

Creating a Deposit-Refund System to Achieve a More Circular Plastic Economy

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Abstract

Plastic is an essential part of everyday life and affords humans great ease; however, only a small percentage of plastic is recycled worldwide resulting in enormous amounts of waste and carbon emissions produced each year. In recent years, numerous countries and local governments have implemented Deposit-Refund Systems (DRS) on plastic beverage packaging to curb plastic waste. DRSs shift the cost of recycling from taxpayers to producers, by allowing consumers to drop off used plastic bottles at commercial stores or depots in exchange for money. Beverage companies then collect these bottles for recycling. Although individual case studies have explored DRSs, there are few comprehensive sources of information on the types of DRS strategies that are used and their effectiveness. This study collected data on 28 countries with 47 DRSs, identified the most effective DRS policies, and created an online database (<https://ioes.ucla.edu/deposit-refund-systems/>) summarizing the basic features of each system for which researchers may consult and contribute in their own studies. Furthermore, through statistical analysis this study found that the most common deposit-refund amount is \$0.05 USD, along with early evidence that there may exist a positive correlation between deposit-refund amount and recollection rate.

Introduction

Plastic is a ubiquitous part of everyday life, affording humans great ease, yet causing ever-increasing pollution that threatens human and ecosystem health. Specifically, humans produce more than 400 million tons of plastic waste each year and only 9% of it will ever be recycled (United Nations, 2012, p. 4,7). In 2012, the production of plastic resulted in approximately 390 million tons of CO₂ released into the atmosphere; and, it is estimated that by 2050, global plastic production will triple in output, going from consuming 6% of the world's oil to 20% (World Economic Forum, 2016, p. 7, 15). Thus, innovations in our plastic collection systems are crucial for curbing present rates of plastic waste and emissions and achieving a more circular economy.

In recent years, polyethylene terephthalate (PET) plastic has taken over the beverage packaging industry with 26% of the total volume of plastics produced used for beverage packaging alone (World Economic Forum, 2016, p. 7). PET plastic has become the most popular material used for the packaging of beverages such as water, soft drinks, and alcohol due to its lightweight nature and high durability (Welle, 2011). Water beverages packaged in PET containers have especially skyrocketed in production, going from 8.4 billion produced worldwide in 2000 to 42.6 billion in 2010 (Container Recycling Institute, 2013, p. 12).

To increase recycling, many government entities started in the 1970s to implement Deposit-Refund Systems (DRS) on beverage packaging to curb waste. Deposit-Refund Systems are recycling schemes that enact the idea of "Extended Producer Responsibility" (EPR). EPR is a concept in which the burden of paying to recycle discarded goods is shifted from taxpayers onto producers (Franklin, 1997). Recently, governments have begun integrating PET plastic into their DRSs.

Worldwide, Sweden is the current leader in PET DRS schemes. Its refillable PET return system began in 1991 and has a 98% recycling rate, while its one-way PET bottle recycling system began in 1994 and has a 79% recycling rate (Amano, 2004, p. 10). The Swedish system features consumers who drop off used PET plastic bottles at stores to be redeemed for a monetary sum and picked up by beverage companies. These beverage companies take PET bottles to plants, where caps and labels are discarded, bottles are washed, refilled, and transported back to stores. The Swedish refillable PET bottle can be reused up to 20 times with an average 3.3 refill rate per year (Amano, 2004, p. 40).

In the United States of America (U.S.), eleven states have implemented their own bottle deposit laws—covering 29 percent of the U.S. population (Viscusi et al, 2012, p. 197). Evaluating the U.S. non-deposit states for PET plastic have a recycling rate of 20% compared to 48% in deposit states (Container Recycling Institute, 2013, p. 10). Similar to the Swedish system, the U.S. system features consumers who drop off used PET plastic bottles at stores or recycling depots to be redeemed for a monetary sum. However, in the U.S., the recycling of PET plastic is run by independent recycling companies not bottle manufacturers.

These data give us a strong base of insight into the similarities and differences of PET plastic DSRs in the world. Although significant work has been done gathering data in individual case studies, an overarching model addressing what policy components are most effective at creating successful DRS programs currently does not exist. Thus, the objectives of this study include: 1) to collect data on all existing DRSs worldwide, 2) identify the most effective DRS policies, and 3) create an online database for researchers to consult and contribute information about DRSs. This data can provide policymakers with valuable information concerning the international successes and failures of plastic DRS programs such as the United States' and Sweden's PET deposit-refund systems. In turn, this knowledge will help aid policymakers in avoiding the creation of ill-informed policies that unnecessarily waste time and capital.

Approach

This study aims to identify all existing DRSs around the world and to identify their associated recycling rates. To identify current DRS programs, we gathered statistics and data from the scientific literature. Due to its worldwide scope, this project collected data from numerous sources of scientific literature. We organized the statistical findings of various scientific reports into the following nine variables: region, features, deposit amount, containers covered, PET deposit legislation, PET consumed, PET recollection rate, PET recycling rate, and state agency. Definitions of these nine variables is included below:

- **Region:** A physical territory with a national, state or municipal government and a DRS program.
- **Deposit Amount:** The amount of money that the consumer pays as a deposit at the point of sale and/or the amount of money that the consumer is refunded at the point of return.

- **Features:** Distinctive aspects of a DRS, including legal obligations and roles of the government, consumers, and producers in the flow of the deposit amount.
- **PET Deposit Legislation:** The year(s) a law regulating a DRS was passed or revised.
- **PET Consumed:** The amount of PET plastic bottles that consumers consume within a region.
- **PET Recollection Rate:** The proportion of total consumed bottles (i.e. **PET Consumed**) that are returned to a DRS program within one year. We can also use the formula: *PET Plastic Bottles Consumed / PET Plastic Bottles Returned*
- **PET Recycling Rate:** Calculated differently among the studies, but generally the proportion of plastic bottles reused in the manufacture of other goods.
- **State Agency:** The agency that runs a region's DRS operations--may be the government, a private company, or a nonprofit.

Methods

Literature Review

First, we conducted a literature review to search relevant articles, papers and news about existing Deposit-Refund Systems around the world. We use the following search engines: ScienceDirect and Google Scholar with phrases that combined keywords such as PET bottle, deposit-refund system, legislation, recycling rate, and specific country names such as “Canada” or “Mexico.”

Creating a Google Sheet & downloading csv

After completing the literature review, we placed all relevant data into a Google Sheet. We organized the Google Sheet in a manner that could be easily turned into code. Each of the nine variables (region, deposit amount, features, etc.) possessed its own column, allowing for each country's data to be placed into one row. An example of this formatting can be seen below (**Figure 1**). After completing this Google Sheets, we then download a comma delimited file (csv) of this data to the computer.

Region	Variable 1	Variable 2
Country 1	Country 1's variable 1 statistics.	Country 1's variable 2 statistics.
Country 2	Country 2's variable 1 statistics.	Country 2's variable 2 statistics.

Figure 1: Example Format of Google-Sheet

Creating a GeoJSON from csv

Next, we converted the csv file into a GeoJSON file using <http://convertcsv.com/csv-to-geojson.htm>. A GeoJSON file is a style of code that represents geographic data and it is often used to create maps online.

Adding GeoJSON and CSV to GitHub Repository

Finally, we uploaded both the csv and GeoJSON files to GitHub at <https://github.com/sophiasiqueiros/deposit-refund-systems> for safekeeping and mapmaking. Uploading both the csv and GeoJSON ensures that the methods are transparent to all map visitors. Furthermore, these files can be used by interested parties to create their own maps.

Results

Types of DRS Program

In total, the literature review revealed 28 countries with 47 DRSs currently in-place. 24 countries had national DRS programs, while four countries had local DRS programs (**Figure 2**). We defined a national DRS program as a DRS system set-up and mandated by national laws, and a local DRS program as a system set-up and mandated by regional laws. Of these 28 countries, more than half are in the European continent, followed by North America, Oceania, Asia, and Africa (**Figure 3**). The 24 countries with national DRS programs included: Austria, Latvia, Croatia, Cyprus, the Czech Republic, Denmark, Estonia, Micronesia, Finland, Germany, Hungary, Iceland, Kiribati, Latvia, Lithuania, the Netherlands, Norway, Poland, Slovakia, South Africa, South Australia, Sweden, Switzerland, and Scotland. The four countries with regional DRS programs included: Canada with 10 DRSs controlled by 10 different regional laws, China with 1 DRS controlled by 1 regional law, Mexico with 1 DRS controlled by 1 regional law, and the United States with 11 DRSs controlled by 11 different regional laws (**Appendix B**).

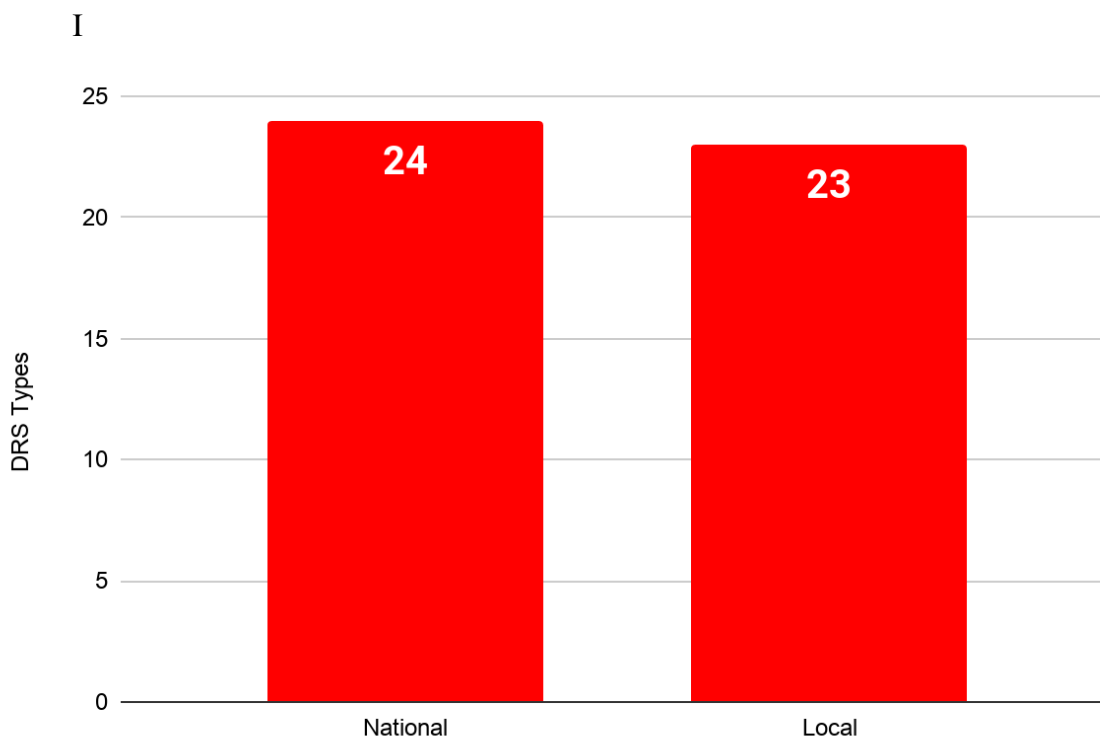


Figure 2. Count of national and local deposit-refund systems.

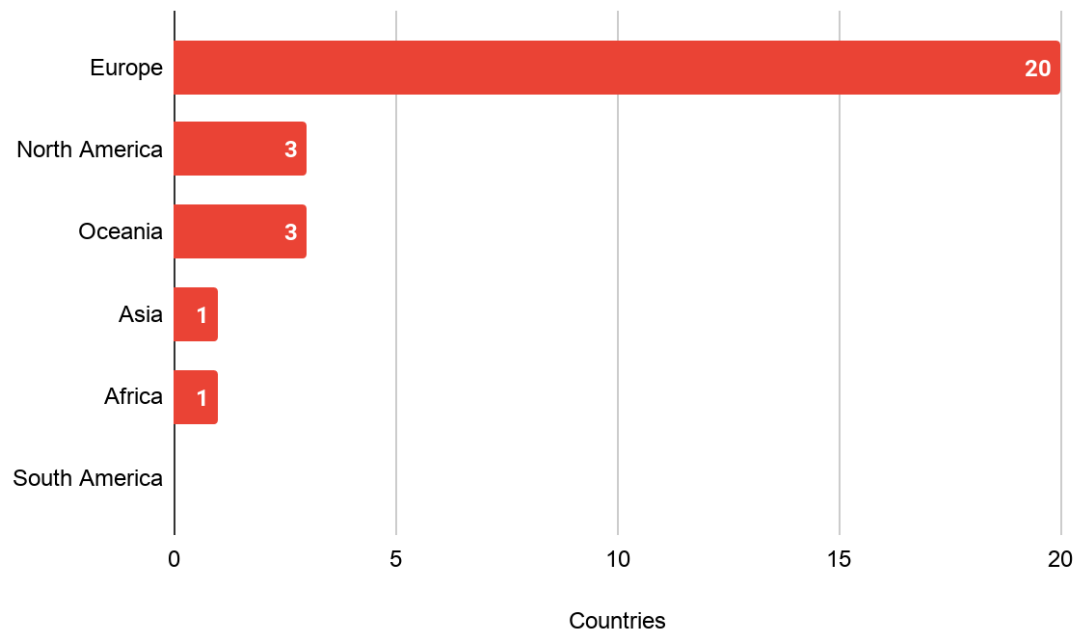


Figure 3. Count of deposit-refund systems by continent.

Population Covered

Collectively, these 47 DRSs cover about 579,267,957 people around the world (**Appendix B**). The 24 countries with national DRSs all covered 100% of their population (**Appendix A**). The four countries with local DRSs, however, did not cover 100% of their population. From population data, we found that approximately 57% of Canada's total population is covered by its 10 DRSs, 1% of China's total population is covered by its 1 DRS, and 28% of the United States' total population is covered by its 11 DRSs (**Figure 4**). It is also important to note that the proportion of Mexico's population covered by its 1 DRS could not be identified in the scientific literature. These statistics highlight that DRSs vary widely in their scope and size; for example, China's 1 DRS program covered more three times as many people as Canada's 11 DRS programs combined (**Figure 4**).

	Population Covered by DRS	Total Population	Proportion
Canada	21,468,744	37,704,762	57%
China	20,462,610	1,438,719,354	1%
USA	91,813,032	330,781,866	28%

Figure 4. Proportion of country population covered by local deposit-refund systems.

Deposit Amounts

We found information on the deposit-refund amounts for 33 of the 47 DRSs. These countries and regions included: Austria, Belgium, Canada-Alberta, Canada-British Columbia, Canada-New Brunswick, Canada-Newfoundland, Canada-Northwest Territory, Canada-Nova Scotia, Canada-Prince Edward Island, Canada-Quebec, Canada-Yukon, Denmark, the Federated States of Micronesia, Finland, Germany, Kiribati, Lithuania, the Netherlands, Norway, Slovakia, South Australia, Sweden, USA-California, USA-Connecticut, USA-Delaware, USA-Hawaii, USA-Iowa, USA-Maine, USA-Massachusetts, USA-Michigan, USA-New York, USA-Oregon, and USA-Vermont (**Appendix B**).

The distribution of deposit-refund amounts vary from less than \$0.05 USD to \$0.40 USD (**Figure 7**). We defined deposit-refund amounts as the amount of money that a consumer receives upon returning their PET bottles. The definition of deposit-refund amounts did not consider the amount of money that a consumer pays at the point of exchange. It is important to note that some DRSs, like South Australia or the Federated States of Micronesia, featured two different deposit-refund rates. South Australia's DRS deposit-refund amount is \$0.10 USD if returned to a retailer and \$0.05 USD if returned to a collection depot (**Appendix B**). The Federated States of Micronesia's DRS deposit-refund amount is \$0.05 USD back, although consumers pay \$0.06 USD at the point of sale.

We found that the most common deposit-refund amount was \$0.05 USD with 42% or 14/33 of the DRS programs refunding this amount. Furthermore, 6% of the DRSs featured deposit-refund rates of less than \$0.05 USD, 24% featured rates of more than \$0.05 to \$0.10 USD, 21% featured rates of less than \$0.10 to \$0.15 USD, 6% featured rates of more than \$0.15 to \$0.20 USD, and 3% featured rates of more than \$0.35 to \$0.40 USD. In fact, there is only one deposit-return rate of \$0.40 USD in Austria (**Figure 5**).

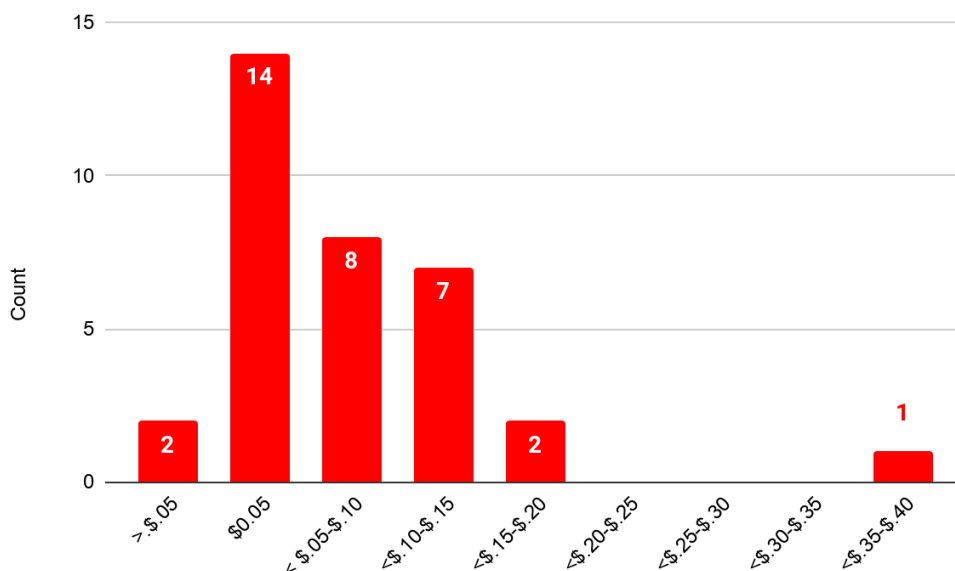


Figure 5. Count of deposit-refund amounts for PET bottles <0.5 L in current USD.

To investigate if there existed a difference in count when using purchasing power parity (PPP) instead of current exchange rates to convert foreign currency deposit-amounts, we used the World Bank's Eurostat-OECD PPP Program. It is important to note that we could only use PPP for data that was not already put into US dollars. 26 of the 33 deposit-return rates were reported

in US dollars within the scientific literature (**Appendix B**). Thus, we were able to use PPP on only 7 deposit-refund amounts. Although a small proportion, the difference in using PPP rather than exchange rates makes a significant difference. Almost 85% or 28/33 of the deposit amounts are in the more than \$0.05 to \$0.10 USD range compared to 67% or 22/28 using exchange rates (**Figure 5, Figure 6**). Furthermore, the proportion of deposit-refund amounts in the range of more than \$0.10 to \$0.15 USD is reduced to 6% or 2/33 from 21% or 7/33 (**Figure 6**). This rate nearly equalized with the proportion of deposit-refund amounts with less than \$0.05 USD, more than \$0.15 to \$0.20 USD, and more than \$0.35 to \$0.40 USD (**Figure 6**).

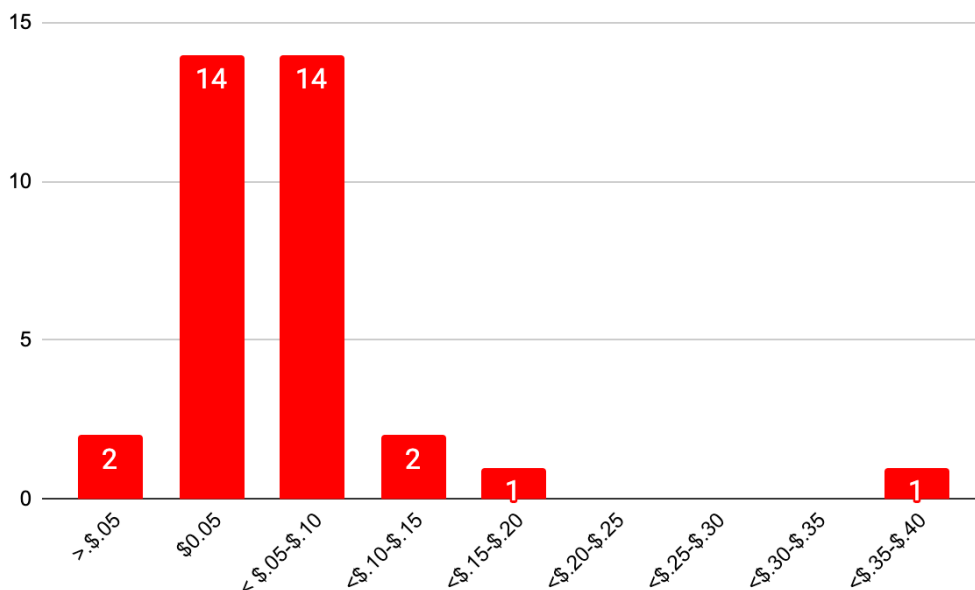


Figure 6: Count of deposit-refund amounts for PET bottles <0.5 L by PPP rate.

PET Recollection & Recycling Rates

Through the literature review, we found PET recollection rates for 25 of the 47 total DRSs (**Appendix B**). A recollection rate is defined as the proportion of total consumed bottles that are returned to a DRS program within one year. It is important to note that recollection rates were not reported in uniform measurements. 10 DRSs provided recollection rates for PET bottles alone, 8 DRSs provided recollection rates for all materials accepted within their programs including items such as aluminum cans and glass bottles, 3 DRSs featured separate recollection rates for both PET bottles and overall materials accepted, and 4 DRSs featured miscellaneous rates with measurements such as pounds collected or soft drink recollection rates.

To evaluate as much data as possible, we focused on PET recollection rates and overall recollection rates. Focusing on PET recollection rates, we evaluated 13 DRSs: Mexico, UK-Scotland, USA-California, USA-Iowa, Austria, USA-Oregon, South Australia, Sweden, Switzerland, Finland, Germany, the Netherlands, and China-Beijing. The distribution of these 13 DRS recollection rates varied from about 30% to almost 100% (**Figure 7**).

Focusing on overall recollection rates, we evaluated 11 DRSs: USA-California, USA-Massachusetts, USA-Connecticut, USA-New York, USA-Hawaii, USA-Maine, USA-Oregon,

Canada-Saskatchewan, USA-Iowa, USA-Vermont, and USA-Michigan. The distribution of these 11 DRS recollection rates varied from 61% to 97% (**Figure 8**). This is a much smaller range of 36 percentage points compared to the range of PET recollection rates of 70 percentage points.

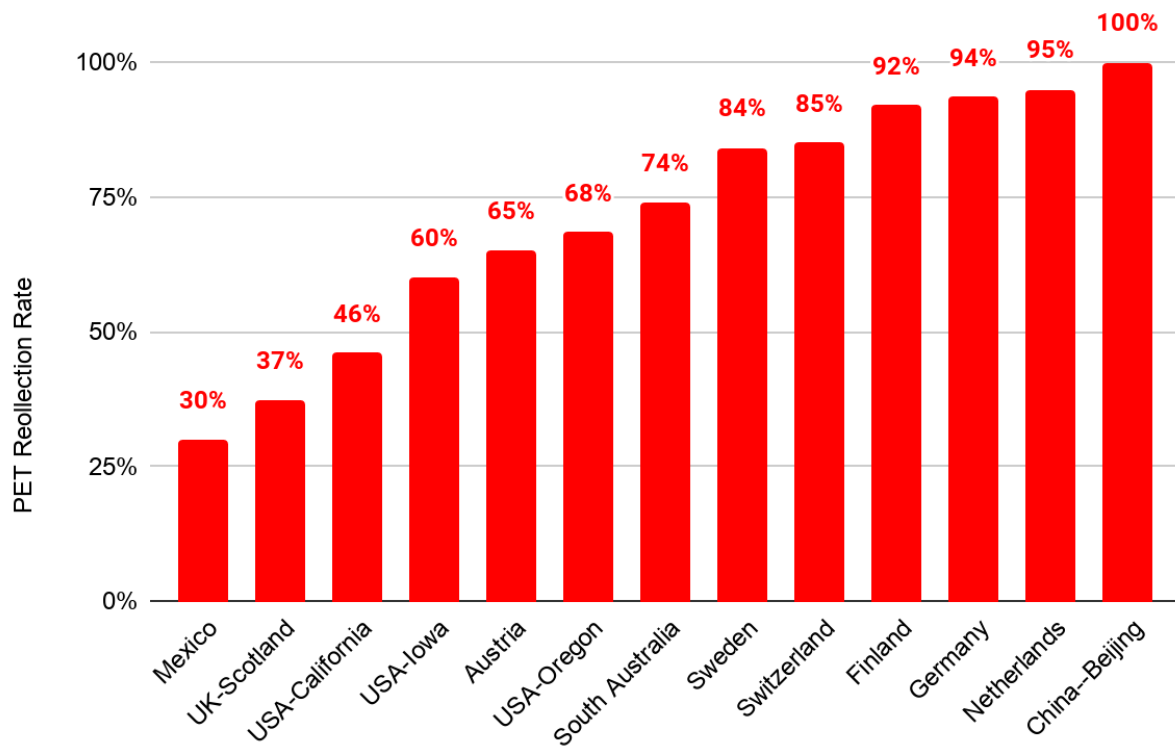


Figure 7: PET Recollection Rates for 13 DRSs.

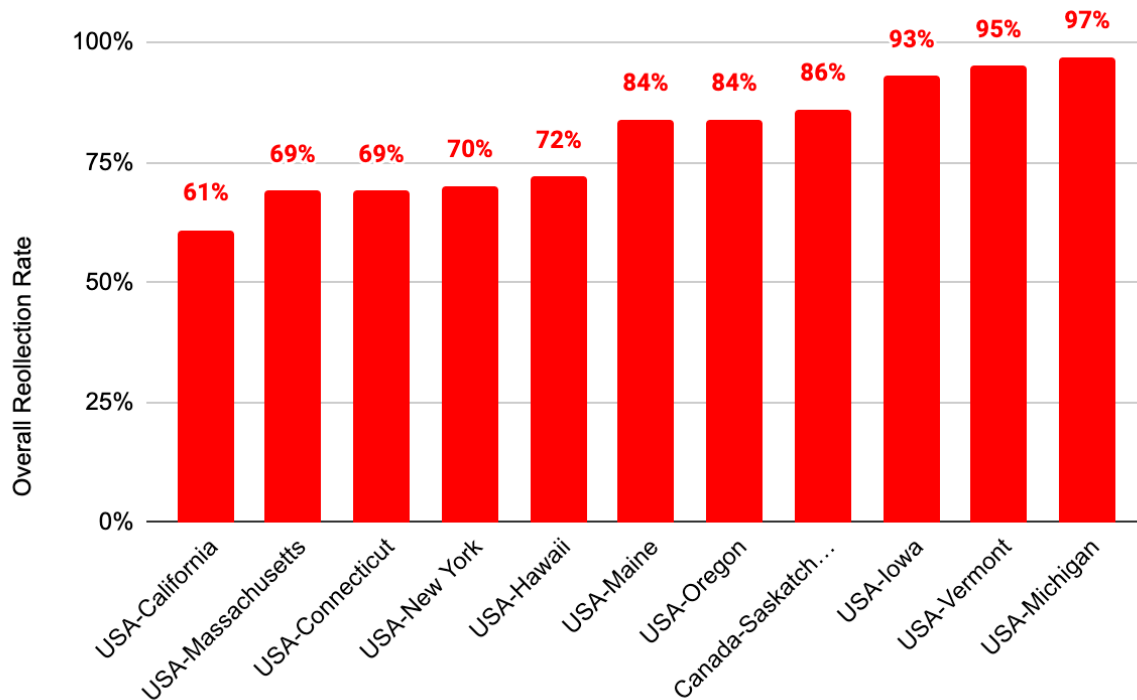


Figure 8: Overall DRS Recollection Rates for 11 DRSs.

Discussion

To explore if there existed a correlation between deposit-amounts and recollection rates, we directly compared DRSs for which we had both recollection rates and deposit-refund amounts (**Figure 9**, **Figure 10**). Overall, we were able to evaluate 9 DRSs on their PET recollection rates compared to their deposit-amounts (both by exchange rate and PPP value), and 10 DRSs on their overall recollection rates compared to their deposit-amounts (both by exchange rate and PPP value).

It is important to note that when evaluating **Figure 9**, we see three rows highlighted in yellow. These highlights indicate DRSs which reported their deposit-amounts in foreign currency. For these programs, we manually determined the US exchange rate and PPP rate. If a DRS is not highlighted, this indicates that no manual calculation occurred since the deposit-refund amount was reported in US dollars. Evaluating **Figure 10**, we see that all 10 DRSs are not highlighted. Because all deposit-refund amounts were reported in US dollars, there was no reason to determine PPP values.

Evaluating **Figure 9** and **Figure 11**, we see that generally as the PET recollection rate increases, so does the PET deposit amount both in exchange rates and PPP values. It is interesting to note, however, that USA-California, USA-Iowa, and USA-Oregon all feature deposit-amounts of \$0.05 USD but have PET recollection rates ranging from 46% to 68% (**Figure 9**). This indicates that the variation in PET recollection rates cannot be solely explained by the variation in deposit-refund amounts. Furthermore, when evaluating **Figure 11** we see a R^2 of 0.02. This means that the deposit-refund amount (in exchange rates) explains 2% of the total variation in the PET recollection rates. This low R^2 value seems to indicate there does not exist a correlation between deposit-amount and recollection rate. It is important to note, however, that the regression was performed on a small sample size with a large outlier of \$0.40 USD and a

65% PET recollection rate. Most likely, this outlier skewed the data and the subsequent R^2 value.

Evaluating **Figure 10** and **Figure 12**, we again see a general positive correlation-- except this time between overall recollection rates and PET deposit-refund amounts. It is important to note that 9/10 of the DRSs have a deposit-refund amount of \$0.05 USD, yet overall PET recollection rates range from 61% to 97%. This evidence further causes us to suspect that the total variation in recollection rates cannot be explained solely by the variation in deposit-refund amounts. Furthermore, when examining **Figure 12** we see a R^2 of .233 or 23.3%. This means that the deposit-refund amounts (by exchange rates) explain 23.3% of the total variation in overall recollection rates. This is a significant difference from **Figure 11**'s R^2 of 2%. This discrepancy, however, must be taken with a consideration of the small sample size and large outliers of \$0.040 USD in **Figure 11** and \$0.10 USD in **Figure 12** which may disproportionately skew the data. To get a reliable R^2 , a large sample size would be the optimal situation. As sample size increases, error is reduced.

	PET Recollection Rate	PET Deposit-Refund Amount (Exchange Rate USD)	PET Deposit- Refund Amount (PPP USD)
USA-California	46%	\$0.05	\$0.05
USA-Iowa	60%	\$0.05	\$0.05
Austria	65%	\$0.40	\$0.40
USA-Oregon	68%	\$0.05	\$0.05
South Australia	74%	\$0.10	\$0.10
Sweden	84%	\$.11	\$0.06
Finland	92%	\$0.11	\$0.07
Germany	94%	\$0.17	\$0.11
Netherlands	95%	\$0.16	\$0.16

Figure 9: PET DRS Recollection Rates Compared to Deposit Exchange Rate and PPP Rate.

	Overall Collection Rate	PET Deposit Amount (Exchange Rate USD)
USA-California	61%	\$0.05
USA-Massachusetts	69%	\$0.05
USA-Connecticut	69%	\$0.05
USA-New York	70%	\$0.05
USA-Hawaii	72%	\$0.05
USA-Maine	84%	\$0.05
USA-Oregon	84%	\$0.05
USA-Iowa	93%	\$0.05
USA-Vermont	95%	\$0.05
USA-Michigan	97%	\$0.10

Figure 10: Overall DRS Recollection Rates Compared to Deposit Exchange Rate and PPP Rate.

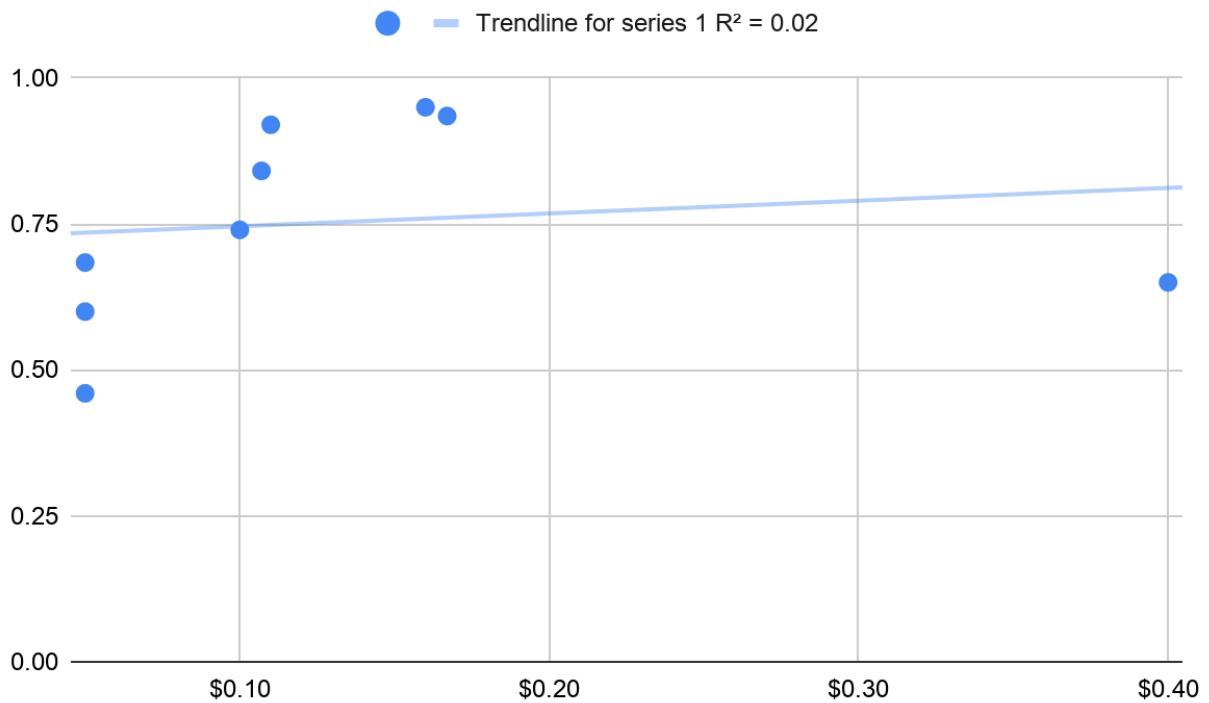


Figure 11: Regression of PET Deposit-Amount by PET Recollection Rate.

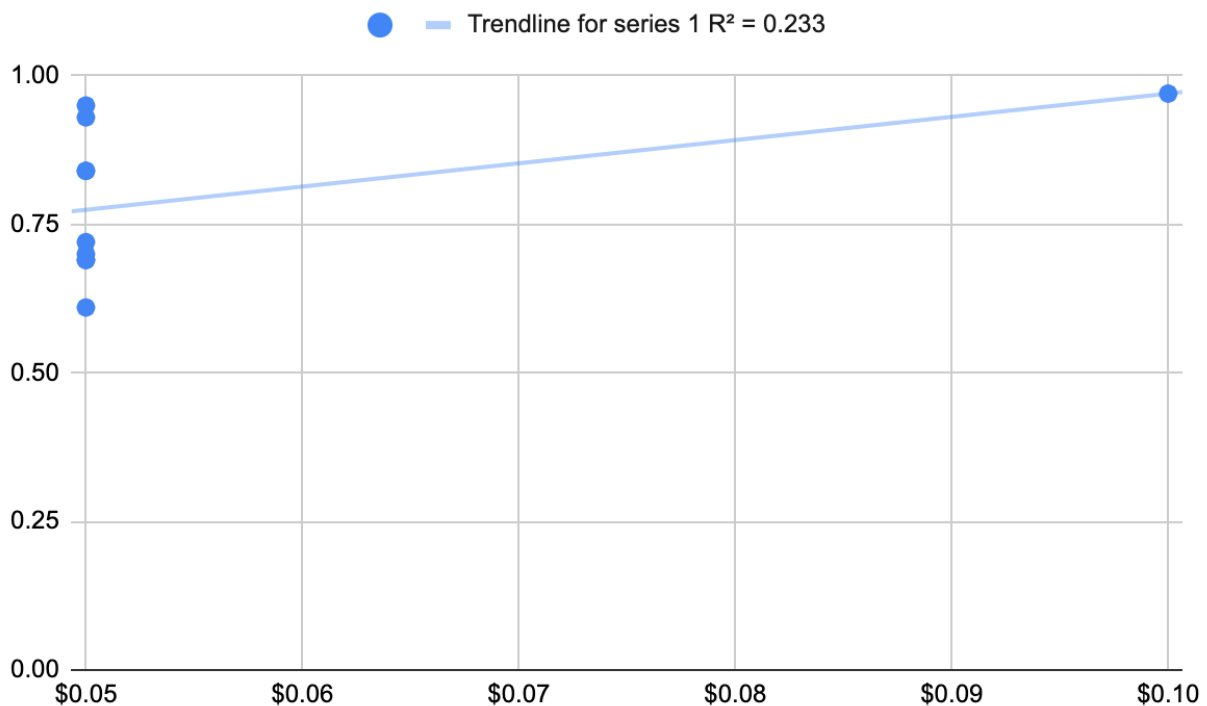


Figure 12: Regression of PET Deposit-Amount by Overall Recollection Rate.

Insights & Limitations

Although preliminary, this study fills an essential gap in knowledge concerning Deposit-Refund Systems around the world. Before this study, there existed few comprehensive analyses on the types of DRS strategies that are used and their effectiveness. Some studies that have, however, begun to analyze Deposit Refund Systems around the world include CM Consulting Inc. and Reloop Platform's *Deposit Systems for One-Way Beverage Containers: Global Overview* (<https://www.cmconsultinginc.com/wp-content/uploads/2017/05/BOOK-Deposit-Global-24May2017-for-Website.pdf>) and the Container Recycling Institute's *Bottle Bill Resource Guide* (<http://www.bottlebill.org>). Given the time constraints of this study there is undoubtedly more information to be found about Deposit-Refund Systems around the world. We hope, however, that this study can serve as a useful starting point for future researchers to start their own studies of Deposit-Refund Systems around the world. A particularly interesting point of research for future researchers is the correlation between recollection rates and deposit-refund amounts. Does a positive correlation truly exist between recollection rates and deposit-refund amounts? Or, is there another explanatory variable such as “institutions” or “government funding” that can better explain variation in recollection rates? It is also important to note that recollection rates and recycling rates in the study are not all from the same year. If interested in further exploring this topic, future researchers should focus on collecting data that is from the same year to better compare between countries and regions. Given the ever-increasing need to turn to a more circular economy, this research question is crucial for improving our rates of recollection and recycling.

Conclusion

This research study identified 47 PET Deposit-Return Systems in 28 countries and created an online database to summarize basic features and statistics of these systems. The results of this study created a database which provides a baseline of information for future academics to research and identify crucial policy components of successful PET plastic DRS programs.

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Appendix A: Country Total Population Data

REGION	POPULATION
Austria	8,999,768
Belgium	11,582,687
Alberta	4,345,737
British Columbia	5,020,302
New Brunswick	772,094
Newfoundland	523790
Northwest territory	44598
Novia Scotia	965382
Prince Edward Island	154748
Quebec	8,433,301
Saskatchewan	1168423
Yukon	40369
Beijing	20,462,610
Croatia	4,108,633
Cyprus	1,206,186
Czech Republic	10,706,686
Denmark	5,789,244
Estonia	1,326,586
Micronesia:	114,870
Finland	5,539,394
Germany	83753495
Hungary	9,663,972
Iceland	340,937
Kiribati	119,449
Latvia	1,889,054

Lithuania	2,727,236
Mexico	128,743,237
Netherlands	17,129,517
Norway	5,414,968
Poland	37,853,445
Slovakia	5,459,336
South Africa	59,203,936
South Australia	1,756,00
Sweden	10,090,442
Switzerland	8,645,493
United Kingdom-Scotland	5,115,000
USA-California	39,937,489
USA-Connecticut	3,563,077
USA-Delaware	982,895
USA-Hawaii	1,412,687
USA-Iowa	3,179,849
USA-Maine	1,345,790
USA-Massachusetts	6,976,597
USA-Michigan	10,045,029
USA-New York	19,440,469
USA-Oregon	4,301,089
USA-Vermont	628,061
Total Population	559,267,95

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Appendix B: Google Sheets Raw Data

Region	Latitude	Longitude
Austria	47.58844	14.140211
Belgium	50.648964	4.6415024
Canada-Alberta	53.981934	-116.58691
Canada-British Columbia	54.561863	-125.10406
Canada-New Brunswick	46.502296	-66.19042
Canada-Newfoundland	48.724693	-56.064953
Canada-Northwest Territory	67.27512	-118.86356
Canada-Novia Scotia	45.598152	-62.367657
Canada-Prince Edward Island	46.252666	-62.997833
Canada-Quebec	53.212738	-72.452095
Canada-Saskatchewan	54.418583	-105.88885
Canada-Yukon	63.62751	-135.50845
China--Beijing	36.553085	103.97543
Croatia	45.444305	15.734504
Cyprus	35.11474	33.486717
Czech Republic	49.739105	15.331501
Denmark	56.10176	9.555907
Estonia	58.693745	25.241625
Federated States of Mirconesia	6.869349	158.18726
Finland	64.28858	25.989403
Germany	51.1657	10.4515
Hungary	47.165733	19.416574
Iceland	64.928566	-18.9617
Kiribati	1.8709185	-157.3626011
Latvia	56.86873	24.840244
Lithuania	55.33872	23.870924
Mexico	23.909094	-102.6334
Netherlands	52.34226	5.528157

[illegible]

large	waste-basket	#E15B6C
large	waste-basket	#E15B6C
large	waste-basket	#E15B6C
large	waste-basket	#E15B6C
large	waste-basket	#E15B6C
large	waste-basket	#E15B6C
large	waste-basket	#E15B6C
large	waste-basket	#E15B6C

Features
Voluntary deposit-refund on beverage packaging (European Parliament, 2011)
Containers taxed \$0.52 per liter unless they have deposit (Hogg et al., 2010); An eco-tax of 0.1 €/l on one-way and reusable beverage packaging is charged. This was intended to be refundable on return, however, the return scheme was not installed. (European Parliament, 2011)
All containers sold in Alberta (including imports) must be registered through the Beverage Container Management Board (BCMB). (Hogg et al., 2010)
All containers must be refillable, and none collected can be landfilled or incinerated. Beer separate system, though still under legislation (Hogg et al., 2010)
89 depots around the province. Deposits paid on all containers (beer milk), but whilst full paid back on refillables, only half paid back on non-refillables. (Hogg et al., 2010)
"Green depots" run as businesses. Half-back system, with manufacturers prohibited from selling containers other than recyclable or refillable for selected products. Beer operated separately, run by brewers. Only have to refund when customer buying (1 for 1), otherwise negotiable. (Hogg et al., 2010)
18 government depots or 26 community depots. Deposit-return system, with additional handling charges for different products/ materials in container. (Hogg et al., 2010)
83 depots. Half-back deposit system. Full refund on refillables, half on non-refillables. (Hogg et al., 2010)
Non-refillable drinks containers for beer or soft drinks banned since 1977. Wine may have half-back system in place. Retailer, supermarket, convenience stores, 15 depots (Hogg et al., 2010)
Return-to-retail deposit system, with industry required to fund kerbside collection for containers not part of the system. (Hogg et al., 2010)
Deposit-return system plus environmental handling charge (EHC) for non-refillable containers, for recycling, and beer bottle deposit system for refillables (Hogg et al., 2010)
No kerbside collection. Deposit-return system, with 'recycling club' for children offering 'prizes' as well as refund if certain numbers reached. Refillables not charged recycling fund fee, all others are. (Hogg et al., 2010)
No systematic regulations and laws to standardize the industry and residents on how to recycle and dispose of the PET bottles. Informal system of collectors. Until 2017, the Incom Recycle, a company working on the DRS of recyclable PET bottles, has installed 5000 waste-buying depots in Beijing. (Kou, 2019)
Deposit-return plus "incentive fee" to be paid by producer if 50% refill isn't met. 5% paid still, if target is met. (Hogg et al., 2010)
Deposit-return system for reusable containers, with legal provisions--the only voluntary deposit on beer glass bottle may end in future (European Parliament, 2011)
deposit-return system for reusable containers w/ legal provisions (European Parliament, 2011)

All beers and soft drinks must be sold in refillable bottles. Ecotax. (Hogg et al.,2010)
2 DRS Policies: 1) Reusable Containers—collection through the breweries for refilling. 2) One-way containers—collection through Dansk Retursystem A/S for recycling (European Parliament, 2011)
Deposit-return at retailers (Hogg et al.,2010); 60% recovery target for all beverage packaging, if recovery system not set up or if the target is not met excise duty levied on enterprises (European Parliament, 2011)
Deposit>Returns to Kosrae Island Resource Management Authority, KIRMA (Hogg et al., 2010)
Tax on beverage containers. Exemption from tax only if part of refillable deposit scheme (Hogg et al.,2010)
EUR 0.51 per litre for all drinks packaging not in registered deposit-refund system (Ettlinger, 2016)
The Finish industry "voluntarily" chose to implement a deposit system to avoid a packaging tax. (European Parliament, 2011)
Einwegpfand Deposit on one-way a standard amount, deposit on refillables manufacturer dependent, not legally specified, though tend to be similar (Hogg et al.,2010); Recycle and Waste Material Control Act of 2003 (Hsiao, 2006); reusable with legal provisions, one-way mandatory deposit (European Parliament, 2011)
Tax linked to market share quotas (Hogg et al.,2010)
Tax on non-refillable containers (Hogg et al.,2010)
Deposit-Return at Kaoki Mange Collection points Kaoki (Hogg et al., 2010)
Deposit-refund system on beverage packaging with legal provisions--reusable containers (European Parliament, 2011)
Deposit-refund system on beverage packaging with legal provisions--reusable containers (European Parliament, 2011)
Higher tax on non-refillable bottles and cans (Hogg et al., 2010); 2002 schemes following the European Green Dot principle have been partly implemented to place responsibility on the producer, mainly soft drink bottlers (Schwanse, 2011)
Voluntary deposit system (Hogg et al., 2010) ; Voluntary systems for glass, beer bottles, and large PET bottles (reusable and one-way). (European Parliament, 2011)
Deposit on containers and tax dependent on return rate. Refillables only exempt if 95% return rate is achieved. Retailers selling non- refillables, must also sell similar products in refillable (Hogg et al., 2010) ; Deposit-refund system on beverage packaging mandatory for one-way containers. The Norwegian system works in such a way that the excise tax decreases as the returns increases, meaning that for example 90 per cent returns for cans translates into a 90 per cent discount on the excise tax. (European Parliament, 2011)
Deposit-refund system on beverage packaging voluntary for reusable containers (European Parliament, 2011)
A mandatory deposit for both reusable and one-way beverage packaging. The deposit system up to now works satisfactorily only for glass beer packaging. (European Parliament, 2011)
Voluntary deposit return system, manufactuer driven not government (Hogg et al., 2010)
Container Deposit Legislation- deposit required on almost all drinks containers, with onus on manufacturer/ wholesaler to ensure convenient system in place for deposit of container/ refunds for customers. (Hogg et al., 2010)
Bottle Manufacturers & Importers: Pay deposit & administration fee to Returpack-PET or Swedish Breweries Association (one-way PET bottle). (Amano, 2004)
Bottle Manufacturers & Importers: Pay deposit & administration fee to Returpack-PET or Swedish Breweries Association (one-way PET bottle). (Amano, 2004)
Beverage Company: Pay deposit fee to manufacturers. (Amano, 2004)
Retailers: Pay deposit fee to beverage company. Provide reverse vending machines which recognize PET bottles by bar code. Small stores take bottles back manually via bags. Deposits reimbursed based on collected bottles. (Amano, 2004)
Consumer: Pay deposit to retailers at point of sale. After consumption, throw PET with household waste or take back to stores for reimbursed deposit. (Amano, 2004)
Law requires rate of 90% recycling of aluminum cans, or complete ban. Industry implemented deposit system to avoid this. (Hogg et al., 2010) 2 Types of Return Systems: 1) Refillable glass bottles. Handled by the breweries. 2) One-way metal cans and plastic bottles. Handled by Returnpack Svenska AB, Dela AB, PET-System AB. (European Parliament, 2011); Swedish beverage container deposit-refund system is obligatory and regulated by law. (Kuo, 2019)

Deposits required on all refillable drinks containers except cans, which have a voluntary tax of \$0.04 (Hogg et al., 2010)
Voluntary deposit-refund on reusable beverage packaging exists only in Scotland--voluntary for reusable containers (European Parliament, 2011)
11 statewide laws with container deposit-return systems (Wen, 2014)
3/11 statewide container deposit-return systems include PET water bottles: California, Hawaii, & Maine (Container Recycling Institute, 2013)
3 methods: curbside collection, buy-back recycling centers, bottle bills (Wen, 2014)
Redemption centers not retailers. California Beverage Container Recycling and Litter Reduction Act, Deposit-return system on non-refillable containers (Hogg et al., 2010)
Redemption center or retailers but only for brands/products they sell. Beverage Container Deposit and Redemption Law (Hogg et al., 2010)
Beverage Container Legislation (Hogg et al., 2010)
Redemption centers or retailers (if not within 2 miles of red. centre in highly populated areas, or if under 5,000 sq ft of retail space). (Hogg et al., 2011)
Redemption centers or retailers, who can refuse if they have an agreement with the former. Deposit containers banned from landfill in 1990. (Hogg et al., 2010)
Redemption centers or retailers, who can refuse if they have an agreement with the former. Deposit containers banned from landfill in 1990. (Hogg et al., 2010)
Any retail establishment that sells the container (Hogg et al., 2010)
Michigan Beverage Container Act. Deposit-return at retailers. (Hogg et al., 2010)
New York State Refillable Container Law; Deposit-return at redemption centers and retail stores (Hogg et al., 2010)
The Beverage Container Act, deposit-return to retail stores, only US deposit law with no handling fee (Hogg et al., 2010)
Beverage Container Law, deposit-return to retail stores and redemption centers (Hogg et al., 2010)

Deposit Amount	Containers Covered
US \$0.4 (Hogg et al., 2010)	PET Bottles w/ non-refillable excluded (Hogg et al., 2010)
\$0.12 < 50 cl deposit; \$0.24 > 50 cl deposit (Hogg et al., 2010)	Beer, soda, and soft drinks (Hogg et al., 2010)
\$0.05 < 1 L, \$0.20 > 1 L; Beer \$0.10 (Hogg et al., 2010)	All beverage containers regulatory except milk which is under a voluntary scheme. (Hogg et al., 2010)
Non-alcoholic: \$0.05 < 1 L, \$0.10 > 1 L; Alcoholic (not incl. beer): \$0.10 < 1 L; \$0.20 > 1 L; Beer: \$1.2 per dozen (Hogg et al., 2010)	All beverage containers except milk, soya milk, infant formulas, dietary or meal supplements, or other milk substitutes. (Hogg et al., 2010)
\$0.10 < 0.5 L, \$0.20 > 0.5 (Hogg et al., 2010)	All except milk (Hogg et al., 2010)
Non-alcoholic: US \$0.08 (\$0.04 back), Alcoholic (excluding beer): US \$0.20 (\$0.10 back) Beer: varies -full refund when same number of beer bought as empties returned. (Hogg et al., 2010)	Beverage containers smaller than 5 L, excluding milk, dietary supplements and medicine. (Hogg et al., 2010)
Wine or spirit: US \$0.25, Other: US \$0.10. Plus additional \$0.05-0.10 handling fee (Hogg et al., 2010)	All beverage containers except milk (Hogg et al., 2010)
Non-alcoholic: US \$0.10; Alc. refillable: \$0.10 < 1 L, \$0.20 > 1 L; Alc. non-refillable: < 0.5 L \$0.10, > 0.5 L \$0.20 (Hogg et al., 2010)	All beverage containers except milk (Hogg et al., 2010)
Non-al: < 0.5 L \$0.15, 0.5 - 1 L \$0.30, > 1 L \$0.70; Alcohol: \$1.20 per dozen, or .07 each (Hogg et al., 2010)	Soft drinks and alcoholic drinks. Wine may be included. (Hogg et al., 2010)

Soft drinks and beer cans: \$0.05 ; Beer bottles: \$0.10 ; Beer bottles and soft drinks: >450ml \$0.20 (Hogg et al., 2010)	All beer and soft drinks containers--not juice, water and iced tea (Hogg et al., 2010)
Deposits vary widely for diff. materials and sizes (Hogg et al., 2010)	All beverage containers apart from milk under voluntary system (Hogg et al., 2010)
D=deposit, R=refund. Liquor ref: D=\$0.10 R=\$0.10 ; Liquor non-refil: <0.5 L D=\$0.15 R=\$0.10, >0.5 L D=\$0.35 R=\$0.25 (Hogg et al., 2010)	All beverage containers except milk (Hogg et al., 2010)
	Glass, PET and metal containers for beer, soft drinks, water, wine, and spirits (Hogg et al., 2010)
€0.13 Cans, plastic and glass bottles <0.5 L; €0.20 0.5 L Plastic Bottles; €0.40 cans, plastic and glass bottles >0.5 L (Hogg et al., 2010)	Beer and soft drinks containers. Deposits on some wine and spirit bottles dependent on retailer. (Hogg et al., 2010)
1.0 kroon: Glass (refill and NRB), 0.5 kroon: Metal and PET < 0.5 L, 1 kroon: PET >0.5 L (Hogg et al., 2010)	Beer, low alcohol drinks, carbonated/non-carbonated soft drinks, water, juice, cider, and perry (Hogg et al., 2010)
US \$0.06, US \$0.05 back (Hogg et al., 2010)	aluminum cans, glass & plastic expected soon (Hogg et al., 2010)
EUR 0.10 for a plastic bottle of less than 0.35L, EUR 0.20 for a plastic bottle of 0.35L-1L, EUR 0.40 for a plastic bottle larger than 1L (Ettlinger, 2016)	refillable glass, PET bottles, one-way cans, & glass bottles (Ettlinger, 2016)
Standard One-way containers: €0.25 ≤1.5 L, €0.50 >1.5 L (Hogg et al., 2010); € 0.15 for reusable glass and plastic bottles for most soft drinks (usually up to 2 litres) (European Parliament, 2011)	One-way beer, water, soft drink, still drink. alcopop, and energy drinks. (European Parliament, 2011); Not containers for wine, fruit juice, or spirits (Hogg et al., 2010)
	Beer, low-alcohol drinks, wine, mineral water, carbonated and non-carbonated soft drinks (Hogg et al., 2010)
	Non-refillable glass, steel, aluminum, and plastic (Hogg et al., 2010)
US \$0.05, \$US 0.04 returned (Hogg et al., 2010)	Aluminum cans and PET drinks bottles (Hogg et al., 2010)
0.1 euro and the returnable size is from 0.1 to 0.3 litres (Kou, 2019)	Plastic and aluminum beverage bottles (Kou, 2019)
PET and glass: US \$0.16 <0.5 L, US \$0.72 > 0.5 L (Hogg et al., 2010)	Soft drinks and water in one-way or refillable glass and PET containers (Hogg et al., 2010)
US \$0.16 <0.5 L, US \$0.40 >0.5 L (Hogg et al., 2010); 0.13 € cans, glass and plastic bottles ≤ 0.5 litre, 0.33 € cans, glass and plastic bottles > 0.5 litre (European Parliament, 2011)	Most drinks containers. Excluding milk, vegetable juices, and water (Hogg et al., 2010)
0.13 € per one beverage packaging up to the volume of 2 L; 0.13 € per one beverage packaging up to the volume of 2 L; 40 € for other reusable beverage packaging. PET not considered reusable and 0 EUR for deposit rate. (European Parliament, 2011)	
Between 8-15% of product cost. 0.5-1% if wine/spirit. (Hogg et al., 2010)	Beer, soft drinks, some wine & spirits bottles (Hogg et al., 2010)
\$0.10 if refillable to retailer, \$0.05 if refillable to collection depot (Hogg et al., 2010)	Most included except wine (unless in plastic bottle), milk, pure fruit juice or flavoured milk >1 L (Hogg et al., 2010)

1 Swedish Krona (SEK)/0.10 € for PET bottles and aluminum cans and up to 1L (Amano, 2004) (Freitas, 2018)	one-way PET bottles, refillable PET bottles until 2007, one-way aluminum cans, and refillable glass bottles. (Tojo, 2016)
2 SEK/0.20 € for PET bottles over 1L (Freitas, 2018)	
4 SEK for refillable PET bottle (Amano, 2004); Has been discontinued (European Parliament, 2011)	
Ref. glass: \$0.16 <0.6 L, \$0.40 >0.6 L; Ref and one-way PET: \$0.40 >1.5 L (Hogg et al., 2010)	Currently all containers above certain weight. (Hogg et al., 2010)
See individual states.	See individual states.
Under 24 oz \$0.05, over 24oz \$0.10 (Hogg et al., 2010)	Non-refillable drinks containers: beer, spirits, carbonated, fruit drinks and some vegetable juices. Not milk. (Hogg et al., 2010)
\$0.05 (Hogg et al., 2010)	Beer, malt, soft drinks, and mineral water (Hogg et al., 2010)
\$0.05 (Hogg et al., 2010)	Non-aluminium beer, malt, carbonated, mineral water and soda water containers less than 2 quarts (approx. 1.9l L). (Hogg et al., 2010)
\$0.05 (Hogg et al., 2010)	All beverage containers excluding milk and dairy derived products, except tea and coffee or liquor containers. (Hogg et al., 2010)
Not less than \$0.05 (Hogg et al., 2010)	Beer, soft drinks, soda water, mineral water, wine, liquor and wine coolers. (Hogg et al., 2010)
Wine & Liquor: \$0.15 ; Other: \$0.05 (Hogg et al., 2010)	Beer, soft drink, wine, cooler, mineral water. Expanded to include wine, liquor, water and non-alcoholic drinks in 1989 (Hogg et al., 2010)
\$0.05 (Hogg et al., 2010)	Beer, soft drinks, and carbonated water (Hogg et al., 2010)
\$0.10 (Hogg et al., 2010)	Beer, soft drinks, carbonated and mineral water. Wine coolers and canned cocktails in 1988. (Hogg et al., 2010)
Minimum of \$0.05 (Hogg et al., 2010)	Beer and other malt drinks, carbonated soft drinks, wine coolers, mineral and soda waters. (Hogg et al., 2010)
Standardized refill bottles \$0.02; non-standardized and non-refillable \$0.05 (Hogg et al., 2010)	Beer, malt, carbonated soft drinks, mineral and soda water and as of 2009 water and flavoured water. Bottles and cans under 3L (Hogg et al., 2010)
Liquor above 50 ml: \$0.15; Other: \$0.05 (Hogg et al., 2010)	Beer, soft drinks, malt, soda and mineral water, mixed wine and liquor (added 1987). (Hogg et al., 2010)

PET Deposit Legislation	PET Consumed	PET Recollection Rate	PET Recycling Rate	State Agency
1992 (Hogg et al.,2010)		65% Collection Rate of all PET Bottles (Van Eygen, Laner, & Fellner 2018) 30% PET (Hogg et al.,2010)	21% PET reprocessed into new bottles (Van Eygen, Laner, & Fellner 2018)	
1993 (Hogg et al.,2010)				
1972 (Hogg et al., 2010)				
1970 (Hogg et al., 2010)				
1992, revised 1999 (Hogg et al., 2010)				
1997 (Hogg et al., 2010)				
2005 (Hogg et al., 2010)				

1977 ban, 1984 deposit (Hogg et al., 2010)		98% Soft Drink (Hogg et al., 2010)		
1973- Litter Control Regulations-- appears the deposit system introduced to this in 1998. (Hogg et al., 2010)		Overall 86% (Hogg et al., 2010)		
1998 (Hogg et al., 2010)		Refillable bottles 103% ; Non-refill. bottles 113% (?) ; Liquor containers <200ml 99%, 1L 90%, >1L 79% (includes refillables) (Hogg et al., 2010)		
	100,000 tons of PET plastic in 2012 (Wen, 2014)	Nearly 100% PET plastic (Kou, 2019); Incom Recycle report 55,000,000 PET bottles have been successfully collected and recycled (Kou, 2019)	Incom Recycle report 70% recycling rate of PET (Kou, 2019)	
2005 (Hogg et al., 2010)				
1989 and amended 1991 (Hogg et al., 2010)			overall one-way packaging 84% (European Parliament, 2011);	
2004 (Hogg et al., 2010)			over 90% PET (European Parliament, 2011)	Eesto Pandipakend LLC (EPP) (European Parliament, 2011)
1991, amended 2006 (Hogg et al., 2010)		20,000 cans per day (Hogg et al., 2010)		
1996: Deposit-Refund systems begins with government decree, PET introduced in 2008 (Ettlinger, 2016)		400 million bottles of PET, 96% can, 92% PET bottle, 88% glass bottle in 2018 (Kou, 2019); 92% bottles (European Parliament, 2011)	12700 metric tons of PET bottle bales in 2016 (Kou, 2019)	"Suomen Palautuspakkau s Oy (PALPA) is a non-profit organisation, owned and operated 50% by the beverage industry and 50% by the retail industry and funded by fees paid by participating producers and importers whose products are covered by the system." (Ettlinger 2016); PALPA responsible for cans and PET bottles, Ekopullo

				responsible for reusable glass and PET bottles (European Parliament, 2011); Alko responsible for reusable glass bottles, A-Pullo responsible for reusable glass bottles (Kuo, 2019)
2003 (Hogg et al., 2010)	590 10 ³ metric tons of total plastic in 2002 (Hsiao, 2006)	Quota Plastic 80% (Hogg et al., 2010); 93.5% PET Recollection Rate in 2011 (Welle, 2011); 98% Bottles (European Parliament, 2011)	99% Plastic Bottle Recycling Rate (Kou, 2019)	DPG (Deutsches Pfandsystem GmbH) a company formed in June 2005 by the trade and industry organizations. (European Parliament, 2011)
2005 (Hogg et al., 2010)				
2008 (Hogg et al., 2010)				
2004 (Hogg et al., 2010)				
			overall 74.3% recycling rate of beverage containers in 2016, raised to be 91.9% in 2017 (Kou, 2019)	Ministry of Environment organized non-profit organization USAD as the operator of DRS. It was built by three associations in Lithuania, representing brewers, trade enterprises and manufacturers. (Kou, 2019)

Management Plan for PET Packaging Waste est. 2002 (Shwanse, 2011)	annual consumption of 160 L per person of soft drinks (Schwanse, 2011)	25-30% PET bottles (Shwanse, 2011); 23.90% of ECOCE (Schwanse, 2011);	12.6% PET Recycling Rate in 2008 (Castro, 2011)	ECOCE A.C. is a private non-profit organization whose members represent 30 groups and approximately 60 soft drink, carbonated water, purified water, seasonings and food brands. By means of a trademark similar to the Green Dot, ECOCE distinguishes the PET bottles (and so the companies) participating in its nationwide recovery programme. (Schwanse, 2011)
1993 (Hogg et al., 2010)		99% PET (Hogg et al., 2010) ; For PET deposit bottles, a return rate of 95% is reported, compared to 66% of non-deposit PET bottles. (European Parliament, 2011)		
1994 (Hogg et al., 2010)		60% Wine/Spirits, 98% Beer, & 98% Soft Drinks (Hogg et al., 2010); 93% of all recyclable bottles and 80% of all drink cans in 2005 (European Parliament, 2005)		Norsk Resirk is the non-profit system founded 3 May 1999 and co-owned by various organisations in trade and industry that handles the

				depositing and recycling of one-way plastic bottles and beverage cans in Norway. (European Parliament, 2011)
2011 (European Parliament, 2011)				
Around 1948 (Hogg et al., 2010)				
1975 (integrated into Environment Protection Act in 1993) (Hogg et al., 2010)		74% PET (Hogg et al., 2010)		
0.1 euro and the returnable size is from 0.1 to 0.3 litres (Kou, 2019)	<p>160 million refillable PET bottles sold in 1991 (Amano, 2004)</p> <p>200 million one-way PET bottles sold in 1994 (Amano, 2004)</p> <p>2169 million beverage containers sold (Kou, 2019)</p> <p>22, 893 tons of non-refillable PET bottles sold in 2008 (Tojo, 2016)</p> <p>26,000 tons of PET bottles sold in 2016 (Freitas 2018)</p>	<p>21,300 tons of PET Bottles (Freitas, 2018)</p> <p>45% PET Closed-Loop Collection Rate (Haupt et al., 2017)</p> <p>31% PET Open-Loop Collection Rate (Haupt et al., 2017); 20,282 tonnes of PET Bottles, 84.1% in 2017 (Kou, 2019)</p>	<p>2004: 98% Recycling Rate of Refillable PET (Amano, 2004)</p> <p>2004: 79% Recycling Rate of One-way PET (Amano, 2004)</p> <p>2016: 82% Recycling Rate of PET Bottles (Freitas, 2018)</p> <p>2017: 84.1% Recycling Rate of PET Bottles, 20282 metric tons PET (Kou, 2019)</p> <p>26% Closed-Loop Recycling Rate of PET (Haupt et al., 2017)</p> <p>30% Open-Loop Recycling Rate of PET (Haupt et al., 2017)</p>	"Returpack-PET AB was formed to manage one-way PET bottle recycling system. It is an independent cooperation owned by a packaging industry REXAM, the Swedish Breweries Association, and trade organizations. The Swedish Breweries Association is responsible for the refillable PET bottle cycle system." (Amano, 2004); Delta AB and PET System AB (Kou, 2019)
1990 (Hogg et al., 2010)		<p>85% PET collection rate (Van Eygen, Laner, & Fellner 2018)</p> <p>45% Closed-loop PET in 2012, 31% open-loop in 2012 (Haupt et al., 2017)</p> <p>Refillable PET 70% (Hogg et al., 2010)</p>	<p>26% Reprocessed into new bottles (Van Eygen, Laner, & Fellner 2018)</p> <p>26% Closed-loop PET recycling in 2012, 30% open-loop recycling in 2012 (Haupt et al., 2017)</p>	
		37.2% PET recollection rate in 2011 (Welle, 2011)		

See individual states.	2427 of 1000 tons of PET in 2010 (Wen, 2014)	26% in 2008, 15-16% Overall PET Collection (Kuczenski, 2010) 29.1% country total in 2011 (Container Recycling Institute, 2013) 47.9% deposit states total in 2010 (Container Recycling Institute, 2013) 19.9% non-deposit states total in 2010 (Container Recycling Institute, 2013) 28.2% in 2011; 655.000 t of post-consumer PET bottles is recollected in 2009 (Welle, 2011)	29.1% PET Recycling in 2010 (Wen, 2014); 27% PET Recycling Rate in 2007 (Castro,2011), 30.1% in 2015 (Kou, 2019), 28.4% in 2016 (Kou, 2016)	
1987. Expanded 2000 to include all non- carbonated and non- alcoholic drinks excluding milk.(Hogg et al., 2010)		PET 46% HDPE 51%, Overall 61% (Hogg et al. 2010)		
1980 (Hogg et al., 2010)		Estimated total recycling rate to be similar to Massachuset of of 69% (Hogg et al., 2010)		
1982 Wholesale, 1983 Retail (Hogg et al., 2010)				
2002 (Hogg et. al, 2010)		total 72% in 2008 (Hogg et al., 2010)		
1979 (Hogg et al., 2010)		total 93% (Hogg et al., 2010)		
1798, revised 1989 (Hogg et al., 2010)				
1983 (Hogg et al., 2010)		total 69% (Hogg et al., 2010)		
1978, amended in 1988 (Hogg et al., 2010)		total 97% (Hogg et al., 2010)		
1983 (Hogg et al., 2010)		Overall 70% (Hogg et al., 2010)		
1972, amended 2009 (Hogg et al., 2010)		Overall 84% (Hogg et al., 2010)		
1973 (Hogg et al., 2010)		Overall 90-95% (Hogg et al., 2010)		

citation-1-title	citation-1-url	citation-2-title	citation-2-url
Hogg et al., 2010	http://www.bottlebill.org/assets/pdfs/campaigns/UK-CPRE-2010.pdf	(European Parliament, 2011)	https://www.euro parl.europa.eu/RegData/etudes/note/join/2011/457065/IPOL-AFET_NT(2011)457065_EN.pdf
(Hogg et al., 2010)	http://www.bottlebill.org/assets/pdfs/campaigns/UK-CPRE-2010.pdf	(European Parliament, 2011)	https://www.euro parl.europa.eu/RegData/etudes/note/join/2011/457065/IPOL-AFET_NT(2011)457065_EN.pdf

			te/join/2011/457065/IPOL-AFET_NT(2011)457065_EN.pdf
(Hogg et al., 2010)	http://www.bottlebill.org/assets/pdfs/campaigns/UK-CPRE-2010.pdf		
(Hogg et al., 2010)	http://www.bottlebill.org/assets/pdfs/campaigns/UK-CPRE-2010.pdf		
(Hogg et al., 2010)	http://www.bottlebill.org/assets/pdfs/campaigns/UK-CPRE-2010.pdf		
(Hogg et al., 2010)	http://www.bottlebill.org/assets/pdfs/campaigns/UK-CPRE-2010.pdf		
(Hogg et al., 2010)	http://www.bottlebill.org/assets/pdfs/campaigns/UK-CPRE-2010.pdf		
(Hogg et al., 2010)	http://www.bottlebill.org/assets/pdfs/campaigns/UK-CPRE-2010.pdf		
(Hogg et al., 2010)	http://www.bottlebill.org/assets/pdfs/campaigns/UK-CPRE-2010.pdf		
(Hogg et al., 2010)	http://www.bottlebill.org/assets/pdfs/campaigns/UK-CPRE-2010.pdf		
(Hogg et al., 2010)	http://www.bottlebill.org/assets/pdfs/campaigns/UK-CPRE-2010.pdf		
(Kou, 2019)	https://lutpub.lut.fi/bitstream/handle/10024/160227/Thesis%20Wei%20Kou_Final%20Version%20for%20Submission%2011.11.2019.pdf?sequence=1&isAllowed=y	(Wen, 2014)	https://www.sciencedirect.com/science/article/pii/S0956053X13003437
(Hogg et al., 2010)	http://www.bottlebill.org/assets/pdfs/campaigns/UK-CPRE-2010.pdf		
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Oregon Department of Environmental Quality	https://www.oregon.gov/deq/recycling/Pages/Bottle-Bill.aspx	(Hogg et al., 2010)	http://www.bottlebill.org/assets/pdfs/campaigns/UK-CPRE-2010.pdf
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