems. Individual communities now exercise considerable jurisdiction over their waste collection, and mandating a switch to PAYT could impose significant costs on communities as they adjust pricing schemes and adapt their waste collection practices.

Comprehensive Curbside

Environmental Impacts: Comprehensive curbside recycling has a strong likelihood of producing environmental benefits. Comprehensive programs collect many types of recyclables and wastes. This allows consumers to divert beverage containers as well as other material such as non-beverage recyclable containers and multiple types of paper. Environmental benefits vary by community. Places with comprehensive curbside recycling programs would realize little or no additional environmental benefit. Municipalities that collect additional containers would generate greater environmental benefits. Madison is one recent example. It began single-stream comprehensive recycling in 2005 and increased overall recycling by 25 percent after one year (Solid and Hazardous Waste Education Center, n.d.).

Contamination of material mitigates some environmental benefit of single-stream comprehensive recycling. The greatest contamination risk is broken glass mixing with plastic beverage containers and paper. Contaminated plastic and paper is unusable in markets for post-consumer recyclables. Most contaminated containers, papers and other materials go to landfills (Solid and Hazardous Waste Education Center, n.d.).

Economic Impacts: Economic impacts on consumers vary. Single-stream comprehensive curbside collection generally reduces opportunity costs on consumers by making recycling convenient and by reducing the time and effort required to sort recyclable and non-recyclable materials. The value of saved time aggregated over the state and over any period of time is difficult to estimate. Any net environmental benefits from increased recycling would be perhaps the best evidence that consumers realize value from comprehensive curbside collection. Consumers may participate in recycling programs, however, and still lose incentive to reduce the waste they generate. Most municipal curbside programs receive funding from property tax assessments that charge households and businesses

uniform fees to cover recycling costs. Although curbside recycling gives consumers the convenience of recycling materials, consumers paying flat fees lose other incentives to purchase goods that use less packaging.

Curbside approaches introduce few if any additional costs to bottlers, distributors or retailers. These interests thus favor curbside collections. Recycling facilities may incur the most significant costs from single-stream curbside recycling. Paper and beverage containers contaminated with broken glass limit the marketable material available for recycling facilities to resell (Van Rossum, 2008). These costs are passed along to municipalities and consumers within the recycling system. Municipalities pass along the costs of recycling and garbage collection to property owners through tax assessments. These indirect costs to consumers include landfill tipping fees and the expense of staff and vehicles used in the collection. Municipalities recoup some of their costs single-stream recycling through sale of marketable post-consumer materials. Some of this benefit dissipates with contamination, such as when glass breaks and mixes with other materials. In addition, single-stream recycling collections cost more to sort at recycling facilities (Van Rossum, 2008).

Political Feasibility: Curbside programs are standard in many Wisconsin municipalities. The DNR (n.d.b) estimates that at least-two thirds of Wisconsin residents have access to curbside collection services. Communities and recycling companies make significant infrastructure investments in expectation of single-stream curbside recycling programs. Municipalities such as Madison have made significant investments in single stream, and, as recently as January 2008, the recycling partnership serving Brown, Outagamie and Winnebago counties passed measures approving and funding construction of a \$7.9 million recycling facility capable of single-stream material processing. Private enterprise is also heavily invested in single-stream. A commercial waste processor is building an \$18 million single-stream facility in Germantown (Lowe, 2008). Private and public institutions with significant investments in single-stream infrastructure will be much more likely to support the consolidation and expansion of comprehensive recycling over other policy alternatives.

Administrative Feasibility: Single-stream comprehensive curbside systems lend themselves to relatively easy operation by municipalities and waste collectors. Single-stream systems require only single-compartment collection trucks that can double capacity for a municipality's trash collection. This feature saves municipalities between five and 25 percent on recyclable collection costs (Solid and Hazardous Waste Education Center, n.d.). Funding and billing for single-stream curbside generally occurs through normal tax assessments levied by municipalities.

Bottle Bill

Environmental Impacts: Duplicating Michigan's high deposit and Maine's comprehensiveness of recyclables would likely achieve higher recycling rates with a greater environmental impact in Wisconsin. The primary reason bottle bills are successful is the economic incentive provided to consumers and retailers. This suggests that environmental net benefits are contingent on sufficiently high bottle deposit amounts that discourage litter and other diversion. Deposits cannot be so high to inefficiently reduce beverage consumption or promote fraud in redemptions, however.

A means of ensuring significant value of a deposit is tying the deposit value to adjust to an index such as the consumer price index or the minimum wage. Flat nominal deposit amounts lose real value against inflation over time. Container deposits of 5 cents that began in the early 1970s would be worth about 25 cents today if indexed for inflation (U.S. Department of Labor, Bureau of Labor Statistics, 2008). This loss of real value over time may explain why recovery rates in bottle-bill states have dropped from about 85 percent to 75 percent (Container Recycling Institute, 2003a). Michigan has a return rate of 95 percent and requires a 10-cent deposit on the same container that be redeemed for 5 cents in other states (Heinlein, 2007). A California study concluded increasing California's redemption value to 10 cents would increase the recycling rate to about 90 percent (Toto, 2004).

The environmental impact of a bottle bill would also be greatest with a comprehensive bill like Maine's that covered many types of beverages and beverage containers. Since the implementation of bottle bills in the 1970s and 1980s, beverages such as single-serving bottled water, juices, teas and sports drinks have gained prominence in the market. Many of these products were an insignificant segment of the market in the 1970s and 1980s. Sales of beverages in PET plastic containers grew from 12 billion bottles in 1992 to 34.6 billion in 1998, however, and PET plastic bottle waste increased by 210 percent during the same period (Container Recycling Institute, 2000). The 3.2 billion pounds of PET bottles sent to landfills in 2002 was almost three times the amount wasted in 1995 (Container Recycling Institute, 2003b). The Container Recycling Institute predicts these new drinks will outsell traditional carbonated beverages such as soft drinks and beer by 2010 (Heinlein, 2007). Table 5 shows how consumers' use of beverage containers changed from 1973 to 2003. Maine's bottle bill includes most containers on the market, with the exception of containers for milk and unprocessed ciders (Governor's Task Force, 2006). A Wisconsin bottle bill would have to include plastic beverage containers to bring about positive environmental outcomes.

Table 5. Change in Composition of Post-Consumer Containers, 1973-2003 (Billions of Containers per Year)				
	1973	1983	1993	2003
Aluminum Cans	10	56	94	100
Glass Bottles	25	32	32	36
PET Plastic Bottles	0	4	9	48

Source: Franklin, 2005

Despite these positive impacts, bottle bills may cut into environmental benefits. The implementation of a bottle bill where curbside recycling already exists creates a parallel recycling stream as individual consumers drive to redeem containers at recycling facilities and other collection points. Individual automobile trips produce emissions and use energy, and even small incremental expenditures and emissions may be significant if aggregated. This may be mitigated by the fact that containers might be recycled on trips that would have been taken anyway. Consumers avoid these outcomes if they relinquish containers to municipal curbside programs, but one would not expect most consumers to be willing to give up their deposits (Morgan, 2008). Critics of bottle bills also contend that deposits divert attention from curbside and drop-off programs by focusing attention on containers that account for less than three percent of the waste stream.

Economic Impacts: The economic impacts of a bottle bill on relevant parties are somewhat unclear because of competing dynamics. First, a deposit system would divert some valuable materials, namely aluminum and plastics, from community programs. Depending on composition, this could hurt an existing system (Van Rossum, 2008). Aluminum containers in particular sell at steadier prices, and stable revenue sources are important to the operations of recycling facilities and municipal programs. Recycling centers may appear to be able to do without aluminum at a given point in time due to a temporary high price in other recyclables, but price fluctuations in markets for other materials could be damaging. A California-based deposit system that defines a clear role for recycling facilities is a good model for reducing the economic threat to private recyclers.

Second, although some valuable materials would leave municipal recycling streams under a deposit system, the loss of glass might benefit municipalities and recycling facilities that use a single-stream system, since materials contaminated with broken glass can reduce marketability of some materials. Municipalities could then sell “cleaner” paper to recycling facilities and realize increased revenue. Eliminating broken glass could lift a cost on recycling centers. Broken glass also can damage processing machines, and it presents occupational hazards (Van Rossum, 2008). A prediction is difficult to make as to which of these two dynamics would substantially affect economic considerations of a bottle bill.

A deposit/return system based on retailer redemption of containers can result in higher costs for retailers. Retailer-based systems often require retailers to create space to store beverage containers, purchase equipment for storage and recycling, and allocate staff to oversee deposit refunds and container sorting. Again, the California system that shifts redemption from retailers to recycling facilities shows how to offset these costs.

Deposit laws also impose costs on bottlers. In some states with deposits, bottlers must pay a per-container surcharge to retailers or other redemption centers for costs incurred during the handling of containers. Another burden on bottlers is the pickup of redeemed containers. Beverage companies may perform any or all of these services themselves, or they may enter contracts with third parties. Oregon addresses these costs on bottlers by allowing them to keep unclaimed deposits. Such a provision minimizes economic impacts on bottler and distributor groups.

As with the other policy options, increased recovery caused by a bottle bill has significant private and social economic benefits, including reduced landfill use, and energy and materials savings. The Container Recycling Institute estimates more than 1 trillion aluminum cans valued at more than \$500 million per year have been disposed of in landfills or as litter since 1972 (Toto, 2004). Reclaiming this material confers benefits on municipalities, recycling facilities and bottling companies that can reduce their demand for products made of newly mined materials.

In all states with beverage container laws, deposits give residents incentive to recycle their containers. To low-income individuals this incentive is rather strong, but for those with substantially higher income this incentive dissipates (Ashenmiller, 2006). Additionally, this incentive may have the unintended consequence of creating a viable substitute to employment for low-income individuals who turn in recyclables for the deposits (Ashenmiller, 2006). Given that this research is in its initial stages, the full impact of these effects is difficult to quantify.

Political Feasibility: A primary consideration from the political perspective is the distribution of costs, although proponents and opponents often frame the debate in terms of economic efficiency, comparative ecological benefits and even morality. Determining an equitable distribution is politically difficult; at this time opponents outnumber proponents of bottle bills. Deposit laws have faced significant political opposition across the country despite their efficacy in recovering post-consumer containers. Efforts for new, expanded or amended bottle bills have failed repeatedly across the country. Wisconsin has failed to pass a bottle bill on at least 15 occasions since the late 1960s. A bottle bill is still unlikely to pass in Wisconsin unless proponents can collaborate with industry.

Legislative failures are due to a disparity between the strength of opponents and proponents for several reasons. First, because costs are narrowly concentrated and benefits are much more diffuse, opponents tend to be highly motivated and willing to

spend more than supporters to fight bottle bills. The core political debate is whether consumers or the government is solely responsible for post-consumer container waste or if the beverage industry shares responsibility. Most bottle bills place some of the responsibility of post-consumer container waste on producers, bottlers and distributors. Observers in Hawaii, the most recent bottle-bill state, suggest that bottlers and distributors resisted arguments that they should take on greater responsibility for a product throughout its lifecycle from manufacturing to recycling (Jones, 2008). Because deposits increase costs for bottlers and distributors and requires them to undertake activities outside of their preferred scope of business, these business interests oppose bottle bills. Therefore, bottle bills tend to have not only local opponents (such as grocers), but also well-funded, national opponents. Some common opponents, such as Anheuser Busch or the National Beer and Wholesalers Association, have a national or international scope, sophisticated lobbying support and significant funding.² This has led to a tremendous difference in funding and logistic support between opponents and proponents. Table 6 shows the differences in funding in several states in which citizens' ballot initiatives or state legislatures proposed bottle bills.

Table 6. Spending on Bottle Bill Initiatives (Includes new legislation, repeal efforts, and modifications)		
	In Favor	Opposed
Colorado (1976)	\$25,000	\$51,000
Maine (1976)	\$26,000	\$404,000
Michigan (1976)	\$117,000	\$1,219,000
Nebraska (1978)	\$11,000	\$350,000
Maine (1979)	\$165,000	\$22,000
Ohio (1979)	\$88,000	\$1,550,000
Washington (1979)	\$72,000	\$968,000
California (1982)	\$900,000	\$5,800,000
Colorado (1982)	\$500,000	\$2,500,000
Massachusetts (1982)	\$250,000	\$1,000,000
Washington (1982)	\$248,000	\$966,000
Washington D.C. (1987)	\$80,000	\$2,297,000
Oregon (1996)	\$400,000	\$3,200,000
Columbia, MO (2002)	\$16,000	\$88,000

Source: Container Recycling Institute, n.d.a

² Other corporations and industry groups opposed to bottle bills include the Coca Cola Company, Pepsi-Cola Company, Aluminum Association, International Bottled Water Association, Can Manufacturers Institute, National Food Processors Association, National Grocers Association, Distilled Spirits Council of the United States, American Beverage Association and Food Marketing Institute (Container Recycling Institute, n.d.b).

Second, traditional bottle bills presented a scenario of costs being focused on a narrow, well-funded and motivated minority. The benefits of a bottle bill accrue over time to a diffuse and less motivated majority. Well-funded opponents would see an immediate effect on their operations and bottom lines. An average citizen likely supports recycling and conservation, but incremental increases in recovery rates of recyclable materials are unlikely to sway focused, vociferous opposition or inspire significant support from the public at large, no matter how important those increases are to ecological outcomes.

Administrative Feasibility: A common criticism of bottle deposit programs is their high administrative cost. A Businesses and Environmentalists Allied for Recycling report found that bottle deposit laws have higher costs than curbside recovery programs or residential drop-off programs. According to the report, the weighted average net cost of container recovery is 1.53 cents per container in deposit states and 1.25 cents in non-deposit states. There is variation, however, among bottle-bill states in terms of the net cost of container recovery. For instance, in states with traditional bottle bills, the average net cost of container recovery is about 2.21 cents per container. The costs are high in those states because the older laws require retailers to store containers on site and sort them by brand. This introduces additional labor expenses and storage space. Also, under traditional deposit laws, beverage companies must arrange for containers to be picked up, transported and processed for sale as scrap material (Multi-Stakeholder Recovery Project Task Force, 2002).

California's plan sidesteps many of these administrative issues. Consumers may redeem containers at traditional recycling centers and in convenience zones. These facilities have low costs for collection and processing, and they do not require sorting by brand or distributor. The net costs of container recovery under a California-style deposit system are similar to the net costs of curbside recycling programs. Another option to reduce administrative costs is the adoption of reverse vending machines into which customers can insert containers and receive their deposits. Reverse vending machines can reduce the net costs of bottle deposit programs by 1.13 cents (Multi-Stakeholder Recovery Project Task Force, 2002).

Recommendation

A bottle bill is a complex issue for Wisconsin, which contrasts with all deposit-law states except Hawaii in that a Wisconsin bill must account for changes in beverage consumption and the existence of a mature recycling and recovery industry. This complexity prompts us to recommend further study of Wisconsin's waste stream to determine whether recovery of containers and their subsequent recycling has increased since the last examination, in 2003. If total recovery rates have not increased, these data would provide the foundation for forging an alliance among the diverse interests involved with beverage containers to pursue a bottle bill in Wisconsin that would help residents and businesses.

We base our conclusions on several key factors.

While Wisconsin's beverage container recovery rate is less than those of states with bottle bills, Wisconsin's beverage container recycling rates compare favorably to those of non-bottle-bill states. The U.S. Environmental Protection Agency estimates that the national recycling rate was 32 percent in 2006; Wisconsin's most recent estimates put the statewide recycling rate at 41 percent to 51 percent for plastic containers, and 55 percent or greater for glass, aluminum and steel containers (U.S. Environmental Protection Agency, 2007a; Wisconsin DNR, 2003). Recyclable materials also account for low percentages of all municipal solid waste by tonnages. A 2003 study of Wisconsin's waste streams conducted for the DNR by Cascadia Consulting Group found that aluminum cans accounted for 0.3 percent, glass bottles accounted for 0.9 percent, PET bottles accounted for 0.2 percent and HDPE bottles accounted for 0.4 percent of each ton of municipal solid waste. Wisconsin's recycling rate of at least one type of container even exceeds the same rate of neighboring Iowa, which has a container deposit program. As of 2003, Wisconsin residents threw away nearly 4,000 fewer tons of HDPE plastic than did Iowa residents (Wisconsin DNR, 2003). Studies also indicate significant participation in and support for recycling among Wisconsin households. The DNR's *Residential Recycling in Wisconsin* (n.d.b) survey found that between 88 percent and 92 percent of households recycle containers made of plastic, glass, aluminum and other metals.

Such public support gives strong rationale for municipalities and private waste haulers to build infrastructure and make investments. Newer efforts by municipalities and private waste haulers may not have had sufficient time to achieve higher recovery rates of recyclables. As such, we suggest that a bottle bill may prove most feasible after another study of the composition of the waste stream in Wisconsin. The DNR's most recent waste studies, the one by Cascadia Consulting Group and another by Franklin Associates Ltd., are from 2003 (Wisconsin DNR, 2003). New studies would show any advances in recovery and recycling made by expanded infrastructure and investments in recycling.

A recovery-rate threshold set by the department could serve as a criterion for beginning a bottle bill campaign. We do not at this time suggest a specific threshold, but the Businesses and Environmentalists Allied for Recycling report suggests a recovery rate of 80 percent (Multi-Stakeholder Recovery Project Task Force, 2002). Although 80 percent marks a substantial jump for many categories of recyclable materials in Wisconsin, we could reason that evidence of little or no growth in recovery rates would be a sufficient condition for the state to pursue a bottle bill.

While we do not recommend pushing for prompt passage of a bottle bill at this time, we do not recommend dismissing it in the long term. A bottle bill in Wisconsin could be successful if it aligns with current administrative realities and promotes economic efficiency while satisfying a diverse set of political interests. We can envision a deposit system working with either or both PAYT and curbside programs. Several questions require further exploration, however, and subsequent studies should ensure that a bottle bill would achieve higher recycling rates by complementing Wisconsin's recycling industry. A bottle bill should not create excessive costs, and it should not compromise Wisconsin residents' propensity to recycle. We outline three primary issues and a brief discussion of each.

Relationship between a bottle bill and material recovery

This study considers the argument that deposits provide incentive for consumers to return containers. States enacting bottle bills historically achieve sharply higher recovery rates. Hawaii's recycling rate reached 68 percent by 2006, compared to 20 percent prior to passage of the 2002 bottle bill (Hawaii Department of Health, 2007; Dingeman, 2004). It is uncertain whether Wisconsin would realize a comparable increase in recycling since Wisconsin recycling rates are already relatively high. Some statistics show Wisconsin's recycling rates for materials such as glass may exceed 68 percent (Wisconsin DNR, 2003). Further study should consider in greater depth the dynamics of the post-consumer resale market for recycled materials collected by municipalities with curbside recycling. A deposit system would reduce aluminum placed in municipal recycling programs, but it also could remove breakable glass from recycling streams. Less broken glass could increase the amount of post-consumer paper that municipalities can resell, and such a revenue increase could offset losses of other materials.

Possible compromise of increased recycling by additional energy used to claim deposits

A Wisconsin bottle bill as conceived herein would operate through recycling facilities as the California system does without impinging on community curbside collections. Consumers who wish to reclaim deposits would have to travel to recycling centers. Decentralized transportation of containers could promote extra trips by individual automobiles in urban and rural areas when residents drive to drop-off collection sites. This would not result in significant duplicate trips in rural areas where drop-off recycling service is more common than curbside pickup. For less populous areas with

curbside services, however, individual redemption trips could lead to new energy use and emissions. This change in consumer behavior could diminish the energy-saving benefits of increased recovery, but the extent of this problem is difficult to predict.

Political feasibility

Prospects for passing a bottle bill depend on a political process that works with the beverage industry rather than against it. The process must ameliorate or eliminate negative impacts on existing recycling systems. A bottle bill based on the strategies used in California, Maine and Hawaii would offset costs to multiple interest groups and result in enhanced political feasibility. Part of a move forward in Wisconsin would be an effort toward an honest debate. Opponents and proponents of bottle bills tend to frame the debate in ways that paint the other side as uninformed and irresponsible. Supporters tend to cast opponents as dangerously irresponsible and label legitimate cost concerns as “myths” (Container Recycling Institute, n.d.e). Proponents acknowledge that these costs exist and argue that industry should bear them. On the other hand, opponents hesitate to discuss their core reasons for opposing bottle bills, leaving observers to speculate about aversion to producer responsibility or aversion to new costs and burdens.

As with many contentious issues, agreement may be possible. Wisconsin may find entrenched positions difficult to bridge, but reconciliation is a necessary precursor for a successful bottle bill. The Businesses and Environmentalists Allied for Recycling report and private initiatives relating to it may provide some places to begin to find consensus. Initiatives based on Multi-Stakeholder Recovery Project data tend to have elements that are more responsive to opponents’ main concerns.

Hawaii implemented a successful deposit law during this decade. It drafted a law more friendly to industry than had been common in other states by placing redemption responsibilities on recycling centers rather than retailers and by managing deposits and disbursements from a centralized state fund for ease of administration (Hawaii Department of Health, n.d.a and n.d.b; City and County of Honolulu Department of Environmental Services, 2002). Proponents also coordinated action among counties, state agencies, environmental organizations and local recycling companies. In any jurisdiction attempting to pass a bottle bill, it may not be possible to overcome the organized opposition a bottle bill would likely face without committed and unified support from proponents (Jones, 2008). This broad level of support could be difficult to achieve in Wisconsin due to significant investments in single-stream solutions by public entities and recyclers.

Given these concerns, we briefly consider other immediate options for increasing recycling rates in Wisconsin. State and local agencies could implement these options in the short term within existing recycling programs. These recommendations reflect the state of recycling in Wisconsin in 2008.

First, the DNR finds that Wisconsin residents recycle at home, but recycling rates away from home fall dramatically (Wisconsin DNR, n.d.a). A two-pronged approach to out-of-home recycling merits consideration. One prong is increased public education, which could inform the public about the costs associated with littering or throwing away recyclable material in parks or at other special events and about ways to recycle. The second prong is expanding recycling grants or targeting existing grants to communities to achieve greater placement and maintenance of recycling receptacles at popular public areas such as parks. Public recycling receptacles could dramatically increase the convenience of out-of-home recycling.

The second short-term option would strive to improve in-home awareness of recycling and waste-reduction habits and practices. The DNR found in 2006 that residents' satisfaction with information on their community recycling programs had declined since 1998. Nearly one-third of respondents said they received no information on recycling from their local government in a year or more. A majority of respondents indicated that they received no information from their communities on ways to reduce waste. More than 90 percent of respondents had very little awareness of DNR's advertising campaigns on recycling. The study found that awareness of community recycling programs was less than 100 percent (Wisconsin DNR, n.d.b). These survey findings suggest that more effective communication from multiple levels of government could be a means, without additional legislation, of increasing recycling by Wisconsin residents. We acknowledge the DNR has attempted public education, and we recognize that creating effective programs may be challenging. Nonetheless, targeted, effective and creatively distributed educational materials could be a relatively inexpensive way of furthering recovery goals within existing systems.

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